In This Section

- River Basin Description
- Population and Land Use
- Local Governments and Planning Authorities
- Water Use Classifications

Section 2

River Basin Characteristics

This section describes the following major characteristics of the Satilla River basin:

- *River basin description (Section 2.1): the physical features and natural processes of the basin.*
- *Population and land use (Section 2.2): the sociological features of the basin, including the types of human activities that might affect water quality and water resource use.*
- *Local governments and planning authorities (Section 2.3): identification and roles of the local authorities within the basin.*
- *Water use classifications (Section 2.4): description of water use classifications and baseline goals for management of waters within the basin as defined in the state regulatory framework.*

2.1 River Basin Description

This section describes the important geographical, geological, hydrological, and biological characteristics of the Satilla River basin.

The physical characteristics of the Satilla River basin include its location, physiography, soils, climate, surface water and ground water resources, and natural water quality. These physical characteristics influence the basin's biological habitats and the ways people use the basin's land and water resources.

2.1.1 River Basin Boundaries

The Satilla River basin is located in southeast Georgia, and is flanked by the Altamaha River basin to the north and the Suwannee and St. Marys River basins to the south (Figure 2-1). The main streams of the Satilla basin are the Satilla River itself and its largest tributaries, the Little Satilla River and the Alabaha River. The Satilla River originates in Ben Hill County east of Fitzgerald, while the little Satilla River originates to the east in Jeff Davis County. The Satilla River meanders southeast to the Atlantic Ocean.

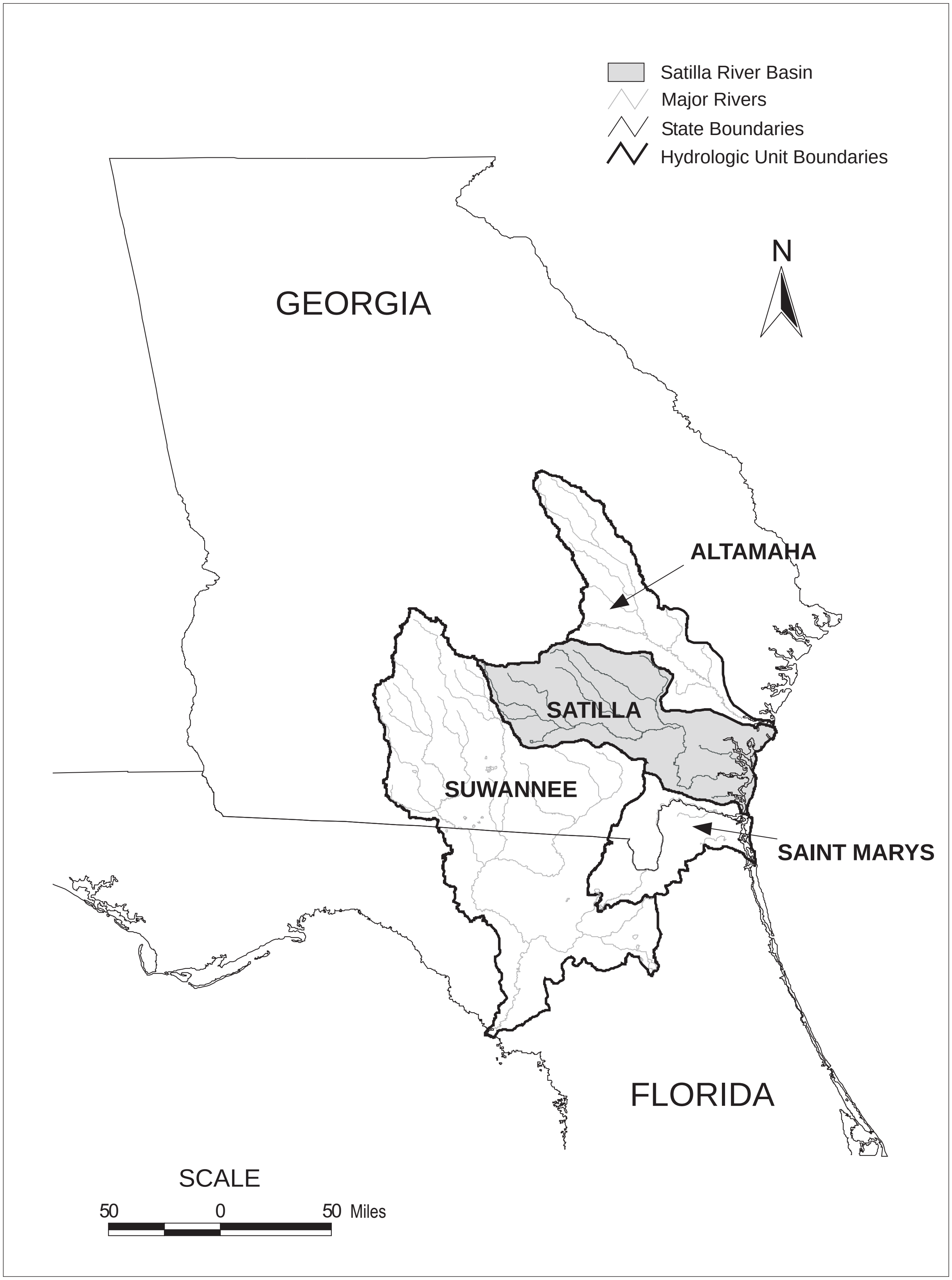

Figure 2-1. Location of the Satilla River Basin

The Satilla River basin or watershed, comprising all land areas draining into the river, occupies a total area of 3,940 square miles.

The U.S. Geological Survey (USGS) has divided the Satilla River basin into three subbasins, 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 Satilla River basin. Figure 2-2 shows the location of these subbasins and the associated counties within each subbasin.

Table 2-1. Hydrologic Unit Codes (HUCs) of the Satilla River Basin in Georgia

03070201	Satilla River
03070202	Little Satilla River
03070203	Turtle River

2.1.2 Climate

The Satilla River basin is characterized by mild winters and hot summers. Mean annual precipitation ranges from 46 to 54 inches per year. Rainfall is fairly evenly distributed throughout the year, but a distinct dry season occurs from mid-summer to late fall. Rainfall is usually greatest in March and least in October. The mean annual temperature is about 68 degrees Fahrenheit.

2.1.3 Physiography, Geology, Soils, and Hydrogeology

Physiography

The Ochlockonee, Satilla, St. Marys and Suwannee river basins lie entirely within the Coastal Plain physiographic province, which extends throughout the southeastern margin of the United States. The physiography of these river basins reflects a geologic history of repeated periods of land submergence which is typical of the Coastal Plain Province. These basins include all or portions of the Tifton Upland, the Okefenokee Basin, the Bacon Terraces and the Barrier Island Sequence districts of the Coastal Plain. The Ochlockonee River basin lies within the western third of the Tifton Upland District. The Satilla River basin lies entirely within the Bacon Terraces and Barrier Island Sequence districts. The St. Marys River basin lies entirely within the Okefenokee Basin and Barrier Island Sequence districts. The Suwannee River basin lies within the Tifton Upland and Okefenokee Basin districts.

The Tifton Upland District is characterized by a well developed, extend dendritic stream pattern where narrow, rounded interfluves occur 50 to 200 feet above relatively narrow stream valley floors. The northwestern boundary of the district is the base of the Pelham Escarpment, which rises as much as 200 feet above the Dougherty Plain to the west. The Okefenokee Basin District is typified by very low topographic relief, numerous extensive swamps, and local sand ridges. The Bacon Terraces District displays a very extended, southeast trending dendritic drainage pattern containing ling, narrow interfluves with gently rounded to flat summits that are 50 to 100 feet above narrow, marshy floodplains. The district also contains several low, moderately dissected terraces which are generally parallel to the coastline. From west to east, these are designated the Hazlehurst, Pearson, Claxton, Argyle, Waycross and Penholoway terraces. The Barrier Island Sequence District is characterized by a series of prominent marine terraces which form a step-like progression of decreasing altitudes toward the sea. The former, higher sea levels created barrier island-salt marsh environments parallel to and similar to those found on the present coast. The terraces are composed of sand ridges marking the former barrier

