7. Current Conditions Model Results

The current conditions model depicts how current water usage and reservoir operation would impact water availability if these factors were held constant over the 1939 to 2007 period of record. Current water usage is explicitly derived from actual, current observed data and not from assumptions or projections about water use. Reservoir operation is that which is currently in effect for the major reservoirs. Finally, impacts are assessed by a gap analysis, described in more detail below. A table of summary statistics and a series of charts are used to interpret results.

Current usage values were developed from 2002 to 2007 observed demand data in the following manner. The highest net water use for each calendar month for the period 2002 to 2007 was then identified. Net water use is total use from municipal withdrawals and returns, industrial withdrawals and returns, agricultural use, thermal plant use, and groundwater use effects on surface water. Once these months were identified, the individual values for municipal, industrial, agricultural, thermal, and groundwater effects on surface water use were selected. These values are the current use values and are constantly applied throughout the 1939 to 2007 period of record for each respective month.

Reservoir operations were modeling using operating rules currently in effect. For the ACF, the Revised Interim Operation Plan (RIOP) is assumed to be in effect. The July 2009 federal court ruling on use of Lake Lanier is not considered because of the subjective nature of identifying its effect on reservoir operations. The ACT and Savannah River federal projects are assumed to follow current water control plans. Georgia Power, Duke Power and the Tennessee Valley Authority projects are assumed to be primarily run-of-river projects, except for Lake Jackson, and Lakes Oconee and Sinclair in the OOA; Nottely, Chatuge, and Blue Ridge in the TN; and Jocassee, and Keowee in the SO. However, the operational plans for these non-run-of-river reservoirs are not known to this study.

For the current assessment, there are two means of gap analyses. The first is to use all water availability to meet demands and allow any shortfall to express itself in not meeting instream flow requirements. The second method is to use all water availability to meet instream flow requirements and allow any shortfall to express itself in not meeting demands. For this assessment of current demands, the first method was employed.

Results for each basin group are presented below, starting with a list of planning nodes evaluated in each basin. A table of summary result statistics follows the list of planning nodes. A detailed assessment with eight types of charts is presented in the appendices. Chart types 1 through 5 are for unregulated nodes and types 6 through 8 are for semi-regulated nodes. The types of charts are described below. These charts provide an understanding of the impacts of water use, including shortages, reservoir operation, and flow regimes.

Chart type 1 is a pie chart that shows the percentage of daily flows above and below the adjusted flow regime. The percentage of time above the adjusted flow regime is an indication of how often the flow regime can be met and withdrawals can be made.

Chart type 2 shows the percentage of time flows are below the adjusted flow regime for each month of the year, indicating months in which water availability is most constrained. The higher the percentage the more often there are shortfalls, hence more water availability constraints.

Chart type 3 shows certain monthly statistics during periods of shortfalls. Namely, average simulated river flows, average adjusted flow regime flows, and average unimpaired flows are shown by line plots. In addition, each month's average shortfall and the range between the largest and smallest shortfall are shown by bar plots. This chart shows the magnitude of a shortfall for a given month relative to the typical flows available during the month only on the days shortfalls occur. Flows for days without shortfalls are not included in generating these statistics.

Chart type 4 shows plots of monthly values of the adjusted flow regime and the 10-percentile (the lowest 10 percent of unimpaired flows), the 50-percentile (mid-range flows), and 90-percentile (all but the top 10 percent) flows. This range of percentiles covers dry, median, and wet conditions respectively. The chart shows the magnitude of the adjusted flow regime relative to the flows that would be in the stream if there were no effects of human development.

Chart type 5 shows plots of monthly values of the adjusted flow regime and the lowest 10 percent of simulated flows i.e. 10-percentile flows, 50-percentile flows, and 90-percentile flows. This chart shows the magnitude of the adjusted flow regime relative to the flows that would be in the stream under current condition assumptions.

Chart type 6 shows the daily storage and seasonal top of conservation curve for a given reservoir over the period of record. The storage remaining in the reservoir reflects the magnitude and timing of demands.

Chart type 7 shows the percentage of storage remaining relative to the seasonal top of conservation pool for a given reservoir over the period of record. The reservoir is 100 percent full when the level is at or above the rule curve. The storage remaining in the reservoir reflects the magnitude and timing of demands.

Chart type 8 shows the percentage of time that the remaining storage of a given reservoir is above a given percentage relative to the rule curve. The reservoir is 100 percent full when the level is at or above the rule curve. Storage remaining in the reservoir reflects magnitude and timing of demands.

7.1 ACF Study Basin

The ACF basin drains an area of 19,600 square miles in northern and western Georgia, southeastern Alabama, and a portion of northwestern Florida. The majority of the Apalachicola River basin is in the state of Florida, with one major tributary, the Chipola River, extending into Alabama. The Chattahoochee River basin extends from the headwaters of Lake Lanier to its confluence with the Flint River basin in Lake Seminole. The Flint River basin is entirely within the state of Georgia. Chattahoochee River flows are highly regulated by a series of federal storage reservoirs and several pondage and run-of-river private power reservoirs. Federal reservoirs operate for multiple purposes, including flood control, water supply, hydropower, navigation, water quality, recreation, and aquatic habitat and species protection. The Flint River is largely unregulated and has no federal or private power storage reservoirs. The most downstream ACF planning node for purposes of this study is the Chattahoochee Gage, which is in Florida just downstream of Woodruff Dam. The four federal reservoirs Lanier, West Point, W.F. George, and Woodruff comprise basic or planning nodes for surface water availability assessment purposes, whereas the smaller private power reservoirs are not located at basic or planning nodes. The ACF study basin map showing node locations and LDAs for each node is shown on Figure 7-6.

The ACF study basin consists of six planning nodes:

- Whitesburg (semi-regulated) – Located approximately midway downstream of Atlanta and upstream of West Point Lake. Atlanta was not designated as a planning node in order to prevent Atlanta's withdrawals and returns from being separated into two different planning areas. Has municipal, industrial and agricultural water usage and thermal plant McDonough.

- Columbus (semi-regulated) – Located just downstream of the Georgia Power fall line projects and West Point Lake, and upstream of the city of Columbus. Contains thermal plants Yates, Wansely, and Franklin, municipal and industrial use, but no agricultural usage. A portion of Alabama's net usage is applied to this reach.

- Columbia (semi-regulated) – Located at Andrews Dam. Has municipal and agricultural usage and Plant Farley, but no industrial usage. A portion of Alabama's net usage is applied to this reach.

- Woodruff (regulated) – Located at the confluence of the Chattahoochee and Flint rivers. This reach is in Subarea 4 and thus exhibits groundwater effects on surface water. Has municipal, industrial, and agricultural usage. A portion of Alabama's net usage is applied to this reach. Subarea 4, is located in the Daughterly Plain and consisting of the lower portions of the Flint and Chattahoochee River basins, is a region where ground water usage significantly affects surface water.

