
In This Section

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- Surface Water Quantity
- Ground Water Quantity

Section 3

Water Quantity

This section addresses water quantity issues (availability and use), while water quality in the Savannah basin is the subject of Section 4. Water use in the Savannah River Basin is measured by estimates of freshwater withdrawn from groundwater and surface water. Uses of water include both consumptive and nonconsumptive uses.

Surface water is the primary water source in the Piedmont Province of the Savannah River basin because ground water yields from crystalline rock aquifers tend to be low. Within the Coastal Plain province, aquifer yields are higher and ground water withdrawals are an important part of the total water budget. Although most public-supply withdrawals in the Piedmont Province are from surface-water sources, with the exception of counties near or immediately below the Fall Line, most public-supply water in the Coastal Plain comes from ground water sources. The Floridan aquifer system supplied most of the ground water used in the basin in 1990, followed by the Claiborne, Clayton, Piedmont crystalline rock, and the Providence aquifer systems. As previously mentioned, the two sources of supply are not independent, because ground water discharge to streams is important in maintaining dry-weather flow. Thus, withdrawal of ground water can, under certain conditions, also result in reduction in surface water flow.

Surface water use in the Savannah River basin is expected to increase in the near future, due to a population increase in the basin and a generally favorable employment outlook. Augusta-Richmond County is the largest municipal (50 mgd) permittee in the Savannah basin with the Augusta Canal as the source. The Savannah Electric and Power Company is the largest industrial (174.0 mgd) permittee in the basin with the Savannah River as the source.

In the following sections, water availability is discussed from a number of viewpoints. First, the important topic of drinking water is presented, which includes both surface and ground water supplies. Then, general surface water availability is presented, followed by ground water availability.

3.1 Drinking Water Supply

3.1.1 Drinking Water Supplies in the Savannah River Basin

The Savannah River basin provides drinking water for nearly 500,000 people in the state of Georgia by municipal or privately owned public water systems. A public water system pipes water for human consumption and has at least 15 service connections or regularly serves at least 25 individuals 60 or more days out of the year. Public water system sources include surface water pumped from rivers and creeks or ground water pumped to the surface from wells or naturally flowing from springs. There are three different types of public water systems: community, non-community non-transient, and non-community transient.

Types of Public Water Systems

A community public water system serves at least 15 service connections used by year round residents or regularly serves at least 25 year-round residents. Examples of community water systems are municipalities, such as cities, counties, and authorities which serve residential homes and businesses located in the areas. Other types of community public water systems include rural subdivisions or mobile home parks which have a large number of homes connected to a private public water system, usually a small number of wells.

A non-community non-transient public water system serves at least 25 of the same persons over six months per year. Examples of non-community non-transient systems are schools, office buildings, and factories which are served by a well.

A non-community transient public water system does not meet the definition of a non-community non-transient system. A non-community transient public water system provides piped water for human consumption to at least 15 service connections or which regularly serves at least 25 persons at least 60 days a year. Examples of a non-community transient are highway rest stops, restaurants, motels, and golf courses.

Private domestic wells serving individual houses are not covered by the state's public water system regulations. However, the regulations for drilling domestic wells are set by the Water Well Standards Act and the local health department is responsible for insuring water quality.

In the Savannah River basin there are 17 community public water systems utilizing surface water and serving 342,410 people and 134 community public water systems utilizing ground water and serving 124,136 people (Table 3-1). The locations of surface water intakes within each of the Hydrologic Units of the Savannah River basin are shown in Figures 3-1 through 3-7.

