

# Chapter 2 - Basin Overview

## 2.1 General Overview

The upper Savannah River watershed is ruggedly beautiful and remote. Rivers in the North Carolina portion of the basin, such as the Chattooga and Horsepasture in Jackson County, and the Toxaway in Transylvania County, generally flow southward toward Georgia and South Carolina (Figure A-4). The Tullulah and Chattooga Rivers join in Georgia to form the Tugaloo River, while the Toxaway, Horsepasture and Whitewater Rivers flow into Lakes Jocassee and Keowee on the Seneca River in South Carolina. Eventually, the Seneca and Tugaloo Rivers form Lake Hartwell in Georgia where the Savannah River begins. The Savannah River flows to the south and southeast, forming the border between Georgia and South Carolina and covering nearly 300 miles before emptying into the Atlantic Ocean (Figure A-5). Roughly 55 percent of the Savannah River basin is in Georgia, 43 percent is in South Carolina, and 2 percent is in North Carolina.

### *Savannah River Basin Statistics*

Total Area: 172 mi<sup>2</sup>  
Stream Miles: 176.2  
Lake Acres: 1,366  
No. of Counties: 4  
No. of Municipalities: 1  
No. of Subbasins: 2  
Population (2000): 11,482 \*  
Estimated Pop. (2020): 14,534 \*  
% Increase (2000-2020): 26.6%  
Pop. Density (1990): 23 persons/ mi<sup>2</sup>

\* Based on % of county land area estimated to be within the basin.

The Savannah River basin is the smallest basin in the state, encompassing only 172 square miles in portions of four counties. The basin contains approximately 176 miles of freshwater streams and 1,366 acres of lakes. A significant portion of the basin lies within the Nantahala National Forest, and 3,000 acres are Wildlife Resources Commission Game Lands. Additionally, Gorges State Park was created in 1999 and encompasses 7,000 acres. The steep slopes, high elevation and large amount of annual rainfall result in spectacular waterfalls, as well as a large number of rare and endangered species that are specially adapted to moist microhabitats. Trout waters are abundant, and many streams have been classified as High Quality or Outstanding Resource Waters. Approximately 17 miles of the Chattooga River and 4.5 miles of the Horsepasture River carry the National Wild and Scenic River designation. The same segment of the Horsepasture River is also a State Natural and Scenic River.

While most of the land is forested (96 percent), many retirement and second home developments, as well as commercial resorts, continue to be constructed in the basin. A portion of the Town of Highlands is the only municipal area; however, the Cashiers community represents a large portion of the developed land. Population of the basin, based on 1990 census data, was estimated to be 3,950. The overall population density of the basin was 23 persons per square mile compared to the statewide average of 139 persons per square mile. The 2000 census data have not been divided according to river basin and subbasin boundaries. However, if 2000 data are adjusted by the percentage of each county that falls within the Savannah River basin, the estimated population is 11,482. Significant growth is expected over the next five-year basinwide planning cycle.

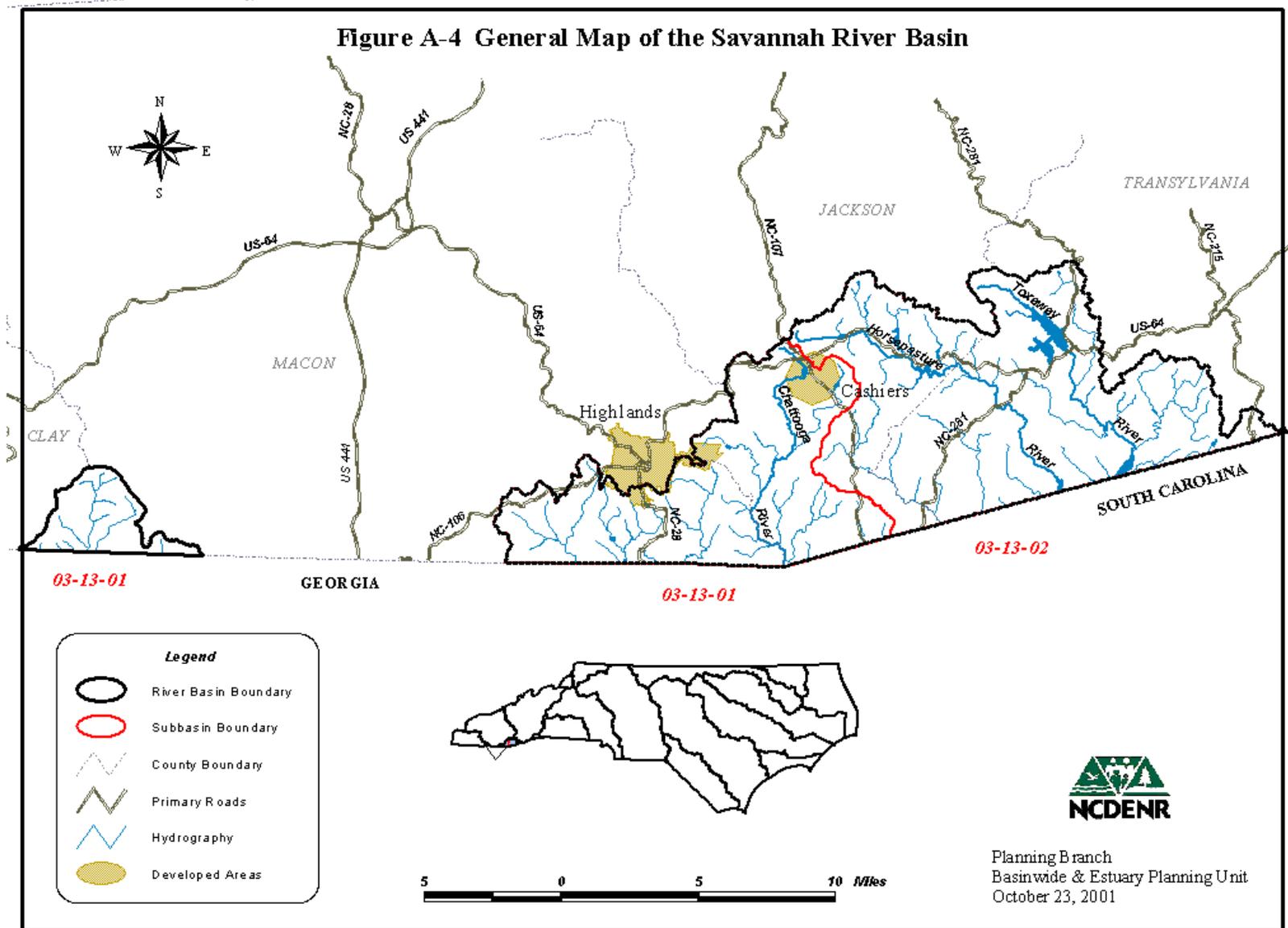


Figure A-4 General Map of the Savannah River Basin (NC Portion)

