Section 2

River Basin Characteristics

Effective management of the Chattahoochee River Basin starts with an understanding of the salient features of this geographic management unit. These provide the context, constraints, and opportunities for management actions. Important aspects include:

- *River basin characteristics* (Section 2.1): the physical features and natural processes of the basin, which determine how waters within the basin respond to conditions;
- *Population and land use* (Section 2.2): the sociological features of the basin, including the types of human activities which may impact water quality;
- *Local governments and planning authorities* (Section 2.3): identification and roles of the local authorities whose decisions may influence man's impact on water quality;
- *Water use classifications* (Section 2.4): the description in the state regulatory framework of best uses and baseline goals for management of waters within the basin.

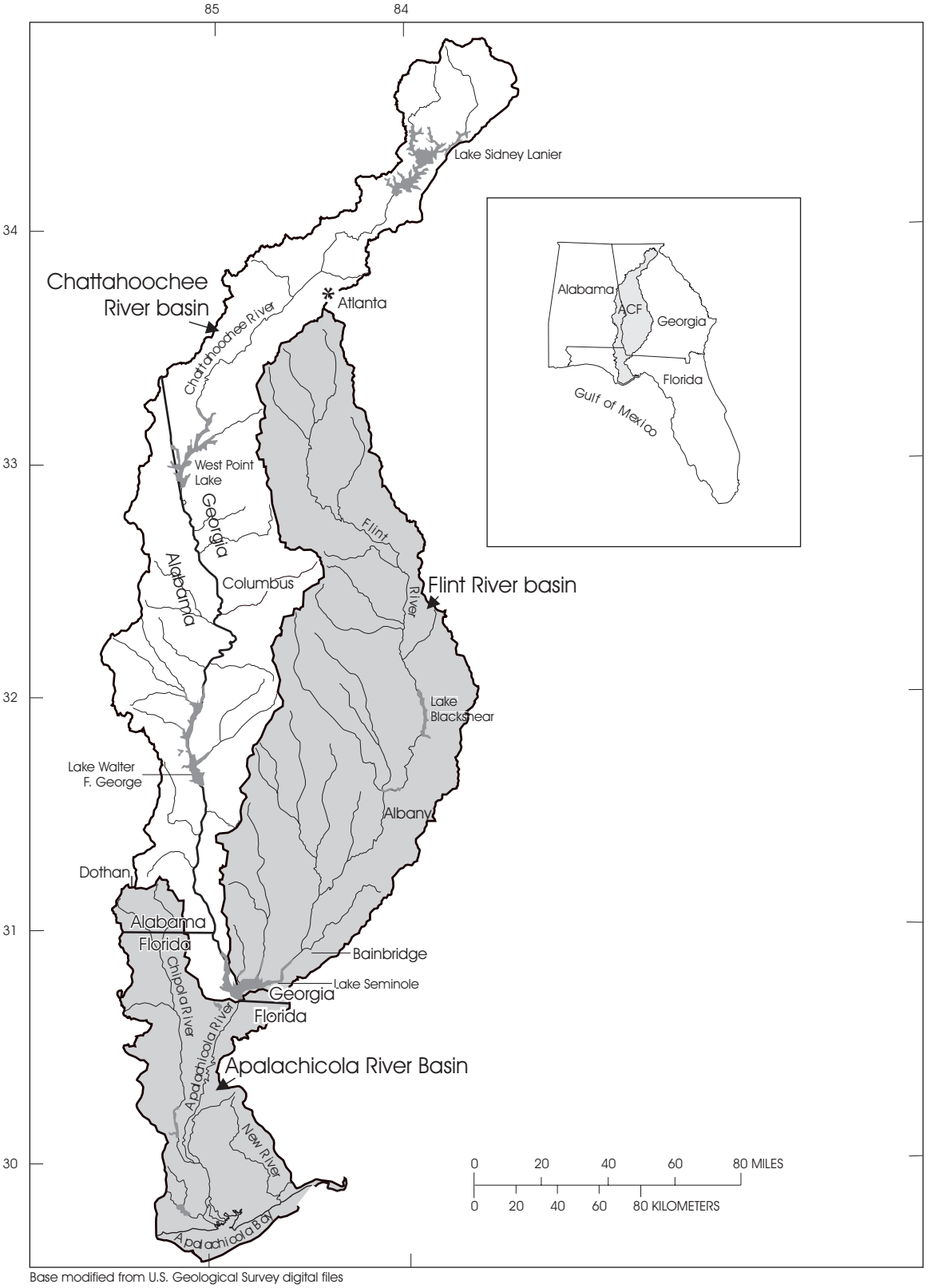
2.1 River Basin Description

This section describes the important geographical, geological, hydrological, and biological characteristics of the Chattahoochee River Basin. It is largely adapted from Couch et al. (1996). Additional material is drawn from EPD (1996), and other sources.

The physical characteristics of the Chattahoochee River Basin include its location, physiography, soils, climate, surface water and ground water resources, and natural water quality. These physical characteristics provide the natural template which influences the basin's biological habitats, and the way in which people use the basin's land and water resources

2.1.1 River Basin Boundaries

The Chattahoochee River originates in the southeast corner of Union County, Georgia, within the Blue Ridge Mountains, and only about 12 miles from the Tennessee border (Figure 2-1). This figure, like many other figures in this section, shows the Chattahoochee basin in the context of the larger "ACF" basin, consisting of the Apalachicola, Flint and Chattahoochee river basins. From its origin, the river flows southwesterly, through the Atlanta metropolitan area, until reaching the Alabama border at West Point, in Troup County, Georgia From this point south, the Chattahoochee forms the border between Georgia and Alabama, and terminates in Lake Seminole, at the Georgia-Florida border for a total distance of about 434 miles. The Flint River basin also discharges to Lake Seminole. The outflow from Lake Seminole forms the Apalachicola River in Florida, which ultimately discharges to the Gulf of Mexico at Apalachicola Bay. The Chattahoochee River Basin or watershed, constituting all land areas draining into the river, occupies a total area of 8,770 square miles, of which 6,140 square miles (70 %) lie in Georgia, 2,574 square miles (29 %) lie in Alabama, and 56 square miles (1 %) lie in Florida. Water resources within the Chattahoochee River Basin are affected by runoff from all parts of the basin. This plan focuses on management of water resources within the Georgia



Base modified from U.S. Geological Survey digital files

Figure 2-1. Location of the Chattahoochee River Basin within the Apalachicola-Chattahoochee-Flint River Basin (modified from Couch et al., 1996)

portion of the basin only. The plan benefits significantly from the basin coordination being accomplished through the ACT-ACF Comprehensive Study.

The USGS has divided the Chattahoochee basin into four sub-basins, or Hydrologic Unit Codes (HUCs; see Table 2-1). These HUCs are referred to repeatedly in this report to distinguish conditions in different parts of the Chattahoochee River Basin. Figure 2-2 shows the location of these sub-basins and the associated counties within each sub-basin.

2.1.2 Climate

The Chattahoochee River Basin is characterized by a warm and humid, temperate climate. Major factors influencing climate variability in the basin are latitude, altitude, and proximity to the Gulf of Mexico.

Because the Chattahoochee River Basin spans about 4 degrees of latitude, it has a sharp gradient in growing seasons. Average annual temperature ranges from about 60 ° F in the north to 70 ° F in the south. Average daily temperatures in the basin for January range from about 40 ° F to 55 ° F, and for July from 75 ° F to 80 ° F. In the winter, cold winds from the northwest cause the minimum temperature to dip below freezing for short periods. Summer temperatures commonly range from the 70's to the 90's.

Precipitation is greatest at the north end of the basin in the mountains, and at the south end near the Gulf of Mexico as a result of the availability of moist air. Average annual precipitation in the basin, primarily as rainfall, is about 55 inches (U.S. Geological Survey, 1986).

Evapotranspiration (the sum of direct evaporation and transpiration by plants) generally increases from north to south and ranges from about 32 to 42 in. of water per year. In the east-central part of the basin, precipitation and evapotranspiration are about equal. Average annual runoff ranges from 15 to 40 in. Areal distribution of average annual runoff from 1951-80 reflects basinwide patterns in precipitation and soil-runoff potential. Runoff is greatest in the Blue Ridge Mountains and near the Gulf coast (Gebert et al., 1987).

2.1.3 Physiography and Geology

The Chattahoochee River Basin contains parts of the Blue Ridge, Piedmont, and Coastal Plain physiographic provinces that extend throughout the southeastern United States. Similar to much of the Southeast, the basin's physiography reflects a geologic history of mountain building in the Appalachian Mountains, and long periods of repeated land submergence in the Coastal Plain Province.

Table 2-1. Hydrologic Unit Codes (HUCs) of the Chattahoochee River Basin

03130001	Upper Chattahoochee, from Headwaters to Peachtree Creek at Atlanta
03130002	Middle Chattahoochee, from Peachtree Creek to Oliver Dam near Columbus, GA
03130003	Middle Chattahoochee, from Oliver Dam to Walter F. George Lock and Dam above Fort Gaines, GA
03130004	Lower Chattahoochee, from Walter F. George Lock and Dam to Lake Seminole

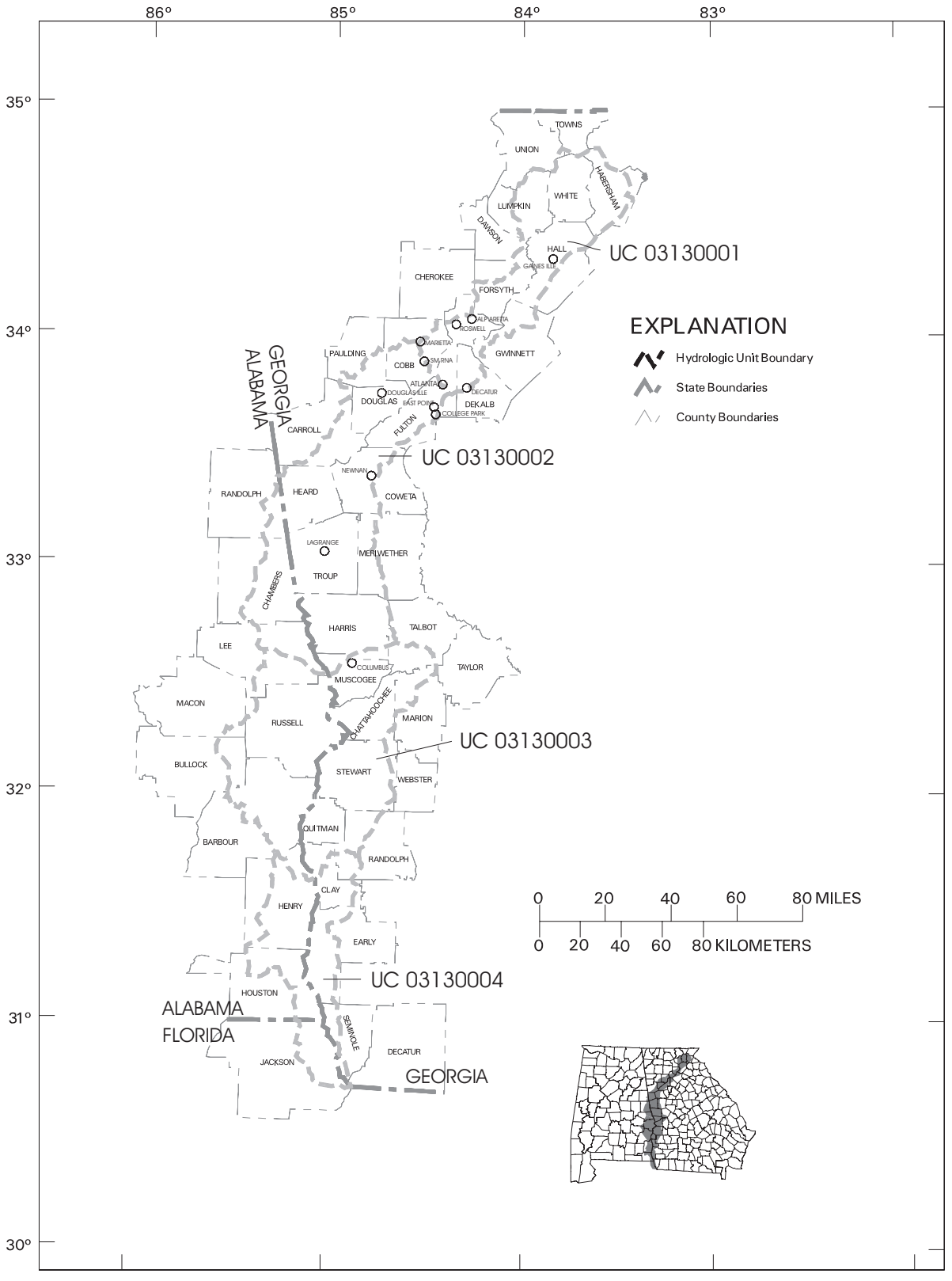


Figure 2-2. Hydrologic Units and Counties of the Chattahoochee River Basin

The northernmost part of the Chattahoochee River Basin is within the Blue Ridge Province where the headwaters arise. Less than one percent of the basin lies within the Blue Ridge Province. The Blue Ridge Province is dominated by rugged mountains and ridges that range in altitude from 3,000 to 3,500 feet (ft). Runoff is quite rapid because of the steep terrain and steep stream gradients in this province. The boundary between the Blue Ridge and the Piedmont is defined by a sharp change in slope at an altitude of approximately 1,700 ft. The Blue Ridge and Piedmont Provinces are underlain by mostly Precambrian and older Paleozoic fractured crystalline rocks that include mica schist, felsic gneiss and schist, and granite and granite gneiss. Less extensive outcrops of quartzites are also present. The crystalline rocks typically are overlain by a porous, residual soil generally known as saprolite.

The Fall Line is the boundary between the Piedmont and Coastal Plain Provinces. This boundary approximately follows the contact between crystalline rocks of the Piedmont Province and the unconsolidated Cretaceous and Tertiary sediments of the Coastal Plain Province. As implied by the name, streams flowing across the Fall Line can undergo abrupt changes in gradient which are marked by the presence of rapids and shoals. Geomorphic characteristics of streams differ between the Piedmont and Coastal Plain Provinces. In the Coastal Plain, streams typically lack the riffles and shoals common to streams in the Piedmont, and exhibit greater floodplain development and increased sinuosity (Wharton, 1978).

The Coastal Plain Province contains two distinct regions – a hilly region immediately below the Fall Line (Fall Line Hills District or Georgia Sand Hills); and a region of porous limestone or karst topography (Dougherty Plain District). The Fall Line Hills District is highly dissected with relief ranging 50-250 ft. Cretaceous sediments lie in a band immediately below the Fall Line and crop out into younger Eocene-Paleocene sediments of the low-lying Dougherty Plain District.

The Dougherty Plain District is characterized by outcrops of the Ocala and Suwannee Limestones that result in a karst topography. The Dougherty Plain slopes southwestward with altitudes of 300 ft in the northeast to less than 100 ft near Lake Seminole. The flat to very gently rolling topography contains numerous sinkholes and associated marshes and ponds. Small streams in the Dougherty Plain District are frequently intermittent during the summer.

Geology

The geology of the Chattahoochee River Basin strongly influences its physiography, geochemistry, soils, surface and ground water resources. The Chattahoochee River Basin in Georgia is underlain by older (Precambrian and Paleozoic) crystalline rocks in the northern 70 percent of the basin and by younger (Cretaceous and Tertiary) sedimentary rocks in the southern 30 percent of the basin. The crystalline rocks are predominantly gneiss (25 percent) and schists (19 percent) with lesser amounts of metamorphosed volcanic rocks (9 percent), metamorphosed sedimentary rocks (8 percent), and granites (4 percent). In the northern half of the basin, the course of Chattahoochee River is principally guided by a zone of intensely sheared and less resistant rocks created by movement along the Brevard Fault Zone, a major structure that extends from Alabama to Virginia. The Brevard Fault Zone marks the boundary between Blue Ridge geologic terrane to the northwest from the Inner Piedmont geologic terrane to the southeast. Rock units are generally aligned to the northeast parallel to regional structures that include the Brevard Fault Zone. In the southern part of the basin, the Chattahoochee River cuts across both resistant and less resistant rock units of the Piedmont and the Coastal Plain.

The Blue Ridge terrane contains several groups of rocks that contain predominantly metamorphosed volcanic rocks or metamorphosed sedimentary rocks. Rocks are mainly gneisses, schists, quartzites, and amphibolites. The type of rocks influence the stream drainage patterns, the type and geochemistry of the soils and sediments that are derived from those rocks, and the chemistry of the water that flows through and reacts with the rocks, soils and sediments. The metamorphosed volcanic rocks contain higher concentrations of metals and host the Dahlonega gold belt and the Carroll County gold belt. Metals include copper, zinc, arsenic, mercury, lead, nickel, molybdenum, and iron. Many of the metal ores are characteristically massive sulfides and weathering of these sulfides may increase stream acidity because of their high sulfide contents. Numerous small ultramafic rocks bodies in the northernmost part of the basin contain high concentrations of chromium, nickel, and asbestos. The metamorphosed sedimentary rocks generally contain lower concentrations of metals with the exception of the relatively small Hall County gold belt.

The Inner Piedmont terrane generally contains metamorphosed sedimentary rocks such as gneisses, schists and quartzites. Small granitic intrusions are found in the Atlanta area and are important sources of crushed stone. Amphibolitic rocks that represent a metamorphosed volcanic rocks are found in the southwestern part of the basin in and adjacent to Troup County. Higher concentrations of metals such as copper, zinc, lead and iron are associated with these amphibolites. Chromium-bearing ultramafic rocks are associated with the amphibolite. Beryllium-bearing pegmatites are also found in Troup County.

Deep weathering of Piedmont and Blue Ridge rocks produced a residuum referred to as saprolite. Saprolites may serve as local aquifers in these provinces. Soils are developed through weathering of the near-surface portions of the saprolite.

The southern third of the basin is underlain by Cretaceous and Tertiary sedimentary rocks of the Coastal Plain. These rocks are predominantly older sands and clays near the Fall Line and younger carbonate rocks in the southernmost part of the basin. These rocks dip gently on the order of a few tens of feet per mile to the southeast. Several important aquifers are associated with the more permeable rock units. Recharge areas for these aquifers are generally located where these rock units crop out in the northern part of the Coastal Plain. Rock composition and permeability have a strong influence on water that flows through them. Iron ores, kaolin, and bauxite are found and have been mined from the upper or northern part of the Coastal Plain.

Quaternary alluvium deposits are found in stream and river valleys with the larger and thicker deposits in the major river valleys. Commonly, these underlie the floodplains of the river systems.

Geochemistry

Background stream sediment and stream geochemistry of the Chattahoochee River Basin has been documented and analyzed by Cocker (in review) using data collected as part of the U.S. Department of Energy's National Uranium Resource Evaluation (NURE) program. Data was collected and analyzed for the period 1976 to 1978. The number of sample sites for this river basin is 1,133. Geochemical data included silver, aluminum, arsenic, barium, beryllium, cobalt, chromium, copper, iron, magnesium, manganese, nickel, lead, titanium, vanadium, zinc, pH, alkalinity, and conductivity. Additional supplementary rock geochemical data (including 396 samples from the Dahlonega district) collected by the U.S. Geological Survey in other studies are also documented and discussed in terms of the impact on stream geochemistry (Cocker, in

review). Geochemical data were contoured and spatially related to specific rock units shown on the Geologic Map of Georgia (Georgia Geologic Survey, 1976) with the aid of a Geographical Information System (GIS).

