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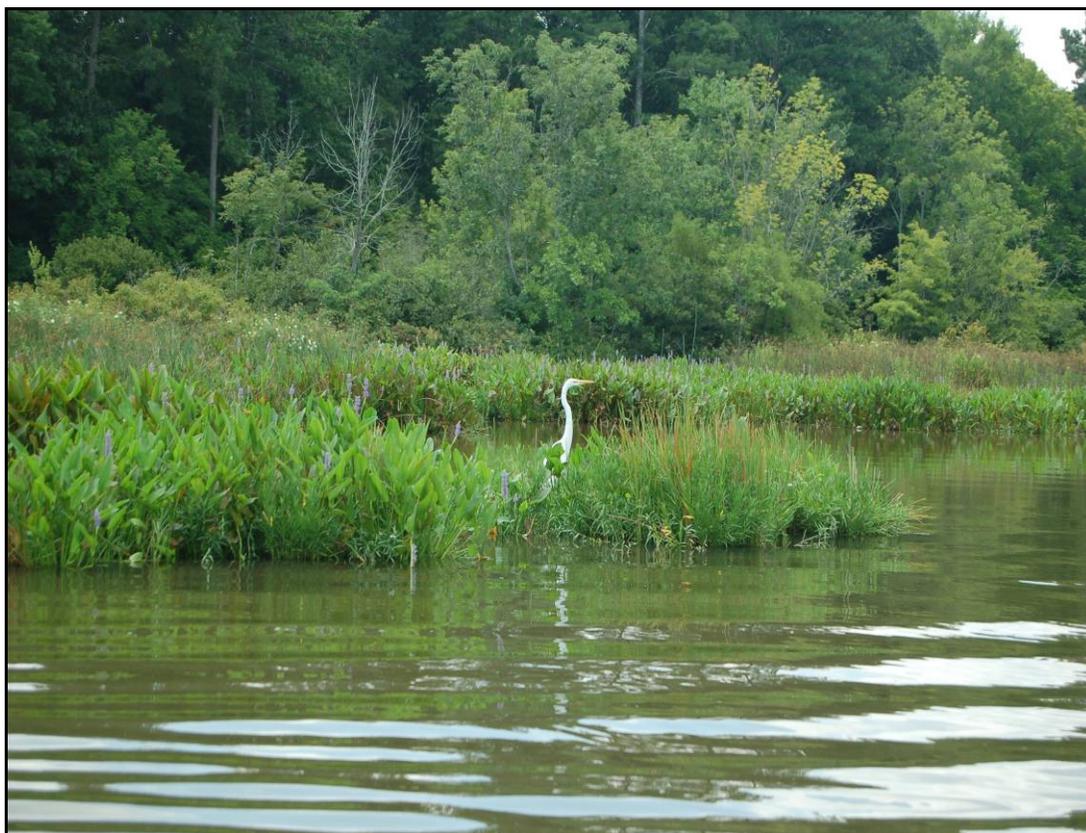
APPENDIX CD – 5

Duke Energy Progress  
Lake Tillery Shoreline  
Management Plan

# **Yadkin-Pee Dee Hydroelectric Project No. 2206**

## **Lake Tillery**

### **Shoreline Management Plan**



**Progress Energy Carolinas, Inc.**

**December 19, 2011**



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## ACRONYMS AND ABBREVIATIONS

ASM	Archaeological Sensitivity Model
CSA	Comprehensive Settlement Agreement
FERC	Federal Energy Regulatory Commission
GIS	geographic information system
Guidelines	Guidelines for the Use of Leased Properties at Lake Tillery
NAVD	North American Vertical Datum
NCDWQ	North Carolina Division of Water Quality
NCNHP	North Carolina Natural Heritage Program
NCWRC	North Carolina Wildlife Resources Commission
NRHP	National Register of Historic Places
PEC	Progress Energy Carolinas, Inc.
RTE	rare, threatened, and endangered
SHPO	State Historic Preservation Office
SMP	Shoreline Management Plan
USFWS	United States Fish and Wildlife Service



## EXECUTIVE SUMMARY

The Tillery Hydroelectric Development is located on the Yadkin-Pee Dee River in Stanly and Montgomery counties in south-central North Carolina. Lake Tillery is the hydroelectric development's reservoir and has almost 118 miles of shoreline. The Tillery Development is part of the Yadkin-Pee Dee Hydroelectric Project (FERC Project No. 2206) which also includes the downstream Blewett Falls Hydroelectric Development. The Yadkin-Pee Dee Hydroelectric Project is owned and operated by Progress Energy Carolinas, Inc. (PEC).

PEC manages the shoreline to accommodate the variety of uses that take place within the Lake Tillery project boundary. PEC actively manages shoreline activities at Lake Tillery through shoreline classifications, its lease<sup>1</sup> program, dock permitting program, and "*Guidelines for the Use of Leased Properties at Lake Tillery*" (Appendix A). PEC filed the initial Lake Tillery Shoreline Management Plan (SMP) in December 2001. On November 24, 2004, FERC issued an Order approving the SMP with certain modifications. The Order approved PEC's commitment to update the Lake Tillery SMP every 10 years. PEC is providing this update to comply with the 10-year review period. This Lake Tillery SMP fulfills PEC's commitment to review and update the SMP every 10 years.

PEC's goal for the Lake Tillery SMP to balance the protection and enhancement of the environmental, scenic, and recreational values provided by Lake Tillery and the surrounding project lands, while ensuring the continued safe and reliable production of hydroelectric power at the project. Specifically, this SMP provides a framework to assist in the protection of rare, threatened, or endangered species; wetlands; aquatic emergent vegetation; naturally vegetated buffers; and other important fish and wildlife habitats within the project boundary.

This SMP includes a description of project operations and license requirements, as they affect the management of the shoreline of the Lake Tillery. PEC has developed long-term management goals for the protection and development of its lands. PEC's goal in managing its lands and planning for the long-term use of its lands within the project boundary is to balance the competing interests that are vying for the resources offered by the Lake Tillery and its surrounding shoreline.

As part of this SMP update, PEC has classified all of the land within the project boundary according to allowable uses. The shoreline was first classified during development of the initial SMP using aerial photographs and on-site observations, as well as information about PEC leased lands. The shoreline classification system was reevaluated and the number of classifications was reduced from 10 to 3 categories. The purpose was to provide a more focused management approach while reducing confusion between the classifications for shoreline residents. The three classification categories are:

(1) **Integrated Use**—This classification acknowledges and accommodates the presence of existing uses and allows for potential future private, public and commercial uses. These

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<sup>1</sup> A lease is a written document by which the rights of use and occupancy of land and/or structures are transferred by the owner to another person or entity for a specified period of time in return for a specified rental.

shoreline areas have no known significant environmental/cultural resources or associated resource management goals that would preclude existing or future shoreline uses. However, some of these shoreline areas may have environmental attributes that require certain additional protection guidelines for permitting of shoreline structures to occur (i.e., Impact Minimization Zones).

(2) **Resource Protection and Management**—Shoreline areas designated for species protection and environmental purposes. This classification is to protect habitat, areas of cultural significance, physical character, and aesthetic attributes of particular shoreline areas. These areas may include wetlands, steep slopes, sensitive aquatic or terrestrial species or their habitat, and islands. This designation is also applied to the shoreline bordering Morrow Mountain State Park.

(3) **Project Works**—Shoreline areas that contain project infrastructure and have public access restrictions for safety, security, operational, or other constraints. This classification includes project facilities such as public recreation sites and other civil-related infrastructure (e.g., bridges, transmission or gas line rights-of-way). Project works includes shoreline areas reserved for uses associated with project operations or fulfillment of FERC license requirements.

PEC also reviewed the most current ecological data for evaluating shoreline classifications and protecting the aquatic and terrestrial wildlife present within the project boundary. PEC undertook a habitat mapping study during June through August 2011 to identify, map, and document locations for six different shoreline aquatic habitat types within the Lake Tillery project boundary. This study was essentially the same as the habitat mapping study conducted in summer 2000 for the initial filing of the Tillery SMP. PEC met with resource agencies on May 11, 2011, to discuss and receive comments in regard to the proposed study plan. It was agreed that repeating the study using similar methodology would allow a direct comparison in changes in shoreline aquatic habitat over the 10-year period between the two Tillery SMP filings. This information, along with PEC management review, was used to review and revise, if necessary, shoreline classifications for all undeveloped lands on Lake Tillery.

During the June through August period, PEC mapped 1,040 individual habitat units at Lake Tillery. Study results indicated some changes in shoreline habitat over the 10-year period depending upon the habitat type. Generally, the number and linear feet of most habitat types increased over the 10-year period. Water willow beds greater than or equal to 100 square feet (management guidelines cut-off size) comprised more than 89 percent of the total number of mapped beds and more than 99 percent of the total mapped acreage. Results of the study were used to re-classify some shoreline areas into the Resource Protection and Management classification (i.e., Environmental/Natural areas) or Impact Minimization Zone. However, the study results also indicated that no significant changes were necessary for current Environmental/Natural or Impact Minimization Zone shoreline classification areas with the updating of the 2011 SMP. The study results also indicated that the Guidelines used to guide shoreline permitting and development has been effective in protecting shoreline aquatic habitats in Lake Tillery over the past 10 years.

PEC also contacted the North Carolina Natural Heritage Program to determine the locations of any state and federally listed rare species, high quality natural communities, and

significant natural heritage areas that have been identified in the vicinity of the Lake Tillery Development. In addition, PEC also documented recreational usage for Lake Tillery and the opportunities for recreation and access that are located throughout the Lake Tillery Development, including commercial marinas, boat ramps, designated bank and pier fishing facilities, private recreation facilities, and Morrow Mountain State Park.

PEC determined the locations of known cultural sites within one-quarter mile of the Lake Tillery project boundary. There are 18 archaeological sites and 11 historic architectural sites documented. PEC developed an Archaeological Sensitivity Model (ASM) based on known archaeological resources within or in proximity to the project boundary as part of the FERC relicensing effort. The study was designed to assess the areas of low, moderate, or high archaeological sensitivity along the shoreline of Lake Tillery in Stanly and Montgomery counties. PEC retains the ASM information on file and monitors permit applications and construction to ensure that any potential impacts on archaeological resources are reviewed and addressed regarding any planned development or permits for construction within the project boundary. If a lease application is submitted that may affect archaeological resources, PEC will direct the applicant to the SHPO for further consultation. The applicant must seek concurrence from the SHPO on the measures needed to protect the site and provide a copy of the concurrence to PEC. PEC shall file for Commission approval any lease application submitted to it that affects cultural resources for which concurrence has not been obtained.

PEC's lake service's personnel routinely monitor the Lake Tillery shoreline. Included in this monitoring schedule are quarterly compliance inspections of the lake shoreline and permitted facilities. These periodic inspections are performed to ensure compliance by all leaseholders as well as compliance of permitted construction activities as specified in the "*Guidelines for the Use of Leased Properties at Lake Tillery*." Additionally, these inspections provide a means to discover any encroachments within the Lake Tillery project boundary. The PEC lease program provides for reasonable and responsible development of project lands.

PEC meets with resource agencies and local county officials, as necessary, to discuss any shoreline management issues that may arise at Lake Tillery. PEC's Lake Services team addresses issues that may arise regarding shoreline management of Lake Tillery. PEC also has the opportunity to review any of the comments that are received regarding development that requires a United States Army Corps of Engineers Section 404 permit. PEC educates many of the leaseholders on the Lake Tillery SMP through the publication of informational articles in its annual newsletter. PEC solicits the U.S. Fish and Wildlife Service and the North Carolina Wildlife Resources Commission for relevant information to include in the newsletter. The newsletter is posted on the Company's website at <https://www.progress-energy.com/commitment/community/real-estate/shoreline-management/tillery.page>.



## 1.0 INTRODUCTION

This Shoreline Management Plan (SMP) for Lake Tillery contains specific information addressing Federal Energy Regulatory Commission (FERC) requirements for SMP content. Section 1 provides background information on the regional setting, project operations, history, and purpose and goals of the SMP. Section 2 describes the existing resource conditions of Lake Tillery and the surrounding environment, including water quality; aquatic resources; terrestrial resources; rare, threatened, and endangered (RTE) species; recreation; and cultural resources. Section 3 describes the shoreline habitat assessment, land use classifications, and shoreline management guidelines. Section 4 describes efforts to consult with appropriate stakeholders including resource agencies, property owners, and the public, and Section 5 contains monitoring and enforcement measures for the SMP. Provisions for providing information and education to property owners and the public are described in Section 6. The proposed SMP review and update process is contained in Section 7. Section 8 contains references cited.

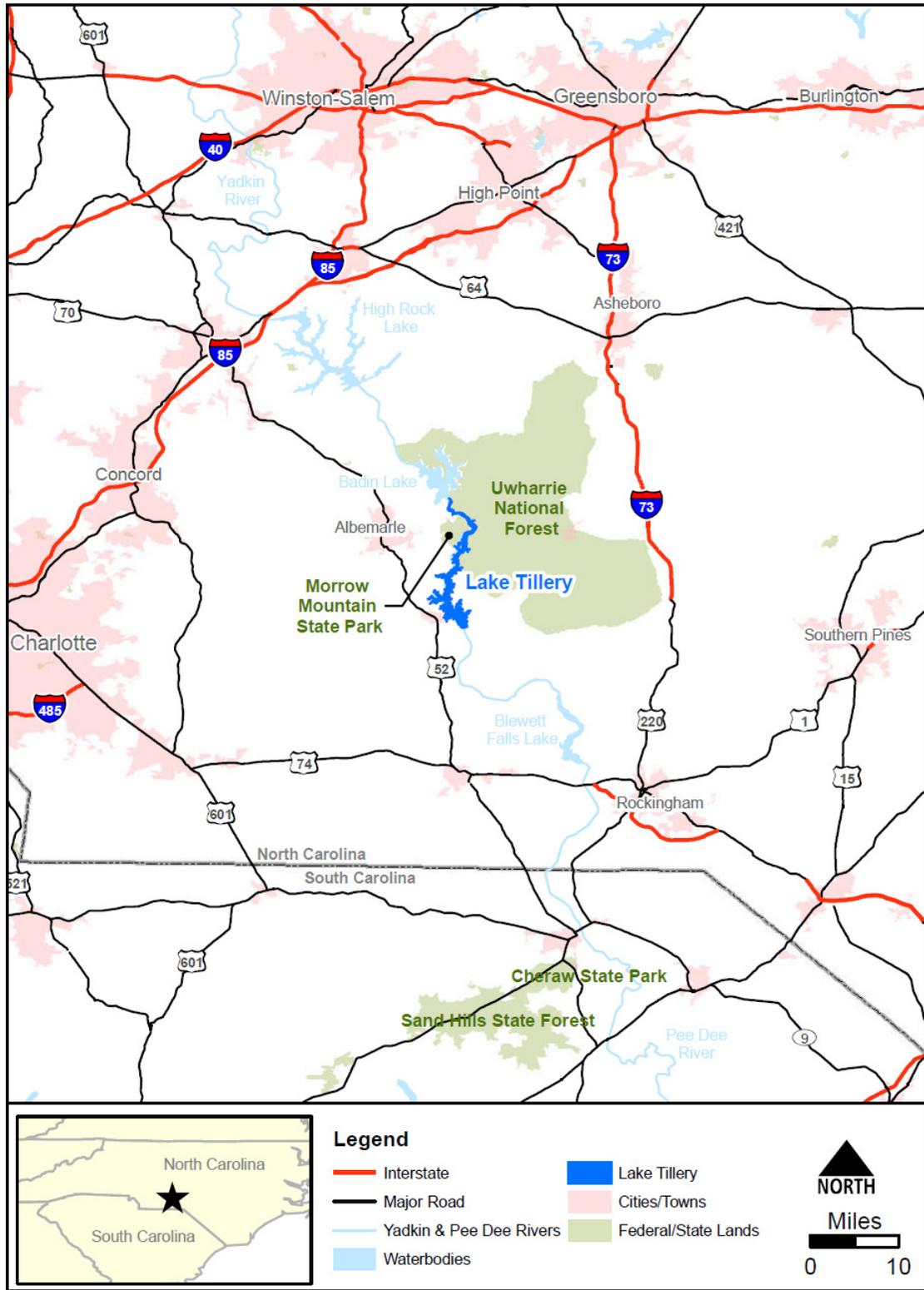
### 1.1 Project Area Description

The Tillery Hydroelectric Development is located on the Yadkin-Pee Dee River in Stanly and Montgomery counties in south-central North Carolina (Figure 1). The Tillery Development is part of the Yadkin-Pee Dee Hydroelectric Project (FERC Project No. 2206), which also includes the downstream Blewett Falls Hydroelectric Development. The Yadkin-Pee Dee Hydroelectric Project is owned and operated Progress Energy Carolinas, Inc. (PEC). The primary purpose of the project is to provide peaking and load-following generation, and total generating capacity of the hydroelectric plant is 86 megawatts. The Tillery Development began operation in 1928 and is located at about mile 218 on the Pee Dee River in the Piedmont region of North Carolina. Lake Tillery is the hydroelectric development's reservoir, and it has a normal pool elevation of 277.3<sup>2</sup> feet above mean sea level.

The Yadkin-Pee River Basin is the second largest river basin in North Carolina covering 7,213 square miles as measured at the North Carolina-South Carolina state line (NCDWQ, 2008). The Yadkin-Pee Dee River originates near the town of Blowing Rock and flows northeasterly for about 100 miles from the Blue Ridge Mountains into the Piedmont physiographical region. As the river turns southeast, it enters an area in central North Carolina that has experienced considerable urban growth. This growing urban area extends from Charlotte to Raleigh/Durham and is known as the Piedmont Crescent (Appalachian State University, 1999). Just to the south of the Piedmont Crescent, the region enters an area known as the Uwharrie Lakes Region. This region is named for the chain of six hydroelectric reservoirs located along this reach of the Yadkin-Pee Dee River, two of which are Lake Tillery and Blewett Falls Lake. It is in this region that the Uwharrie River joins the Yadkin River at the upper end of Lake Tillery to form the Pee Dee River.

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<sup>2</sup> North American Vertical Datum (NAVD) 88 datum. Unless otherwise noted, all data are NAVD 88 datum. The NAVD 88 datum is 0.9 foot lower than the 1929 National Geodetic Vertical Datum (NAD 29).



**Figure 1. Yadkin-Pee Dee River Project, Lake Tillery Development.**

Lake Tillery extends approximately 15 miles upstream to the tailrace of the Falls Project powerhouse. The lake has 117.8 miles of shoreline and a surface area of about 5,697 acres (PEC, 2006a). Islands comprise 41 acres in the lake.

## **1.2 Project Operations and License Requirements**

The FERC license issued for the Yadkin-Pee Dee River Project, which includes the Lake Tillery Development, allows PEC to draw down the lake up to 22 feet. PEC currently operates Lake Tillery within a 4 foot range under “normal” circumstances and the vast majority of the time operates within a 2 foot range. Fluctuation of lake levels beyond 4 feet is considered atypical. However, there are situations in which it becomes necessary to draw down lake levels beyond this range. These situations are generally dependent upon inflow from the upstream Falls Lake. Such events are infrequent and occur only when absolutely necessary for the operation or maintenance of the hydroelectric development. The fluctuation of the reservoir under “normal” circumstances does not cause large-scale impacts and is not considered to have an effect on adjoining shoreline property.

PEC has an agreement with the North Carolina Wildlife Resources Commission (NCWRC) to hold the elevation of Lake Tillery as constant as practicable during the largemouth bass spawning season (April 15-May 15). Additional efforts are made by PEC staff during this period to keep the reservoir operating within 1 foot.

FERC Order dated November 16, 2001 amended the license to include the FERC’s Standard Land Use Article as license Article 27.

There are no other items in the project operations, original license, or amendments that affect management of the shoreline. It should be noted that PEC has proposed new operating lake levels, recreational enhancements, and cultural resource management for Lake Tillery in the next license term; these are outlined in the Comprehensive Settlement Agreement (CSA) (PEC, 2007); the FERC final environmental impact statement license recommendations (FERC, 2008); and the FERC Programmatic Agreement for cultural resources (FERC, 2009). Any changes to lake levels, recreational areas, and cultural resources would be made upon the terms and conditions of the CSA stipulations and the new license, once issued by FERC.

## **1.3 Purpose and Goals**

The purpose of the Lake Tillery SMP update is to:

- update the existing Lake Tillery SMP, initially filed with FERC on December 28, 2001, and subsequently approved in the FERC’s Order Modifying and Approving Shoreline Management Plan (issued November 24, 2004);
- describe and update PEC’s shoreline management planning process including the *Guidelines for the Use of Leased Properties at Lake Tillery* (the *Guidelines*, Appendix A); and
- document the stakeholder consultation process for updating the SMP.

PEC's goal in managing its lands and planning for the long-term use of its lands within the project boundary<sup>3</sup> is to balance the competing interests that are vying for the resources offered by the Tillery Hydroelectric Development and the Lake Tillery shoreline. Within the context of the primary function to provide clean, renewable hydroelectric power, PEC manages these lands to serve the greater public interest, providing for recreational access, development of residential and commercial areas, preservation of important wildlife habitat, production of power needs, protection of cultural resources contained within the project boundary, and consideration of the aesthetic resources of the Tillery Hydroelectric Development. This balance is maintained through the provisions of the SMP, enforcement of PEC's *Guidelines*, consultation with interested parties, and the continued work of PEC to identify areas in need of resource protection within the project boundary.

The specific goal in regard to the development of this SMP is to provide a mechanism to assist in the protection and enhancement of the environmental, scenic, recreational, and cultural resource values provided by Lake Tillery and the project lands, while ensuring the continued safe and reliable production of hydroelectric power at the Tillery Development. Specifically, this SMP will assist in the protection of rare, threatened, and endangered species, wetlands, aquatic emergent vegetation, naturally vegetated buffers, and other important fish and wildlife habitats within the project boundary.

#### **1.4 History of the Shoreline Management Plan**

PEC manages the shoreline to accommodate the variety of uses that take place within the Lake Tillery project boundary. Through its lease program, dock and other structures permitting program, and *Guidelines*, PEC has actively managed shoreline activities at Lake Tillery since 2001.

The initial Lake Tillery SMP was filed with FERC on December 28, 2001, in accordance with an Order issued by the FERC Division of Licensing and Compliance on September 20, 1999 (CP&L, 2001). FERC completed its environmental assessment of the filed SMP and issued an Order Modifying and Approving the SMP on November 24, 2004 (FERC, 2004). In Section 7.0 of the approved SMP, PEC, then known as Carolina Power & Light Company, proposed to update the Tillery SMP every 10 years.

This SMP fulfills the commitment by PEC to update the SMP every 10 years (as dated from the initial PEC SMP filing on December 28, 2001). This updated SMP includes:

- (1) a detailed description of the types and locations of existing land and water uses, fish and wildlife resources, and significant features or resources within the Tillery Development project boundary;
- (2) description of existing project operations and license requirements that relate to the management of Lake Tillery including adjoining shoreline property;
- (3) a description of the licensee's efforts to obtain input from resource agencies, property owners, and the public on the development of the proposed shoreline

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<sup>3</sup>The perimeter of the Licensee's property at Lake Tillery as shown in its license with the Federal Energy Regulatory Commission.

- management plan;
- (4) a description of long-term management goals established for shoreline property and associated project resources;
  - (5) a description of measures and general guidelines to be implemented at Lake Tillery to achieve stated management goals, such as land use classifications, identification of permitted and prohibited shoreline uses, general development standards, and specific measures to protect environmentally sensitive areas;
  - (6) a description of monitoring and enforcement measures to be implemented at the Lake Tillery Development to ensure effective implementation of the SMP;
  - (7) provisions to periodically review and update the SMP, including periodic consultation with resource agencies and other interested parties; and
  - (8) provisions to provide information and education to property owners and the public of the goals and requirements of the SMP.

## **2.0 DESCRIPTION OF NATURAL RESOURCES**

### **2.1 Water Quality**

Lake Tillery is a warmwater, moderately productive reservoir, with moderate amounts of nutrients and ions (PEC, 2006a). The North Carolina Division of Water Quality (NCDWQ) has characterized Lake Tillery as mesotrophic in biological productivity according to a 1999 water quality assessment (NCDWQ, 2000). The lake's waters have a weak buffering capacity due to the low to moderate anion and cation concentrations. The short hydraulic retention time of Lake Tillery Reservoir (average of 8.3 days at normal maximum operating pool elevation based on 1983 to 2000 inflow data [PEC, 2006b]), coupled with the "filtering effect" of the four upstream hydroelectric reservoirs (i.e., High Rock Lake, Tuckertown Reservoir, Narrows Reservoir, and Falls Lake), influences the nutrient and solids concentrations, turbidity values, and the trophic status of the reservoir. Water clarity of the lake is periodically influenced by precipitation-related events associated with tributary input and upstream contributions of sediment from the Yadkin River (PEC, 2006b). NCDWQ also classified the lake as "fully supporting" its designated primary uses of recreation, swimming, and water supply (NCDWQ, 2010). Lake waters are currently classified as WS-IV, B CA by NCDWQ (NCDWQ, 2011), which is suitable for drinking water supplies and other consumptive uses and primary and secondary recreation. Since NCDWQ classified the lake as a WS-IV reservoir, land extending ½ mile from the edge of the normal lake elevation is further classified as a Critical Area which has more stringent allowable development activities than the rest of the watershed. Lake Tillery currently provides drinking water supplies for Montgomery County and the city of Norwood.

### **2.2 Aquatic Resources**

PEC characterized the fish community of the lake during the 2000-2002 period as part of the relicensing activities (PEC, 2006a) and NCWRC conducted ongoing fishery management assessments during the 2006 to 2008 period (Dorsey, 2008; Thompson 2009a, 2009b). The lake currently supports a healthy sport fishery consisting of largemouth bass, striped bass, black crappie, white bass, white perch, channel catfish, and blue catfish, and several panfish species (*Lepomis* species or bream). Fishery assessments conducted by PEC in 2000-2002 showed the

lake to be dominated by bluegill, other sunfish species, largemouth bass, white perch, yellow perch, threadfin shad, gizzard shad, white catfish, and channel catfish. The total fish weight or biomass per surface area was comparable to other warmwater southeastern United States reservoirs.

NCWRC is responsible for managing the sport fishery in Lake Tillery and has periodically stocked several species of sport fish in the lake since the 1950s to enhance the sport fishery. Species that have been stocked in the lake and currently have viable populations are channel catfish, striped bass, white bass, bluegill, redear sunfish, and largemouth bass (PEC, 2006a). Prey species, threadfin shad and blueback herring have also been stocked in the Yadkin River Basin by NCWRC. These two species have viable populations in Lake Tillery. NCWRC has maintained a striped bass fingerling stocking program at the lake since the mid-1970s, and a put-and-take sport fishery for this species has developed in the lake.

Fishery assessments were conducted by NCWRC for populations of striped bass and largemouth bass in Lake Tillery during 2006 (Dorsey, 2008; Thompson, 2009a), and crappie during 2008 (Thompson, 2009b). In 2006, the striped bass population in Lake Tillery exhibited excellent body condition and fast growth by reaching the minimum size limit before age 2. Many ages were present in the sample, indicating that high mortality (fishing and natural) is not a concern. Growth rates remained high before leveling off after age 5. This scenario is typical for Yadkin-Pee Dee River reservoirs (Thompson, 2009a). The black crappie population of Lake Tillery had a high proportion of quality-size and larger fish that also had excellent growth rates based on the 2008 NCWRC survey. Black crappies reached the minimum size limit by age 2. Young-of-year recruitment seems to be variable in Lake Tillery, with a strong year-class produced every few years which is commonly observed in crappie populations. Lake Tillery continues to support a quality largemouth bass fishery. There is a balance of fish above and below the minimum size limit and growth is average in comparison to other Piedmont reservoirs. Mean relative weight values for largemouth bass were comparable to other Piedmont North Carolina reservoirs.

NCWRC has also installed and maintained artificial fish attractors at several sites within Lake Tillery to provide additional protective cover for fish and identified angling areas for public use.

### **2.3 Terrestrial Wildlife Resources**

Lake Tillery and adjacent riverine areas of the Yadkin-Pee Dee and Uwharrie rivers provide habitat for large numbers of avian fauna (e.g., neotropical songbirds, waterbirds, waterfowl, and shorebirds), as well as a diverse herpetile and mammalian community. This is due to the presence of several large contiguous tracts of forest land, wetlands, and other natural communities; the juxtaposition of several habitat types; and several high value wetland and terrestrial habitats. A detailed description of the terrestrial resources of Lake Tillery and project lands can be found in PEC's license application filed with FERC during April 2006 (PEC, 2006c) and the Yadkin-Pee Dee Project final environmental impact statement subsequently issued by FERC (FERC, 2008). Areas of highest wildlife diversity include the headwaters portion of Lake Tillery including the Morrow Mountain State Park area; Uwharrie River and

adjacent wetlands at the confluence with the Yadkin River in Lake Tillery; headwater portions of Jacobs Creek and Cedar Creek complex; and the Pee Dee River tailwaters below the Tillery Hydroelectric Plant.

Spring bird surveys in May 2004 showed 601 and 659 species, at the Uwharrie River/upper Lake Tillery and the Tillery Dam tailwaters habitat areas respectively (PEC, 2006c). The bird species diversity in these two areas were the greatest observed at all monitoring stations located in the Yadkin-Pee Dee Project. Surveys in spring 2011 reported the river between the town of Yadkin above High Rock Reservoir and Blewett Falls Lake now supports 11 occupied bald eagle territories that produced 17 chicks in 2011 (Watts, 2011). This reach now supports 19 great blue heron colonies that contained 1,096 pairs of great blue herons, 71 pairs of great egrets, and 85 pairs of double-crested cormorants (Watts, 2011). In addition to these breeding birds, the system supports large numbers of wintering double-crested cormorants, waterfowl, and a growing number of white pelicans.

During the 2011 survey, three great blue heron nesting colonies were located within Lake Tillery supporting 30 pairs of mating birds. These nesting colonies have appeared since the 2005 aerial survey and suggest expansion of the great blue heron population in the area. One small colony of two nesting pairs was located near Tater Top Mountain within Morrow Mountain State Park and outside the project boundary. This nesting area was visible from the lake. The shoreline adjacent to this nesting colony is classified as Resource Protection and Management and will not be developed. The second nesting colony was located in loblolly pines along the shoreline near the mouth of Mountain Creek and within the project boundary. The colony supported 18 mating pairs of great blue heron and is completely visible from the water. The third colony supported 8 nesting pairs and is completely visible from the water. This colony was located in loblolly pines along the east shoreline along a peninsula, near State Road 1111, and just downstream of the bald eagle nest.

In addition, a very large colony of 147 nesting pairs of great blue herons is located along the west shoreline of the Pee Dee River tailwater of the Tillery Hydroelectric Plant. Virtually all of these pairs were nesting in loblolly pines, and the colony appears to be completely visible and accessible from the water. This nesting area has been in existence at least since 2001 and has expanded from 80 nesting pairs to the current 147 nesting pairs. This area was classified as Resource Protection and Management, and this shoreline will not be developed.

## **2.4 Rare, Threatened and Endangered Species and Special Natural Communities**

In updating the SMP, PEC contacted the North Carolina Natural Heritage Program (NCNHP) regarding rare, threatened, and endangered (RTE) species and significant natural communities within the project boundary. NCNHP provided information about rare species, high quality natural communities, state park and recreation areas, and significant natural heritage areas in the vicinity of the project boundary. Information received from NCNHP in regard to the area within a 1-mile radius of the shoreline. For the purposes of this SMP, only the plant and animal species and habitats that occur within the project boundary are discussed.

## **Bald Eagle**

NCNHP has designated three areas of Lake Tillery as Bald Eagle (*Haliaeetus leucocephalus*) forage and nesting habitat (Appendix E). These areas are: (1) upper lake above the Uwharrie River confluence encompassing both shorelines including Morrow Mountain State Park lands; (2) mid-lake encompassing Morrow Mountain State Park to downstream of the Mountain Creek confluence; and (3) lower lake extending from Mountain Creek confluence to the downstream portion of the Pee Dee River. Active bald eagle nesting sites are located within each of these areas. The U.S. Fish & Wildlife Service (USFWS) removed the bald eagle from the federal list of threatened and endangered species on August 9, 2007. After nearly disappearing from most of the United States decades ago, the bald eagle is now flourishing across the nation and no longer needs the protection of the Endangered Species Act (ESA) (USFWS, 2011). However, the species has a threatened status under the North Carolina listing of protected species (NCNHP, 2010), and additional federal laws (i.e., Bald and Golden Eagle Protection Act and Migratory Bird Treaty Act) protect the species with emphasis during nesting periods.

In Lake Tillery, bald eagle populations continue to increase since 2005 indicating that suitable habitat conditions are present for population sustainability and expansion since the initial SMP filing in 2001 (Watts, 2005, 2011). Three active bald eagle territories were located with Lake Tillery during the 2011 breeding season. Collectively, these three nesting pairs of bald eagles produced seven chicks. Two active nests were located within the upper portion of the lake on Morrow Mountain State Park lands outside of the project boundary. The current and future land use of the adjacent lake shoreline area is classified as Resource Protection and Management, and this shoreline will not be developed. One active nest was located within the lower portion of the lake along the east shoreline within the project boundary, west of State Road 1111, and directly across the lake from the mouth of Jacobs Creek. This nest was close to adjacent development and within sight of a cul-de-sac and is surrounded by development that currently does not have any residences. Potential for disturbance is higher at this nesting site as compared to the two nesting sites along the Morrow Mountain State Park shoreline. PEC follows the USFWS National Bald Eagle Management Guidelines (USFWS, 2007) to protect perching and nesting areas within the project boundary.

## **Yadkin River Goldenrod**

Yadkin River goldenrod (*Solidago plumosa*) is a state-listed endangered species and a Candidate species for federal listing (listed on May 11, 2005) under ESA (NCNHP, 2010; USFWS, 2010). The Yadkin River goldenrod is only known to occur along the Yadkin River around rock outcrops along the shoreline and rocky shoals below the Narrows and Falls dams (APGI, 2006; FERC, 2008). USFWS indicates that the species may benefit from periodic scouring which would prevent the establishment of other species without simultaneously eliminating previously established plants. However, the species does not occur in frequently flooded habitats, and therefore appears intolerant of prolonged or frequent inundation (USFWS, 2010). PEC, in cooperation with personnel with NCNHP, conducted a Yadkin River goldenrod survey in the upper portion of Lake Tillery on August 30, 2011. This upper portion of the lake contains habitat (boulder outcrops) that is suitable for Yadkin River goldenrod inhabitation.

The survey found three separate clusters of Yadkin River goldenrod totaling 11 plants in this upper portion of the lake. The first location (Area 1) was a large boulder outcrop about 0.5 mile downstream of the Narrows Dam on the west shore of Morrow Mountain State Park. Five plants were located along fissures in the boulder outcrop. Most of the plants in this area were not in flower. The second location (Area 2) was approximately 250 feet downstream of the Narrows Dam. Four plants were located along the fissures of a large bedrock outcrop in the mid channel area of the Falls Dam tailwaters. Most of the plants in this area were in flower. The third location (Area 3) was located on a bedrock outcrop about 200 feet downstream of the Narrows Dam on the east shoreline. Two non flowering plants were located on the bedrock outcrop that connects the river channel to the east shoreline. The exact locations of these plant areas are not presented in a map in this SMP report due to the rare status of these plants and the sensitivity to protect the plants. Areas 1 and 2 are located within the Tillery Development project boundary while Area 3 is located outside of the project boundary.

PEC conducted previous surveys for Yadkin River goldenrod in this upper portion of Lake Tillery during 2002 and 2004 as part of relicensing studies (CP&L, 2002; PEC, 2003, 2006a). The relicensing surveys found a cluster of non-flowering plants in the same location as Area 1 described in the current survey. Plants at Areas 2 and 3 were not reported in the 2002 or 2004 surveys. The cluster of plants located in Area 1 was initially documented by the North Carolina Plant Conservation Program during 1998 (CP&L 2002). The largest known population of Yadkin River goldenrod exists in the upstream Falls Reservoir and tailwaters of the Narrows Hydroelectric Development (APGI, 2006; FERC, 2008; USFWS, 2010).

These plants are located in a Resource Protection and Management area that will not be subject to shoreline development or private lease permitting. Additionally, the plants are located in areas not subject to normal foot traffic from hikers using nearby Morrow Mountain State Park or the Uwharrie National Forest. Access by boat is also somewhat difficult so these plants remain generally isolated from public viewing or tampering. The location of these plants is outside the zone of influence by operations of the Tillery Hydroelectric Plant and not affected by project water level fluctuations (FERC, 2008). These plants are likely periodically exposed to high flow events from upstream water releases during high precipitation and river basin inflows.



**Figure 2. Yadkin River Goldenrod (in flower) located at Area 2 in Lake Tillery headwaters.**

### **Other Rare Animal and Plant Species and Unique Natural Communities**

Lake Tillery is home to a number of natural communities and rare plants and animals. NCNHP includes in its assessment of “rare” species, all species that are state and federally listed as endangered, threatened, species of concern, or candidates for listing. The NCNHP listing for Lake Tillery and adjacent project lands includes 11 animal species, 16 plant species, and 14 natural communities.