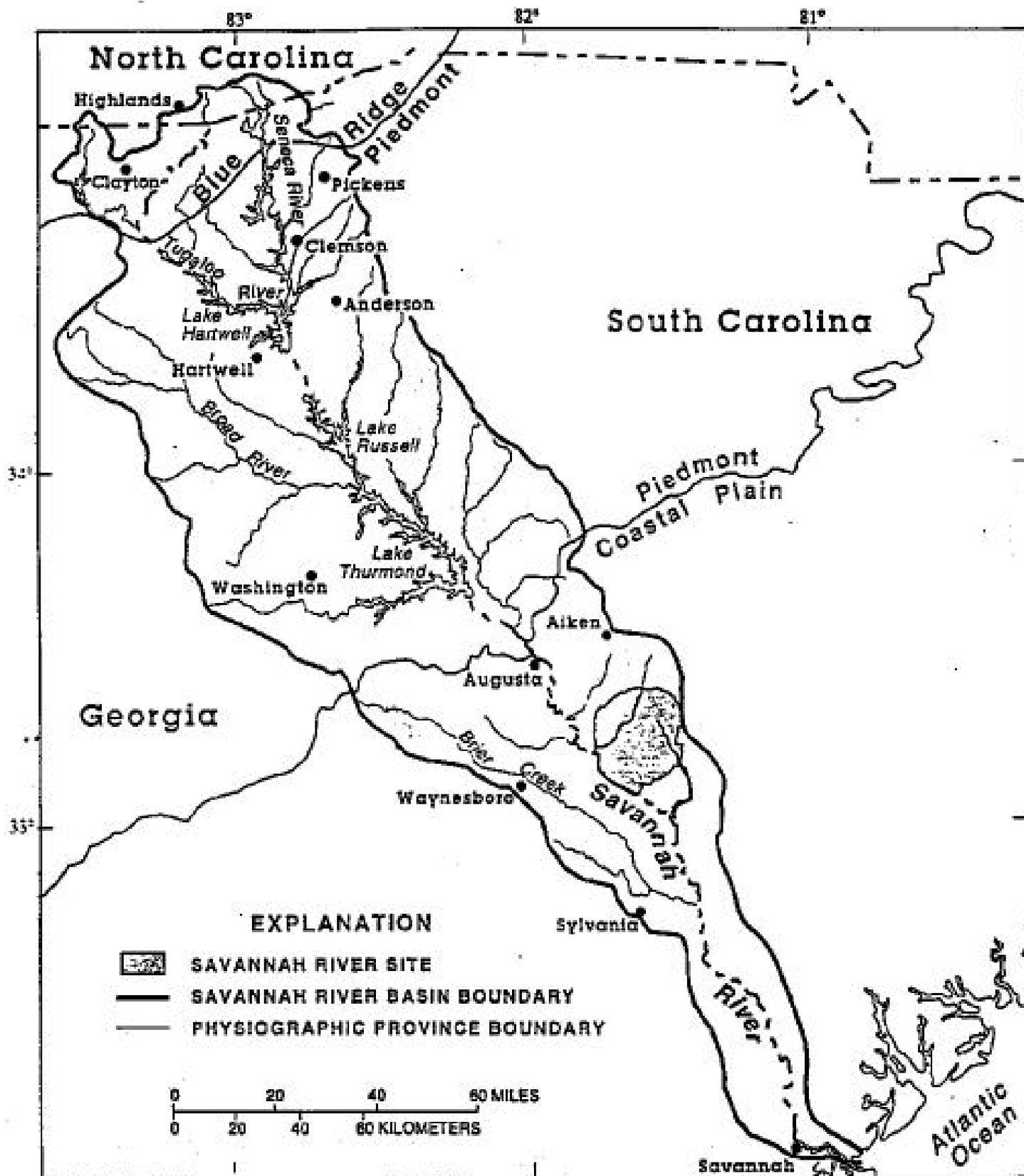


Figure A-5 General Map of the Entire Savannah River Basin

## 2.2 Local Governments and Planning Jurisdictions in the Basin

The North Carolina portion of the Savannah River basin encompasses all or part of the following four counties and one municipality (Table A-3).

Table A-3 Local Governments and Planning Units within the Savannah River Basin

County	Council of Government Region	Municipalities
Clay	A	None
Jackson	A	Highlands ♦
Macon	A	Highlands ♦
Transylvania	B	None

♦ Highlands is located in more than one county and more than one river basin.

Note: Counties adjacent to and sharing a border with a river basin are not included as part of that basin if only a trace amount of the county (<2%) is located in that basin, unless a municipality is located in that county.

Region	Name	Location	Website
A	Southwestern Commission	Bryson City	<a href="http://www.regiona.org">http://www.regiona.org</a>
B	Land-of-Sky Regional Council	Asheville	<a href="http://www.landofsky.org/">http://www.landofsky.org/</a>

## 2.3 Surface Water Hydrology

Most federal government agencies, including the US Geological Survey and the Natural Resources Conservation Service (NRCS), use a system of defining watersheds that is different from that used by the Division of Water Quality (DWQ) and many other state agencies in North Carolina. Under the federal system, the Savannah River basin is made up of two hydrologic areas referred to as hydrologic units. DWQ has a two-tiered system in which the state is divided into 17 major river basins with each basin further subdivided into subbasins. Table A-4 compares the two systems. The Savannah River basin is subdivided by DWQ into two subbasins which correspond with the larger watersheds of the Seneca and Tugaloo Rivers (shown on Figure A-5). Maps of each subbasin are included in Section B of this plan.

Table A-4 Hydrologic Subdivisions in the Savannah River Basin

Watershed Name and Major Tributaries	USGS 8-digit Hydrologic Units	DWQ 6-digit Subbasin Codes
<i>Tugaloo River</i> Tullulah River, Chattooga River Big Creek, Overflow Creek, Scotsman Creek, Fowler Creek	03060102	03-13-01
<i>Seneca River</i> Toxaway River, Horsepasture River Thompson River, Whitewater River	03060101	03-13-02

The North Carolina portion of the Savannah River basin is located entirely within the Blue Ridge Physiographic Province. The Blue Ridge Province is a mountainous area of steep ridges, intermountain basins and valleys that intersect at all angles. In this basin, 176 miles of freshwater streams drain 172 square miles. There are many streams draining small areas of land; the average drainage area per stream mile is 0.97 square miles. In comparison, each stream mile in the Cape Fear River basin drains 1.5 square miles of land. In other words, in the Savannah River basin, there are more streams draining smaller portions of land (high drainage density due to very steep terrain). Areas with high drainage density are associated with high flood peaks, high sediment production, relatively low suitability for traditional agriculture, and high development costs for the construction of buildings and the installation of roads and bridges.