The Chattahoochee River Basin cuts across five regions that differ in stream pH, conductivity and alkalinity and that are spatially coincident with regional geology and related stream sediment geochemical trends. Two regions have higher pH (greater than 7), higher conductivity (greater than 50 micromhos/cm), and higher alkalinity (greater than 0.3 meq/L) and separate regions of lower pH, conductivity and alkalinity. These parameters are important because they may affect or measure the amount of dissolved metals in the surface and ground water (Cocker, in review).

Stream sediments with anomalous metals appear to be spatially related to particular geologic units or mineralized areas. High aluminum, cobalt, copper, lead, nickel, silver, and zinc are related to a biotite gneiss in White and Lumpkin Counties. Anomalously high lead, copper, cobalt, nickel, and zinc that are found in Coweta, Fulton, Carroll, and Cobb Counties appear related to the Dahlonega and Carroll County gold belts and to unnamed mineralized areas in Coweta and south Fulton Counties. Spatial and statistical analyses indicate that most anomalous NURE geochemical data could be related to natural sources, although a few sample sites may be influenced anthropogenic sources (Cocker, in review).

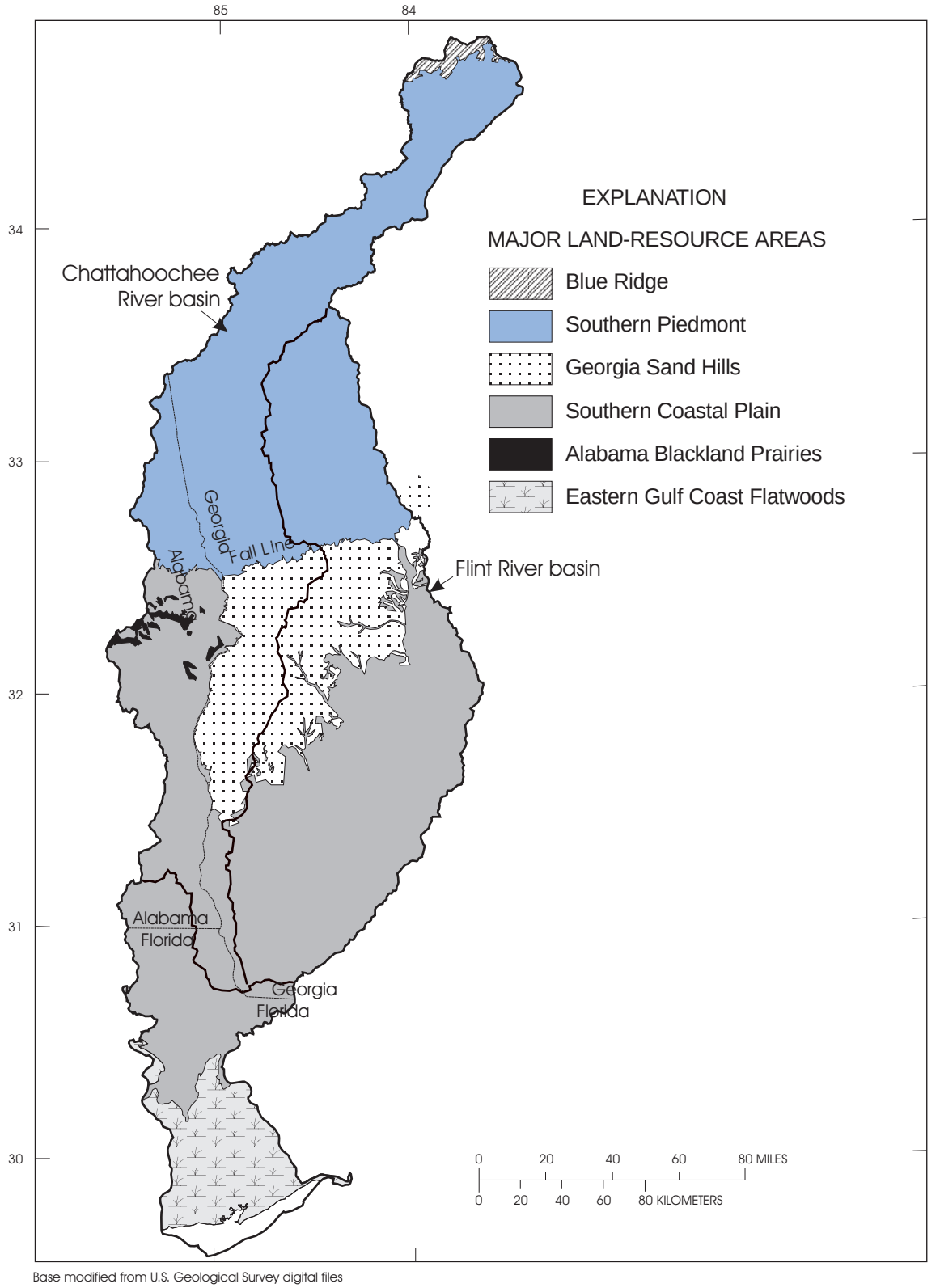
Soils

Soils of the Chattahoochee River Basin are divided into four major land-resource areas (formerly called soil provinces), which generally reflect the physiographic provinces and are shown in Figure 2-3. The Southern Piedmont, Georgia Sand Hills, and Southern Coastal Plain land-resource areas cover 98 percent of the Chattahoochee River Basin.

Two major soil orders, ultisols and entisols, and more than 40 soil series are present in the Chattahoochee River Basin (Hajek et al., 1975; Perkins and Shaffer, 1977; Caldwell and Johnson, 1982). The Southern Piedmont land-resource area is dominated by ultisols. Ultisols are characterized by sandy or loamy surface horizons and loamy or clayey subsurface horizons. These deeply weathered soils are derived from underlying crystalline rock. Piedmont ultisol soils are acid, low in nitrogen and phosphorus, and generally lack the original topsoil. Topsoil erosion began with intensive cultivation of cotton in the 1800's (Wharton, 1978). Massive soil movement from historical agricultural practices resulted in sediment deposition in streams and waterbodies which continues to affect conditions today (Trimble, 1974).

Soils in the Southern Coastal Plain and the Georgia Sand Hills land-resource areas are derived from marine and fluvial sediments eroded from the Appalachian and Piedmont Plateaus. Ultisols are found throughout the Southern Coastal Plain, with the exception of some areas in the Sand Hills and Dougherty Plain where entisols locally are present. Entisols are young soils with little or no change from parent material and with poorly developed subhorizons. These soils are frequently infertile and dry because they are deep, sandy, well-drained, and subject to active erosion.

Basinwide patterns in soil leaching and runoff potential provide information on areas that may be susceptible to greater contaminant transport through infiltration or runoff. Maps of soil leaching and runoff potential have been constructed for soils in the Chattahoochee River Basin using data from the digital State Soil Geographic Database (STATSGO) of the U.S. Department



Base modified from U.S. Geological Survey digital files

Figure 2-3. Major Land-Resource Areas in the Apalachicola-Chattahoochee-Flint River Basin (modified from Couch et al., 1996)

of Agriculture, Natural Resources Conservation Service (formerly called the Soil Conservation Service) (see Couch et al., 1996). A high leaching rate is assigned to soils with a permeability of 6.0 inches per hour or more (Brown et al., 1991). Soils with high leaching rates are concentrated in the sandy Cretaceous sediments south of the Fall Line.

Runoff ratings are based on the inherent capacity of bare soil to permit infiltration, and consider slope, frequency of flooding during the growing season, and permeability (Brown et al., 1991). Soils with high runoff ratings are distributed throughout the basin, but are concentrated in areas having low permeability, steep slopes; or where flooding is frequent or the water table is near the surface, such as in floodplains and other low-lying areas. In the Chattahoochee River Basin, soils with the highest runoff rate are present on steep slopes in the Blue Ridge, several areas in the Piedmont Province, and the Fall Line Hills District.

2.1.4 Surface Water Resources

The Chattahoochee River arises as a cold-water mountain stream in the Blue Ridge Province at altitudes above 3,000 ft and flows 430 mi to its confluence with the Flint River in Lake Seminole. The river drains an area of 8,770 mi^2 and is the most heavily used water resource in Georgia. Flow from 94% of the basin land area has been measured at the USGS gage station at Andrews Lock and Dam near Columbia, Alabama, with a drainage area of 8040 mi^2 (USGS gage 02343801). For the period from October 1975 through September 1996, the median or 50^{th} percentile daily flow at this station was 8,760 cubic feet per second (ft^3/s). Observed daily flows during this period ranged from a low of 498 ft^3/s (Jan. 29, 1989) to an estimated high of 195,000 ft^3/s (July 7, 1994), as summarized in Figure 2-4. The highest daily flow occurred during the passage of Tropical Storm Alberto on July 3-7, 1994, which resulted in record flooding on the Flint and Ocmulgee Rivers. The Chattahoochee River Basin did not receive as extreme rainfall as the Flint Basin, but 5-day total rainfall in parts of the lower Chattahoochee was in excess of 10 inches.

As discussed in Section 2.1.1, the Chattahoochee River Basin is subdivided into four Hydrologic Units (HUCs). Stream networks within the Georgia portions of each of these four HUCs are shown in Figures 2-5 through 2-8.

A longitudinal profile of the Chattahoochee River shows three concave segments that are separated by two nick or inflection points. The southern nick point is the Fall line near Columbus, and the northern nick point lies along the stretch of river from Roswell to Vinings. The gradient of the Chattahoochee River is steepest (11 to 22 feet per mile) from Helen to Cornelia and decreases to 2 to 5 feet per mile from Cornelia to Roswell. Gradients of 3 to 6 feet per mile are present from Roswell through the Atlanta area. Gradients decrease to 1 to 2 feet per mile from Atlanta to Franklin and are fairly constant from the Cornelia-Gainesville area to the West Point-Columbus area. A steep gradient of 9 feet per mile is developed at the Fall Line between West Point and Columbus. Gradient of the Chattahoochee River is lower (0.7 to 1 foot per mile) from the Columbus gage to its mouth. The Chattahoochee River is well-incised either into its floodplain or into rock where the floodplain is non-existent.

Thirteen dams are located on the main stem of the Chattahoochee River (Table 2-1, Figure 2-9), and the terminus of the Chattahoochee is also impounded by Lake Seminole, an impoundment of the Apalachicola River. Dam construction in the basin began in the early 1800's on the Chattahoochee River above the Fall Line at Columbus, Georgia, to take advantage of natural gradients for power production. Annual flow has not been appreciably altered by the system

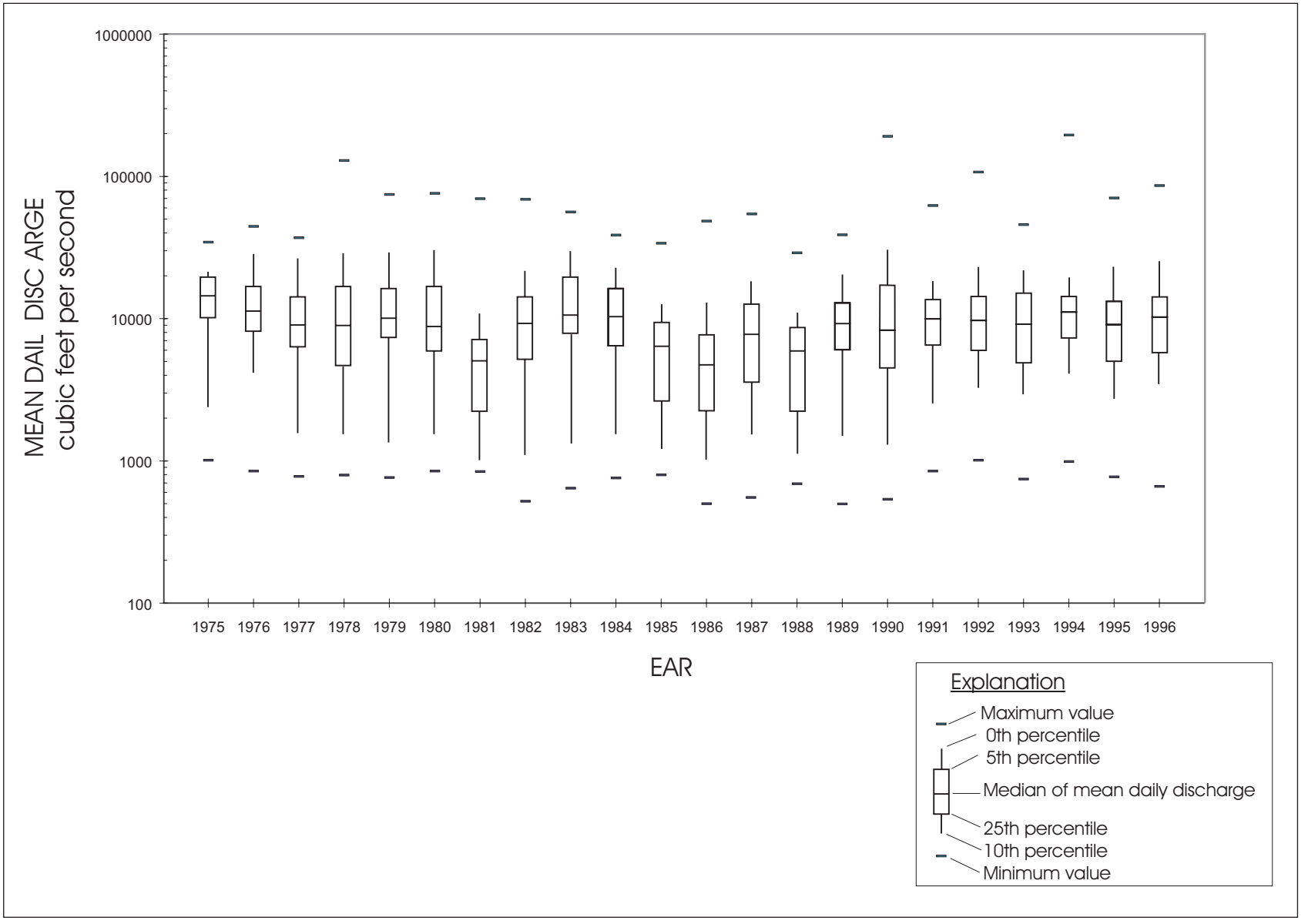


Figure 2-4. Mean Daily Discharge for the Chattahoochee River at Columbia, Alabama (USGS Station 02343801)

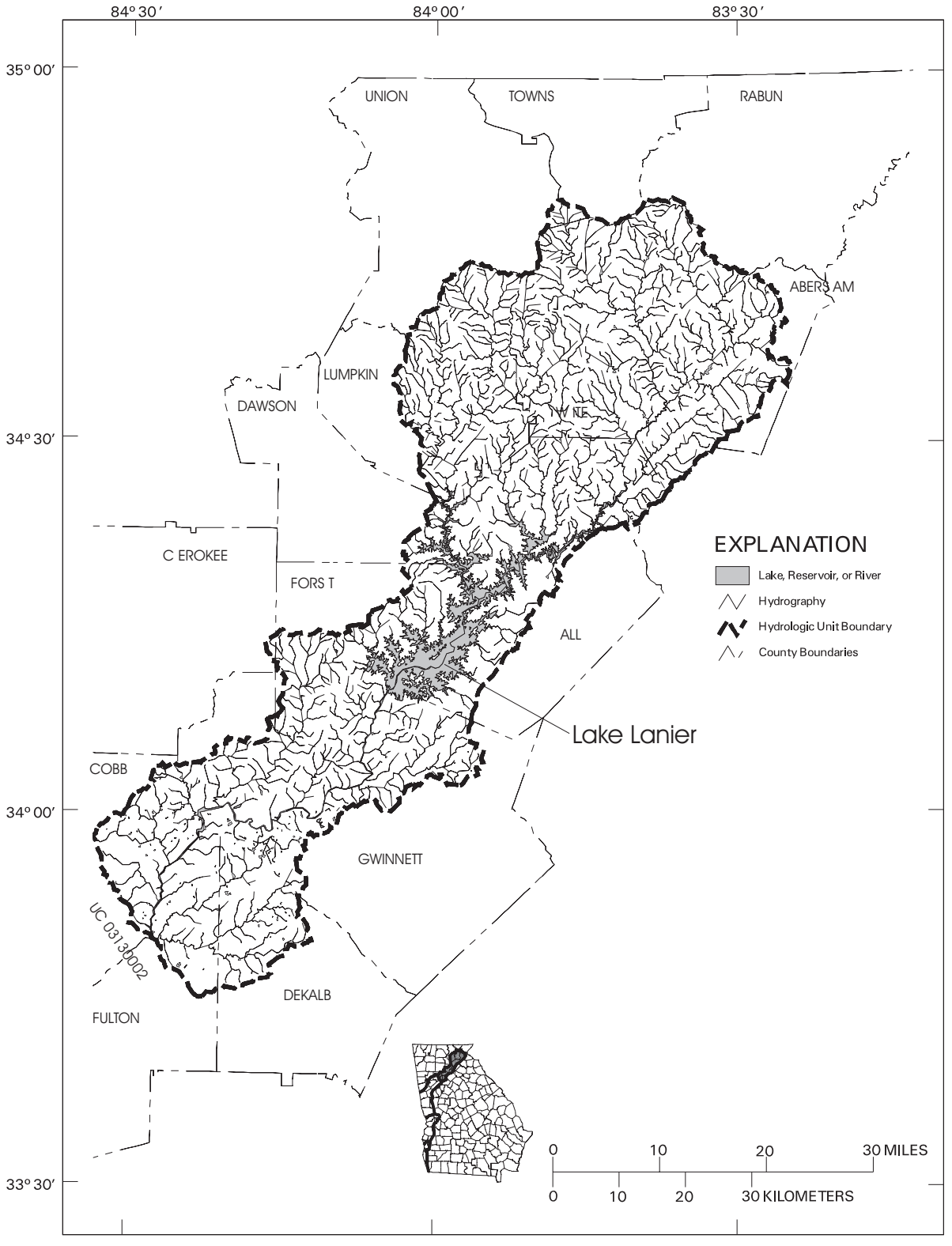


Figure 2-5. Hydrography, Upper Chattahoochee River Basin, HUC 03130001 (Headwaters to Peachtree Creek at Atlanta