- Montezuma (unregulated) – The most upstream node on the Flint River. This node is unregulated. Has municipal, industrial, and agricultural usage.

- Bainbridge (unregulated) – Located just upstream of Lake Seminole. This reach is in Subarea 4 and thus exhibits groundwater effects on surface water. Has municipal and agricultural usage, but no industrial usage. Contains thermal plant Mitchell.

Of these 6 planning nodes, 4 are regulated or semi-regulated. Modeling of current conditions indicated that there are no shortfalls at any of these nodes. For the 2 unregulated nodes, shortfalls were seen at both of them. The means of summarizing results for regulated and semi-regulated nodes differ from the means used for summarizing unregulated nodes. Water availability at regulated and semi-regulated nodes is examined by the average demand shortage, the average at site flow requirement shortage, the minimum reservoir storage (expressed as volume and percent of total seasonal volume remaining), and the average basinwide requirement shortage. Water availability at unregulated nodes is examined by the percent of time flow is below the adjusted flow regime (AFR), the average shortfall, the long-term average flow, the maximum shortfall, and the flow regime corresponding to the maximum shortfall. Summary results statistics for the nodes in this study basin are presented in the following tables.

Table 7-1-1 ACF Regulated and Semi-Regulated Nodes

Node	Average Demand Shortage (cfs)	Average at-Site Flow Requirement Shortfall (cfs)	Minimum Reservoir Storage (Acre-Feet)	Minimum Percent Reservoir Storage (%)	Average Basinwide Flow Requirement Shortfall (cfs)
Whitesburg	0	0	539,600 at Lanier	48 at Lanier	None
Columbus	0	0	14,226 at West Point	5 at West Point	None
Columbia	0	0	11,872 at W.F. George	5 at W.F. George	None
Woodruff	0	0	565,698 at Lanier, West Point, and W.F. George	34 at Lanier, West Point, and W.F. George	None

Table 7-1-2 ACF Unregulated Nodes

Node	Percent of Time Flow is Below the Adjusted Flow Regime (AFR) (%)	Average Shortfall (cfs)	Long-Term Average Flow (cfs)	Maximum Shortfall (cfs)	Flow Regime Target Corresponding to the Maximum Shortfall (cfs)
Montezuma	2	<1	3,392	1	593
Bainbridge	12	314	7,920	1202	2506

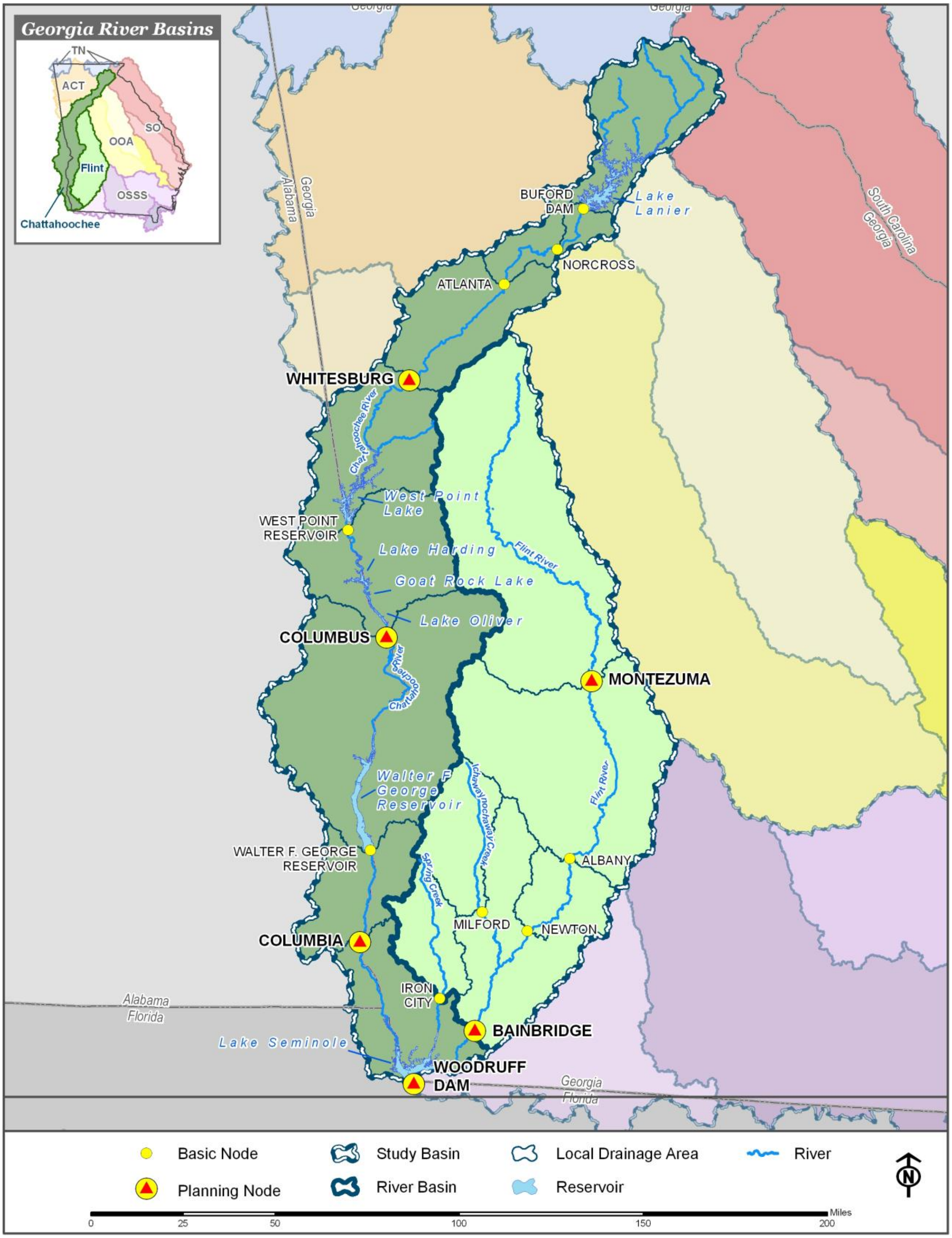

Figure 7-1 ACF Study Basin

7.2 ACT Study Basin

The ACT basin drains an area of 14,739 square miles in Georgia and Alabama. Approximately 5,299 square miles of the basin are in Georgia, and approximately 9,440 square miles are in Alabama. The confluence of the Coosa and Tallapoosa rivers forms the Alabama River near Wetumpka, Alabama, and the Alabama and Tombigbee rivers merge to form the Mobile River near Calvert, Alabama. This study addresses the Georgia portion of the ACT basin only.

The Georgia portion of the Coosa River basin and its tributary streams occupy a 4,579-square-mile area of the northwestern corner of the state (Figure 7-5). Downstream of Georgia, the Coosa River covers a 5,353-square-mile area of Alabama. North of Georgia, a 127-square-mile area lies in Tennessee.