The farthest upstream portion of the reservoir contains three natural communities and several rare plant and animal species (Appendix E). This area falls within an undeveloped portion of the shoreline and is classified under Resource Protection and Management with the shoreline undeveloped. The natural communities present are Basic Oak-Hickory Forest, Dry Mesic Oak-Hickory Forest, and Piedmont Mafic Cliff. The headwaters of Dutch John Creek support a Mesic Mixed Hardwood Forest. The rare plants in this area are the Carolina thistle (*Cirsium carolinianum*) (candidate for state-listing); Little sneezeweed (*Helenium brevifolium*) (state-listed, endangered); Hedge-nettle (*Stachys* sp. 1); Piedmont indigo-bush (*Amorpha schwerinii*) (state-listed, significantly rare); Schweinitz’s sunflower (*Helianthus schweinitzii*) (state- and federally listed, endangered); and the Yadkin River goldenrod (*Solidago plumosa*) (state-listed, endangered, and federally listed, species of concern). Several rare mussels and fish inhabit this upper portion of Lake Tillery, including Eastern lampmussel (*Lampsilis radiata*), Eastern creekshell (*Villosa delumbis*), and Carolina redhorse (*Moxostoma* sp. 3). The four-toed salamander has been documented downstream in wetlands associated with the Uwharrie River confluence, and the Timber rattlesnake (*Crotalus horridus*) inhabits upland areas of Morrow Mountain State Park.

Portions of shoreline along the mid-section of the reservoir support Dry Mesic Oak-Hickory Forest, and Basic Oak-Hickory forest primarily associated with Morrow Mountain State Park (Appendix E). The headwaters portion of Mountain Creek supports Piedmont/Low Mountain Alluvial Forest. Portions of the shoreline that support these natural communities have also been classified under Resource Protection and Management.

Two other locations of rare plant species are known to exist along the Lake Tillery shorelines. The Piedmont indigo-bush is a state-listed significantly rare species that is found on the both sides of the reservoir, both north and south of the Highway 24/27 Bridge. This area is largely developed residential area (Integrated Use). The Georgia aster (*Aster georgianus*), a state-listed threatened species and federally listed species of special concern, is found on the east side just south of the Highway 24/27 Bridge, near the Swift Island boating access area.

## **2.5 Nonnative Aquatic Vegetation Management Efforts**

Hydrilla, a nonnative aquatic plant, was discovered in Lake Tillery during the summer of 2006. Hydrilla is listed as a federal noxious weed, and is considered to be a major aquatic weed throughout the world's warmer climates. The plant forms stems reaching up to 35 feet long and dense mats that surround lake shorelines. From its introduction to the United States through the aquarium trade in the early 1950s, the weed had spread by the 1990s to 21 states, including North Carolina and South Carolina. In North Carolina, hydrilla has been documented in the nearby Catawba-Wateree and Cape Fear river basin as well as other reservoirs throughout the state. Hydrilla is able to quickly dominate freshwater ecosystems mainly by regrowth of stem fragments, and also reproduces by growth of axillary buds (turions) and subterranean tubers, which can remain viable for more than four years. Hydrilla can tolerate a wide range of environmental conditions, including low light levels, high or low nutrient waters, and freezing temperatures. Some of the known impacts of heavy hydrilla infestations include clogging of water intake systems and disruption of recreational boating activities.

To control the spread of hydrilla, PEC has cooperatively worked with the North Carolina Division of Water Resources, NCWRC, North Carolina State University, U.S. Army Corps of Engineers, and Duke Energy. These cooperating partners have formed the Lake Tillery Hydrilla Management Team and developed a management plan to guide the hydrilla control efforts for Lake Tillery (NCDWR et al., 2011).

An integrated management plan of spot treatments with herbicide and stocking of sterile, triploid grass carp has been used to control hydrilla in Lake Tillery. Control efforts began in 2007 with herbicide treatments around the Swift Island boating access area and expanded to include stocking of sterile grass carp in 2009, 2010, and 2011 as well as continued herbicide spot treatments. Control measures have been effective in reducing the amount of hydrilla in the lake. Grass carp grazing has also reduced other native submersed aquatic vegetation, which was anticipated by the Hydrilla Management Team during decision-making discussions regarding the introduction of grass carp into the lake.

PEC plans to continue to coordinate hydrilla control efforts in Lake Tillery with the Hydrilla Management Team.

## **2.6 Recreation Resources**

There are a variety of recreational opportunities throughout the Lake Tillery development. In addition to formally designated sites, there are a number of informal, unmarked areas that offer opportunities for a rustic recreation experience. Formal facilities exist in the form of marinas, public boat ramps, designated bank fishing facilities, private recreation facilities, and a state park. Informal opportunities exist at unmarked sites throughout the project where wildlife observation and fishing occur as well as other areas used informally for water or shoreline access.

### **Commercial Marinas**

Four marinas are located on the Lake Tillery development: Ken's Landing, J & J Marina, Cook's Marina, and Jordan's Marina. Services provided by the marinas include boat storage, fuel sales, boat repair, general merchandise and boat and Jet Ski rentals. Two of the marinas, Cook's Marina and Jordan's Marina, are located near NCWRC public boat ramps. J & J Marina is currently not in operation, but project lands are still under lease.

### **Public Boat Ramps and Access Areas**

There are five public boat ramps on Lake Tillery, four of which are maintained by NCWRC on PEC lands that have been leased to them. Morrow Mountain State Park operates the fifth area, which is also on PEC lands that have been leased to the North Carolina Division of Parks & Recreation. The four boat ramps operated by NCWRC area are the Norwood access area, the Stony Mountain access area, the Swift Island access area, and the Lilly's Bridge access area. Morrow Mountain State Park operates and maintains the Morrow Mountain access area. PEC also maintains a canoe portage route from the west shoreline at the Tillery Dam downstream to the Pee Dee River. Public signage marks the portage trail.

### **Developed Fishing Areas**

The Lilly's Bridge fishing pier is located directly across from the Lilly's Bridge access area. The area encompasses the old State Road Bridge No. 26, which has been decommissioned to vehicular traffic with the installation of a new bridge in 2007. NCWRC maintains the area, and it is handicapped accessible. PEC also maintains a small tailwater fishing deck on the east shoreline just below the Tillery Hydroelectric Plant.

### **Private Recreation Facilities**

Several private recreation facilities are located at major subdivisions on Lake Tillery. These private facilities include areas at Woodrun, Holiday Shores, Sugar Loaf Shores, Carolina Forest, Bay Shore, Edge Water, The Cove, and Twin Harbor. Developers of these projects and, subsequently, the homeowner associations, operate and maintain recreation facilities including boat ramps, dock facilities, swimming/beach areas, and boat storage.

## **Morrow Mountain State Park**

Morrow Mountain State Park is located in Stanly County on the upper northwestern section of Lake Tillery. The park, which is the third oldest state park in North Carolina, was built in the Depression Era. The park boundary encompasses approximately 5,000 acres and offers a scenic overlook of Lake Tillery from the top of Morrow Mountain. Water-related recreation facilities at the park include a one-lane boat ramp, two docks, parking for about 35 vehicles, a public fishing pier, and boat and canoe rentals. Other recreation facilities at the park include primitive camping, cabins, a swimming pool, hiking and equestrian trails, picnic areas, a natural history museum, and an outdoor amphitheater.

## **Informal Recreation Areas**

Informal unmarked recreation areas are scattered around the lake on PEC lands within the project boundary. The major undesignated recreation areas associated with the Lake Tillery development project boundary include: the Tillery Dam tailrace and tailrace fishing platform; the PEC lands leased to NCWRC on the west side of the reservoir just above the dam; and the PEC lands on Cedar Creek Bay near the intersection of State Roads 1740 and 1745. The predominant activity at these sites is bank fishing.

## **Recreation Use Levels**

PEC monitors recreational use of Lake Tillery through the FERC Form 80 reporting process. This process involves a six-year cycle for reporting recreational use levels for all facilities within the project boundary. The most recent Form 80 was filed with FERC in March 2009 using existing data from the 2004/2005 recreational use assessment developed in conjunction with the relicensing effort (PEC, 2006a), adjusted and supplemented by additional data collected in 2008. In preparation for the 2009 Form 80 reporting, PEC documented recreation visitation for the period of May 2008 through September 2008. PEC estimated recreational use through updated recreational inventories at public access sites, aerial counts, and spot counts. Based on the 2009 Form 80 Recreation Report, total recreational use at Lake Tillery was estimated to be 49,190 recreation days, with a peak weekend average of 1,730 recreation days. FERC defines “recreational day” as each visit by a person to a development [lake] for recreational purposes during any portion of a 24-hour period.

The 2009 Form 80 report (PEC, 2009) concludes that recreational facilities have not reached the point of over-capacity. The 2009 report states: “None of the public access sites at Lake Tillery are within range of concern with respect to facility capacity.”

PEC cooperates with the NCWRC to consider recreation facility needs, and it has committed to working with the NCWRC and other stakeholders to make several recreational access improvements at Lake Tillery following issuance of the new FERC license (PEC, 2007). These future improvements include: (1) upgrading existing public boat access area facilities at Lilly’s Bridge, Swift Island, Stony Mountain, and Norwood; (2) funding of an Americans with Disabilities Act compliant public fishing pier at Stony Mountain access area; (3) funding a NCWRC enforcement facility at Stony Mountain access area; (4) constructing a new public boat

access at Clark's Creek on the Pee Dee River below the Tillery Hydroelectric Plant; and (5) funding NCWRC operations and maintenance activities for the Lake Tillery public boat access areas.

PEC will continue to monitor recreation usage on Lake Tillery and will work with NCWRC and local county officials on any issues that arise during the course of such monitoring. The next recreation study update is scheduled for 2014 in support of the Form 80 report due to be filed with FERC by April 2015.

## **2.7 Cultural Resources**

PEC reviewed cultural resources information filed with the State Historic Preservation Office (SHPO) and FERC as part of the relicensing process to determine the extent of the cultural resources found within 656 foot buffer (200 meters) of the shoreline of the Lake Tillery development (Stallings, 2006; Whitley, 2006). This area encompasses the Tillery project boundary. There were 18 archaeological sites and 11 historic architectural sites documented in the review (Stallings, 2006; Whitley, 2006). Due to the sensitive nature of these sites and their locations, the specifics of the sites will not be discussed here but are documented in reports completed as part of the project FERC hydro relicensing process (Stallings, 2006; Whitley, 2006).

The historic architectural sites identified by the SHPO records include Tillery (Norwood) Dam at the southern end of the impoundment, as well as Bridge No. 26 spanning Lake Tillery along State Road 1111 and the Swift Island Ferry Bridge at Highway 24/27. These sites are located completely or partially within the project boundary.

The Tillery Dam has been previously recorded as potentially eligible for the National Register of Historic Places (NRHP) by SHPO. The Tillery Development, completed in 1928, includes distinctive characteristics such as its dam, gated spillway, powerhouse, and Art Deco design features on the old Administrative Building and Tool Shed (Stallings, 2006). The Swift Island Bridge was constructed in 1927 as a replacement to a 1922 structure that required demolition due to impoundment of Lake Tillery. The bridge is a reinforced concrete rib-arched open spandrel bridge. Bridge No. 26 is an older bridge that was determined by the North Carolina Department of Transportation to be eligible for inclusion in the NRHP. The bridge has been replaced by a new bridge for vehicular traffic using State Road 1111. Currently, Bridge No. 26 serves as a fishing area for the public and is accessed from the Lilly's Bridge public access area.

There are also nine additional sites located within 0.5 mile of the project boundary. These architectural sites include the Gladys Russell House, J.R. Snuggs House, Randall House, Randall Slave Cabin, Randall Church Community, Simpson Chase House, Rosenwald (Old Colored) School, Ingram Mill Road, and Morrow Mountain State Park (Stallings, 2006). The Randle House and Randle Slave Cabin are the only two of these nine sites that have NRHP listed status. All nine properties are located outside of the project boundary and fall beyond any measureable effect of the Tillery Development.

Lake Tillery is adjacent to one of the largest quarries in eastern North America in the upper portion of the lake. A quarry is a location from which prehistoric groups excavated raw materials for making stone tools. The quarry complex contains archeological sites from the Middle Archaic phase of history (approximately 5,000–9,000 years before present). There are 80 archaeological sites associated with this quarry. The sites also correspond with the Morrow Mountain State Park and the Uwharrie National Forest. These sites are outside of the Tillery project boundary.

PEC developed an Archaeological Sensitivity Model (ASM) based on known archaeological resources within or in proximity to the project boundary as part of the FERC relicensing effort (Whitley, 2006). The study was designed to assess the areas of low, moderate, or high archaeological sensitivity along the shoreline of Lake Tillery in Stanly and Montgomery counties. The ASM provides a management tool for evaluating areas low, moderate, and high sensitivity of archaeological issues. Highly sensitive areas are considered to be the highest priority for intensive archaeological survey and/or protection. Moderately sensitive areas should be somewhat lower priority for survey and/or protection, while lower sensitivity areas should be very unlikely to produce intact or significant archaeological materials. PEC reviews the ASM to assess requested permitting activities that may disturb land within the project boundary as well as conferring with the SHPO, as necessary. The ASM has also been provided to the SHPO.

PEC retains the ASM information on file and monitors permit applications and construction to ensure that any potential impacts on archaeological resources are reviewed and addressed regarding any planned development or permits for construction within the project boundary. If a lease application is submitted that may affect archaeological resources, PEC will direct the applicant to the SHPO for further consultation. The applicant must seek concurrence from the SHPO on the measures needed to protect the site and provide a copy of the concurrence to PEC. PEC shall file for Commission approval any lease application submitted to it that affects cultural resources for which concurrence has not been obtained.

PEC will work with the SHPO and other stakeholders to develop informational articles regarding cultural resources, as necessary, for the annual Lake Tillery newsletter. The articles will be developed to educate and inform adjacent landowners as to the importance of protecting known archaeological sites and reporting any potential sites or artifacts that are discovered.

### **3.0 SHORELINE MANAGEMENT**

#### **3.1 Shoreline Habitat Assessment**

A shoreline aquatic habitat mapping study was conducted at Lake Tillery during June through August 2011 to assist in the updating of the SMP (Appendix B). The study plan was developed through consultation with resource agencies and confirmed during a meeting on May 11, 2011. The 2011 study was based on a similar study conducted in 2000 for filing the initial Tillery SMP (CP&L, 2001) with FERC. Similar study methods between the 2000 and 2011 surveys allowed a comparison of any shoreline aquatic habitat changes over time with one exception. Substrate classifications were not performed in 2011 because it was felt that substrate type would not substantially vary over the 10-year period between the studies.

Six habitat types, important to fish and wildlife were identified and mapped: (1) emergent-submerged wetlands aquatic vegetation, (2) water willow beds, (3) water willow-submerged timber/woody debris, (4) submerged timber-woody debris, (5) fringed wetlands, and (6) scrub-shrub habitat.

A total of 1,040 habitat type areas were mapped around the entire shoreline of Lake Tillery with water willow beds (86 percent of the total mapped habitat areas) the most frequently mapped habitat type. Water willow was the habitat type that comprised the greatest amount of linear feet of shoreline mapped followed by emergent/submerged wetlands, scrub-shrub, and submerged timber-woody debris areas.

Water willow beds were dispersed throughout the lake and commonly found along both developed and undeveloped shoreline areas. There were 896 water willow beds mapped throughout Lake Tillery with a total area of 1,119,143 ft<sup>2</sup> or approximately 26 acres. The number of water willow beds  $\geq$  100 ft<sup>2</sup> (shoreline management guidelines cut-off size) comprised 89.4 percent (801 water willow beds) of the 896 mapped beds. Water willow beds  $<$  100 ft<sup>2</sup> (95 beds) comprised 10.6 percent of the total mapped beds. By area, water willow beds  $\geq$  100 ft<sup>2</sup> comprised more than 99 percent of the total mapped bed acreage. The total area of water willow beds decreased slightly (11.1 percent) from 28.9 acres (1,259,535 ft<sup>2</sup>) during the 2000 aquatic habitat mapping study compared to 25.7 acres in the 2011 study. Water willow beds  $\geq$  100 ft<sup>2</sup> decreased about 3 acres from 2000 to 2011. However, the number of individual mapped beds  $\geq$  100 ft<sup>2</sup> increased from 502 beds mapped in the 2000 study to 801 beds mapped in the 2011 study.

Submerged timber-woody debris habitat areas were scattered throughout the lake shoreline with pockets of this habitat type primarily clustered in the upper portion of the lake on the Morrow Mountain State Park shoreline; in the middle reservoir area across from the Cedar Creek Complex arm of the lake; and in the lower lake adjacent to the Lower Richland Creek arm. This habitat type was associated with deep coves along undeveloped shoreline where trees had fallen into the water due to periodic high winds from storms.

Water willow-submerged timber/woody debris areas were also scattered throughout the lake, and areas of this habitat type were most often found in the back of undeveloped coves where wave action accumulated woody debris. Some areas of this habitat were also found along developed shoreline areas.

Scrub-shrub habitat was frequently encountered in the upper portion of the lake due to the number of islands just below Falls Dam and the peninsula associated with the emergent-submerged aquatic vegetation habitat located adjacent to the confluence with the Uwharrie River. This habitat type was also often associated with emergent-submerged aquatic vegetation habitat throughout the lake. Scrub-shrub peninsulas resulted from the formation of sediment deltas at the confluence of lake tributaries.

Fringed wetlands occurred infrequently throughout the lake along undeveloped shoreline, and patches of this habitat type were not concentrated in any particular area of the lake.

Emergent-submerged aquatic vegetation habitat areas were scattered throughout the lake and most commonly associated with undeveloped shoreline areas near the confluence of tributaries. These areas are considered important because of the diversity of wetlands habitat present in these areas and the associated positive habitat value for fish and wildlife habitat. Notable areas of this habitat type were near the confluence of the Uwharrie River with the lake; Dutch John Creek; Mountain Creek; Jacobs Creek; Cedar Creek Complex arm, Richmond Creek; and Lower Richland Creek (upstream of the Lilly's Bridge public boating access area).

A diverse assemblage of plant and wildlife species were observed in all mapped habitat types during the study. A total of 38 aquatic and riparian terrestrial plant taxa were observed for both water willow bed and water willow-woody debris habitat types; 39 plant taxa for the water submerged timber-woody debris habitat type; 40 plant taxa for the emergent-submerged aquatic vegetation habitat type; 41 for the fringed wetland habitat type; and 55 plant taxa for the scrub-shrub habitat type. Generally, the number of aquatic plant species was greater for wetland types of habitat—emergent-submerged aquatic vegetation habitat and fringed wetlands habitat. Scrub-shrub habitat areas had a greater number of terrestrial riparian vegetation taxa compared to aquatic vegetation taxa.

The number of all mapped habitat areas increased from 655 in 2001 to 1,040 in 2011 (Table 1). Most habitat types increased from 2000 to 2011. Water willow beds had the greatest increase going from 561 beds mapped in 2000 to 896 beds mapped in 2011. Submerged timber woody debris habitat areas increased from 8 to 42; fringed wetland habitat areas increased from 11 to 19; water willow-submerged timber/woody debris habitat areas increased from 35 to 42; emergent-submerged vegetation habitat areas increased from 15 to 16. The scrub shrub habitat type remained unchanged from 2000 to 2011 with 25 habitat areas mapped.

The linear amount of shoreline coverage by all habitat types increased from 188,868 feet mapped in 2000 to 190,284 feet in 2011 (Table 1). Submerged timber-woody debris linear shoreline coverage increased by 70.2 percent; fringed wetland coverage increased by 44.1 percent; and scrub shrub coverage increased by 17.3 percent. Water willow-submerged timber/woody debris coverage decreased by 46.6 percent; water willow bed linear shoreline coverage decreased by 5.4 percent; and emergent-submerged aquatic vegetation linear shoreline coverage decreased by 0.7 percent.

Spatial changes in habitat types from 2000 to 2011 showed no consistent pattern throughout the lake. Increases of submerged timber-woody debris occurred mainly along undeveloped shoreline in the main lake. Spatial changes in water willow beds were a result of either smaller beds previously mapped or new beds observed in 2011 when compared to the 2000 habitat distribution. There were no discernable spatial patterns in changes with the other habitat types during the 11-year period.

These results indicated that no significant changes were necessary for identified Environmental Natural or Impact Minimization Zone shoreline classification areas with the updating of the 2011 SMP. The study results also indicated that the *Guidelines* used to guide shoreline permitting and development have been effective in protecting shoreline aquatic habitats in Lake Tillery over the past 10 years.

**Table 1. Comparison of shoreline aquatic habitat types mapped, 2000 versus 2011, and the percent increase or decrease of mapped habitat units and mapped linear shoreline distance.**

Habitat Type	2000 Number of Mapped Units	2011 Number of Mapped Units	Percent Increase (+) or Decrease (-) in Mapped Units	2000 Total Linear Distance (Feet) of Mapped Habitat	2011 Total Linear Distance (Feet) of Mapped Habitat	Percent Increase (+) or Decrease (-) in Linear Distance of Mapped Habitat
Emergent-submerged vegetation	15	16	+6.7	52,681	52,304	-0.7
Scrub-shrub units	25	25	No change	22,552	26,463	+17.3
Water willow beds	561	896	+59.7	81,001	76,631	-5.4
Water willow-submerged timber-woody debris	35	42	-20.0	16,290	8,697	-46.6
Submerged timber-woody debris	8	42	+42.5	10,096	17,186	+70.2
Fringed wetlands	11	19	+72.7	6,248	9,003	+44.1
<b>Total mapped habitat units</b>	<b>655</b>	<b>1,040</b>	<b>+58.5</b>	<b>188,868</b>	<b>190,284</b>	<b>+0.8</b>

### 3.2 Shoreline Classifications

The shoreline was first classified during development of the initial SMP using aerial photographs and on-site observations, as well as information about PEC leased lands which loosely amounted to existing uses. In the 2001 SMP, there were approximately 59.6 miles of

shoreline classified as Residential, 17.8 miles as Environmental/Natural, 14 miles as Impact Minimization Zone (IMZ), 11.7 miles as Undeveloped Public Recreation, 8.8 miles as Other Potential Development, 2.1 miles as Agriculture, 1.4 miles as Commercial, 1.1 miles as Project Operations, 0.9 miles as Public Infrastructure, and 0.7 miles as Developed Public Recreation for a total of approximately 118 miles of shoreline. As part of this SMP update, PEC classified all of the land within the project boundary according to allowable uses. This evaluation of the shoreline classification system resulted in a reduction of the number of classifications (which dictate the allowable uses of the shoreline) from 10 classifications to 3 classifications. These classifications are Integrated Use (which includes Impact Minimization Zones), Resource Protection and Management, and Project Works. Table 2 compares the old classifications with the new classifications and the shoreline totals of each. Figure 3 shows the locations of the shoreline classifications around the reservoir including where slight changes in shoreline classifications have occurred as part of this update. The purpose of condensing the 10 classifications into 3 was to provide a more focused management approach while reducing confusion among the classifications for shoreline residents.

**Integrated Use**—This classification acknowledges and accommodates the presence of existing uses and allows for potential future private, public, and commercial uses. These shoreline areas have no known significant environmental/cultural resources or associated resource management goals that would preclude existing or future shoreline uses. The integrated use classification, as shown in Table 2, combines the 2001 SMP classifications of Residential, Commercial, Agricultural, Public Infrastructure, and IMZs unless otherwise noted. These lands are managed to accommodate reasonable demands for public and private uses within the guidelines of the SMP permitting program (*Guidelines*), included in Appendix A.

Some of these integrated use shoreline areas may have environmental attributes that require certain additional protection guidelines for permitting of shoreline structures to occur and have therefore been classified as Integrated Use - Impact Minimization Zones (IMZ). The Integrated Use/IMZ Guidelines (Appendix A, Attachment E) offer an increased level of protection to these areas. Disturbance, including shoreline clearing and modification, impacts to aquatic vegetation beds (including the removal of submerged woody debris), construction of piers, and other activities within IMZs requires the approval of the Lake Services staff. Permit applications must include an impact minimization plan that contains measures to avoid, minimize or mitigate impacts to important environmental features within the IMZ.

Any use of PEC lands are at the discretion of Lake Services, however Lake Services could approve, through the permit process, certain types of use including improvements and/or construction of water dependent structures (e.g., boat slips, piers, decks) with a combined square footage not to exceed 1,200 square feet except in the IMZ sub classification where the combined square footage cannot exceed 800 square feet. See Appendix A for additional specifications related to allowable and unallowable uses on PEC property.

**Resource Protection and Management**—Shoreline areas designated for species protection and environmental purposes. This classification is to protect habitat, cultural significance, character, and aesthetic attributes. These areas may include wetlands, steep slopes, sensitive aquatic or terrestrial species or their habitat, and islands. This classification also

includes shoreline areas with significant RTE species habitat or known presence of communities of RTE species. This designation is also applied to the shoreline bordering Morrow Mountain State Park. The Resource Protection and Management classification, as shown in Table 2, combines the 2001 SMP classifications of Environmental Natural areas and Undeveloped Public Recreation. There also has been an addition of nearly 1 mile of shoreline to this classification between the 2001 SMP and this SMP update. The Resource Protection and Management classification is for preservation, therefore no water dependent structures, removal of vegetation, dredging or filling, alteration of shoreline features, or construction of any structure will be permitted in these areas.

**Project Works**—Shoreline areas that contain project infrastructure and have public access restrictions for safety, security, operational, or other constraints. Also includes project facilities such as public recreation sites and other civil-related infrastructure (e.g., bridges or transmission or gas line rights-of-way). Project works includes shoreline areas reserved for uses associated with project operations or fulfillment of FERC license requirements. The Project Works classification combines the 2001 SMP classifications of Project Operations and Developed Public Recreation plus about 0.03 mile of additional shoreline that was misclassified in the 2001 SMP (Table 2).

Figure 3 shows the location of each land classification: Integrated Use, Integrated Use-IMZ, Resource Protection and Management, and Project Works along the shoreline of Lake Tillery.

**Table 2. Current shoreline land use classification totals.**

<b>Shoreline Classification (2011)</b>	<b>Previous Classification (2001 SMP)</b>	<b>Shoreline Miles</b>	<b>Percent of Shoreline Miles</b>
Integrated Use	Commercial	1.4	1.2
	Residential	59.6	50.5
	Agriculture	1.6	1.4
	Other Potential Development	8.8	7.4
	Public Civil Infrastructure	0.9	0.8
	Impact Minimization Zones	13.7	11.6
<b>Total Integrated Use</b>		<b>85.9</b>	<b>72.9</b>
Resource Protection & Management	Environmental Natural Areas	17.8	15.1
	Other Potential Development <sup>a</sup>	<0.01	< 0.01
	Agriculture <sup>a</sup>	0.5	0.4
	Project Operations <sup>b</sup>	0.4	0.4
	Undeveloped Public Recreation	11.7	10.0
<b>Total Resource Protection &amp; Management</b>		<b>30.4</b>	<b>25.8</b>
Project Works	Project Operations	0.7	0.6
	Developed Public Recreation	0.8	0.7
	Residential <sup>c</sup>	0.03	< 0.01
<b>Total Project Works</b>		<b>1.5</b>	<b>1.3</b>
<b>Total</b>		<b>117.8</b>	<b>100</b>

<sup>a</sup> The aquatic habitat mapping study identified this segment of shoreline in need of protection.

<sup>b</sup> The tailrace shoreline was adjusted to a more restrictive classification.

<sup>c</sup> The Norwood Recreation Access Area was incorrectly classified as Residential in the 2001 SMP.

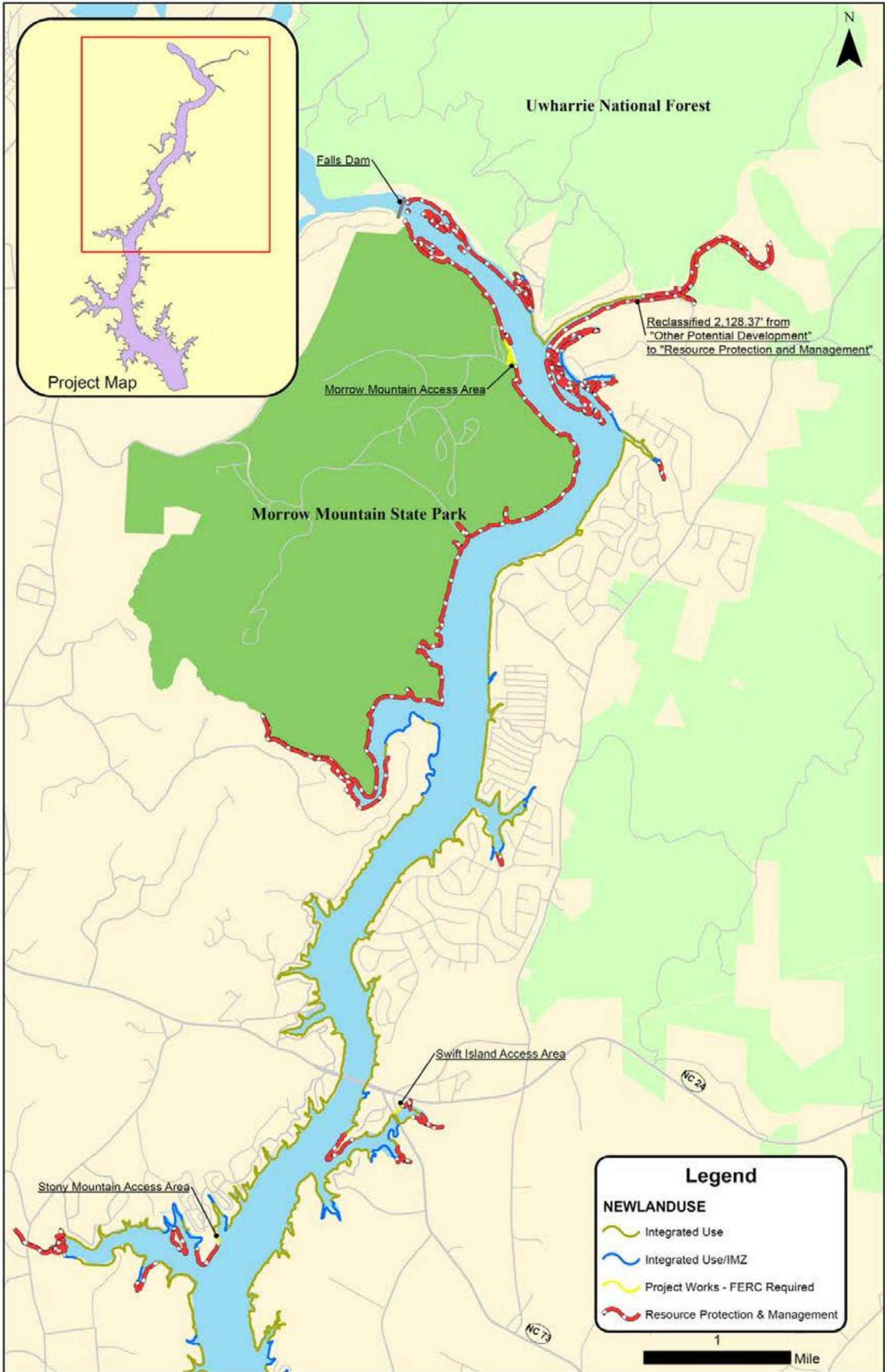


Figure 3. Shoreline classifications of Lake Tillery - Sheet 1 of 2.

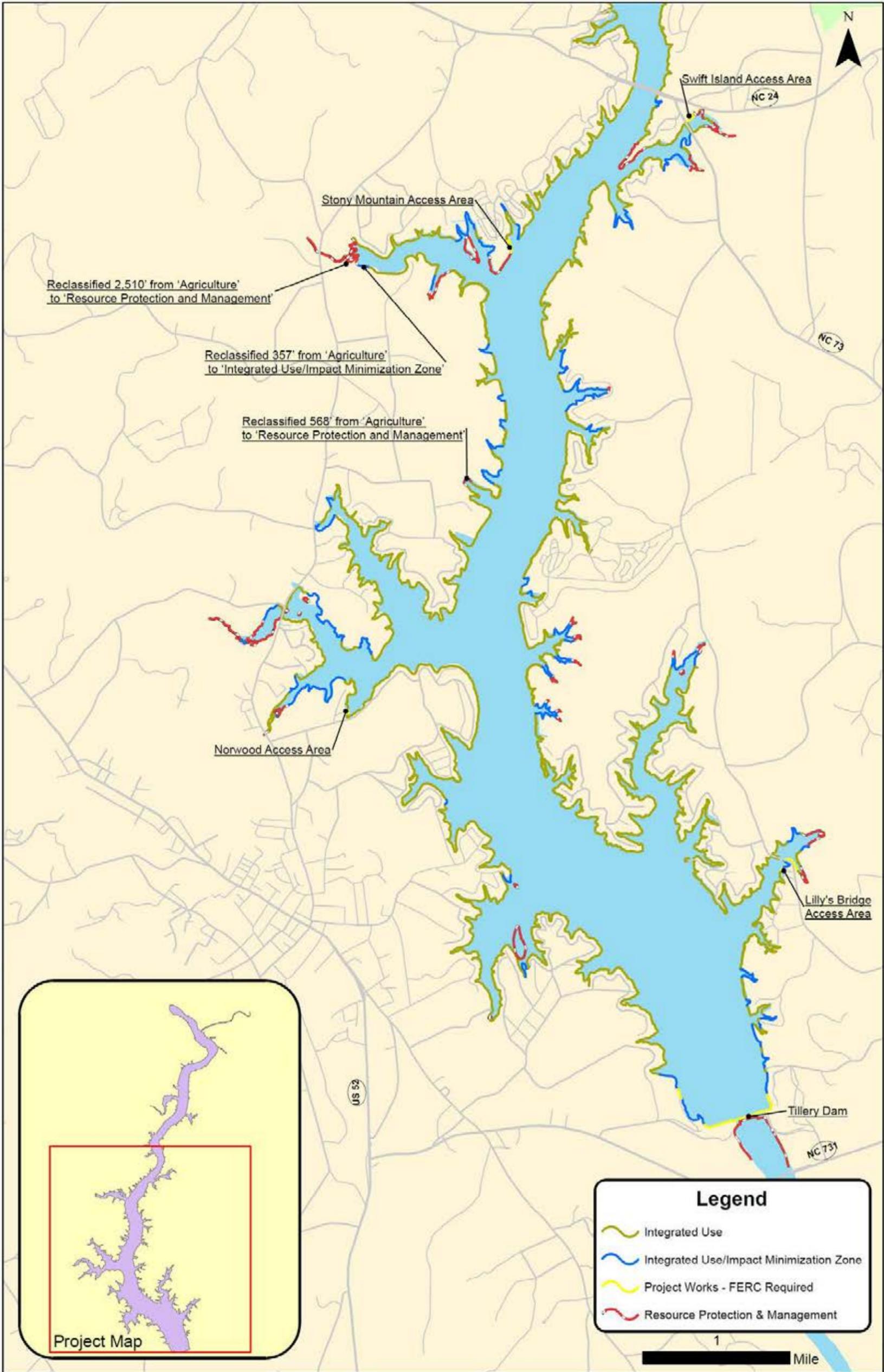


Figure 3. Shoreline classifications of Lake Tillery - Sheet 2 of 2.

### 3.3 SMP Guidelines

PEC manages the project in accordance with the terms of its license and the applicable FERC rules and regulations. This responsibility includes providing adequate public access and public recreation facilities, and protecting important natural, environmental, and scenic resources. PEC allows public access to project lands and waters, so far as it is consistent with the proper operation of the project, for purposes of navigation and recreation. Along the shoreline, PEC lands are both managed by PEC and leased to private entities. For the leased lands PEC has developed a publication entitled “*Guidelines for the Use of Leased Properties<sup>1</sup> at Lake Tillery*” (Appendix A).

The following activities always require a written permit<sup>2</sup> from PEC:

- (a) **Construction**—construction or modification (reconstruction, repairs, additions, or expansion) of any structures, roads, or access pathways within the project boundary.
- (b) **Shoreline Stabilization**—construction, installation, and modification of riprap, retaining walls, or other forms of shoreline stabilization measures, including shoreline plantings.
- (c) **Shoreline Alteration (Modification and Fill)** —removal, addition, or alteration of any natural features of the project and the shoreline within the project boundary including sediment, soil, and rock.
- (d) **Vegetation Removal**—removal of any vegetation, living or dead, within the project boundary.
- (e) **Shoreline Clean-up**—removal of dead or fallen trees, “lap trees”, or other woody or natural debris that exists in the project boundary
- (f) **Vegetative Plantings**—planting of any vegetation, including but not limited to shrubs, hedges, flowering plants, native vegetation, etc. within the project boundary.

Removal of floating debris and shoreline litter (that poses an imminent threat to life or property), such as floating logs, paper, plastic, and other unnatural forms of garbage or debris, does not require PEC approval as long as the method of removal complies with the other requirements of the *Guidelines*.

### 4.0 CONSULTATION WITH STAKEHOLDERS (RESOURCE AGENCIES, PROPERTY OWNERS, AND THE PUBLIC)

As part of developing the SMP, PEC provided resource agencies and local government officials with the opportunity to meet and comment on the methods used in developing aspects of the plan. PEC met with resource agencies on May 11, 2011, to review the content and schedule for updating the Tillery SMP. This meeting included a field site visit to Lake Tillery to view various shoreline classifications and natural features of the lake. During this meeting, the aquatic habitat mapping study methods, including proposed habitat classifications, were discussed with these stakeholders. Agencies that were represented at the meeting included NCWRC, NCDWQ,

<sup>1</sup> The location where rights of use or occupancy has been transferred from lessor (landlord) to lessee (tenant).