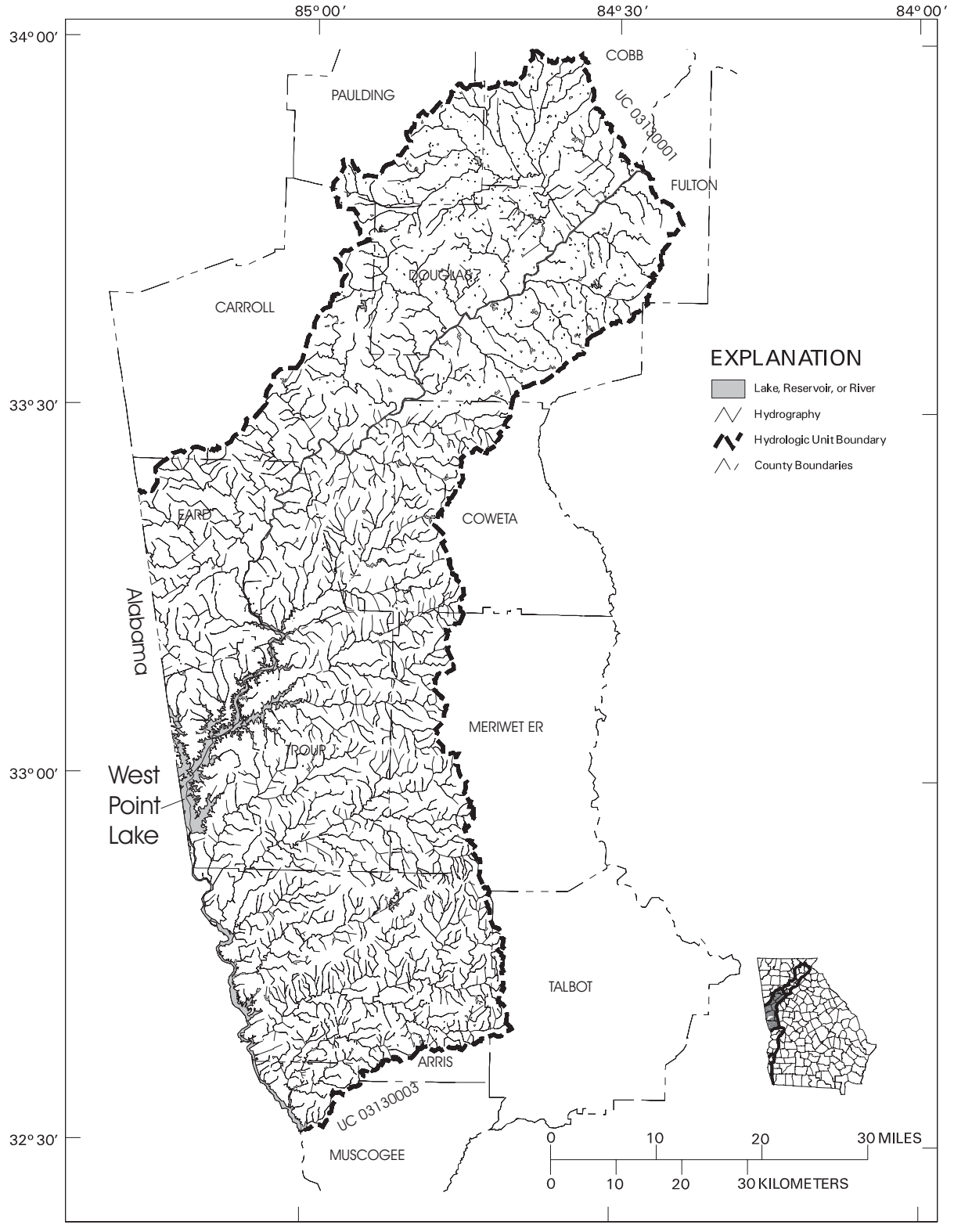


Figure 2-6. Hydrography, Middle Chattahoochee River Basin, HUC 03130002 (Peachtree Creek at Atlanta to Oliver Dam near Columbus)

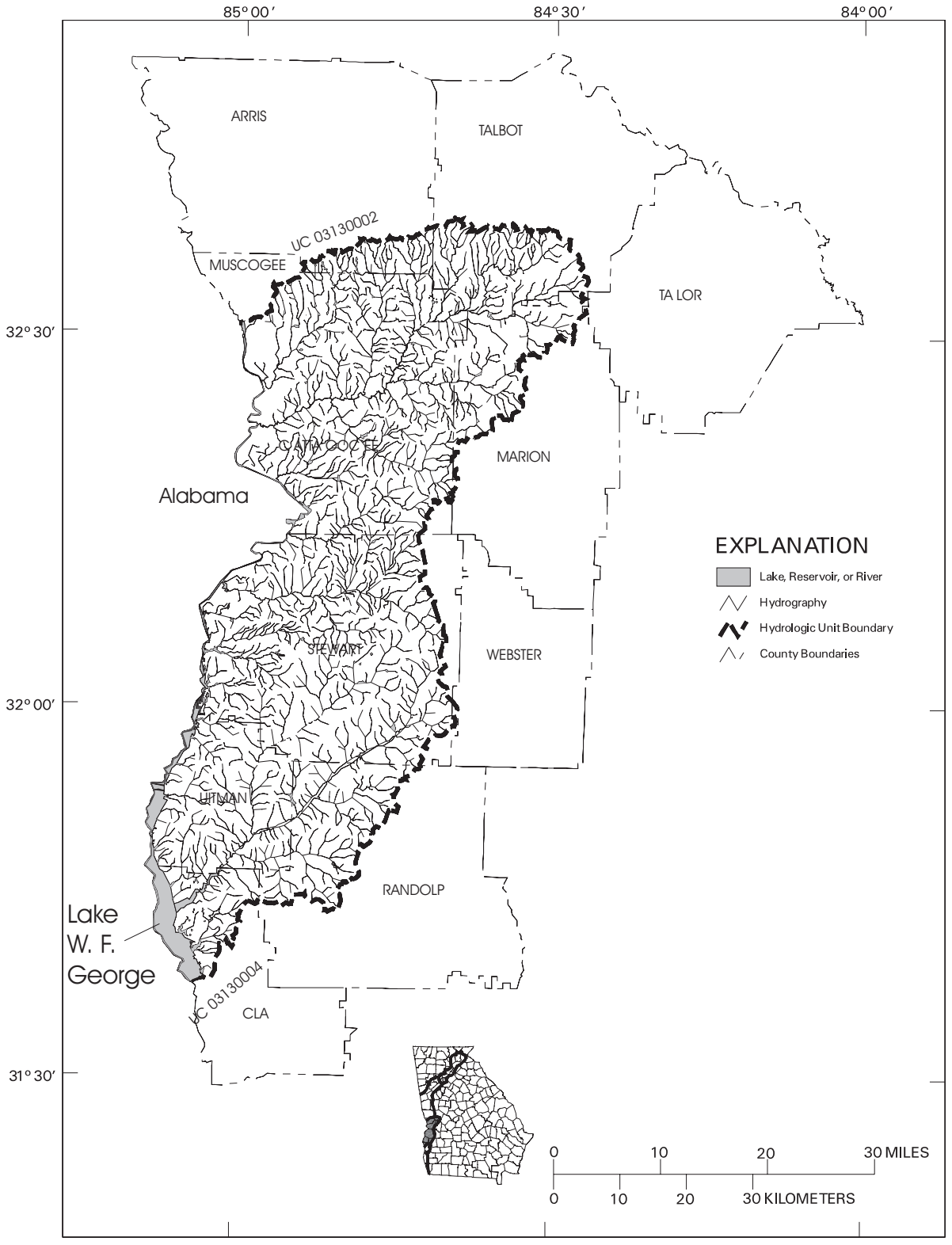


Figure 2-7. Hydrography, Middle Chattahoochee River Basin, HUC 03130003 (Oliver Dam near Columbus to Walter F. George Lock and Dam)

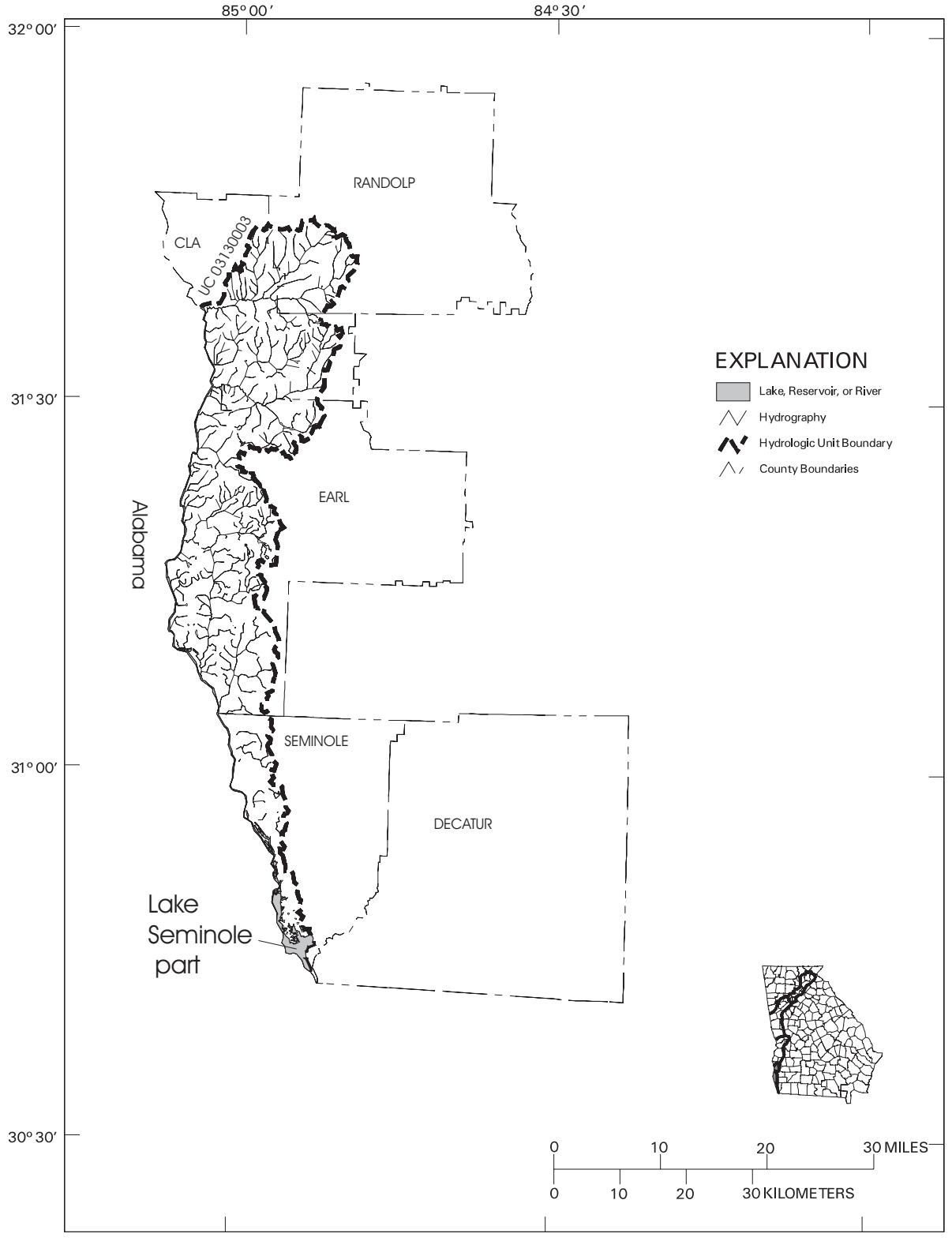
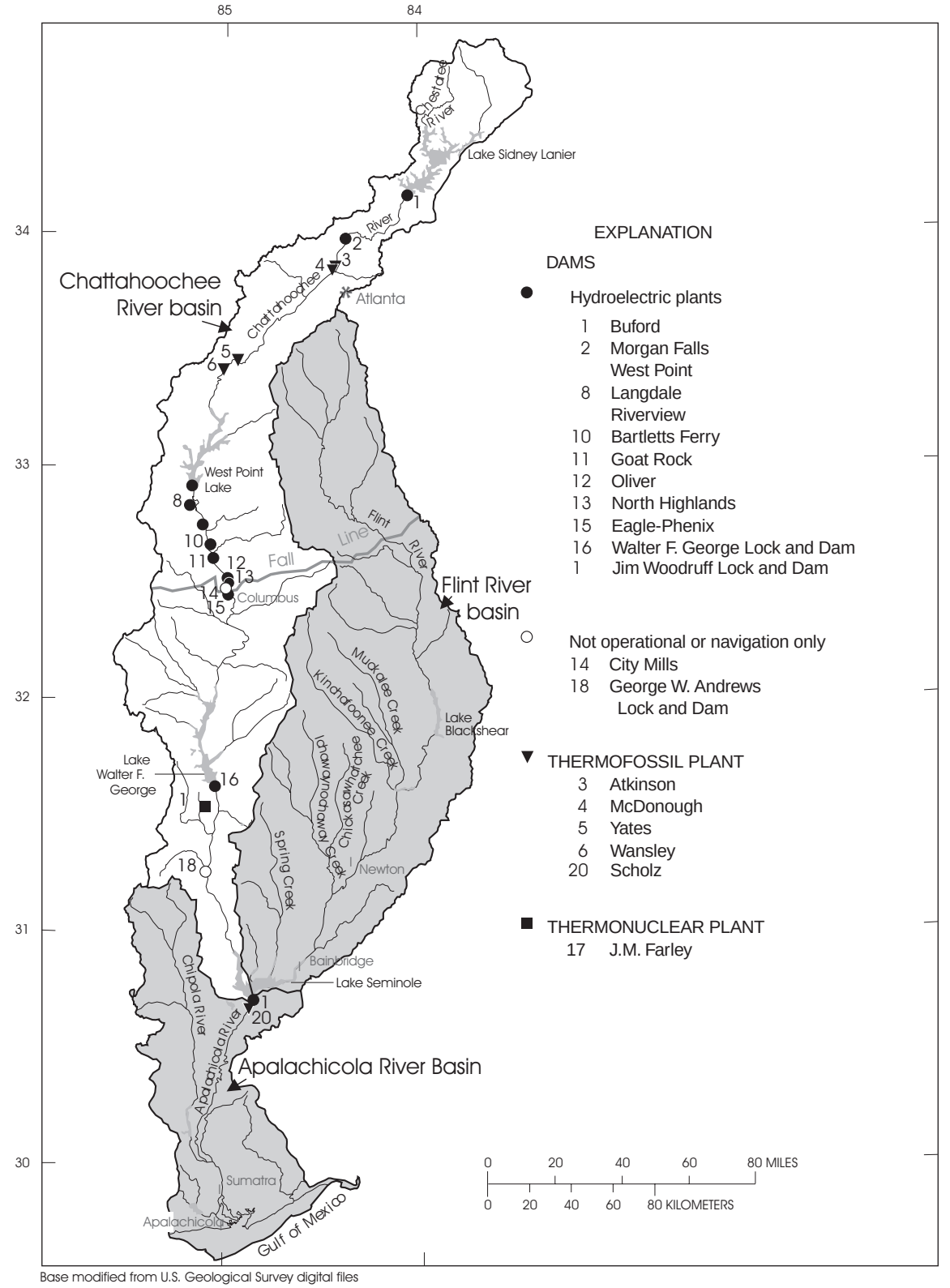


Figure 2-8. Hydrography, Lower Chattahoochee River Basin, HUC 03130004 (Walter F. George Lock and Dam to Lake Seminole)



Base modified from U.S. Geological Survey digital files

Figure 2-9. Location of Mainstem Dams and Power-Generating Plants in the Chattahoochee River Basin (modified from Couch et al., 1996)

of dams, although storage is used to augment flows during periods of low flow; and daily fluctuations below some reservoirs can be dramatic. Pronounced decreases in the frequency of high and low flows have occurred since the start of operation of Buford Dam that forms Lake Sidney Lanier. Lake Sidney Lanier, West Point Lake, and Lake Walter F. George provide most water storage available to regulate flows in the basin. Lake Sidney Lanier has the largest storage capacity, although it drains only 12% of the basin and also has the lowest ratio of inflow to storage, indicating that it is likely to be slower to recover from drought-induced drawdowns than other reservoirs in the basin.

Over most of its length, the flow of the Chattahoochee River is controlled by hydroelectric plants releasing water for production of hydropower. These hydroelectric plants use hydropeaking operations to augment power supply during peak periods of electric demand. At Cornelia, Georgia, the Chattahoochee River is free flowing; however, throughout the remainder of its length, the river shows the influence of hydropeaking operation.

In contrast to the main stem Chattahoochee River, many tributaries remain free flowing. Most tributaries have higher sustained flows during winter months, and show responses to storm events throughout the year. However, sharper peaks in the hydrograph of creeks in urban drainages reflect the greater influence of impervious land cover in this urban basin.

Reservoirs

The Chattahoochee basin contains fourteen major dams and associated impoundments (including Lake Seminole, which is an impoundment of the Apalachicola River below the confluence of the Chattahoochee and Flint Rivers), as shown in Table 2-2 and Figure 2-9.

Several of the dams are run-of-the-river hydropower operations, without significant storage capacity. The following nine impoundments have a surface area greater than 500 acres and are considered major lakes:

Lake Sidney Lanier is a multi-purpose water resource project constructed and operated by the U.S. Army Corps of Engineers (COE) and provides hydroelectric power, flood control, water supply, water quality, navigation, and recreation benefits. Lake Lanier is formed by Buford Dam, located 48 miles upstream from Atlanta (Peachtree Creek) at river mile (RM) 348.32, and has a full-pool surface area of 38,542 acres. The reservoir project was authorized by the U.S. Congress in 1946; construction began in 1950 and the reservoir was first filled in 1957 and reached full power pool in 1959. From Buford Dam the reservoir extends about 44 miles up the Chattahoochee River and about 19 miles up the Chestatee River. The reservoir has a basin drainage area of 1,040 square miles, a maximum pool elevation of 1,100 feet, and a conservation pool elevation of 1,071 feet. At the 1,071-foot elevation Lake Lanier has a surface area of 38,542 acres, a lake volume of 1,917,000 acre-feet, and a shoreline length of 540 miles. The Chattahoochee River (934 cfs) and the Chestatee River (568 cfs) contribute 45% and 28% of the annual average lake inflow. The annual average outflow is 2,071 cfs. The designated water use classification for the entire lake is Recreation. Lake Lanier is the largest impoundment located wholly in Georgia. It has the highest annual recreational visitation of all the COE lakes. Lake Lanier's shoreline is developed with residential housing and commercial marina facilities, and the human population of the watershed is growing rapidly.

Bull Sluice Lake is impounded by Morgan Falls Dam at RM 311.77, and is operated by Georgia Power for hydroelectric power and water quality purposes. It has a surface area of 580 acres.

Table 2-2. Major Dams and Impoundments in the Chattahoochee River Basin

Project Name	Owner/Yr Initially Completed	Drainage Area (Sq. mi.)	Reservoir Size (Ac)	Reservoir Storage Volume (Ac-Ft)	Total Power Capacity (kW)	Normal Lake Elevation (ft)
Buford Dam / Lake Lanier	COE / 1957	1,040	38,542	1,917,000	86,000	1,071
Morgan Falls Dam / Bull Sluice Lake	GPC / 1903	1,340	580	Run-of-river	16,800	866
West Point Dam and Lake	COE / 1975	3,440	25,900	604,527	82,200	635
Langdale Dam	GPC / 1860	3,600	152	Run-of-river	401	548
Riverview Dam	GPC / 1902	3,600	75	Run-of-river	480	531
Bartletts Ferry Dam / Lake Harding	GPC / 1926	4,260	5,850	181,000	129,300	521
Goat Rock Dam and Lake	GPC / 1912	4,500	1,050	11,000	68,100	404
Oliver Dam and Lake	GPC / 1959	4,630	2,150	32,000	60,000	337
North Highlands Dam	GPC / 1900	4,630	131	1,500	29,600	269
City Mills (inoperative)	City Mills / 1963	4,630	110	684	740	226
Eagle and Phenix Dam (inoperative)	Consolidated Hydro / 1834	4,640	NA	260	4,260	215
W.F. George Lock, Dam and Lake (Lake Eufaula)	COE / 1963	7,460	45,180	934,400	130,000	190
G.W. Andrews Lock, Dam, and Lake	COE / 1963	8,210	1,540	18,180	None	102
Jim Woodruff Lock and Dam / Lake Seminole	COE / 1954	17,230	37,500	367,320	30,000	77

Since its creation in 1904, Bull Sluice Lake has experienced extensive sediment deposition, which has created broad and shallow pools and wetlands attractive to recreation and fishing in the lake. The lake is characterized by low flow velocities, moderate algal productivity and dispersed aquatic vegetation, primarily *Elodea* (Law Environmental, 1994).