3.1.2 Drinking Water Demands

Over the next few years there will be an increase in the withdrawal of surface water to be used for drinking water from the Savannah River Basin. Two of the largest and expanding urban areas, Augusta-Richmond County and Savannah, currently utilize both ground water and surface water for drinking water uses. Currently the Savannah "Industrial and Domestic" intake (on Abercorn Creek part of the Savannah River) and water system are serving mainly industries in the Chatham County area. However since Chatham County is one of the four "cap" counties targeted for reduce groundwater usage due to saltwater intrusion, the use of surface water for drinking water will be increasing. Currently Savannah is in the process of expanding the surface water plant and capacity of

Table 3-I. Community Public Water Systems in the Savannah River Basin

Drinking Water Permit Number	Water System Name	County
HUC 03060102		
GA1190003	Lavonia	Franklin
GA1470055	Paradise Pt-Chateau Estate	Hart
GA1470056	Paradise Pt-Reed Creek Subdivision	Hart
GA1470057	Paradise Pt-Reed Creek Point	Hart
GA1470058	Paradise Pt-Vickery Point	Hart
GA2410001	Tallulah Falls	Rabun
GA2410033	Screamer Mountain Subdivision	Rabun
GA2410097	Covecrest Subdivision	Rabun
GA2410118	Clayton-Rabun Co. Authority	Rabun
GA2410119	Laurel Ridge Subdivision	Rabun
GA2410120	Sandy Ford Subdivision	Rabun
GA2570001	Toccoa	Stephens
GA2570011	Toccoa Falls College	Stephens
GA2570020	Toccoa Falls College Mobile Home Park	Stephens
GA2570026	Mill Bridge Mobile Home Park	Stephens
GA2570029	Lake Harbor Shores Subdivision	Stephens
HUC 03060103		
GA1050001	Elberton	Elbert
GA1050036	Beaverdam Mobile Home Park	Elbert
GA1470000	Hartwell	Hart
GA1470008	Bowersville	Hart
GA1470009	Paradise Pt-Tahoe/York Subdivision	Hart
GA1470051	Sanders Mobile Home Park	Hart
GA1470052	Paradise Pt-McMullen Subdivision	Hart
GA1470053	Paradise Pt-Milltown Point	Hart
GA1470060	Bamboo Point Subdivision HOA	Hart
GA1810000	Lincolnton	Lincoln
GA1810002	Montego Point	Lincoln
GA1810038	Lincoln County Water System	Lincoln
GA3170001	Tignall	Wilkes
HUC 03060104		
GA0110000	Homer	Banks
GA0110001	Maysville	Banks
GA0110026	Banks Co Structure #11	Banks
GA1050000	Bowman	Elbert
GA1050009	Whispering Pines Mobile Home Park	Elbert
GA1050012	Heardmont Healthcare Center	Elbert
GA1050013	Nancy Hart Memorial Medical Ct	Elbert
GA1050034	Northwood Hills Subdivision	Elbert
GA1050038	Shadylane Mobile Home Park	Elbert
GA1190000	Canon	Franklin
GA1190001	Carnesville	Franklin
GA1190002	Franklin Springs	Franklin
GA1190004	Royston	Franklin
GA1190046	Springwater Mobile Home Park	Franklin
GA1190051	Franklin County Water System	Franklin
GA1190052	Nails Creek Crossing	Franklin
GA1570001	Commerce	Jackson
GA1950000	Carlton	Madison
GA1950001	Colbert	Madison
GA1950002	Comer	Madison
GA1950003	Danielsville	Madison