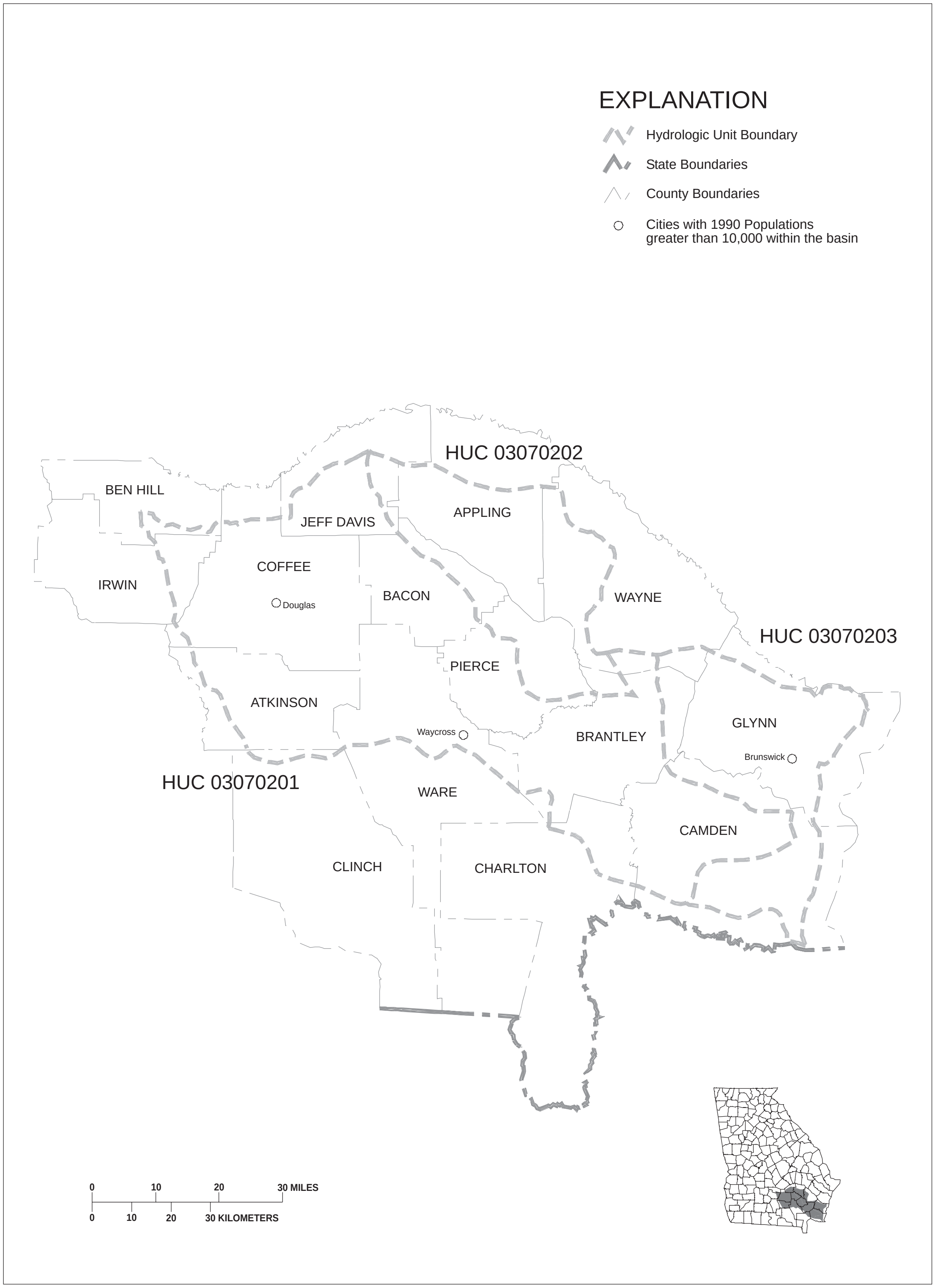

Figure 2-2. Hydrologic Units and Counties of the Satilla River Basin

islands, and are flanked by fresh water marshes at the former salt marsh locations. They have undergone slight to moderate dissection which is generally more advanced at the western edge of the district. Trail Ridge is the most prominent of these terraces with a maximum elevation of approximately 160 feet. It marks the western boundary of the Barrier Island Sequence District where it joins the Bacon Terraces and Okefenokee Basin districts. Other, less prominent terraces in the district, from west to east, are the Wicomico, Penholoway, Talbot, Pamlico, Princess Anne, and Silver Bluff-Holocene terraces.

The streams in these basins are typical of the Coastal Plain. They generally lack the riffles and shoals that are common to streams in the Piedmont Province to the north, and exhibit more extensive floodplain development and greater sinuosity.

Carolina Bays are elliptical or “spoon-shaped” wetland depressions aligned roughly north-northwest and are logically well developed throughout the area east of the Suwannee River basin. Lime sinks and lake-filled sinks are well developed in areas underlain by limestone in the shallow subsurface, notably in the Lake Park area south and west of Valdosta, Lowndes County.

Geology

Weathered, poorly consolidated sediments underlie all of these river basins, and are dominantly composed of sands, clays, and gravels which range from Miocene to Holocene in age. These sediments include the Miccosukee Formation (Pliocene age), Altamaha Formation and various formations of the Hawthorne Group (all Miocene age), as well as barrier island and marsh/lagoon facies of the numerous shoreline complexes (Pleistocene to Holocene age). Local occurrences of calcareous sediments include the Suwannee Limestone (Oligocene age) and Duplin Marl (Pliocene age). Other rock types in the area include dolomite, chert, peat, phosphate and fuller’s earth, as well as Quaternary alluvium in the flood plains along the major stream valleys. Most of these sediments were deposited in either terrestrial or shallow marine environments.

Sediments in the area are locally mined for construction sand and fill material. In addition, the Meigs Member of the Coosawhatchie Formation (Hawthorne Group) is the source of the economically important fuller’s earth clay deposits being mined in the Ochlockonee River Basin. In the past, crushed stone was produced from some of the limestone deposits, and a few of the larger Carolina Bays were mined for peat

Soils

The Satilla River Basin is within the Southern Coastal Plain and the Atlantic Coast Flatwoods Major Land Resource Areas (MLRA) (Figure 2-3). The soils within the river basin vary considerably, particularly from west to east across the area. The soils in this area can be combined into four major groups for discussion.

The first group of soils covers the western-most portion of the river basin and is in the Southern Coastal Plain. This group is dominated by nearly level and very gently sloping Tifton, Leefield, and Fuquay soils on uplands and nearly level Pelham soils along drainageways and floodplains. Tifton are well drained upland soils that have a sandy surface layer and a yellowish brown or strong brown, loamy subsoil. The surface layer is normally loamy sand and is about 10 inches thick. The subsoil is mostly sandy clay loam. Fuquay and Leefield soils have a thicker sandy surface than Tifton, and Leefield soils have a water table is higher. Characteristic of these soils is a layer of plinthite in the subsoil at a depth of about 30 inches. Plinthite is an iron-rich mixture of clay with quartz and other constituents that can perch water during wet seasons. Pelham soils are nearly level and poorly drained. They have a sandy surface layer 20 to 40 inches thick over a loamy subsoil. Water tables are commonly at or near the surface during wet seasons, and the soils are subject to flooding.

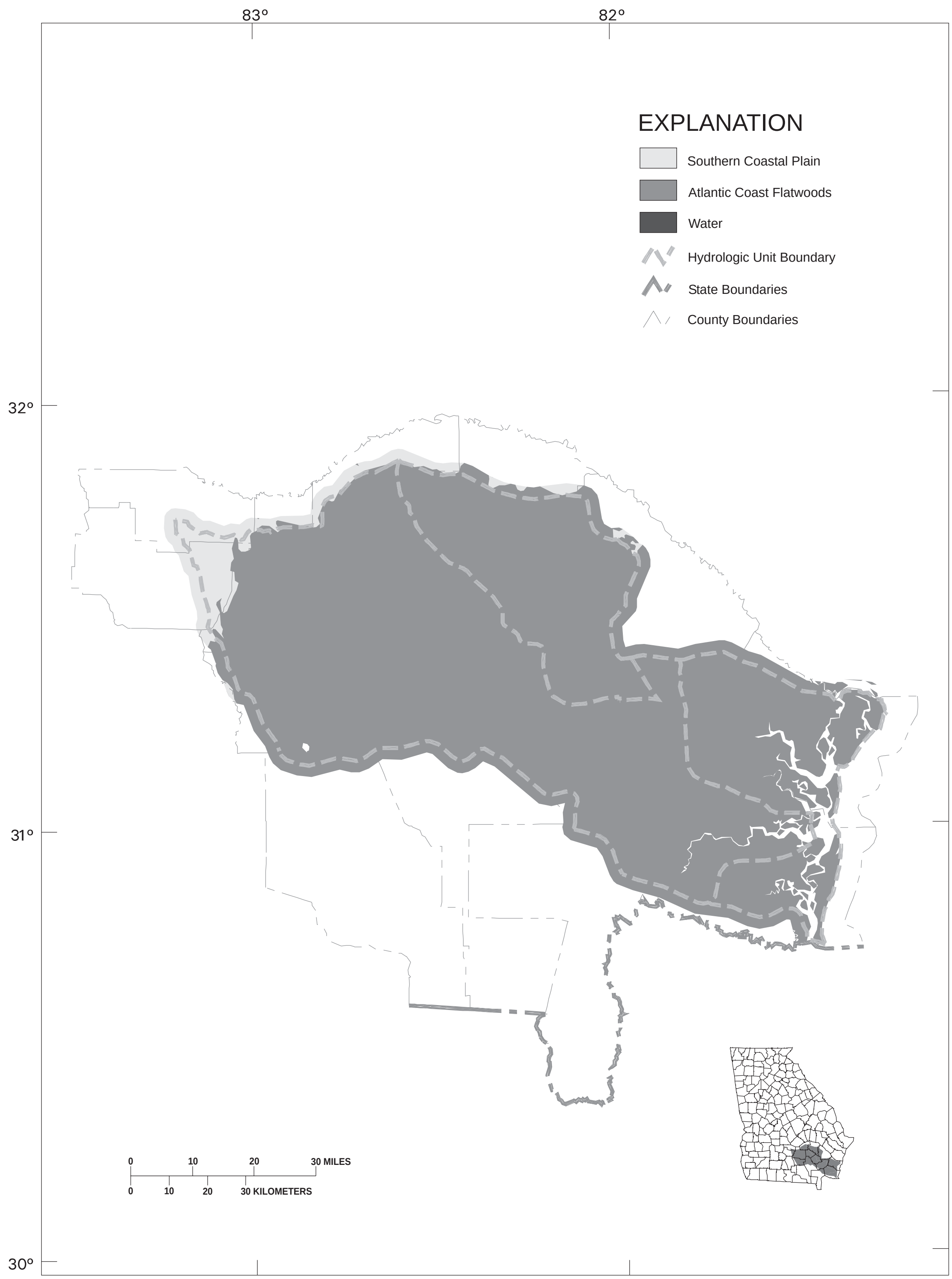

Figure 2-3. Major Land Resource Areas in the Satilla River Basin

The second major group of soils is in the Atlantic Coast Flatwoods MLRA. This area is dominated by nearly level, poorly drained soils on broad flats, and by very poorly drained soils in depressions and along drainageways. This area is characterized by an abundance of Spodosols, which are sandy soils that have a layer where a complex of organic matter and aluminum has accumulated. Most of the soils in this area are sandy, although a loamy subsoil is sometimes found at depth of around 3 feet. Water tables are commonly at or near the surface during wet seasons, and soils in depressions are often ponded. Pelham soils, which are not Spodosols, are also found throughout this area. Tifton, Leefield, and Fuquay soils as described in the previous group occur near drainageways in the western part of this area where the landscape is more dissected.

The third group of soils are nearly level, poorly drained and very poorly drained, clayey soils on low marine terraces and in depressions. These soils are different from most soils in the Atlantic Coast Flatwoods because of their high clay content. They are often ponded or flooded. Brookman, Bladen, and Pooler are common soils in this area.

The fourth group of soils occur in tidal marshes. These soils are continuously saturated with water. They are clayey or silty, and are high in sulpher and salt content. Bohicket and Capers are common soils in this area. Islands and other areas of higher elevation in this area are dominated by sandy Spodosols as outlined in group two above.

Hydrogeology

Coastal Plain sediments underlie the entire region and groundwater is produced from several aquifers. Sources of ground water include, in order of importance, the unconfined Surficial aquifer, the Upper and Lower Brunswick aquifers and the Upper and Lower Floridan aquifers. The Surficial aquifer is up to 230 feet thick and consists of interlayered, Miocene and younger, sand, clay and limestone. It is underlain by the Upper and Lower Brunswick aquifers both of which are composed of 150 and 70 feet, respectively, of poorly sorted sand. The Upper and Lower Floridan aquifers consist of Eocene to Oligocene carbonate rocks (largely limestone and dolostone) 700 to 2,500 feet in thickness. In each of the aquifers, except for the Surficial aquifer, the groundwater is under confined (aquifer) conditions. Most of these aquifers consistently have excellent water quality; however, the Lower Floridan aquifer is saline and generally does not meet drinking water standards.

