Executive Summary

Basinwide water quality planning is a watershed-based approach to restoring and protecting the quality of North Carolina's surface waters. The North Carolina Division of Water Quality (DWQ) prepares Basinwide water quality plans for each of the 17 major river basins in the state. Each basinwide plan is revised at five-year intervals. While these plans are prepared by DWQ, their implementation and the protection of water quality entail the coordinated efforts of many agencies, local governments and stakeholders throughout the state.

The goals of basinwide planning are to:

- Identify water quality problems and restore full use to Impaired waters.
- Identify and protect high value resource waters.
- Protect unimpaired waters while allowing for reasonable economic growth.

DWQ accomplishes these goals through the following objectives:

- Collaborate with other agencies to develop appropriate management strategies. This includes providing agencies information related to financial and funding opportunities.
- Assure equitable distribution of waste assimilative capacity.
- Evaluate cumulative effects of pollution.
- Improve public awareness and involvement.
- Regulate point and nonpoint sources of pollution where other approaches are not successful.

This document is the third five-year update of the *Savannah River Basinwide Water Quality Plan*. The first basinwide plan for the Savannah River basin was completed in 1997 and the second in 2002. The format of this plan was revised in response to comments received during the first and second planning cycles. DWQ replaced much of the general information in the first two plans with more detailed information specific to the Savannah River basin. For this plan, a greater emphasis was placed on identifying water quality concerns on the watershed level in order to facilitate protection and restoration efforts.

DWQ considered comments from the Western North Carolina Basinwide Planning Conference held in the region and subsequent discussions with local resource agency staff and citizens during draft plan development. This input will help guide continuing water quality management activities throughout the river basin over the next five years.

Basin Overview

The portion of the Savannah River Basin located in North Carolina lies entirely within The Southern Crystalline Ridges and Mountains ecoregion (Griffith et al 2002) and occupies 151 square miles (Figure *iii* and *iv*). Most of the land is contained within the Nantahala National Forest and Gorges State Park. The largest towns are Highlands and Cashiers. Additional areas of commercial, residential, and golf course development can be found scattered throughout the US 64 corridor between Lake Toxaway and Highlands. Outstanding Resource Waters located in the Savannah River Basin include the Chattooga River and many of its tributaries, Big Creek,

and Overflow Creek. In addition, a portion of the Horsepasture River downstream is included in the National Wild and Scenic River System.

Information presented in this basinwide water quality plan is based on data collected from September 1999 to August 2004. Maps of each subbasin are included in each of the subbasin chapters. Each subbasin has its own characteristics and water quality concerns. These are discussed in Chapters 1 and 2.

DWQ identifies water quality stressors as specifically as possible depending on the amount of information available in a watershed. Most often, the source of the stressor is based on the predominant land use in a watershed. In the Savannah River basin, new development/construction activities, land clearing, impervious surfaces, and point source discharges were all identified as possible stressors. However, unknown stressors impact many streams. Water quality decline can often be attributed to a combination of many stressors that lead to habitat and water quality degradation. In some way, every person, industry, landowner, and municipality in the basin impacts water quality. Therefore, every resident of the basin must play a role in management strategies designed to protect and restore the streams, lakes, and rivers of the basin.

Subbasin 03-13-01

This mountainous subbasin is divided into two pieces: a small portion of the Tullulah River headwaters in Clay County and a larger portion of the basin that includes the Chattooga River, Norton Mill, Big, Clear and Overflow Creeks. The majority of streams in this subbasin flow generally south toward Georgia. The Chattooga River forms part of the state boundary between Georgia and South Carolina. The Chattooga and Tullulah Rivers join to form the Tugaloo River in Georgia. A map of this subbasin including water quality sampling locations is presented as Figure 3.

This subbasin lies within the level IV ecoregion of the Southern Crystalline Ridges and Mountains. This ecoregion is characterized by elevations ranging between 1,200 and 4,500 feet, high rainfall rates, abundant forest cover, and acidic, loamy, well-drained soils (Griffith *et al* 2002). As would be expected for an area with rugged topography, most of the land within this subbasin is forested (96.8 percent) and lies within the Nantahala National Forest including the Southern Nantahala Wilderness and the Ellicott Rock Wilderness areas. Notable exceptions include the urbanizing areas in and around the Town of Highlands and the Cashiers community. Residential development is increasing rapidly around these communities and along primary roadways.