<sup>2</sup> Authorization by one party of a certain activity by another party.

North Carolina Division of Parks & Recreation, NCNHP, Montgomery County Government, and Stanly County Government. The NC Division of Water Resources and USFWS were invited to the meeting but were unable to attend due to schedule conflicts.

On June 15, 2011, PEC included a SMP update notice with the annual lease billing invoices to all lake property owners around Lake Tillery. The notice included information on the SMP process and schedule and provided information on where to locate the draft SMP update on PEC's company website. The website also provided a means for stakeholders to submit comments on the update SMP via email or through regular U.S. Postal Service. Property owners were also notified of the SMP update through the annual newsletter published by PEC, which was distributed in May 2011 (PEC, 2011).

On October 3, 2011, PEC distributed a draft copy of the updated SMP to agencies for review and comment. Property owners were mailed postcards prior to posting the draft SMP on the PEC website to notify them of the availability of the Plan for review and comment. In addition, hard copies of the draft SMP were made available at the Tillery Plant and at the Stanley and Montgomery County library reference desks for those residents without computer or internet access. Comments were received from NCDWQ, NCWRC, NCNHP, and NCDWR. Letters of appreciation for being included in the consultation process but without a specific comment were received from NCSHPO and the USFS. The full consultation record as well as PEC's response is included as Appendix F Stakeholder Comments and Progress Energy Carolinas Response Matrix.

## **5.0 MONITORING AND ENFORCEMENT MEASURES**

PEC's Lake Services staff routinely monitors the Lake Tillery shoreline, including annual quarterly shoreline inspections during the spring, summer, fall, and winter seasons. Post-construction inspections are also made on any new construction activities or modifications to existing structures. This monitoring is performed to ensure compliance by all leaseholders with all of the provisions of applicable permits and PEC's *Guidelines*. Any use of or change in the features or vegetation on project lands and waters without specific authorization from PEC is prohibited and considered an encroachment. Such activities requiring specific authorization from PEC include, but are not limited to:

- (a) construction, installation, or placement of structures, including retaining walls;
- (b) construction of roads, sidewalks, or pathways;
- (c) clearing or disturbance of land;
- (d) logging or removal of trees and vegetation;
- (e) installation of pipes and or pumps; and
- (f) dumping in the reservoir or on project lands.

Under its FERC license, PEC has the authority to permit limited development activities around the shoreline of Lake Tillery and to convey certain interests in project lands and waters; however, PEC must ensure the protection of public recreation opportunities, aesthetic beauty, environmental features, and power production capability at the project. For those purposes, PEC has the continuing responsibility to supervise and control the uses and occupancy for which it grants permission, and to monitor the use of, and ensure the compliance with, any leases and permits it has conveyed under its FERC license.

PEC has two types of applications: a shoreline access lease application, and a facilities permit application (see Appendix A, *Section 15.0, Glossary*, for definition of each application). The application process for both begins with communication with PEC's Lake Service staff. Both types of applications require PEC approval, and PEC reserves the right to determine the type of facilities used in any new development or modification to an existing development. In deciding whether to grant permission, PEC will balance the desires of the lessees and applicants with environmental values, public good, and other project purposes. Each proposed activity will be evaluated according to these guidelines. If a permitted use or occupancy violates any conditions of PEC's FERC license or any other condition imposed by PEC for the protection and enhancement of the project's scenic, recreational, or other environmental values, or if the terms of the permit are violated, PEC will take lawful actions necessary to correct the violation.

PEC may authorize certain activities to be carried out within the project boundary by issuing a construction or activity permit. Other than public recreational use of the project through public access areas, any non-project uses or activities on project lands or waters requires a written permit from PEC and may not commence until the permit is written. PEC has information on file in regard to the cultural resources within the project boundary. PEC will monitor permit applications and construction to be sure that sensitive areas are avoided. If a permit application is submitted that affects any of the archaeological sites, PEC will direct the applicant to consult with the North Carolina SHPO. Some of the activities for which permits are most often requested are summarized below. PEC reserves the right to refuse to grant an activity permit in the event that the applicant has not complied with any of the *Guidelines*. Ownership of a lot on the reservoir or lease of property from PEC does not guarantee the property owner or lessee the right to make alterations to PEC lands, including the cutting of vegetation, dredging and filling, or construction of any structure without specific written authorization from PEC, which may also require federal and/or state permits. All applications will be evaluated on a case-by-case basis.

If a construction or activity permit is issued, all work must be done in compliance with the terms of the permit; the *Guidelines*; and other PEC policies, procedures, and requirements. The applicant is responsible for correcting or removing any unauthorized activity or structures. Permits are of limited duration and are terminable by PEC in accordance with their terms. Changing conditions or other factors may lead PEC to refuse to renew an activity permit or to terminate an activity permit.

In addition to administering the *Guidelines*, leases, and permit applications, PEC continually monitors its shoreline including all leased lands.

## **6.0 PUBLIC OUTREACH AND EDUCATION**

PEC is able to educate many of the leaseholders on Lake Tillery shoreline management topics through publication of its annual newsletter, the *Lake Tillery Newsletter* and through the use of the Lake Tillery website (<https://www.progress-energy.com/commitment/community/real-estate/shoreline-management/tillery.page>). The *Lake Tillery Newsletter* is generally published once per year and is sent to all leaseholders. Recent issues of the newsletter have provided information about land issues at Lake Tillery; hydrilla infestations in the lake; policies for tree removal on PEC property; trees and plants that can be used for lake landscaping; safe boating

tips; the *Guidelines*; historic sites; Morrow Mountain State Park; and the Uwharrie National Forest. PEC will continue to publish the newsletter as an educational and informational tool.

PEC has also produced *Landscaping with Native Plants in a Riparian Buffer Area* (Appendix C). This document is distributed to lessees of land within the Lake Tillery project boundary. PEC uses the document to educate these individuals about the advantages of using native plants to vegetate the area around the lake. PEC encourages its leaseholders to landscape using naturally occurring vegetation. In addition, PEC uses the document to explain the benefits to wildlife of using native plants to landscape. PEC has also published a list of nonnative plants (published by the North Carolina Native Plant Society) that should be avoided when landscaping shoreline property (Appendix D).

PEC used the *Lake Tillery Newsletter* to inform leaseholders about the SMP update effort and included contact email and phone numbers for those interested in participating. To inform property owners of the goals and requirements of the updated SMP, PEC will devote a section of its annual 2012 newsletter to the SMP update changes. The issue will include the executive summary of the SMP and will provide information about where the entire SMP report can be found on the PEC website (see Appendix A, *Guidelines*, for current contact information).

## **7.0 SMP REVIEW AND UPDATE PROCESS**

The Tillery SMP will be subject to periodic PEC internal review. PEC also proposes to continue updating the Tillery SMP every 10 years. The update will include consultation with resource agencies, local governmental officials, leaseholders, and the public. Further, the update will incorporate any revisions that are deemed necessary to protect the public recreation opportunities, aesthetic beauty, environmental features, and power production capability at the Tillery Development. Finally, those applicable environmental, recreational, and cultural provisions stated in PEC's CSA (PEC, 2007) and required in the future new FERC license will be implemented and integrated into the overall SMP process.

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# **Appendix A**

## **Guidelines for the Use of Leased Properties At Lake Tillery**



# Guidelines for the Use of Leased Properties at Lake Tillery

Revision 5, 2011

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## **Guidelines for the Use of Leased Properties at Lake Tillery**

### **1.0 Purpose**

These guidelines are intended to help lessees and potential lessees understand policies for permitting activities within areas leased around Lake Tillery. The Tillery Hydroelectric Development generates electricity under a license granted by the Federal Energy Regulatory Commission (Yadkin-Pee Dee Hydroelectric Project, FERC License No. 2206). FERC allows the license holder to permit limited development activities around the shoreline of Lake Tillery. A leasing program is established to ensure the protection of public recreation opportunities, aesthetic beauty, environmental features, regulatory compliance and power production capability at the project. The leasing process for multi-slip facilities requires agency review and approval by FERC, while only select residential facilities require agency review (examples: seawalls, dredging and riprap) (see Section 15.0, Glossary, Page 14 for definitions of lease and facility types). The Project Owner (Licensee) reserves the right to determine the type of facilities used in any development or commercial entity. In deciding whether to grant permission, the Licensee will attempt to balance the requests of the lessees and applicants with the environmental and aesthetic values, recreational use, public good and other project purposes while meeting regulatory requirements. Each proposed activity will be evaluated according to these guidelines as interpreted by the Licensee.

It should be noted that some areas around Lake Tillery are not available for leasing. Private ownership of a lot adjacent to Lake Tillery does not guarantee that a lease will be granted for use of the Licensee's shoreline property. Shoreline leases and permitted activities are a privilege, not a right. Contact Lake Services with questions or concerns regarding these matters.

### **2.0 Goal**

The Licensee's goal with these guidelines is to provide a mechanism to assist in the protection and enhancement of the environmental, scenic and recreational values provided by Lake Tillery and the project lands, while ensuring the continued safe and reliable production of hydroelectric power at the project and compliance with regulatory requirements.

### **3.0 General Guidelines**

3.1 These guidelines are not intended to be all-inclusive.

3.2 These guidelines are subject to revision at the Licensee's discretion.

3.3 Use of leased property will be evaluated on a case-by-case basis.

3.4 Any property owner who wishes to construct facilities or engage in any land-disturbing activity (including altering or impacting any vegetation) on leased property must apply for a permit).

3.5 Any improvements on leased property, including the cutting of vegetation, dredging and filling, alteration of shoreline features, or construction of any structure without specific written authorization from Lake Services is prohibited.

3.6 All activities must comply with applicable building codes and other regulatory requirements.

3.7 Lessees within identified Impact Minimization Zones (IMZ) must comply with the lease guidelines, including the IMZ Guidelines located in Attachment E, which contain additional requirements.

3.8 For private facilities, a current, paid-in-full, compliant residential lease must cover the leased property.

3.9 Construction of private facilities will be permitted only if the associated area owned by the lessee has been improved by the construction of a single-family or multi-unit dwelling and at least a portion of the lot is within 200 feet of the water's edge at lake elevation 277.3 feet MSL. No permits will be issued for vacant lots, undeveloped sites or lots with less than 100-feet of linear shoreline with the exception of pre-existing situations where leases were granted prior to the "lot improvement" requirement.

3.10 For private facilities, the allowable combined square footage of all water-dependent structures is dependent upon the classification of the impacted shoreline and may be limited by the length of leased shoreline but shall not exceed 1,200 square feet. For shoreline within an IMZ, the maximum allowed square footage over water is 800 square feet. (Attachment E identifies other restrictions in IMZs).

3.11 All land disturbance and construction activities and the placement of water-dependent facilities should be done in such a manner as to avoid, if possible, and minimize impacts to all leased land, including aquatic habitat and terrestrial habitats, especially water willow beds greater than or equal to 100 square feet, forested shorelines, and submerged woody debris.

3.12 On some subdivision maps on Lake Tillery, the project property associated with a lot is indicated by dotted or solid lines that extend from the lot across company property to or into the water of Lake Tillery. On other subdivision maps that do not allocate the company property, the lot sidelines should be extended to make the allocation. All facilities located on company property should be within the confines of these lines (either on land or over water) whether they are indicated or must be extended. Placement of new structures or additions/modifications to existing structures cannot be within 5 feet of the allocation lines. The company reserves the right to determine the location of facilities between the allocation lines. Any deviation from these guidelines should only occur when a recorded encroachment agreement between the affected parties permits such an occurrence. If two or more parties are unable to agree on the company land associated with their lot, the Licensee has the sole right to take those actions necessary to resolve the disagreement.

3.13 When a new lease is granted or a lease is transferred, a lease application fee is required. There is also a yearly rental fee based on lot frontage on the waterward side of land along the Licensee's property boundary. The minimum lease fee is for frontage of 100 feet or less along the company's project boundary. If the frontage is greater than 100 feet, there is an additional fee per 10 feet or portion thereof. (See Attachment C – Fee Schedule for rates).

3.14 All activities within the project boundary are subject to the license and other regulations and orders as dictated by FERC.

3.15 The Licensee reserves the right for its representatives to enter any and all leased areas without notice or constraint.

Property owners must receive written approval from Lake Services before beginning any improvements within the leased area. This requirement applies to all facilities on the land or over the water. Written approval must also be obtained from Lake Services prior to beginning activities such as, but not limited to, dredging and filling or vegetation removal and/or treatment in the water or on the Licensee's land. Failure to get such written approval from Lake Services prior to conducting unauthorized activities on leased property could result in a fine, legal action by the Licensee or affected regulatory agencies and cancellation of the lease.

#### **4.0 The Application Process**

The application process begins by visiting the Lake Services website or by contacting a Lake Services representative (see Attachment A – Contact Information). There are two types of applications.

**4.1 Lease Application Process** – The lease application process begins by visiting the Lake Services website to print a lease application form or contact a Lake Services representative to request a lease application form. This application must be completed to obtain a lease for access to Licensee’s property between Lake Tillery and the adjoining property. The lease is required prior to any activities taking place on the Licensee’s property and over the water. After the lease application form is completed, along with all requested information, please return to the address listed in Attachment A and allow a minimum of 10 business days for a reply.

**4.2 Facility Permit Application Process** – The facility permit application process begins by visiting the Lake Services website to print a facility application form or contact a Lake Services representative to request a facility application form. This application must be completed to obtain a permit to construct a facility or modify Licensee’s shoreline. Prior to submitting this application a lease must be on file with the Licensee.

After the application form is completed and returned, along with the required items, a Lake Services representative may meet with you on your property to review your relevant drawings and discuss requirements and guidelines.

Once the applicant has satisfactorily provided the required items to the Lake Services representative, the applicant must obtain a completed Permit Letter from Lake Services. The Permit Letter is required to obtain a building permit from the county.

**Note:** The Licensee reserves the right to disapprove, reject or modify any proposed construction plans if the proposed construction is deemed to be unsafe for the general public, doesn’t exhibit sound construction methods or is determined to adversely impact environmental aquatic or terrestrial habitats. In addition, the Licensee could reject or modify the proposed construction plans if it is determined that the appearance of the completed structure would not be compatible with the Licensee’s stated goal of protecting aesthetic values of the Tillery project, if the structure could adversely impact the surrounding property value or if the structure does not comply with applicable regulations.

The Licensee reserves the right to make periodic inspections of permitted activities or facilities during and after construction to ensure compliance with permit conditions. After construction is completed, notify Lake Services, and a representative will make the final inspection to verify compliance with the facilities Permit Letter terms and conditions.

#### **5.0 Guidelines Regarding Soil Disturbance**

No heavy equipment or soil disturbance is allowed on leased property without written permission from Lake Services. Proper installation of silt fences for erosion control is required to prevent runoff and sedimentation impacts to waterways. Dredging may occur only when the necessary local, state, federal and Lake Services approvals are secured. Due to fish spawning and peak recreational activity, dredging is prohibited from March 1 through September 15.

#### **6.0 Guidelines Regarding Vegetation**

Vegetation is important to the aesthetic qualities and environmental health of Lake Tillery. In addition to enhancing the natural beauty of the lake, terrestrial and aquatic vegetation help prevent water pollution

and provide habitats for birds, mammals and fish. These guidelines are intended to provide lessees the opportunity to use the Licensee's property appropriately, while protecting the natural environmental characteristics and vegetated shoreline of Lake Tillery.

#### 6.1 Vegetative Buffer

In addition to the primary purpose of electric power generation, Lake Tillery is also used as a source of public water for many residents in the adjacent counties. North Carolina water quality regulations applicable to Lake Tillery require that a vegetative buffer zone be maintained adjacent to the shoreline to provide protection from erosion and runoff pollution. State and federal resource agencies support the buffer zone concept and the Licensee encourages the buffer zone be maintained on private lands where the buffer zone extends beyond the Licensee's project boundary. State regulations require a buffer zone, which extends a minimum of 30 horizontal feet from the shoreline as measured from the water's edge at normal full lake elevation. In addition, Lake Tillery is classified as a Water Supply-IV reservoir, land extending ½ mile from the edge of the normal lake elevation is further classified as a Critical Area with more stringent allowable development activities than the rest of the watershed. The following guidelines regarding vegetation and land disturbance apply to property leased within the Tillery Hydroelectric Project:

6.1-1 The Licensee requires that no ground-disturbing activities of the project land are permitted without Lake Services approval. Unless written permission is secured from a Lake Services representative, do not remove leaf litter, disturb root mats or use any equipment other than hand tools in this area.

6.1-2 The Licensee requires that at least 75 percent of the leased area remain completely undisturbed. This means the cutting or removal of vegetation (except under special permit from Lake Services) will not be allowed on 75 percent of the leased area, except for pruning up to a height of 10 feet per accepted arboricultural standards. The intent is to provide lessees the opportunity to use the Licensee's property appropriately, while protecting the natural environmental characteristics and vegetated shoreline of Lake Tillery.

6.1-3 Within the 25 percent of the leased area where disturbance is allowed and consistent with state regulations, limited clearing for visual and physical access to the water is permitted, but large trees and shrubs must be retained. No tree larger than 3 inches in diameter as measured at a height of 4.5 feet above the ground shall be removed unless the tree is dead, dying or poses a safety hazard. Written approval is required prior to the removal of any trees.

6.1-4 The Licensee reserves the right to plant or require the planting of native vegetative materials within the leased area. The Licensee may require, at the leaseholder's expense, the removal of any unauthorized improvements and restoration of leased land to a natural state.

6.1-5 The Licensee prohibits the removal of existing submerged woody debris with a diameter of 10 inches or greater at the base of the trunk from the lake, unless such debris constitutes a navigational or public safety hazard. Lake services must approve removal of such woody debris from the lake. Woody debris that falls into the lake as a result of storms or natural occurrence should be left in place, unless such debris constitutes a navigational or public safety hazard. Woody debris that has broken loose from submerged trunks and is floating in such a manner that constitutes a navigational or safety hazard may be removed from the lake. In the placement and construction of new docks, these facilities should be placed to minimize removal of woody debris. Lessees may be required to mitigate at a 2:1 ratio for removal of woody debris from the lake in nearby areas, depending upon the type and age of submerged woody debris. Such mitigation may include, but is not limited to, the design and construction of a fish-friendly pier.

6.1-6 The Licensee requires landscaping with native plants. For more information, see Attachment D – Plant Lists of the Lake Tillery Shoreline Management Plan, call the Lake Services or contact your local county Extension Agent.

6.1-7 The use of non-native, invasive species for planting is prohibited (See Attachment D – Plant Lists for prohibited plants).

6.2 Pesticides, Herbicides and Fertilizers – The use of pesticides, herbicides and fertilizers by anyone other than the Licensee’s personnel or authorized applicators is prohibited on leased property.

6.3 Aquatic Vegetation – Aquatic vegetation is beneficial for a healthy lake ecosystem and will be protected. It is important for fish cover, spawning, feeding, rest and rearing areas and provides food for other animals, such as waterfowl and wading birds. However, some noxious and non-native aquatic weeds (for example, Hydrilla) in the Licensee’s lakes, reservoirs and impoundments have the potential to negatively impact company operations, authorized public recreation, water quality and/or the aquatic populations of these water bodies. Also, they may threaten the water resources used by the public.

Water willow beds are of high aquatic habitat value in Lake Tillery and any type of vegetation control method on this vegetation by the general public is expressly prohibited. Any willful non-permitted acts of removal of water willow or vegetation within Resource Protection and Management will be penalized and require mitigation. Lake services may authorize removal of water willow in areas where there is an expansion or encroachment of a bed into an existing navigational channel or for shoreline stabilization.

Lake services will require mitigation by the lessee if construction activities significantly impact water willow beds. Such mitigation may include, but is not limited to, construction of a fish-friendly pier or funding the establishment of a water willow bed in another area of the lake, preferably an adjacent or nearby area. Significant impact is defined as a disturbance within the lot allocation area that impacts more than 25 percent of the surface area of an existing water willow bed that is equal to or greater than 100 square feet. The measure of the impacted area will be determined by the amount of water willow covered by any structure, except walkways constructed under IMZ guidelines.

In order to reduce or eliminate the impact and threat of noxious aquatic weeds in the Licensee’s lakes, reservoirs and impoundments, it is the policy of the Licensee to implement or recommend, when appropriate, the best available technology for weed control when any of the above-mentioned impacts are demonstrated. These measures may include, but are not limited to, accepted chemical, biological and physical control techniques. Any control measures implemented will be done so only after consideration of all known factors and after consultation with appropriate state agencies having jurisdiction. In warranted cases, Lake Services may provide written permission for noxious and non-noxious aquatic weed control to a lessee, provided the lessee uses an approved, licensed aquatic pesticide applicator and obtains written approval from the appropriate state (i.e., N.C. Wildlife Resource Commission) and federal resource agencies. The lessee and applicator will be responsible for any impacts to the aquatic environment that occurs as a result of negligence, improper application or unexpected consequences.

Lessees may not use aquatic herbicides, stock grass carp or use other biological or mechanical control. Only licensed herbicide applicators will be allowed to apply herbicides to public waters and, under circumstances of written permission from Lake Services, the lessee and applicator must consult with appropriate resource agencies prior to application. Additional restrictions regarding the use of any herbicides by licensed applicators may be applicable to drinking water supply reservoirs, such as Lake Tillery.

#### 6.4 Bald Eagle and Blue Heron Nesting and Perch Sites

Management of the project lands for bald eagles and blue heron will be consistent with the requirements of the Bald Eagle Protection Act and the Migratory Bird Treaty Act. To accomplish this, the Licensee follows the recommendations of the U.S. Fish & Wildlife Service's "National Bald Eagle Management Guidelines" (May 2007).

Eagles and blue herons nest and roost in large trees, primarily pine trees. Leaving these larger trees will benefit populations of both species and ensure sufficient locations for these species to nest, roost and perch around the edge of the lake. Therefore, no trees greater than 3 inches in diameter as measured at the height of 4.5 feet above the ground shall be removed from leased land unless the tree poses a public safety hazard. Written approval from Lake Services is required prior to the removal of any trees.

#### 6.5 Danger Tree Removal Process

Prior to the removal of a tree larger than three inches in diameter as measured at the height of 4.5 feet above ground, permission must be granted from Lake Services. To request a tree to be removed, please provide the following information to Lake Services (review section 6.1 for compliance):

- A written request (email is acceptable), stating the reason for removal
- Drawing of lease area showing property lines, allocation lines, boat house, shoreline and location of tree/s to be removed
- Pictures of tree/s to be removed
- A letter signed by a Certified Arborist stating the reason the tree should be removed (not required but will expedite the process)

Upon receipt of this information, a Lake Services representative will visit the site if necessary to determine the extent of damage to the tree. If it is determined the tree can be removed, a letter will be mailed from Lake Services granting permission to remove the requested tree/s.

Any tree removed from leased property must be replaced with one that is native to the area (refer to Attachment D – Plant Lists).

### **7.0 Guidelines Regarding Shoreline Stabilization**

Seawalls, bulkheads and similar structures are sometimes used to prevent shoreline erosion. Lake services prefer the use of native shoreline vegetation to control erosion. For appropriate indigenous species, contact your local county extension agent. Riprap is preferred to stabilize eroding shoreline, as compared to bulkheads or seawalls, because the placement of riprap along a severely eroded shoreline can enhance the protective habitat for fish. Bulkheads and seawalls offer very little in terms of aquatic habitat value. The following guidelines will apply for the construction of seawalls:

7.1 Any land-disturbing activity on leased land, including the shoreline, requires prior written approval. Appropriate measures are required to prevent erosion and are evaluated on a case-by-case basis.

7.2 Facilities approval forms are required for the repair, maintenance or construction of seawalls.

7.3 Riprap material on the waterward side of seawalls (3 feet at base extending back to seawall on a 2:1 slope) is required for the enhancement of fish habitat, except where the slope of the lake bed is greater than 2:1. The U.S. Army Corps of Engineers and the N.C. Division of Water Quality regulate the placement of stone or other materials into water. Compliance with these agencies' requirements is a prerequisite to receiving approval from Lake Services.

7.4 Riprap without a seawall will be permitted only with a filter cloth barrier.

7.5 Seawalls must be constructed of pressure-treated lumber, interlocking stone or other approved materials. Railroad ties, metal, rubber or other non-approved materials will not be permitted. The use of creosote-treated wood is expressly prohibited.

7.6 The height of seawalls shall conform to the natural contour of land, but in no case shall seawalls be higher than 5 feet. Fill material behind seawalls shall be gravel, quarry stone or soil. Brick or block is not allowed.

7.7 Seawalls cannot be used to extend the shoreline into the lake or raise the natural contour of leased property.

7.8 No walkways are allowed on the landward side of seawalls.

7.9 Hardwood mulch or vegetative ground cover in previously disturbed areas in combination with the planting of species native to the area is acceptable for the stabilization of the shoreline.

### **8.0 Guidelines Regarding Dredging**

Do not deposit or remove any soil from leased property, including the lake, prior to obtaining Lake Services' written approval. Permission from the State Historic Preservation Office (SHPO), U.S. Army Corps of Engineers and the N.C. Division of Water Quality is required for dredging or excavation within the lake. General dredging guidelines include, but are not limited to:

8.1 Dredging is not permitted from March 1 through September 15 when fish-spawning activity is the greatest and there is peak recreational activity.

8.2 It is the Licensee's intent that only materials that have silted into the lake be removed from the lake.

8.3 Written approval must be obtained from Lake Services prior to any alteration of the shape of the shoreline and said alteration must comply with U.S. Army Corps of Engineers guidelines.

8.4 Dredging is not permitted in aquatic emergent/submerged vegetation beds (for example, water willow) equal to or greater than 100 square feet in surface area, except as required to maintain boating access.

8.5 Dredging is not permitted in IMZs or Resource Protection and Management areas.

8.6 All dredged material must be properly disposed and completely removed from leased property. No material (including: trash, yard waste, leaves, grass, garbage, food waste, fish parts or animal waste) shall be left on leased property or disposed into lake waters.

### **9.0 Guidelines for Private Facilities**

9.1 Boathouses, Boat Slips, Piers and Decks – Private piers, boathouses and other water-dependent structures are permitted for the convenience of the landowner and are a privilege, not a right. To enhance public safety and visibility of the shoreline and water, only single-story, open-sided boathouses will be permitted for use by private property owners. Lake services will examine the plans for each structure before permitting. The following guidelines apply:

9.1-1 The allowable combined square footage of all water-dependent structures is dependent on the length of leased shoreline and shall not exceed 1,200 square feet, except in IMZs where the upper limit is 800 square feet. (This does not include seawall square footage.) The 1,200 square feet is the footprint of the facilities over the water. An uncovered slip is counted as square footage.

9.1-2 Piers or other docking structures may not extend more than 100 feet from the shore. In cove areas, the dock must not present a hazard to navigation, with the maximum length of the dock to be established in writing by Lake Services. As a general guide, a structure should not obstruct more than 1/3 the width of the cove to protect public access and safety and protect aesthetic values of the lake shoreline. Lake services reserves the right to disallow the location of structures in coves whose width is 45 feet or less. Placement of structures or additions/modifications to existing structures cannot be within 5 feet of the allocation lines unless written permission from Lake Services is received.

9.1-3 All fixed structures over water must be at least 1 foot above full pool in areas designated for development. See IMZ Guidelines (Attachment E) for requirements for structures permitted in areas designated as IMZs. New construction must be 3 feet above normal full pool elevation if constructed over water willow beds greater than 100 square feet in area.

9.1-4 All structures built over the water must have adequate reflectors at corners and every 10 feet in between for safety purposes. The state of North Carolina recommends white reflectors.

9.1-5 Docks and piers may be stationary or floating, but floatation devices must be of encapsulated Styrofoam or polystyrene, as approved by the U.S. Army Corps of Engineers.

9.1-6 Benches, guardrails and other attachments on docks, piers or decks over water must not significantly obstruct views.

9.1-7 Boathouses may not be shared or co-owned by adjoining lot owners without receiving prior written approval from Lake Services and recording of appropriate legal documentation of the terms and conditions of said joint ownership.

9.1-8 Boathouses must be constructed of wood or other approved materials. Metal or shingles may be used on the roof of a boathouse while metal siding, vinyl and wood may be used on the sides of storage rooms. The color of materials used should be natural, neutral or earth tone.

9.1-9 No living, sleeping, cooking, heating, cooling, plumbing facilities or refrigerators are permitted within, adjacent to or above boathouses or otherwise on leased property, except for existing commercial leases.

9.1-10 The external dimensions of enclosed storage areas associated with boathouses must not exceed 80 square feet and must be located on the landward side of piers, deck areas and boathouses. The use of boathouse storage areas for items other than those associated with swimming, boating, skiing and fishing is prohibited. The storage of fuel or any other petroleum supply and yard treatment chemicals and fertilizers is prohibited.

9.1-11 Decks shall be constructed of wood or other environmentally acceptable materials as approved by Lake Services.

9.1-12 Every effort should be made to minimize incidental disturbance of aquatic vegetation due to approved activities. Placement of boathouses should avoid impacting water willow beds or other

significant aquatic vegetation beds that are equal to or greater than 100 square feet by siting the facility outside of such beds or by traversing the water willow bed at the end points rather than the middle of a bed. Walkways must be 3 feet above normal full pool elevation and no more than 5 feet wide to permit sunlight penetration to the water willow bed. Placement of boathouses or docks should also take into account the shading effect of such structures relative to sun exposure. Lake services may require mitigation by the lessee if construction activities significantly impact water willow beds. Such mitigation may include, but is not limited to, construction of a fish-friendly pier or funding the establishment of a water willow bed at an adjacent area. Significant impact is defined as disturbance within the lot allocation area that impacts more than 25 percent of the surface area of an existing water willow bed that is equal to or greater than 100 square feet. The measure of the impacted area will be determined by the amount of water willow covered by any structure, except walkways constructed under IMZ Guidelines. Other restrictions will apply for water willow beds located in IMZs.

9.1-13 Lake services may authorize the removal of water willow in areas where there is an expansion or encroachment of a bed into an existing navigational channel or facility.

9.1-14 Deck/roof combinations, widow's watch or second floors of any type including stairs or ladders to access the roof are prohibited. Roof design may be gable or hip style.

9.2 Walkways – Lake Services may permit the limited construction of walkways within the leased area. Walkways must either have natural ground cover or be constructed of open-slatted, pressure-treated wooden or composite materials, follow the contour of the land and must lead to a pier or boathouse. Access to the shoreline shall be by pathway no wider than 5 feet. An elevated walkway to the boathouse is permitted where need for handicap accessibility is certified in writing by a medical doctor.

9.3 Fences – Fences within the leased area can be constructed with Lake Services' prior written permission, but in no case are fences permitted on leased property within 30 feet of the shoreline. New fence installation, including the placement and selection of construction materials, must take into account aesthetic values.

#### 9.4 Items Prohibited on Leased Property (not intended to be all-inclusive)

1. Septic Systems – The Licensee does not allow the placement of any septic system components on its property by Residential lessees. Any existing septic system components located on the Licensee's property that fail or are in need of repair must be removed.
2. Swimming pools
3. Storage buildings or other structures except as permitted in boathouses
4. Houses, including residential roof overhangs
5. Asphalt or concrete driveways or walkways
6. Porches or other attachments to residential structures
7. Decks or patios on land
8. Garages or carports
9. Wells, pumps or other methods of water withdrawal without prior written permission from a Lake Services representative
10. Animal lots and houses
11. Television or radio satellite dishes or towers
12. Encroachments on adjoining leased areas unless a specific recorded encroachment agreement exists between the affected parties
13. Electrical service that does not meet National Electric Safety Code requirements
14. Facilities that represent health and safety hazards

15. Commercial activities without Lake Services' written permission
16. Assignment or subletting of leases without prior written approval
17. Storage of vehicles or other material
18. Underwater or partially submerged structures or facilities which could present a safety hazard
19. Burning
20. Storage or disposal of any regulated materials
21. Water gardens, fountains or underground lawn sprinkler systems
22. Private boat ramps
23. The discharge of any concentrated runoff; that is, concentrating storm water runoff into a pipe or improperly constructed ditch, which discharges onto the Licensee's property and accelerates erosion
24. The discharge or disposal of any material
25. The use of heat exchange coils or thermal loops in the lake for HVAC systems
26. Structures that do not meet N.C. Building Code requirements
27. Fuel or other storage tanks or fuel pumps
28. Livestock within 30 feet of the lake unless crossing the stream channel per specifications of Natural Resources Conservation Service
29. Buoys with ropes from existing boathouses/docks to such buoys in the water
30. In-ground boathouses
31. Permanent water fowl blinds or hunting stands

**NOTE: FAILURE TO ABIDE BY THESE CONDITIONS MAY RESULT IN THE CANCELLATION OF EXISTING LEASE AND THE RESTORATION OF ANY DAMAGE AT THE COST OF THE LESSEE.**

#### **10.0 Guidelines for Multi-slip Facilities**

These facilities must be permitted by Lake Services. Multi-slip facility will be limited to accommodate no more than 10 watercraft (in accordance with the FERC standard Land Use Article) for a frontage of 100 linear feet along the Company's Project Boundary pending Lake Services approval. If the frontage is greater than 100 linear feet, one additional watercraft is allowed per 25 linear feet. (see Attachment C – Fee Schedule for rates). Detailed plans for construction, additions or modifications of these facilities must be submitted to Lake Services for review and approval prior to beginning work. The merits of these plans will be considered on a case-by-case basis and will consider the value of such facilities with regard to environmental impact, aesthetics and potential navigational and safety issues. As mentioned above, consultation with state and federal agencies is required and will be the responsibility of the applicant (see Attachment F – Multi-slip Facilities for step-by-step approval process). In most instances, Lake Services cannot approve multi-slip facilities without prior FERC approval. Lake services may permit the following:

- Signs for commercial operations,
- Fuel lines, pumps and other associated equipment for marina operations require Lake Services' prior written permission and must meet all applicable legal requirements.

Certain activities and items are expressly prohibited at these facilities, including, but not limited to, the following:

10.1 Encroachments on adjoining leased areas.

10.2 Electrical service that does not meet National Electric Safety Code requirements.

10.3 Facilities that represent health and safety hazards.

10.4 Assignment or subletting of leases without prior written approval.

10.5 Improper storage or disposal of any regulated materials.

10.6 Structures that do not meet N.C. Building Code requirements.

10.7 Docking, mooring, anchoring, storing or otherwise tying up any boat or vessel except to a dock, pier or other water-related structure that is in compliance with this Lease, the Guidelines and applicable Law.

10.8 Docking, mooring, anchoring, storing or otherwise tying up (permanently or temporarily) any boat or vessel at the Premises, at any time that equals or exceeds 35 feet in length.

10.9 Constructing, installing or otherwise placing any dock, pier, boat slip or other water-related structure that is designed to accommodate any boat or vessel 35 feet or more in length.

10.10 Maintenance and repair operations (including without limitation boat engine or equipment maintenance and repair, replacement or handling of engine oil, oil filters, waste oil, transmission fluid, anti-freeze or similar liquids or products); painting, paint removal, varnishing, sanding or abrasive blasting; boat or boat equipment cleaning with toxic products or solvents and/or high pressure washing.

10.11 Engage in or sponsor any type of "party cruise," "dinner cruise" or similar event or activity (public or private) at, on or from the Premises, Lessee's marina or restaurant.

#### **11.0 Exceptions for Existing Facilities**

At the Licensee's discretion and subject to license and other regulatory directives, existing water-dependent and other facilities that do not comply with the general guidelines may remain in the leased area or over the water for their useful lives, as long as they are in compliance with federal, state and local laws and regulations (termed "grandfather" provisions). When major repairs involving more than 50 percent of the value of the structure as determined by a certified licensed appraiser approved by Lake Services are made, the structure must be repaired so as to be in compliance with the guidelines included herein. Metal siding is not permitted for repair of any structures. If an existing structure is destroyed by fire or by other means, the replacement structure must be built in compliance with the general guidelines and is not subject to the "grandfather" provisions.

All modifications to existing facilities are subject to these guidelines so that any pre-existing noncompliance is not increased. For the purpose of measuring the area covered by existing facilities, all structures on leased property, whether over water or on land, are to be counted. Structures include, but are not limited to, boathouses, decks, docks, boat slips, piers, storage buildings and all noncomplying structures. Approved walkways over land or seawalls are not included in the calculation of area covered by structures. No expansion of an existing facility or addition of a new facility is allowed on leased property where the expansion or addition would cause the area covered by all facilities to exceed 1,200 square feet, whether grandfathered or not.

No expansion or addition will be permitted to any structure, nor will additional facilities be permitted if the area covered by all facilities in the leased area exceeds 1,200 square feet. All facilities must be well maintained. Failure to properly maintain facilities may result in the cancellation of any existing lease and the removal of the facility and restoration of the property at the expense of the lessee.