2.1.4 Surface Water Resources

The Satilla River basins's major surface water body is the Satilla River. The Satilla River rises in Southeast Georgia, 0.3 miles east of Fitzgerald, at an elevation of about 350 feet above mean sea level. It flows in a southeasterly direction for about 250 miles, discharging to the Atlantic Ocean about ten miles south of Brunswick, between Jekyll Island and Cumberland Island. The basin drains a total area of 3,940 square miles which includes all of Bacon, Brantley and Pierce counties and portions of twelve other counties.

Some of the major streams in the basin includes the Little Satilla River, Alabaha River, Big Satilla River, Seventeen Mile Creek and Hurricane Creek. Stream networks within each HUC are shown in Figures 2-4 through 2-6.

2.1.5 Ground Water Resources

Groundwater resources in the Satilla River basin are supplied by the Floridan aquifer system, one of the most productive ground water reservoirs in the United States. The system supplies about 50 percent of the ground water used in the state. It is used as a major water source throughout most of South Georgia. A more detailed description of the Floridan aquifer system is provided below.

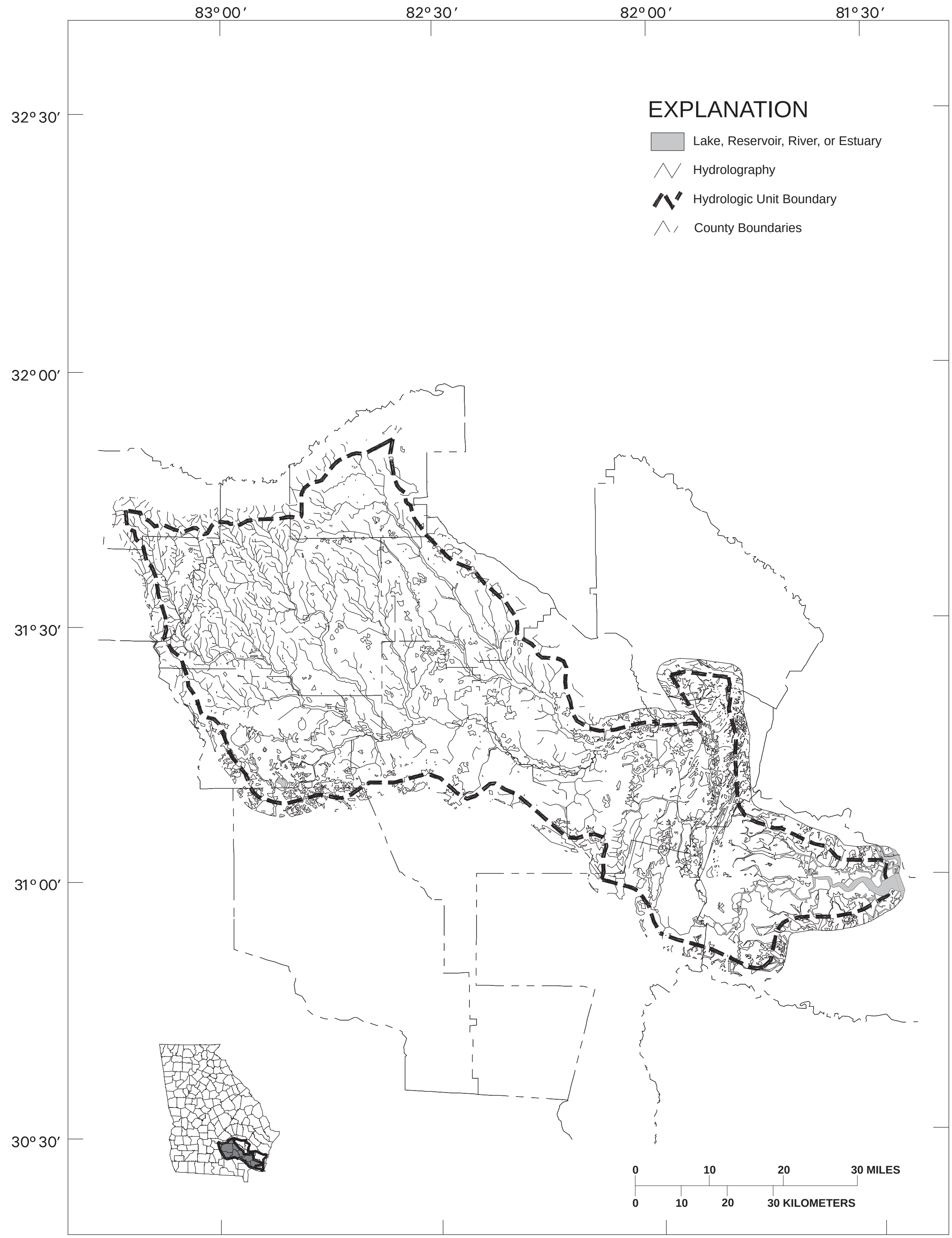

Figure 2-4. Hydrography, Satilla River Basin, HUC 03070201

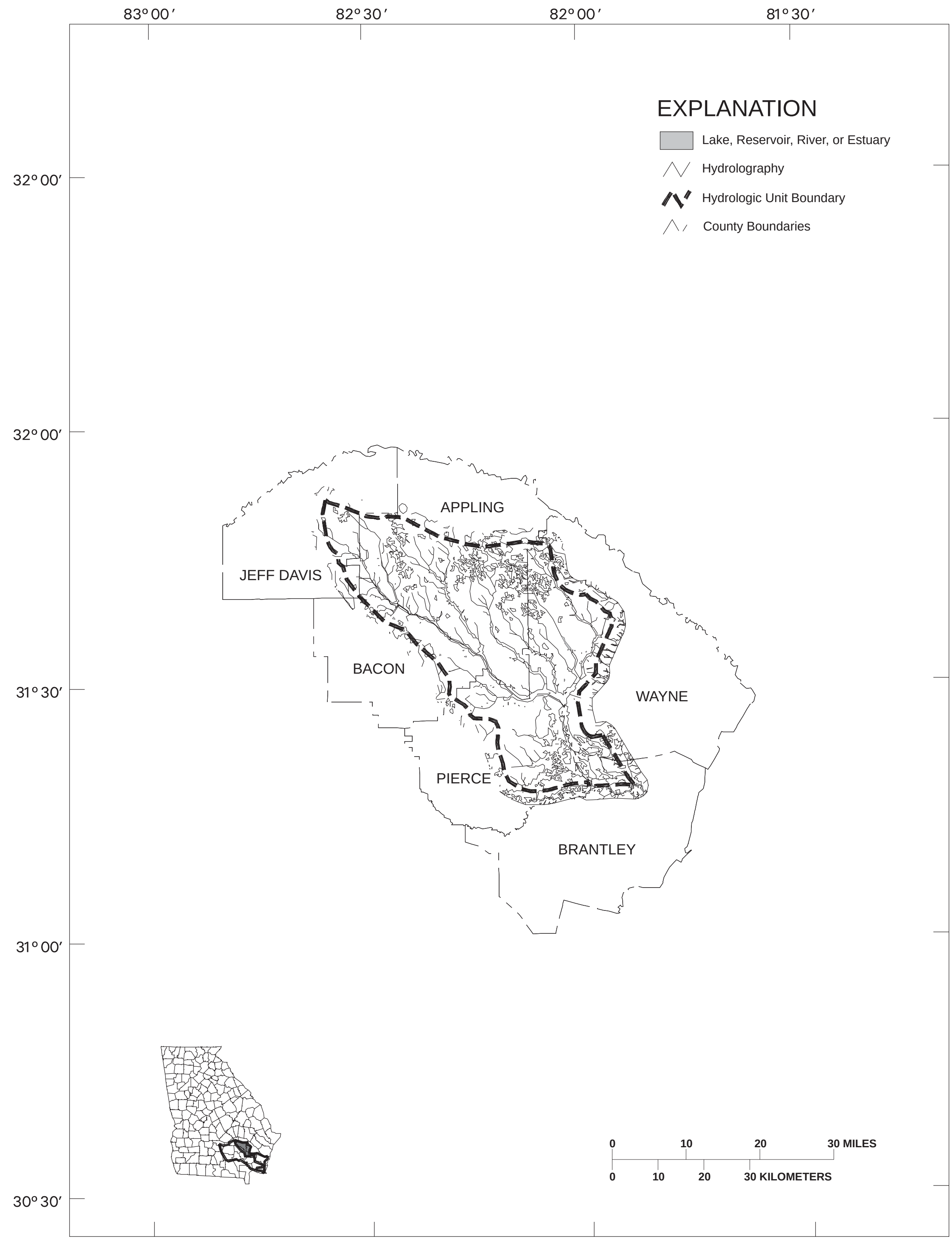

Figure 2-5. Hydrography, Satilla River Basin, HUC 03070202

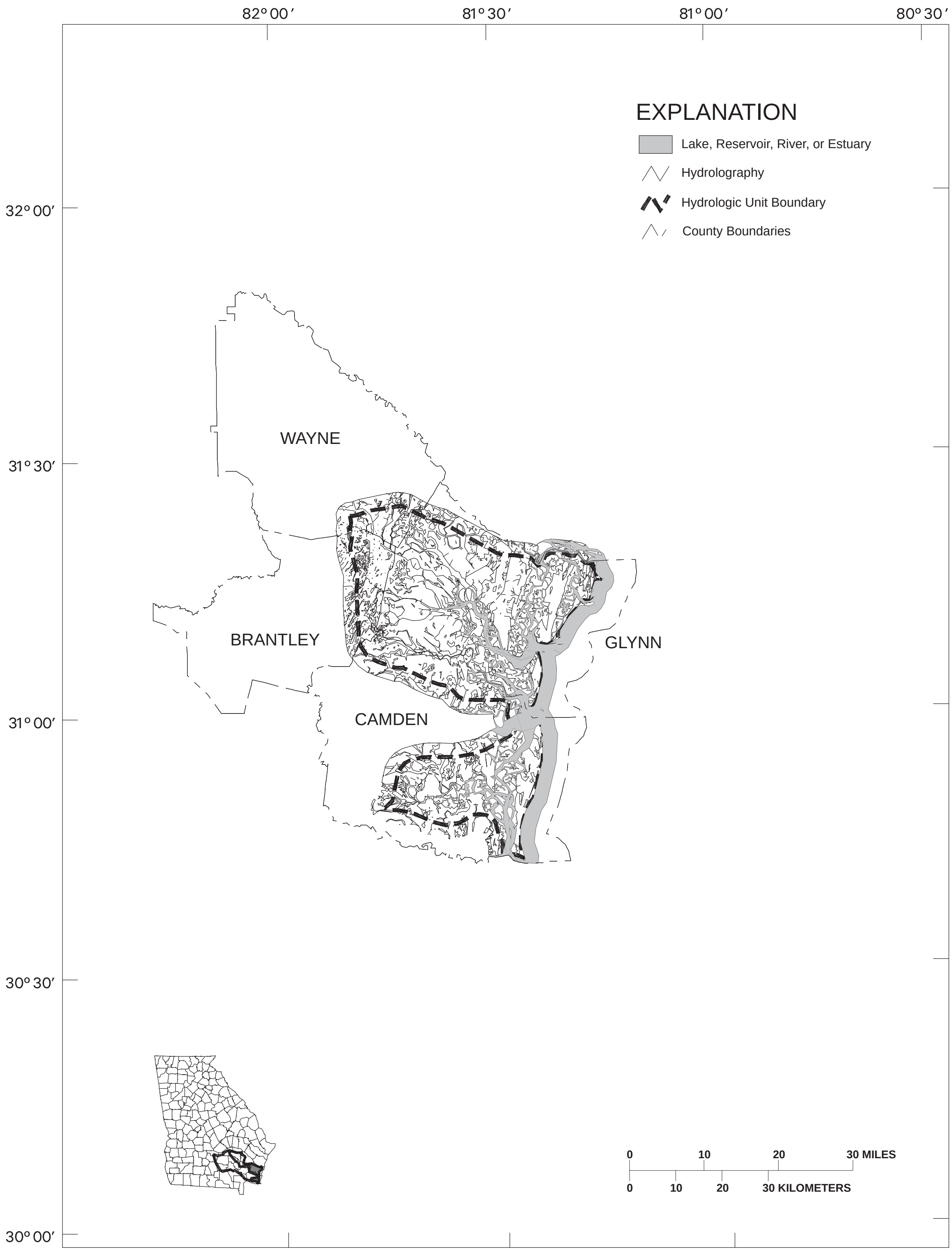

Figure 2-6. Hydrography, Satilla River Basin, HUC 03070203

Floridan Aquifer

The Floridan aquifer underlies the rest of the southern portion of the basin. The aquifer is overlain by approximately 25-125 feet of sandy clay residuum derived from chemical weathering of the underlying rock. The total thickness of the Floridan aquifer in the basin ranges from a few feet in the north to more than 400 feet in the extreme southern portion of the basin. Clastic grains of sand and shale are major components of the Floridan aquifer near its northernmost extent, where it is dominantly limestone in the Ochlockonee basin. Throughout most of the basin, the aquifer can be divided into three thick limestone formations: the Tampa Limestone, the Suwannee Limestone and the Ocala Limestone. The Tampa Limestone consists of whitish gray limestone that has a shale bed at its base. This shale acts as a confining layer to the underlying Suwannee and Ocala limestones (Miller, 1986). Below the Tampa, the Suwannee limestone is a massive chalky unit that is easily dissolved and weathered. For this reason, the many solution cavities in the Tampa provide abundant water to the underlying Ocala Limestone. The Ocala Limestone is the principal unit of the Floridan aquifer, and contains an upper friable, porous unit and a lower fine-grained unit (Miller, 1986). This lower unit contains most of the groundwater in the Floridan aquifer (Torak and others, 1993). The Ocala is underlain by the clay-rich Lisbon Formation, which acts as a slower confining bed to the water-bearing limestones above. Well yields in the Floridan aquifer can range from about 40 GPM in the north to more than 10,000 GPM in the thickest, southern most portion of the Floridan aquifer. The Floridan serves as the main aquifer from Decatur and Burke counties to the coast.

Well yields in the portions of the Crataceous sand aquifer underlying the Satilla River basin have been found to exceed 1,000 GPM. Recharge occurs through the sandy soil in the outcrop area. In the northern portion of basin this unit is seen as one singe aquifer and can be called either the Cretaceous Aquifer or the Dublin Midville Aquifer.

2.1.6 Biological Resources

The Satilla River basin supports a diverse and rich mix of terrestrial and aquatic habitats and is home to several federally and state-protected species. The basin encompasses parts of five major land resource areas. Some of the biological resources of the basin are summarized below.

Fish Fauna

The Satilla River has the typical fish assemblage of a coastal plain blackwater stream. The fish assemblage of the Satilla River basin is comprised of 52 species representing 16 families, and is not as diverse as many of the piedmont and mountain streams which are dominated by the family Cyprinidae. Fifteen species from the family Centrarchidae are present, making it the dominant family in the Satilla River basin. As in many coastal plain streams, species diversity is limited by acidic water, low alkalinity, extreme variation in flows, and the relatively homogenous habitat present through most of the river.