There are five NPDES dischargers in this subbasin; two are required to perform whole effluent toxicity testing. The Cashiers WWTP (NC0063321, 0.1 MGD) discharges to an unnamed tributary of the Chattooga River and has had three toxicity violations since 2001. The Mountain (formerly Highlands Camp and Conference Center) facility (NC0061123, MGD .006) discharges to Abes Creek and has had seven toxicity violations since 2000.

Subbasin 03-13-02

The Horsepasture and Toxaway Rivers originate in Jackson and Transylvania counties and flow in a southeastern direction toward South Carolina's Lake Jocassee. The Horsepasture falls more than 2,000 feet in the North Carolina portion of the watershed and contains several spectacular

waterfalls. Other tributaries in this subbasin include the Whitewater and Thompson Rivers. A map of this subbasin including water quality sampling locations is presented as Figure 5.

Most of the land within this subbasin is forested (95.6 percent). The Whitewater River watershed lies within the Nantahala National Forest. The Gorges State Park and Toxaway Game Lands encompass 10,000 acres in this subbasin (mostly the Toxaway River watershed). There are no municipalities; however, several residential and resort communities exist near Sapphire and Lake Toxaway.

Water quality in this subbasin is generally good to excellent. Nearly all waters are classified trout waters. Several streams including Bearwallow Creek and a portion of the Whitewater River are High Quality Waters. Additionally, 4.5 miles of the Horsepasture River are both a State Natural and Scenic River and a National Wild and Scenic River.

Use Support Summary

Use support assessments based on surface water classifications form the foundation of this basinwide plan. Surface waters are classified according to their best-intended use. Determining how well a waterbody supports its use (*use support* rating) is an important method of interpreting water quality data and assessing water quality.

Biological, chemical, and physical monitoring data collected between September 1999 and August 2004 were used to assign use support ratings in the Savannah River basin. No streams in the Savannah River basin were rated as Impaired (Table *i*).

Use support methodology has changed significantly since the 2002 revision of the *Savannah River Basinwide Water Quality Plan*. In the previous plan, surface waters were rated fully supporting (FS), partially supporting (PS), not supporting (NS) and not rated (NR). FS was used to identify waters that were meeting their designated use. Impaired waters were rated PS and NS, depending on the degree of degradation. NR was used to identify waters with no data or those that had inconclusive data.

The *2002 Integrated Water Quality Monitoring and Assessment Report Guidance* issued by the Environmental Protection Agency (EPA) requests that states no longer subdivide the Impaired category. In agreement with this guidance, North Carolina no longer subdivides the Impaired category and rates waters as Supporting (S), Impaired (I), Not Rated (NR), or No Data (ND). These ratings refer to whether the classified uses of the water (such as water supply, aquatic life, primary/secondary recreation) are being met. Detailed information on use support methodology is provided in Appendix VIII.

Table *i* Summary of Use Support Ratings by Category and Subbasin in the Savannah River Basin

Subbasin 03-13-01			Subbasin 03-13-02		
Use Support Rating	**Aquatic Life**	**Recreation**	**Use Support Rating**	**Aquatic Life**	**Recreation**
Monitored Waters					
Supporting	18.1 mi	0	Supporting	28.7 mi	3.9 mi
Impaired*	0	0	Impaired*	0	0
Not Rated	0.6 mi 23.7 ac	0	Not Rated	524.9 ac	0
Total	**18.7 mi 23.7 ac**	**0**	**Total**	**28.7 mi 524.9 ac**	**3.9 mi**
Unmonitored Waters					
No Data	68.7 mi 17.0 ac	87.4 mi 40.7 ac	No Data	77.9 mi 125.6 ac	102.8 mi 650.5 ac
Total	**68.7 mi 17.0 ac**	**87.4 mi 40.7 ac**	**Total**	**77.9 mi 125.6 ac**	**102.8 mi 650.5 ac**
Totals					
All Waters	**87.4 mi 40.7 ac**	**87.4 mi 40.7 ac**	**All Waters****	**106.6 mi 650.5 ac**	**106.7 mi 650.5 ac**

* The noted percent Impaired is the percent of monitored miles/acres only.
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Use support methods were developed to assess ecosystem health and human health risk through the development of use support ratings for five categories: aquatic life, fish consumption, recreation, shellfish harvesting, and water supply. These categories are tied to the uses associated with the primary classifications applied to North Carolina rivers, streams, and lakes. A full description of the classifications is available in the DWQ document titled *Classifications and Water Quality Standards Applicable to Surface Waters of North Carolina*. This document is available on-line at http://h2o.enr.state.nc.us/csu/.