The Coosa River basin contains several major rivers, as well as manmade reservoirs. The Coosa River itself is formed by the confluence of the Oostanaula and Etowah rivers near Rome, Georgia. The Oostanaula River in turn is formed by the confluence of the Conasauga and Coosawatee rivers. The basin also contains the Chattooga River, which joins the Coosa River in Alabama.

Three dams are located within the Georgia portion of the Coosa River basin, while a fourth, Weiss Dam in Alabama, has an impoundment that extends into Georgia (July 1962). Within Georgia, multipurpose projects have been constructed to harness the power potential of headwater streams; the first was Allatoona Dam, constructed by the Corps of Engineers and completed in December 1949, followed by Carters Dam on the Coosawatee River, completed in November 1974. There is also a reregulation dam below Carters Dam that captures water for pump back and moderates the impacts of hydropower generation flow.

The Tallapoosa River basin within Georgia consists of the Tallapoosa River itself and the Little Tallapoosa River. The basin drains a total area of 4,680 square miles, of which 720 square miles are in Georgia and 3,960 square miles are in Alabama.

The ACT basin consists of five planning nodes:

- Kingston (semi-regulated) – Downstream of Lake Allatoona. Contains Plant Bowen and municipal, industrial and agricultural usage.
- Rome Coosa (semi-regulated) – Confluence of the Etowah and Oostanaula rivers. Contains other municipal and industrial usage, but no agricultural usage.
- Gayles (unregulated) – Downstream gage on the Chattooga River. Contains municipal and industrial usage, but no agricultural usage.
- Newell (unregulated) – Downstream gage on the Little Tallapoosa River. Contains municipal and industrial usage, but no agricultural usage.
- Heflin (unregulated) – Downstream gage on the Tallapoosa River. Contains municipal and industrial usage, but no agricultural usage.

Of these 5 planning nodes, 2 are semi-regulated. Modeling of current conditions indicated that there are no shortfalls at any of these nodes. For the 3 unregulated nodes, shortfalls were seen at all 3 nodes. The means of summarizing results for regulated and semi-regulated nodes differ from the means used for summarizing unregulated nodes. Water availability at regulated and semi-regulated nodes is examined by the average demand shortage, the average at site flow requirement shortage, the minimum reservoir storage (expressed as volume and percent of total seasonal volume remaining), and the average basinwide requirement shortage. Water availability at unregulated nodes is examined by the percent of time flow is below the adjusted flow regime (AFR), the average shortfall, the long-term average flow, the maximum shortfall, and the flow regime corresponding to the maximum shortfall. Summary results statistics for the nodes in this study basin are presented in the following tables.

Table 7-2-1 ACT Regulated and Semi-Regulated Nodes

Node	Average Demand Shortage (cfs)	Average at-Site Flow Requirement Shortfall (cfs)	Minimum Reservoir Storage (Acre-Feet)	Minimum Percent Reservoir Storage (%)	Average Basinwide Flow Requirement Shortfall (cfs)
Kingston	0	0	45,832	15	N/A
Rome (Coosa)	0	0	120,152 at Carters	85	N/A
			45,832 at Allatoona	15	

Table 7-2-2 ACT Unregulated Nodes

Node	Percent of Time Flow is Below the Adjusted Flow Regime (AFR) (%)	Average Shortfall (cfs)	Long-Term Average Flow (cfs)	Maximum Shortfall (cfs)	Flow Regime Target Corresponding to the Maximum Shortfall (cfs)
Gaylesville	7	4	653	6	119
Heflin	6	3	659	4	65
Newell	7	9	590	12	23