Drinking Water Permit Number	Water System Name	County
GA1950004	Ila	Madison
GA1950006	Brown Brothers Farm Subdivision	Madison
GA1950009	Tranquility Forest Mobile Home Park	Madison
GA1950011	Westbrook Trailer Park	Madison
GA1950012	Hidden Forest Subdivision	Madison
GA1950015	Morningside Village Trailer Park	Madison
GA1950043	Madison Acres Subdivision	Madison
GA1950045	Apple Acres-Kingston-Gatewood	Madison
GA1950047	Ray's Mobile Home Park	Madison
GA1950049	Patterson Place/McCellan Court	Madison
GA1950052	W & R Farms Subdivision	Madison
GA1950056	Strickland's Mobile Home Park	Madison
GA2210000	Crawford	Oglethorp
GA2210001	Lexington	Oglethorp
GA2210004	Arnoldsville	Oglethorp
GA2210049	Wolfskin Subdivision	Oglethorp
GA2570000	Martin	Stephens
GA3170000	Rayle Water Association	Wilkes
HUC 03060105		
GA0730001	Grovetown	Columbia
GA0730002	Harlem	Columbia
GA0730077	Lake Crossing Health Center	Columbia
GA1330002	Union Point	Greene
GA1330004	Woodville	Greene
GA2210002	Maxeys	Oglethorp
GA3010000	Camak	Warren
GA3010004	Norwood	Warren
GA3170002	Washington	Wilkes
HUC 03060105 and 03060106		
GA0730000	Columbia County	Columbia
GA1890001	Thomson-McFuffie Co Water & Sewage	McDuffie
HUC 03060106		
GA0730010	Martinez Water Assoc.	Columbia
GA0730017	Windy Acres Mobile Home Park	Columbia
GA2450000	Augusta-Richmond Co Watr System	Richmond
GA2450002	Hephzibah	Richmond
GA2450011	Plantation Acres Mobile Home Park, LLC	Richmond
GA2450014	Mars Trailer Park	Richmond
GA2450016	Mobile Home Country Club	Richmond
GA2450017	Hephzibah-Oakridge	Richmond
GA2450023	Gracewood State School & Hosp.	Richmond
GA2450028	USA-Fort Gordon	Richmond
GA2450029	Heritage Mobile Home Park	Richmond
GA2450038	Simon Trailer Park	Richmond
GA2450061	Oakdale Trailer Park	Richmond
GA2450156	Woodland Trailer Park	Richmond
HUC 03060108		
GA0330000	Girard	Burke
GA0330002	Sardis	Burke
GA0330004	Waynesboro	Burke
GA0330013	Mamie Joe Rhodes Harrison Subdivision	Burke
GA0330044	Keyville	Burke
GA0730020	Mobile City Mobile Home Park	Columbia
GA0730022	Pine Needle Trailer Park	Columbia

Drinking Water Permit Number	Water System Name	County
GA1630005	Wrens	Jefferson
GA1630011	Brown Terrace Subdivision	Jefferson
GA2450001	Blythe	Richmond
GA2510000	Hiltonia	Screven
GA2510046	Rem-Kim Trailer Park	Screven
GA2510047	Friendship Trailer Park	Screven
GA2510050	Lawton Place Mobile Home Park	Screven
HUC 03060109		
GA0510000	Garden City	Chatham
GA0510002	Port Wentworth	Chatham
GA0510003	Savannah-Main	Chatham
GA0510004	Savannah-Industrial & Domestic	Chatham
GA0510005	Tybee Island	Chatham
GA0510019	Cherokee Mobile Home Park	Chatham
GA0510041	Pine Forest Subdivision	Chatham
GA0510092	Derenne Plaza Condo	Chatham
GA0510136	C & S Mobile Estates	Chatham
GA0510137	Barnwell Gardens Subdivision	Chatham
GA0510239	Chatham Co-Savannah Port Authority	Chatham
GA1030001	Rincon	Effingham
GA1030002	Springfield	Effingham
GA1030010	Lakeside Farms/Bloomingdale Subdivision	Effingham
GA1030012	Westwood Heights Subdivision	Effingham
GA1030019	Tara Mobile Home Park	Effingham
GA1030030	Cub Enterprises, L.L.C.	Effingham
GA1030031	Lake Cherie Mobile Home Park	Effingham
GA1030033	Twin Oaks Mobile Home Park	Effingham
GA1030036	Red Gate Mobile Home Park	Effingham
GA1030077	Goshen Villa Subdivision	Effingham
GA1030079	Coastal Chlor-Paddleford Plan.	Effingham
GA1030080	Quail Run Mobile Home Estates	Effingham
GA1030081	Brothers` Keepers	Effingham
GA1030082	Auriga Farms	Effingham
GA1030084	Hunts Mobile Home Park	Effingham
GA1030087	South Effingham Woods Water Co	Effingham
GA1030088	Hawk Hammock	Effingham
GA1030092	Coachwood Estates	Effingham
GA1030093	Saddlebrook Subdivision	Effingham
GA1030095	Wrph Ltd-Pine Hill Subdivision	Effingham
GA1030100	Hickory Knob Subdivision	Effingham
GA1030101	Deerwood Subdivision-Green Peace Park	Effingham
GA1030103	Waterford Plantation Subdivision	Effingham
GA1030108	Lakewood Subdivision	Effingham
GA1030109	Hunters Mill Subdivision	Effingham
GA1030110	Mill Creek Subdivision	Effingham
GA1030115	Twenty-one Center	Effingham
GA1030120	Barrington Subdivision	Effingham
GA1030122	Sandy Woods Subdivision	Effingham
GA1030124	Oetgen`s Mobile Home Park	Effingham
GA2510003	Sylvania	Screven
GA2510021	Brinsons Trailer Park	Screven
GA2510049	Screven Co. Prison	Screven