Challenges Related to Achieving Water Quality Protection

Thankfully, no streams in the Savannah River basin appear on the 303(d) list of impaired waters. However, as urbanization continues the risk of impairment increases. Balancing economic growth and water quality protection will be a tremendous challenge. Point source impacts on surface waters can be measured and addressed through the basinwide planning process and do not represent the greatest threat to water quality in the basin.

Cumulative Effects

While any one activity may not have a dramatic effect on water quality, the cumulative effect of land use activities in a watershed can have a severe and long-lasting impact.

The cumulative effects of nonpoint source pollution are the primary threat to water quality and aquatic habitat in the Savannah River basin. Nonpoint source pollution issues can be identified through the basinwide plan, but actions to address these impacts must be taken at the local level. Such actions should include:

- Develop and enforce local erosion control ordinances
- Require stormwater best management practices for existing and new development
- Develop and enforce buffer ordinances

- Conduct comprehensive land use planning that assesses and reduces the impact of development on natural resources.

This basinwide plan presents many water quality initiatives and accomplishments that are underway within the basin. These actions provide a foundation on which future initiatives can be built. Individual homeowners can participate in resource protection by doing the following on their own properties.

- To decrease polluted runoff from paved surfaces, households can develop alternatives to areas traditionally covered by impervious surfaces. Porous pavement materials are available for driveways and sidewalks, and native vegetation and mulch can replace high maintenance grass lawns.
- Homeowners can use fertilizers sparingly and sweep driveways, sidewalks, and roads instead of using a hose.
- Instead of disposing of yard waste, use the materials to start a compost pile.
- Learn to use Integrated Pest Management (IPM) in the garden and on the lawn to reduce dependence on harmful pesticides.
- Pick up after pets.
- Use, store, and dispose of chemicals properly.
- Drivers should check their cars for leaks and recycle their motor oil and antifreeze when these fluids are changed.
- Drivers can also avoid impacts from car wash runoff (e.g., detergents, grime, etc.) by using car wash facilities that do not generate runoff.
- Households served by septic systems should have them professionally inspected and pumped every 3 to 5 years. They should also practice water conservation measures to extend the life of their septic systems.
- Support local government watershed planning efforts and ordinance development.

Impacts from Steep Slope Disturbance

Dramatic elevation changes and steep slopes define mountain topography. Building sites perched along mountainsides provide access to unparalleled vistas and are a major incentive for development. However, construction on steep slopes presents a variety of risks to the environment and human safety.

Poorly controlled erosion and sediment from steep slope disturbance negatively impact water quality, hydrology, aquatic habitat, and can threaten human safety and welfare. Soil types, geology, weather patterns, natural slope, surrounding uses, historic uses, and other factors all contribute to unstable slopes. Improper grading practices disrupt natural stormwater runoff patterns and result in poor drainage, high runoff velocities, and increased peak flows during storm events. There is an inherent element of instability in all slopes and those who choose to undertake grading and/or construction activities should be responsible for adequate site assessment, planning, designing, and construction of reasonably safe and stable artificial slopes.

Local communities also have a role in reducing impacts from steep slope development. These impacts can also be addressed through the implementation of city and/or county land use and sediment and erosion control plans. Land use plans are a non-regulatory approach to protect water quality, natural resources and sensitive areas. In the planning process, a community gathers data and public input to guide future development by establishing long-range goals for the local

community over a ten- to twenty-year period. They can also help control the rate of development, growth patterns and conserve open space throughout the community. Land use plans examine the relationship between land uses and other areas of interest including quality-of-life, transportation, recreation, infrastructure and natural resource protection (Jolley, 2003).

Population Growth and Changes in Land Use

The Savannah River basin encompasses all or portions of four counties and one municipality. In 2000, the overall population in the basin (based on the percent of the county land area in the basin) was 11,482. The most populated areas are located in and around Highlands.