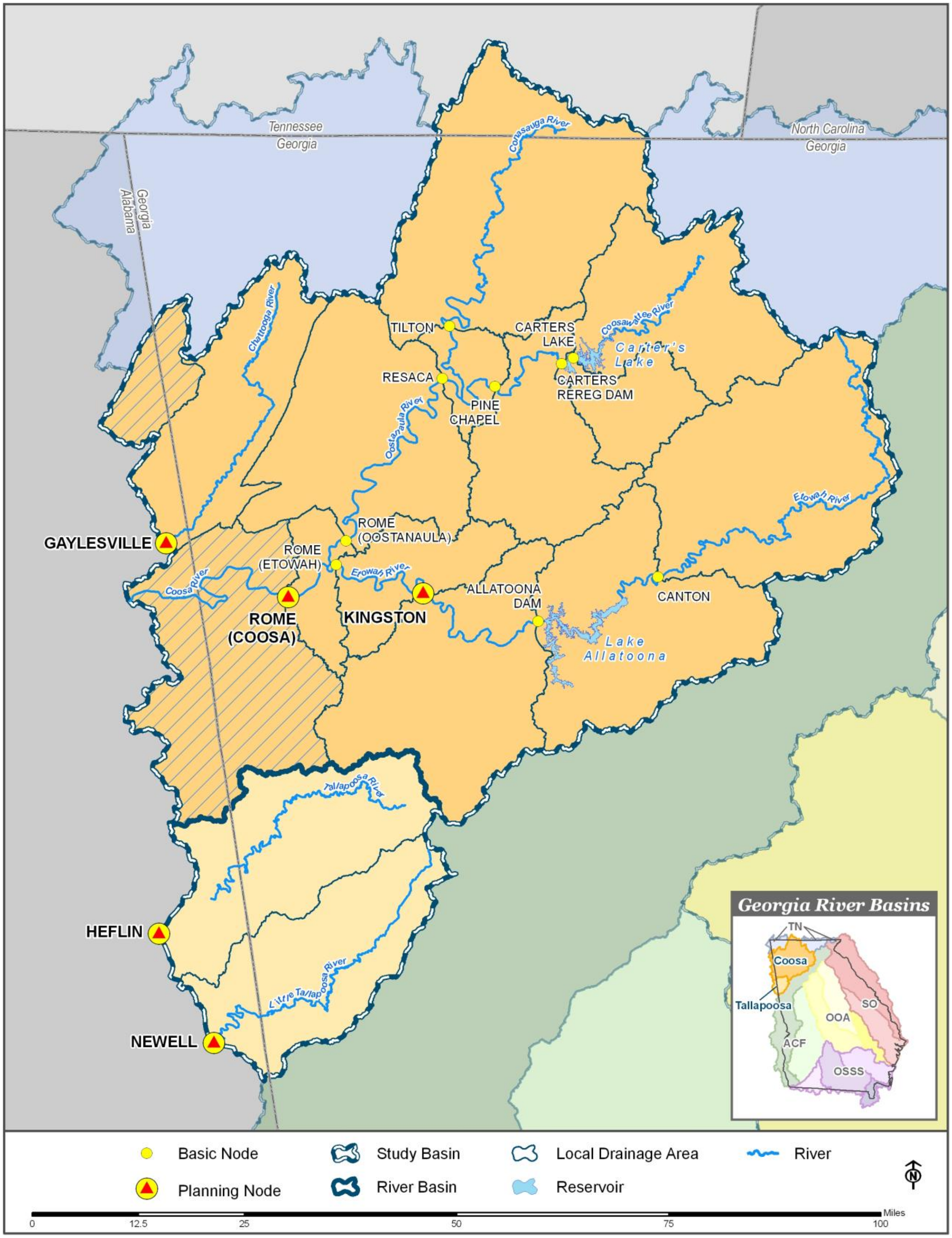

Figure 7-2 ACT Study Basin

7.3 OOA Study Basin

The OOA basin, located entirely within the state of Georgia, drains an area of approximately 14,265 square miles in central-southeastern Georgia. The Ocmulgee River basin is the westernmost river basin within the OOA basin and is located in the Piedmont and Coastal Plain physiographic provinces of central Georgia. The South, Yellow, and Alcovy Rivers join at Lake Jackson south of the Atlanta metropolitan area to form the Ocmulgee River. The Oconee River basin is located just east of the Ocmulgee River basin and is formed by the confluence of the Middle and North Oconee Rivers south of Athens, Georgia. Approximately 20 miles south of the confluence of the Middle and North Oconee Rivers, the Oconee River flows into Lake Oconee and then into Lake Sinclair. The Altamaha River begins at the confluence of the Ocmulgee and Oconee Rivers and flows eastward, where it is joined by the Ohoopee River. The Altamaha River flows southeasterly from its confluence with the Ohoopee River to the Atlantic Ocean, south of Savannah, Georgia.

Ocmulgee River and Oconee River flows are regulated by hydropower reservoirs operated by Georgia Power. The Altamaha River is unregulated, having no federal or private power storage reservoirs in its drainage basin. The most downstream OOA planning node for purposes of this study is the Doctortown node, which is located northeast of Jessup, Georgia. Three Georgia Power reservoirs exist within the OOA basin: Lake Jackson, Lake Oconee and Lake Sinclair. Lake Jackson is located within the Ocmulgee River, southeast of Atlanta, Georgia and Lakes Oconee and Sinclair are located within the Oconee River basin, south of Greensboro, Georgia, and north of Milledgeville, Georgia. Lake Oconee is a 21,000-acre reservoir formed by Wallace Dam; immediately downstream is Lake Sinclair, a 15,330-acre reservoir formed by Sinclair Dam. Lake Oconee drains approximately 1,830 square miles and began commercial operation in 1979, upon completion of Wallace Dam. Lake Sinclair drains an area of approximately 2,910 square miles, and its construction was completed in 1953. Stream flow gages south of Lake Jackson (Jackson) and Lake Sinclair (Milledgeville) are planning nodes for surface water availability assessment purposes. The OOA study basin map showing node locations and LDAs for each is shown on Figure 7-3.

The OOA basin consists of six planning nodes. Each planning node and node type are listed below with the type of water uses at the node. More detailed descriptions of the nodes are provided in the appendix.

- Jackson (regulated) – Located on the Ocmulgee River near Jackson, Georgia. This node has municipal demands and returns, industrial returns, and agricultural demands.

- Lumber City (semi-regulated) – Located on the Ocmulgee River in Lumber City, Georgia .This node has municipal demands and returns, industrial demands and returns, agricultural demands, and thermal demands.

- Penfield (unregulated) – Located on the Oconee River near Penfield, Georgia. This node has municipal demands and returns, and agricultural demands.

- Milledgeville (regulated) – Located on the Oconee River in Milledgeville, Georgia. This node has municipal demands and returns, industrial demands, agricultural demands, and thermal demands.

- Mount Vernon (semi-regulated) – Located on the Oconee River near Mount Vernon, Georgia. This node has municipal demands and returns, industrial demands and returns, and agricultural demands.

- Doctortown (semi-regulated) – Located on the Altamaha River in Doctortown, Georgia. This node has municipal returns, industrial returns, agricultural demands, and thermal demands.

Of these 6 planning nodes, 5 are regulated or semi-regulated. Modeling of current conditions indicated that there are no shortfalls at any of these nodes. The means of summarizing results for regulated and semi-regulated nodes differ from the means used for summarizing unregulated nodes. Water availability at regulated and semi-regulated nodes is examined by the average demand shortage, the average at site flow requirement shortage, the minimum reservoir storage (expressed as volume and percent of total seasonal volume remaining), and the average basinwide requirement shortage. Water availability at unregulated nodes is examined by the percent of time flow is below the adjusted flow regime (AFR), the average shortfall, the long-term average flow, the maximum shortfall, and the flow regime corresponding to the maximum shortfall. Summary results statistics for the nodes in this study basin are presented in the following tables.

Table 7-3-1 OOA Regulated and Semi-Regulated Nodes

Node	Average Demand Shortage (cfs)	Average At-Site Flow Requirement Shortfall (cfs)	Minimum Reservoir Storage (Acre-Feet)	Minimum Percent Reservoir Storage (%)	Average Basinwide Flow Requirement Shortfall (cfs)
Milledgeville	0	0	94,230 in Milledgeville Reach	63	None
Jackson	0	0	61,000 in Lake Jackson	82	None
			112,900 in Jackson Reach (including Lake Jackson and municipal storage)	90	
Mount Vernon, Lumber City and Doctortown	0	0	61,000 in Lake Jackson	82	None
			94,230 in Milledgeville Reach	63	
			112,900 in Jackson Reach (including Lake Jackson and municipal storage)	90	

Table 7-3-2 OOA Unregulated Nodes

Node	Percent Of Time Flow Is Below The Adjusted Flow Regime (AFR) (%)	Average Shortfall (cfs)	Long-Term Average Flow (cfs)	Maximum Shortfall (cfs)	Flow Regime Target Corresponding To The Maximum Shortfall (cfs)
Penfield	0	0	1,245	0	N/A