There are three notable reservoirs in the North Carolina portion of the Savannah River basin: Cashiers Lake, Fairfield Lake and Lake Toxaway. Table A-5 presents statistics, including surface and drainage areas, for each.

Table A-5 Statistics for Major Lakes in the Savannah River Basin

Subbasin/ Lake	County	Classification	Surface Area (ac)	Mean Depth (ft)	Watershed (mi <sup>2</sup> )
<i>03-13-01</i> Cashiers Lake	Jackson	B Tr ORW	21	4.6	1.1
<i>03-13-02</i> Fairfield Lake	Jackson	B	74	15.1	2.8
Lake Toxaway	Transylvania	B Tr	640	32.8	7.8

The community of Lake Toxaway has more waterfalls within a 15-mile radius than any other point in the state. The Thompson River alone has seven major waterfalls, with the Horsepasture River adding another six. The Toxaway River and its tributaries contain more than two dozen waterfalls between Cold Mountain Gap and Lake Jocassee near the state line. Several waterfalls also exist on Overflow and Clear Creeks as well as on the Chattooga River (Adams, 1994). For further information about the unique aquatic habitat these hydrologic features provide, refer to page 20.

## 2.4 Land Cover

Land cover information in this section is from the most current National Resources Inventory (NRI), as developed by the Natural Resources Conservation Service (USDA, updated June 2001). The NRI is a statistically based longitudinal survey that has been designed and implemented to inventory land cover types and acreages. The NRI provides results that are nationally and temporally consistent for four points in time – 1982, 1987, 1992 and 1997.

In general, NRI protocols and definitions remain fixed for each inventory year. However, part of the inventory process includes reviewing previously recorded data when determinations are made for the new inventory year. For those cases where a protocol or definition needs to be modified, all historical data must be edited and reviewed on a point-by-point basis to make sure that data for all years are consistent and properly calibrated. The following excerpt from the *Summary*

Report: 1997 National Resources Inventory provides guidance for use and interpretation of current NRI data:

*“The 1997 NRI database has been designed for use in detecting significant changes in resource conditions relative to the years 1982, 1987, 1992 and 1997. All comparisons for two points in time should be made using the new 1997 NRI database. Comparisons made using data published for the 1982, 1987 and 1992 NRI may provide erroneous results, because of changes in statistical estimation protocols and because all data collected prior to 1997 were simultaneously reviewed (edited) as 1997 NRI data were collected.”*

Table A-6 summarizes acreage and percentage of land cover from the 1997 NRI for the North Carolina portion of the basin, as defined by the USGS 8-digit hydrologic units. Data from 1982 are also provided for a comparison of change over 15 years. During this period, the amount of land in the Urban & Built-Up category increased significantly (2,300 acres), while all remaining land described as pasture (2,300 acres) were converted to other land uses. In 1997, no lands were described as cropland or pasture by the NRI. Approximately 87 percent of the basin is forested, either in federal (51,700 acres) or state and private (44,500 acres) ownership.

Table A-6 Land Cover in the Savannah River Basin by Major Watersheds – 1982 vs. 1997 (Source: USDA-NRCS, NRI, updated June 2001)

LAND COVER	MAJOR WATERSHED AREAS *								
	Seneca Watershed		Tugaloo Watershed		1997 TOTALS		1982 TOTALS		% change since 1982
	Acres (1000s)	%	Acres (1000s)	%	Acres (1000s)	% of TOTAL	Acres (1000s)	% of TOTAL	
Cult. Crop	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Uncult. Crop	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pasture	0.0	0.0	0.0	0.0	0.0	0.0	2.3	2.1	-100.0
Forest	36.0	51.0	8.5	21.6	44.5	40.5	44.6	40.6	-0.2
Urban & Built-Up	1.9	2.7	8.7	22.1	10.6	9.6	8.3	7.6	27.7
Federal	30.3	42.9	21.4	54.5	51.7	47.0	51.6	47.0	0.2
Other	2.4	3.4	0.7	1.8	3.1	2.8	3.1	2.8	0.0
Totals	70.6	100.0	39.3	100.0	109.9	100.0	109.9	100.0	
% of Total Basin		64.2		35.8		100.0			
SUBBASINS	03-13-02		03-13-01						
8-Digit Hydraulic Units	03060101		03060102						

\* = Watershed areas defined by the 8-Digit Hydraulic Units do not necessarily coincide with subbasin titles used by DWQ.

Source: USDA, Soil Conservation Service - 1982 and 1997 NRI

Figure A-6 presents these land cover changes. Descriptions of land cover types identified by the NRI are found in Table A-7.

Figure A-6 Land Cover Changes from 1982 to 1997 for the Savannah River Basin  
(Source: USDA-NRCS, NRI, updated June 2001)

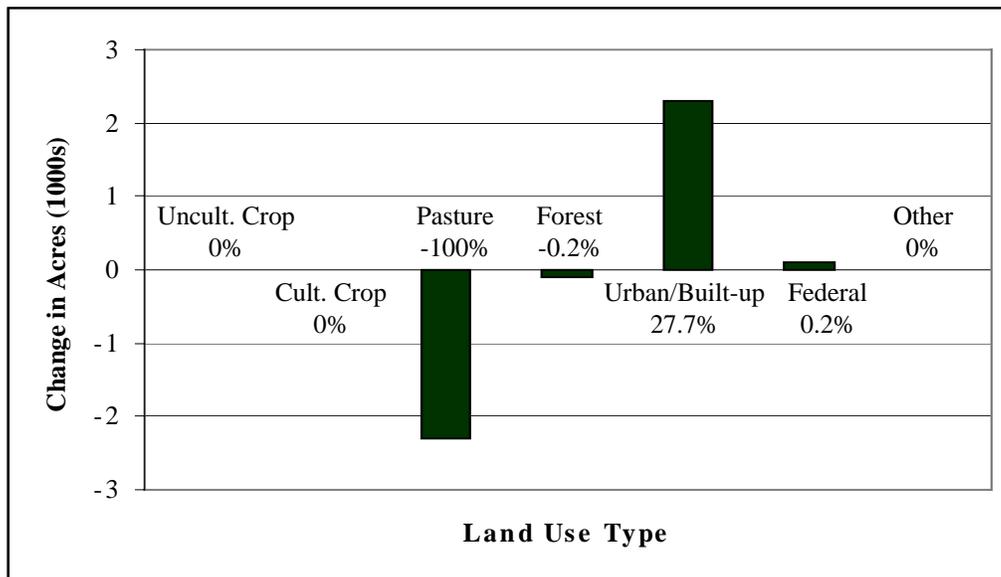


Table A-7 Description of Land Cover Types  
(Source: USDA-NRCS, NRI, updated June 2001)