West Point Lake is a 25,900-acre reservoir operated by the COE on the Chattahoochee River on the Georgia-Alabama border. West Point Lake is impounded by West Point Dam and became

operational in 1975. It is the first impoundment on the Chattahoochee River south of Atlanta, and ranks seventh in size for lakes in the state. West Point Dam is located just north of West Point, Georgia (106 miles downstream from Peachtree Creek in Atlanta) on the Georgia - Alabama border and the impoundment of the Chattahoochee River extends northward to Franklin, Georgia. The lake is just west of La Grange, Georgia. Portions of the lake lie within Chambers and Randolph Counties, Alabama, as well as within Troup and Heard Counties, Georgia. The reservoir was designed for flood control, navigation, power generation, recreation, fishing and wildlife habitat. The reservoir has a mean summer dam pool elevation of 635 feet above sea level, a drainage area of 3,440 mi^2, a surface area at full dam pool of 25,864 acres, a storage capacity of 604,527 acre / feet and a hydraulic retention time of 23 to 91 days. West Point Lake is the first Corps Reservoir to be constructed downstream from a major metropolitan area. The Chattahoochee River is the primary tributary to West Point Lake. Other tributaries to the lake include Wehadkee, Stroud and Veasey Creeks on the Alabama side and the New River, Brush, Whitewater, Potato, Yellowjacket, Beech and Jackson Creeks on the Georgia side. The lake is one of the best largemouth bass and hybrid lakes in the state, and also supports healthy white bass, crappie and channel catfish populations. Excellent facilities and close proximity to Atlanta contribute to the reservoir's popularity.

Lake Harding, also known as Lake Bartletts Ferry, is impounded by Bartlett's Ferry Dam at Chattahoochee River Mile 178.0 between LaGrange and Columbus, constructed in 1926. The reservoir is operated by Georgia Power as a run-of-the-river hydropower facility and water supply. Lake Harding is located approximately 7 miles northwest of Columbus, Georgia on the Alabama-Georgia border. Portions of the lake are located in Harris Co., Georgia, as well as in Chambers and Lee County, Alabama. The reservoir has a mean summer dam pool elevation of 521 feet above sea level. The surface area is 23.67 km^2 (5,850 acres), mean depth 9.4 meters, and maximum depth 33.8 meters. Mean hydraulic retention time is 14 days. There are 156 miles of shoreline. The basin drainage area is 10,958 km^2, with the Chattahoochee River being the primary tributary, comprising over 86% of the inflow. Other contributing tributaries include Blanton Creek, Mountain Oak Creek, Halawakee Cree, Osanippa Creek, and Flat Shoals Creek.

Goat Rock Lake, with a surface area of approximately 1,050 acres, is impounded by Goat Rock Dam, constructed in 1912, at River Mile 172.3, and is directly downstream from Bartlett's Ferry Dam and ten miles above Columbus on the Alabama-Georgia border. Georgia Power Company operates this lake principally for peaking hydropower generation. Portions of the lake are located in Harris County, Georgia and Lee County, Alabama. The reservoir was designed for hydroelectric power generation, with swimming, boating and fishing as secondary benefits. The lake was impounded in 1912. The reservoir has a mean summer dam pool elevation of 404 feet above sea level, and has 25.4 miles of shoreline. The Chattahoochee River is the primary tributary to Goat Rock Lake. Other tributaries to the lake include Mill Creek and Wacoochee Creek on the Alabama side and Mulberry Creek on the Georgia side.

Lake Oliver is the third in a chain of hydroelectric impoundments created on the Chattahoochee River by Georgia Power between West Point and Columbus, Georgia, and is operated by Georgia Power for peaking hydropower generation. Oliver Dam, at River Mile 163.2, became operational in 1962. Portions of the lake are located in Lee County, Alabama and Harris and Muscogee Counties in Georgia, including a portion within the Columbus city limits. The reservoir functions as the main water supply for the city of Columbus. The reservoir has a mean summer dam pool elevation of 337 feet above sea level, a surface area of 2,150 acres and has 40 miles of shoreline. The Chattahoochee River is the primary tributary to Lake Oliver. Other

tributaries to the lake include Rock Creek and Turkey Creek on the Alabama side and Standing Boy Creek on the Georgia side.

Lake Walter F. George is formed by the COE dam near Fort Gaines, Georgia. The reservoir project was authorized by the U.S. Congress in 1946 to provide hydroelectric power, regulate transportation, provide flood control, and promote recreation. Construction began in 1955 and the reservoir was first filled in 1963. The reservoir lies along the Alabama-Georgia border and extends from Columbus to Fort Gaines. The Chattahoochee River channel crosses the Walter F. George Dam at 85°3'54" W, 31°37'26" N. The reservoir has a mean summer pool elevation of 190 feet, a surface area of 45,180 acres, mean depth of 20.3 feet, a lake volume of 934,400 acre-feet, a shoreline length of 640 miles, a basin drainage area of 7,460 square miles, a mean hydraulic retention time of 47 days, and a mean stream flow of 10,000 cfs. The Chattahoochee River is the primary tributary with over 80% of the total inflow. Other tributaries include Upatoi, Uchee, Hannahatchee, Cowikee, Chewalla, Barbour, Cheneyhatchee, and Pataula Creeks.

Lake Andrews, with surface area of 1,540 acres, occupies the 29 miles of the Chattahoochee River between Walter F. George Lock and Dam and George W. Andrews Lock and Dam near Blakely at River Mile 46.5. Andrews Lock and Dam, operational in 1963, is maintained by the COE primarily for navigation purposes. This reservoir acts more like a large river than a lake, and, as a result, the fish populations and fishery are riverine in nature.

Lake Seminole is located in the extreme southwestern corner of Georgia at the junction of the Chattahoochee and Flint Rivers, and is formed by the United States Army Corps of Engineers (COE) Jim Woodruff Lock and Dam. This dam is on the Apalachicola River at River Mile 107.6, just downstream of the confluence of the Chattahoochee and Flint Rivers. The reservoir project was authorized by the U.S. Congress in 1946 for primary purposes of hydropower and transportation. Other project purposes include regulation of stream flow, fish and wildlife conservation, and public recreation. Construction was completed in 1957. The reservoir lies in the southwest corner of Georgia along the Georgia-Florida border and is also shared in part with Alabama. From the dam the reservoir extends 47 river miles up both the Chattahoochee River and the Flint River. The reservoir has a basin drainage area of 17,150 square miles (51% Chattahoochee basin, 49% Flint basin). The Flint basin side contains two other significant embayments, Fish Pond Drain and Spring Creek. The normal summer pool elevation is 77 feet msl. At this elevation Lake Seminole has a surface area of 37,500 acres, a lake volume of 367,320 acre-feet, and a shoreline length of 250 miles. The annual average outflow is 21,800 cfs. The COE maintains a nine foot deep, 100 foot wide transportation channel extending commercial river transportation from the coast through Lake Seminole upstream to Columbus on the Chattahoochee River and to Bainbridge on the Flint River. Lake Seminole suffers from a severe infestation of the aquatic weed Hydrilla.

2.1.5 Ground Water Resources

The geology of the Chattahoochee River Basin determines the ground-water characteristics of the area. South of the Fall Line (which extends through Columbus) the Chattahoochee River flows through the Coastal Plain. Aquifers in the Coastal Plain consist of porous sands and carbonates, and include alternating units of sand, clay, sandstone, dolomite, and limestone that dip gently and thicken to the southeast. Several of these are prolific producers of ground water. The aquifers in the Coastal Plain are of two types: unconfined and confined. The unconfined aquifers are hydraulically interconnected to surface water bodies and the two form a single

system; the confined or artesian aquifers, however, are buried and hydraulically isolated from surface water bodies. Confining units between these aquifers are mostly silt and clay.

From the Fall Line to Lake Seminole, progressively younger sediments crop out and overlie older sediments. The complex interbedded clastic rocks and sediments of Coastal Plain aquifers range in age from Quaternary to Cretaceous.

Five major aquifers underlie the Chattahoochee River Basin. These aquifers are listed below from south to north, in order of descending stratigraphy and increasing age. Generalized outcrop areas of major aquifers for the Chattahoochee River Basin are shown in Figure 2-10 in the context of the adjoining Flint and Apalachicola basins.

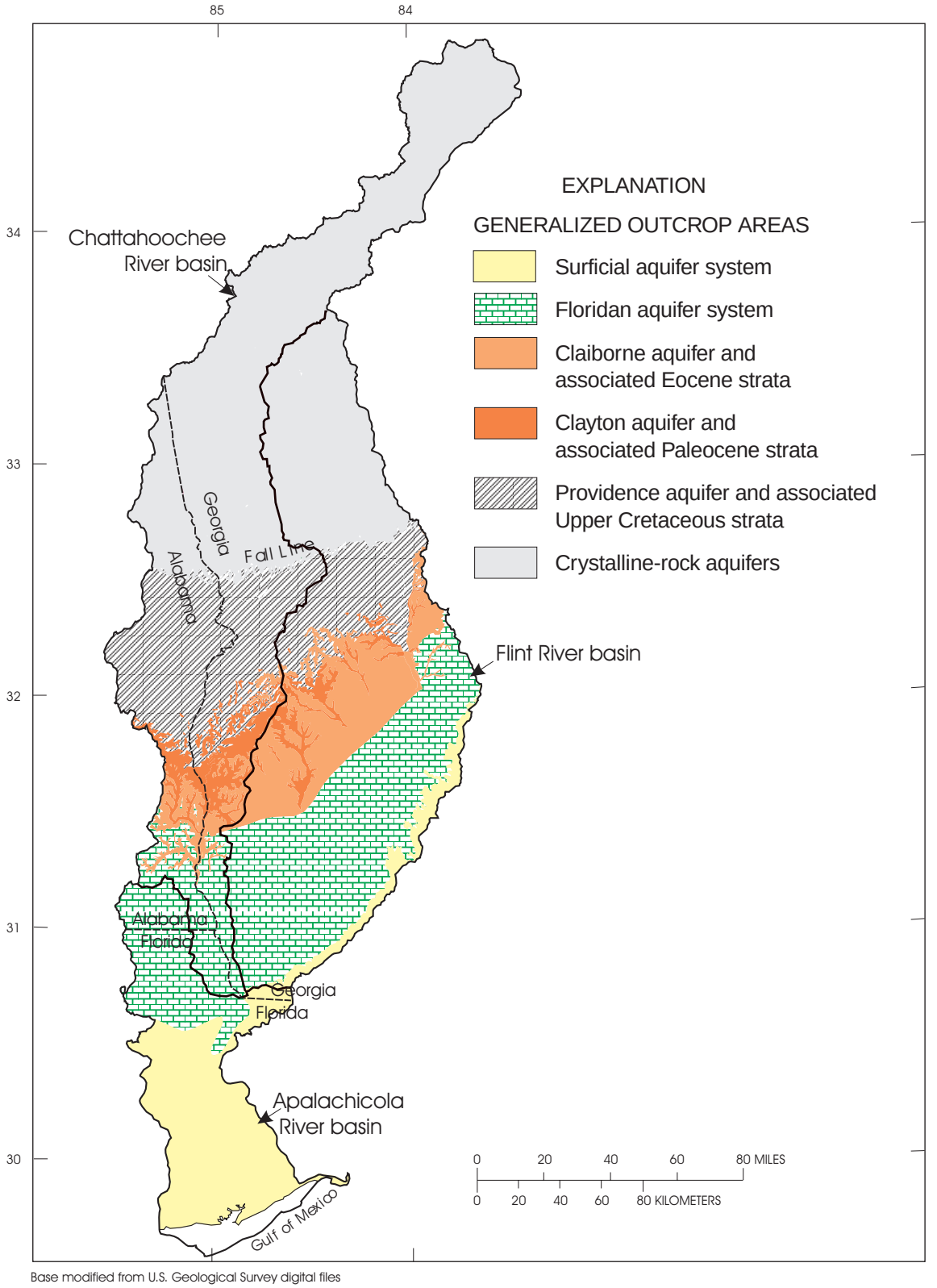
- The **Floridan aquifer** system, one of the most productive aquifers worldwide, underlies much of the southernmost portion of the Chattahoochee Basin. The Floridan aquifer system, which is unconfiend or semi-confined, is comprised of a thick sequence of carbonate rocks that are of Tertiary age and are hydraulically connected in varying degrees (Miller, 1986). The Ocala Limestone is one of the thickest and most productive formations that crops out in the Dougherty Plain and gives rise to a karst topography riddled with sinkholes. The complex hydrogeology of the Floridan aquifer system is reflected by highly variable transmissivities that range from 2,000 to 1,300,000 feet squared per day (ft^2/d). The range in transmissivities in the Ocala Limestone is caused by the variable, fractured nature, and the dissolution of limestone that creates conduits and solution openings (Miller, 1986).

- The **Claiborne aquifer** is an important source of water in part of southwestern Georgia. it is made up of sand and sandy limestone and is mostly confined in the areas where it is extensively used. It's principal water bearing formation is the Tallahatta Formation of Eocene age (McFadden and Perriello, 1983).

- The **Clayton aquifer**, contained in the Clayton Formation of Paleocene age is another important source of water in southwestern Georgia. It is made up of sand and limestone and is generally confined.

- The **Providence aquifer** system is the deepest of the principle aquifers in South Georgia. It serves as a major source of water in the northern one-third of the Coastal Plain. The aquifer system consists of sand and gravel that locally contains layers of clay and silt which function as confining beds. The principal water-bearing formation is the Providence Sand of Late Cretaceous age (McFadden and Perriello, 1983). Older Cretaceous strata generally are too deep to be economically developed. The Cretaceous aquifer system may be either confined or un-confined and cros out immediately below the Fall Line.

- North of the Fall Line, the Chattahoochee River Basin is underlain by bedrock, and ground water is contained within the **crystalline rock aquifer**. The crystalline rocks contain little primary porosity; rather, most ground water is stored in the porous saprolite and transmitted to wells in the bedrock via fractures. Currently, the crystalline rock aquifers are used primarily for private water supplies and livestock watering. It is commonly believed that ground water in this part of the state is not sufficient to support municipal supplies and industrial uses.



Base modified from U.S. Geological Survey digital files

Figure 2-10. Hydrogeologic Units Underlying the Apalachicola-Chattahoochee-Flint River Basin (modified from Couch et al., 1996)

The regional direction of ground-water flow in the Coastal Plain is from north to south; however, local flow directions vary, especially in the vicinity of streams and areas having large ground-water withdrawals. Rivers and streams in the Coastal Plain Province commonly are deeply incised into underlying aquifers and receive substantial amounts of ground-water discharge. Strata associated with the Floridan aquifer system are exposed along sections of the Chattahoochee River (Maslia and Hayes, 1988). As a result of the greater hydraulic connection between the Floridan aquifer system and the Flint River, however, ground-water discharge contributes more significantly to baseflow in the Flint River than in the Chattahoochee River. Aquifer discharge to the Chattahoochee River is estimated to be one-fifth of the amount that discharges to the Flint River (Torak et al., 1991). In areas such as the northern part of the Fall Line Hills District where unconfined aquifers are used for water supply, ground and surface water are closely interconnected and pumpage of ground water reduces stream flow at a ratio approaching 1:1. Further south, however, the sediments progressively deepen, and, eventually, the aquifers become confined and the ground and surface water regimes are only poorly interconnected. Where this happens, pumpage from wells no longer affects stream flow. The unconfined aquifers in the Coastal Plain have average pollution susceptibility. The confined aquifers, because they are buried and isolated, are less susceptible to pollution from activities at the land surface.

North of the Fall Line, the Piedment aquifer system is characterized by relatively low-yielding wells. Ground water is stored in a mantle of soil and saprolite (decomposed rock) and transmitted to wells via fractures or other geologic discontinuities in the crystalline bedrock. These crystalline rocks have similar hydraulic characteristics and are mapped as one aquifer. Each surface water drainage basin or watershed is also a ground water drainage basin or watershed; surface and ground water are in such close hydraulic interconnection they can be considered as a single and inseparable system. In general, pumpage of ground water reduces stream flow at a 1:1 ratio. Reported yields of wells completed in the crystalline-rock aquifer range from zero to 471 gallons per minute (gal/m), but are commonly less than 50 gal/m with a typical yield of 20 gal/m (Cressler et al., 1983; Chapman et al., 1993). In the Piedmont, the decomposed rock or saprolite contains considerable clay that acts as a barrier to ground water pollution. As a result, ground water in this section of the Chattahoochee basin has below average pollution susceptibility.

2.1.6 Biological Resources

Human activities have altered and transformed much of the Chattahoochee River Basin; yet, the basin's environment is noteworthy for its remaining biological diversity. The Chattahoochee River Basin contains parts of the Blue Ridge Mountains and Southeastern Plains Ecoregions (Omernik, 1987). The Blue Ridge Ecoregion is contained within the small part of the basin in the Blue Ridge Land Resource Area. The Southeastern Plains Ecoregion encompasses all the remainder of the Chattahoochee River Basin. These ecoregions are intended to identify areas of relatively homogeneous ecological systems and are partially based on the distribution of terrestrial biota.

Terrestrial Habitats

The health of aquatic ecosystems is linked to the health of terrestrial ecosystems. All parts of the Chattahoochee River Basin have been subjected to varying degrees of forest-cover alteration. Small-scale disturbance of native forests began with American Indians who used fire to create fields for cultivation. Forest disturbance was greatly accelerated by European settlers who

logged throughout the basin and extensively cleared land for agriculture in the Piedmont and Coastal Plain. Between 1868 and approximately 1940, hydraulic mining of gold in the Blue Ridge also resulted in locally extensive deforestation of land (Leigh, 1994).

Prior to European settlement, the Chattahoochee River Basin was mostly forested. Historically, the Blue Ridge Province was covered by oak-chestnut-hickory forests, with hemlock in moist coves and white pine in drier ridges. Chestnut was extirpated from these forests as a result of the Chestnut Blight. Native forests in the Piedmont Province were dominantly deciduous hardwoods and mixed stands of pine and hardwoods. The Coastal Plain supported oak-sweetgum-pine forests, with gum-cypress in floodplain forests. Parts of the lower Coastal Plain were vegetated by open savannahs of wiregrass and longleaf pine (Wharton, 1978).

Although land cover in the Blue Ridge Province historically has been dominated by forest, forest-species composition and age structure have been altered by mining, logging, and disease. Deforestation caused by mining and logging resulted in localized severe erosion and thick sediment deposits in floodplains in the Blue Ridge. As much as five feet of sediment has been deposited in floodplains of the Chestatee River in the upper Chattahoochee River Basin as a result of hydraulic mining of gold (Leigh, 1994).

The Piedmont Province experienced two major phases of land abandonment – after the Civil War, during the agricultural depression of the late 1880's, and after the boll weevil infestation in the 1920's. Cotton production in the Piedmont Province left the land relatively infertile and almost devoid of topsoil. Almost all topsoil in the Piedmont had been eroded by 1935 (Wharton, 1978). Abandoned agricultural lands were replaced by the secondary forests that cover most of the Piedmont today.

Forest cover probably reached a low between 1910 and 1919 basinwide when agriculture was at peak acreage. By the 1920's, about 87 percent of the Piedmont had been cultivated (Plummer, 1975). By the mid-1970's, approximately 59 percent of the land cover in the entire Apalachicola-Chattahoochee-Flint River basin was forests of second growth stands and large acreages of planted pine (U.S. Geological Survey, 1972-78).