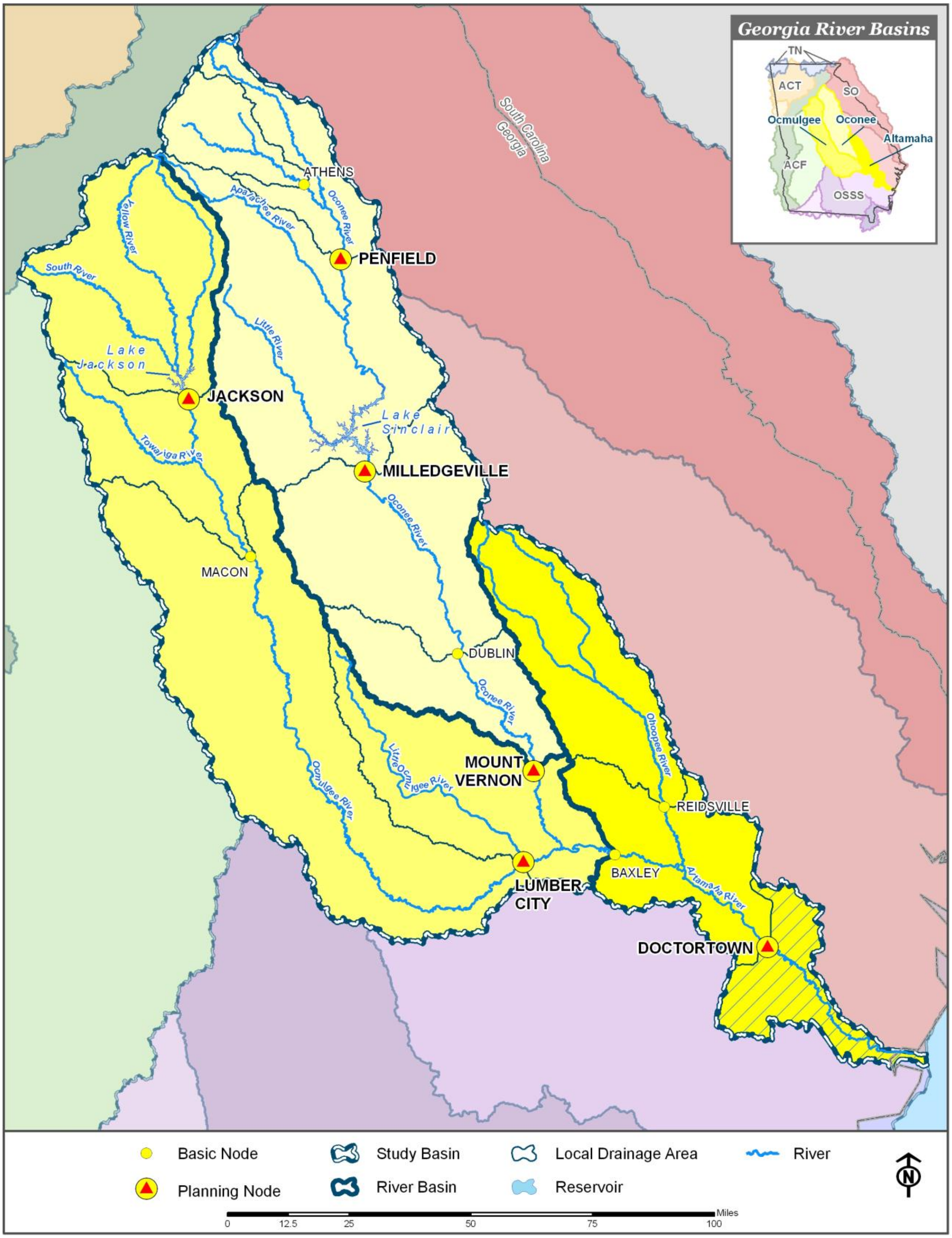

Figure 7-3 OOA Study Basin

7.4 OSSS Study Basin

The OSSS basin drains an area of 10,450 square miles in southern Georgia. The Ochlockonee River basin is in the southwestern part of the state of Georgia. The Ochlockonee River begins approximately 19 miles southeast of Albany, Georgia, and extends southwest through Florida to the Gulf of Mexico. The Suwannee River basin lies between the Ochlockonee and Satilla basins. The Suwannee River begins approximately 9 miles south of Waycross, Georgia, in the Okefenokee Swamp, flows southwest through Florida, and empties into the Gulf of Mexico. Major tributaries of the Suwannee River that lie within Georgia are the Alapaha, Withlacoochee, and Aucilla rivers. The Satilla basin is between the Suwannee River basin and the Atlantic Coast. The Satilla River begins approximately 25 miles east of Tifton, Georgia, and flows southeast to the Atlantic Ocean. A major tributary of the Satilla River is the Little Satilla River. The St. Mary's basin is located in the southeastern corner of Georgia. The St. Mary's River begins approximately 14 miles east of Lake City, Florida, and flows north into Georgia and then east to the Atlantic Coast.

Ochlockonee, Suwannee, Satilla, and St. Mary's river flows within Georgia are unregulated, having no federal or private power storage reservoirs. The OSSS basin consists of eight planning nodes including Quincy, Concord, Pinetta, Jennings, Statenville, Fargo, Atkinson, and Gross. The location of these planning nodes and the basic nodes in the OSSS basin are shown on Figure 7-1.

A few reaches in the OSSS study basin have municipal and industrial water use; however, most reaches have some agricultural water use. Some reaches have no withdrawals but have returns. This is because groundwater withdrawals are returned to the river in these reaches. Each planning node is listed below with the type of water uses at the node. More detailed descriptions of the nodes are provided in the appendix.

- Quincy (unregulated) – Located on the Little River near Quincy, Florida. This node has industrial use and returns with agricultural use.
- Concord (unregulated) – Located on the Ochlockonee River near Concord, Florida. This node has industrial returns, municipal returns, and agricultural use.
- Pinetta (unregulated) – Located at the Withlacoochee River near Pinetta, Florida. This node has industrial returns, municipal returns, and agricultural use.
- Statenville (unregulated) – Located on the Alapaha River at Statenville, Georgia. The node has municipal returns and agricultural use.
- Jennings (unregulated) – Located on the Alapaha River near Jennings, Florida. This node has agricultural use.
- Fargo (unregulated) – Located on the Suwanee River at U.S. 441 in Fargo, Georgia. This node has municipal returns and agricultural use.

- Atkinson (unregulated) – Located on the Satilla River in Atkinson, Georgia. This node has municipal returns, industrial demands, and agricultural use.

- Gross (unregulated) – Located on the St. Mary's River near Gross, Florida. This node has municipal returns.

Of these 8 planning nodes, none is regulated or semi-regulated. Shortfalls were seen at 7 nodes. The means of summarizing results for regulated and semi-regulated nodes differ from the means used for summarizing unregulated nodes. Water availability at regulated and semi-regulated nodes is examined by the average demand shortage, the average at site flow requirement shortage, the minimum reservoir storage (expressed as volume and percent of total seasonal volume remaining), and the average basinwide requirement shortage. Water availability at unregulated nodes is examined by the percent of time flow is below the adjusted flow regime (AFR), the average shortfall, the long-term average flow, the maximum shortfall, and the flow regime corresponding to the maximum shortfall. Summary results statistics for the nodes in this study basin are presented in the following tables.