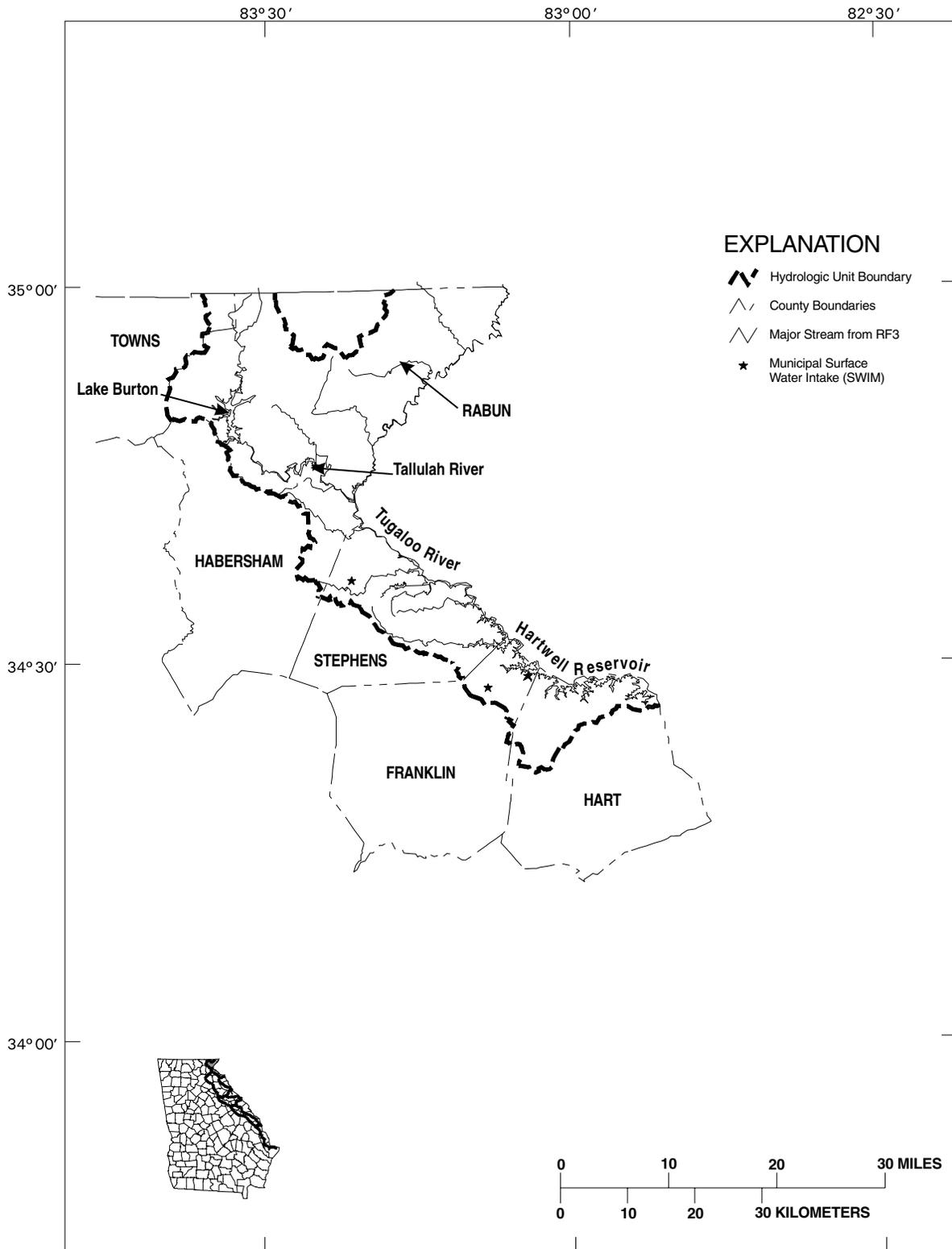


Figure 3-I. Surface Water Intakes, Savannah River Basin, HUC 03060102