Wetland Habitats and Aquatic Vegetation

Wetlands are lands transitional between terrestrial and deep-water habitats where the water table is at or near land surface or the land is covered by shallow water (Cowardin et al., 1979). Most wetlands in the Chattahoochee River Basin are forested wetlands located in floodplains of streams and rivers. Forested-floodplain wetlands are maintained by the natural flooding regime of rivers and streams, and in turn, influence the water and habitat quality of riverine ecosystems.

Assessments of wetland resources in Georgia have been carried out with varying degrees of success by the Natural Resources Conservation Service (Soil Conservation Service-USDA), the US Fish and Wildlife Service National Wetland Inventory, and Georgia's Department of Natural Resources.

Wetlands Inventory

Hydric soils as mapped in county soil surveys are useful indicators of the location and extent of wetlands for the majority of Georgia counties. The dates of photography from which the survey maps are derived vary widely across the state. However, soil surveys have proven useful in wetland delineation in the field and in the development of wetland inventories.

County acreage summaries provide useful information on the distribution of wetlands across the state.

The National Wetland Inventory (NWI) of the U.S. Fish and Wildlife Service utilizes soil survey information during photo-interpretation in the development of the 7.5 minute, 1:24,000 scale products of this nationwide wetland inventory effort. Wetlands are classified according to the Cowardin system, providing some level of detail as to the characterization of individual wetlands. Draft products are available for the 1,017 7.5 minute quadrangles in the state of Georgia, and many final map products have been produced. More than 100 of these quadrangles are available in a digital format. Although not intended for use in jurisdictional determinations of wetlands, these products are invaluable for site surveys, trends analysis, and land-use planning.

A complementary database was completed by Georgia DNR in 1991 and is based on classification of Landsat Thematic Mapper (TM) satellite imagery taken during 1988-1990. Due to the limitations of remote sensing technology, the classification scheme is simplified in comparison to the Cowardin system used with NWI. Total wetland acreage based on landsat TM imagery is 76,691 acres or 2 % of land area in the Chattahoochee River Basin. These data underestimate the acreage of forested wetlands in the Piedmont and Coastal Plain, where considerable acreage may have been classified as hardwood or mixed forest.

Aquatic Fauna

This section focuses on aquatic or wetland species including fishes, amphibians, aquatic reptiles, and aquatic invertebrates. However, the Chattahoochee River Basin is rich in many other fauna that rely on the water resources of the basin, including many species of breeding birds and mammals. Although a description of these bird and mammal species is beyond the scope of this report, the water needs of these species, such as bald eagles, fish-eating mammals, and migratory water fowl, should be considered in water-resource planning and management.

Fish Fauna. The diverse fish fauna of the Chattahoochee River Basin includes 104 species representing 22 families (Couch et al., 1996). Ten fish species occurring within the Chattahoochee River Basin have been listed for protection by Federal or State agencies as endangered, threatened, rare, unusual, or extirpated. Two species are listed by the State as threatened: the bluestripe shiner (*Cyprinella callitaenia*) and highscale shiner (*Notropsis hypsilepsis*), while the Gulf Coast sturgeon (*Acipenser oxyrhynchus desoti*) is listed as extirpated in Georgia. The Gulf Coast sturgeion is listed as threatened under the Federal Endangered Species Act (ESA), while the bluestripe shiner is a candidate for listing as threatened or endangered under the ESA.

The largest number of fish species in the Chattahoochee River Basin (31) are in the minnow family Cyprinidae. Minnows are small fish that can be seen darting around in streams. Other families with large numbers of species are the sunfishes (Centrarchidae), the catfishes (Ictalaridae), and the suckers (Catostomidae). Species that have the largest numbers of individuals living in streams typically are minnows and suckers. These species are often not well known because, unlike sunfish, black bass, and catfish, people do not fish for them, although certain minnows may be used as bait. Minnows have an important role in the aquatic food chain as prey for larger fish, aquatic snakes, turtles, and wading birds such as herons. Suckers can grow to more than one foot long and are named for their down-turned mouth that they use to "vacuum" food from stream bottoms. Although suckers are not popular game fish,

they are ecologically important because they often account for the largest fish biomass in streams.

Sixteen fish species have been introduced in the Chattahoochee River Basin by humans. Introduced species include the rainbow and the brown trout, white catfish, flathead catfish, black bullhead, goldfish, carp, rough shiner, red shiner, white bass, spotted bass, rock bass, crappie, yellow perch, sauger, and walleye.

The headwaters of the Chattahoochee River Basin support self-sustaining populations of brook trout, the only trout considered native to the eastern United States. Naturalized populations of rainbow and brown trout, which were introduced into Georgia in the 1890s, are also well established in the basin. Georgia's trout streams support very low standing crops of fish due to the extremely soft water associated with the igneous and metamorphic geologic strata making up the southern Blue Ridge Mountains. This fact, coupled with a high demand for recreational fishing, led the Georgia DNR to begin stocking catchable (9-inch+) hatchery-reared trout many years ago. At present, many streams in the headwaters of the Chattahoochee, Chestatee and Soque rivers are stocked with trout from March through August each year. These put-and-take stockings, along with natural reproduction by wild trout populations, support a fishery that has considerable recreational as well as economic value. The best quality trout streams are located in the higher elevations, primarily on national forest land. A few trout streams in the basin are managed with special regulations to produce large trout or high catch rates, including Waters and Dukes creeks (managed by the state for public fishing) and several fee-fishing stream segments on the Soque River that are managed by private landowners for trophy fish.

Downstream of trout waters, the larger streams support limited populations of coolwater / warmwater fishes such as redeye, spotted and largemouth bass, sunfish, suckers, bullheads and a variety of non-game species. A popular relative of the redeye, the yet to be described shoal bass, is found in the Chattahoochee and Chestatee rivers above Lake Lanier. Small tributary streams in this area support limited game fish populations, but diverse populations of non-game species, unless water quality or habitat is severely impacted by pollution. Because such streams have not been sampled much, little detail is known about actual species composition and standing crops. Much work needs to be done to better understand the impacts of land use changes on aquatic habitat in these streams.

Lake Lanier, the uppermost major impoundment on the Chattahoochee River, supports popular fisheries for a number of game fish species, most notably black bass (spotted and largemouth), striped bass, crappie and white bass. Lake Lanier's black bass fishery attracts several major bass tournaments each year and dozens of smaller ones.

For approximately 45 miles downstream of Lake Lanier, the Chattahoochee River is again classified trout water because of the cold hypolimnetic discharge from Buford Dam. River flow in the tailwater fluctuates daily due to power generation between a minimum of approximately 550 cubic feet per second and up to 8,400 cfs during peak generation. Approximately 350,000 catchable and fingerling trout are stocked annually by the GA DNR, supporting a major trout fishery that provides a unique recreational opportunity for the metropolitan Atlanta area. Most of this river section is considered part of the Chattahoochee River National Recreation Area, and scattered tracts of land adjoining the river are owned by the National Park Service. These areas serve as public access points for recreational use (primarily fishing) of the river.

The Chattahoochee River from Peachtree Creek downstream to West Point Lake has been impacted by urban runoff and municipal/industrial discharges from the City of Atlanta. Limited sampling data from this section of the river has indicated a dominance of rough fish such as carp and relatively low numbers of sport fish species. In recent years, adult striped bass migrating upstream from West Point Lake have attracted some attention from sport fishermen, and the spring white bass spawning run from West Point is also a significant fishery. Tributary streams to this part of the river are relatively small, but support limited fisheries for sunfish, catfish and redeye bass. Couch *et al*. (1995) list the fish species identified in historic surveys of streams of the metropolitan Atlanta area using museum records. Because many of these surveys were conducted before basins became urbanized, the records indicate fish species that were present when these basins were mostly rural. Forty-two native fish species have been found in tributaries of the Chattahoochee River in the study area.

West Point Lake supports high-quality fisheries for largemouth bass and hybrid bass, and fishing for crappie and channel catfish is also good. The lake has also been stocked with striped bass. The high nutrient content of water flowing into the lake from the Chattahoochee River is partially responsible for the quality of the fishery. The West Point fishery is an important part of the local economy, as the lake is a popular location for major bass tournaments and several fishing guides depend on it for a livelihood.

After flowing freely for a few miles downstream from West Point Lake, the Chattahoochee River is impounded by a series of small hydro-power projects owned and operated by Georgia Power Company and other entities. The largest of these, Lake Harding (also known as Bartletts Ferry Lake), has an excellent largemouth bass fishery, and fishing is also good for white bass and hybrid bass. Lake Harding is stocked with the Gulf strain of striped bass, as part of a tri-state cooperative effort to maintain the remnant striped bass strain indigenous to these waters. Lake Oliver, at 2,150 acres, is better known for its bream and crappie fisheries, but fishing for white and hybrid bass is also good. Goat Rock Lake, at 940 acres, is a lesser known lake with little development around it. It supports fisheries for bass, sunfish, hybrid bass, and catfish. In addition to the three lakes mentioned above, dams at five other locations between West Point and Columbus utilize at least part of the river flow for power generation, but provide only minor fishery resources.

Below Columbus, the Chattahoochee River flows into Lake Walter F. George. This lake supports popular fisheries for largemouth, white, and hybrid bass, as well as crappie and catfish. It is also stocked with the Gulf strain striped bass. Lake Seminole, at the terminus of the Chattahoochee River, has long had an excellent reputation for largemouth bass fishing, and it attracts numerous tournaments and supports several guide services. It also has good fisheries for white and hybrid bass and catfish. Gulf strain striped bass are stocked in the reservoir to help maintain a viable population in the Apalachicola-Chattahoochee-Flint system.

Amphibians and Reptiles. In addition to the diversity of fish fauna, the Chattahoochee River Basin is noteworthy for its diversity of amphibians and reptiles. Martof (1956) provides a checklist with distributional notes for species in the basin. This checklist indicates that the Chattahoochee River Basin is inhabited by about 24 species of freshwater aquatic turtles, about 37 species of salamanders and sirens, about 30 species of frogs and toads, and the American alligator. All require freshwater to complete or sustain their life cycles. In addition, numerous species of snakes and lizards inhabit the basin.

Two species of turtles are noteworthy because of their rarity and protected status. The alligator snapping turtle (*Macroclemys temmincki*), the world's largest freshwater turtle, is designated as threatened as a result of commercial overharvesting for its meat. Barbour's map turtle (*Graptemys barbouri*), a Federal candidate species under the Endangered Species Act, is endemic to the Coastal Plain part of the ACF basin. The natural range of the turtle was decreased by the formation of Lake Seminole causing a decline in population, and its population then further declined because of harvesting for meat. Both species occur in Lake Seminole and have been reported at least once in the lower Chattahoochee.

Aquatic Macroinvertebrate Fauna. With the exception of perhaps mollusc (Heard, 1977) and crayfish species (Hobbs, 1942, 1981), knowledge of the number and distribution of aquatic-invertebrate species that inhabit the Chattahoochee River Basin is limited. Perhaps the largest diversity of macrofaunal-aquatic organisms occurs among the insects. However, information on the occurrence of aquatic insect species is limited to checklists relevant only to selected taxa and only in portions of the Chattahoochee River Basin.

Hobbs (1942, 1981) lists 20 species of crayfish that occur in the Chattahoochee or Flint River basins. Six species are endemic to the Chattahoochee River Basin.

Aquatic and Wetland Vegetation. While the Chattahoochee River Basin supports a diverse population of upland plants, wetland areas are limited, while lakes and ponds occur only as a result of man's activities. The Georgia Natural Heritage Program has identified 77 Special Concern plant species occurring in the Chattahoochee River Basin, including species designated as unusual, rare, threatened, or endangered. Among these, there are nine wetland or aquatic species with state threatened or endangered status (Table 2-3).

Table 2-3. Threatened or Endangered Wetland and Aquatic Plant Species in the Chattahoochee River Basin

Common Name	Species	Status	Habitat
Shoals Spiderlily	*Hymenocallis coronaria*	E	River shoals
Curtiss Loosestrife	*Lythrum curtissii*	T	Openings in calcareous swamps
Lax Water-milfoil	*Myriophyllum laxum*	T	Bluehole spring runs; shallow, sandy, swift-flowing creeks; clear, cool ponds
Clearwater Butterwort	*Pinguicula primuliflora*	T	Sandy, clearwater streams and seeps; Atlantic white cedar swamps
Monkeyface Orchid	*Platanthera integrilabia*	T	Red maple-gum swamps; seeps and bogs
Whitetop Pitcherplant	*Sarracenia leucophylla*	E	Wet savannas, pitcherplant bogs
Parrot Pitcherplant	*Sarracenia psittacina*	T	Wet savannas, pitcherplant bogs
Purple Pitcherplant	*Sarracenia purpurea*	E	Swamps, wet rhododendron thickets
Sweet Pitcherplant	*Sarracenia rubra*	E	Atlantic white cedar swamps; wet meadows

Aquatic vegetation and algae may thrive in areas where changes in water quality, such as nutrient enrichment or altered hydraulic conditions occur, and may result in nuisance conditions. These problems are most likely to occur in reservoirs in the Coastal Plain Province, where stable water levels, shallow depths, sedimentation, high nutrient inputs, and a mild climate provide conditions favorable to the proliferation of aquatic vegetation, particularly introduced species.

Lake Seminole has experienced severe problems with noxious growths of aquatic plants, and as much as 80 percent of the lake's surface area has been covered by aquatic plants. Noxious growth of aquatic plants in Lake Seminole began in 1955 at the time water began to be impounded (Gholson, 1984). In 1973, an aquatic plant survey of Lake Seminole identified more than 400 species, of which 70 were classified as noxious or potentially noxious plants. Several introduced species have established themselves, including Eurasian milfoil (*Myriophyllum spicatum*), giant cutgrass (*Zizaniopxis miliacea*), water hyacinth (*Eichorina crassipes*) and Hydrilla (*Hydrilla verticillata*).

2.2 Population and Land Use

2.2.1 Population

The Chattahoochee River Basin is located in the heart of the Nation's "sunbelt" region. Metropolitan Atlanta, the largest metropolitan area in the southeastern United States, is partly within the Chattahoochee River Basin. Population distribution in the basin at the time of the 1990 Census by Census blocks is shown in Figure 2-11. A summary of 1990 population estimates by HUC units based on census tract/block centroids (EPA Geographic Information Query System) for Georgia, Alabama and Florida by HUC is shown in Table 2-4.

As of 1995, nearly 91 percent of the basin population lived in Georgia with nearly 76 percent of that population in the Atlanta metropolitan area (DRI/McGraw-Hill, 1996). Population centers in the Chattahoochee watershed outside the Metropolitan Atlanta area include the Columbus, Georgia, and Phenix City, Alabama, area (210,000 population). Most other population centers have fewer than 50,000 people, and generally are in the range of 5,000 to 10,000 people.

Between 1985 and 1995, the population in the Chattahoochee River Basin increased by 1.9 percent per year. With vigorous job creation expected, the proportion of Georgia's population resident within the Chattahoochee Basin is expected to continue to increase (DRI/McGraw-Hill, 1996). Basin population is projected to increase at a rate of 1.2 percent per year between 1995 and 2000, and continue at 1.1 percent per year through 2010. The largest increases in population are projected for the Metropolitan Atlanta area. The predominantly rural counties of the southern part of the basin are projected to have stable or slightly declining populations (DRI/McGraw-Hill, 1996).

2.2.2 Employment

The Chattahoochee River Basin has by far the largest employment share within the overall Apalachicola-Chattahoochee-Flint (ACF) River basin, accounting for nearly 80 percent of all jobs in the basin 1990. Since 1975, the Chattahoochee basin has experienced strong employment growth, with jobs expanding at a 4.2% annual rate from 1975-90. (DRI/McGraw-Hill, 1996). Since metropolitan Atlanta and Columbus are included within the basin, strong employment growth is projected to continue, although at a somewhat decelaeated rate of 1.6% per year through 2010.

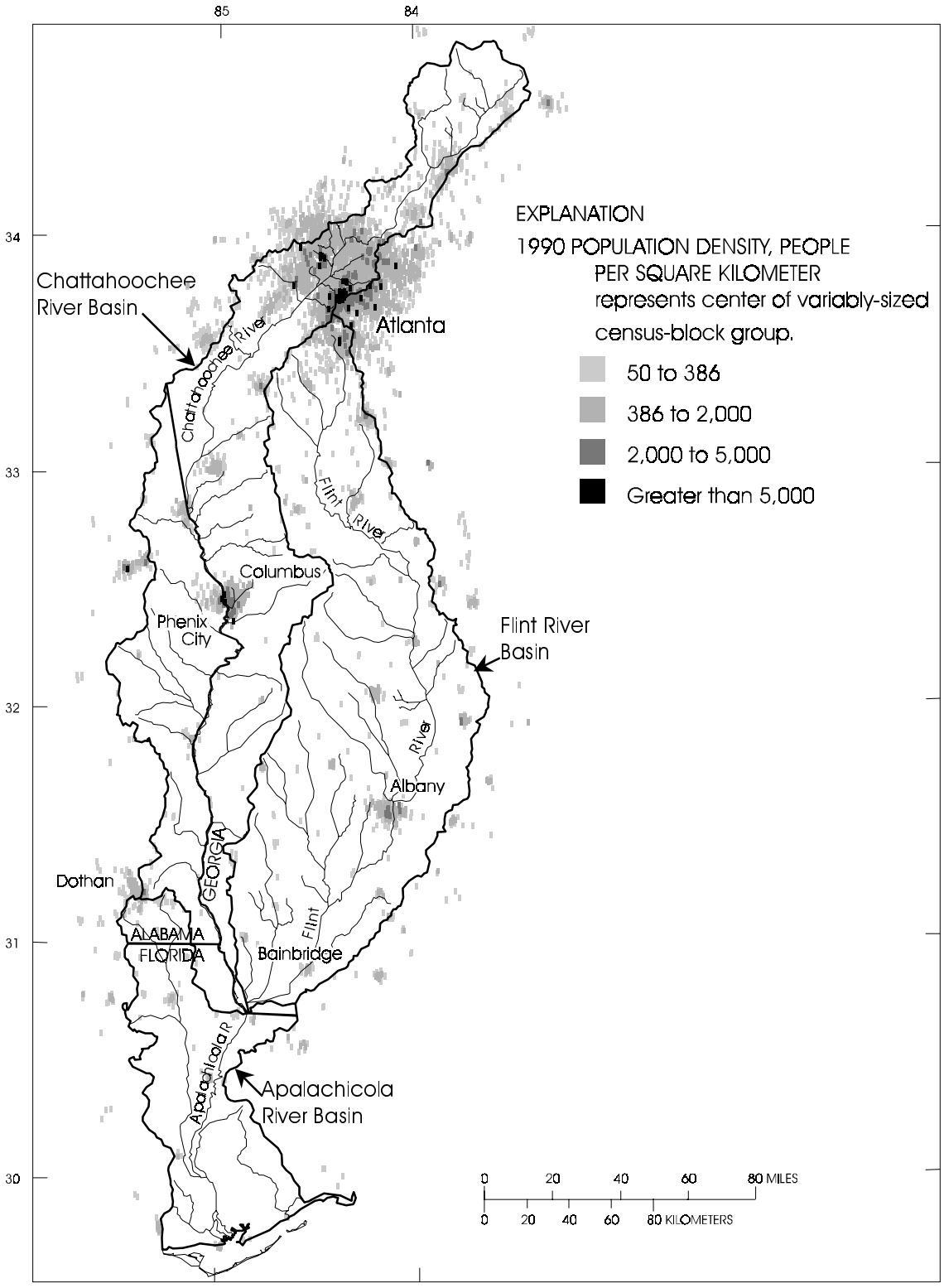


Figure 2-11. Population Density in the Apalachicola-Chattahoochee-Flint River Basin, 1990 (modified from Couch et al., 1996)

Table 2-4. Population Estimates for the Chattahoochee River Basin by HUC (1990)

HUC	Population	Housing Units
03130001	907749	429492
03130002	687175	279950
03130003	276842	109050
03130004	48937	19566
Total	*1920703*	*838058*

While employment will continue to increase, type of employment within the basin is also undergoing a dramatic shift. Manufacturing employment, which accounted for over 17% of the basin's jobs in 1975, had declined to 13% by 1990 and is projected to represent only 3.1% of the basin's jobs by 2050. This reflects transition to a more dominantly service-based economy, and service-related jobs are predicted to increase to over 44% of the basin's jobs by 2050. Despite this transition, industrial production within the basin is expected to continue to grow. The group with the fastest-growing production will be "other nondurables" (nondurables excluding food processing, textiles, paper, and chemicals). Textiles, once an important part of the industrial base, are expected to see the least growth, reflecting strong international competition.