Table 7-4-1 OSSS Unregulated Nodes

Node	Percent of Time Flow is Below the Adjusted Flow Regime (AFR) (%)	Average Shortfall (cfs)	Long-Term Average Flow (cfs)	Maximum Shortfall (cfs)	Flow Regime Target Corresponding to the Maximum Shortfall (cfs)
Quincy	5	5	264	28	72
Concord	9	15	1,108	113	206
Pinetta	11	44	1714	144	350
Statenville	20	31	1,060	92	95
Jennings	14	34	1,387	97	120
Fargo	3	<1	959	<1	1
Gross	0	0	1,240	0	N/A
Atkinson	11	17	2,258	233	365

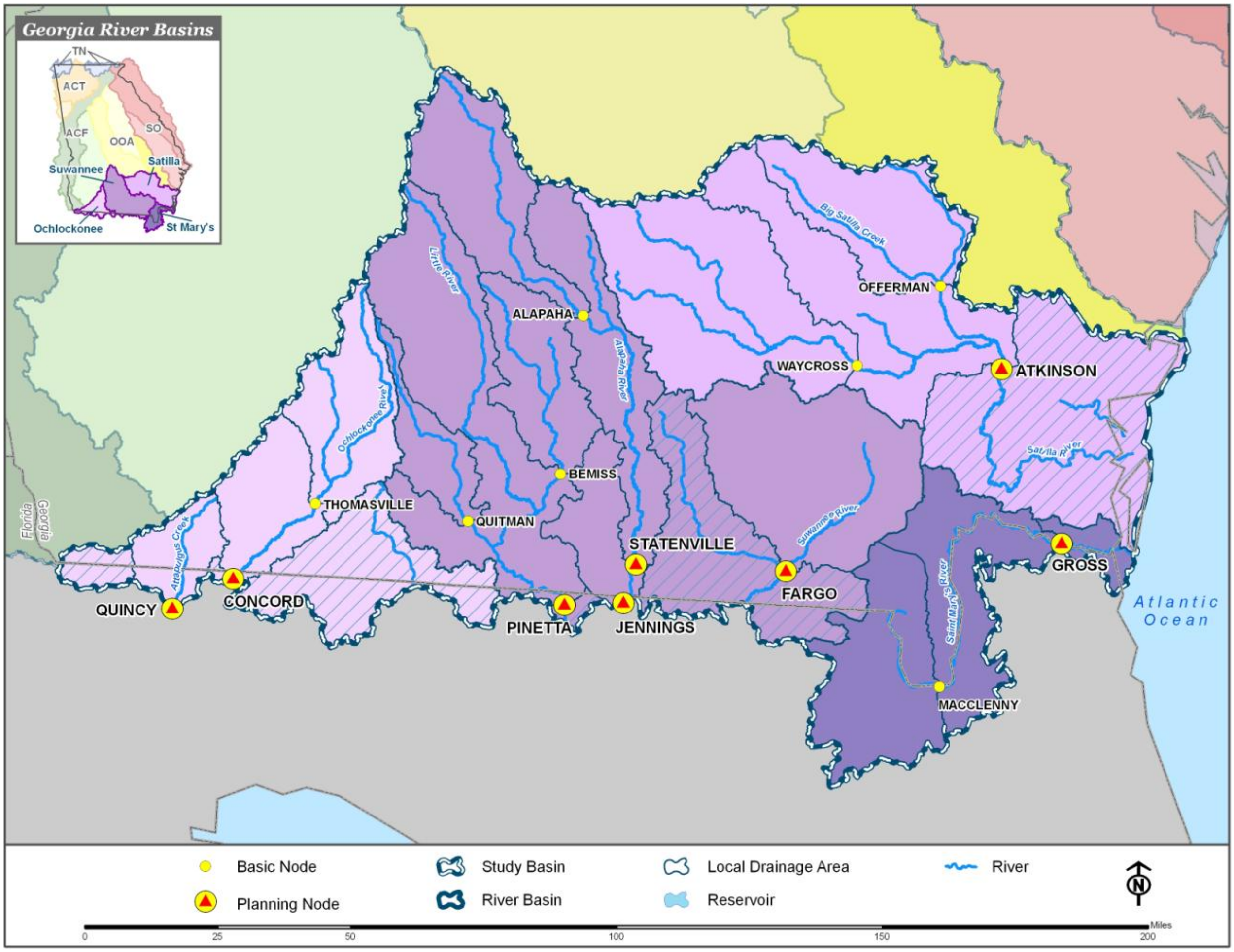

Figure 7-4 OSSS Study Basin

7.5 SO Study Basin

The Savannah River basin is located in northern and eastern Georgia, originating in the Blue Ridge Mountains at the common border of Georgia, North Carolina, and South Carolina. The basin forms the Georgia-South Carolina border and flows through the Mountain, Piedmont, and Coastal Plains physiographic regions to the Atlantic Ocean. The total drainage area of the Savannah River is 10,577 square miles, of which 175 square miles are in southwestern North Carolina and 4,581 square miles lie in western South Carolina. The Savannah River basin is characterized by mild winters and hot summers in the lower portions, and cold winters and mild summers in the mountain area. Mean annual precipitation ranges from 40 inches to 80 inches. Precipitation occurs principally as rainfall, distributed fairly uniformly throughout the year but with a dry season from mid-summer to late fall. Rainfall is usually greatest in March and least in October. Mean annual temperature in the basin is approximately 65 degrees Fahrenheit.

The Savannah River upstream of Augusta is highly regulated by three large multipurpose Corps' reservoirs – Hartwell, Richard B. Russell, and Thurmond – and by a number of private power reservoirs, including several small Georgia Power projects (Burton, Nacoochee, Rabun, Tallulah Falls, Tugaloo, and Yonah) and Duke Energy's Keowee-Jocassee pumped-storage project. Downstream of Augusta are the Corps' New

Savannah Bluff Lock and Dam and the South Carolina Electric and Gas Stevens Creek project, both of which are essentially operated as run-of-river projects.

The Ogeechee River basin is located in southeastern Georgia between the Altamaha and Oconee river basins to the west, and the Savannah basin to the north and east. The headwaters are located in the southeastern edge of the Piedmont physiographic region, and the river flows 245 miles in a southeasterly direction to the Atlantic Ocean. The Ogeechee River basin is located entirely within the state of Georgia and drains approximately 5,540 square miles. There are no large storage reservoirs or hydroelectric projects in the Ogeechee River basin, although there are numerous small lakes, reservoirs, and farm ponds. The SO study basin map showing node locations and LDAs for each is shown on Figure 7-4.

The SO consists of eight planning nodes. Each planning node is listed below with the type of water uses at the node. More detailed descriptions of the nodes are provided in the appendix.

- Lake Keowee (regulated) – Located on Lake Keowee near Six Mile, South Carolina. This node has municipal demands and returns, and industrial demands and returns.

- Hartwell Reservoir (regulated) – Located on Hartwell Reservoir. This node has municipal demands and returns, and industrial demands and returns.

- Augusta (semi-regulated) – Located on the Savannah River in Augusta, Georgia. This node has municipal demands and returns, industrial demands and returns, and agricultural use.

- Clyo (semi-regulated) – Located on the Savannah River near Clyo, Georgia. This node has municipal demands and returns, industrial demands and returns, agricultural use, and thermal use.

- Savannah (semi-regulated) – Located on the Savannah River at the Corps of Engineers' Dock in Savannah, Georgia. This node has municipal demands and returns, industrial demands and returns, agricultural use, and thermal use.

- Claxton (unregulated) – Located on the Canoochee River near Claxton, Georgia. This node has municipal returns and agricultural use.