Land Cover Type	Land Cover Description
Cultivated Cropland	Harvestable crops including row crops, small grain and hay crops, nursery and orchard crops, and other specialty crops.
Uncultivated Cropland	Summer fallow or other cropland not planted.
Pastureland	Forage plants for livestock grazing, including land that has a vegetative cover of grasses, legumes and /or forbs, regardless of whether it is being grazed by livestock.
Forestland	At least 10 percent stocked (a canopy cover of leaves and branches of 25 percent or greater) by single-stemmed trees of any size, which will be at least 4 meters at maturity, and land bearing evidence of natural regeneration of tree cover. The minimum area for classification of forestland is 1 acre; must be at least 1,000 feet wide.
Urban and Built-Up Land	Includes airports, playgrounds with permanent structures, cemeteries, public administration sites, commercial sites, railroad yards, construction sites, residences, golf courses, sanitary landfills, industrial sites, sewage treatment plants, institutional sites, water control structure spillways and parking lots. Includes highways, railroads and other transportation facilities if surrounded by other urban and built-up areas. Tracts of less than 10 acres that are completely surrounded by urban and built-up lands.
Other	<i>Rural Transportation:</i> Consists of all highways, roads, railroads and associated rights-of-way outside urban and built-up areas; private roads to farmsteads; logging roads; and other private roads (but not field lanes). <i>Small Water Areas:</i> Waterbodies less than 40 acres; streams less than 0.5 mile wide. <i>Census Water:</i> Large waterbodies consisting of lakes and estuaries greater than 40 acres and rivers greater than one-half mile in width. <i>Minor Land:</i> Lands not in one of the other categories.

The North Carolina Corporate Geographic Database contains land cover information for the Savannah River basin based on satellite imagery from 1993-1995. The state's Center for Geographic Information and Analysis (CGIA) developed 24 categories of statewide land cover information. For the purposes of this report, those categories have been condensed into five broader categories as described in Table A-8. An important distinction between this land cover dataset and that of the NRI is that there is no actual groundtruthing of the satellite-generated data.

Figure A-7 provides an illustration of the relative amount of land area that falls into each major cover type for the Savannah River basin. Please note the description of "Pasture/Managed Herbaceous" in Table A-8. Section B of this plan provides land cover data specific to each subbasin.

Table A-8 Description of Major CGIA Land Cover Categories

Land Cover Type	Land Cover Description
Urban	Greater than 50% coverage by synthetic land cover (built-upon area) and municipal areas.
Cultivated	Areas that are covered by crops that are cultivated in a distinguishable pattern (such as rows).
Pasture/Managed Herbaceous	Areas used for the production of grass and other forage crops and other managed areas such as golf courses and cemeteries. Also includes upland herbaceous areas not characteristic of riverine and estuarine environments.
Forest/Wetland	Includes salt and freshwater marshes, hardwood swamps, shrublands and all kinds of forested areas (such as needleleaf evergreens, conifers, deciduous hardwoods).
Water	Areas of open surface water, areas of exposed rock, and areas of sand or silt adjacent to tidal waters and lakes.

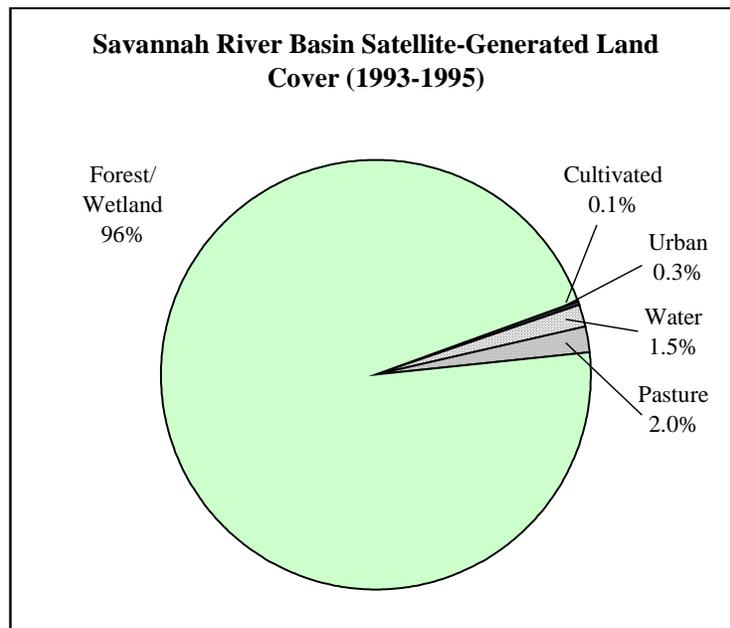


Figure A-7 Percentages within Major CGIA Land Cover Categories in the Savannah River Basin

Unfortunately, due to differences in the system of categorizing various land cover classes, it is not possible to establish trends in land cover changes by comparing this data set to previously attained land cover data. However, it is anticipated that comparisons will be possible with future satellite data since a strong consensus-based effort was made to develop the classification system that was used with the 1993-1995 data.

## 2.5 Population and Growth Trends

### Population

Following the 1990 census, North Carolina population data were compared with subbasin boundaries in an attempt to better estimate actual river basin population. Based on this comparison, the Savannah River basin had an estimated population of 3,950. Table A-9 presents census data, by subbasin, for 1970, 1980 and 1990 census data.

Table A-9 Savannah River Subbasin Population, Densities (1970, 1980 and 1990) and Land Area Summaries

SUBBASIN	POPULATION <sup>1</sup>			POPULATION DENSITY <sup>2</sup>			AREA <sup>3</sup>	
	(Number of Persons)			(Persons/Square Mile)			(Acres)	(Sq. Miles)
	1970	1980	1990	1970	1980	1990		
03-13-01	995	1,146	1,640	14	16	23	46,401	72
03-13-02	1,200	1,898	2,310	12	19	24	63,136	98
<b>TOTALS</b>	<b>2,195</b>	<b>3,044</b>	<b>3,950</b>	<b>13</b>	<b>18</b>	<b>23</b>	<b>109,537</b>	<b>170</b>

<sup>1</sup> Population estimated based on US Census data and percentage of census block that falls within the subbasin.

<sup>2</sup> Population density based on land area only. Large wetlands (swamps) not included in area used to calculate density.

<sup>3</sup> Information generated by the NC Center for Geographic Information Analysis.