2.2.3 Land Cover and Use

Land use/land cover classification was determined for the Chattahoochee River Basin based on high-altitude aerial photography for 1972-76 (U.S. Geological Survey, 1972-78). Subsequently in 1991 land cover data were developed based on interpretation of Landsat TM satellite image data obtained during 1988-90, leaf-off conditions. These two coverages differ significantly. Aerial photography allows identification of both land cover and land uses. Satellite imagery, however, detects primarily land cover, and not land use, such that a forest and a wooded subdivision may, for instance, appear similar. Satellite interpretation also tends to be less accurate than aerial photography.

The 1972-76 classification, after being updated for expanded urban areas based on the 1990 Census (Couch et al., 1996), indicates that 68 percent of the basin land area was forest, 19 percent was agriculture, and 9 percent was urban land cover, with 4 percent in other land uses, including less than 1 percent wetlands (Figures 2-12 through 2-15). In contrast to the Piedmont Province, agriculture comprised a larger percentage of land cover in the Coastal Plain. Urban land cover was concentrated in the upper part of the Chattahoochee River Basin in the Metropolitan Atlanta area. The 1988-90 land cover interpretation showed 73% of the basin in forest cover, 2 % in wetlands, 5 % in urban land cover, and 16% in agriculture (Figures 2-16 through 2-19). Statistics for 15 landcover classes in the Georgia portion of the Chattahoochee basin for the 1988-90 coverage are presented in Table 2-5 (GA DNR, 1996).

Forestry

Commercial forest lands represent about 66 percent of the total land area in the Chattahoochee River Basin according to the US Forest Service's Forest Statistics for Georgia, 1989 report (Thompson, 1989). Private landowners account for 77 percent of the ownership while the forest industry companies account for 15 percent. Governmental entities account for about 8 percent

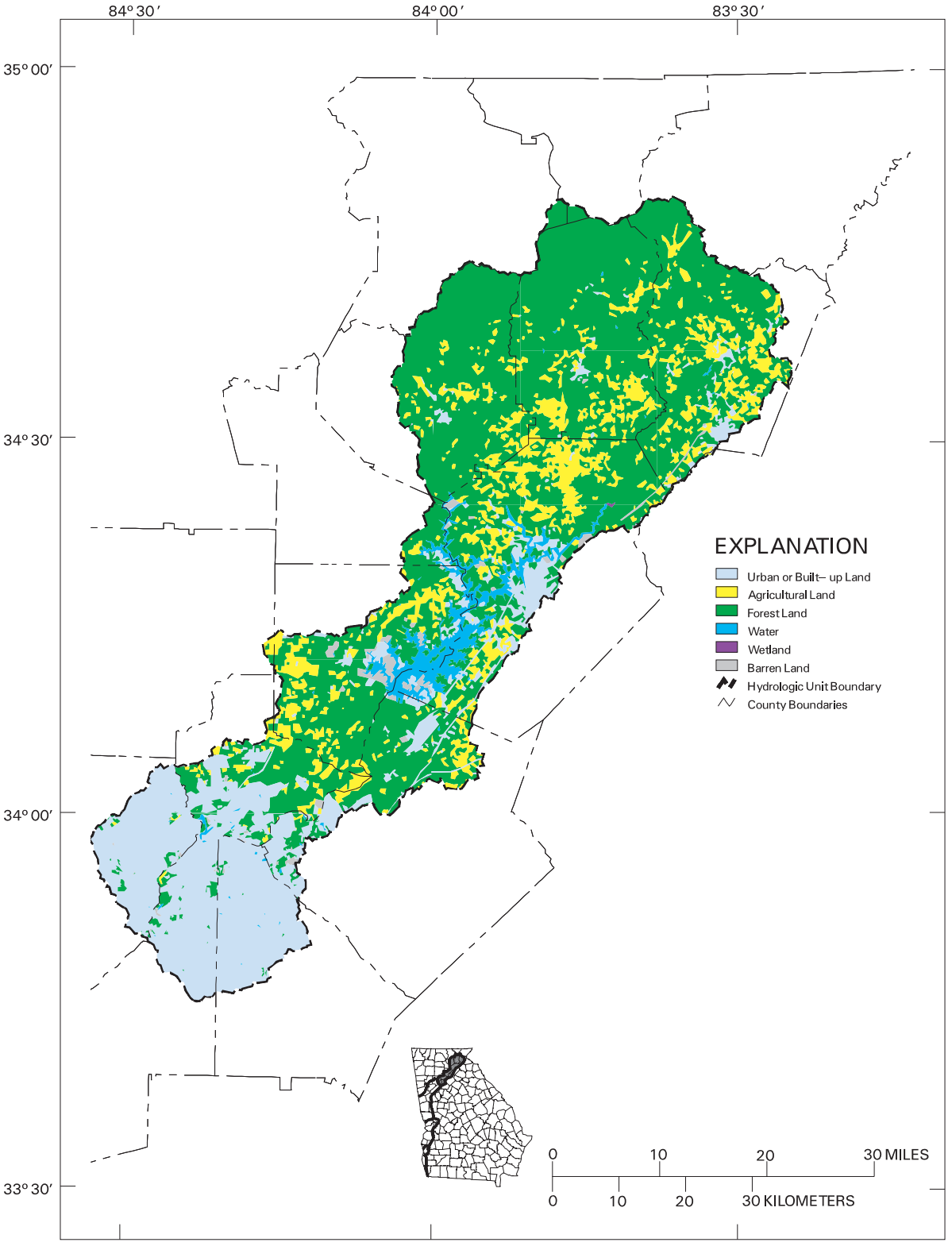


Figure 2-12. Land Use, Upper Chattahoochee River Basin, HUC 031300001, USGS 1972-76 Classification Updated with 1990 Urban Areas

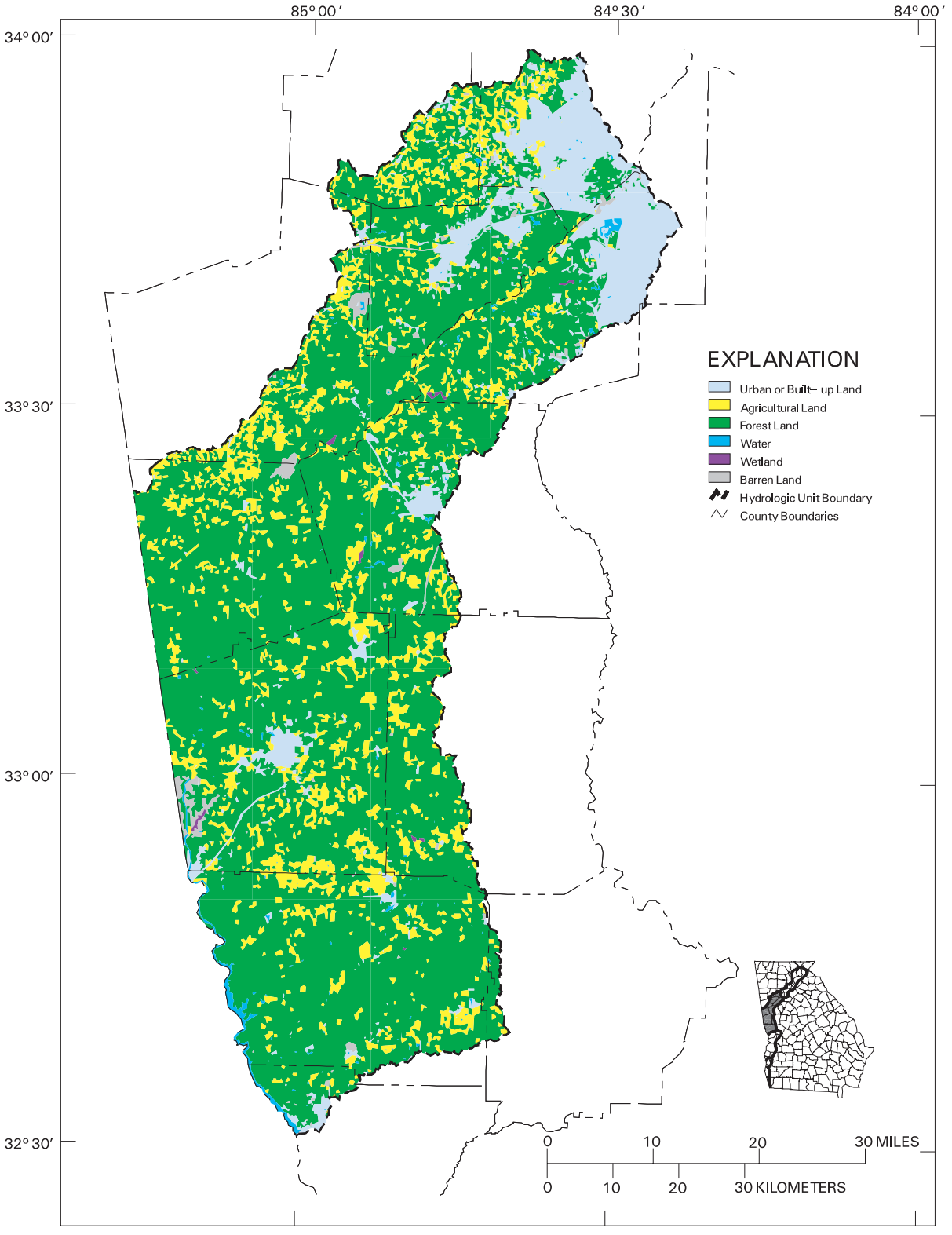


Figure 2-13. Land Use, Middle Chattahoochee River Basin, HUC 03130002, USGS 1972-76 Classification Updated with 1990 Urban Areas

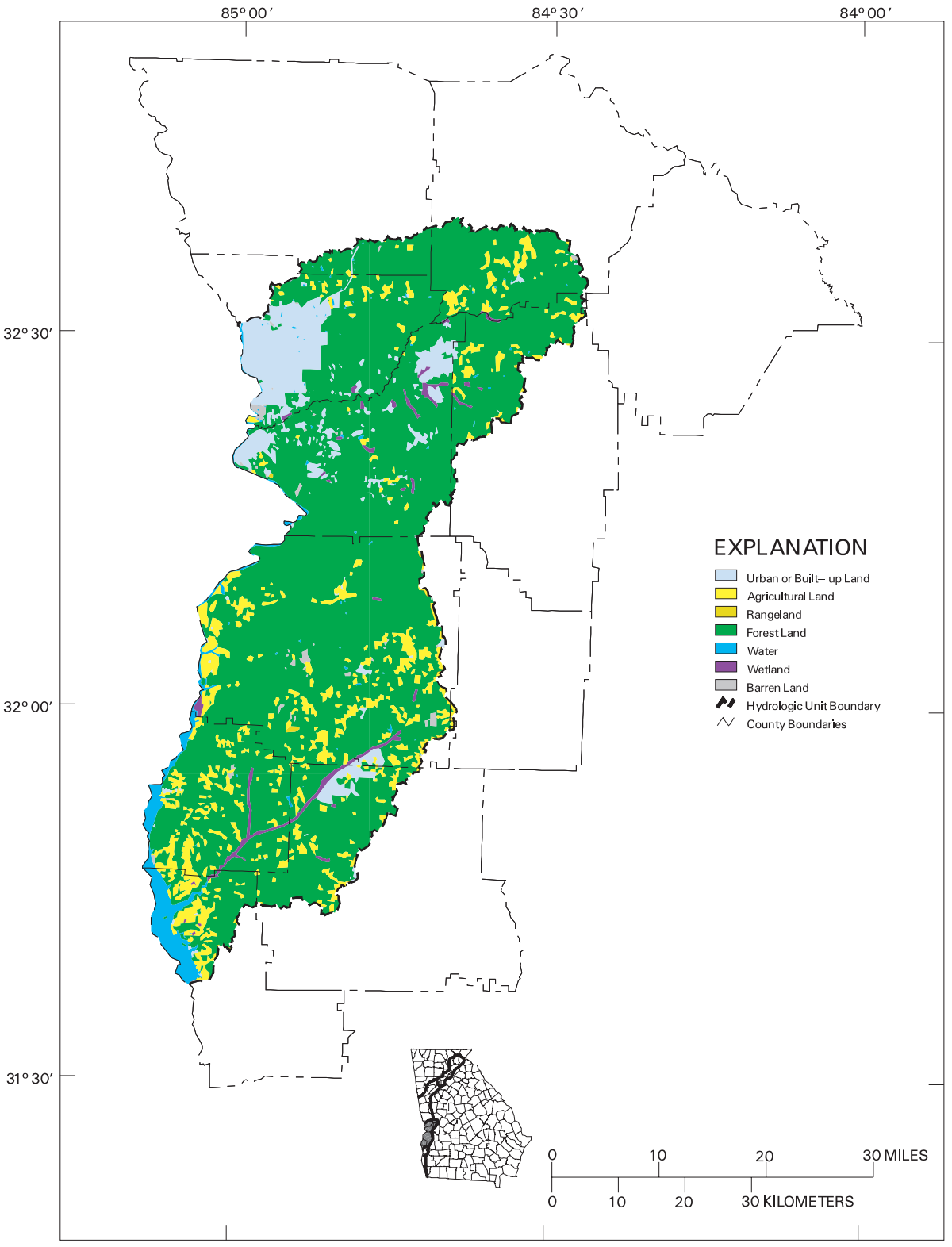


Figure 2-14. Land Use, Middle Chattahoochee River Basin, UUC 03130003, USGS 1972-76 Classification Updated with 1990 Urban Areas

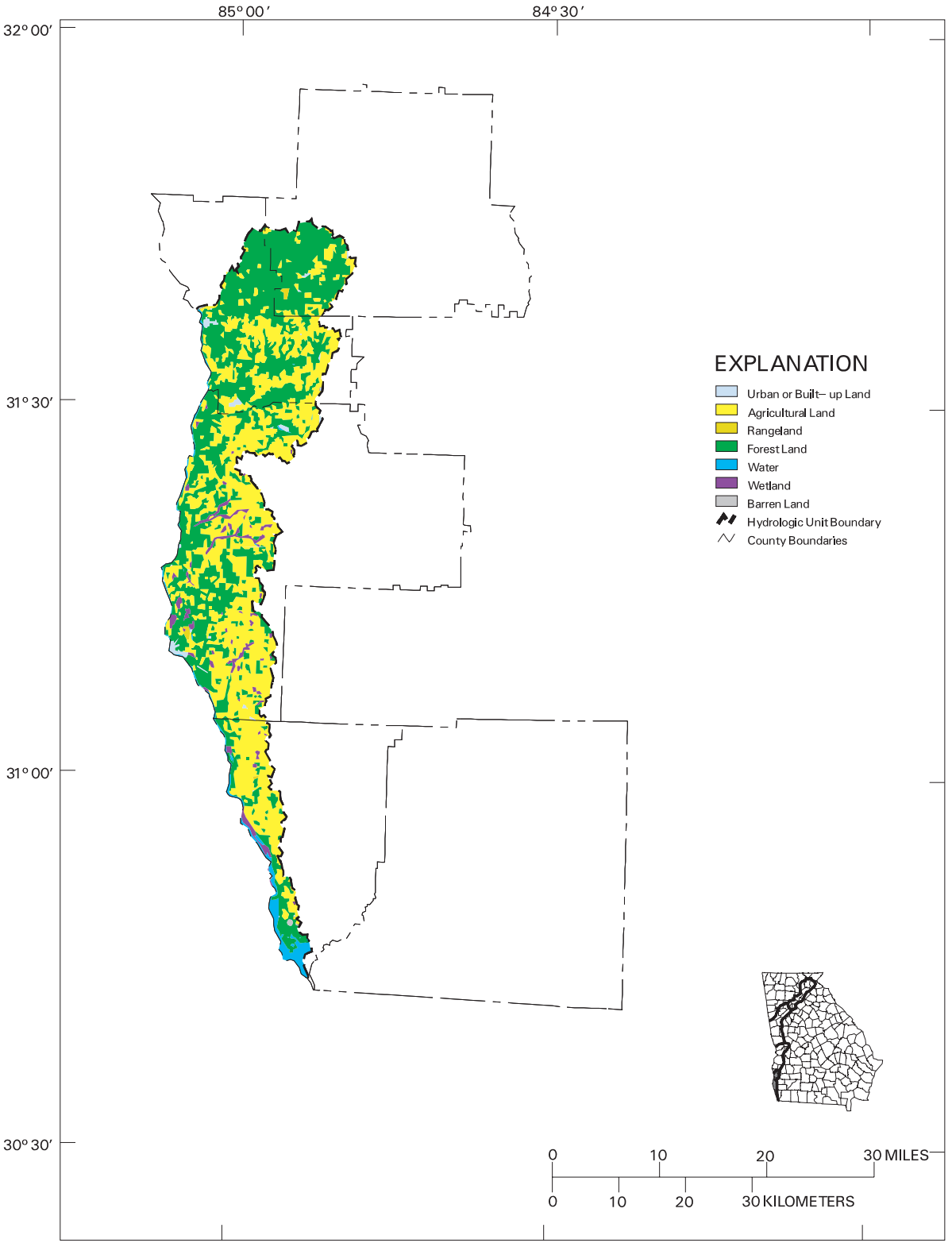


Figure 2-15. Land Use, Lower Chattahoochee River Basin, HUC 03130003, USGS 1972-76 Classification Updated with 1990 Urban Areas