## **12.0 Guidelines Regarding Miscellaneous Items (not intended to be all-inclusive)**

12.1 Signs are only permitted at marinas and access areas upon approval by Lake Services.

12.2 Fish attractors are allowed per Lake Service specifications. Fish attractors under piers are encouraged.

12.3 Navigational aids and No Wake markers are handled by N.C. Wildlife Resources Commission.

12.4 Parasails, hang gliders, ultra light aircraft and seaplanes are not allowed.

12.5 Vending operations over water are controlled by the county health department. If allowed, they must be in an area approved by Lake Services.

## **13.0 Guidelines Regarding Special Uses**

Lake services reserves the right to grant special uses that deviate from the Guidelines for the Use of Leased Properties at Lake Tillery when in its judgment the action is advantageous for the benefit of public welfare and does not jeopardize the environmental quality of the lake or the project operations.

## **14.0 Guidelines Regarding Penalty Fees and Mitigation**

**Failure to abide by these guidelines could result in cancellation of the lease.** Failure to build, maintain and renovate facilities according to the facilities approval form and the Guidelines for the Use of Leased Properties at Lake Tillery will result in lease cancellation. If Lake Services decide to re-let the property at a later date, a lease re-instatement fee will be levied. In the event the lease is not re-instated, Lake Services reserves the right to remove all remaining personal property and remaining facilities from the Licensee's property.

Lake services routinely patrols the lake shoreline for compliance. Any violations will be investigated and handled by Lake Services and/or the appropriate regulatory agencies. Lake services will require mitigation by the lessee if construction activities significantly impact water willow beds or other environmentally sensitive habitat. Such mitigation may include, but is not limited to, construction of a fish-friendly pier or funding the establishment of a water willow bed in another area of the lake, preferably an adjacent or nearby area. Significant impact is defined as disturbance within the lot allocation area that impacts more than 25 percent of the surface area of an existing water willow bed that is equal to or greater than 100 square feet. The measure of the impacted area will be determined by the amount of water willow covered by any structure, except walkways constructed under IMZ Guidelines.

### **Penalty Fees**

Persons who own property adjacent to, or lease property on Lake Tillery could incur a penalty (see Attachment C – Fee Schedule for rates) from Lake Services:

- Failing to obtain a lease and/or Facilities Approval Form prior to construction. Construction deviates from the original permit and drawing approved by a Lake Services' representative.
- Construction not complying with the Guidelines for the Use of Leased Properties at Lake Tillery.

Individuals found to be in violation of procedures, approved permit or guidelines will be expected to take corrective action by:

- Acquiring the necessary forms (e.g., lake lease and/or Facilities Application Form) and submitting payment for all fees and penalties incurred.
- Bringing their facilities into compliance with the approved drawing submitted with their Facilities

- Application Form.
- Possible additional mitigation to enhance the shoreline.

Lake services reserves the right to cancel or deny a lease to those individuals who do not submit payment of fees and penalties or refuse to comply with the procedures, policies and guidelines.

## 15.0 Glossary

**Aesthetic** – Characteristics that are visually pleasing and usually conform to certain identified background features.

**Allocation Line** – A line on a subdivision map or the projected lot side lines that determines the location of facilities on leased land or over the water of Lake Tillery.

**Application Process** – Involves calling a Lake Services representative, meeting on the site, discussing proposed construction of facilities, preparing detailed sketch of facilities and their location, securing necessary agency approvals if necessary, obtaining facilities approval form, payment of fee and obtaining building permit from appropriate county.

**Aquatic Emergent/Submerged Vegetation Beds** – Rooted aquatic plants found totally submersed below or emerging from the lake's surface and usually located in water less than 6 feet deep.

**Assignment** – A transfer of a claim, property right, etc.

**Best Management Practice (BMP)** – A structural or nonstructural management-based practice used singularly or in combination to reduce nonpoint source inputs to receiving waters in order to achieve water quality protection goals.

**Boat Slip** – A roofed or unroofed structure confined by three sides used for temporary or permanent storage and/or mooring of a watercraft.

**Buffer Zone** – A natural or vegetated area through which storm water runoff flows in a diffuse manner so that the runoff does not become channelized and which provides for infiltration of the runoff and filtering of pollutants. The buffer shall be measured landward from the normal pool elevation of impounded structures and from the bank of each side of streams or rivers.

**Building Permit** – A written authorization secured from the county where structure(s) will be built, allowing construction according to certain specifications.

**Cancellation** – Termination of a lease between the Licensee and the lessee.

**Development** – Any activity within the area leased involving, requiring or consisting of the construction or enlargement of a structure; excavation; dredging; filling; dumping; removal of clay, silt, sand, gravel or minerals; bulk heading or driving of pilings; clearing or alteration of land; alteration of the shore, bank or bottom of Lake Tillery, or any tributary or wetland; or placement of a floating or attached structure within the leased area.

**Docking Structure** – A structure over or adjacent to water used for mooring watercraft.

**Dredging** – The term “dredged material” means material that is excavated or dredged from waters of the United States as defined by the Code of Federal Regulations [33 CFR 323.2(c)] and as permitted by appropriate federal and state agencies.

**Earth Tone** – Related to color. Colors that are usually neutral in shade and that blend in with the surroundings and do not conflict with aesthetics of the environment.

**Easement** – A nonpossessing interest held by one party in the land of a second party whereby the first party is accorded partial use of the land for a specific purpose with certain specified restrictions.

**Encroachment Agreement** – A document recorded at the pertinent county register of deeds office that allows one party to place facilities in the allotted area of a second party.

**Environmental** – The aggregate of all conditions affecting the existence, growth and general welfare of living organisms and includes complex interactions with chemical and physical variables.

**Environmentally Sensitive Habitat** – Habitat that is identified to be of high quality for a healthy ecosystem, including both plants and animals, which provide important areas for living, feeding, reproduction, rearing and resting. These habitats also include habitat for rare, threatened or endangered plants and animals. Such habitats have the highest priority for protection from degradation and impact due to human activities to sustain the ecosystem in general or specific identified organisms.

**Excavation** – Removal of soil and rock associated with construction or placement of shoreline bulkheads.

**FAA** – Abbreviation for the Federal Aviation Administration.

**Facilities** – Structures such as walkways, seawalls, piers, boathouses, boat slips, deck areas or other structures located on leased property.

**Facility Permit** – A form that describes the proposed facilities to be located on leased property. Form is used to secure a building permit from the appropriate county.

**Facility Permit Application Fee** – A fee to cover expenses associated with the permitting of facilities on leased property. Synonymous with processing fee.

**FERC** – Abbreviation for the Federal Energy Regulatory Commission. The federal agency by which the Licensee is licensed to operate the Tillery Hydroelectric Plant, Lake Tillery and the surrounding project lands.

**Filling** – The placement of material in the lake for purposes of land reclamation. This practice is prohibited.

**Filter Cloth Barriers** – A cloth placed on the bank prior to placement of riprap to prohibit soil from washing away from riprap.

**Floatation Devices** – Normally made of encapsulated Styrofoam.

**Full Pond/Full Lake/Full Pool Elevation** – A measurement of elevation, in feet (277.3 normal full pool

elevation above mean sea level based on NAVD88) above mean sea level, to the top of the floodgates at the Tillery Dam.

**Grandfather Provisions** – Temporary provisions that allow an existing structure to continue to exist in noncompliance with existing guidelines. When maintenance repairs exceed 50 percent of the value of the structure, the grandfather provisions are void and the structure must come in compliance with existing guidelines.

**Guidelines** – A manual of procedures governing the use of leased properties at Lake Tillery.

**Habitat** – The regions where plants or animals naturally grow or live and include chemical and physical features that comprise the environment and allow plants and animals to thrive.

**Herbicides** – Chemicals designed to retard or prohibit plant growth.

**In-Ground Boathouse** – A boathouse placed in an excavated area in the shoreline bank of a lake.

**Indigenous Species** – Species native to the area.

**Integrated Use** – This classification acknowledges and accommodates the presence of existing uses and allows for potential future private, public and commercial uses. These shoreline areas have no known significant environmental/cultural resources or associate resource management goals that would preclude existing or future shoreline uses. These lands are managed to accommodate reasonable demands for public and private uses within the guidelines of the Shoreline Management Plan permitting program.

**Land-Disturbing Activity** – Any use of the land that results in a change in the natural cover or topography that may cause or contribute to sedimentation.

**Landward** – On the side toward the land.

**Lease** – A written document by which the rights of use and occupancy of land and/or structures are transferred by the owner to another person or entity for a specified period of time in return for a specified rental.

**Leased Properties/Leased Area** – The location where rights of use or occupancy have been transferred from lessor to lessee.

**Lessee** – The party who possesses the right to use or occupy a property under lease agreement (tenant).

**Lessor** – The party who holds title to and conveys the right to use and occupy a property under lease agreement (landlord).

**License** – A formal, legally binding agreement that allows a certain activity to be performed.

**Licensee** – Carolina Power & Light Company, a North Carolina Public Service Corporation d/b/a Progress Energy Carolinas, Inc. and its assigns, owns and operates the license granted by the Federal Energy Regulatory Commission (FERC License #2206).

**MSL** – Abbreviation for mean sea level.

**Multi-slip Facilities** – Facilities related to the operation of a marina or restaurant, or other multiple-use public or private facility and may have provisions for food services, limited to accommodate no more than 10 watercraft (in accordance with FERC’s standard land use article) for a frontage of 100 linear feet along the Licensee’s Project Boundary pending Lake Services approval. If the frontage is greater than 100 linear feet, one additional watercraft is allowed per 25 linear feet.

**Multi-slip Lease** – Land leased in association with a business such as a marina or a restaurant or other multiple-use public or private facility that accommodates watercraft or as determined by the Licensee.

**Multi-Unit Dwelling** – A structure that can legally accommodate more than one family unit, such as an apartment or townhouse.

**Natural Condition/Natural State/Natural** – The forest floor as found in an undisturbed mature or maturing forest. (See definition of Natural Forested Vegetation as given below.)

**Natural Forested Vegetation** – The plants of an area which grow together in disturbed or undisturbed conditions in various wooded plant communities in any combination of trees, saplings, shrubs, vines and herbaceous plants.

**Natural Ground Cover** – Low-growing terrestrial vegetation existing on forest or shoreline lands that is naturally occurring without disturbance from human activity.

**NCDENR** – Abbreviation for the North Carolina Department of Environment & Natural Resources.

**NCWRC** – Abbreviation for the North Carolina Wildlife Resources Commission.

**Neutral** – Pertaining to color, usually earth tone colors that do not sharply contrast to the existing background colors.

**Noncompliant Structure** – Any structure that does not conform to the entitled Guidelines for the Use of Leased Properties at Lake Tillery.

**NCDWQ** – Abbreviation for the North Carolina Division of Water Quality, a division within the North Carolina Department of Environment and Natural Resources.

**Open-Sided Boathouse** – A boathouse whose sides are open from the decking upward to the ceiling joist.

**Open-Slatted** – Refers to boards on walkway, each board having a space between it and the next board.

**Permit** – Authorization by one party of a certain activity by another party.

**Private Recreation Lease** – Land leased in association with the residence of a single family.

**Project Boundary** – The perimeter of the Licensee’s property at Lake Tillery as shown in its license with the Federal Energy Regulatory Commission.

**Project Owner** – Carolina Power & Light Company, a North Carolina Public Service Corporation d/b/a Progress Energy Carolinas, Inc. and its assigns, owns and operates the license granted by the Federal Energy Regulatory Commission (FERC License #2206).

**Project Works** – FERC Required – Project lands associated with hydropower production, including but not limited to the dam, powerhouse and other hydroelectricity property. This can also include lands associated with Project lands occupied by developed public recreation (i.e., NCWRC public boat ramps). Shoreline areas reserved for uses associated with project operations or fulfillment of license requirements.

**Projection Lines** – Synonymous with allocation lines.

**Recapture** – Placing soil into an eroded area or the formation of a new land area is prohibited unless permitted by U.S. Army Corps of Engineers guidelines.

**Re-let** – To lease again.

**Residential Lease** – Land leased in association with a private single family dwelling.

**Resource Protection & Management** – Shoreline areas designated for species protection and environmental purposes. This classification is to protect habitat, cultural significance, character, and aesthetic value of particular locations. These areas may include wetlands, steep slopes, sensitive aquatic or terrestrial habitat and islands. This classification also includes shoreline areas with significant rare, threatened and endangered (RTE) species habitat or known presence of communities of RTE species.

**Riprap** – Large crushed stone (8-10 inches or greater in diameter) used for bank stabilization. This method of shoreline stabilization provides better fish habitat structure.

**Runoff** – Water that is not absorbed into the ground and enters into a body of water.

**Silt Fence** – An upright cloth or synthetic barrier anchored in the ground to prevent erosion.

**Sublet** – The process by which the existing lessee leases rights to another party.

**USACOE** – Abbreviation for the United States Army Corps of Engineers.

**USF&W** – Abbreviation for the United States Fish & Wildlife Service.

**USGS** – Abbreviation for the United States Geological Survey.

**Vegetated Condition** – Plant life, such as natural vegetation consisting of grasses, shrubs and trees in a sufficient amount to minimize or prevent soil erosion and bank slumping.

**Vegetative Buffer** – Plant life, such as natural vegetation, in a sufficient amount to prohibit erosion in the designated buffer zone.

**Water-Dependent Structure** – Those structures for which use requires access or proximity to or siting within surface waters to fulfill its basic purpose, such as boat houses, docks and bulkheads. Ancillary facilities such as restaurants, outlets for boat supplies, parking lots and commercial boat storage areas are not water-dependent structures.

**Water Quality Regulations** – Rules established by the NCDENR to promote and protect water quality.

**Watercraft** – A craft designed for water transportation.

**Waterward** – On the side toward the water.

**Wetlands** – Areas that are inundated or saturated by an accumulation of surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas. Wetlands classified as waters of the state are restricted to waters of the United States as defined by the Code of Federal Regulations (33 CFR 328.3 and 40 CFR 230.3).

**NOTES:**



## Attachment A

### Contact Information

**Mailing Address:**

Progress Energy  
Lake Services  
PO Box 1551 – PEB  
Raleigh, NC 27602

**Email:**

Lake.management@pgnmail.com

**Phone:**

877.893.0001

**Fax:**

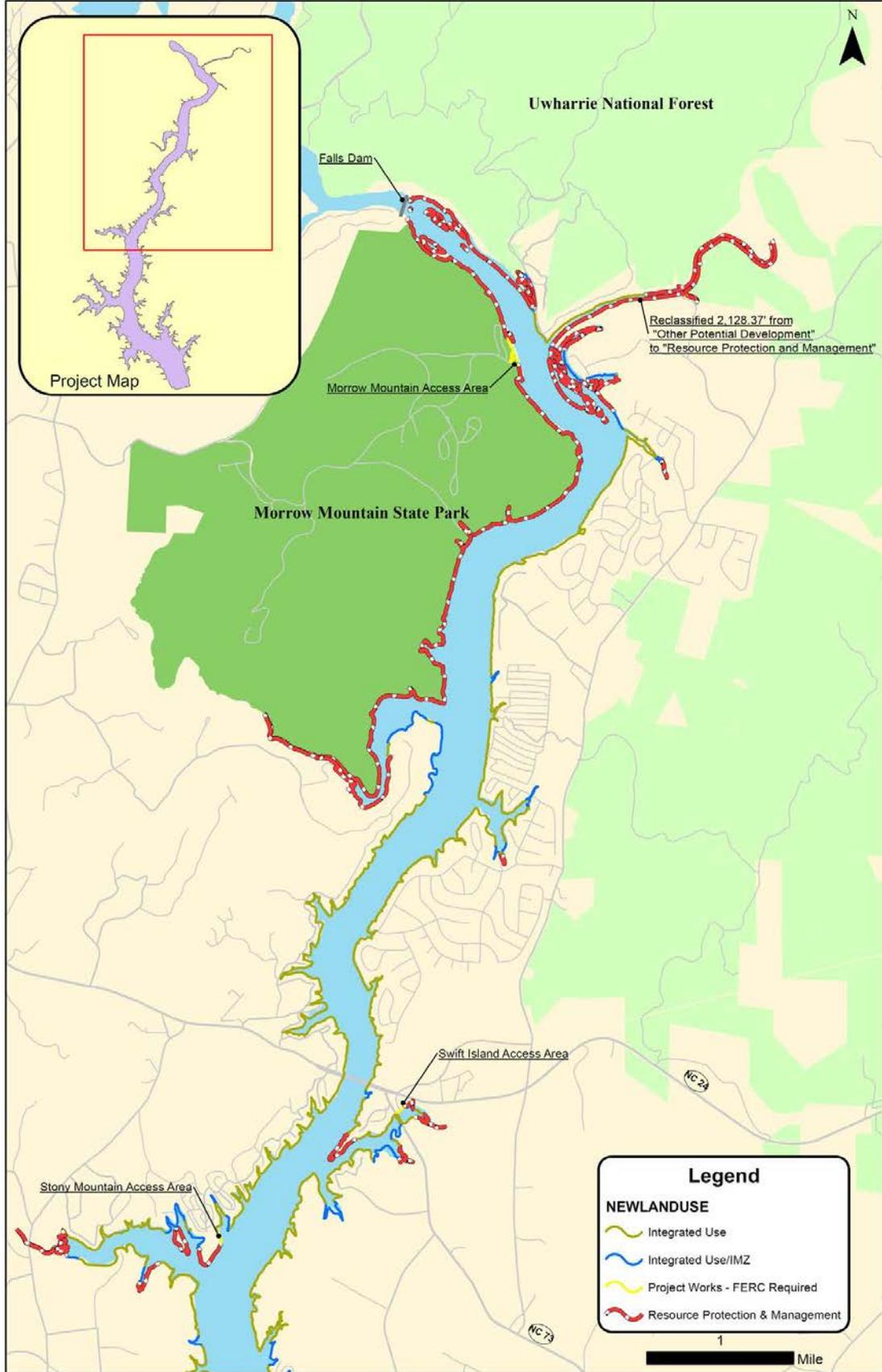
919.232.4983

**Website:**

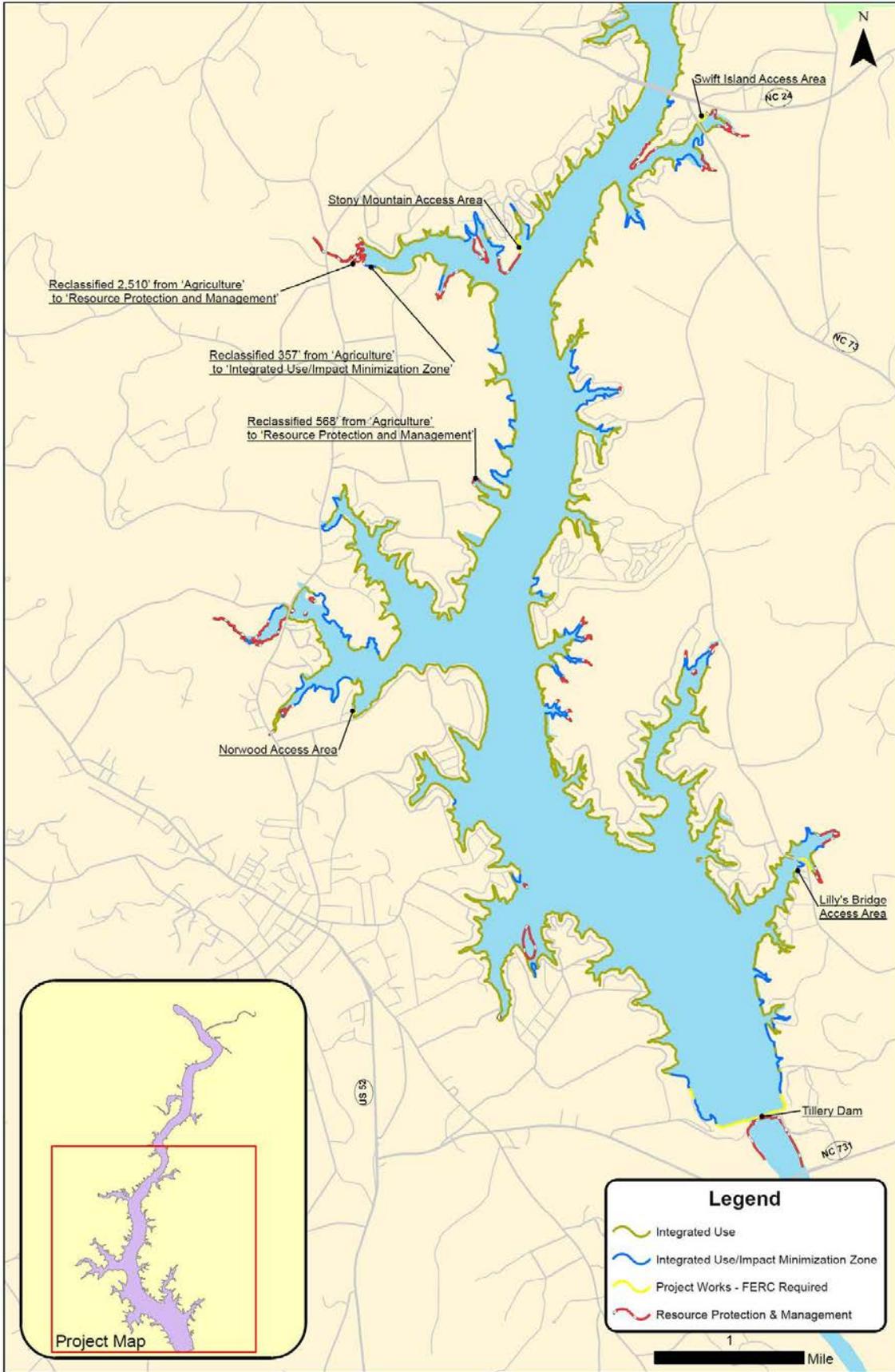
<https://www.progress-energy.com/commitment/community/real-estate/shoreline-management/tillery.page?>



### Attachment B



Shoreline classifications of Lake Tillery - Sheet 1 of 2



Shoreline classifications of Lake Tillery - Sheet 2 of 2

**Attachment C**

**Fee Schedule**

The Federal Energy Regulatory Energy Commission (FERC) license for the Yadkin-Pee Dee Hydroelectric Project No. 2206, Tillery Hydroelectric Development allows Progress Energy to charge reasonable fees to cover the cost of administering its shoreline management program. Fees are frequently reviewed and are subject to change to more accurately reflect the cost of implementing Progress Energy’s Lake Services program.

**Lease Application Fee** (includes new lease request and transfers):

- Residential-----\$100
- Multi-Slip-----\$500

**Facility Application Fee** (includes new construction and modifications):

- Residential-----\$300
- Multi-Slip
  - No FERC consultation required-----\$500
  - FERC consultation required-----\$1,000

**Annual Lease Fee**

- Residential (base rent)-----\$150
  - An additional \$5 for every 10 feet or any portion thereof over 100 feet of shoreline is added to base rent
- Multi-Slip (base rent)-----\$1,000
- Multi-Slip (each additional slip over 10)-----\$150

**Penalty Fee**

- Per Violation-----\$250



## Attachment D

### Plant Lists

Below is a list of native plants, which may be useful in landscaping for your home and property. We stress native plants because there are many examples of non-native plants (see section below regarding non-native plants) which are considered invasive and which may become difficult to control. Examples of non-native invasive include kudzu, English ivy, wisteria, and Japanese honeysuckle.

#### Deciduous Trees

Red maple	<i>Acer rubrum</i>
Sugar maple	<i>Acer saccharum</i>
Serviceberry	<i>Amelanchier arborea</i>
Shagbark hickory	<i>Carya ovata</i>
Chestnut (hybrid)	<i>Castanea sp.</i>
Hackberry	<i>Celtis occidentalis</i>
Redbud	<i>Cercis canadensis</i>
Fringetree	<i>Chionanthus virginicus</i>
Flowering dogwood	<i>Cornus florida</i>
Pesimmon	<i>Diospyros virginiana</i>
Honey locust	<i>Gleditsia triacanthos</i>
Sweetgum	<i>Liquidambar styraciflua</i>
Yellow poplar	<i>Liriodendron tulipifera</i>
Blackgum	<i>Nyssa sylvatica</i>
Sourwood	<i>Oxydendron arboreum</i>
Sycamore	<i>Platanus occidentalis</i>
Black cherry	<i>Prunus serotina</i>
White oak	<i>Quercus alba</i>
Scarlet oak	<i>Quercus coccinea</i>
So. red oak	<i>Quercus falcata</i>
Cherrybark oak	<i>Quercus falcata var. pagodaefolia</i>
Water oak	<i>Quercus nigra</i>
Willow oak	<i>Quercus phellos</i>
Chestnut oak	<i>Quercus prinus</i>
Red oak	<i>Quercus rubra</i>

#### Evergreen trees

American holly	<i>Ilex opaca</i>
Eastern red cedar	<i>Juniperus virginiana</i>
Loblolly pine	<i>Pinus taeda</i>

#### Evergreen shrubs

Inkberry	<i>Ilex glabra</i>
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Mountain laurel  
Wax myrtle  
Rhododendron  
Strawberry bush

*Kalmia latifolia*  
*Myrica cerifera*  
*Rhododendron catawbiense*  
*Euonymus americana*

### **Deciduous shrubs**

Red chokeberry  
Black chokeberry  
Amer. Beauty-berry  
Sweetshrub  
Chinquapin  
Sweet pepperbrush  
Gray dogwood  
Wahoo  
Witch-alder  
Winterberry  
Wild plum  
Staghorn sumac  
Elderberry  
Blueberries  
Possumhaw  
Black haw  
Yellowroot

*Aronia arbutifolia*  
*Aronia melanocarpa*  
*Callicarpa americana*  
*Calycanthus floridus*  
*Castanea pumila*  
*Clethra alnifolia*  
*Cornus racemosa*  
*Euonymus atropurpureus*  
*Fothergilla spp.*  
*Ilex verticillata*  
*Prunus angustifolia or P. umbellata*  
*Rhus typhina*  
*Sambucus canadensis*  
*Vaccinium spp.*  
*Viburnum nudum*  
*Viburnum rufidulum*  
*Xanthorhiza simplicissima*

### **Ground covers**

Lady fern  
Blazing star  
Wood sorrel  
Bird-foot violet

*Athyrium filix-femina*  
*Liatris graminifolia*  
*Oxalis spp.*  
*Viola pedata*

### **Ornamental grasses**

Bluestem/broomstraw  
Virginia wild rye  
Deertongue grass  
Swichgrass  
Indiangrass  
Eastern gamagrass  
River oats

*Andropogon spp.*  
*Elymus virginicus*  
*Dichanthelium candestinum*  
*Panicum virgatum*  
*Sorghastrum nutans*  
*Tripsacum dasyloides*  
*Uniola paniculata*

### **Flowering perennials**

Wild columbine  
Butterfly weed  
Beggar-ticks

*Aquilegia canadensis*  
*Asclepias tuberosa*  
*Bidens spp.*

Partridge pea	<i>Chamaecrista fasciculata</i> (annual, but reseeds well)
Coreopsis	<i>Coreopsis</i> spp.
Butterfly pea	<i>Centrosema virginianum</i>
Queen Anne's lace	<i>Daucus carota</i>
Tickclover	<i>Desmodium</i> spp.
Geum	<i>Geum virginianum</i>
Sunflowers	<i>Helianthus</i> spp.
Blazing star	<i>Liatris scariosa</i>
Cardinal flower	<i>Lobelia cardinalis</i>
Virginia bluebells	<i>Mertensia virginica</i>
Wild bergamot	<i>Monarda fistulosa</i>
Wild sweet William	<i>Phlox divaricata</i>
Black-eyed Susan	<i>Rudbeckia hirta</i>
Fire pink	<i>silene vurginica</i>
Virginia spiderwort	<i>Tradescantia virginiana</i>

A listing of commercial sources for wildlife planting materials may be obtained from the NC Wildlife Resources Commission

### **Plants Deer Don't Usually Like**

Deer sometimes cause a problem for the native plants you use for landscaping. Generally deer do not like plants with aromatic or pungent foliage. Plants with fuzzy leaves, prickly needles, spiny branches and thorns usually discourage deer from eating them. Using plants that combine the tangy with the bitter and the spicy with the prickly will aid you in reducing damage by deer to your native plants.

Listed below are some plants deer do not usually like:

### **Annuals, Biennials and Perennials**

<b><u>Botanical Name</u></b>	<b><u>Common Name</u></b>
<i>Achillea</i> spp.	Yarrow
<i>Aconitum</i> spp.	Monkshead
<i>Aquilegia</i>	Columbine
<i>Amsonia</i>	Blue star
<i>Anemone</i>	Anemone
<i>Asclepias tuberosa</i>	Butterfly Weed
<i>Campanula</i> spp.	Bellflower
<i>Coreopsis</i> spp.	Coreopsis
<i>Cosmos</i>	Cosmos
<i>Delphinium</i>	Delphinium
<i>Dicentra</i>	Bleeding Heart
<i>Ilex</i> spp.	American Holly
<i>Lobelia erinus</i>	Lobelia
<i>Lupinus</i>	Lupine
<i>Monarda didyma</i>	Bee Balm
<i>Myosotis</i>	Forget Me Not

*Oenothera*  
*Rudbeckia*  
*Salvia*  
*Sedum*  
*Senecio aureus*  
*Verbena*  
*Viola*  
*Yucca*

Evening Primrose  
 Blackeyed Susan  
 Salvia  
 Sedum  
 Golden Ragwort  
 Verbena  
 Violet  
 Yucca

### **Trees**

*Alnus*  
*Betula*  
*Carpinus*  
*Castanea*  
*Catalpa*  
*Cedrus*  
*Cercis*  
*Cladrastis*  
*Cornus*  
*Gleditsia*  
*Liquidamber stynaciflua*  
*Liriodendron*  
*Morus*  
*Quercus*  
*Rhus*  
*Robinia*  
*Tsuga*

Alder  
 Birch  
 Hornbeam  
 Chinkapin  
 Catalpa  
 Cedar  
 Redbud  
 Yellow Wood  
 Dogwood  
 Honey Locust  
 Sweet Gum  
 Tulip Tree  
 Mulberry  
 Oak  
 Sumac  
 Black Locust  
 Hemlock

### **Herbs**

*Sassafras*

Sassafras

### **Vines**

*Campsis spp.*  
*Lonicera spp.*  
*Parthenocissus*  
*Wisteria*  
*Vitis*

Trumpet Creeper  
 Honey Suckle  
 Virginia Creeper  
 Wisteria (American & Kentucky)  
 Grape

### **Shrubs**

*Vaccinium*

Blueberry

## NC Native Plant Society – Invasive Exotic Plants in NC – 2011

*Compiled by Misty Franklin Buchanan with review and input from biologists in the following agencies: NC Natural Heritage Program, NC Botanical Garden, University of North Carolina Herbarium, NC Exotic Pest Plant Council, NC DENR Aquatic Weed Control Program, US Fish & Wildlife Service, The Nature Conservancy, the NC Zoo, and volunteers and board members of the NC Native Plant Society.*

The intent of the NC Native Plant Society Invasive Exotic Plant list is to rank exotic (alien, foreign, introduced, and non-indigenous) plants based on their invasive characteristics, to educate the public and resource managers, and to encourage early detection of invasive exotic species so that a rapid response can be implemented when needed. We hope this list will help eliminate the use of invasive exotic plants in landscaping and restoration projects. The 2004 Tennessee Exotic Pest Plant Council Invasive Exotic Plant list was used as a model for organization of this list, but species listed and ranks assigned here are applicable to North Carolina. The NC Native Plant Society Invasive Exotic Plant List is considered a work in progress, and will be evaluated and updated as new information is gathered about these and other species. Please send your comments to:

North Carolina Native Plant Society  
c/o North Carolina Botanical Garden  
Totten Center 3375  
Chapel Hill, NC 27599-3375

**Background:** Many introduced plants have become naturalized in North Carolina and some are replacing our native plant species. Not all exotic species are considered harmful. Invasive plants are usually characterized by fast growth rates, high fruit production, rapid vegetative spread and efficient seed dispersal and germination. Not being native to NC, they lack the natural predators and diseases which would naturally control them in their native habitats. The rapid growth and reproduction of invasive plants allows them to overwhelm and displace existing vegetation and, in some cases, form dense one-species stands. Invasive species are especially problematic in areas that have been disturbed by human activities such as road building, residential development, forest clearing, logging, grazing, mining, ditching, mowing, erosion control, and fire control activities.

Invasive exotic plants disrupt the ecology of natural ecosystems, displace native plant and animal species, and degrade our biological resources. Aggressive invaders reduce the amount of light, water, nutrients and space available to native species. Some cause increased erosion along stream banks, shorelines and roadsides. Some exotics hybridize with related native plant species, resulting in changes to a population's genetic makeup; others have been found to harbor plant pathogens, which can affect both native and non-native plants, including ornamentals. Others contain toxins that may be lethal humans and other animals. Some invasive plants compete with and replace rare and endangered species and encroach upon their limited habitat. Other problems include disruption of native plant-pollinator relationships, tree and shrub mortality due to girdling, reduced establishment of native tree and shrub seedlings, reduction in the amount of space, water, sunlight and nutrients that would be available to native species, and altered fire regimes. Invasive plants also cause economic losses and expenditures each year for agriculture, forestry, and roadside management.

Our native fauna, including insects, birds, mammals, reptiles, fish and other animals, is dependent on native plants for food and shelter. While some animals can feed on a wide number of plant species, others are highly specialized and may be restricted to feeding on several or a single plant species. As exotic plants replace our native flora, fewer host plants are available to provide the necessary nutrition for our native wildlife. In some cases, invasive plants replace nutritious

native plant foods with lower quality sources. Each exotic plant is one less native host plant for our native insects, vertebrates and other organisms that are dependent upon them.

It is important to document the spread of invasive exotic plants into natural areas. When invaders are found outside of landscape plantings, they should be recorded and voucher specimens should be collected for donation to a herbarium.

To reduce invasive plant invasions, we must approach the problem in a variety of ways: stop planting them, prevent accidental introductions, manage existing infestations, minimize disturbance to forests, wetlands, and other natural communities, and learn to work with (rather than against) natural systems and cycles.

**Rank 1 – Severe Threat:** Exotic plant species that have invasive characteristics and spread readily into native plant communities, displacing native vegetation.

**Scientific Name**

*Ailanthus altissima* (Mill.) Swingle  
*Albizia julibrissin* Durz.  
*Alliaria petiolata* (Bieb.) Cavara & Grande  
*Alternanthera philoxeroides* (Mart.) Griseb.  
*Celastrus orbiculatus* Thunb.  
*Elaeagnus umbellata* var. *parvifolia*  
*Hedera helix* var. *helix*  
*Hydrilla verticillata* (L.f.) Royle  
*Lespedeza bicolor* Turczaninow  
*Lespedeza cuneata* (Dum.-Cours.) G. Don  
*Ligustrum sinense* Lour.  
*Lonicera fragrantissima* Lindl. & Paxton  
*Lonicera japonica* Thunb.  
*Microstegium vimineum* (Trin.) A. Camus  
*Murdannia keisak* (Hassk.) Hand.-Mazz.  
*Muriophyllum aquaticum* (Vell.) Verdc.  
*Paulownia tomentosa* (Thunb.) Sieb. & Zucc. ex Steud.  
*Persicaria perfoliata* (Linnaeus) H. Gross (= *Polygonum perfoliatum* L.)  
*Phragmites australis* (Cav.) Trin. ssp. *australis*  
*Pueraria montana* var. *lobata*  
*Pyrus calleryana* Decne.  
*Reynoutria japonica* Houttuyn (*Polygonum cuspidatum*)  
*Rosa multiflora* Thunb.  
*Salvinia molesta* Mitchell  
*Vitex rotundifolia* L.f.  
*Wisteria sinensis* (Sims) DC

**Common Name**

Tree of Heaven  
Mimosa  
Garlic-mustard  
Alligatorweed  
Asian bittersweet  
Spring silverberry, Autumn olive  
English ivy  
Hydrilla  
Bicolor lespedeza  
Sericea lespedeza  
Chinese privet  
Fragrant honeysuckle  
Japanese honeysuckle  
Japanese stilt-grass  
Asian spiderwort  
Parrotfeather  
Princess tree  
Mile-a-minute vine  
Common reed  
Kudzu  
Bradford pear  
Japanese knotweed  
Multiflora rose  
Aquarium water-moss  
Beach vitex  
Chinese wisteria

**Rank 2 – Significant Threat:** Exotic plant species that display some invasive characteristics, but do not appear to present as great a threat to native communities in NC as the species listed in Rank 1.