Fisheries

The Satilla River is a blackwater stream that flows unimpeded from its origin in Ben Hill County approximately 260 miles to the Atlantic Ocean, emptying into St. Andrew Sound between Jekyll and Cumberland islands. The basin drains 3,390 square miles, which is 5.8 percent of the state’s total area. The Satilla River supports major fisheries for redbreast sunfish and catfish. Less dominant fisheries exist for other sunfish species, chain pickerel, warmouth, and largemouth bass. The banded topminnow is a state-listed rare species that occurs in the basin.

The Laura Walker State Park is the only publically-owned lake in the Satilla River basin. This blackwater lake is approximately 110 acres in size and has fisheries for largemouth bass, bluegill, catfish, chain pickerel, and flier.

Flathead catfish have been illegally stocked into the Satilla River. On the nearby Altamaha River, the illegal introduction of these non-native predators caused an 80 percent reduction in the highly regarded redbreast sunfish population, and virtual elimination of bullhead catfish. The Fisheries Section has an aggressive removal program in an attempt to keep flathead catfish numbers low so they will not negatively impact native fishes.

2.2 Population and Land Use

2.2.1 Population

As of 1995, about 101,000 people lived in the Satilla watershed (DRI/McGraw-Hill, 1996). Population distribution in the basin at the time of the 1990 census by census blocks is shown in Figure 2-7. Population centers in the Satilla watershed include the development surrounding Waycross, Brunswick and Douglas.

Between 1975 and 1995, the population in the Satilla River basin increased by 1 percent per year (DRI/McGraw-Hill, 1996). Basin population is projected to increase at a faster than average growth rate through 2050.

The river basin will mirror state trends in terms of its elderly population with the 65 and older age group showing the largest gains in share through 2050, at which time 19 percent of the population will be in this age group. This share will be only slightly smaller than the 20.5 percent share for young children. Large youth and elderly populations will mean a decline in the working age population.

2.2.2 Employment

The Satilla River basin supported 182,100 jobs in 1995. It is moving from a manufacturing- to a service-based economy. In the coming years, a decrease in jobs is expected in manufacturing and durable goods, offset by an increase in jobs in the service and trade sectors.

The Satilla River basin has historically been less dependent on manufacturing industries than is the rest of Georgia. In 1975, only 21 percent of the river basin's jobs were in industrial sectors, as compared with 24 percent statewide. As manufacturing sectors have declined across the state, Georgia as a whole is beginning to look more like Satilla in terms of industrial mix. In fact, by 2050, only 4 percent of jobs, both within the river basin and within the state, are forecast to be in manufacturing sectors. One important sector for Satilla is paper, in which the river basin's 4,800 jobs constitute 14 percent of the state's paper industry. In terms of job losses between 1995 and 2050, however, the most significant sector is durable goods, in which more than one-half of the 28,800 jobs will no longer be present in 2050. This decline accounts for 47 percent of all employment losses in industrial sectors. The nonmanufacturing sectors, in particular the service sector, will offset these job losses. By 2050, services will account for 40 percent of river basin employment, growing at an annual rate of 1.9 percent. The trade sector will also remain important for the area, keeping a nearly constant employment share of 24 percent until the end of the 55-year forecast horizon.

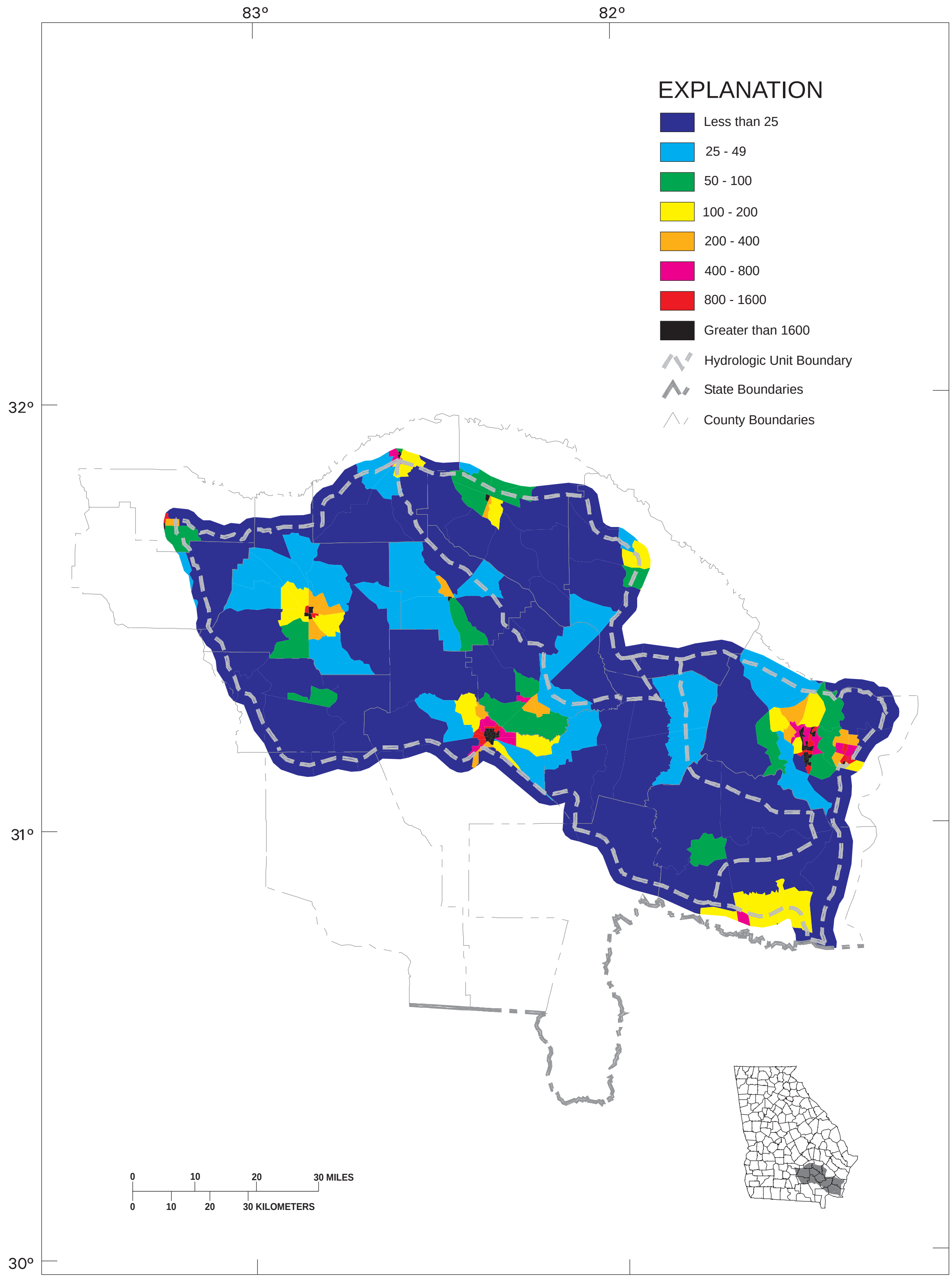

Figure 2-7. Population Density in the Satilla River Basin, 1990 (persons per square mile)

2.2.3 Land Cover and Use

Land use/land cover classification (Figure 2-8 through 2-13) was determined for the Satilla 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 1988-90 land cover interpretation showed 37 percent of the basin in forest cover, 24 percent in wetlands, 2 percent in urban land cover, and 18 percent in agriculture (Figures 2-11 through 2-13). Statistics for 15 landcover classes in the Georgia portion of the Satilla River basin for the 1988-90 coverage are presented in Table 2-2 (GA DNR, 1996).