Savannah River ***Basin Statistics***
(North Carolina Portion)

Total Area: 172 sq. miles
Freshwater Stream Miles: 176.2 mi
No. of Counties: 4
No. of Municipalities: 1
No. of Subbasins: 2
Population (2000): 11,482*
Pop. Density (2000): 67 persons/sq. mile*

Water Quality Statistics

Aquatic Life
Percent Monitored Streams: 24.4% mi/79.4% ac
Percent Supporting: 24.1% mi
Percent Impaired: 0%

Recreation
Percent Monitored Streams: 2%
Percent Supporting: 2%
Percent Impaired: 0%

* Estimated based on % of county land area that is partially or entirely within the basin, not the entire county population.

Once one of the most remote and sparsely populated regions of the state, western North Carolina is now penetrated by modern interstates and highways that provide speedy access to the deepest folds of the rugged terrain. This improved access coupled with an abundance of recreational opportunities, cultural activities, and countless other amenities sets the stage for rapid population increases. With this growth comes increased pressure on the natural environment. Every person living in or visiting a watershed contributes to impacts on water quality. If water pollution is to be eliminated, each individual should be aware of these contributions and take actions to reduce them.

Between 1990 and 2000, county populations increased by over 18,000 people. The fastest growing county was Macon (21.2 percent increase), followed by Jackson (19.0 percent increase). County populations are expected to grow by another 27,000 people (21.2 percent) by 2020. This would result in a total population of over 128,000 people in the four counties partially or entirely contained within the Savannah River basin. Population growth trends and the accompanying impacts to water quality are discussed in Chapters 4 and 5.

Population growth results in dramatic impacts on the natural landscape. The most obvious impact is the expansion of urban and suburban areas. New stores, roads, and subdivisions are products of growing populations. What is not so obvious is the astonishing rate at which rural landscapes are converted to developed land. Between 1982 and 1997, the United States population increased by 15 percent. Over the same period, developed land increased by 34 percent – more than double the rate of population growth (NRI, 2001; U.S. Census Bureau, 2000). Locally, the trend can be even more pronounced. For example, the urban area of Charleston, SC expanded 250 percent between 1973 and 1994 while its population grew by 40 percent (Allen and Lu, 2000). Based on the current land cover information provided by the National Resources Inventory (USDA-NRCS, 2001), there was a 100 percent (2,300 acres) decrease in pasture land in the Savannah River basin from 1982 to 1997. Forestry also decreased

by nearly 100 acres (27.7 percent). Urban and built-up areas increased by 2,300 acres (27.7 percent). Land use cover tables and statistics are included in Appendix III.

Growing populations not only require more water, but they also lead to the discharge and runoff of greater quantities of waste and pollutants into the state's streams and groundwater. The impacts on rivers, lakes, and streams can be significant and permanent if stormwater runoff is not controlled. Thus, just as demand and use increases, some of the potential water supply is lost (Orr and Stuart, 2000).

Impacts from Stormwater Runoff

Stormwater runoff is rainfall or snowmelt that runs off the ground or impervious surfaces (e.g., buildings, roads, parking lots, etc.) instead of absorbing into the soil. In some cases, stormwater runoff drains directly into streams, rivers, lakes, and oceans. In other cases, particularly urbanized areas, stormwater drains into streets and manmade drainage systems consisting of inlets and underground pipes, commonly referred to as a storm sewer system. Stormwater runoff is a primary carrier of nonpoint source pollution in both urbanized and rural areas. The impact of stormwater runoff is particularly severe in developing areas where recently graded lands are highly susceptible to erosion. Water quality impacts are also evident in urbanized areas where stormwater runoff is increased by impervious surfaces and is rapidly channeled through ditches or curb and gutter systems into nearby streams. For more information on stormwater as it relates to growth and development, refer to Chapter 5.

There are several different stormwater programs administered by DWQ. One or more of these programs may affect communities in the Savannah River basin. The goal of DWQ stormwater discharge permitting regulations and programs is to prevent pollution from entering the waters of the state via stormwater runoff. These programs try to accomplish this goal by controlling the source(s) of pollution. For more information on statewide stormwater programs, refer to Chapter 6.