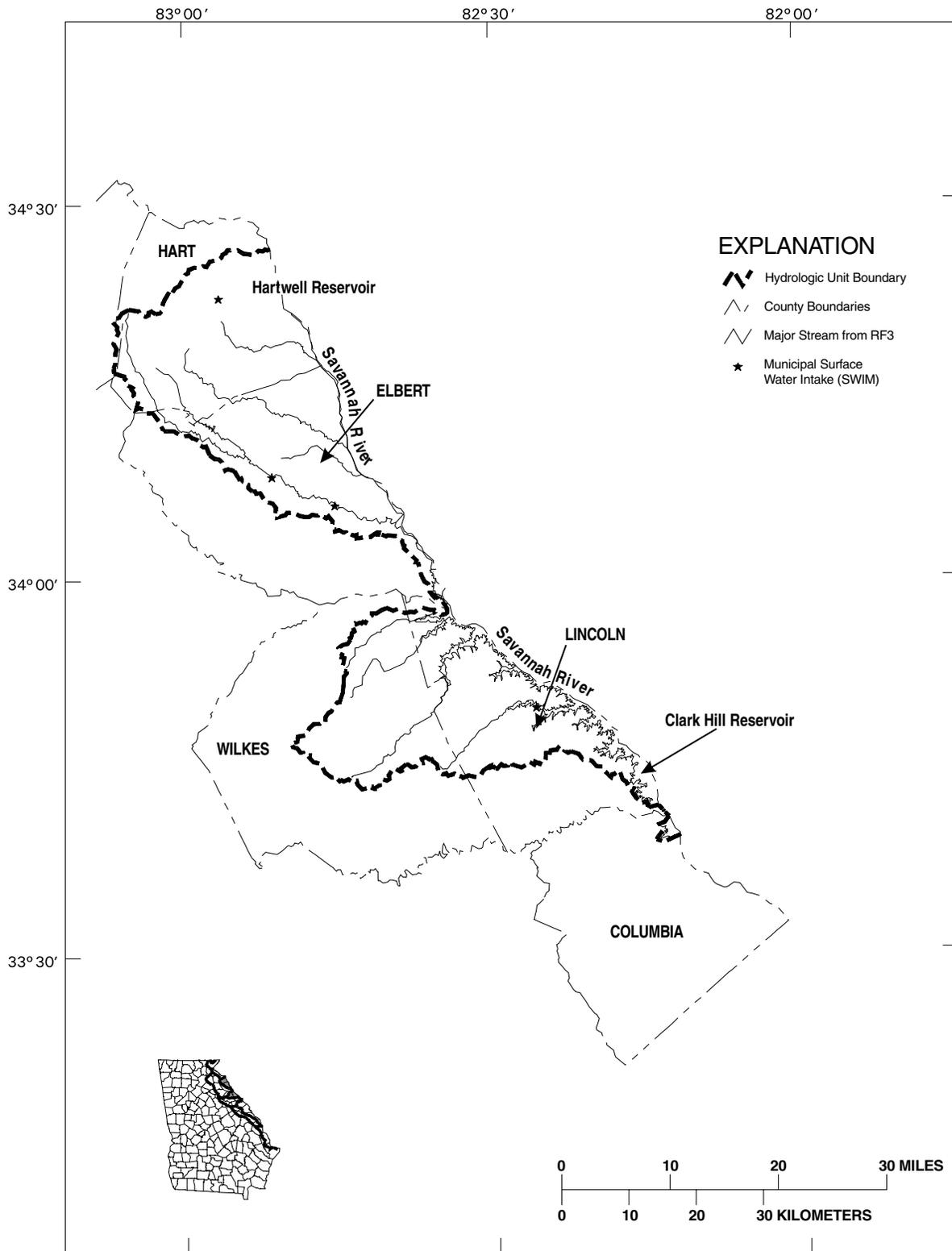


Figure 3-2. Surface Water Intakes, Savannah River Basin, HUC 03060103