Table 2-2. Land Cover Statistics for the Satilla Basin

Class Name	%	Acres
Open Water	2.4	61,992.9
Clear Cut/Young Pine	17.0	449,475.7
Pasture	4.1	107,009.6
Cultivated/Exposed Earth	14.3	378,019.0
Low Density Urban	1.4	37,565.8
High Density Urban	0.5	12,637.3
Emergent Wetland	1.8	47,038.8
Scrub/Shrub Wetland	0.6	15,024.9
Forested Wetland	16.3	429,619.8
Coniferous Forest	16.0	421,808.0
Mixed Forest	14.5	383,597.5
Hardwood Forest	6.3	164,872.1
Salt Marsh	3.0	80,118.8
Brackish Marsh	1.6	40,772.4
Tidal Flats/Beaches	0.3	6,821.9
Total	*100.0*	*2,637,771.0*

Forestry

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 1997 grew to approximately $19.5 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 $9.3 billion dollars. Georgians are benefited directly by 177,000 job opportunities created by the manufacture of paper, lumber, furniture and various other wood products as well as benefiting 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.

According to the US Forest Service's Forest Statistics for Georgia, 1997 report (Thompson, 1997), there is approximately 3,365,100 acres of commercial forestland for the entire counties within the basin. Approximately 69 percent of the total land area is

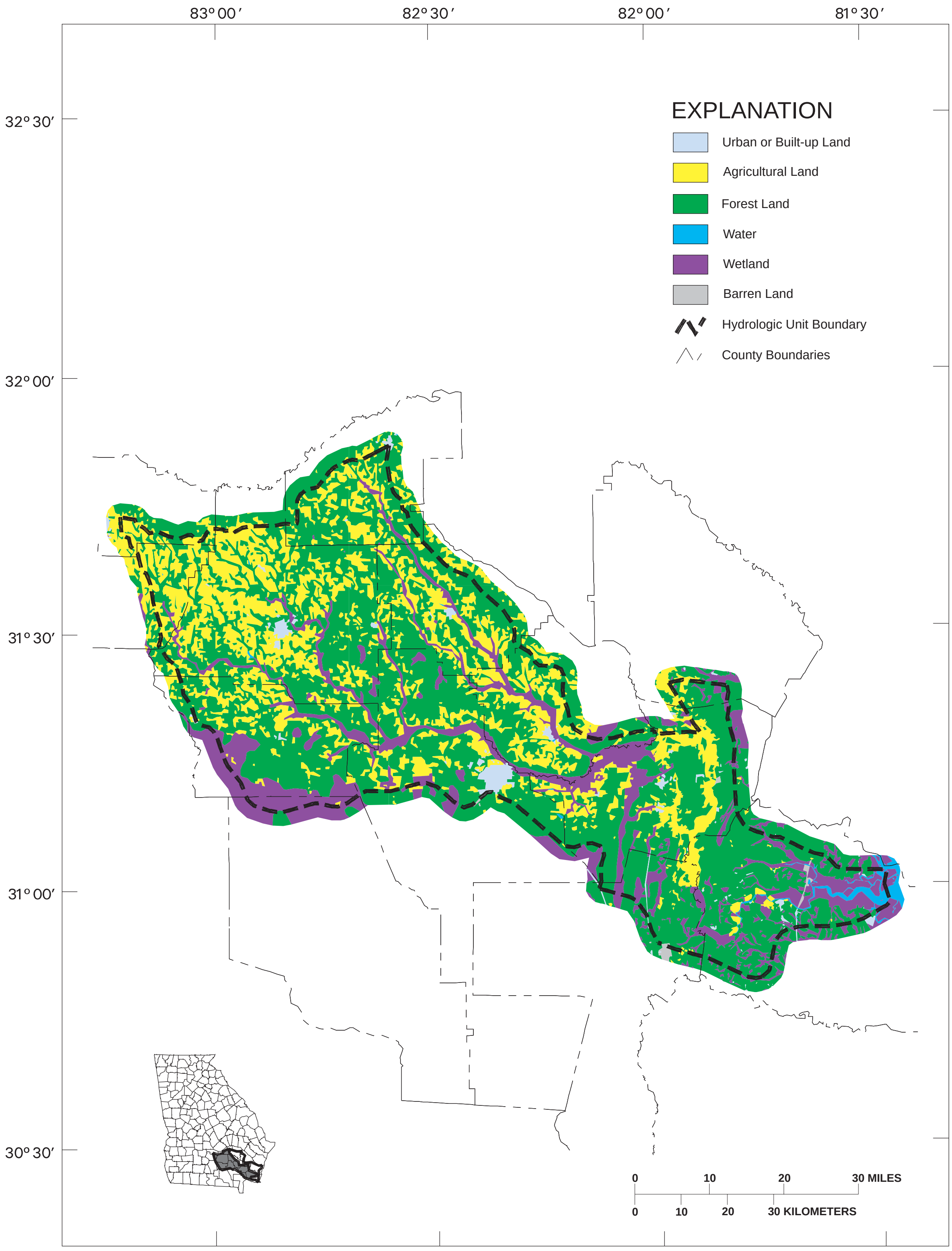

Figure 2-8. Land Use, Satilla River Basin, HUC 03070201, USGS 1972-76 Classification Updated with 1990 Urban Areas

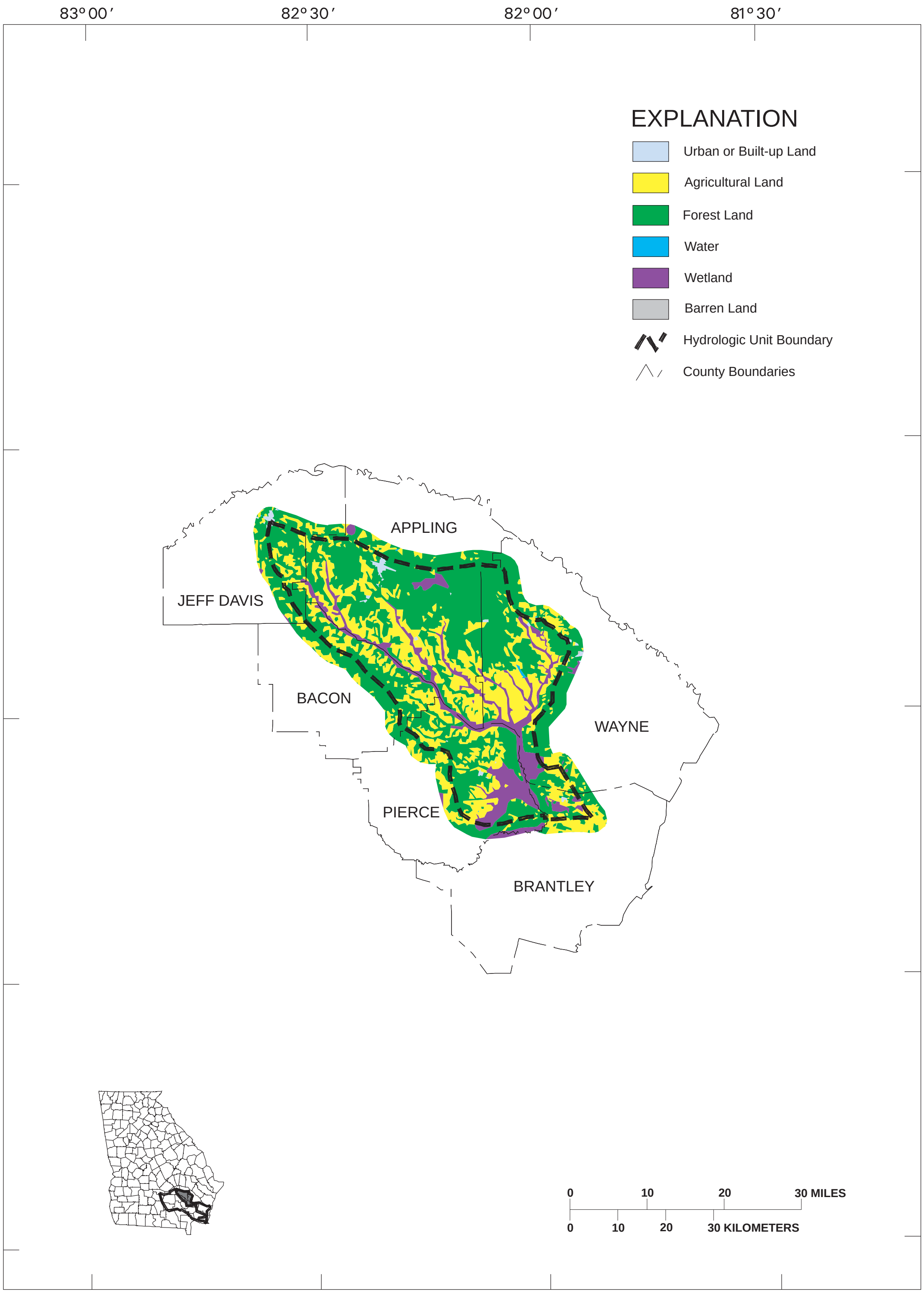

Figure 2-9. Land Use, Satilla River Basin, HUC 03070202, USGS 1972-76 Classification Updated with 1990 Urban Areas