In using these data, it should be noted that the census data are collected within boundaries such as counties and municipalities. By contrast, the subbasin lines are drawn along natural drainage divides separating watersheds. Therefore, where a census block group straddles a subbasin line, an estimate is made on the percentage of the population that is located in the subbasin. This was done by simply determining the percentage of the census block group area located in the subbasin and then taking that same percentage of the total census block group population and assigning it the subbasin. Use of this method necessitates assuming that population density is evenly distributed throughout a census block group, which is not always the case. However, the level of error associated with this method is not expected to be significant for the purposes of this document. It is also important to note that the census block groups change every ten years, so comparisons between years must be considered approximate. This analysis to determine river basin population has not yet been conducted for the recently released 2000 census data.

Table A-9 also includes population densities (persons/square mile) based on the *land area* (excludes open water) for each subbasin. Because subbasin 03-13-01 includes the 10.5-square mile Southern Nantahala Wilderness and the majority of Ellicott Rock Wilderness, population is more densely distributed within privately-owned land in the subbasin than is reflected in Table

A-9. However, the majority of the basin’s population lives in subbasin 03-13-02 in the Cashiers, Sapphire and Toxaway communities along US Highway 64.

### **Growth Trends**

There is one municipality located wholly or partially within the North Carolina portion of the Savannah River basin. Only the fringes of Highlands spill over into the basin; however, these data are still important. The population of this municipality exploded between 1980 (653) and 1990 (948), increasing nearly 45 percent. However, between 1990 and 2000 (909) the population decreased slightly (4 percent).

Table A-10 shows the projected population in 2020 and the estimated population change between 2000 and 2020 for counties that are wholly or partly contained within the basin. Since river basin boundaries do not usually coincide with county boundaries, these numbers are not directly applicable to the Savannah River basin (refer to discussion prior to Table A-9). Even though 30 percent of Jackson and Transylvania counties are contained within the basin, only 5 percent of Clay County and only 6 percent of Macon County are encompassed. This information was obtained from the Office of State Planning (April and May 2001).

Table A-10 Past, Projected and Change in Population (1990, 2000, 2020) by County

County	% of County in Basin *	1990	2000	1990-2000 (Change)	Estimated Population 2020	Estimated Pop Change 2000-2020
Clay	5	7,155	8,775	1,620	11,331	2,556
Jackson	12	26,835	33,121	6,286	44,426	11,305
Macon	6	23,504	29,811	6,307	40,773	10,962
Transylvania	18	25,520	29,334	3,814	34,390	5,056

\* Source: North Carolina Center for Geographic Information and Analysis

Note: The numbers reported reflect county population; however, the county may not be entirely contained within the basin. The intent is to demonstrate growth for counties located wholly or partially within the basin.

For more information on past, current, and projected population estimates, contact the Office of State Planning at (919) 733-4131 or visit their website at <http://www.ospl.state.nc.us/demog/>.

## **2.6 Natural Resources**

The Savannah River basin is one of the most ecologically diverse landscapes in the southern Appalachian Mountains and North Carolina. Topography and rainfall almost define the region, providing spectacular gorges and abundant waterfalls, as well as creating rare natural communities. The region is located where the steep eastern face of the Blue Ridge turns and faces to the south, and with its relatively warm and extremely wet climate (over 80 inches of rainfall a year), creates a unique setting within the Blue Ridge. The area has been well recognized by naturalists and botanists because of the abundance of rare species. 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, overhanging crags and cliffs, and rich coves and other forest communities.

A geographical coincidence worth noting is that the North Carolina portion of the Savannah basin is entirely headwaters. Headwaters, when protected, can harbor aquatic species that are impacted or eliminated by downstream degradation. As habitat in downstream stream reaches is restored, these species can migrate from the headwaters to repopulate the entire stream. Refer to page 48 for further discussion.

### 2.6.1 Significant Natural Heritage Areas in the Savannah River Basin

The North Carolina Natural Heritage Program identifies areas that have outstanding conservation value, either because they contain rare or endangered species, or because an area provides an excellent, intact example of an ecological community which naturally occurs in the state. The Savannah River basin contains a number of unique ecological communities, including several important aquatic and riparian areas, presented on Figure A-8 and discussed below.

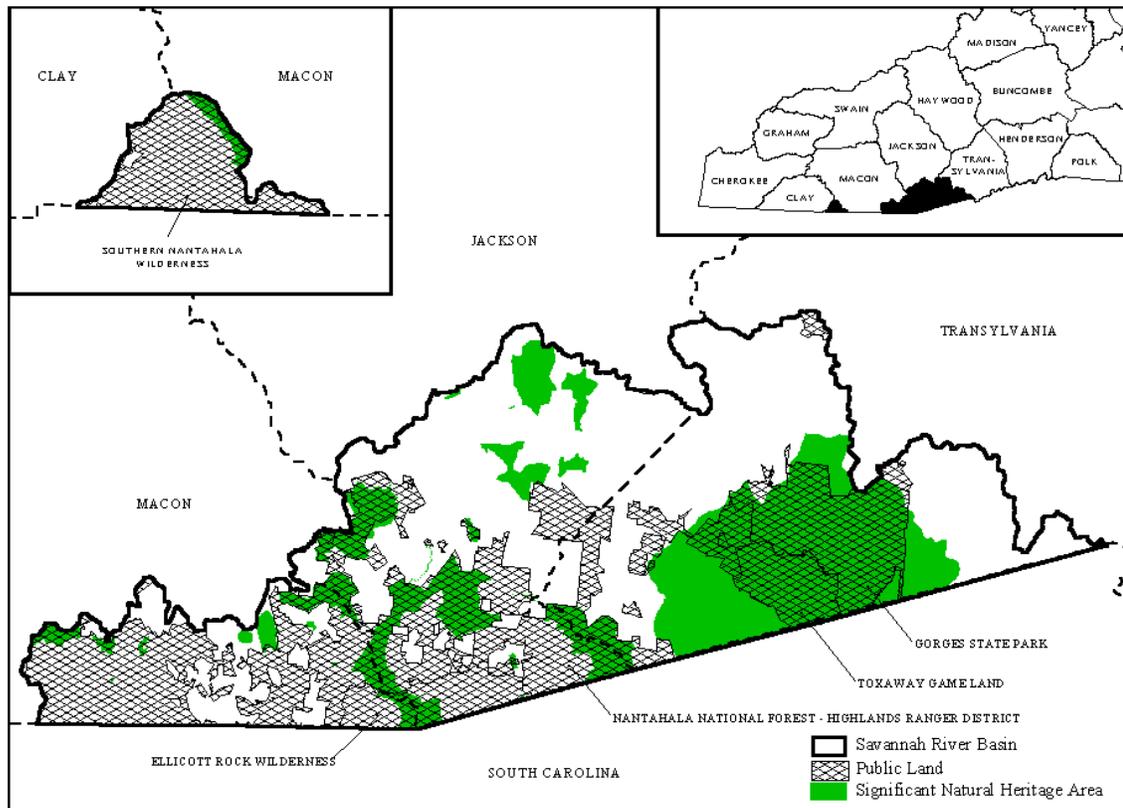


Figure A-8 Public Lands and Significant Natural Heritage Areas in the Savannah River Basin

Most of the natural areas lie in the river gorges of the Chattooga, Toxaway, Horsepasture, Thompson and Whitewater Rivers. Intact, high quality riparian vegetation in these steep gorges maintains water quality and also provides habitat for animals found nowhere else in North

Carolina, such as the Turquoise Darter (*Etheostoma inscriptum*), a fish found only in streams in the Savannah River basin. Two unique high quality wetland types that can be found in the basin are spray cliffs and mountain bogs.