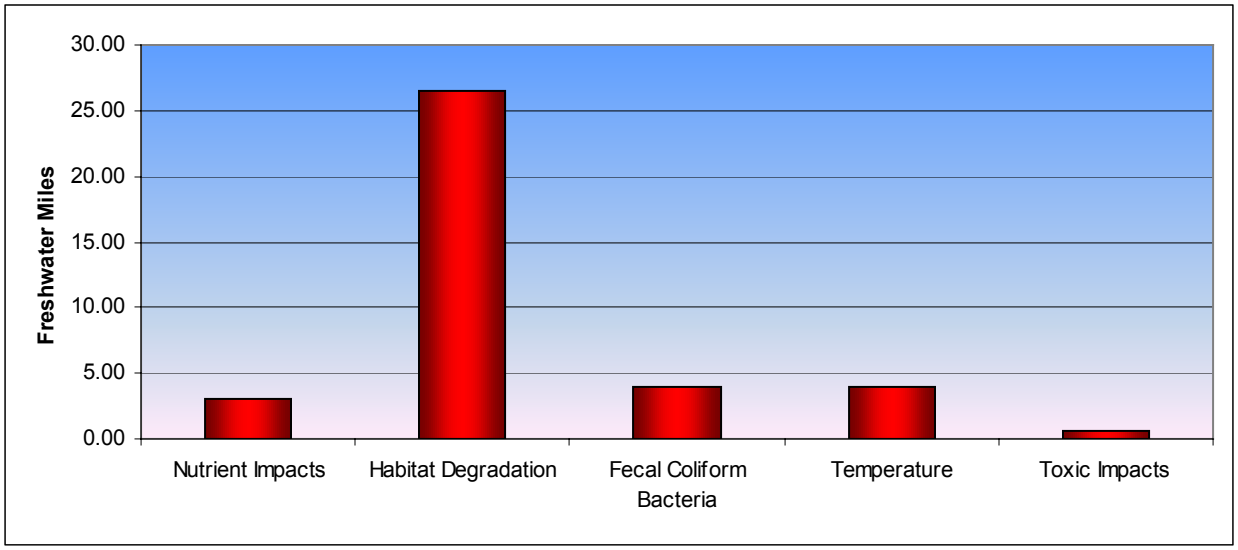
Septic Systems and Straight Pipes

In the Savannah River basin, wastewater from many households is not treated at a wastewater treatment plant (WWTP). Instead, it is treated on-site through the use of permitted septic systems. However, wastewater from some homes illegally discharges directly into streams through what is known as a "straight pipe". In some cases, wastewater can also enter streams through failing septic systems. In highly susceptible areas, wastewater from failing septic systems or straight pipes can contaminate a drinking water supply or recreational waters with nutrients, disease pathogens (such as fecal coliform bacteria), and endocrine disturbing chemicals. More information on DWQ wastewater programs can be found in Chapter 6.

Water Quality Stressors

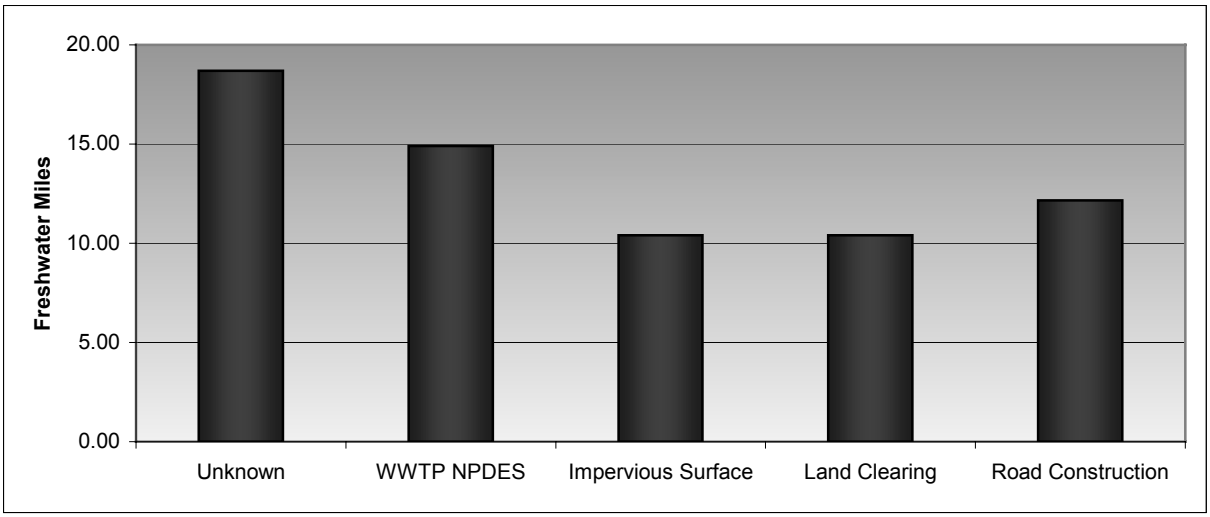
Water quality stressors are identified when impacts have been noted to biological (fish and benthic) communities or water quality standards have been violated. Whenever possible, water quality stressors are identified for Impaired waters as well as waters with notable impacts (Figures *i* & *ii*)