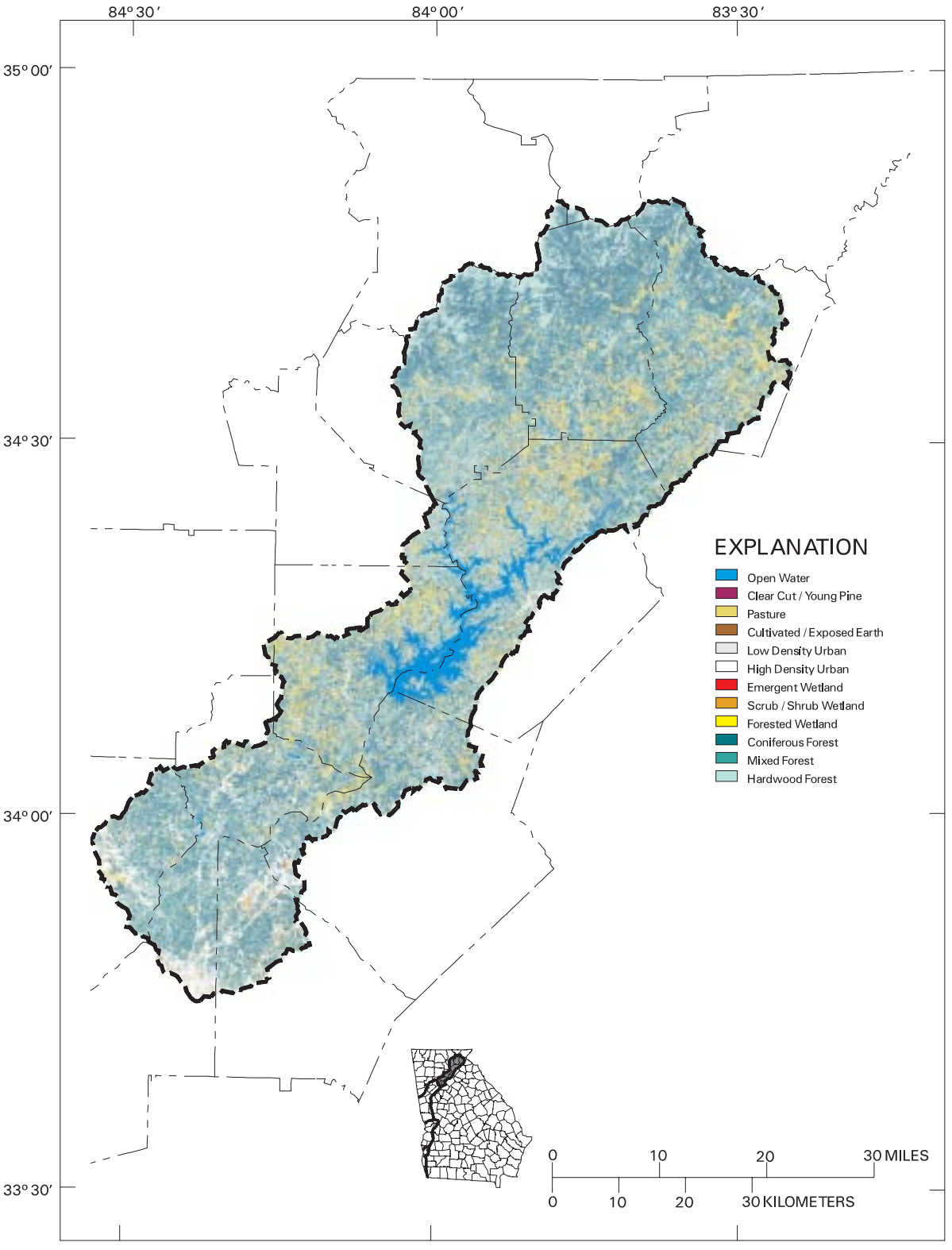


Figure 2-16. Land Cover 1990, Upper Chattahoochee River Basin, HUC 03130001

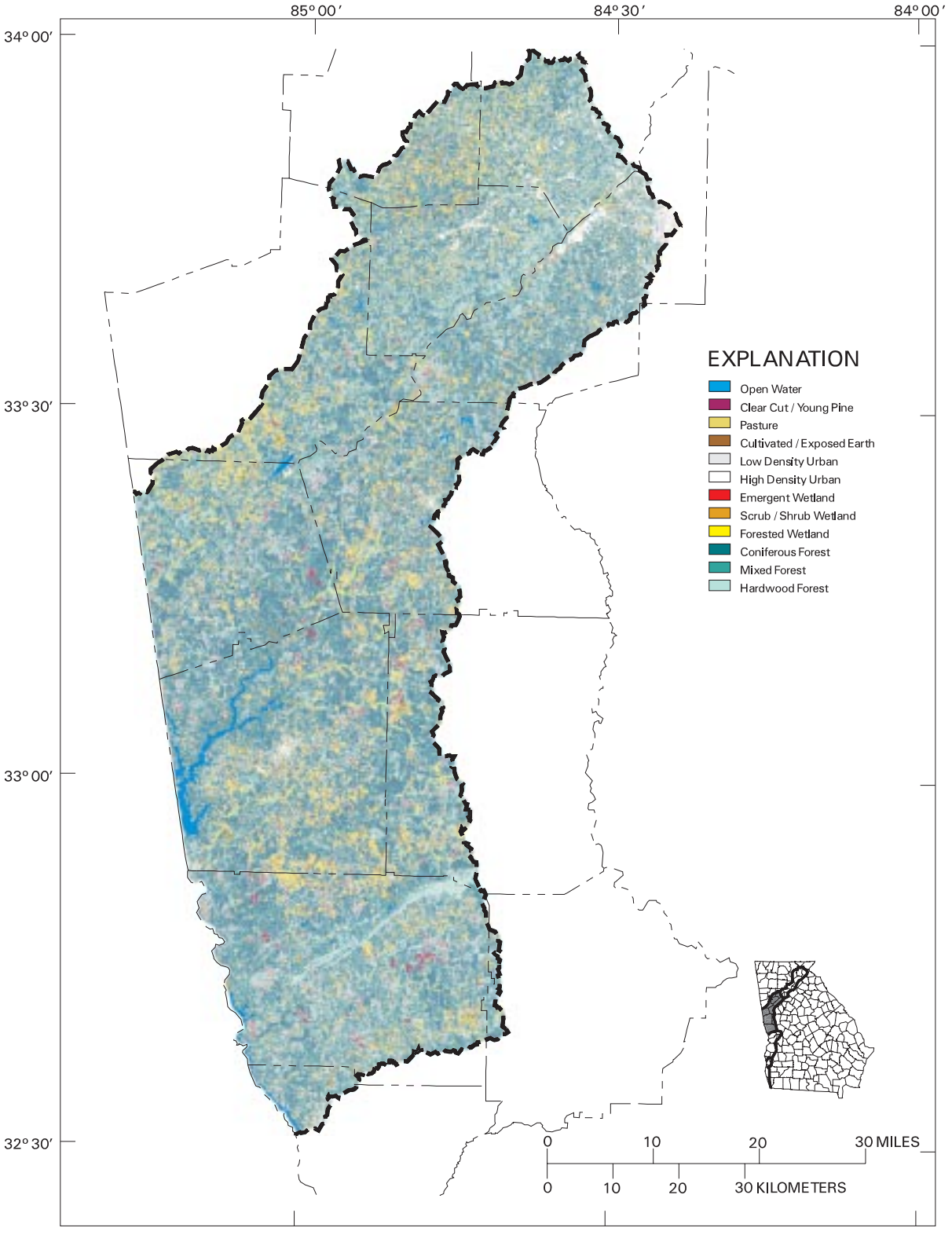


Figure 2-17. Land Cover 1990, Middle Chattahoochee River Basin, HUC 03130002

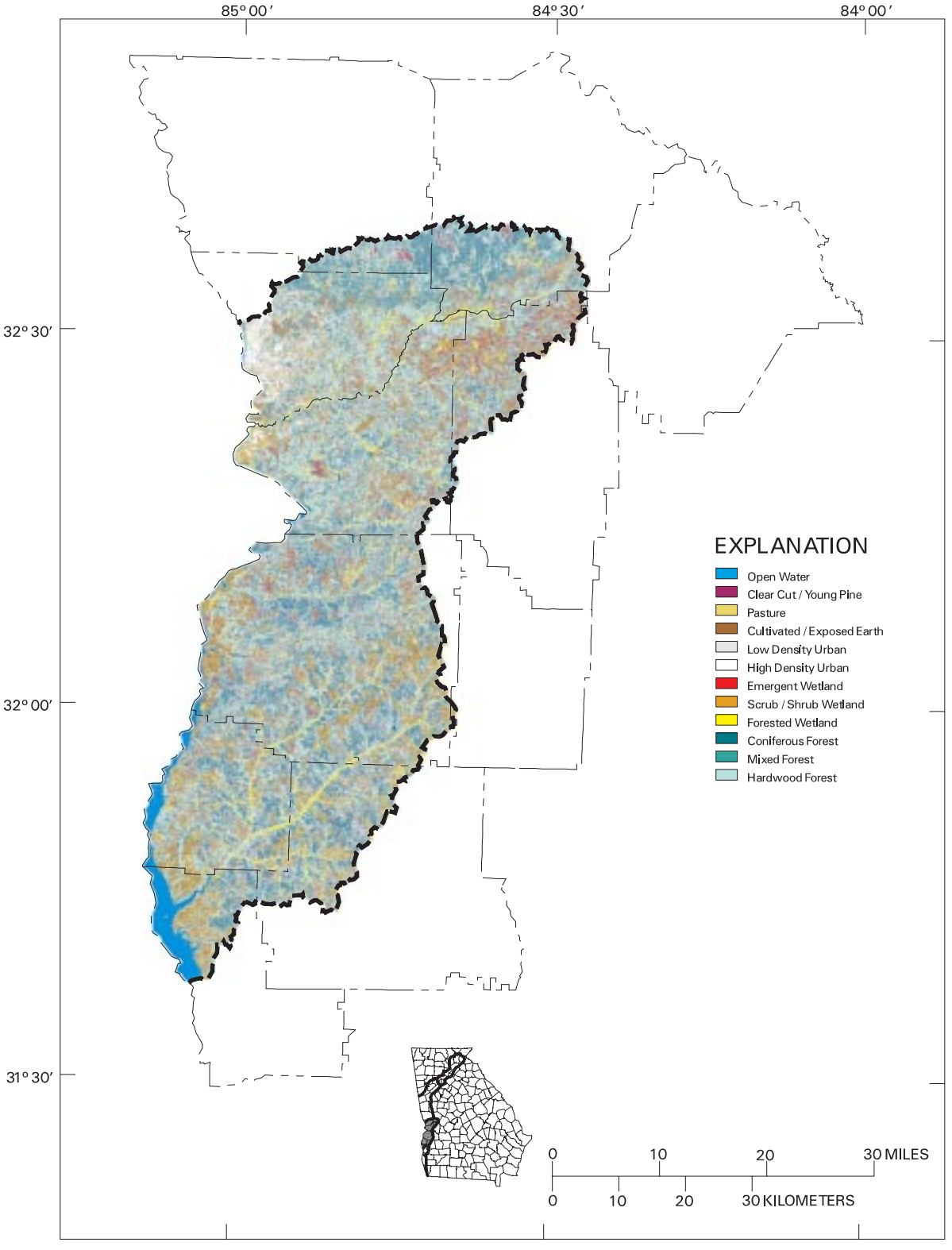


Figure 2-18. Land Cover 1990, Middle Chattahoochee River Basin, HUC 03130003

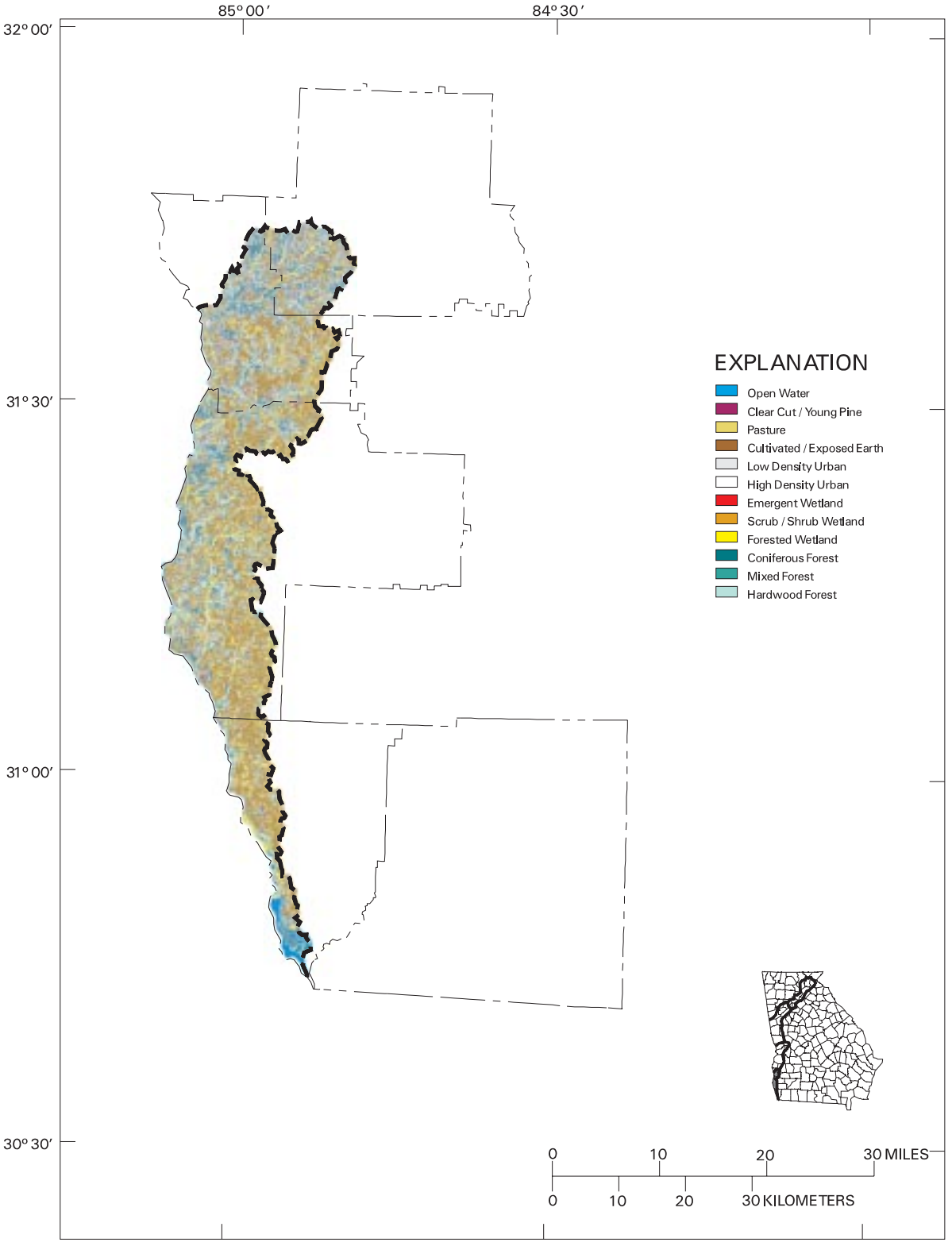


Figure 2-19. Land Cover 1990, Lower Chattahooche River Basin, HUC 03130004

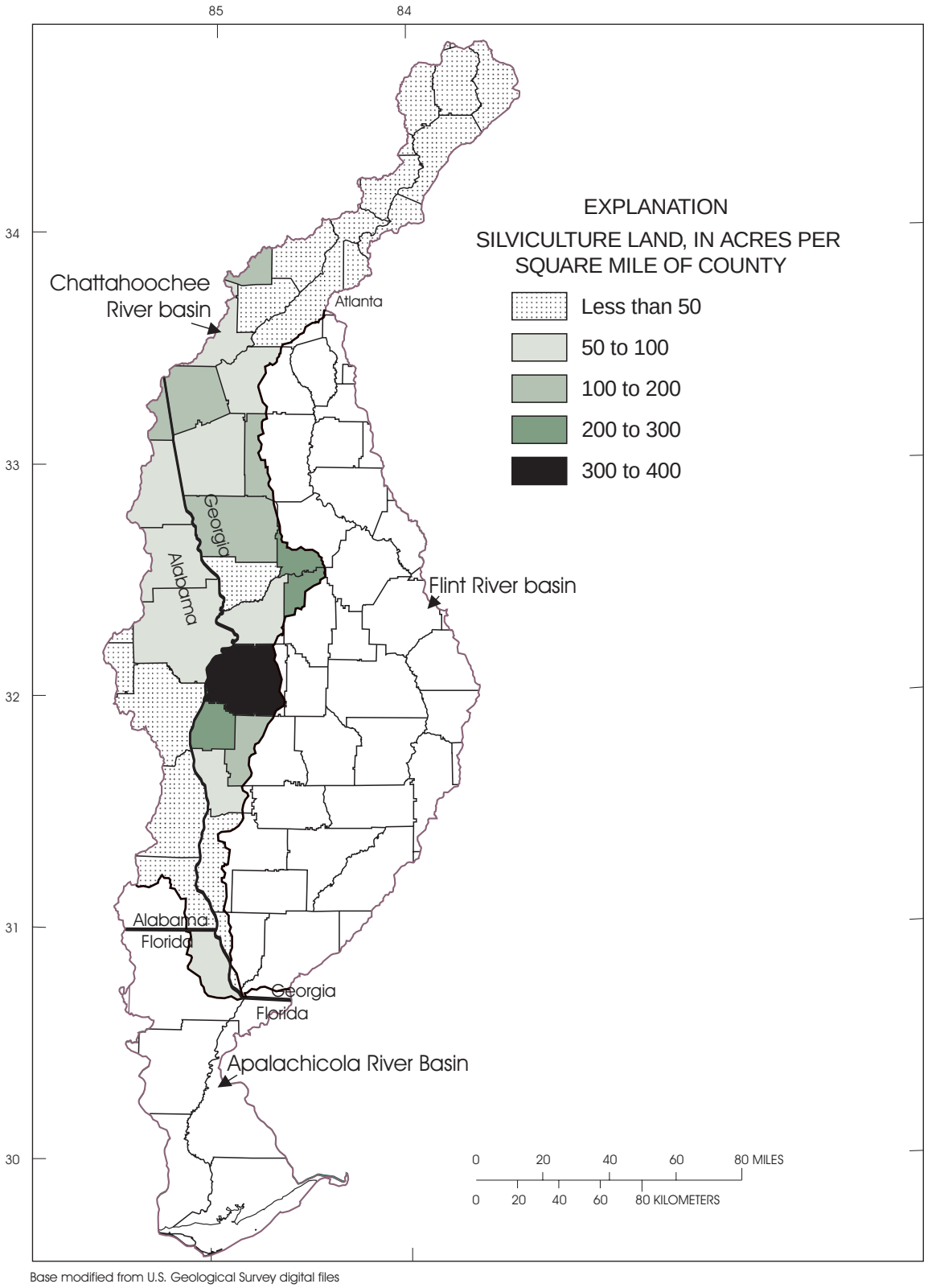
Table 2-5. Landcover Statistics for the Chattahoochee Basin

Class Name	%	Acres
Open Water	2.9	110,939.8
Clear Cut/Young Pine	4.4	170,860.2
Pasture	8.3	318,762.6
Cultivated/Exposed Earth	8.2	313,544.0
Low Density Urban	3.1	120,863.7
High Density Urban	1.6	60,383.2
Emergent Wetland	0.2	5,654.8
Scrub/Shrub Wetland	0.2	7,001.9
Forested Wetland	1.7	64,037.9
Coniferous Forest	21.2	816,271.5
Mixed Forest	22.3	859,295.5
Hardwood Forest	25.5	979,244.6
Salt Marsh	0.0	0.0
Brackish Marsh	0.0	0.0
Tidal Flats/Beaches	0.0	0.0
Total	*100.0*	*3,847,560.0*

of the forest land. Commercial silvicultural land use is concentrated in the Piedmont south of Atlanta and in the Coastal Plain just below the Fall Line (Figure 2-20).

Forestry is a major part of the economy within the basin. Markets for forest products afford landowners excellent investment opportunities to manage and sell their timber, pine straw, naval stores, etc., products. Statewide, the forest industry output for 1996 grew to approximately $ 17.3 billion dollars. The value added by this production, which includes wages, profits, interest, rent, depreciation and taxes paid into the economy reached a record high $ 7.9 billion dollars. Georgians are benefitted directly by 177,000 job opportunities created by the manufacture of paper, lumber, furniture and various other wood products as well as benefitting the consumers of these products.