**Scientific Name**

*Ampelopsis brevipedunculata* (Maxim.) Trautv.  
*Arthraxon hispidus* var. *hispidus*  
*Bambusa* spp.  
*Berberis thunbergii* DC  
*Broussonetia papyrifera* (L.) L'Her. ex Vent.  
*Cardiospermum halicacabum* L.  
*Cayratia japonica* (Thunb. ex Murray) Gagnep.  
*Centaurea stoebe* ssp. *micranthos* (*Centaurea biebersteinii*)  
*Citrus trifoliata* (*Poncirus trifoliata*)  
*Clematis terniflora* DC (= *C. dioscoreifolia*)  
*Conium maculatum* L.  
*Dioscorea polystachya* (*Dioscorea oppositifolia*)  
*Eichhornia crassipes* (Mart.) Solms  
*Euonymus alatus*  
*Euonymus fortunei* (Turcz.) Hand. – Mazz.  
*Ficaria verna* ssp. *ficariiformis* (F.W. Schultz) B. Walln. (= *Ranunculus ficaria*)  
*Glechoma hederacea* L.  
*Humulus japonicus* Siebold & Zuccarini  
*Lamium purpureum* L.  
*Ligustrum japonicum* Thunb.  
*Ligustrum vulgare* L.  
*Lonicera ×bella* [*L. morrowii* × *tatarica*]  
*Lonicera maackii* (Rupr.) Maxim.  
*Lonicera morrowii* A. Gray  
*Lonicera standishii* Jaques  
*Lygodium japonicum* (Thunb. ex Murr.) Sw.  
*Lythrum salicaria* L.  
*Mahonia bealei*  
*Miscanthus sinensis* Andersson  
*Morus alba* L.  
*Myriophyllum spicatum* Komarov  
*Nandina domestica* Thunb.  
*Persicaria longiseta* (de Bruijn) Moldenke (= *Polygonum caespitosum* Blume)  
*Persicaria maculosa* S.F. Gray (= *Polygonum persicaria* L.)  
*Phyllostachys* spp.  
*Pseudosasa japonica* (Sieb. & Zucc. ex Steud.) Makino ex Nakai  
*Rhodotypos scandens* (Thunb.)  
*Rubus phoenicolasius* Maxim.  
*Securigera varia* (*Coronilla varia*)  
*Solanum viarum* Dunal

**Common Name**

Porcelain-berry  
 Basket grass, Hairy jointgrass  
 Exotic bamboo  
 Japanese barberry  
 Paper mulberry  
 Balloonvine  
 Bushkiller  
  
 Spotted knapweed  
 Hardy-Orange  
 Leatherleaf clematis  
 Poison hemlock  
 Air-potato, Chinese yam  
 Water-hyacinth  
 Burning bush, Winged Euonymus  
 Winter creeper  
  
 Lesser Celandine  
 Gill-over-the-ground, ground ivy  
 Japanese Hops  
 Henbit  
 Japanese privet  
 Common privet  
 Hybrid Bush Honeysuckle  
 Amur bush honeysuckle  
 Morrow's bush honeysuckle  
 Standish's Honeysuckle  
 Japanese climbing fern  
 Purple loosestrife  
 Leatherleaf Mahonia, Oregon grape  
 Chinese silver grass  
 White mulberry  
 Eurasian watermilfoil  
 Nandina  
  
 Oriental ladies-thumb  
  
 Lady's-thumb  
 Exotic bamboo  
  
 Arrow bamboo  
 Makino jetbead  
 Wineberry  
 Crown vetch  
 Tropical soda apple

<i>Sorghum halepense</i> (L.) Pers.	Johnson grass
<i>Spiraea japonica</i> L.f.	Japanese spiraea
<i>Stellaria media</i> (L.) Vill.	Common chickweed
<i>Veronica hederifolia</i> L.	Ivyleaf speedwell
<i>Vinca major</i> L.	Bigleaf periwinkle
<i>Vinca minor</i> L.	Common periwinkle
<i>Wisteria floribunda</i> (Willd.) DC	Japanese Wisteria
<i>Xanthium strumarium</i> L.	Common cocklebur
<i>Youngia japonica</i> (L.) DC.	Oriental false hawksbeard

**Rank 3 – Lesser Threat:** Exotic plant species that spread into or around disturbed areas, and are presently considered a low threat to native plant communities in NC.

<b><u>Scientific Name</u></b>	<b><u>Common Name</u></b>
<i>Ajuga reptans</i> L.	Bugleweed
<i>Allium vineale</i> L.	Field garlic
<i>Artemisia vulgaris</i> L.	Mugwort, common wormwood
<i>Arundo donax</i> L.	Giant reed
<i>Baccharis halimifolia</i> L.*	Silverling, groundsel tree
<i>Bromus catharticus</i> var. <i>catharticus</i>	Bromegrass, Rescue grass
<i>Bromus commutatus</i> Schrad.	Meadow brome
<i>Bromus japonicus</i> Thunb. ex Murray	Japanese bromegrass
<i>Bromus secalinus</i> L.	Rye brome
<i>Bromus tectorum</i> L.	Thatch bromegrass, Cheat grass
<i>Buddleja davidii</i>	Butterfly-bush
<i>Cichorium intybus</i>	Chicory
<i>Leucanthemum vulgare</i> ( <i>Chrysanthemum leucanthemum</i> )	Ox-eye daisy
<i>Cirsium vulgare</i> (Savi) Ten.	Bull thistle
<i>Daucus carota</i> L.	Wild carrot, Queen Anne's-lace
<i>Dipsacus fullonum</i> L.	Fuller's teasel
<i>Egeria densa</i> Planch.	Brazilian elodea, Brazilian water-weed
<i>Fatoua villosa</i> (Thunb.) Nakai	Hairy crabweed
<i>Schedonorus pratensis</i> ( <i>Festuca pratensis</i> )	Meadow fescue
<i>Ipomoea quamoclit</i> L.	Cypressvine morningglory
<i>Kummerowia stipulacea</i> (Maxim.)	Makino Korean clover
<i>Kummerowia striata</i> (Thunb.) Schindl.	Japanese clover
<i>Liriope muscari</i> (Dcne.) Bailey	Liriope, Lilyturf
<i>Lysimachia nummularia</i> L.	Moneywort, creeping Jenny
<i>Melilotus albus</i> Medik.	White sweet clover
<i>Melilotus officinalis</i> (L.) Lam.	Yellow sweet clover
<i>Najas minor</i> All.	Brittle naiad
<i>Pastinaca sativa</i> L.	Wild parsnip
<i>Perilla frutescens</i> (L.) Britt.	Beefsteakplant
<i>Populus alba</i> L.	White poplar
<i>Senecio vulgaris</i> L.	Ragwort
<i>Setaria faberi</i> R.A.W. Herrm.	Nodding foxtail-grass
<i>Triadica sebifera</i> (L.) Small	Chinese tallowtree
<i>Tussilago farfara</i> L.	Coltsfoot
<i>Vicia sativa</i> ssp. <i>sativa</i> and <i>Vicia sativa</i> ssp. <i>nigra</i>	Garden vetch, Narrowleaf vetch

\**Baccharis halimifolia* is native to marshes and marsh borders on the outer Coastal Plain in NC, but has spread along road corridors to invade disturbed areas in the Piedmont, which is not considered its native habitat.

**Watch List A:** Exotic plants that naturalize and may become a problem in the future; includes species that are or could become widespread in North Carolina. At this time, more information is needed.

**Scientific Name**

*Arum italicum* ssp. *italicum*  
*Buglossoides arvensis* (L.) I.M. Johnston (L.) I.M.  
*Bupleurum rotundifolium* L.  
*Centaurea cyanus* L.  
*Cyperus entrerianus* Böckler  
*Echium vulgare* L.  
*Elaeagnus pungens* Thunb.  
*Hibiscus syriacus* L.  
*Hypericum perforatum* L.  
*Ornithogalum umbellatum* L.  
*Solanum dulcamara* L.  
*Verbascum thapsus* L.

**Common Name**

Arum, Italian lords and ladies  
 Corn gromwell  
 Hound's-ear, hare's-ear  
 Cornflower  
 Deeprooted sedge  
 Viper's bugloss  
 Thorny olive  
 Rose of Sharon  
 St. John's-wort  
 Star of Bethlehem  
 Climbing nightshade  
 Common mullein

**Watch List B:** Exotic plant species that cause problems in adjacent states but have not yet been reported to cause problems in NC.

**Scientific Name**

*Acer platanoides* L.  
*Akebia quinata* (Houtt.) Dcne.  
*Bromus inermis* Leyss.  
*Carduus nutans* L.  
*Carex kobomugi* Ohwi  
*Cirsium arvense* (L.) Scop.  
*Commelina benghalensis* L.  
*Elaeagnus pungens* Thunb.  
*Hesperis matronalis* L.  
*Imperata cylindrica* (Linnaeus) Palisot de Beauvois  
*Iris pseudacorus*  
*Lonicera tatarica* L.  
*Ludwigia grandiflora* ssp. *grandiflora* (Michx) Greuter & Burdet  
*Melia azedarach* L.  
*Nymphoides cristata* (Roxburgh) Kuntze  
*Pistia stratiotes* L.  
*Potamogeton crispus* L.  
*Quercus acutissima* Carruthers  
*Rhamnus cathartica* L.  
*Setaria italica* (L.) P. Beauv.  
*Setaria verticillata* (L.) Beauv.

**Common Name**

Norway maple  
 Fiveleaf akebia  
 Smooth brome grass  
 Musk thistle  
 Japanese sedge  
 Canada thistle  
 Bengal dayflower  
 Thorny-olive  
 Dame's rocket  
 Cogongrass  
 Yellow flag, Water flag  
 Tartarian honeysuckle  
 Creeping waterprimrose  
 Chinaberry  
 Crested floating heart  
 Water-lettuce  
 Curly pondweed  
 Sawtooth oak  
 European buckthorn  
 Foxtail-millet  
 Bur-foxtail

*Setaria viridis* var. *viridis*  
*Stachys floridana* Shuttlw. ex Benth.  
*Torilis arvensis* (Huds.) Link  
*Tragopogon dubius* Scop.  
*Trapa natans* L.  
*Tribulus terrestris* L.  
*Xanthium spinosum* L.

Green bristle-grass, Green  
millet  
Florida Hedge nettle  
Spreading hedge-parsley  
Yellow goat's-beard  
Water-chestnut  
Puncturevine  
Spiny cocklebur

## Attachment E

### Integrated Use/Impact Minimization Zone (IMZ) Guidelines

Impact Minimization Zones (IMZs) are areas of special environmental concern to PEC. Certain areas are worthy of an additional level of protection that is not afforded to all of the lands covered by the Guidelines for the Use of Leased Properties at Lake Tillery. IMZs offer an increased level of protection to these areas.

Within the individual IMZs, there may be certain aquatic or terrestrial resources or habitat characteristics that need complete protection to avoid environmental degradation of the area. Lake Services will carefully review development within the IMZs, and, in some instances, permits may be denied or modified so as to minimize the impact to environmental resources.

Disturbance, including shoreline clearing and modification, impacts to aquatic vegetation beds including the removal of submerged woody debris, construction of piers, etc., in areas within IMZs requires the approval of the Lake Services staff. Any proposed disturbance must include an impact minimization plan that contains measures to avoid, minimize or mitigate impacts to important environmental features within the IMZ.

There may be special considerations in an area that is contained in an IMZ that would preclude disturbance of any type. Approval of disturbance activities and the plan to minimize the impact of the proposed disturbance will be decided on a case-by-case basis.

Activities in the IMZ are subject to the following restrictions:

- Disturbance of an area within an IMZ may be prohibited.
- Construction of boathouses and docks will not be allowed in the shallow upper ends of coves or lake arms where water depths are considered to be not navigable in normal operating ranges of the reservoir.
- Removal of woody debris will not be allowed without the express written permission of Lake Services. Submerged trunks 10 inches or greater in diameter are considered high-quality fish habitat. Removal of woody debris may require mitigation by lessees, unless the debris constitutes a navigational or safety hazard.
- Construction of new docks will require the design considerations for a fish-friendly pier.
- Construction activities are not allowed except with the express written permission of Lake Services and must be completed by a specified date.
- Land-disturbing activities are not allowed except with the express written permission of Lake Services and must be completed by a specified date.
- No types of dredging are allowed in IMZs.
- Facilities built are restricted to no more than 800 square feet of surface area.
- Only shoreline stabilization through the use of native plant species is allowed in IMZs.
- Piers may not exceed 75 feet in total length or one-third of the total width of a cove at full pond elevation, whichever is less, and should not extend waterward any further than necessary to access a water depth of 6 feet. Lake services may disallow all facilities if the cove is less than 45 feet wide.

All leased properties are subject to the *“Guidelines for the Use of Leased Properties at Lake Tillery”*.

The following practices are encouraged in the IMZs and will be given special consideration by Lake Services staff:

- If structures are permitted, they should incorporate additional structure complexity under piers to create additional fish habitat and use fish friendly pier design considerations.
- Walkways must be 3 feet above the normal full pool elevation and no more than 5 feet wide to minimize disturbance to existing vegetation.

Placement of such structures should also consider orientation of the sun and the potential shading of an existing aquatic vegetation bed.

The design of all structures should be developed such that they avoid environmentally sensitive habitat within the IMZ. Environmentally sensitive habitat includes the shallow end of coves or lake arms, known spawning areas for bedding fish, areas where tributaries enter the lake, and habitat that has been documented to be utilized by any rare, threatened or endangered species.

## **Attachment F**

### **Multi-slip Facilities**

#### **Application Process for Construction or Additions**

Construction of or additions to multi-slip facilities within the Lake Tillery Hydroelectric Development Project Boundary requires Lake Services approval, resource agency consultation and approval by the Federal Energy Regulatory Commission (FERC) before any activities begin. The process requires the following steps:

##### **Step 1**

Contact the Lake Services representative and present proposal. Proposal should include:

- Completed facility application.
- Non-refundable application fee (See Attachment C – Fee Schedule).
- Description, including reason(s) proposal is desired or needed.
- Two scaled drawings of the site showing the proposed additions and all existing facilities within the leased area overlaid on an aerial photograph. One scale drawing should show just the area affected by the additions and associated property and the second scale drawing should show how the proposed additions fit from a large scale view. Include dimensions of additions and other principle structures.
- USGS or similar map showing site location.
- Engineered plan and profile drawings of proposed additions
- Comments from adjacent landowners upon request
- Environmental assessment outlining current existing conditions, expected impacts, and proposed mitigation measures, if necessary.
- Written directions to the property.

Lake Services will review the proposal and determine the merits of continuing the approval process. If the proposal is approved to proceed, a nonrefundable application fee (see “Fee Schedule”) will be required and the applicant will be instructed to consult with the resource agencies (with documentation provided to Lake Services as noted below).

##### **Step 2**

If approved to proceed by Lake Services, the applicant must consult with the resource agencies. Consultation with agencies requires that the entire proposal package be sent to applicable local, state, and federal agencies. Written confirmation of agency consultation and comments must be obtained by the applicant and provided to Lake Services for review. Resolving agency comments is the responsibility of the applicant. In addition, the applicant must provide appropriate documentation to show that the proposed project complies with all local, state, and federal environmental laws and regulations (e.g., N.C. Division of Water Quality Regulations). The proposal, the consultation documents, and resolution of agency comments must be reviewed and deemed appropriate by Lake Services before being forwarded to FERC by the Project Operator or Licensee for approval.

**Step 3**

After the proposal has been reviewed, and it is deemed appropriate to proceed, Lake Services will prepare a package to submit to FERC which will include: (1) the proposal description, drawing and a location map; (2) resource agency comments and applicant responses; and (3) any required license exhibits or other items necessary for FERC review. Approval by FERC is not guaranteed and may involve follow-up correspondence and other FERC mandated activities. Final approval by the Project Operator or Licensee is dependent upon the response of FERC.

**Step 4**

Once construction is complete and a final walk through with a Lake Services representative is conducted to insure compliance with submitted plan, submit detailed "As-built" drawings showing dimensions, to Lake Services.

# **Appendix B**

## **Lake Tillery Shoreline Aquatic Habitat Mapping Study**



**Yadkin Pee-Dee Hydroelectric Project No. 2206  
Tillery Hydroelectric Development**

**Lake Tillery Shoreline  
Aquatic Habitat Mapping Study**

**Progress Energy Carolinas, Inc.**

**November 2011**

## Preface

This copy of the report is not a controlled document as detailed in the *Environmental Services Section Biology Program Quality Assurance Manual*. Any changes made to the original of this report subsequent to the date of issuance can be obtained from:

Manager  
Environmental Services and Strategy  
Progress Energy Carolinas, Inc.  
410 S. Wilmington St.  
Raleigh NC, 27601

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## Executive Summary

A shoreline aquatic habitat mapping study was conducted at Lake Tillery during June through August 2011 to assist in the updating of the Lake Tillery Shoreline Management Plan (SMP) for the Tillery Hydroelectric Development. The study was developed through consultation with resource agencies on May 11, 2011, and was based on a similar study conducted in 2000 for filing the initial Tillery SMP (CP&L 2001) with the Federal Energy Regulatory Commission (FERC). Similar study methods between the 2000 and 2011 allowed a comparison of any shoreline aquatic habitat changes over time since the initial SMP filing. The only difference between the 2000 and 2011 studies was that substrate classifications were not performed in 2011. It was felt that substrate type would not substantially vary over the 10-year period between the studies.

Six habitat types, important to fish and wildlife were identified and mapped during the study. The habitat types were: (1) emergent-submerged aquatic vegetation, (2) water willow beds, (3) water willow-submerged timber-woody debris, (4) submerged timber-woody debris, (5) fringed wetlands, and (6) scrub-shrub habitat.

A total of 1,040 habitat type units were mapped around the entire shoreline of Lake Tillery with water willow beds (86% of the total mapped habitat units) the most frequently mapped habitat type. The second and third most frequently mapped habitat types were water willow-woody debris and submerged timber-woody habitat types, respectively. Water willow was the habitat type that comprised the greatest amount of linear feet of shoreline mapped followed by emergent-submerged aquatic vegetation, scrub-shrub, and submerged timber-woody debris types.

Water willow beds were dispersed throughout the lake and commonly found along developed and undeveloped shoreline units. There were 896 water willow beds mapped throughout Lake Tillery with a total area of 1,119,143 ft<sup>2</sup> or approximately 26 acres. The number of water willow beds  $\geq 100$  ft<sup>2</sup> (shoreline management guidelines cut-off size) comprised 89.4% (801 water willow beds) of the 896 mapped beds. Water willow beds  $< 100$  ft<sup>2</sup> (95 beds) comprised 10.6% of the total mapped beds. By area, water willow beds  $\geq 100$  ft<sup>2</sup> comprised over 99% of the total mapped bed acreage. The total area of water willow beds decreased slightly (11.1%) from 28.9 acres (1,259,535 ft<sup>2</sup>) during the 2000 aquatic habitat mapping study compared to 25.7 acres in the 2011 study. Water willow beds  $\geq 100$  ft<sup>2</sup> decreased about 3 acres from 2000 to 2011. However, the number of individual mapped beds  $\geq 100$  ft<sup>2</sup> increased from 502 beds mapped in the 2000 study to 801 beds mapped in the 2011 study.

Submerged timber-woody debris habitat was scattered throughout the lake shoreline with pockets of this habitat type primarily clustered in the upper portion of the lake on the Morrow Mountain State Park shoreline; in the middle reservoir area across from the Cedar Creek Complex arm of the lake; and in the lower lake adjacent to the Lower Richland Creek arm. This habitat type was associated with steep-sided, deep coves along undeveloped shoreline where trees had fallen into the water due to periodic high winds from storms.

Water willow-submerged timber-woody debris habitat was also scattered throughout the lake and units of this habitat type was most often found in the back of undeveloped coves where wave action accumulated woody debris. Some units of this habitat were also found along developed

shoreline units.

Scrub-shrub habitat was frequently encountered in the upper portion of the lake due to the number of islands just below Falls Dam and the peninsula adjacent to the confluence with the Uwharrie River. This habitat type was also often associated with emergent-submerged aquatic vegetation habitat throughout the lake. Scrub-shrub peninsulas resulted from the formation of sediment deltas at the confluence of lake tributaries.

Fringed wetlands occurred infrequently throughout the lake along undeveloped shoreline, and patches of this habitat type were not concentrated in any particular area of the lake.

Emergent-submerged aquatic vegetation habitat was scattered throughout the lake and most commonly associated with undeveloped shoreline units near the confluence of tributaries. This habitat type is considered important because of the diversity of wetlands habitat present in these units and the associated positive habitat value for fish and wildlife habitat. These units also help to locally protect the lake's water quality. Notable units of this habitat type were near the confluence of the Uwharrie River with the lake; Dutch John Creek; Mountain Creek; Jacobs Creek; Cedar Creek Complex arm; Richmond Creek; and Lower Richland Creek (upstream of the Lilly's Bridge public boating access area).

The number of all mapped habitat units increased from 655 to 1,040 in 2011. Most habitat types increased from 2000 to 2011 with water willow beds having the greatest increase going from 561 beds mapped in 2000 to 896 beds mapped in 2011. Submerged timberwoody debris habitat units increased from 8 to 42; fringed wetland habitat units increased from 11 to 19; water willow-submerged timber-woody debris habitat units increased from 35 to 42; emergent-submerged vegetation habitat units increased from 15 to 16. The scrub shrub habitat type remained unchanged from 2000 to 2011 with 25 habitat units mapped.

The linear amount of shoreline coverage by all habitat types increased from 188,868 feet mapped in 2000 to 190,284 feet in 2011. Submerged timber-woody debris linear shoreline coverage increased by 70.2%; fringed wetland coverage increased by 44.1%; and scrub-shrub coverage increased by 17.3%. Water willow-submerged timber/woody debris coverage decreased by 46.6%; water willow bed linear shoreline coverage decreased by 5.4%; and emergent-submerged vegetation linear shoreline coverage decreased by 0.7%.

Spatial changes in habitat types from 2000 to 2011 showed no consistent pattern throughout the lake. Increases of submerged timber-woody debris occurred mainly along undeveloped shoreline in the main lake. Spatial changes in water willow beds were a result of either smaller beds previously mapped or new beds observed in 2011 when compared to the 2000 habitat distribution. There were no discernable spatial patterns in changes with the other habitat types during the 11-year period.

## Introduction

The purpose of this study was to identify and map six major types of aquatic habitat present along the shoreline and littoral zone of Lake Tillery. The overall goal of the study was to provide information for updating the Lake Tillery Shoreline Management Plan (SMP) for the Tillery Hydroelectric Development (Yadkin Pee Dee Hydroelectric Project No. 2206). This study was developed through consultation with resource agencies on May 11, 2011 and was based on a similar study conducted in 2000 for filing the initial Tillery SMP (CP&L 2001) with the Federal Energy Regulatory Commission (FERC). Similar study methods between the 2000 and 2011 allowed a comparison of any shoreline aquatic habitat changes over time since the initial SMP filing.

Shoreline aquatic and riparian habitat provides important habitat units for fish and other wildlife, such as reptiles (snakes and, turtles), amphibians (frogs, salamanders, etc.), and birds (raptors, waterfowl, wading birds, and neotropical migratory birds). These units provide important reproductive, rearing and, foraging units for a variety of fish and other wildlife species. Another function is to locally protect the lake's water quality. Finally, these units may have aesthetic appeal to some user groups who utilize the lake for recreational purposes. Development of the Lake Tillery SMP has taken into consideration the various aquatic shoreline habitat units that are important in fulfilling these fish and wildlife life cycle functions, particularly in identifying unique natural and sensitive aquatic habitats and limiting or prohibiting development in these identified units within the lake.

## Study Objectives

The objectives of this study were to: (1) map the aquatic shoreline habitat of Lake Tillery utilizing Global Positioning System (GPS)/Geographical Information System (GIS) data collection techniques, (2) identify shoreline units that were considered of high value based on habitat diversity attributes such as sensitive spawning or rearing units, foraging units, or protective cover units for fish and/or other wildlife, and (3) identify aquatic plants (submerged, emergent, and floating vegetation types) and wildlife observed during the field habitat mapping phase of the study.

## Study Site Description

Lake Tillery is a mestrophic lake with a surface area of 5,697 acres, a shoreline length of approximately 120 miles, and a drainage area of 4,834 square miles (Progress Energy 2006). The lake is 15 miles in length with a mean depth of 33 ft, and a maximum depth of 69 feet. Land use around the impoundment is primarily forest, agricultural, pasture, and residential development (NCDWQ 2008). The N.C. Division of Water Quality (NCDWQ) has classified the lake as WS-IV, B CA, which is suitable for drinking water supplies and other consumptive uses and primary and secondary recreation (NCDWQ 2010).

The Uwharrie River enters Lake Tillery to form the Pee Dee River at the confluence with the Yadkin River in the uppermost portion of the lake (Figure 1). Other named tributaries entering the reservoir include Sugar Loaf Creek, Mountain Creek, Little Mountain Creek, Jacobs Creek,

Cedar Creek, Rocky Creek, Big Island Creek, Wood Run Creek, Upper Wood Run Creek, Davids Creek, Bunny Creek, Richmond Creek, Lower Richland Creek, and Dutch John Creek (NCDWQ 2010). Morrow Mountain State Park borders the western shoreline in the upper portion of the impoundment located in Stanly County. The Uwharrie National Forest bounds the eastern shoreline of the upper portion of the lake in Montgomery County.

## Methods

Progress Energy followed the same study methods used in the 2000 shoreline aquatic habitat mapping study (CP&L 2001). Using the same study methodology allowed a direct comparison in any changes of the various shoreline aquatic habitat types over time and any necessary adjustments in the shoreline aquatic habitat classifications and SMP Guidelines. The 2000 study methods were review and approved by the N.C. Wildlife Resources Commission and the U.S. Fish & Wildlife Service and filed with FERC during December 2001 as part of the initial SMP for the Tillery Hydroelectric Development. To validate the 2011 study methods, a meeting and subsequent field site visit was conducted on May 11, 2011, with N.C. Wildlife Resources Commission, N.C. Division of Water Quality, N.C. Division of Parks & Recreation, N.C. Natural Heritage Program, the Louis Berger Group, and Progress Energy. Those agencies present during this meeting agreed that using the same study methods to map the shoreline aquatic habitat for updating the Lake Tillery SMP was the appropriate approach. The only difference between the 2000 and 2011 studies was that substrate classifications were not performed in 2011. It was felt that substrate type would not substantially vary over the 10-year period between the studies.

Six habitat types were identified and defined as:

**(1) Habitat Type 1 (ESWT designation code)**—Emergent-submerged wetlands aquatic vegetation habitat is defined as a diverse assemblage of herbaceous and woody plant species (not dominated by one species) in relatively shallow water habitat (generally less than 6 feet deep) and associated with a tributary stream.

**(2) Habitat Type 2 (SCSB designation code)**—Scrub-shrub delta and island habitat has a diverse assemblage of herbaceous and woody plants and; associated with tributary streams, deltas or islands; and are transitional units from terrestrial to aquatic habitat types.

**(3) Habitat Type 3 (WWBD designation code)**—Water willow bed habitat is defined as beds having at least four square feet (4ft<sup>2</sup>) in aerial coverage; sparse sprigs or isolated beds less than this areal coverage will not be mapped.

**(4) Habitat Type 4 (WWWD designation code)**—Water willow and submerged timber-woody debris habitat is defined as a mixture of these types, typically associated with the back of coves with either a continuous or intermittent tributary stream.

**(5) Habitat Type 5 (STWD designation code)**—Submerged timber-woody debris habitat consists of downed trees submerged in coves with at least 5 trees per 100 linear feet with diameters of 10 inches or greater at the trunk base. This habitat type is generally associated with

deep water in a large portion of a cove or along main channel shoreline (10-20 feet in depth).

**(6) Habitat Type 6 (FRWT designation code)**—Fringed wetland habitat has a diverse assemblage of herbaceous and woody plant (emergent-submerged and scrub-shrub) species in shallow water habitat (less than 6 feet) located along shoreline and not associated with a tributary stream.

All water willow beds ( $\geq 4\text{ft}^2$ ) were re-mapped. The other habitat types were evaluated based on the results from the 2000 mapping study to determine if those units have significantly changed in linear footage. If there was a change of 5% or greater in linear feet or new units identified (e.g. submerged timber-woody debris), then the habitat types were mapped.

The shoreline units of each habitat type were mapped (including any island or peninsula habitats with scrub-shrub wetland and terrestrial vegetation) according to the methods given above. Field note lists were compiled of the vegetation types in the mapped area. Identifications were made to at least genus level, and species level, if taxonomic characteristics permit (NCSU 2010). For wetlands units (Habitat Types 1 and 6), the areal coverage of each vegetation type was qualitatively estimated in the field notes and only mapped with GPS if the areal coverage exceeded 50% of the mapped area (including submerged aquatic vegetation). Water willow beds (Habitat Type 3) were mapped for areal size with the GPS equipment. If vegetation obstructions hindered use of the GPS equipment (acquisition of satellites), then manual on-ground dimensional measurements were made with a field measuring tape and entered into a field database which was linked to the GIS mapping data. Areal estimates were also made for Habitat Type 4—water willow and submerged timber-woody debris. Generally, this habitat was located in the back of coves. The shoreline was mapped for submerged timber-woody debris units (Habitat Type 5), and no areal coverage was made for this habitat type. Any piers, docks, or other manmade structures located in the mapped units were recorded and entered into field notes regarding the type and extent of development.

Habitat Types 1 and 6 were commonly referred to as “wetlands”; but, these units were not strictly delineated as jurisdictional wetlands during this study according to criteria specified by the U.S. Corps of Engineers. These units, however, had several attributes, such as high diversity of aquatic vegetation species and standing water, which were indicative of wetlands.

U.S. Geological Survey topographical maps, aerial photos, and data collected in the 2000 study were also used to identify mapped units as part of the field data collection. Digital photographs and/or other digital videography were taken of all mapped units with the exception of water willow beds. Representative photographs were taken of this habitat type. Other ancillary information, such as aquatic or terrestrial wildlife actively using mapped habitats, was recorded in field notes during the study. Any other significant features that were of interest were also recorded in the field notes.

Shoreline habitat mapping of Lake Tillery was conducted from June through August 2011. The entire lake shoreline was traversed with an airboat, habitat identified, and mapped electronically with a Global Positioning System (GPS) instrument (Trimble Geo XT with sub-meter accuracy).

The GPS data were differentially corrected for true geographical position using post-processing techniques (i.e., base station correction data). If differential corrections were unavailable, manual hand corrections were made. The GPS data were recorded in ARCVIEW electronic data files and imported into GIS for map compilation of shoreline habitat types. Because of time constraints, most habitat types were mapped as linear distances; however, in some instances, the areal coverage was also obtained (e.g., water willow bed). Shoreline linear distances were calculated using the shoreline length that a given habitat covers and the perimeter of units mapped.

During habitat mapping, observations were made on the terrestrial (riparian) and aquatic vegetation types present in each mapped area. Dominant vegetation types were qualitatively ranked as those species comprising at least 10% of the areal coverage in the mapped area. Identification of plants was made to at least genus level, and species level, where taxonomic characteristics permitted. Taxa lists of plants and wildlife observed during the habitat mapping were compiled for each habitat type.

Habitat types were recorded with the character nomenclature and sequential numbers assigned to mapped units within each habitat type (e.g., third wetland area mapped in the lake—ESWT-3). An effort was made to match these habitat number designations to units formally mapped in the 2000 study with the exception of water willow beds and water willow woody debris units.

A voucher collection of new vegetation types will be established and maintained at Progress Energy's herbarium located at the Harris Visitors Center. Vegetation specimens collected during the study will be compared to existing voucher specimens catalogued in the herbarium collection. This collection will be the basis of correct identification of wetland plant types. References that may be used for plant identification include Beal (1977) and Schmidt (1990).

## Results and Discussion

A total of 1,040 habitat type units were mapped along the entire shoreline of Lake Tillery (Table 1). Water willow beds (WWBD) were the most frequently mapped habitat type and comprised approximately 86% of the total mapped habitat types. The second and third most frequently mapped habitat types were water willow-woody debris and submerged timber-woody habitat types, respectively (Table 1). Water willow beds also had the most mapped linear feet, followed by emergent/submerged aquatic vegetation, scrub-shrub, and submerged timber-woody debris units (Table 1). The distribution of mapped shoreline aquatic habitat types throughout the lake is shown in Figure 8.

Water willow was commonly encountered in developed and undeveloped shoreline units throughout the lake and some extensive beds occurred in the vicinity of boat docks and shoreline bulkheads (Figure 8). There were 896 water willow beds mapped throughout Lake Tillery with a total area of 1,119,143 ft<sup>2</sup> or approximately 26 acres (Table 1). The number of water willow beds  $\geq$  100 ft<sup>2</sup> (shoreline management guidelines cut-off size<sup>6</sup>) was 801 beds (89.4% of the 896

<sup>6</sup> FERC Order 112 PERC ¶62. 189 (Issued September 1, 2005) approved 100 ft<sup>2</sup> as the management guideline size for protection and enhancement of water willow beds in Lake Tillery. Progress Energy uses greater than or

mapped beds) compared to 95 beds  $< 100 \text{ ft}^2$  (10.6% of total mapped beds). Water willow beds  $\geq 100 \text{ ft}^2$  comprised over 99% of the total mapped area of 26 acres. By area, water willow beds  $\geq 100 \text{ ft}^2$  comprised over 99% of the total mapped bed acreage. The total area of all mapped water willow beds decreased slightly (11.1%) from 28.9 acres (1,259,535  $\text{ft}^2$ ) in the 2000 aquatic habitat mapping study compared to 25.7 acres in the 2011 study (Progress Energy 2005). Water willow beds  $\geq 100 \text{ ft}^2$  decreased about 3 acres from 2000 to 2011. However, the number of individual mapped beds  $\geq 100 \text{ ft}^2$  increased from 502 beds mapped in the 2000 study to 801 beds mapped in the 2011 study.

This perennial habitat type provides protective cover and feeding units for young and adult fish. Water willow provides a seasonal cover during the spring through autumn months and senesces with colder temperatures and shorter daylight length associated with winter months.

Water willow-submerged timber-woody debris (WWWD) units were also scattered throughout the lake, and pockets of this habitat type were most often found in the back of undeveloped coves where wave action accumulated woody debris. Some pockets of this habitat were found along developed shoreline units. This habitat also provided protective cover for juvenile fish nesting units for nest-building centrarchids, and basking units for amphibians and reptiles.

Submerged timber-woody debris (STWD) habitat units were also scattered along the lake shoreline with pockets of this habitat clustered in the upper portion of the lake on the Morrow Mountain State Park west shoreline; in the middle lake area across from the Cedar Creek Complex; and in the lower lake adjacent to the Lower Richland Creek arm (Figure 8). This habitat type was most often associated with steep-banked, deep coves along undeveloped shoreline where trees had fallen into the water due to periodic high winds from storms. This habitat also provides protective cover for both juvenile and adult fish, fish spawning units in the shallower parts of the coves, and basking units for amphibians and reptiles.

Scrub-shrub habitat (SCSB) was frequently encountered in the upper portion of the lake due to the number of islands just below Falls Dam and the peninsula adjacent to the confluence with the Uwharrie River (Figures 1 and 8). This habitat type was often associated with emergent-submerged wetlands aquatic vegetation habitat type throughout the lake. With the exception of islands, scrub-shrub habitat was most likely formed as the result of sedimentation input from adjacent tributaries part which formed silt deltas of a delta that resulted from sediment accumulation over time.

Fringed wetlands (FRWT) also occurred infrequently throughout the lake, mainly along undeveloped shoreline units (Figure 8). These patches of habitat were not concentrated in any particular area of the lake.

Emergent-submerged wetlands aquatic vegetation (ESWT) habitat units were also scattered throughout the lake and commonly associated with undeveloped shoreline units near the confluence of tributaries (Figure 8). Notable units of this habitat type were near the confluence of the Uwharrie River with the lake, the Mountain Creek arm, the Jacobs Creek arm, the Cedar

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equal to  $100 \text{ ft}^2$  for water willow beds as part of its shoreline permitting guidelines.

Creek Complex arm, the Richmond Creek arm, and the Lower Richland Creek arm (adjacent to Lilly's Bridge boating access area). These units are considered of high wildlife habitat value because of the diversity of aquatic vegetation, the local water quality protection benefits, and the shallow backwater nature of this habitat type. Centrarchids (sunfish family) spawning nests were frequently encountered in emergent-submerged aquatic vegetation units. Additionally, this habitat also provided important breeding units for reptiles and amphibians and foraging and resting habitat for waterfowl, wading birds, and raptors.

A total of 38 aquatic and riparian terrestrial plant taxa were observed for both water willow bed and water willow-woody debris habitat types; 39 plant taxa for the submerged timber-woody debris habitat type; 40 plant taxa for the emergent-submerged aquatic vegetation habitat type; 41 plant taxa for the fringed wetland habitat type; and 55 plant taxa for the scrub-shrub habitat type (Table 3).

Dominant plant taxa that were most frequently associated with the emergent-submerged aquatic vegetation habitat and fringed wetlands habitat types included arrowhead, black willow, common cat-tail, common rush, creeping water primrose, great bulrush, pickerelweed, rose mallow, tag alder, unidentified panic grass species, and water willow (Table 3).

For scrub-shrub habitat, the dominant species were black willow, common rush, green ash, loblolly pine, red maple, tag alder, water oak, and water willow.

Lyngbya (filamentous blue-green algae), red maple, sweet gum, tag alder, green ash, loblolly pine, red cedar, sourwood, southern red oak, sycamore, tulip poplar, and water willow were dominant taxa in either the water willow-woody debris or submerged timber-woody debris habitat types.

Water willow bed habitat had the following dominant plant taxa—water willow, dodder (parasitic plant associated with water willow), Lyngbya, and tag alder.