### **Spray Cliffs**

In this region that is famous for waterfalls, sloping rock faces are bathed in spray from plunging water. The resulting constant humidity and moderate temperatures support a rich plant community dominated by ferns, mosses and liverworts. The presence of species more typical of the tropics than the Southern Appalachian Mountains makes these communities unique. Obviously, the extent of spray cliff species is quite limited by the conditions that these communities require. Sites where the spray cliff community can be found are few; known from only a few dozen occurrences, most of them are less than one acre in size. Yet the spray cliffs are home to the largest number of rare plants in the North Carolina portion of the Savannah River basin. Confounding the survival of these communities is the natural appeal of waterfalls, which draws admirers who inadvertently trample flora in their appreciation of the cascades.

### **Mountain Bogs**

Less than 500 acres of mountain bogs exist within North Carolina, and the entire Appalachian Highlands, which includes the Appalachian Plateau, Ridge and Valley, and Blue Ridge provinces of Alabama, Georgia, Tennessee, North Carolina, Virginia and West Virginia, contain less than 6,175 acres (Moorhead and Rossell, 1998). Mountain bogs in North Carolina are generally small, isolated and rare wetlands largely concentrated in two areas: a band between Henderson and Clay counties in the southern mountains (including the Savannah River basin); and in Avery, Watauga, Ashe and Alleghany counties in the northern mountains (Early, 1989).

North Carolina's mountain bogs host 77 species of rare, threatened or endangered plants such as the bunched arrowhead, swamp pink and Gray's lily. In addition to harboring important plant species, the state's mountain bogs also host five species of rare, threatened or endangered animals (Murdock, 1994), most notably the bog turtle (*Clemmys muhlenbergii*). Of the estimated 500 acres of mountain bogs in North Carolina, less than half support bog turtles (Herman, 1994).

Little research has investigated the hydrology of these bogs, but they may be found in four principle positions on the landscape: 1) headwater regions of mountain streams; 2) slopes intercepting the water table and subject to constant groundwater seepage; 3) stream valleys no longer subject to flooding; and 4) isolated systems over resistant rock strata (Walbridge, 1991; Weakley and Schafale, 1994). Although these wetlands are groundwater fed, technically called "fens" in classifications based on water source, they are locally known as bogs and have been called that in most publications within the state. The groundwater in fens tends to be acidic and nutrient poor, because of the rock and soil types it flows through. Groundwater in these areas of the Savannah River basin is less rich than is typical of most northern fens; therefore, the vegetation is more "bog-like" (Pohlman, September 2001).

Historically ditched and drained for farms, ponds and pastures, mountain bogs today are also imperiled by development activities. Active management of some mountain bogs has focused on protecting or enhancing habitat for bog turtles or rare plants (Moorhead and Rossell, 1998).

Since many bogs are privately owned and not actively managed or protected (Weakley and Moorhead, 1991), educating landowners on the value and significance of mountain bogs is an important first step in their protection.

### 2.6.2 Rare Aquatic and Wetland-Dwelling Species

The NC Natural Heritage Program within the Division of Parks and Recreation tracks the status of individual species in North Carolina. Table A-11 presents rare aquatic and wetland-dwelling species found in the Savannah River basin. As was mentioned previously, the Turquoise darter (*Etheostoma inscriptum*) is found only in streams in the Savannah River basin.

Table A-11 Rare Aquatic and Wetland-Dwelling Animal Species (as of November 2000)

Major Taxon	Common Name	Scientific Name	State Status	Federal Status
fish	Rosyface chub	<i>Hybopsis rubrifrons</i>	T	
fish	Redeye bass	<i>Micropterus coosae</i>	SR	
fish	Yellowfin shiner	<i>Notropis lutipinnis</i>	SC	
fish	Turquoise darter	<i>Etheostoma inscriptum</i>	SC	
invertebrate	Caddisfly	<i>Helicopsyche paralimnella</i>	SR	FSC
invertebrate	Caddisfly	<i>Matripotila jeanae</i>	SR	
invertebrate	Caddisfly	<i>Micrasema burksi</i>	SR	
invertebrate	Caddisfly	<i>Micrasema sprulesi</i>	SR	
invertebrate	Stonefly	<i>Diploperla morgani</i>	SR	
invertebrate	Mayfly	<i>Litobrancha recurvata</i>	SR	
invertebrate	Mayfly	<i>Drunella longicornis</i>	SR	
crustacean	Transylvania crayfish ostracod*	<i>Waltoncythere acuta</i>	SR	FSC
crustacean	Whitewater crayfish ostracod*	<i>Dactylocythere prinsii</i>	SR	FSC
crustacean	Oconee stream crayfish	<i>Cambarus chaugaensis</i>	SR	
crustacean	Oconee crayfish ostracod*	<i>Cymocythere clavata</i>	SR	
plant	Floating sickle-moss	<i>Warnstorfia fluitans</i>	SR	
plant	Lichen	<i>Hydrothyria venosa</i>	C	

Rare Species Listing Criteria	
T =	Threatened (considered likely to become endangered within the foreseeable future)
C =	Candidate (very rare in North Carolina and likely to merit listing as endangered or threatened)
SR =	Significantly Rare (rare in North Carolina, but not yet officially listed as threatened or endangered)
SC =	Special Concern (have limited numbers in North Carolina and vulnerable populations in need of monitoring)
FSC =	Federal Species of Concern (those under consideration for listing under the Federal Endangered Species Act)

\*Ostracods are small (less than 0.5 mm) crustaceans whose symbiotic hosts are crayfish.

### 2.6.3 Public Lands in the Savannah River Basin

Publicly-owned lands are a significant component of the Savannah River basin. Federal and state agencies currently manage approximately 62,000 acres of public land (56 percent) in the Savannah River basin (Figure A-8). A portion of the Nantahala National Forest, including Ellicott Rock Wilderness and Southern Nanatahala Wilderness, makes up the federal lands found in the basin. State lands consist of the 7,000-acre Gorges State Park and the 3,000-acre Toxaway Game Land, both of which were created in 1999. All of these public lands are managed for multiple uses, but in the long-term are protected from extensive development.