- Eden (unregulated) – Located on the Ogeechee River near Eden, Georgia. This node has municipal demands and returns, industrial returns, and agricultural use.

- Kings Ferry (unregulated) – Located on the Ogeechee River at U.S. 17 in Georgia. This node has municipal returns and agricultural use.

Of these 8 planning nodes, 5 are regulated or semi-regulated. Modeling of current conditions indicated that there are no shortfalls at any of these nodes. For the 3 unregulated nodes, shortfalls were seen at all 3 nodes. The means of summarizing results for regulated and semi-regulated nodes differ from the means used for summarizing unregulated nodes. Water availability at regulated and semi-regulated nodes is examined by the average demand shortage, the average at site flow requirement shortage, the minimum reservoir storage (expressed as volume and percent of total seasonal volume remaining), and the average basinwide requirement shortage. Water availability at unregulated nodes is examined by the percent of time flow is below the adjusted flow regime (AFR), the average shortfall, the long-term average flow, the maximum shortfall, and the flow regime corresponding to the maximum shortfall. Summary results statistics for the nodes in this study basin are presented in the following tables.

Table 7-5-1 SO Regulated and Semi-Regulated Nodes

Node	Average Demand Shortage (cfs)	Average at-Site Flow Requirement Shortfall (cfs)	Minimum Reservoir Storage (Acre-Feet)	Minimum Percent Reservoir Storage (%)	Average Basinwide Flow Requirement Shortfall (cfs)
Hartwell	0	0	523,700	37	None
Thurmond	0	0	135,000	13	None
Augusta, Clyo and Savannah	0	0	523,700 at Hartwell	37	None
Augusta, Clyo and Savannah	0	0	135,000 at Thurmond	13	None

Table 7-5-2 SO Unregulated Nodes

Node	Percent of Time Flow is Below the Adjusted Flow Regime (AFR) (%)	Average Shortfall (cfs)	Long-Term Average Flow (cfs)	Maximum Shortfall (cfs)	Flow Regime Target Corresponding to the Maximum Shortfall (cfs)
Claxton	18	5	457	15	15
Eden	6	20	2,257	42	201
Kings Ferry	4	11	3,720	17	257

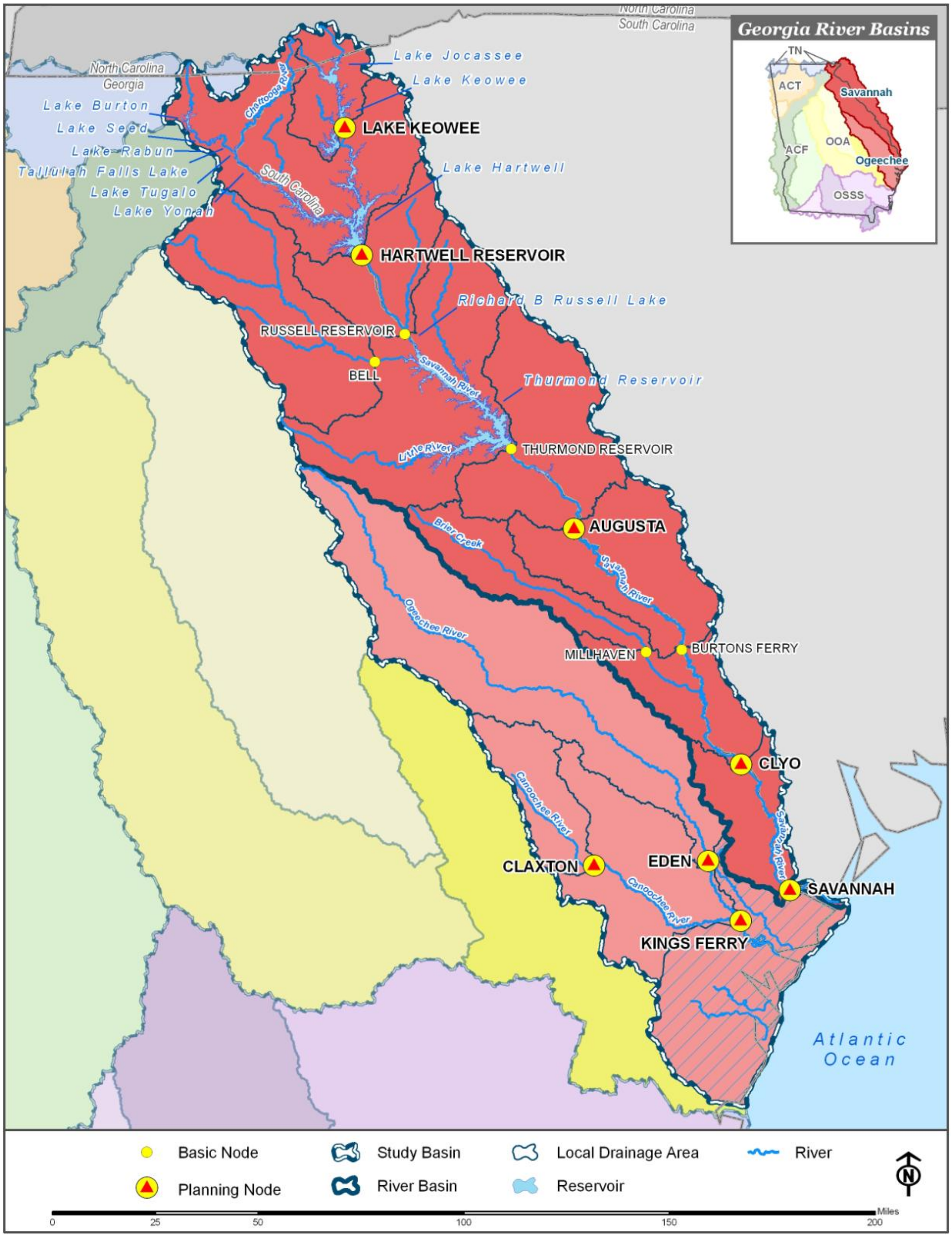

Figure 7-5 SO Study Basin

7.6 TN Study Basin

The TN basin drains an area of 2,100 square miles in northern Georgia and small portions of southwestern North Carolina, southeastern Tennessee, and northeastern Alabama. The Georgia portion of the TN basin is split between three tributaries along the northern border of Georgia. The Little Tennessee River basin drains an area of 85 square miles and begins in the state of Georgia and drains north into North Carolina. The Toccoa-Nottely-Hiwassee River basin drains an area of 1,030 square miles and begins in the state of Georgia and drains northwest into Tennessee and North Carolina. The South Chickamauga-Lookout Creek basin drains an area of 970 square miles and begins in the states of Georgia and Alabama and drains north into Tennessee.