Other benefits of the forest include hunting, fishing, aesthetics, wildlife watching, hiking, camping and other recreational opportunities as well as providing important environmental benefits such as clean air and water and wildlife habitat. Since 1982, there has been a statewide trend of loss of forest acreage, resulting from both conversion to urban and related uses and clearing for agricultural uses. Within the basin itself, since 1982 the area classified as pine type (plantation and natural) has decreased 250,645 acres (13 percent) from 1,870,334 acres to 1,619,689 acres. The area classified as oak-pine type increased 72,726 acres (13 percent) from 540,211 acres to 612,937 acres. Upland hardwood acreage increased 62,478 acres (4.8 percent) from 1,299,513 acres to 1,361,991 acres. Bottomland hardwood acres increased 10,478 acres (3.4 percent) from 305,922 acres to 316,400 acres.



Base modified from U.S. Geological Survey digital files

Figure 2-20. Silvicultural Land in the Chattahoochee River Basin (modified from Couch et al, 1996)

Agriculture

Despite the rapid growth of urban areas, agriculture continues to play an important role in the local economy, particularly in the southern and northern ends of the Chattahoochee basin. Agricultural operations in the basin include poultry, milk, and beef production, along with crop, orchard, and vegetable production. Row crops dominate agricultural land use in the Coastal Plain Province. The dominant agricultural land uses in the Piedmont Province are pasture and confined feeding for poultry and livestock production, and hay production.

Total farmland in the Chattahoochee River Basin (Figure 2-21) has decreased every agricultural census year from 1974 to 1987 (U.S. Bureau of the Census, 1981a,b,c; 1989a,b,c), totaling 461,456 acres in 1987. However, poultry production has been increasing during that same period. In 1991, approximately 170 million broiler chickens, 116 thousand cattle, and 51 thousand swine were produced in the basin (see Table 2-6). Most poultry production is concentrated in the upper part of the Chattahoochee River Basin above Lake Sidney Lanier in Hall, White, and Habersham Counties, Georgia.

Crops with the largest harvested acreage include peanuts, corn, soybeans, and cotton. Other important crops include wheat, hay, vegetables, and tobacco. In 1987, another 3000 acres were planted in orchards. The ranking of harvested acres among these crops varies from year to year in response to market conditions, government subsidy programs, and the weather.

2.3 Local Governments and Planning Authorities

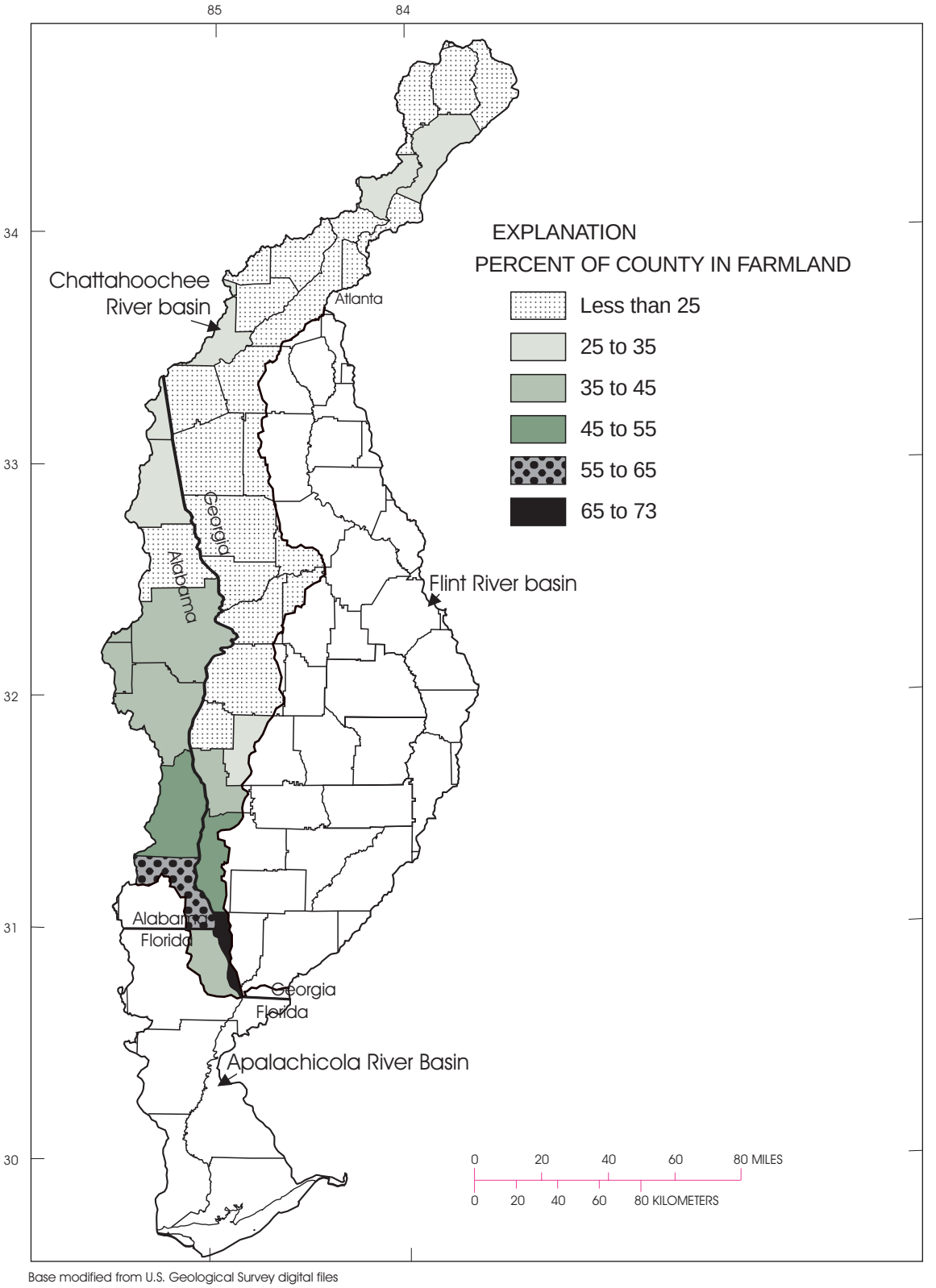
Many aspects of basin management and water quality depend on decisions regarding zoning, land use, and land management practices. These are particularly important for the control of nonpoint pollution — pollution which arises in stormwater runoff from agriculture, urban or residential development, and other land uses. The authority and responsibility for planning and control of these factors lies with local governments, making local governments and jurisdictions important partners in basin management.

The **Department of Community Affairs** (DCA) is the state's principal department with responsibilities for implementing the coordinated planning process established by the Georgia Planning Act. Responsibilities include promulgation of minimum standards for preparation and implementation of plans by local governments, review of local and regional plans, certification of qualified local governments, development of a state plan, and provision of technical assistance to local governments. Activities under the Planning Act are coordinated with the EPD, Regional Development Centers and local governments.

2.3.1 Counties and Municipalities

Local governments in Georgia consist of counties and incorporated municipalities. As entities with Constitutional responsibility for land management, local governments have a significant role in the management and protection of water quality. The role of local governments includes enacting and enforcing zoning, stormwater and development ordinances; undertaking water supply and wastewater treatment planning, participating in programs to protect wellheads and significant groundwater recharge areas. Many local governments are also responsible for operation of water supply and wastewater treatment facilities.

The Chattahoochee Basin includes part or all of 32 Georgia counties (Table 2-7 and Figure 2-2); however, only six counties are entirely within the basin, and five counties have an insignificant



Base modified from U.S. Geological Survey digital files

Figure 2-21. Agricultural Land in the Chattahoochee River Basin (modified from Couch et al., 1996)

Table 2-6. Agricultural Operations in the Chattahoochee River Basin, 1987-1991 (data supplied by NRCS)

Element	HUC 03130001	HUC 03130002	HUC 03130003	HUC 03130004	Total for Basin
Dairy Cows	3,125	6,328	0	451	9,904
Beef Cows	38,288	43,054	10,200	14,342	105,884
Hogs	20,840	6,007	16,521	7,151	50,519
Layer Hens (millions)	1.24	0	0.002	0	1.24
Broilers (millions)	165.69	0.53	1.21	3.00	170.43
Row Crops (acres)	17,562	18,167	36,620	52,077	124,426
Orchard (acres)	382	847	941	820	2,990
Hay (acres)	29,729	51,017	6,859	7,495	95,100
Total Agriculture (acres)	108,370	166,071	80,281	106,734	461,456

fraction of their land area within the basin. There are thus a total of 27 counties with significant jurisdictional authority in the basin. Municipalities or cities are communities officially incorporated by the General Assembly. Georgia has over 530 municipalities. Table 2-8 lists the

Table 2-7. Georgia Counties in the Chattahoochee River Basin

Counties Entirely within the Chattahoochee Basin	Counties Partially within the Chattahoochee Basin	Counties with Insignificant Area within the Basin
White	Habersham	Union
Douglas	Lumpkin	Towns
Troup	Hall	Dawson
Harris	Forsyth	Cherokee
Muscogee	Gwinnett	Clayton
Quitman	DeKalb	
	Cobb	
	Fulton	
	Paulding	
	Carroll	
	Heard	
	Coweta	
	Meriwether	
	Talbot	
	Chattahoochee	
	Marion	
	Stewart	
	Randolph	
	Clay	
	Early	
	Seminole	

Table 2-8. Georgia Municipalities in the Chattahoochee River Basin

Acworth	College Park	Gainesville	Norcross
Alpharetta	Columbus	Geneva	Oakwood Palmetto
Alto	Cornelia	Georgetown	Palmetto
Atlanta	Cumming	Grantville	Pine Mountain
Austell	Cusseta	Hamilton	Powder Springs
Baldwin	Dahlonega	Helen	Richland
Berkeley Lake	Decatur	Hiram	Roswell
Bibb City	Demorest	Hogansville	Shiloh
Blakely	Doraville	Jakin	Smyrna
Bluffton	Douglasville	LaGrange	Sugar Hill
Buford	Duluth	Lithia Springs	Suwanee
Centralhatchee	East Point	Lumpkin	Union City
Chamblee	Ephesus	Marietta	Villa Rica
Clarkesville	Fairburn	Moreland	Waverly Hall
Clarkston	Flowery Branch	Mount Airy	West Point
Clermont	Fort Gaines	Mountain Park	Whitesburg
Cleveland	Franklin	Newnan	

municipalities in the basin. RDCs including counties within the Chattahoochee Basin are summarized in Table 2-9.

2.3.2 Regional Development Centers

Regional Development Centers are agencies of local governments, with memberships consisting of all the cities and counties within each RDC's territorial area. There are currently 17 RDCs in Georgia. RDCs facilitate coordinated and comprehensive planning at local and regional levels, assist their member governments with conformity with minimum standards and procedures, and can have a key role in promoting and supporting management of urban runoff, including watershed management initiatives. RDCs also serve as liaisons with state and federal agencies for local governments in each region. Funding sources include members' dues and funds available through DCA.

Table 2-9. Regional Development Centers in the Chattahoochee River Basin

Regional Development Center	Member Counties with Land Area in the Chattahoochee Basin
Georgia Mountains RDC	Dawson, Forsyth, Habersham, Hall, Lumpkin, Towns, Union, White
Atlanta Regional Commission	Cherokee, Clayton, Cobb, DeKalb, Douglas, Fulton, Gwinnett
Coosa Valley RDC	Paulding
Chattahoochee Flint RDC	Carroll, Coweta, Heard, Meriwether, Troup
Lower Chattahoochee RDC	Chattahoochee, Clay, Harris, Muscogee, Quitman, Randolph, Stewart, Talbot
Middle Flint RDC	Marion
Southwest Georgia RDC	Early, Seminole

Of these seven RDCs, the Atlanta Regional Commission has a special role in managing water quality in the Chattahoochee, since this region is the source of the majority of wastewater and urban stormwater input to the basin. The Atlanta Regional Commission is the regional development center serving the 10-county Atlanta region. The region includes the City of Atlanta and 63 other cities. ARC's enabling legislation directs the agency to research, study and prepare plans for the control of water pollution and the Commission provides a forum where leaders come together to discuss and act on issues of region-wide consequence. ARC and Georgia Mountains RDC have been granted specific authority for management of development in the Chattahoochee River corridor under the Metropolitan Rivers Protection Act.

2.4 Water Use Classifications

2.4.1 Georgia's Water Use Classification System

The Board of Natural Resources was authorized through the Rules and Regulations for Water Quality Control promulgated under the Georgia Water Quality Control Act of 1964, as amended, to establish water use classifications and water quality standards for the surface waters of the State.

The water use classifications and standards were first established by the Georgia Water Quality Control Board in 1966. Georgia was the second state in the nation to have its water use classifications and standards for intrastate waters approved by the federal government in 1967. For each water use classification, water quality standards or criteria were developed which established a framework to be used by the Water Quality Control Board and later the Environmental Protection Division in making water use regulatory decisions.

The water use classification system was applied to interstate waters in 1972 by the EPD. Georgia was again one of the first states to receive federal approval of a statewide system of water use classifications and standards. Table 2-10 provides a summary of water use classifications and criteria for each use.

Table 2-10. Georgia Water Use Classifications and Instream Water Quality Standards for Each Use

Use Classification[1]	Bacteria (fecal coliform)		Dissolved Oxygen (other than trout streams)[2]		pH	Temperature (other than trout streams)[2]	
	30-Day Geometric Mean[3] (no/100 ml)	Maximum (no./100ml)	Daily Average (mg/l)	Minimum (mg/l)	Std. Units	Maximum Rise above Ambient (°F)	Maximum (°F)
Drinking Water requiring treatment	1,000 (Nov-April) 200 (May-October)	4,000 (Nov-April)	5.0	4.0	6.0-8.5	5	90
Recreation	200 (Freshwater) 100 Coastal)	--	5.0	4.0	6.0-8.5	5	90
Fishing Coastal Fishing[4]	1,000 (Nov-April) 200 (May-October)	4,000 (Nov-April)	5.0	4.0	6.0-8.5	5	90
Wild River	No alteration of natural water quality						
Scenic River	No alteration of natural water quality						

[1] Improvements in water quality since the water use classifications and standards were originally adopted in 1972 provided the opportunity for Georgia to upgrade all stream classifications and eliminate separate use designations for "Agriculture", "Industrial", "Navigation", and "Urban Stream" in 1993.
[2] Standards for Trout Streams for dissolved oxygen are an average of 6.0 mg/l and a minimum of 5.0 mg/l. No temperature alteration is allowed in Primary Trout Streams and a temperature change of 2°F is allowed in Secondary Trout Streams.
[3] Geometric means should be "based on at least four samples collected from a given sampling site over a 30-day period at intervals not less than 24 hours." The geometric mean of a series of N terms is the Nth root of their product. Example: the geometric mean of 2 and 18 is the square root of 36.
[4] Standards are same as fishing with the exception of dissolved oxygen which is site specific.

Congress made changes in the CWA in 1987 that required each state to adopt numeric limits for toxic substances for the protection of aquatic life and human health. To comply with these requirements, the Board of Natural Resources adopted 31 numeric standards for protection of aquatic life and 90 numeric standards for the protection of human health. Appendix B provides a summary of toxic substance standards that apply to all waters in Georgia. Water quality standards are discussed in more detail in Section 5.2.1.

In the latter 1960s through the mid-1970s there were many water quality problems in Georgia. Many stream segments were classified for the uses of navigation, industrial, or urban stream. Major improvements in wastewater treatment over the years have allowed the stream segments to be raised to the uses of fishing or coastal fishing which include more stringent water quality standards. The final two segments in Georgia were upgraded as a part of the triennial review of standards completed in 1989. All of Georgia's waters are currently classified as either fishing, recreation, drinking water, wild river, scenic river, or coastal fishing.

2.4.2 Water Use Classifications for the Chattahoochee River Basin

Waters in the Chattahoochee River Basin are classified as either fishing, recreation, or drinking water. The majority of the waters are classified as fishing. Those waters classified as drinking water or recreation are shown in Table 2-11. A number of waters in the northern portion of the Chattahoochee River basin are also designated as primary or secondary trout streams, as shown in Table 2-12.

Table 2-11. Chattahoochee River Basin Waters Classified as Drinking Water or Recreation[1]

Waterbody	Description of Segment	Use Classification
Chattahoochee River	Headwaters to Buford Dam	Recreation
Chattahoochee River	Buford Dam to Atlanta (Peachtree Creek)	Drinking Water and Recreation
Chattahoochee River	Atlanta (Peachtree Creek) to Cedar Creek	Fishing[2]
Chattahoochee River	New River to West Point Dam	Recreation
Chattahoochee River	West Point Dam to West Point Mfg. Company Water Intake	Drinking Water
Chattahoochee River	Osanippa Creek to Columbus (North Highland Dam)	Recreation and Drinking Water
Chattahoochee River	Cowikee Creek to Great Southern Division of Great Northern Paper Company	Recreation
Chattahoochee River	Georgia Hwy. 91 (Neal's Landing) to Jim Woodruff Dam	Recreation
Big Creek	Georgia Hwy. 400 to City of Roswell Water Intake	Drinking Water
Dog River	Headwaters to Dog River Reservoir	Drinking Water
Bear Creek	Headwaters to Douglasville-Douglas County Water and Sewer Authority Water Intake	Drinking Water

Notes: 1. Waters within the Chattahoochee River Basin not listed above are classified as Fishing.
2. Specific criteria apply at all times when the river flow measured at a point immediately upstream from Peachtree Creek equals or exceeds 750 cfs (Atlanta gage flow minus Atlanta water supply withdrawals).

Table 2-12. Chattahoochee River Basin Waters Designated as Trout Stream

County	Classification	Description of Segment
Cobb	Secondary	Chattahoochee River upstream from I-285 West Bridge
Forsyth	Secondary	Chattahoochee River
Fulton	Secondary	Chattahoochee River upstream from I-285 West Bridge
Gwinnett	Secondary	Chattahoochee River
Habersham	Primary	Chattahoochee River watershed upstream from Georgia Hwy. 255 Bridge
	Primary	Soque River watershed upstream from King's Bridge (bridge on Georgia Hwy. 197 just below the mouth of Shoal Creek)
	Secondary	Chattahoochee River watershed upstream from Georgia Hwy. 115 to the Georgia Hwy. 255 bridge.
	Secondary	Soque River watershed upstream from the mouth of Deep Creek to King's Bridge.
Lumpkin	Primary	Cane Creek watershed upstream from Cane Creek Falls.
	Primary	Cavender Creek watershed.
	Primary	Chestatee River watershed upstream from Lumpkin County Road 52-S976.
	Primary	Clay Creek Watershed
	Secondary	Cane Creek watershed upstream from Georgia Hwy. 52 Bridge to Cane Creek Falls.
	Secondary	Chestatee River watershed upstream from the mouth of Tesnatee Creek to Lumpkin County Road 52-S976.
	Secondary	Yahoola Creek watershed upstream from Georgia Hwy. 52.
Paulding	Secondary	Powder Creek watershed.
Towns	Primary	Chattahoochee River watershed.
Union	Primary	Chattahoochee River watershed.
White	Primary	Cathey Creek watershed upstream from the Arrowhead Campground Lake.
	Primary	Chattahoochee River watershed upstream from Georgia Hwy. 255 Bridge.
	Primary	Town Creek watershed upstream from the mouth of Jenny Creek.
	Secondary	Chattahoochee River watershed upstream from Georgia Hwy. 115 to the Georgia Hwy. 255 Bridge.
	Secondary	Little Tesnatee Creek watershed upstream from the mouth of Turner Creek.
	Secondary	Turner Creek watershed except as listed under primary above (Turner Creek nearest to Cleveland city limits).

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