The number of habitat area types increased from 655 to 1,040 in 2011 (Tables 1 and 2). Most of the habitat types increased from 2000 to 2011 with water willow beds having the greatest increase going from 561 beds mapped in 2000, to 896 beds mapped in 2011. Submerged timber-woody debris habitat units increased from 8 to 42; fringed wetland habitat units increased from 11 to 19; water willow-submerged timber-woody debris habitat units increased from 35 to 42; emergent-submerged wetlands aquatic vegetation habitat units increased from 15 to 16. Scrub-shrub habitat types stayed the same in both years surveyed with 25 habitat area mapped.

The linear shoreline shore line coverage by all habitat types increased from 188,868 feet mapped in 2000, to 190,284 feet in 2011. Submerged timber-woody debris linear shoreline coverage increased by 70.2%; fringed wetland linear shoreline coverage increased by 44.1%; and scrub-shrub linear shoreline coverage increased by 17.3%. Water willow-submerged timber-woody debris linear shoreline coverage decreased by 46.6%; water willow bed linear shoreline coverage decreased by 5.4%; and emergent-submerged wetlands aquatic vegetation linear shoreline coverage decreased by 0.7%.

Spatial changes in habitat types from 2000 to 2011 showed no consistent pattern throughout the lake. Increases of submerged timber-woody debris occurred mainly along undeveloped shoreline in the main lake. Spatial changes in water willow beds were a result of either smaller beds previously mapped or new beds observed in 2011 when compared to the 2000 habitat distribution. There were no discernable spatial patterns in changes with the other habitat types during the 11-year period.

## Summary

A shoreline habitat mapping study was conducted at Lake Tillery during June through August 2011. The overall goal of the study was to provide information for updating the Lake Tillery Shoreline Management Plan (SMP) for the Tillery Hydroelectric Development (Yadkin-Pee Dee Hydroelectric Project No. 2206). The study was developed through consultation with resource agencies on May 11, 2011 and was based on a similar study conducted in 2000 for filing the initial Tillery SMP (CP&L 2001) with the Federal Energy Regulatory Commission (FERC) during December 2001. Similar study methods between the 2000 and 2011 allowed a comparison of any shoreline aquatic habitat changes over time since the initial SMP filing. The only difference between the 2000 and 2011 studies was that substrate classifications were not performed in 2011. It was felt that substrate type would not substantially vary over the 10-year period between the studies.

A total of 1,040 habitat types units were mapped around the entire shoreline of Lake Tillery with water willow beds (86% of the total mapped habitat units) the most frequently mapped habitat type. The second and third most frequently mapped habitat types were water willow-woody debris and submerged timber-woody habitat types, respectively. Water willow was also the habitat type with the most linear feet mapped followed by emergent/submerged aquatic vegetation, scrub-shrub, and submerged timber-woody debris units.

Water willow beds were dispersed throughout the lake and commonly found in developed and undeveloped shoreline units. There were 896 water willow beds mapped throughout Lake Tillery with a total area of 1,119,143 ft<sup>2</sup> or approximately 26 acres. The number of water willow beds  $\geq 100$  ft<sup>2</sup> (shoreline management guidelines cut-off size) was 801 beds (89.4% of the 896 mapped beds) compared to 95 beds  $< 100$  ft<sup>2</sup> (10.6% of total mapped beds). Water willow beds  $\geq 100$  ft<sup>2</sup> comprised over 99% of the total mapped area of 26 acres. By area, water willow beds  $\geq 100$  ft<sup>2</sup> comprised over 99% of the total mapped bed acreage. The total area of all mapped water willow beds decreased slightly (11.1%) from 28.9 acres (1,259,535 ft<sup>2</sup>) in the 2000 aquatic habitat mapping study compared to 25.7 acres in the 2011 study. Water willow beds  $\geq 100$  ft<sup>2</sup> area decreased about 3.2 acres from 2000 to 2011. However, the number of individual mapped beds  $\geq 100$  ft<sup>2</sup> increased from 502 beds mapped in the 2000 study to 801 beds mapped in the 2011 study.

Spatial changes in habitat types from 2000 to 2011 showed no consistent pattern throughout the lake. Increases of submerged timber-woody debris occurred mainly along undeveloped shoreline in the main lake. Spatial changes in water willow beds were a result of either smaller beds

previously mapped or new beds observed in 2011 when compared to the 2000 habitat distribution. There were no discernable spatial patterns in changes with the other habitat types during the 11-year period.

A total of 38 aquatic and riparian terrestrial plant taxa were observed for both water willow bed and water willow-woody debris habitat types; 39 plant taxa for the submerged timber-woody debris habitat type; 40 plant taxa for the emergent-submerged aquatic vegetation habitat type; 41 for the fringed wetland habitat type; and 55 plant taxa for the scrub-shrub habitat type. Generally, the number of aquatic plant species was greater for wetland types of habitat—emergent-submerged aquatic vegetation habitat and fringed wetlands habitat. Scrub-shrub habitat units had a greater number of terrestrial riparian vegetation taxa compared to aquatic vegetation taxa.

Submerged timber-woody debris habitat units occurred infrequently along the lake shoreline with pockets of this habitat clustered in the upper portion of the lake on the Morrow Mountain shoreline; in the middle lake area across from the Cedar Creek Complex arm of the lake; and in the lower lake adjacent to the Lower Richland Creek arm of the lake. This habitat type was most often associated with steep-banked, deep coves along undeveloped shoreline where trees had fallen into the water due to periodic high winds from storms.

Water willow-submerged timber-woody debris units were also scattered throughout the lake and pockets of this habitat type were most often found in the back of undeveloped coves where wave action accumulated woody debris. Some pockets of this habitat were found in developed shoreline units.

Scrub-shrub habitat was frequently encountered in the upper portion of the lake due to the number of islands just below Falls Dam and the peninsula adjacent to the Uwharrie River confluence. This habitat type was often associated with emergent-submerged aquatic vegetation habitat throughout the lake. Scrub-shrub habitat was most likely formed as the result of sedimentation input from adjacent tributaries part which formed silt deltas that resulted from sediment accumulation over time.

Fringed wetlands occurred infrequently throughout the lake, mainly along undeveloped shoreline units, and patches of this habitat type were not concentrated in any particular area of the lake.

Emergent-submerged aquatic vegetation habitat units were scattered throughout the lake and commonly associated with undeveloped shoreline units near the confluence of tributaries. These units were often considered as environmental natural or sensitive units because of the wetlands vegetation diversity, the local water quality protection benefits, and the high value shallow water habitat present for fish and wildlife. Notable units of this habitat type were near the confluence of the Uwharrie River with the lake, the Mountain Creek arm, the Jacobs Creek arm, the Cedar Creek Complex arm, the Richmond Creek arm, and the Lower Richland Creek arm (adjacent to Lilly's Bridge boating access area).

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**Table 1. Shoreline habitat types and total linear distance (feet) of each habitat type mapped in Lake Tillery during June-August 2011.**

<b>Habitat Type</b>	<b>Number of Mapped Units</b>	<b>Total Linear Distance (Feet) of Mapped Habitat</b>
Emergent-submerged vegetation	16	52,304
Scrub-shrub units	25	26,463
Water willow beds	896	76,631
Water willow-submerged timber-woody debris	42	8,697
Submerged timber-woody debris	42	17,186
Fringed wetlands	19	9,003
<b>Total mapped habitat units</b>	<b>1,040</b>	<b>190,284</b>

**Table 2. Shoreline habitat types and total linear distance (feet) of each habitat type mapped in Lake Tillery during July-August 2000.<sup>+</sup>**

<b>Habitat Type</b>	<b>Number of Mapped Units</b>	<b>Total Linear Distance (Feet) of Mapped Habitat</b>
Emergent-submerged vegetation	15	52,681
Scrub-shrub units	25	22,552
Water willow beds	561	81,001
Water willow-submerged timber-woody debris	35	16,290
Submerged timber-woody debris	8	10,096
Fringed wetlands	11	6,248
<b>Total mapped habitat units</b>	<b>655</b>	<b>188,868</b>

<sup>+</sup> Revisions were made to the linear distance (feet) of mapped habitat from the 2000 shoreline aquatic habitat mapping results after an error in calculation was identified during a Quality Control review of the 2000 GIS data.

**Table 3. Plant and wildlife species observed for each habitat type during the Lake Tillery shoreline aquatic habitat mapping study, June-August 2011.**

Habitat Type <sup>+</sup>	Plant species	Wildlife species
<b>Emergent Submerged Wetlands (ESWT)</b>	Arrowhead <sup>□</sup> Black willow <sup>□</sup> Bladderwort Blue false indigo Brittle naiad Bulrush Button bush Common cat-tail <sup>□</sup> Common duckweed Common rush <sup>□</sup> Creeping water primrose <sup>□</sup> Dodder (parasitic plant) Elephant ear Elderberry Four-angled spike-rush Giant duckweed Great bulrush <sup>□</sup> Honey locust Hop-like sedge Hydrilla Lizard tail Lyngbya (bluegreen algae) Mock Bishop's-weed Muskgrass Pickerelweed <sup>□</sup> Poison ivy Rose mallow <sup>□</sup> Smartweed Southern naiad Spadder dock Spike-rush St. John's wort Tag alder <sup>□</sup> Umbrella sedge Unidentified bulrush species Unidentified panic grass species <sup>□</sup> Unidentified sedge species Water oak Water willow <sup>□</sup> Wild Celery	Banded water snake Barn swallow Belted kingfisher Bluegill Colonial bryozoans Common crow Gizzard shad Grass carp Great blue heron Great egret Green heron Kildeer Largemouth bass Mallards Muskrat Osprey Painted turtle Redwing blackbird Unidentified Song birds Water turkey
<b>Total ESWT Taxa</b>	<b>40</b>	<b>20</b>

Table 3 (continued)

Habitat Type <sup>+</sup>	Plant species	Wildlife species
<b>Scrub Shrub (SCSB)</b>	American holly Arrowhead Beech Black gum Black willow <sup>□</sup> Blue false indigo Blueberry Bulrush Button bush Common cat-tail Common rush <sup>□</sup> Creeping water primrose Dodder (parasitic plant) Dogwood Elderberry Green ash <sup>□</sup> Hickory Honey locust Hydrilla Lespedeza Loblolly pine <sup>□</sup> Mimosa Mistletoe Muskgrass (Chara) Persimmon Pickerelweed Poison ivy Pokeweed Red cedar Red maple <sup>□</sup> River birch Rose mallow Sassafras Shortleaf pine Cat briar (Smilax) Sourwood Southern red oak Spike rush St. John's wort Sumac species Swamp bay Sweetgum Sycamore Tag alder <sup>□</sup> Tulip poplar	Bald eagle Barn swallow Belted kingfisher Bluegill Common crow Gizzard shad Grass carp Great blue heron Great egret Green heron Mallards Painted turtle Redwing blackbird

Table 3 (continued)

Habitat Type <sup>+</sup>	Plant species	Wildlife species
<b>Scrub Shrub (SCSB)</b>	Unidentified hickory species Unidentified panic grass species Virginia creeper Water oak <sup>□</sup> Water willow <sup>□</sup> White mulberry White oak Wild grape Willow oak Winged sumac	
<b>Total SCSB Taxa</b>	<b>55</b>	<b>13</b>

Table 3 (continued)

Habitat Type <sup>+</sup>	Plant species	Wildlife species
<b>Water Willow Bed (WWBD)</b>	Arrowhead Black willow Blue false indigo Brittle naiad Button bush Common cattail Common duckweed Creeping water primrose Dodder (parasitic plant) <sup>□</sup> Dogbane Dogwood Elephant ear Elderberry Four-angled sedge Honey locust Hydrilla Knot weed Lizard tail Lyngbya (bluegreen algae) <sup>□</sup> Mimosa Morning glory Muskgrass (Chara) Paw-paw Pickerelweed Pokeberry Red bud River birch Rose mallow Silky dogwood Smartweed Smilax Tag alder <sup>□</sup> Unidentified bulrush species Water oak Water willow <sup>□</sup> Wild grape Winged sumac Wisteria	American coot Bald eagle Banded water snake Barn swallow Belted kingfisher Bluegill Canada goose Channel catfish Colonial bryozoans Common crow Eastern mosquitofish Gizzard shad Golden shiner Great blue heron Grass carp Green heron Grey squirrel Largemouth bass Mallards Mourning dove Muskrat Osprey Painted turtle Redbreast sunfish Ruby throated hummingbird Threadfin shad Wood duck Whitetail deer Yellow perch
<b>Total WWBD Taxa</b>	<b>38</b>	<b>29</b>

Table 3 (continued)

Habitat Type <sup>+</sup>	Plant species	Wildlife species
<b>Water Willow Submerged Timber Woody Debris (WWWD)</b>	American holly	Belted kingfisher
	Arrowhead	Bluegill
	Black gum	Common crow
	Blue false indigo	Gizzard shad
	Button bush	Grass carp
	Common duckweed	Great blue heron
	Creeping water primrose	Green heron
	Dodder (parasitic plant)	Largemouth bass
	Dogwood	Mallards
	Elderberry	Osprey
	Elephant ear	Painted turtle
	Giant duckweed	Snapping turtle
	Green ash	Wood thrush
	Honey locust	Yellow perch
	Lizards tail	
	Loblolly pine	
	Lyngbya (bluegreen algae) <sup>□</sup>	
	Pickerelweed	
	Pondweed	
	Red cedar	
	Red elm	
	Red maple <sup>□</sup>	
	River birch	
	Rose mallow	
	Scarlett oak	
	Silky dogwood	
	Sourwood	
	Southern red oak	
	Sweetgum <sup>□</sup>	
	Sycamore	
	Tag alder <sup>□</sup>	
	Tulip poplar	
	Virginia pine	
	Water fern	
	Water oak	
	Water willow <sup>□</sup>	
	White oak	
	Wild grape	
<b>Total WWWD Taxa</b>	<b>38</b>	<b>14</b>

Table 3 (continued)

Habitat Type <sup>+</sup>	Plant species	Wildlife species
<b>Submerged Timber Woody Debris (STWD)</b>	American holly Arrow head Beech Black gum Black oak Chestnut oak Dogwood Green ash <sup>□</sup> Hackberry Hickory species Honey locust Loblolly pine <sup>□</sup> Lyngbya (bluegreen algae) Mockernut hickory Persimmon Red cedar <sup>□</sup> Red elm Red maple <sup>□</sup> River birch Scarlet oak Silky dogwood Shortleaf pine Sourwood <sup>□</sup> Southern red oak <sup>□</sup> Swamp bay Swamp chestnut oak Sweet gum <sup>□</sup> Sycamore <sup>□</sup> Tag alder Trumpet creeper Tulip poplar <sup>□</sup> Virginia pine Water oak Winged elm Winged sumac Witch hazel White oak Wild grape Willow oak	Bald eagle Banded water snake Belted kingfisher Bluegill Gizzard shad Great blue heron Painted turtle Pumpkinseed Redbreast sunfish Wood duck
<b>Total STWD Taxa</b>	<b>39</b>	<b>10</b>

Table 3 (continued)

Habitat Type <sup>+</sup>	Plant species	Wildlife species
<b>Fringed Wetland (FRWT)</b>	American holly Arrowhead <sup>□</sup> Black willow Blue false indigo Brittle naiad Bulrush Button bush Common cat-tail Common duckweed Common rush <sup>□</sup> Creeping water primrose Dodder (parasitic plant) Elephant ear Giant duckweed Great bulrush Green ash Honey locust Hydrilla Japanese grass Knot weed Loblolly pine Mimosa Muskgrass (Chara) Pickerelweed <sup>□</sup> Red cedar Red maple River birch Rose mallow <sup>□</sup> Smartweed Southern najas Southern red oak Spike-rush St. John's Wart Sweetgum Sycamore Tag alder <sup>□</sup> Tulip poplar Unidentified panic grass Water oak Water willow <sup>□</sup> Willow oak	Barn swallow Belted kingfisher Canada goose Muscovy duck Gizzard shad Great blue heron Green heron Kingbird Mallards Painted turtle Redwing blackbird White-tailed deer
<b>Total FRWT Taxa</b>	<b>41</b>	<b>12</b>

**Table 3 (continued)**

- <sup>+</sup> Habitat type designations were as follows: (1) ESWT—emergent-submerged wetlands aquatic vegetation habitat, (2) SCSB—scrub-shrub habitat consisting of islands or peninsulas associated with emergent-submerged wetlands aquatic vegetation habitat. (3) WWBD—water willow bed habitat, (4) WWWD—water willow-submerged timber-woody debris habitat, (5) STWD—submerged timber-woody debris habitat, and (6) FRWT—fringed wetlands habitat.
- <sup>□</sup> The vegetation type was judged as a dominant species in the mapped habitat, having an aerial coverage of at least 10%.

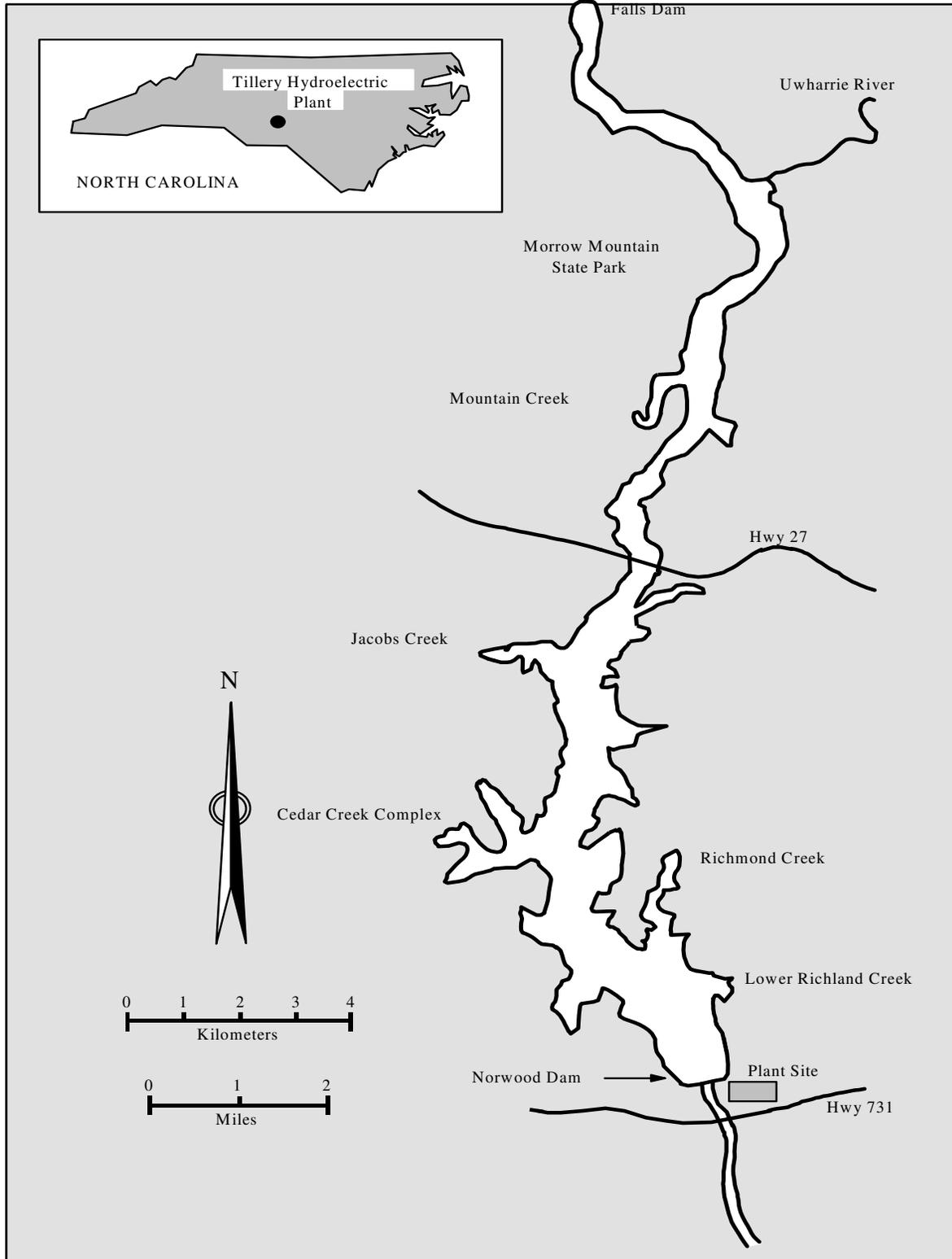


Figure 1. Map of Lake Tillery, North Carolina.



**Figure 2.** Photograph of emergent-submerged wetlands aquatic vegetation habitat type located in Dutch John Creek arm of Lake Tillery.



**Figure 3.** Photograph of scrub-shrub habitat type associated with emergent-submerged wetlands aquatic vegetation habitat type located at the Jacobs Creek confluence in Lake Tillery.



**Figure 4.** Photograph of water willow bed habitat type associated with developed shoreline located in the lower Richmond Creek arm of Lake Tillery.



**Figure 5.** Photograph of water willow-submerged timber-woody debris habitat associated with shoreline near the mouth of Rocky Creek in Lake Tillery.



**Figure 6.** Photograph of submerged timber-woody debris type associated with shoreline at Morrow Mountain State Park near the base of Tater Top Mountain.



**Figure 7.** Photograph of fringed wetland habitat type associated with shoreline located along the Morrow Mountain State Park shoreline of Lake Tillery.

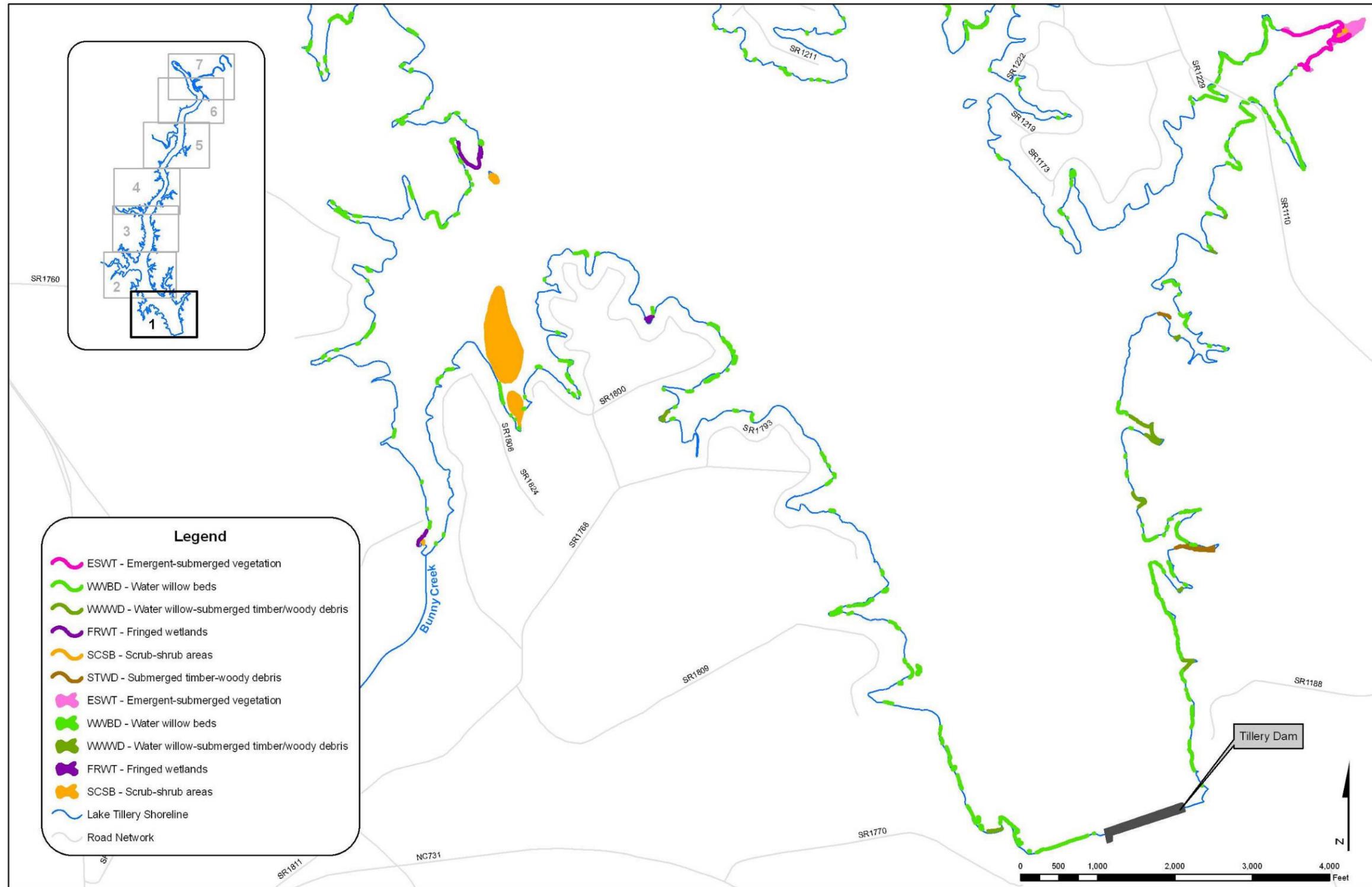


Figure 8. GIS mapping of shoreline aquatic habitat types located along the shoreline of Lake Tillery.

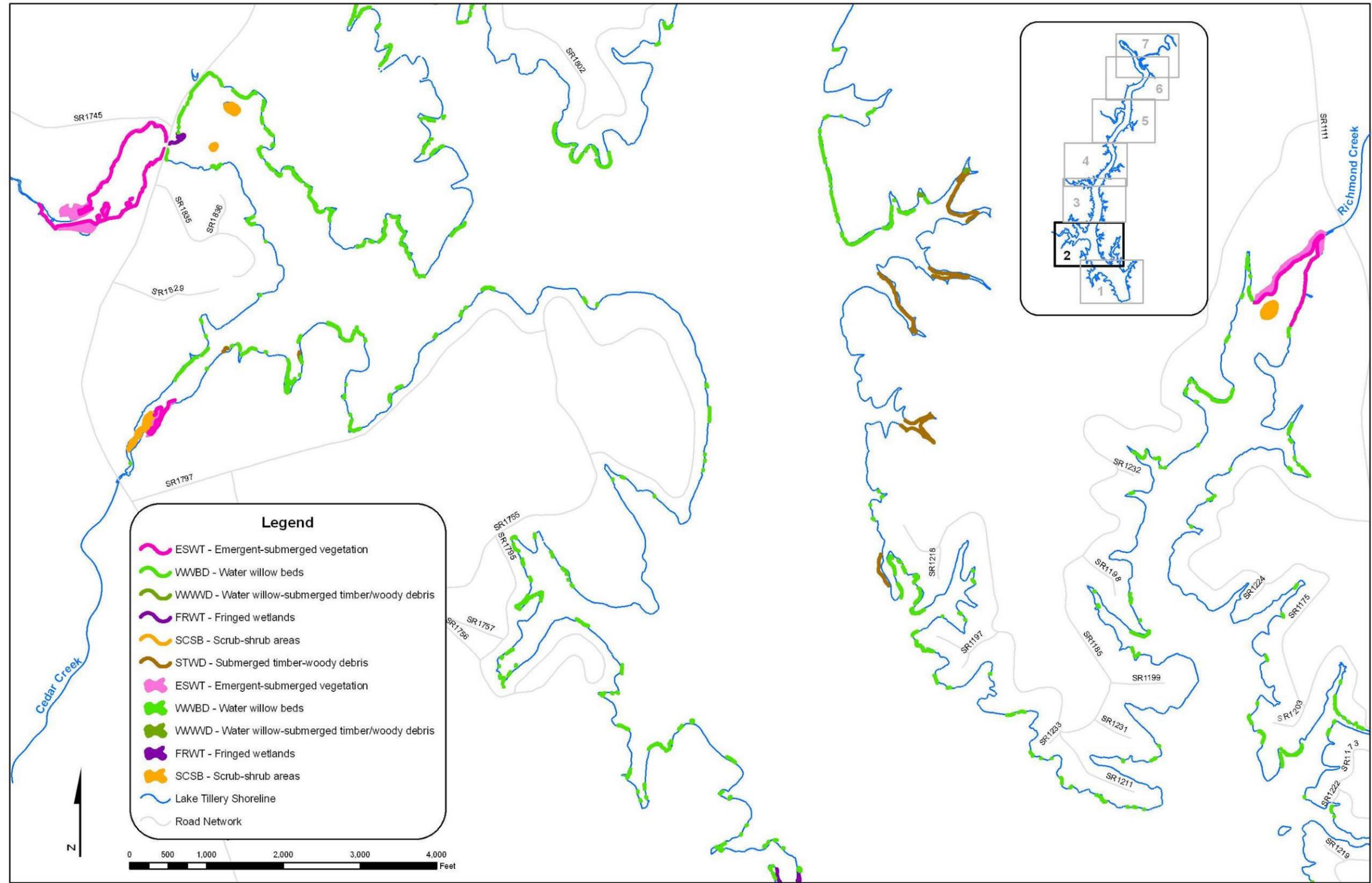


Figure 8 (continued)

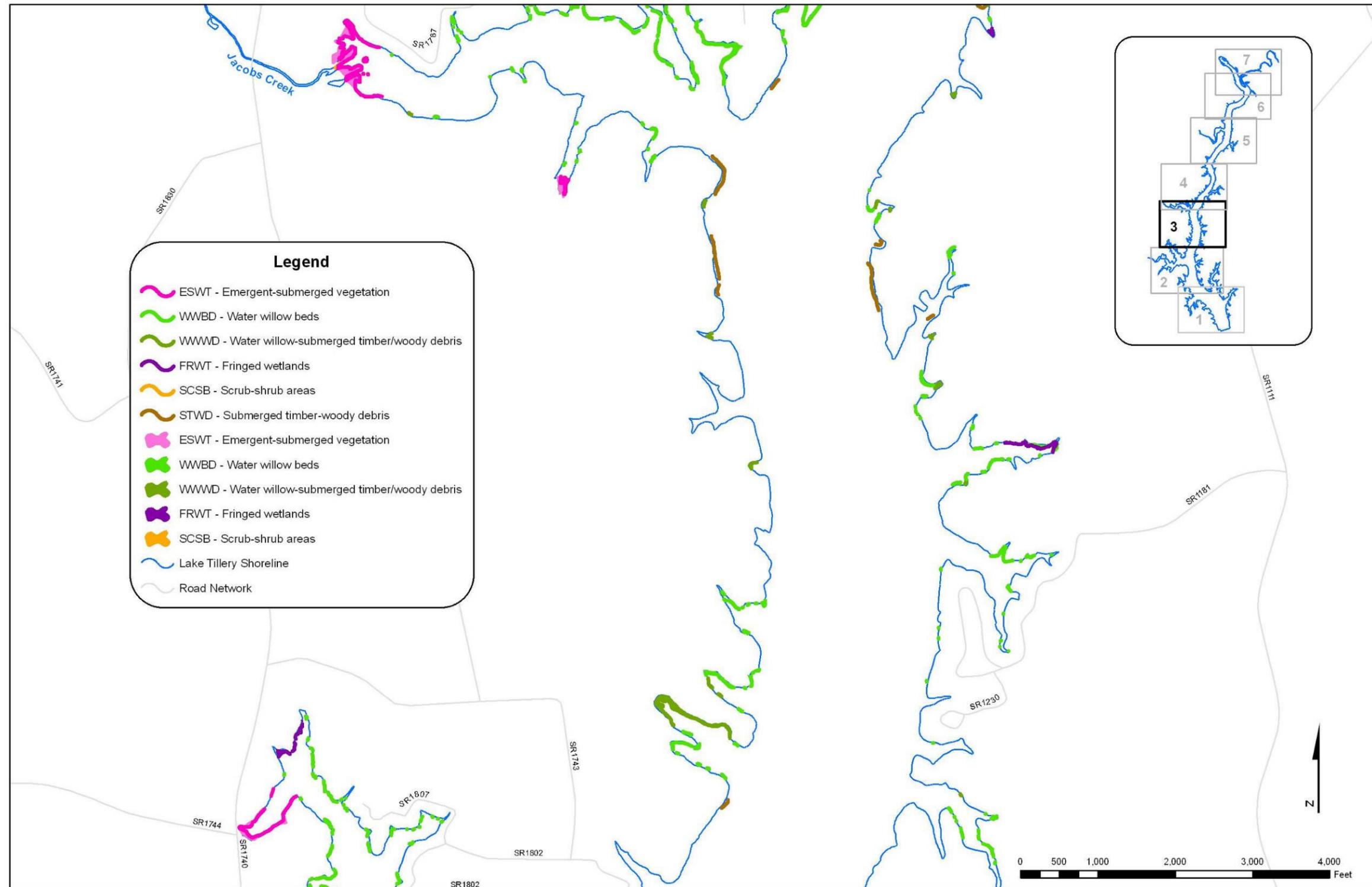


Figure 8 (continued)

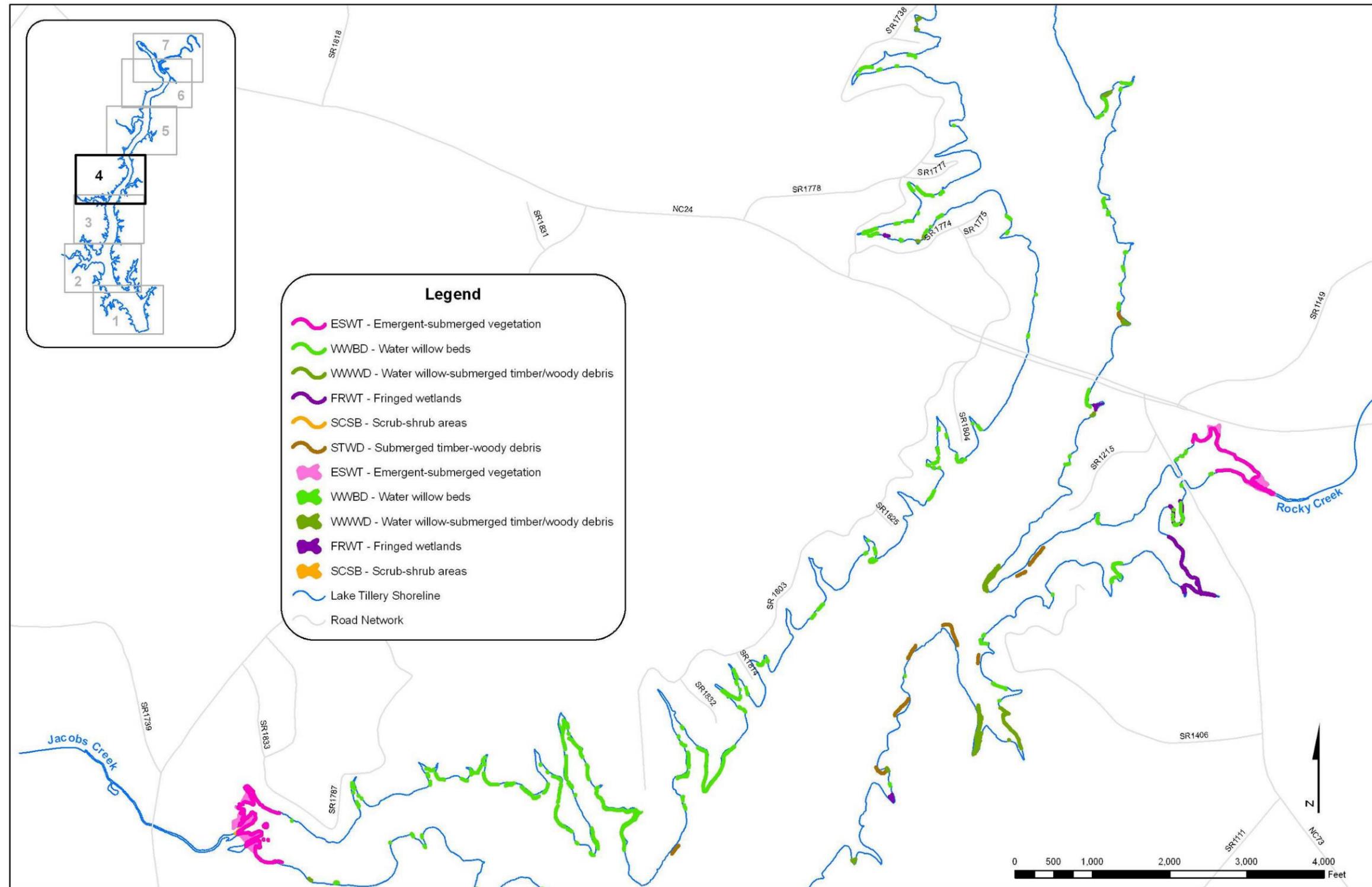


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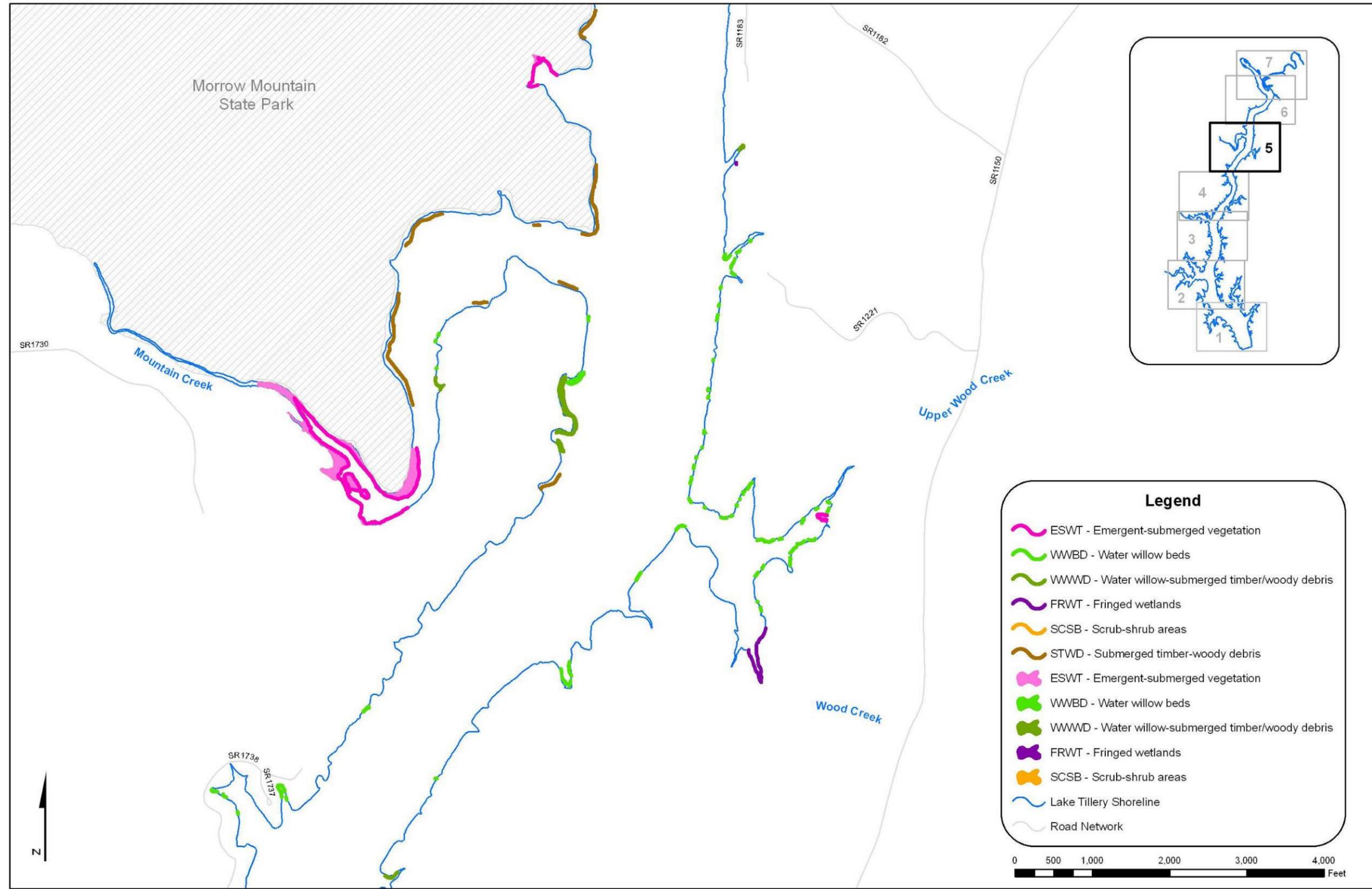