Toccoa-Nottely-Hiwassee River basin flows are regulated by TVA reservoirs on each of the three major rivers. The TVA reservoirs are operated primarily as flood control and hydropower facilities. The three reservoirs – Blue Ridge, Nottely, and Chatuge– comprise basic or planning nodes for surface water availability assessment purposes. The Little Tennessee River and the South Chickamauga-Lookout Creek basins are largely unregulated. The TN study basin map showing node locations and local drainage areas for each is shown on Figure 7-2.

The TN basin consists of six planning nodes. Each planning node is listed below with the type of water uses at the node. More detailed descriptions of the nodes are provided in the appendix.

- Chatuge Dam (regulated) – Located on the Hiwassee River below Chatuge Dam near Hayesville, North Carolina. This node has municipal demands and returns.

- Chickamauga (unregulated) – Located on South Chickamauga Creek near Chickamauga, Tennessee. This node has municipal demands and returns, industrial demands and returns, and agricultural demands.

- Copperhill (semi-regulated) – Located on the Ocoee River in Copperhill, Tennessee. This node has municipal demands and returns.

- New England (unregulated) – Located on Lookout Creek near England, Georgia. This node has municipal demands and returns.

- Little Tennessee (unregulated) – Planning node at the Georgia-North Carolina boundary in the TN basin. This node has industrial returns.

- Nottely Dam (regulated) – Located on the Nottely River at Nottely Dam near Ivylog, Georgia. This node has municipal demands and returns.

Of these 6 planning nodes, 3 are regulated or semi-regulated. Modeling of current conditions indicated that there are no shortfalls at any of these nodes. For the 3 unregulated nodes, shortfalls were seen at 2 nodes. The means of summarizing results for regulated and semi-regulated nodes differ from the means used for summarizing unregulated nodes. Water availability at regulated and semi-regulated nodes is examined by the average demand shortage, the average at site flow requirement shortage, the minimum reservoir storage (expressed as volume and percent of total seasonal volume remaining), and the average basinwide requirement shortage. Water availability at unregulated nodes is examined by the percent of time flow is below the adjusted flow regime (AFR), the average shortfall, the long-term average flow, the maximum shortfall, and the flow regime corresponding to the maximum shortfall. Summary results statistics for the nodes in this study basin are presented in the following tables.

Table 7-6-1 TN Regulated and Semi-Regulated Nodes

Node	Average Demand Shortage (cfs)	Average at Site Flow Requirement Shortfall (cfs)	Minimum Reservoir Storage (Acre-Feet)	Minimum Percent Reservoir Storage (%)	Average Basinwide Flow Requirement Shortfall (cfs)
Copperhill	0	0	155900 at Blue Ridge	96 At Blue Ridge	None
Nottely Dam	0	0	133650 at Nottely	96 at Nottely	None
Chatuge Dam	0	0	155450 at Chatuge	97 at Chatuge	None

Table 7-6-2 TN Unregulated Nodes

Node	Percent of Time Flow is Below the Adjusted Flow Regime (AFR) (%)	Average Shortfall (cfs)	Long-Term Average Flow (cfs)	Maximum Shortfall (cfs)	Flow Regime Target Corresponding to the Maximum Shortfall (cfs)
New England	7	3	249	4	12
Chickamauga	1	6	691	9	48
Little Tennessee	0	0	150	0	N/A

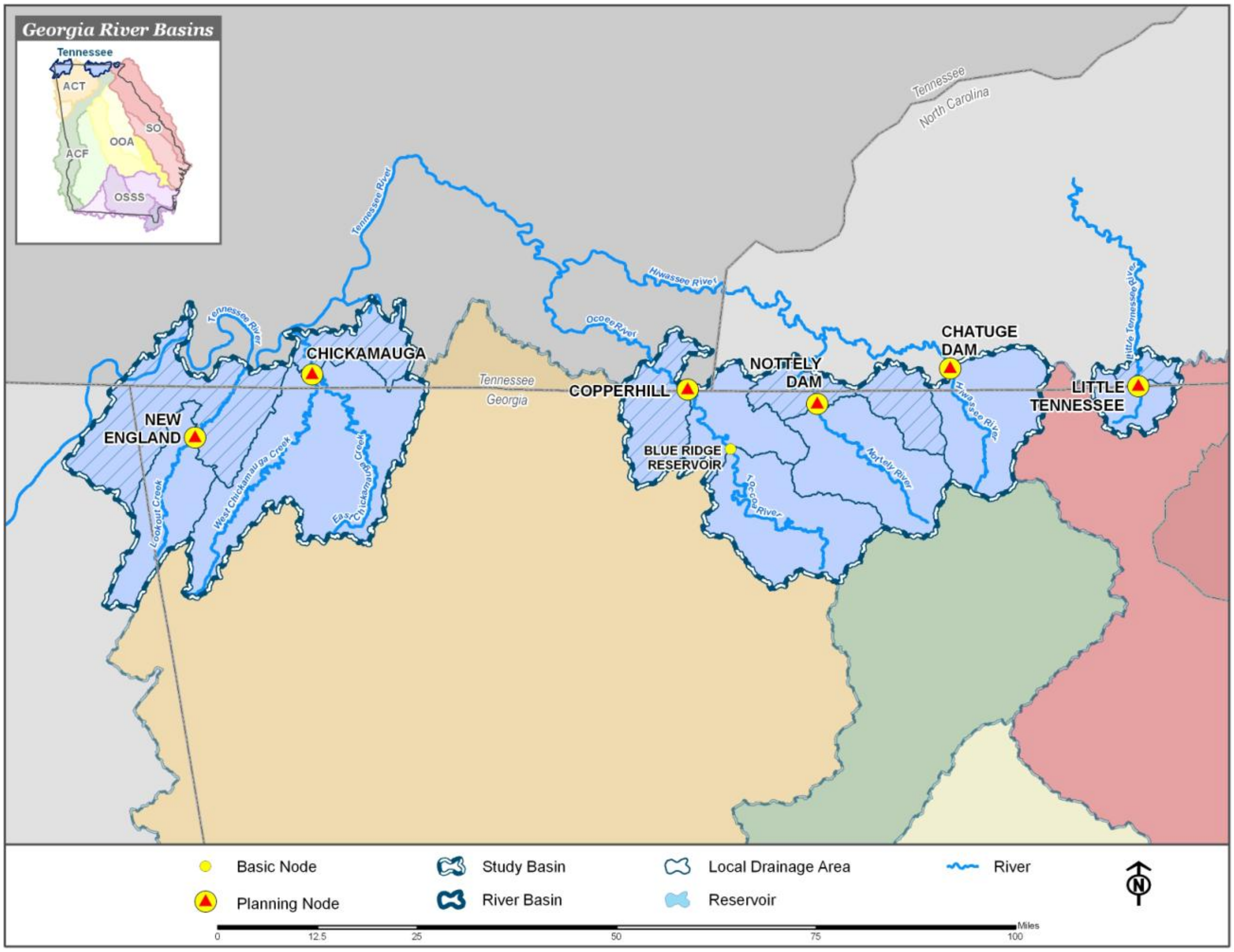

Figure 7-6 TN Study Basin