## 2.7 Permitted Wastewater and Stormwater Discharge Facilities

Discharges that enter surface waters through a pipe, ditch or other well-defined point are broadly referred to as "point sources". Wastewater point source discharges include municipal (city and county) and industrial wastewater treatment plants and small domestic wastewater treatment systems serving schools, commercial offices, residential subdivisions and individual homes. Stormwater point source discharges include stormwater collection systems for municipalities which serve populations greater than 100,000 and stormwater discharges associated with certain industrial activities. Point source dischargers in North Carolina must apply for and obtain a National Pollutant Discharge Elimination System (NPDES) permit. Discharge permits are issued under the NPDES program, which is delegated to DWQ by the Environmental Protection Agency.

***The primary pollutants associated with point source discharges are:***

- ❖ oxygen-consuming wastes
- ❖ nutrients
- ❖ toxic substances including chlorine, ammonia and metals

### 2.7.1 Wastewater Discharges in the Savannah River Basin

***Types of Wastewater Discharge***

**Major Facilities:** Municipal wastewater treatment plants with flows  $\geq 1$  MGD (million gallons per day); and some industrial facilities .

**Minor Facilities:** Any facilities not meeting the definition of Major.

**100% Domestic Waste:** Facilities that only treat domestic-type waste (water from bathrooms, sinks).

**Municipal Facilities:** Public facilities that serve a municipality. Can treat waste from homes and industries.

**Nonmunicipal:** Non-public facilities that provide treatment for domestic, industrial or commercial wastewater. This category includes wastewater from industrial processes other facilities such as schools, subdivisions, groundwater remediation projects, water treatment plants and non-process industrial wastewater.

There are 17 permitted discharges in the Savannah River basin. Table A-12 provides summary information (by type and subbasin) about the discharges. Various types of dischargers listed in the table are described in the inset box. More detailed information about each permitted discharge can be found in Appendix I.

Almost all of the NPDES permitted discharges in the Savannah River basin are from small wastewater treatment plants serving residential communities. Currently, there are no discharges described as "major" (see inset box). Facilities where recent data show problems with a discharge are discussed in each subbasin chapter in Section B.

Table A-12 Summary of NPDES Dischargers and Permitted Flows for the Savannah River Basin (as of February 2001)

Facility Categories	Subbasin		
	03-13-01	03-13-02	TOTAL
<b>Total Facilities</b>	5	12	17
Total Permitted Flow (MGD)	0.3	0.8	1.1
<b>Major Discharges</b>	0	0	0
<b>Minor Discharges</b>	5	12	17
Total Permitted Flow (MGD)	0.3	0.8	1.1
<b>100% Domestic Waste</b>	5	11	16
Total Permitted Flow (MGD)	0.3	0.8	1.1
<b>Municipal Facilities</b>	1	0	1
Total Permitted Flow (MGD)	0.1	0.0	0.1
<b>Nonmunicipal Facilities</b>	4	12	16
Total Permitted Flow (MGD)	0.2	0.8	1.0

Figure A-9 shows the location of permitted wastewater discharges within the basin.

### 2.7.2 Stormwater Discharges in the Savannah River Basin

Amendments were made to the Clean Water Act in 1990 and most recently in 1999 pertaining to permit requirements for stormwater discharges associated with industrial activities and municipal separate storm sewer systems (MS4s). DWQ administers these regulations in North Carolina through the state's NPDES stormwater program. The goal of the DWQ stormwater discharge permitting regulations is to prevent pollution via stormwater runoff by controlling the source(s) of pollutants.

The municipal permitting requirements are designed to lead into the formation of comprehensive stormwater management programs for municipal areas. No municipalities in the Savannah River basin were required to obtain a NPDES permit for stormwater sewer systems under the Phase I rules (population >100,000). Additionally, no municipalities in the basin are automatically required (US Census designated Urban Areas) to obtain a NPDES stormwater permit under the

#### **EPA Stormwater Rules**

##### **Phase I – December 1990**

- Requires a NPDES permit for municipal separate storm sewer systems (MS4s) serving populations of 100,000 or more.
- Requires a NPDES stormwater permit for ten categories of industry.
- Requires a NPDES stormwater permit for construction sites that are 5 acres or more.

##### **Phase II – December 1999**

- Requires a NPDES permit for some municipal storm sewer systems serving populations under 100,000, located in urbanized areas.
- Provides a "no stormwater exposure" exemption to industrial facilities covered under Phase I.
- Requires a NPDES stormwater permit for construction sites that are larger than 1 acre.