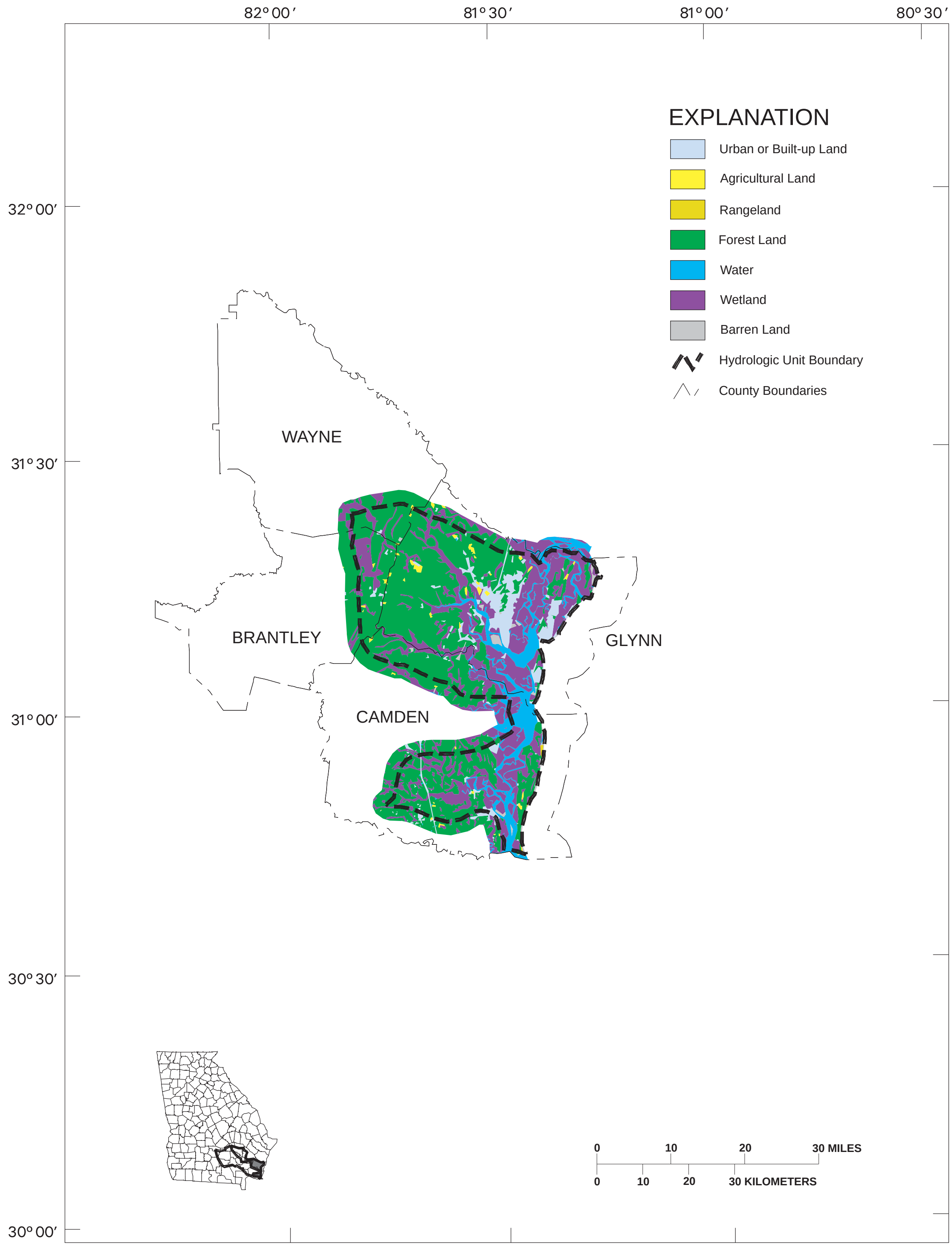

Figure 2-10. Land Use, Satilla River Basin, HUC 03070203, USGS 1972-76 Classification Updated with 1990 Urban Areas