Figure 8 (continued)

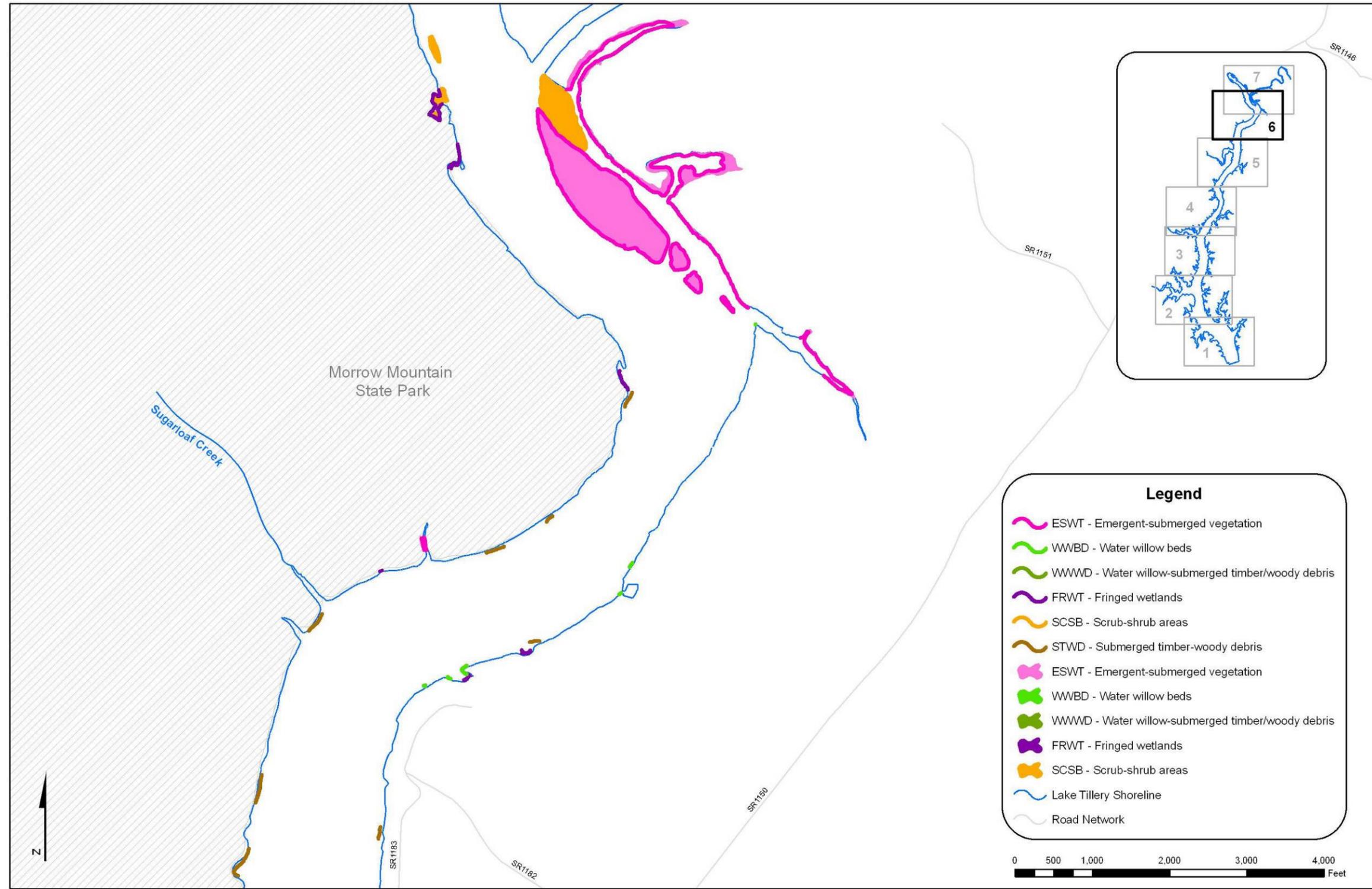


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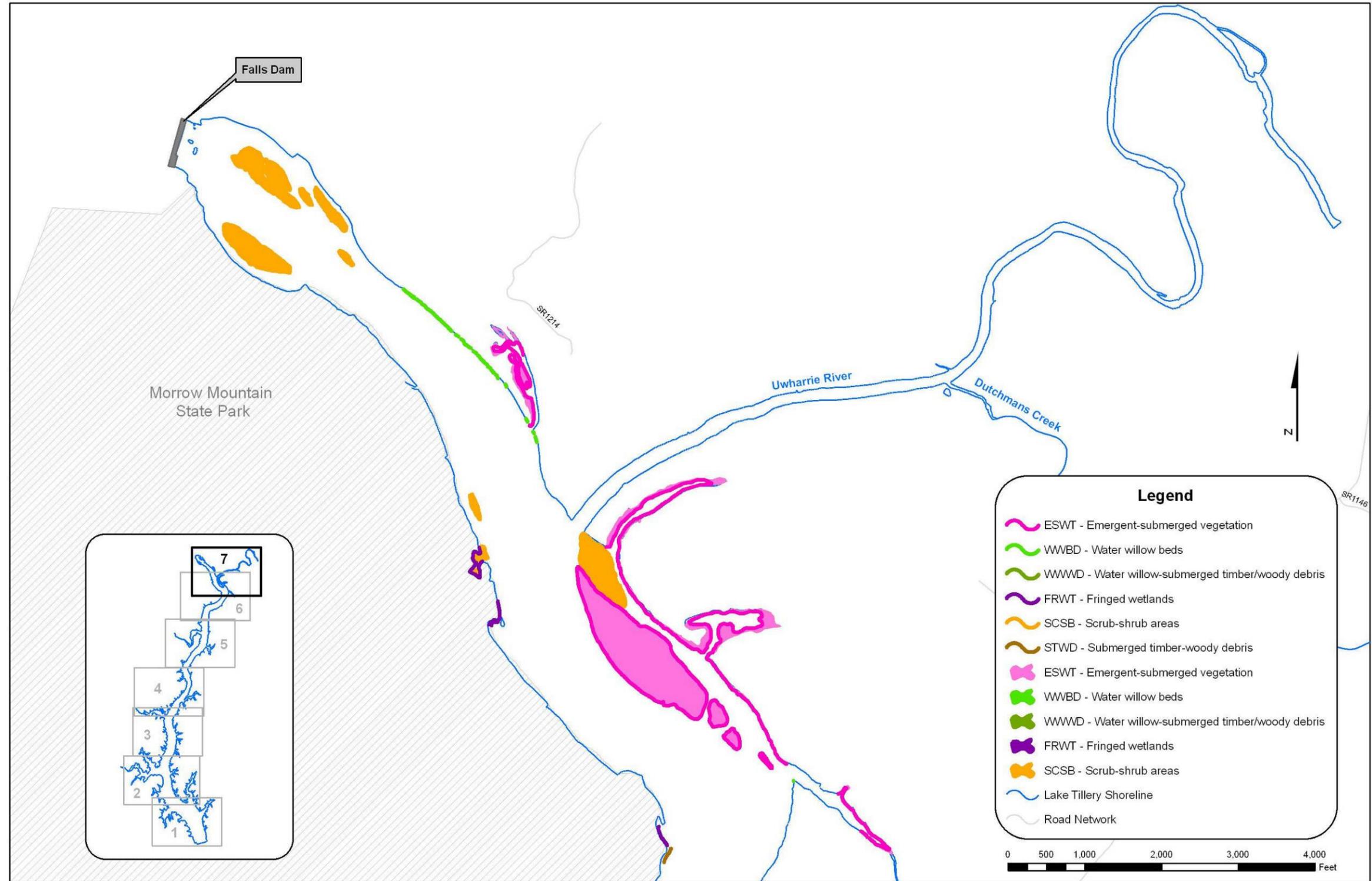


Figure 8 (continued)



# **Appendix C**

## **Landscaping with Native Plants in a Riparian Buffer Area**





# **Landscaping With Native Plants In A Riparian Buffer Area**

# Introduction

**W**hat's the hottest news in landscaping?

## **NATIVE PLANTS**

Native Plants have been around for many thousands of years, adapting themselves to their habitats and just recently we have begun to appreciate their beauty.

When landscaping with native plants you enter into a new way of looking at your lot and the adjacent land. Instead of following the base rule of landscaping you let nature do what it has been doing successfully for many years, then modify those concepts to suit your own personal vision.

Landscaping native is our way of letting Mother Nature do her job with our help. Native plants offer us a wonderful alternative, because they are self-sufficient, reduce maintenance, environmentally friendly and do not need chemical pesticides, herbicides and fertilizers.

Progress Energy strongly recommends that the leased land remain natural and enhanced with plants native to the area. We encourage the lessees to landscape their property adjacent to Company's property with native trees and plants as well.

Progress Energy's goal is to protect and improve water quality by adding and retaining existing shoreline vegetation. Native plants and the natural environment provide food and habitat for animals, filter nutrients, sediments, and other pollutants from runoffs; provide shade and cover for fish; minimize shoreline erosion; and contribute to shoreline aesthetics.

Progress Energy seeks to increase awareness of the impact of pesticides, herbicides and fertilizers on the lake ecosystem. The Company recommends the use of native plants to protect the riparian buffer area around Lake Tillery.

We encourage natural landscaping (environmentally beneficial landscaping), this means using native plants and employing landscaping practices and technologies that conserve water and prevent pollution. The use of native plants not only protects and provides wildlife habitat, but also reduces fertilizer, pesticide, and herbicide pollution and generates long-term cost savings.

The purpose of this material is to recommend landscaping with native plants in the riparian buffer area adjacent to Lake Tillery. Landscaping with native plants is environmentally sensitive and aesthetically pleasing. We have gone to several sources and did extended research to get help in this endeavor. We will include references that will give more insight into landscaping with native plants, including places in the area and outside for the purchase of native trees, shrubs, plants, etc. Parties that landscape with native plants can be assured they have contributed to the improvement of water quality and wildlife habitat.

## What is a Riparian Buffer Area

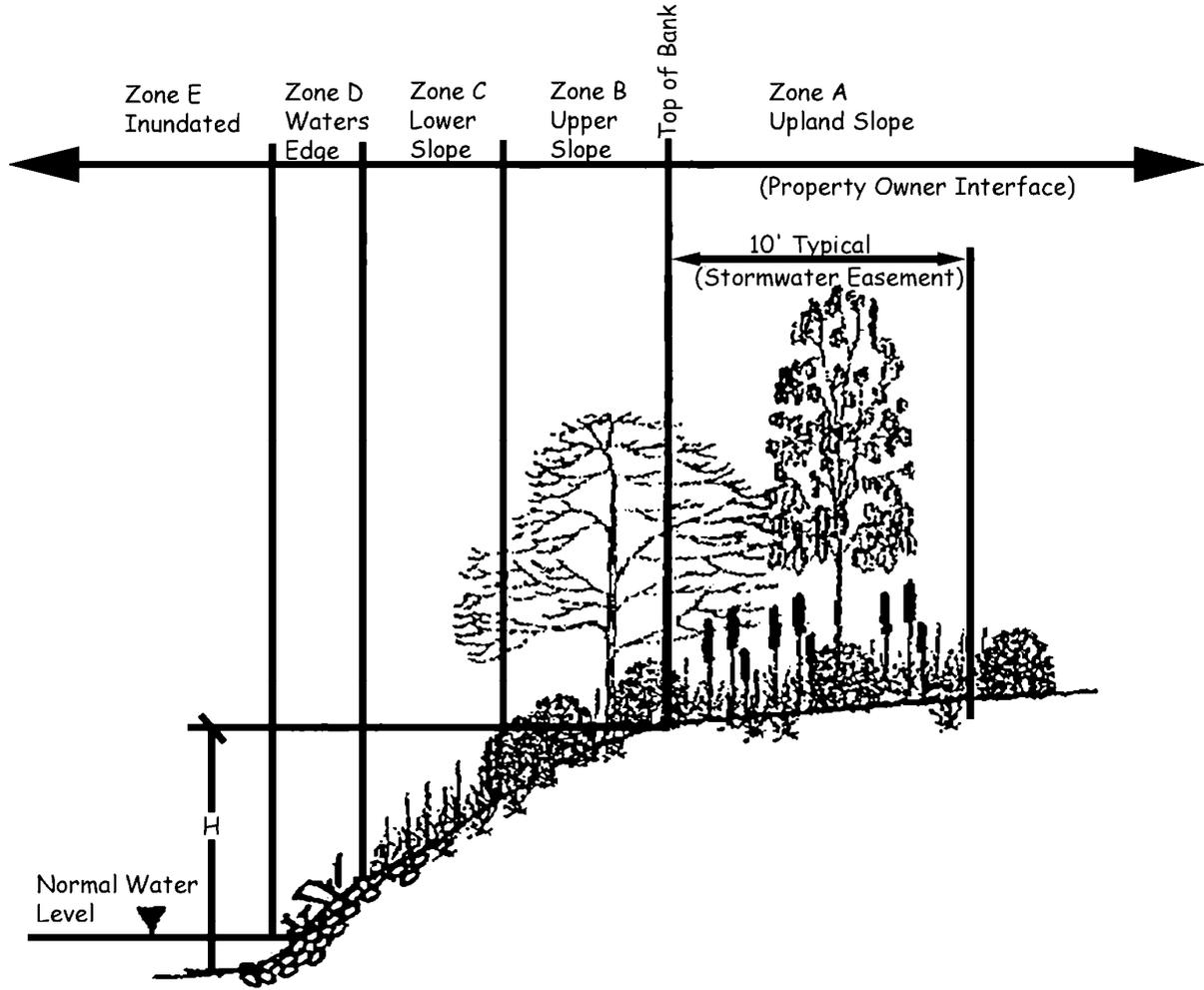
A riparian buffer area is an area beside a body of water that serves as a zone of protection between the body of water and the various upland uses. The buffer area is most effective in a natural and undisturbed state.

### Why is A Riparian Buffer Area Important?

1. The roots of trees and other vegetation anchor the soil and keep it in place.
2. Takes the energy from rain by slowing it down and allowing it to absorb into the ground thus preventing erosion.
3. Improves water quality by filtering and trapping chemical contaminants.
4. Allows microbial decomposition to take place where chemical contaminants can be changed to nontoxic forms.
5. Supplies food and habitat for fish and wildlife.
6. Corridor of movement for wildlife.
7. Promotes biodiversity and environmental stewardship.
8. Provide food and shelter for native wildlife.
9. Adapted to local weather and soil conditions and generally requires less maintenance (designed for area).
10. Usually more resistant to local pest populations.
11. Do not require pesticides and fertilizers because of natural adaptations.
12. Low maintenance.
13. No mowing.
14. Nature purifies water best filtering pesticide, herbicides and fertilizers out before they reach our source of drinking water.
15. Fish in cooler cleaner waters. Trees and bushes along the shoreline provide cooler habitat for fish during the warmer months.
16. Dogwood or other trees of similar height will cause only minimal damage if they should fall onto a house or boathouse.

# Zones of A Riparian Buffer Area

- Zone A – Upland Zone
- Zone B – Upper Slope
- Zone C – Lower Slope
- Zone D – Waters Edge
- Zone E – Inundated



Riparian Zones - Use With Vegetation Schedule

N.T.S

Zones A – D should be undisturbed and a minimum of 30 feet wide. A greater distance is preferable and more environmentally advantageous.

# **Why Landscape with Native Plants in the Riparian Buffer Area?**

1. Native plants are adapted or best suited to the area.
2. Native plants offer the greatest rate of survival
3. Provide bio-diversity of plant life.
4. Benefit a large number of wildlife species.
5. Low maintenance, allowing more time to enjoy recreational activities.
6. Native plants are rarely invasive.
7. Maintain and improve soil fertility, reduce erosion.
8. Saves time and money.
9. More resistant to pests and diseases reducing the need for pesticides and herbicides.
10. Once established native plants do not require watering or fertilizing.
11. The greater the diversity of native plants used increases the likelihood of uncommon or rare species of wildlife being attracted to the area.
12. Varying flowers, foliage, color, form and texture of native plants allows the creation of distinctive natural landscapes that are aesthetically pleasing.
13. You are working with nature to make the environment better.

# Landscaping

## For Wildlife

Wildlife is a product of the land and the plants living thereon. Acorns, hickory nuts and dogwood berries are among the best-known plants, which provide food for a variety of animals. Large hardwood trees provide nesting cavities for wood ducks, flying squirrels and screech owls. Mature pine trees are used as roosting sites for wild turkeys while younger pines make escape cover for cottontail rabbits and white –tailed deer. Grasses provide nesting cover for grasshopper sparrows. In short, it is important to offer a variety of plants in order to provide for the greatest diversity of wildlife.

Below is a list of native plants, which may be useful in landscaping for your home and property. We stress native plants because there are many examples of non-native plants which are considered invasive and which may become difficult to control. Examples of non-native invasive include kudzu, English ivy, wisteria, and Japanese honeysuckle.

### Deciduous Trees

Red maple	<i>Acer rubrum</i>
Sugar maple	<i>Acer saccharum</i>
Serviceberry	<i>Amelanchier arborea</i>
Shagbark hickory	<i>Carya ovata</i>
Chestnut (hybrid)	<i>Castanea sp.</i>
Hackberry	<i>Celtis occidentalis</i>
Redbud	<i>Cercis canadensis</i>
Fringetree	<i>Chionanthus virginicus</i>
Flowering dogwood	<i>Cornus florida</i>
Pecan	<i>Diospyros virginiana</i>
Honey locust	<i>Gleditsia triacanthos</i>
Sweetgum	<i>Liquidambar styraciflua</i>
Yellow poplar	<i>Liriodendron tulipifera</i>
Blackgum	<i>Nyssa sylvatica</i>
Sourwood	<i>Oxydendron arboreum</i>
Sycamore	<i>Platanus occidentalis</i>
Black cherry	<i>Prunus serotina</i>
White oak	<i>Quercus alba</i>
Scarlet oak	<i>Quercus coccinea</i>
So. red oak	<i>Quercus falcata</i>
Cherrybark oak	<i>Quercus falcata var. pagodaefolia</i>
Water oak	<i>Quercus nigra</i>

Willow oak  
Chestnut oak  
Red oak

*Quercus phellos*  
*Quercus prinus*  
*Quercus rubra*

### **Evergreen trees**

American holly  
Eastern red cedar  
Loblolly pine

*Ilex opaca*  
*Juniperus virginiana*  
*Pinus taeda*

### **Evergreen shrubs**

Inkberry  
Mountain laurel  
Wax myrtle  
Rhododendron  
Strawberry bush

*Ilex glabra*  
*Kalmia latifolia*  
*Myrica cerifera*  
*Rhododendron catawbiense*  
*Euonymus americana*

### **Deciduous shrubs**

Red chokeberry  
Black chokeberry  
Amer. Beauty-berry  
Sweetshrub  
Chinquapin  
Sweet pepperbrush  
Gray dogwood  
Wahoo  
Witch-alder  
Winterberry  
Wild plum  
Staghorn sumac  
Elderberry  
Blueberries  
Possumhaw  
Black haw  
Yellowroot

*Aronia arbutifolia*  
*Aronia melanocarpa*  
*Callicarpa americana*  
*Calycanthus floridus*  
*Castanea pumila*  
*Clethra alnifolia*  
*Cornus racemosa*  
*Euonymus atropurpureus*  
*Fothergilla* spp.  
*Ilex verticillata*  
*Prunus angustifolia* or *P. umbellata*  
*Rhus typhina*  
*Sambucus canadensis*  
*Vaccinium* spp.  
*Viburnum nudum*  
*Viburnum rufidulum*  
*Xanthorhiza simplicissima*

### **Ground covers**

Lady fern  
Blazing star  
Wood sorrel  
Bird-foot violet

*Athyrium filix-femina*  
*Liatris graminifolia*  
*Oxalis* spp.  
*Viola pedata*

## Ornamental grasses

Bluestem/broomstraw  
Virginia wild rye  
Deertongue grass  
Swichgrass  
Indiangrass  
Eastern gamagrass  
River oats

*Andropogon* spp.  
*Elymus virginicus*  
*Dichanthelium candestinum*  
*Panicum virgatum*  
*Sorghastrum nutans*  
*Tripsacum datyloides*  
*Uniola paniculata*

## Flowering perennials

Wild columbine  
Butterfly weed  
Beggarticks  
Partridge pea

Coreopsis  
Butterfly pea  
Queen Anne's lace  
Tickclover  
Geum  
Sunflowers  
Blazing star  
Cardinal flower  
Virginia bluebells  
Wild bergamot  
Wild sweet William  
Black-eyed Susan  
Fire pink  
Virginia spiderwort

*Aquilegia canadensis*  
*Asclepias tuberosa*  
*Bidens* spp.  
*Chamaecrista fasciculata* (annual, but reseeds well)  
*Coreopsis* spp.  
*Centrosema virginianum*  
*Daucus carota*  
*Desmodium* spp.  
*Geum virginianum*  
*Helianthus* spp.  
*Liatris scariosa*  
*Lobelia cardinalis*  
*Mertensia virginica*  
*Monarda fistulosa*  
*Phlox divaricata*  
*Rudbeckia hirta*  
*Silene virginica*  
*Tradescantia virginiana*

A listing of commercial sources for wildlife planting materials may be obtained from the NC Wildlife Resources Commission

## Plants Deer Don't Usually Like

Deer sometimes cause a problem for the native plants you use for landscaping. Generally deer do not like plants with aromatic or pungent foliage. Plants with fuzzy leaves, prickly needles, spiny branches and thorns usually discourage deer from eating them. Using plants that combine the tangy with the bitter and the spicy with the prickly will aid you in reducing damage by deer to your native plants.

Listed below are some plants deer do not usually like:

### Annuals, Biennials and Perennials

<u>Botanical Name</u>	<u>Common Name</u>
<i>Achillea</i> spp.	Yarrow
<i>Aconitum</i> spp.	Monkshead
<i>Aquilegia</i>	Columbine
<i>Amsonia</i>	Blue star
<i>Anemone</i>	Anemone
<i>Asclepias tuberosa</i>	Butterfly Weed
<i>Campanula</i> spp.	Bellflower
<i>Coreopsis</i> spp.	Coreopsis
<i>Cosmos</i>	Cosmos
<i>Delphinium</i>	Delphinium
<i>Dicentra</i>	Bleeding Heart
<i>Ilex</i> spp.	American Holly
<i>Lobelia erinus</i>	Lobelia
<i>Lupinus</i>	Lupine
<i>Monarda didyma</i>	Bee Balm
<i>Myosotis</i>	Forget Me Not
<i>Oenothera</i>	Evening Primrose
<i>Rudbeckia</i>	Blackeyed Susan
<i>Salvia</i>	Salvia
<i>Sedum</i>	Sedum
<i>Senecio aureus</i>	Golden Ragwort
<i>Verbena</i>	Verbena
<i>Viola</i>	Violet
<i>Yucca</i>	Yucca

### Trees

<i>Alnus</i>	Alder
<i>Betula</i>	Birch
<i>Carpinus</i>	Hornbeam
<i>Castanea</i>	Chinkapin
<i>Catalpa</i>	Catalpa
<i>Cedrus</i>	Cedar
<i>Cercis</i>	Redbud
<i>Cladrastis</i>	Yellow Wood
<i>Cornus</i>	Dogwood
<i>Gleditsia</i>	Honey Locust

*Liquidambar stynaciflua*  
*Liriodendron*  
*Morus*  
*Quercus*  
*Rhus*  
*Robinia*  
*Tsuga*

Sweet Gum  
Tulip Tree  
Mulberry  
Oak  
Sumac  
Black Locust  
Hemlock

## Herbs

*Sassafras*

Sassafras

## Vines

*Campsis spp.*  
*Lonicera spp.*  
*Parthenocissus*  
*Wisteria*  
*Vitis*

Trumpet Creeper  
Honey Suckle  
Virginia Creeper  
Wisteria (American & Kentucky)  
Grape

## Shrubs

*Vaccinium*

Blueberry

# **Appendix D**

## **A List of Nonnative Plants to Avoid Planting**

**Obtained from North Carolina Native Plant Society,  
Invasive Exotic Species List**



## NC Native Plant Society – Invasive Exotic Plants in NC – 2011

<http://www.ncwildflower.org/invasives/list.htm>,

(Accessed on September 21, 2011)

*Compiled by Misty Franklin Buchanan with review and input from biologists in the following agencies: NC Natural Heritage Program, NC Botanical Garden, University of North Carolina Herbarium, NC Exotic Pest Plant Council, NC DENR Aquatic Weed Control Program, US Fish & Wildlife Service, The Nature Conservancy, the NC Zoo, and volunteers and board members of the NC Native Plant Society.*

The intent of the NC Native Plant Society Invasive Exotic Plant list is to rank exotic (alien, foreign, introduced, and non-indigenous) plants based on their invasive characteristics, to educate the public and resource managers, and to encourage early detection of invasive exotic species so that a rapid response can be implemented when needed. We hope this list will help eliminate the use of invasive exotic plants in landscaping and restoration projects. The 2004 Tennessee Exotic Pest Plant Council Invasive Exotic Plant list was used as a model for organization of this list, but species listed and ranks assigned here are applicable to North Carolina. The NC Native Plant Society Invasive Exotic Plant List is considered a work in progress, and will be evaluated and updated as new information is gathered about these and other species. Please send your comments to:

North Carolina Native Plant Society  
c/o North Carolina Botanical Garden  
Totten Center 3375  
Chapel Hill, NC 27599-3375

**Background:** Many introduced plants have become naturalized in North Carolina and some are replacing our native plant species. Not all exotic species are considered harmful. Invasive plants are usually characterized by fast growth rates, high fruit production, rapid vegetative spread and efficient seed dispersal and germination. Not being native to NC, they lack the natural predators and diseases which would naturally control them in their native habitats. The rapid growth and reproduction of invasive plants allows them to overwhelm and displace existing vegetation and, in some cases, form dense one-species stands. Invasive species are especially problematic in areas that have been disturbed by human activities such as road building, residential development, forest clearing, logging, grazing, mining, ditching, mowing, erosion control, and fire control activities.

Invasive exotic plants disrupt the ecology of natural ecosystems, displace native plant and animal species, and degrade our biological resources. Aggressive invaders reduce the amount of light, water, nutrients and space available to native species. Some cause increased erosion along stream banks, shorelines and roadsides. Some exotics hybridize with related native plant species, resulting in changes to a population's genetic makeup; others have been found to harbor plant pathogens, which can affect both native and non-native plants, including ornamentals. Others contain toxins that may be lethal humans and other animals. Some invasive plants compete with and replace rare and endangered species and encroach upon their limited habitat. Other problems include disruption of native plant-pollinator relationships, tree and shrub mortality due to

girdling, reduced establishment of native tree and shrub seedlings, reduction in the amount of space, water, sunlight and nutrients that would be available to native species, and altered fire regimes. Invasive plants also cause economic losses and expenditures each year for agriculture, forestry, and roadside management.

Our native fauna, including insects, birds, mammals, reptiles, fish and other animals, is dependent on native plants for food and shelter. While some animals can feed on a wide number of plant species, others are highly specialized and may be restricted to feeding on several or a single plant species. As exotic plants replace our native flora, fewer host plants are available to provide the necessary nutrition for our native wildlife. In some cases, invasive plants replace nutritious native plant foods with lower quality sources. Each exotic plant is one less native host plant for our native insects, vertebrates and other organisms that are dependent upon them.

It is important to document the spread of invasive exotic plants into natural areas. When invaders are found outside of landscape plantings, they should be recorded and voucher specimens should be collected for donation to a herbarium.

To reduce invasive plant invasions, we must approach the problem in a variety of ways: stop planting them, prevent accidental introductions, manage existing infestations, minimize disturbance to forests, wetlands, and other natural communities, and learn to work with (rather than against) natural systems and cycles.

**Rank 1 – Severe Threat: Exotic plant species that have invasive characteristics and spread readily into native plant communities, displacing native vegetation.**

**Scientific Name**

*Ailanthus altissima* (Mill.) Swingle  
*Albizia julibrissin* Durz.  
*Alliaria petiolata* (Bieb.) Cavara & Grande  
*Alternanthera philoxeroides* (Mart.) Griseb.  
*Celastrus orbiculatus* Thunb.  
*Elaeagnus umbellata* var. *parvifolia*  
*Hedera helix* var. *helix*  
*Hydrilla verticillata* (L.f.) Royle  
*Lespedeza bicolor* Turczaninow  
*Lespedeza cuneata* (Dum.-Cours.) G. Don  
*Ligustrum sinense* Lour.  
*Lonicera fragrantissima* Lindl. & Paxton  
*Lonicera japonica* Thunb.  
*Microstegium vimineum* (Trin.) A. Camus  
*Murdannia keisak* (Hassk.) Hand.-Mazz.  
*Myriophyllum aquaticum* (Vell.) Verdc.  
*Paulownia tomentosa* (Thunb.)  
 Sieb. & Zucc. ex Steud.  
*Persicaria perfoliata* (Linnaeus)  
*H. Gross* (= *Polygonum perfoliatum* L.)  
*Phragmites australis* (Cav.) Trin. ssp. *australis*  
*Pueraria montana* var. *lobata*  
*Pyrus calleryana* Decne.  
*Reynoutria japonica* Houttuyn  
 (*Polygonum cuspidatum*)  
*Rosa multiflora* Thunb.  
*Salvinia molesta* Mitchell  
*Vitex rotundifolia* L.f.  
*Wisteria sinensis* (Sims) DC

**Common Name**

Tree of Heaven  
 Mimosa  
 Garlic-mustard  
 Alligatorweed  
 Asian bittersweet  
 Spring silverberry, Autumn olive  
 English ivy  
 Hydrilla  
 Bicolor lespedeza  
 Sericea lespedeza  
 Chinese privet  
 Fragrant honeysuckle  
 Japanese honeysuckle  
 Japanese stilt-grass  
 Asian spiderwort  
 Parrotfeather  
  
 Princess tree  
  
 Mile-a-minute vine  
 Common reed  
 Kudzu  
 Bradford pear  
  
 Japanese knotweed  
 Multiflora rose  
 Aquarium water-moss  
 Beach vitex  
 Chinese wisteria

**Rank 2 – Significant Threat: Exotic plant species that display some invasive characteristics, but do not appear to present as great a threat to native communities in NC as the species listed in Rank 1.**

<u>Scientific Name</u>	<u>Common Name</u>
<i>Ampelopsis brevipedunculata</i> (Maxim.) Trautv.	Porcelain-berry
<i>Arthraxon hispidus</i> var. <i>hispidus</i>	Basket grass, Hairy jointgrass
<i>Bambusa</i> spp.	Exotic bamboo
<i>Berberis thunbergii</i> DC	Japanese barberry
<i>Broussonetia papyrifera</i> (L.) L'Her. ex Vent.	Paper mulberry
<i>Cardiospermum halicacabum</i> L.	Balloonvine
<i>Cayratia japonica</i> (Thunb. ex Murray) Gagnep.	Bushkiller
<i>Centaurea stoebe</i> ssp. <i>micranthos</i> ( <i>Centaurea biebersteinii</i> )	Spotted knapweed
<i>Citrus trifoliata</i> ( <i>Poncirus trifoliata</i> )	Hardy-Orange
<i>Clematis terniflora</i> DC (= <i>C. dioscoreifolia</i> )	Leatherleaf clematis
<i>Conium maculatum</i> L.	Poison hemlock
<i>Dioscorea polystachya</i> ( <i>Dioscorea oppositifolia</i> )	Air-potato, Chinese yam
<i>Eichhornia crassipes</i> (Mart.) Solms	Water-hyacinth
<i>Euonymus alatus</i>	Burning bush, Winged Euonymus
<i>Euonymus fortunei</i> (Turcz.) Hand. – Mazz.	Winter creeper
<i>Ficaria verna</i> ssp. <i>ficariiformis</i> (F.W. Schultz) B. Walln. (= <i>Ranunculus ficaria</i> )	Lesser Celandine
<i>Glechoma hederacea</i> L.	Gill-over-the-ground, ground ivy
<i>Humulus japonicus</i> Siebold & Zuccarini	Japanese Hops
<i>Lamium purpureum</i> L.	Henbit
<i>Ligustrum japonicum</i> Thunb.	Japanese privet
<i>Ligustrum vulgare</i> L.	Common privet
<i>Lonicera ×bella</i> [ <i>L. morrowii</i> × <i>tatarica</i> ]	Hybrid Bush Honeysuckle
<i>Lonicera maackii</i> (Rupr.) Maxim.	Amur bush honeysuckle
<i>Lonicera morrowii</i> A. Gray	Morrow's bush honeysuckle
<i>Lonicera standishii</i> Jaques	Standish's Honeysuckle
<i>Lygodium japonicum</i> (Thunb. ex Murr.) Sw.	Japanese climbing fern
<i>Lythrum salicaria</i> L.	Purple loosestrife
<i>Mahonia bealei</i>	Leatherleaf Mahonia, Oregon grape
<i>Miscanthus sinensis</i> Andersson	Chinese silver grass
<i>Morus alba</i> L.	White mulberry
<i>Myriophyllum spicatum</i> Komarov	Eurasian watermilfoil
<i>Nandina domestica</i> Thunb.	Nandina
<i>Persicaria longiseta</i> (de Bruijn)	
<i>Moldenke</i> (= <i>Polygonum caespitosum</i> Blume)	Oriental ladies-thumb
<i>Persicaria maculosa</i> S.F. Gray (= <i>Polygonum persicaria</i> L.)	Lady's-thumb
<i>Phyllostachys</i> spp.	Exotic bamboo

<i>Pseudosasa japonica</i> (Sieb. & Zucc. ex Steud.)	
<i>Makino ex Nakai</i>	Arrow bamboo
<i>Rhodotypos scandens</i> (Thunb.)	Makino jetbead
<i>Rubus phoenicolasius</i> Maxim.	Wineberry
<i>Securigera varia</i> ( <i>Coronilla varia</i> )	Crown vetch
<i>Solanum viarum</i> Dunal	Tropical soda apple
<i>Sorghum halepense</i> (L.) Pers.	Johnson grass
<i>Spiraea japonica</i> L.f.	Japanese spiraea
<i>Stellaria media</i> (L.) Vill.	Common chickweed
<i>Veronica hederifolia</i> L.	Ivyleaf speedwell
<i>Vinca major</i> L.	Bigleaf periwinkle
<i>Vinca minor</i> L.	Common periwinkle
<i>Wisteria floribunda</i> (Willd.) DC	Japanese Wisteria
<i>Xanthium strumarium</i> L.	Common cocklebur
<i>Youngia japonica</i> (L.) DC.	Oriental false hawksbeard

**Rank 3 – Lesser Threat: Exotic plant species that spread into or around disturbed areas, and are presently considered a low threat to native plant communities in NC.**

<u>Scientific Name</u>	<u>Common Name</u>
<i>Ajuga reptans</i> L.	Bugleweed
<i>Allium vineale</i> L.	Field garlic
<i>Artemisia vulgaris</i> L.	Mugwort, common wormwood
<i>Arundo donax</i> L.	Giant reed
<i>Baccharis halimifolia</i> L.*	Silverling, groundsel tree
<i>Bromus catharticus</i> var. <i>catharticus</i>	Bromegrass, Rescue grass
<i>Bromus commutatus</i> Schrad.	Meadow brome
<i>Bromus japonicus</i> Thunb. ex Murray	Japanese bromegrass
<i>Bromus secalinus</i> L.	Rye brome
<i>Bromus tectorum</i> L.	Thatch bromegrass, Cheat grass
<i>Buddleja davidii</i>	Butterfly-bush
<i>Cichorium intybus</i>	Chicory
<i>Leucanthemum vulgare</i> ( <i>Chrysanthemum leucanthemum</i> )	Ox-eye daisy
<i>Cirsium vulgare</i> (Savi) Ten.	Bull thistle
<i>Daucus carota</i> L.	Wild carrot, Queen Anne's-lace
<i>Dipsacus fullonum</i> L.	Fuller's teasel
<i>Egeria densa</i> Planch.	Brazilian elodea, Brazilian water-weed
<i>Fatoua villosa</i> (Thunb.) Nakai	Hairy crabweed
<i>Schedonorus pratensis</i> ( <i>Festuca pratensis</i> )	Meadow fescue
<i>Ipomoea quamoclit</i> L.	Cypressvine morningglory
<i>Kummerowia stipulacea</i> (Maxim.)	Makino Korean clover
<i>Kummerowia striata</i> (Thunb.) Schindl.	Japanese clover
<i>Liriope muscari</i> (Dcne.) Bailey	Liriope, Lilyturf
<i>Lysimachia nummularia</i> L.	Moneywort, creeping Jenny
<i>Melilotus albus</i> Medik.	White sweet clover
<i>Melilotus officinalis</i> (L.) Lam.	Yellow sweet clover
<i>Najas minor</i> All.	Brittle naiad
<i>Pastinaca sativa</i> L.	Wild parsnip
<i>Perilla frutescens</i> (L.) Britt.	Beefsteakplant
<i>Populus alba</i> L.	White poplar
<i>Senecio vulgaris</i> L.	Ragwort
<i>Setaria faberi</i> R.A.W. Herrm.	Nodding foxtail-grass
<i>Triadica sebifera</i> (L.) Small	Chinese tallowtree
<i>Tussilago farfara</i> L.	Coltsfoot
<i>Vicia sativa</i> ssp. <i>sativa</i> and <i>Vicia sativa</i> ssp. <i>nigra</i>	Garden vetch, Narrowleaf vetch

\**Baccharis halimifolia* is native to marshes and marsh borders on the outer Coastal Plain in NC, but has spread along road corridors to invade disturbed areas in the Piedmont, which is not considered its native habitat.