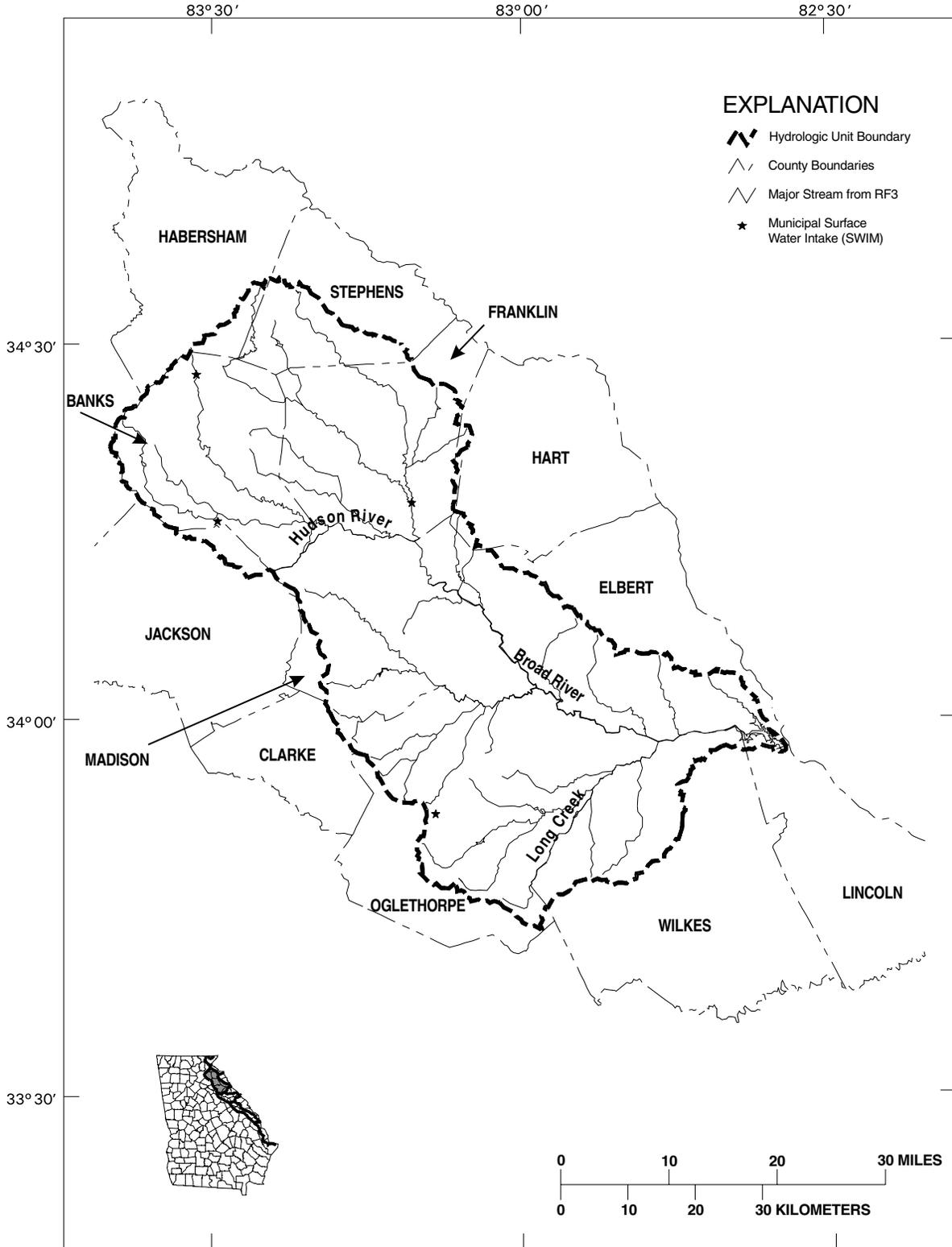


Figure 3-3. Surface Water Intakes, Savannah River Basin, HUC 03060104