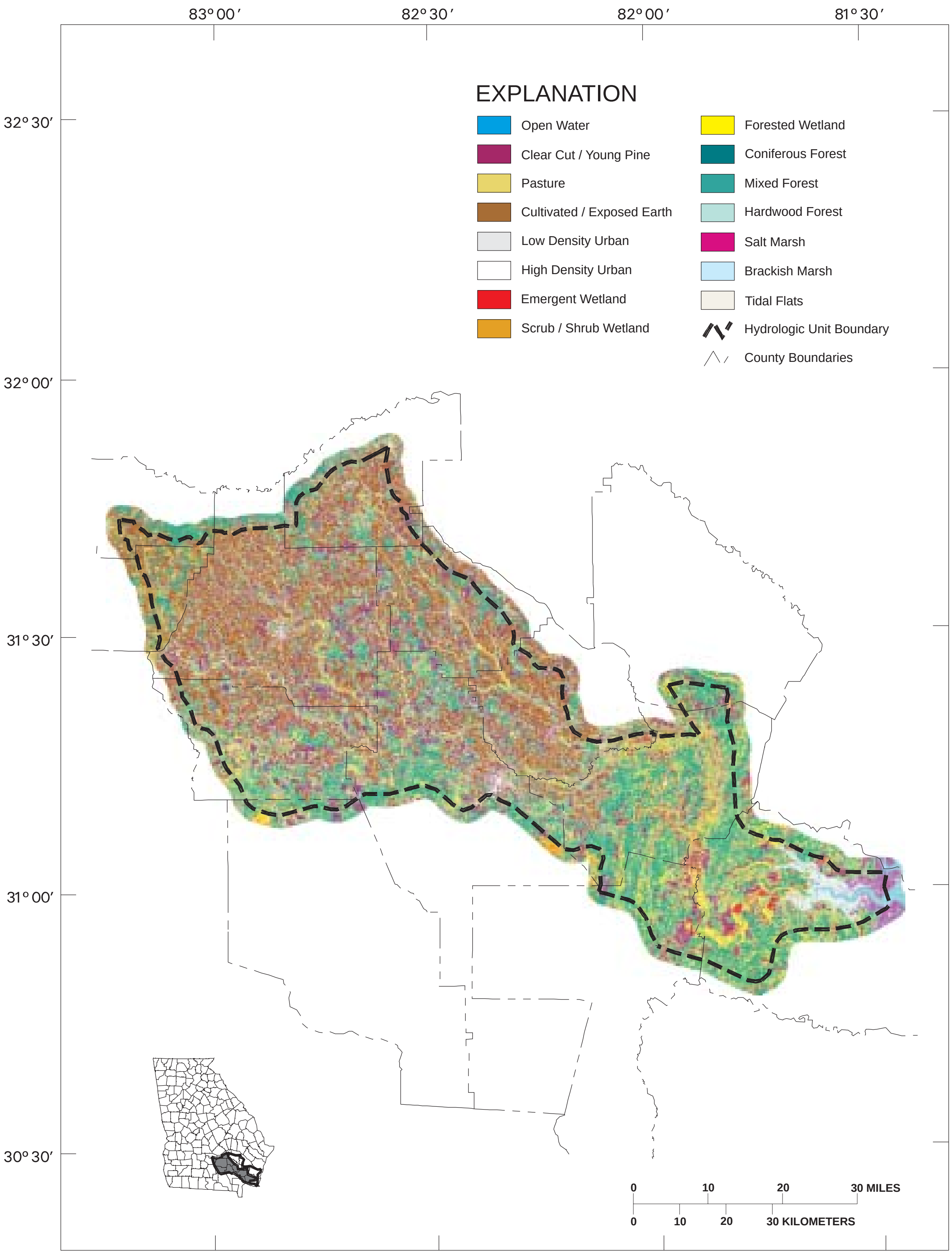

Figure 2-11. Land Cover 1990, Satilla River Basin, HUC 03070201

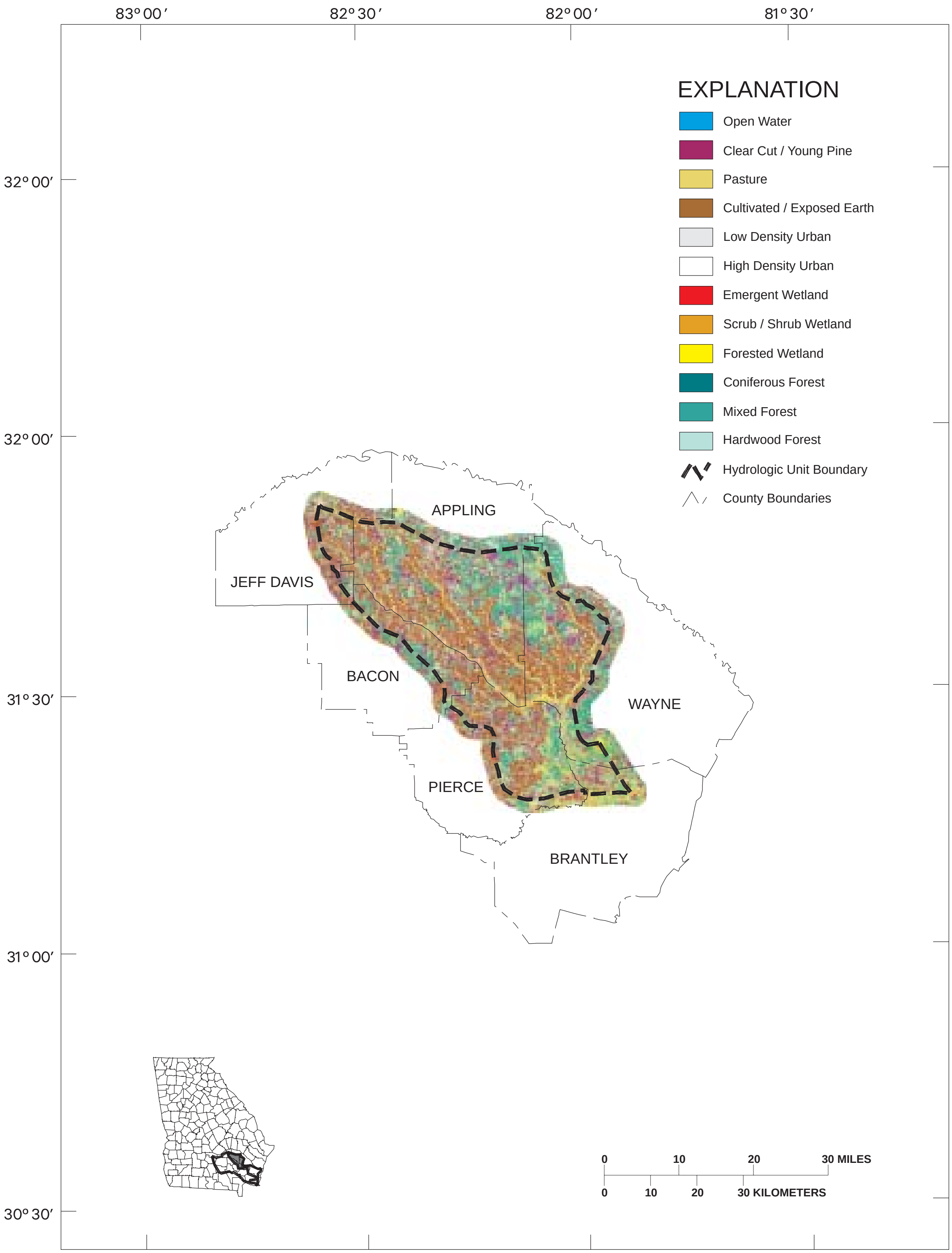

Figure 2-12. Land Cover 1990, Satilla River Basin, HUC 03070202

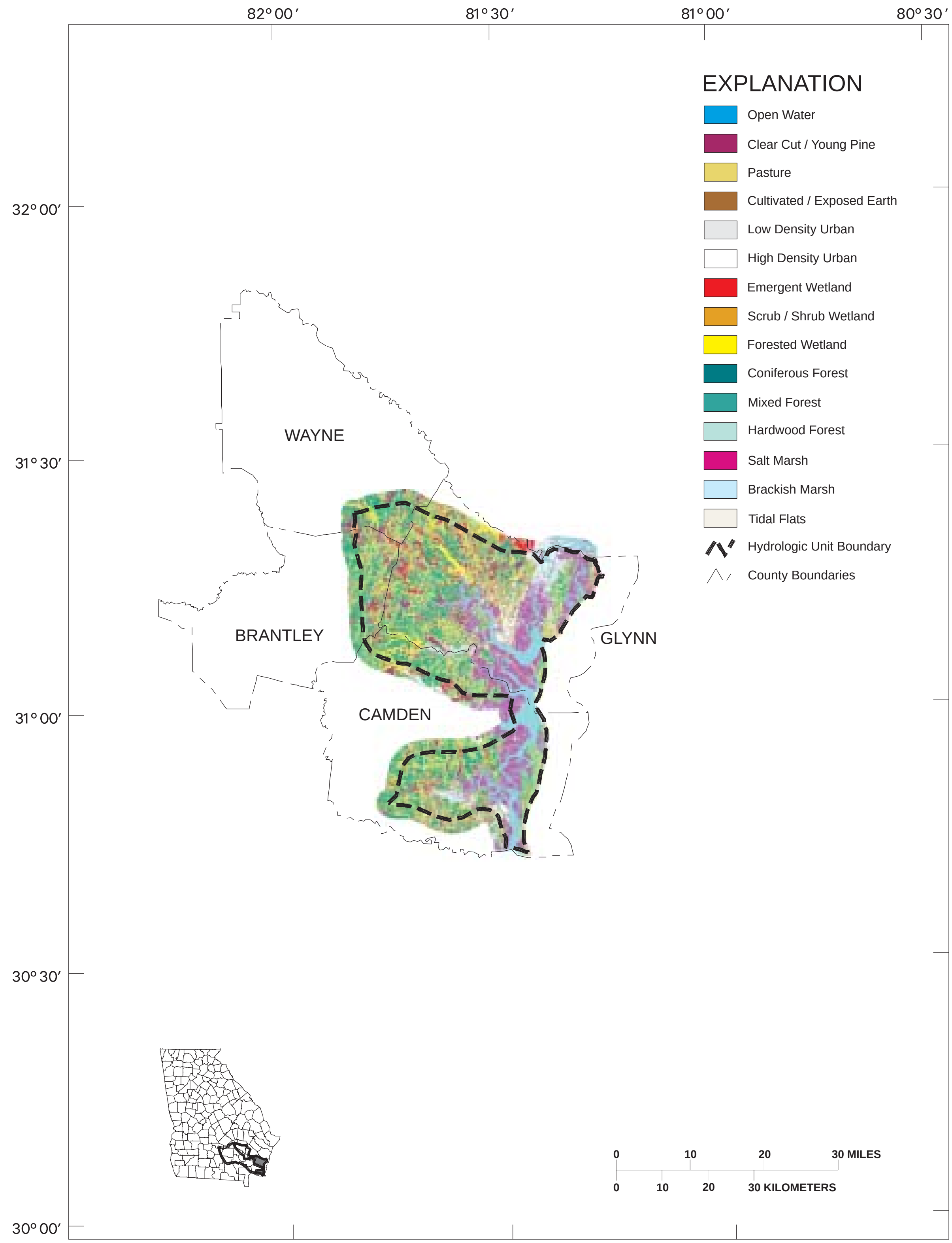

Figure 2-13. Land Cover 1990, Satilla River Basin, HUC 03070203

commercial forest. Private landowners account for 54 percent of the commercial forest ownership while the forest industry companies account for 43 percent. Governmental entities account for about 3 percent of the forestland. Figure 2-14 depicts silvicultural land use in the Satilla basin. Forestry acreage in the Satilla River basin is summarized in Table 2-3.

Table 2-3. Forestry Acreage in the Satilla River Basin

County	Commercial Forest	Pine	Oak-pine	Upland Hardwood	Lowland Hardwood
Appling	222,000	145,800	23,800	5,800	40,100
Atkinson	169,900	94,500	11,300	10,600	42,200
Bacon	122,100	75,400	10,700	6,300	26,900
Ben Hill	109,500	67,200	16,800	2,300	15,200
Brantley	237,100	129,500	31,600	5,500	63,200
Camden	267,600	138,600	29,700	9,000	86,000
Charlton	307,100	202,000	41,200	7,300	38,400
Clinch	469,100	309,600	36,400	0	108,400
Coffee	240,900	137,900	30,400	8,800	53,000
Glynn	147,400	88,400	10,700	5,200	31,400
Irwin	117,500	58,600	24,300	9,500	25,100
Jeff Davis	151,600	101,100	20,400	4,900	20,300
Pierce	135,900	62,600	16,000	6,100	41,900
Ware	345,100	228,700	32,400	0	66,400
Wayne	322,300	197,100	32,600	25,100	54,000
Total	*3,365,100*	*2,037,000*	*368,300*	*106,400*	*712,500*

For the period from 1982 to 1997, for the entire counties within the basin, the area classified as commercial forestland decreased approximately 1/2 percent. The area classified as pine type decreased approximately 6 percent. The area classified as oak-pine type increased approximately 19 percent. The area classified as upland hardwood decreased approximately 35 percent. The area classified as bottomland hardwood decreased approximately 6 percent. Approximately 141,100 acres were classified as non-stocked.

Agriculture

Agriculture in the Satilla River Basin is a varied mix on animal operations and commodity production. Some 17 percent of the land use in the basin soils that vary considerably from west to east across the area.

In 1997, there were some 464,292 acres devoted to agricultural production (Figure 2-15). All major commodities that are grown in Georgia (peanuts, corn, cotton, oats, rye, sorghum, soybeans, and tobacco) are produced in the Basin. Irwin County ranks 6th in the State in corn production. Coffee County is among the state leaders in cotton and tobacco production.

Orchard production is relatively limited in the Basin. However, Bacon County is 10th in peach production. Vegetable production is also active in the area.

Georgia's irrigation permit database shows 1,925 irrigation permits have been issued for the purpose of agricultural irrigation in the Satilla River Basin. Commodity producers, in the counties that comprise the Basin, applied some 47.05 million gallons of water per day for supplemental irrigation to over 85,912 acres. This equates to an average of 7.3 inches per acre for 1995. A majority of agricultural water use for irrigation came from groundwater sources, some 67 percent, in 1995. Coffee and Pierce Counties contain the largest number of irrigated acres in the Basin.