Figure *i* Stressors Identified for Streams with Noted Impacts



One of the most noted water quality stressors is instream habitat degradation. Instream habitat degradation is identified where there is a notable reduction in habitat diversity or a negative change in habitat. Sedimentation, streambank erosion, channelization, lack of riparian vegetation, loss of pools or riffles, loss of woody habitat, and streambed scour are all associated with habitat degradation. These stressors are typically a result of increased flow of stormwater runoff due to land use changes or to sediment runoff from land-disturbing activities. Streams with noted habitat degradation are discussed in the subbasin chapters (Chapters 1-2).

Figure *ii* Sources of Stressors Identified in the Savannah River Basin



Other chemical and biological factors can also impact water quality. These include excess algal growth, low dissolved oxygen, nitrogen and phosphorus levels, pH, and fecal coliform bacteria. Chapter 4 provides definitions and recommendations for reducing impacts associated with physical, chemical, and biological factors.

Local Involvement
DWQ is aware of only limited local activity in the Savannah River basin. Citizens should organize themselves to protect the resources most important to them. Local organizations and agencies are able to combine professional expertise and local knowledge not present at the state and federal level. This allows groups to holistically understand the challenges and opportunities of local water quality concerns. Involving a wide array of people in water quality projects also brings together a range of knowledge and interests and encourages others to become involved and invested in these projects. Working in cooperation across jurisdictional boundaries and agency lines opens the door to additional funding opportunities and eases the difficulty of generating matching or leveraged funds. This could potentially allow local entities to do more work and be involved in more activities because funding sources are diversified. The most important aspect of these local endeavors is that the more localized the project, the better the chances for success. Chapter 11 examines the importance of local, state, and federal initiatives.

The collaboration of local efforts is key to water quality improvements. DWQ is not aware of many local water quality initiatives in the Savannah Basin. DWQ encourages concerned citizens to get involved in resource protection.

Water Quality Standards and Classifications
Throughout the Savannah River basin, water quality is generally good and even excellent. Chapter 3 discusses water quality standards and classifications and includes maps showing the designated Water Supply (WS) watersheds, High Quality Waters (HQW), and Outstanding Resource Waters (ORW).

In the Savannah River basin, communities are being pressured to expand. This often involves construction and/or development in areas of pristine waters along several tributaries of the Horsepasture and Toxaway Rivers. HQW and ORW are supplemental classifications to the primary freshwater classification placed on a waterbody. Special management strategies are often associated with the supplemental HQW and ORW classification and are intended to prevent degradation of water quality below present levels from point and nonpoint sources of pollution. A brief summary of these strategies and the administrative code under which the strategies are found are included in Chapter 3.

Agriculture and Water Quality
Excess nutrient loading, pesticide and/or herbicide contamination, bacterial contamination, and sedimentation are often associated with agricultural activities, and all can impact water quality. Chapter 7 provides information related to the limited agricultural activities in the Savannah River basin and also identifies funding opportunities for best management practices (BMP). There were no North Carolina Agricultural Cost Share Program (NCACSP) projects in the basin during this assessment period.

Forestry and Water Quality
Based on land cover information provided by the North Carolina Corporate Geographic Database (CGIA) and the U.S. Department of Agriculture Natural Resources Conservation Service (NRCS), 93 percent (44,500 acres) of land in the Savannah River basin consists of forestland. There were 10.4 streams miles (3b) that were noted or identified by stressors associated with land clearing or forestry activities. Where forest harvesting is identified as a source of water quality impact, DWQ will notify the Division of Forest Resources to investigate for potential

violations and the enforcement of management strategies. Chapter 8 presents more information related to the impacts of forestry on water quality.

Water Resources

Chapter 9 presents information related to minimum streamflow requirements, interbasin transfers, and the impact to water quality during drought conditions. The chapter also includes the federal cataloging units, or hydrologic units, as they relate to the state subbasin boundaries.