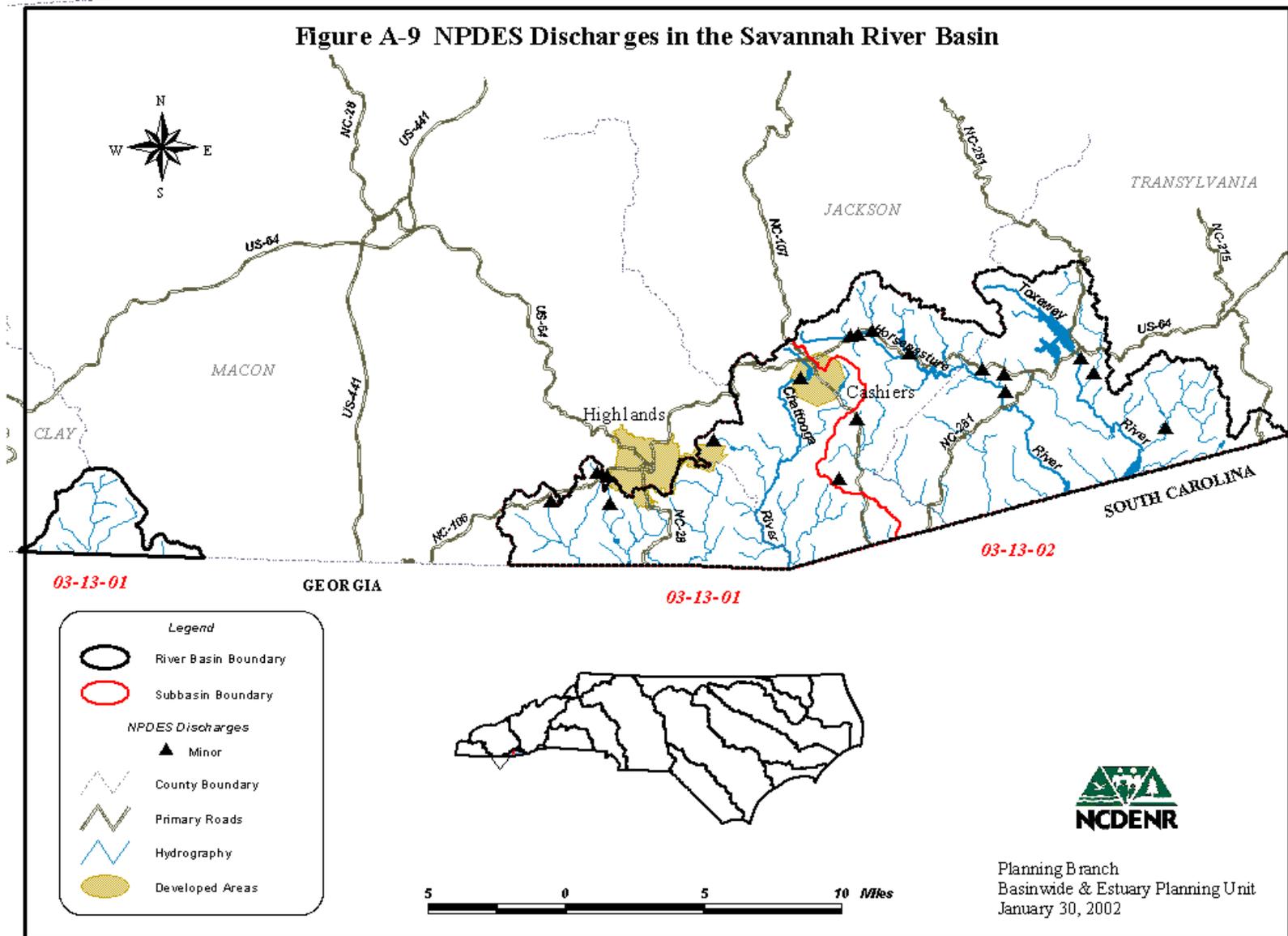


Figure A-9 Location of NPDES Permitted Dischargers in the Savannah River Basin

Phase II rules. DWQ is currently developing criteria that will be used to determine what local governments should be required to obtain a NPDES stormwater permit.

Industrial activities which require permitting are defined in categories ranging from sawmills and landfills to manufacturing plants and hazardous waste treatment, storage or disposal facilities. Stormwater permits are granted in the form of general permits (which cover a wide variety of more common activities) or individual permits. Excluding construction stormwater general permits, there are three general stormwater permits active within the Savannah River basin. Currently, no individual stormwater permits are held.

The primary concern with runoff from industrial facilities is the contamination of stormwater from contact with exposed materials. Poor housekeeping can lead to significant contributions of sediment and other water quality pollutants. To address these issues, each NPDES stormwater permitted facility must develop a Stormwater Pollution Prevention Plan (SPPP) that addresses the facility’s potential impacts on water quality. Facilities identified as having significant potential to impact water quality may also be required to conduct analytical monitoring to characterize pollutants in stormwater discharges.

The state stormwater management rules (15A NCAC 2H .1000) regulate development activities in 20 coastal counties and on lands statewide that drain to Outstanding Resource Waters (ORW) and/or High Quality Waters (HQW). Under this program, development is permitted as either low density or high density. Low density limits the impervious, or built upon, area on a project and allows natural infiltration and attenuation of stormwater runoff. High density requires installation and maintenance of structural best management practices to control and treat stormwater runoff from the site. Surface waters in the Savannah River basin where development activities are regulated under these special rules are presented on Figure A-13 (page 30).

## 2.8 Water Withdrawals and Interbasin Transfers

Prior to 1999, North Carolina required water users to register their water withdrawals with the Division of Water Resources (DWR) only if the amount was 1,000,000 gallons or more of surface or groundwater per day. In 1999, the registration threshold for all water users except agriculture was lowered to 100,000 gallons per day (0.1 MGD). There is currently one registered water withdrawal in the North Carolina portion of the Savannah River basin (Table A-13).

Table A-13 Registered Water Withdrawals in the Savannah River Basin

County	1999 Average (MGD)	1999 Maximum (MGD)	Source of Withdrawal	Facility
Jackson	0.188	0.525	Groundwater	Carolina Water Service – Fairfield Sapphire Valley

In addition to water withdrawals (discussed above), water users in North Carolina are also required to register surface water transfers with the Division of Water Resources (DWR) if the amount is 100,000 gallons per day or more. In addition, persons wishing to transfer two million gallons per day (MGD) or more, or increase an existing transfer by 25 percent or more, must first

obtain a certificate from the Environmental Management Commission (G.S. 143-215.22I). The river basin boundaries that apply to these requirements are designated on a map entitled *Major River Basins and Sub-Basins in North Carolina*, on file in the Office of the Secretary of State. These boundaries differ slightly from the 17 major river basins delineated by DWQ.

In determining whether a certificate should be issued, the state must determine that the overall benefits of a transfer outweigh the potential impacts. A provision of the interbasin transfer law requires that an environmental assessment or environmental impact statement be prepared in accordance with the State Environmental Policy Act as supporting documentation for a transfer petition. Currently, there are no certified or known potential interbasin transfers in the Savannah River basin.

## **2.9 Physical Impacts to Wetlands and Streams**

DWQ has issued approvals for wetland filling activities since the mid-1980s; however, in 1989, the Environmental Management Commission directed DWQ to begin reviewing wetland fill and stream alteration activities using a review sequence of (1) avoidance, (2) minimization and (3) mitigation of wetland impacts. Rules finalized in 1996, required that wetland values, such as whether or not the wetland is providing significant uses or whether the filling activity would remove or degrade those uses, be considered. The rules also specify wetland and stream mitigation ratios and type and location of projects to make the mitigation process more predictable and manageable for the regulated community. DWQ's emphasis continues to be on water quality and the essential role that wetlands play in maintaining water quality. The issuance of a 401 Water Quality Certification by DWQ is required before the US Army Corps of Engineers can issue a Section 404 Permit authorizing the fill or alteration of wetlands and/or streams in North Carolina.

Despite efforts to protect and restore wetland and stream functions on the part of DWQ and many other agencies and organizations in North Carolina, there is still an annual net loss of wetlands and streams statewide. DWQ and Division of Land Resources (DLR) regulate construction activities near streams and wetlands. These regulatory programs ensure that construction projects cause minimal damage to these resources and that unavoidable impacts are addressed through mitigation projects. Restoration projects are also funded through the Wetland Restoration Program (WRP), Section 319 Program, Clean Water Management Trust Fund and Division of Water Resources Grant Program that can help offset stream and wetland impacts.

DWQ tracks wetland and stream losses that are authorized through the issuance of a 401 Water Quality Certification. In addition to the permitted wetland and stream impacts that are tracked by DWQ, an unknown amount of permanent wetland and stream losses also occurs. Projects that affect less than one-third of an acre of wetland or less than 150 linear feet of stream are not required to receive written confirmation from DWQ, and therefore, might not be reported. The magnitude of unauthorized impacts to wetlands and streams is not known.