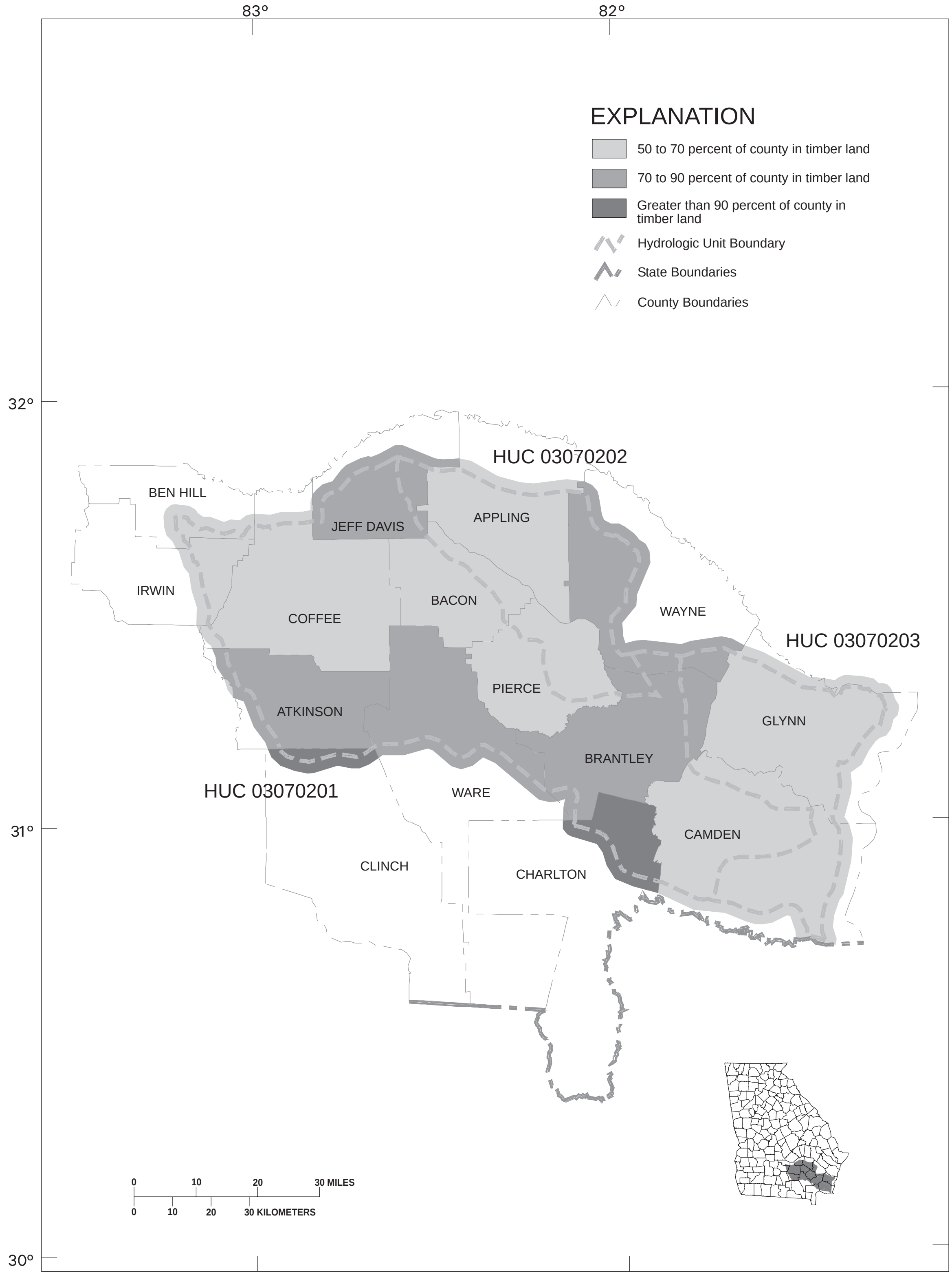

Figure 2-14. Silvicultural Land in the Satilla River Basin

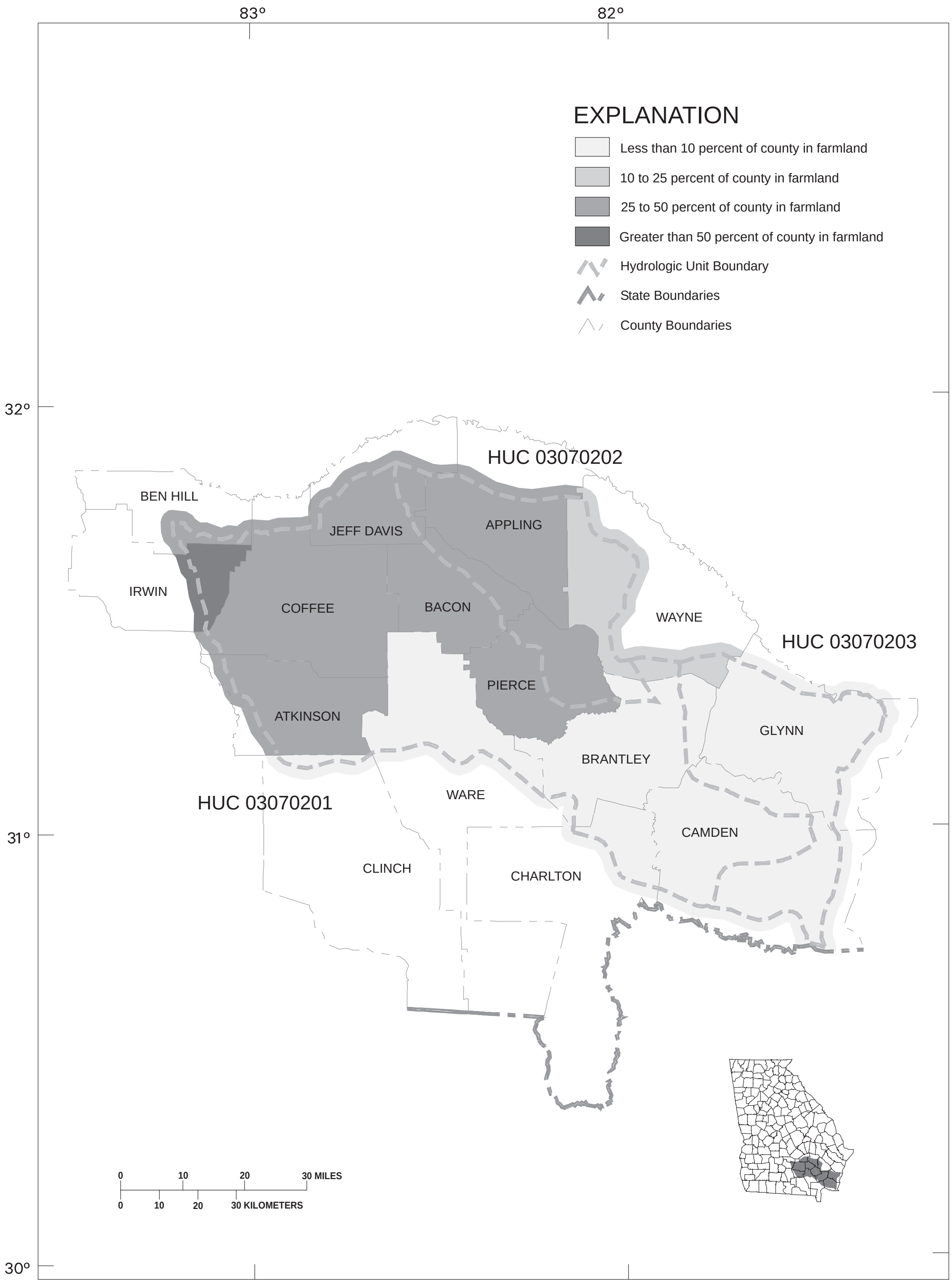

Figure 2-15. Agricultural Land in the Satilla River Basin

In addition to commodity production, animal agriculture is prominent in the Satilla River Basin as well. Table 2-4 shows number of animals by sector within the animal agricultural industry in the Basin. Coffee County, a major agricultural county, ranks the State's highest producers in cattle, swine, broiler, and layer production. Appling County has significant milk production from dairies ranking them 5th in Georgia with the number of dairy cattle on farm.

Table 2-4. Agricultural Operations in the Satilla River Basin (data supplied by NRCS)

Element	Watershed 03070201	Watershed 03070202	Watershed 03070203	Satilla Basin Total
Acres	271758	109822	14164	395743
Dairy Cattle (Head 1997)	2313	3783	19	6116
All Cattle and Calves (Head 1997)	38535	10497	1473	50505
Hogs and Pigs (Head 1996)	50544	12492	454	63490
Boilers (thousands, 1997)	51340907	4220693	0	55561600
Layers (thousands, 1997)	2142717	309967	215720	2668403
Irrigated Acres (1995)	39664	10956	472	51091
Total Agriculture Acres (1989-1997)	323179	125991	15122	464292

Collectively, across all animal operations, there are an estimated 212,044 Animal Units [AUs] in the Basin. AUs are defined here as 1000 lb. Animal Equivalents. Animal operations, in the counties that comprise the Basin, used some 2.27 million gallons of water per day in 1995. Additionally, some 2.9 million tons per year of animal waste was generated on these operations. Producers handle animal waste through various management activities that utilize nutrients, and other soil amendment benefits, for commodity production.

Agriculture is a key component of the Satilla River Basin's economy. In 1997, agriculture contributed over $2.2 billion to the local economy. Along with significant agricultural production, however, comes an increased potential for agricultural non-point source pollution. As a part of the river basin planning process, the Georgia Soil and Water Conservation Commission (GSWCC)—with technical assistance from the Natural Resources Conservation Service (NRCS)—assess agricultural impacts on water quantity and water quality. Historical, present, and future agricultural water demand is assessed in Section 3; while agricultural non-point source pollution is assessed in Section 4.

2.3 Local Governments and Planning Authorities

Many aspects of basin management and water quality protection depend on decisions regarding zoning, land use, and land management practices. These are particularly important for the control of nonpoint pollution—pollution that arises in storm water 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. Its 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 Environmental Protection Division (EPD), Regional Development Centers (RDCs), 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, storm water and development ordinances; undertaking water supply and wastewater treatment planning; and participating in programs to protect wellheads and significant ground water recharge areas. Many local governments are also responsible for operation of water supply and wastewater treatment facilities.

The Satilla River basin includes part or all of 15 Georgia counties (Table 2-5 and Figure 2-2); however, only two are entirely within the basin, and four counties have a small fraction (<20 percent) of their land area within the basin. Thus there are a total of 9 counties with significant jurisdictional area in the basin. Municipalities or cities are communities officially incorporated by the General Assembly. Georgia has more than 530 municipalities. Table 2-6 lists the municipalities in the Satilla River basin.

Table 2-5. Georgia Counties in the Satilla River Basin

Counties Entirely Within the Satilla River Basin	Counties Partially Within the Satilla River Basin	Counties With Less Than 20% Area Within the Basin
Bacon, Pierce	Coffee, Atkinson, Ware, Camden, Glynn, Brantley, Appling, Wayne, Jeff Davis	Ben Hill, Irwin, Clinch, Charlton

Table 2-6. Georgia Municipalities in the Satilla River Basin

HUC 03070201				
Alma	Bushnell	Millwood	Rovkingham	West Green
Ambrose	Denton	Mora	Sessoms	White Oak
Atkinson	Dixie Union	Nahunta	Silco	Winokur
Axson	Douglas	Nicholls	Snipesville	Withlaacoochee
Beach	Hickox	Osterfield	Tarboro	Woodbine
Blackshera	Hoboken	Pearson	Upton	Wray
Bolen	Jerusalem	Pridgen	Waresboro	
Brickley	Kirkland	Raybon	Waverly	
Broxton	Lulaton	Roper	Waycross	
HUC 03070202				
Baxley	Hortense	Offerman	Screven	
Bristol	Mershon	Patterson	Surrency	
Hazlehurst	Ocum	Pine Grove	Trudie	
HUC 03070203				
Arco	Glynn Haven	Pyles Marsh	St. Simons	Thalmann
Brunswick	Harrington	Sea Island	Sterling	Waynesboro

2.3.2 Regional Development Centers

Regional Development Centers (RDCs) are agencies of local governments, with memberships consisting of all the cities and counties within each RDC's territorial area. There are currently 16 RDCs in Georgia. RDCs facilitate coordinated and comprehensive planning at local and regional levels, assist their member governments with conformity to 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 2-7 summarizes the RDCs and the associated counties within the Satilla River basin.

Table 2-7. Regional Development Centers in the Satilla River Basin

Regional Development Center	Member Counties with Land Area in the Satilla Basin
Southeast Georgia	Coffee, Atkinson, Clinch, Ware, Charlton, Brantley, Pierce, Bacon
Heart of Georgia – Altamaha	Appling, Wayne, Jeff Davis
South Georgia	Ben Hill, Irwin
Coastal Georgia	Glynn, Camden

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 2-8 provides a summary of water use classifications and criteria for each use.

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.

Table 2-8. Georgia Water Use Classifications and Instream Water Quality Standards for Each Use

	Bacteria (fecal coliform)		Dissolved Oxygen (other than trout streams)[2]		pH	Temperature (other than trout streams)[2]	
Use Classification[1]	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.

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 Satilla River Basin

Waters in the Satilla River basin are classified as fishing, recreation, drinking water, or wild and scenic. Most of the waters are classified as fishing. Those waters explicitly classified in Georgia regulations are shown in Table 2-9; all waters not explicitly classified are classified as fishing.

Table 2-9. Satilla River Basin Waters Classified in Georgia Regulations[1]

Waterbody	Segment Description	Use Classification
Littoral Waters	All littoral waters on the ocean side of Cumberland and Jekyll Islands	Recreation

[1] Rules and Regulations for Water Quality Control, Chapter 391-3-6(13). Waters within the Satilla River basin not explicitly classified and listed above are classified as Fishing.

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