Natural Resources

Although small in total area compared to most of North Carolina's river basins, the Savannah River basin is one of the most ecologically diverse landscapes in the southeastern Appalachians and North Carolina. The region is located where the steep eastern face of the Blue Ridge turns and faces south, and with its relatively warm and extremely wet climate (up to 90 inches of rainfall a year), creates a unique setting within the Blue Ridge. A total of 87 rare plant species are known to exist among a diversity of habitats that include spray zones of waterfalls, rock faces of outcrops and overhanging crags and cliffs, and rich coves and other forest communities.

Chapter 10 presents information related to the ecological significance of the basin and identifies endangered and threatened species, significant natural areas and aquatic habitats, and public lands that are locally significant.

Figure iii General Map of the Entire Savannah River Basin

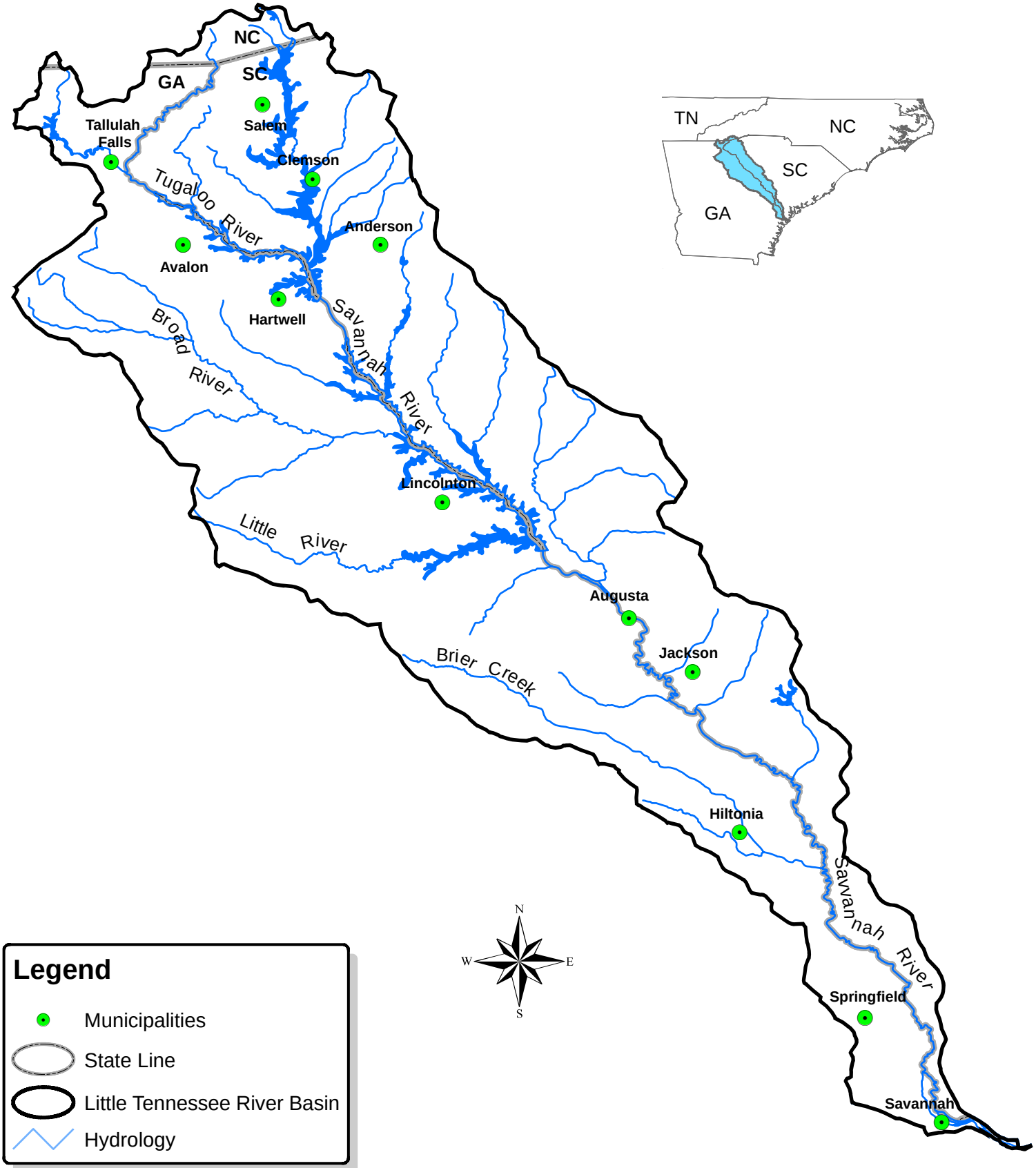
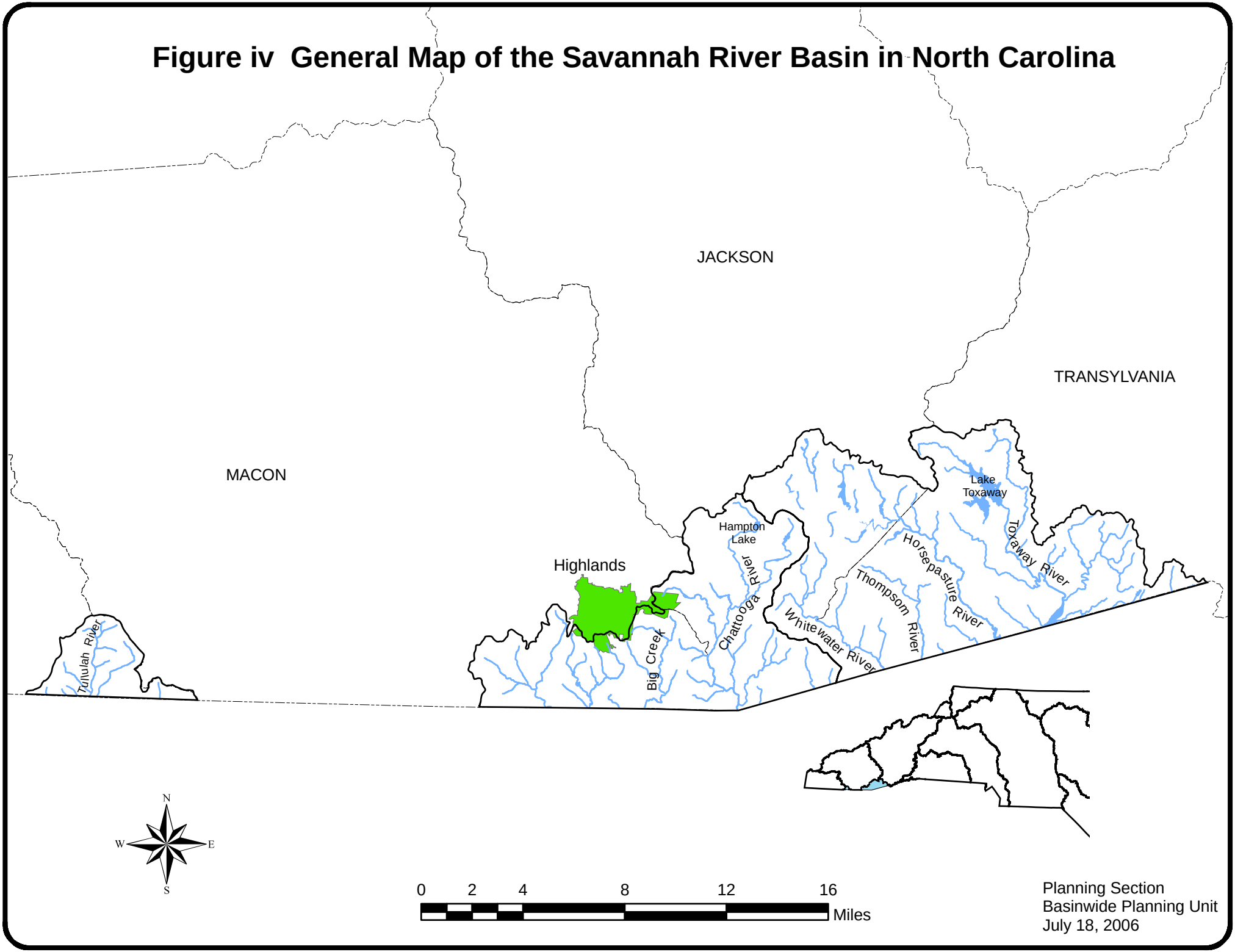


Figure iv General Map of the Savannah River Basin in North Carolina



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