**Watch List A: Exotic plants that naturalize and may become a problem in the future; includes species that are or could become widespread in North Carolina. At this time, more information is needed.**

**Scientific Name**

*Arum italicum ssp. italicum*

*Buglossoides arvensis (L.)*

*I.M. Johnston (L.) I.M.*

*Bupleurum rotundifolium L.*

*Centaurea cyanus L.*

*Cyperus entrerianus Böckler*

*Echium vulgare L.*

*Elaeagnus pungens Thunb.*

*Hibiscus syriacus L.*

*Hypericum perforatum L.*

*Ornithogalum umbellatum L.*

*Solanum dulcamara L.*

*Verbascum thapsus L.*

**Common Name**

Arum, Italian lords and ladies

Corn gromwell

Hound's-ear, hare's-ear

Cornflower

Deeprooted sedge

Viper's bugloss

Thorny olive

Rose of Sharon

St. John's-wort

Star of Bethlehem

Climbing nightshade

Common mullein

**Watch List B: Exotic plant species that cause problems in adjacent states but have not yet been reported to cause problems in NC.**

**Scientific Name**

*Acer platanoides* L.  
*Akebia quinata* (Houtt.) Dcne.  
*Bromus inermis* Leyss.  
*Carduus nutans* L.  
*Carex kobomugi* Ohwi  
*Cirsium arvense* (L.) Scop.  
*Commelina benghalensis* L.  
*Elaeagnus pungens* Thunb.  
*Hesperis matronalis* L.  
*Imperata cylindrica* (Linnaeus) Palisot de Beauvois  
*Iris pseudacorus*  
*Lonicera tatarica* L.  
*Ludwigia grandiflora* ssp. *grandiflora* (Michx)  
 Greuter & Burdet  
*Melia azedarach* L.  
*Nymphoides cristata* (Roxburgh) Kuntze  
*Pistia stratiotes* L.  
*Potamogeton crispus* L.  
*Quercus acutissima* Carruthers  
*Rhamnus cathartica* L.  
*Setaria italica* (L.) P. Beauv.  
*Setaria verticillata* (L.) Beauv.  
  
*Setaria viridis* var. *viridis*  
*Stachys floridana* Shuttlw. ex Benth.  
*Torilis arvensis* (Huds.) Link  
*Tragopogon dubius* Scop.  
*Trapa natans* L.  
*Tribulus terrestris* L.  
*Xanthium spinosum* L.

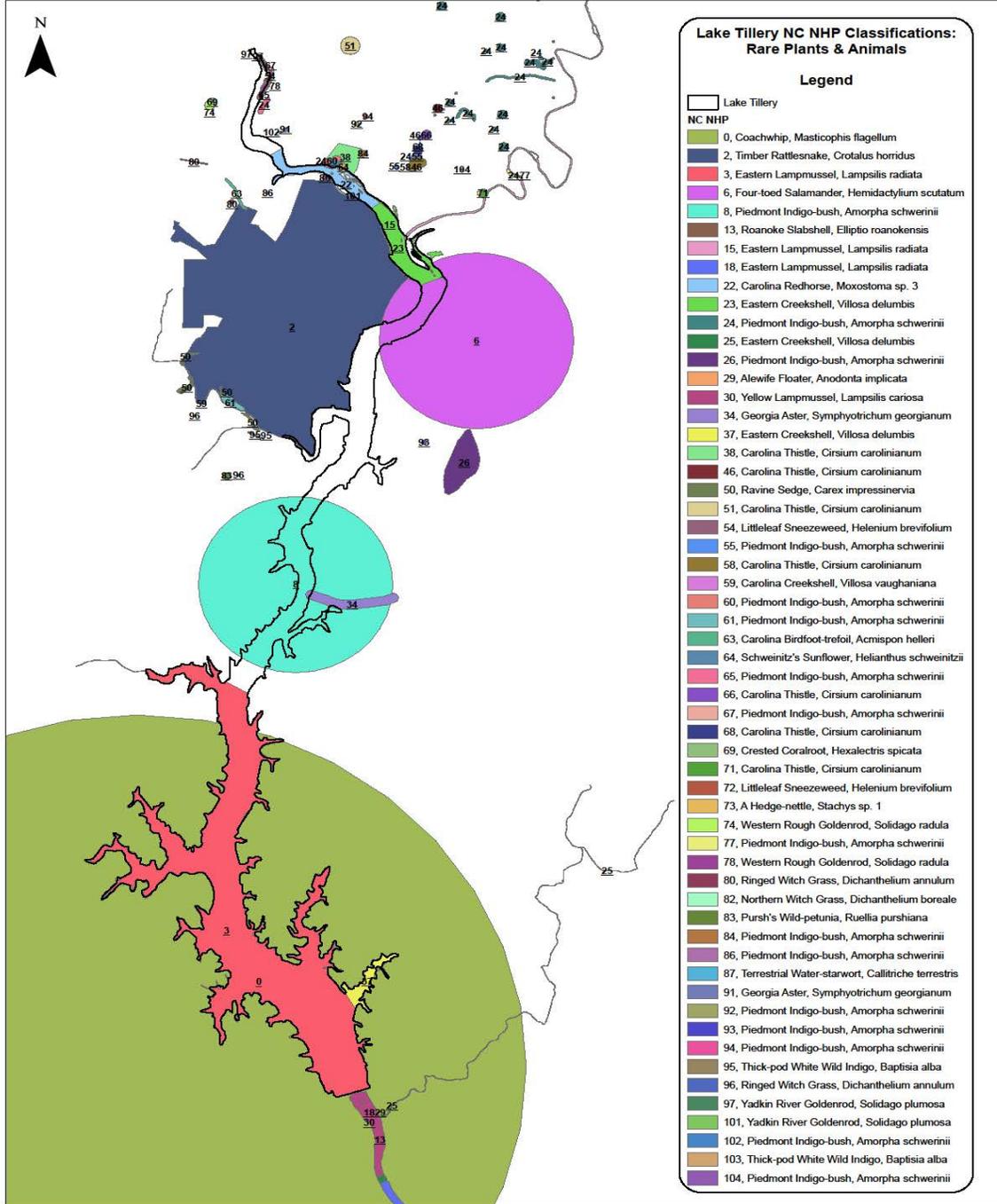
**Common Name**

Norway maple  
 Fiveleaf akebia  
 Smooth bromegrass  
 Musk thistle  
 Japanese sedge  
 Canada thistle  
 Bengal dayflower  
 Thorny-olive  
 Dame's rocket  
 Cogongrass  
 Yellow flag, Water flag  
 Tartarian honeysuckle  
  
 Creeping waterprimrose  
 Chinaberry  
 Crested floating heart  
 Watter-lettuce  
 Curly pondweed  
 Sawtooth oak  
 European buckthorn  
 Foxtail-millet  
 Bur-foxtail  
 Green bristle-grass, Green  
 millet  
 Florida Hedge nettle  
 Spreading hedge-parsley  
 Yellow goat's-beard  
 Water-chestnut  
 Puncturevine  
 Spiny cocklebur

# **Appendix E**

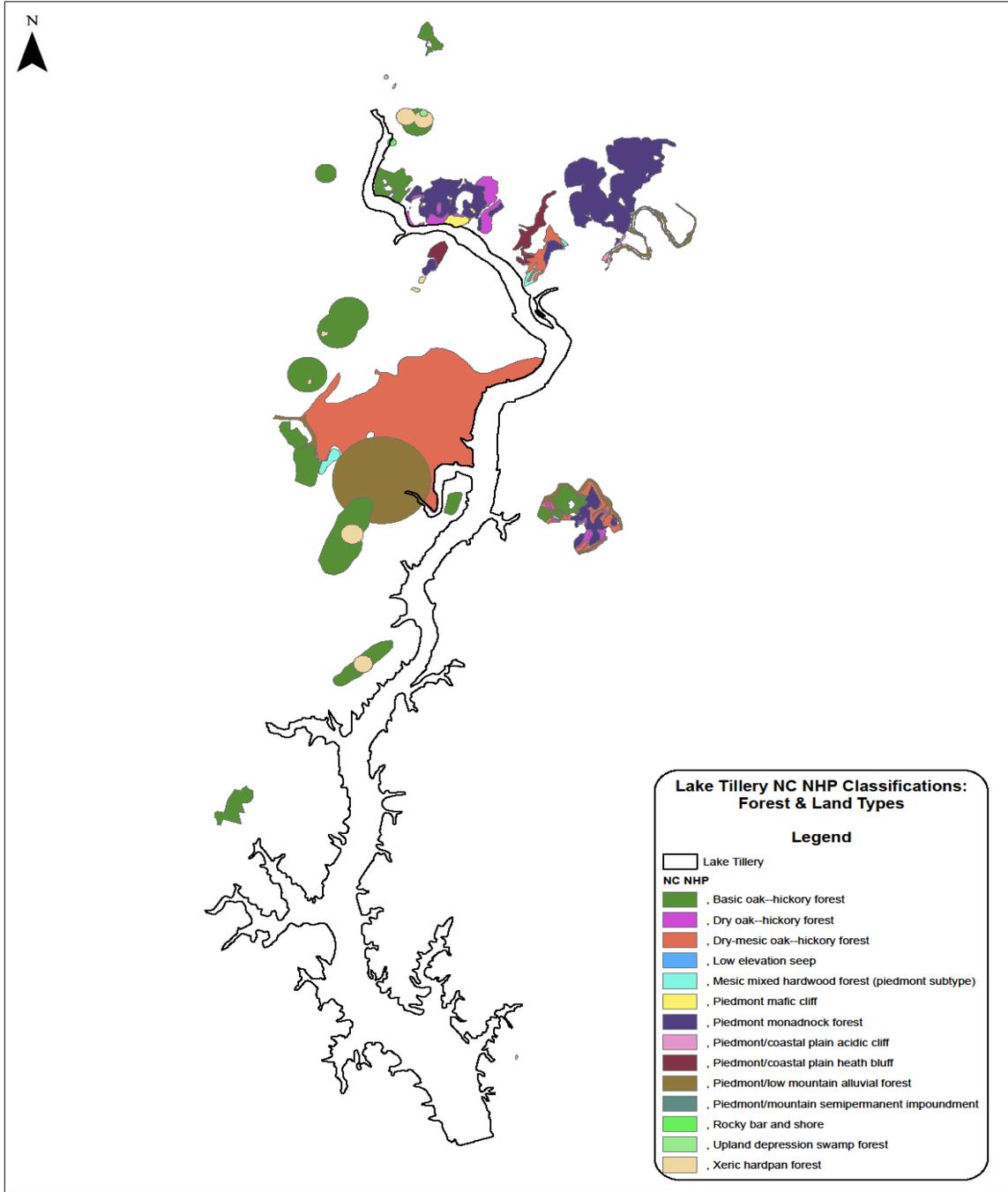
## **North Carolina Natural Heritage Program Rare Plant and Animal Species Maps**



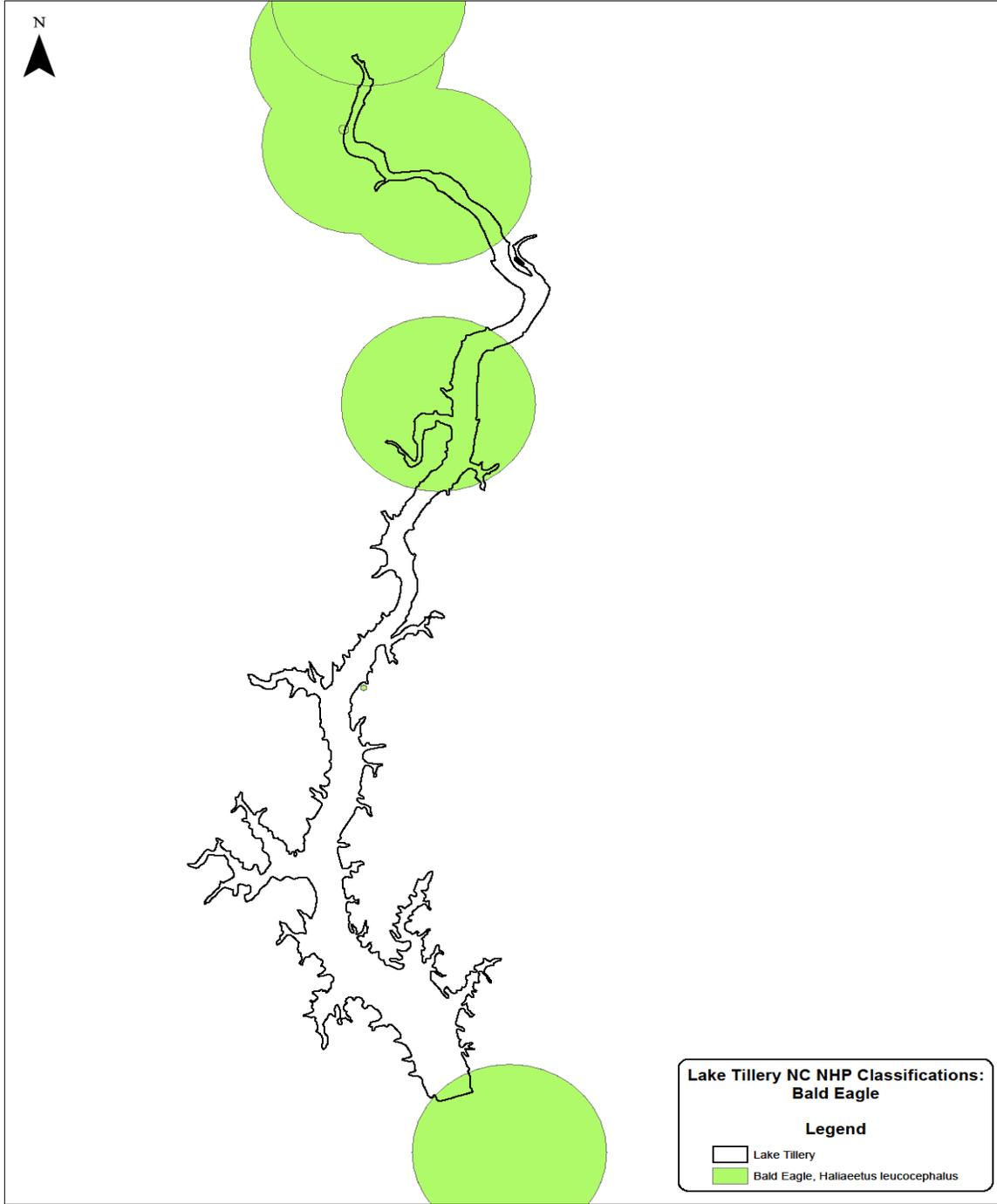


Not to Scale  
Updated August 2011

**Appendix E-1. Map of Lake Tillery and Surrounding Lands Showing Locations of Rare Plant and Animal Species Listed by the N.C. Natural Heritage Program.**



**Appendix E-2. Map of Lake Tillery and Surrounding Lands Showing Locations of Significant Natural Communities by the N.C. Natural Heritage Program.**



**Appendix E-3. Map of Lake Tillery and Surrounding Lands Showing Locations of Active Bald Eagle Nesting and Perching Areas by the N.C. Natural Heritage Program.**



# **Appendix F**

## **Stakeholder Comments and Progress Energy Carolinas Response Matrix**



Stakeholder	Date Comments Received	Comment	Progress Energy Response and Disposition of Comment
North Carolina Division of Water Quality (Mike Lawyer)	10/19/11	<p>Progress Energy and lessees of shoreline property need to be aware of the allowable/restricted development activities as detailed under the Water Supply Watershed Protection Program administered by delegated local governments. The Draft SMP does mention the need for lessees to comply with other federal, state and local regulations, but does not provide specific information with regards to development activities. It may be prudent to supply current and prospective lessees with such information or supply instructions on who to contact or where to obtain the information. The majority of shoreline development consists of single lot construction that typically requires less than one acre of land disturbance; however any development that exceeds one acre of disturbance must comply with the applicable local government's ordinance on water supply watershed protection. Since NCDWQ classifies Lake Tillery as a Water Supply-IV reservoir, land extending ½ mile from the edge of the normal lake elevation is further classified as a Critical Area with more stringent allowable development activities than the rest of the watershed. These allowable activities in a WS-IV Critical Area include a maximum amount of built-upon area (BUA) for high-density development (anything exceeding 24% BUA) of 50% with a vegetated buffer of 100' from BUA to the shoreline. It may be that the associated local governments have ordinances that are more restrictive than the state's minimum criteria.</p>	<p>PEC acknowledges this comment. Additional text has been added to the SMP, Section 2.1, Water Quality (page 5) to inform the public of the additional restrictions within ½ mile of Lake Tillery. Edits have been made to 6.1 of the guidelines to include NCDWQ's designation of the lands within ½ miles of Lake Tillery as Critical Area for drinking water reservoirs, and additional information about allowable development activities within the WS-IV water supply reservoir and NCDWQ regulations that pertain to shoreline leases and permit applications will be provided to the lessees in future newsletters.</p>

Stakeholder	Date Comments Received	Comment	Progress Energy Response and Disposition of Comment
		For example, approvals for development projects with less than one acre of land disturbance may be required and/or residential projects must meet low-density criteria only.	
North Carolina Natural Heritage Program (Scott Pohlman)	10/20/11	We would suggest substituting a map of the Significant Natural Heritage Areas for Appendix E-1 “Map of Lake Tillery and Surrounding Lands Showing Locations of Rare Plant and Animal Species Listed by the N.C. Natural Heritage Program,” and Appendix E-2, “Map of Lake Tillery and Surrounding Lands Showing Locations of Significant Natural Communities by the N.C. Natural Heritage Program.” The element occurrences are mapped at varying levels of accuracy, and perhaps give a misleading impression as depicted. We would encourage the inclusion of a list of extant Natural Heritage elements (species and natural communities) known to occur in the Lake Tillery project area, but the Significant Natural Heritage Areas are the specific locations where we try to focus conservation action, as they represent the most viable or rarest of the Natural Heritage elements.	PEC downloaded the GIS information provided by the N.C. Natural Heritage Program and has published the most up to date information in the SMP. PEC did not point out specific locations of significant natural heritage areas due to the sensitive nature of the flora and fauna.
		We greatly appreciate the addition of Appendix D, “A List of Nonnative Plants to Avoid Planting,” to the Plan Update.	Comment noted.
North Carolina Wildlife Resources Commission (Chris Goudreau and Shari Bryant)	10/20/11 (via conference call)	Page 1, Section 1.1, Project Boundary Description—clarify Project Boundary Line with description and how it is controlled with the SMP.	PEC has added a definition of the FERC Project Boundary on page 4 of the SMP.

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		Page 15, Section 3.0, Shoreline Management: Move Section 3.3, Shoreline Habitat Assessment up to first subsection in the section (Subsection 3.1). Move Subsection 3.1, Shoreline Classifications and re-label Subsection 3.2, and then move Subsection 3.2, SMP Guidelines to Subsection 3.3. Add more text on Shoreline classifications and the methods that went into the reclassification and how this affects the previous shoreline classification.	PEC agrees with the recommendation. Section 3.0 of the SMP has been reorganized. Additional text related to the shoreline classifications has also been added.
		Page 15, Subsection 3.1, Shoreline Classifications—provide additional description or protocol why mapping was condensed down from previous shoreline classifications to the 3 classifications (e.g., Agriculture and Project Operations) and any resulting changes due to the reclassification to 3 categories.	Comment acknowledged. PEC has added text to section 3.2 shoreline classifications to address NCWRC's comment. The initial SMP was developed through examination of existing land uses surrounding the Project. This resulted in some shoreline classifications (e.g., Agriculture) that did not clearly convey the allowable use of the shoreline. The new classifications are forward looking with regards to managing requests to lease and develop the shoreline in the future.
North Carolina Wildlife Resources Commission (Chris Goudreau and Shari Bryant)	10/20/11 (via conference call)	Page 15, Table 1. Comparison in tabular form of old classification data in 2001 and 2011 data? Place table on one page; add clarification that miles are reallocation of miles from one classification scheme to the other with no	PEC agrees with NCWRC recommendations. Table 1 now includes the year 2011 and is located on a single page. PEC also added a footnote to

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		significant changes in numbers.	Table 1 describing the reallocation of miles from one class to another.
		Page 15, Subsection 3.1, Shoreline Classifications-- Integrated use, Resource Protection & Management, and Project Operations—provide examples of what is allowed and not allowed in each classification.	Acknowledged. PEC has added some additional text describing examples of allowed uses within the shoreline classifications.
		Page 19, Subsection 3.2, SMP Guidelines—Define lease and permit terminology, differences, and clarify. Provide definitions in the text and reference definitions section in the report.	PEC has added a footnote providing the definitions and referencing the Guidelines.
		Page 21, Subsection 3.3, Shoreline Habitat Assessment— Convert or supplement the text description of habitat changes to a table; add table to clarify text description of habitat changes.	Comment acknowledged. PEC has moved this section to the front renumber it to 3.1 and included a table in to supplement the text description of habitat changes.
		Page 21, Subsection 3.3, Shoreline Habitat Assessment-- Describe if observed habitat changes were concentrated in one area vs. widespread across the lake. Add narrative for spatial changes in habitat distribution patterns.	Comment acknowledged. PEC has included a description about spatial changes in habitat distribution in this section which is now Section 3.1.
		Appendix A, SMP Guidelines—Review title for any editorial changes.	Comment noted.
		Appendix A, SMP Guidelines, Section 1.0, Purpose-- Describe the types of leases—title properly and be consistent in definition use throughout	A reference to the glossary in the Guidelines has been inserted into Section 1.0 to identify where to locate the definition of a multi-slip facility.

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		Appendix A, SMP Guidelines, Section 3: Be consistent in what you call yourself –Lake Management or Shoreline Management; Licensee, etc.	PEC has changed all references of lake or shoreline management staff to Lake Services, except the email address which will remain as is until necessary.
		Appendix A, SMP Guidelines, Section 3.11: Include forested shoreline to minimize impacts.	PEC has edited the guidelines to include forested shoreline in Section 3.11.
		Appendix A, SMP Guidelines, Section 4 , The Application Process—What are differences between Lease Application and Facilities Permit Application? Clarify that you apply for lease, and then apply for permit.	Comment noted. PEC has added additional clarification in Section 4.1 and 4.2 of the Guidelines.
		Appendix A, SMP Guidelines, Section 5, Guidelines Regarding Soil Disturbance: Extended dredging period prohibition compared to 2001 SMP Guidelines. Guidelines or suggestions to minimize forested shoreline impacts; look at including some wording on this topic.	Comment acknowledged. Text has been added to the Guidelines.
		Appendix A, SMP Guidelines, Section 6 , Guidelines Regarding Vegetation-- Sloping and clearing of entire shoreline and meet the stated guidelines of 75% of nondisturbed shoreline.	Commented noted. PEC has added text under Section 6.1-2 of the Guidelines to describe PEC’s intent to preserve the shoreline.
		Appendix A, SMP Guidelines, Section 7, Regarding Shoreline Stabilization—Define rip-rap versus river rock: 6-8 inch diameter zone, larger stones where applicable on high energy zones of shoreline. Stability of stone with shape (no necessary action, just better define types of rock for stabilization).	Comment noted. PEC does not want to be overly prescriptive on required shoreline stabilization materials, therefore no definition has been provided. However, to be clear, all shoreline stabilization materials must continue to be approved by PEC Lake Services through the permit process.

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		Appendix A, SMP Guidelines, Section 8, Guidelines Regarding Dredging-- Delete the NCWRC review sentence; the NCWRC does not need to review dredging permit applications.	Noted. Sentence deleted.
		Appendix A, SMP Guidelines, Section 9, Guidelines for Private Facilities, Subsection 9.2, Walkways-- change will to may in first sentence.	Noted. Made change.
		Appendix A, SMP Guidelines, Section 9, Guidelines for Private Facilities, Section 9, No. 31: Add “permanent” to water blinds or hunting stands.	Agree. Added the word permanent.
		Appendix A, SMP Guidelines, Section 10, Guidelines for Multi-slip Facilities-- Multi-slip Facilities Definition: Discuss FERC Standard Land Use Article with regard to 10 boat slips and that Progress Energy requires NCWRC review of less than 10 slips.	Comment acknowledged. Additional text has been added to Section 10 of Guidelines.
		Appendix A, SMP Guidelines, Section 10, Guidelines for Multi-slip Facilities, Subsection 10.7: Grammatical change from “Shall” look at sentence flow compared to other sentences.	Comment noted. PEC has rewritten the sentence in Section 10.7.
		Appendix B, Lake Tillery Shoreline Aquatic Habitat Mapping Study Grammatical/editorial suggestions—Change “habitat type areas” habitat type “patches” or “units”. Page 1: Study site description: Use English units throughout, not metric units (style consistency).	PEC changed habitat type areas to habitat type units. The units of measurement have also been changed to English units to be consistent.
		Appendix B, Lake Tillery Shoreline Aquatic Habitat Mapping Study, Page 6: Spatial distributions, last two paragraphs, changes in habitat. Describe where these habitat changes	PEC has provided additional narrative on the spatial distribution of habitat changes on page 6 of the Lake Tillery

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		spatially occurred from 2001 to 2011. Provide more description on where the changes occurred.	Shoreline Aquatic Habitat Mapping Study.
		Appendix B, Lake Tillery Shoreline Aquatic Habitat Mapping Study, Page 10: Combine Tables 1 and 2 into one table.	Comment noted.
		Appendix A, Shoreline Management Guidelines, Attachment E, Impact Minimization Zone Guidelines— Incorporate the IMZ Guidelines directly into the SMP Report.	Noted. PEC has inserted text defining what an IMZ constitutes into the SMP. Full details of what is allowable in an IMZ are described in Attachment E of the <i>Guidelines</i>
		Appendix A, Shoreline Management Guidelines, Attachment E, Impact Minimization Zone Guidelines, Page E-1, second paragraph--Shoreline management..... Change severely to minimize or limit impact.	Agree. The text has been changed.
North Carolina Wildlife Resources Commission (Chris Goudreau and Shari Bryant)	11/3/11 (Additional Comments Received)	Several recent incidents have highlighted the need for Progress Energy to be more proactive and involved in protecting the riparian buffer. In these cases, the riparian vegetation was completely removed in order for the permittee to slope the bank and/or install shoreline stabilization. In various places in the Guidelines document, we strongly recommend that provisions be added to prohibit the clearing of the riparian buffer in order to stabilize the shoreline. If this is not possible, the riparian buffer should be avoided, particularly trees and woody vegetation, and clearing should be minimized. In certain areas, Progress Energy should require permittees to	Comment acknowledged. PEC's goal is to balance the competing interests, while protecting, and enhancing the environmental, scenic, and recreational values provided by Lake Tillery and the surrounding project lands, while also ensuring the continued safe and reliable production of hydroelectric power at the project. This balancing requires through review of permit applications; which at times can result in disturbance to the riparian buffer (as indicated in the

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		<p>conduct the stabilization work from a barge in order to protect important riparian habitats.</p> <p>Specifically, we raise the following examples in the Guidelines that need clarification or rewording to better protect riparian and shoreline habitats:</p> <p>Section 3.11: “All construction activities and the placement of water-dependent facilities should be done in such a manner as to minimize impacts to aquatic habitat, especially water willow beds greater than or equal to 100 square feet and submerged woody debris.”</p> <ul style="list-style-type: none"> <li>• We recommend adding forested shorelines to the list.</li> </ul>	<p>NCWRC comment) at the expense of a longer term investment of the property and resource protection through shoreline stabilization. Such cases require the lessee to re-vegetate the disturbed area with native plant species.</p> <p>If an applicant chooses to require their contractor to work from a barge that is between the property owner (permit holder) and the contractor. We are not aware of any other lakes where this is required by FERC Project Licensees, as suggested.</p> <p>PEC acknowledges the comment and has included forested shoreline in Section 3.11 of the Guidelines.</p>

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		<p>Section 6.1-2: “The Licensee requires that at least 75 percent of the leased land remain completely undisturbed. This means the cutting or removal of vegetation (except under special permit for safety reasons) will not be allowed on 75 percent of the leased area, except for pruning up to a height of 10 feet per accepted arboricultural standards. “</p> <ul style="list-style-type: none"> <li>• We note that some recent shoreline lease permittees have completely cleared forested riparian areas, and replaced them with riprap and grass, or riprap and bark. See also Section 7.0.</li> </ul> <p>Section 6.5: Danger Tree Removal Process states: “Any tree removed from leased property must be replaced with one that is native to the area.”</p> <ul style="list-style-type: none"> <li>• We recommend clarifying that the tree must be replaced in the same area as the one removed.</li> </ul> <p>Section 7.0: Guidelines Regarding Shoreline Stabilization</p> <ul style="list-style-type: none"> <li>• We recommend adding the following: <ul style="list-style-type: none"> <li>○ “Forested shorelines may not be cleared to slope banks or install riprap. The provisions outlined in 6.1-2, 6.1-3, and 6.4 regarding tree</li> </ul> </li> </ul>	<p>Comment Acknowledged. PEC’s intent is to provide lessees the opportunity to use the Licensee’s property appropriately, while protecting the natural environmental characteristics and vegetated shoreline of Lake Tillery.</p> <p>Comment Noted. The tree would have been removed because it posed a danger. PEC continues to require a tree to be planted on PEC property.</p> <p>Comment acknowledged. PEC recognizes the good intentions of this comment, however at this time we also recognize the need to balance our resource protection methods which may result in the temporary loss of shoreline</p>

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		<p>protections must be followed.”</p> <ul style="list-style-type: none"> <li>○ “Only Class I or Class II (preferred) riprap can be used for shoreline stabilization. No river rock can be used.”</li> </ul> <p>Section 8.6: “All dredged material must be properly disposed and completely removed from leased property.”</p> <ul style="list-style-type: none"> <li>• We recommend adding the following: <ul style="list-style-type: none"> <li>○ “Dredged material should not be disposed where it could get back into the lake.” If the leased property is only a few feet wide, some homeowners may opt to stockpile dredged material at the edge of their property.</li> </ul> </li> </ul>	<p>vegetation while installing shoreline stabilization. The stabilization is designed for long term shoreline protection including the lands the shoreline vegetation require.</p> <p>Comment Noted. PEC currently requires permit holders to follow Best Management Practices which include mandatory installation of slit fences to prevent movement of soil across Project lands. Unfortunately our jurisdiction is limited to the Project boundary and an owner could potentially stockpile dredged material as suggested and not be properly captured by the BMPs.</p>

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		<p>We also concur with the comments and recommendations submitted by the NC Division of Water Resources (Mr. Jim Mead) in their October 25, 2011 email.</p>	<p>PEC has changed the classification for the shoreline near the mouth of the Uwharrie River from the Integrated Use classification to the Resource Protection &amp; Management classification to ensure consistency with the relicensing Comprehensive Settlement Agreement terms and conditions regarding future shoreline and land restrictions. Resource Protection &amp; Management is a more restrictive classification than Integrated Use.</p>
<p>N.C. Division of Water Resources (Jim Mead)</p>	<p>10/25/11</p>	<p>As part of the relicensing process for the Tillery hydroelectric project the Comprehensive Settlement Agreement (CSA) that was developed included section 2.5 - Additional Stream Protection Measures. The following property was described in section 2.5.3 – Lands Subject to a Restrictive Covenant:            Within twenty four (24) months of the issuance of the New License that is Final and Non-Appealable, Progress Energy will place a restrictive covenant for conservation purposes on certain lands it owns near the mouth of the Uwharrie River, which are depicted in the attached Appendix D. The lands to be protected by a restrictive covenant include (1) those extending from Dutchman’s Creek downstream to the tip of the peninsula on the south side of the mouth of</p>	<p>Agree. In the revised shoreline classification maps (Figure 3), PEC has changed the classification for the area near the mouth of the Uwharrie River from the Integrated Use classification to the Resource Protection &amp; Management classification to ensure consistency with the relicensing Comprehensive Settlement Agreement terms and conditions regarding future shoreline and land restrictions. Resource Protection &amp; Management is a more restrictive classification than Integrated Use.</p>

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		<p>the Uwharrie River and (2) those at the upper end of the "bay," created by the above peninsula, that are classified as of December 2006 as Environmental/Natural Areas in the Shoreline Management Plan, stopping at the first tract of land classified as Impact Minimization Zone.</p> <p>Page 3 of the attached PDF file contains a map of the lands described above. The 401 certificate issued during the relicensing process also contains this same language and map.</p> <p>Our review of the draft SMP closely examined the classification of lands near the mouth of the Uwharrie River to see if the classification is consistent with the Additional Stream Protection Measures described above. Figure 3, sheet 1 of 2, on page 17 of the draft SMP covers the area in question. Based on our review of Figure 3, it appears that land along the south side of the Uwharrie River that is immediately west of the confluence with Dutchman's Creek is classified as Integrated Use for slightly less than half the distance downstream to the mouth of the Uwharrie River, and then changes to Resource Protection &amp; Management.</p> <p>To be consistent with the CSA and 401 certificate the ENTIRE length along the south side of the Uwharrie River extending from Dutchman's Creek downstream to the</p>	

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		mouth of the river should be classified as Resource Protection & Management. We strongly encourage Progress Energy to revise Figure 3 and any associated documentation to reflect this change.	
U.S. Forest Service (Deborah Walker)	11/03/11	Thank you for the recent update on the Tillery Hydroelectric Development Shoreline Management Plan. The Uwharrie National Forest does not manage any lands along the Lake Tillery portion of the Pee Dee River. I appreciate your willingness to include the Forest Service in any updates to the SMP in this area, and prefer to be kept on your mailing list in the event we acquire property along this shoreline in the future. Therefore, I have no comments to provide on your draft SMP at this time.	Comment acknowledged.
N.C. Department of Cultural Resources (SHPO) (Renee Gledhill-Earley)	11/8/11	Thank you for your email of October 17, 2011, transmitting the management plan and attachments for the above project. We believe the plan adequately addresses our concerns for historic resources.  The above comments are made pursuant to Section 106 of the National Historic Preservation Act and the Advisory Council on Historic Preservation's Regulations for Compliance with Section 106 codified at 36 CFR Part 800.	Comment acknowledged.