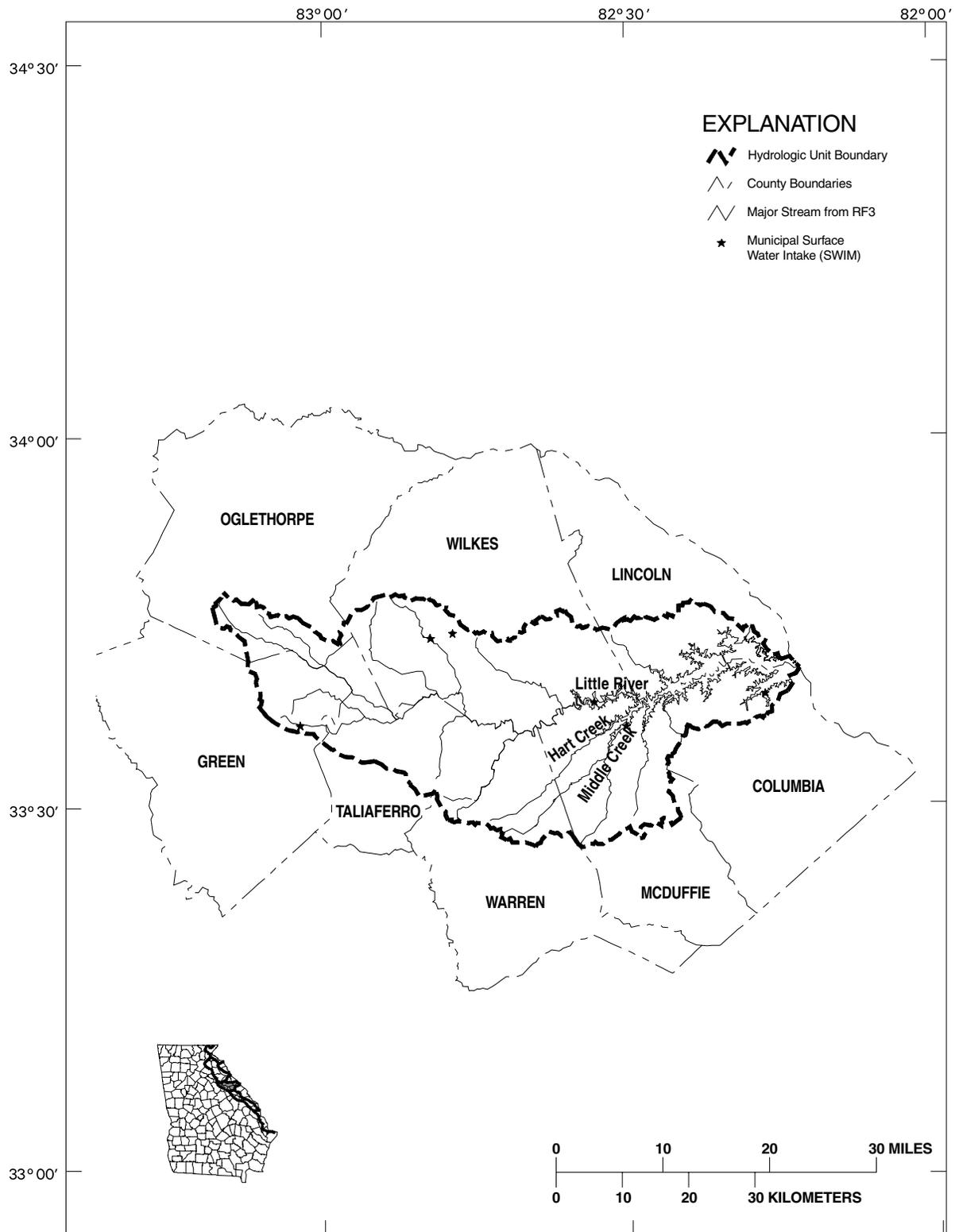


Figure 3-4. Surface Water Intakes, Savannah River Basin, HUC 03060105

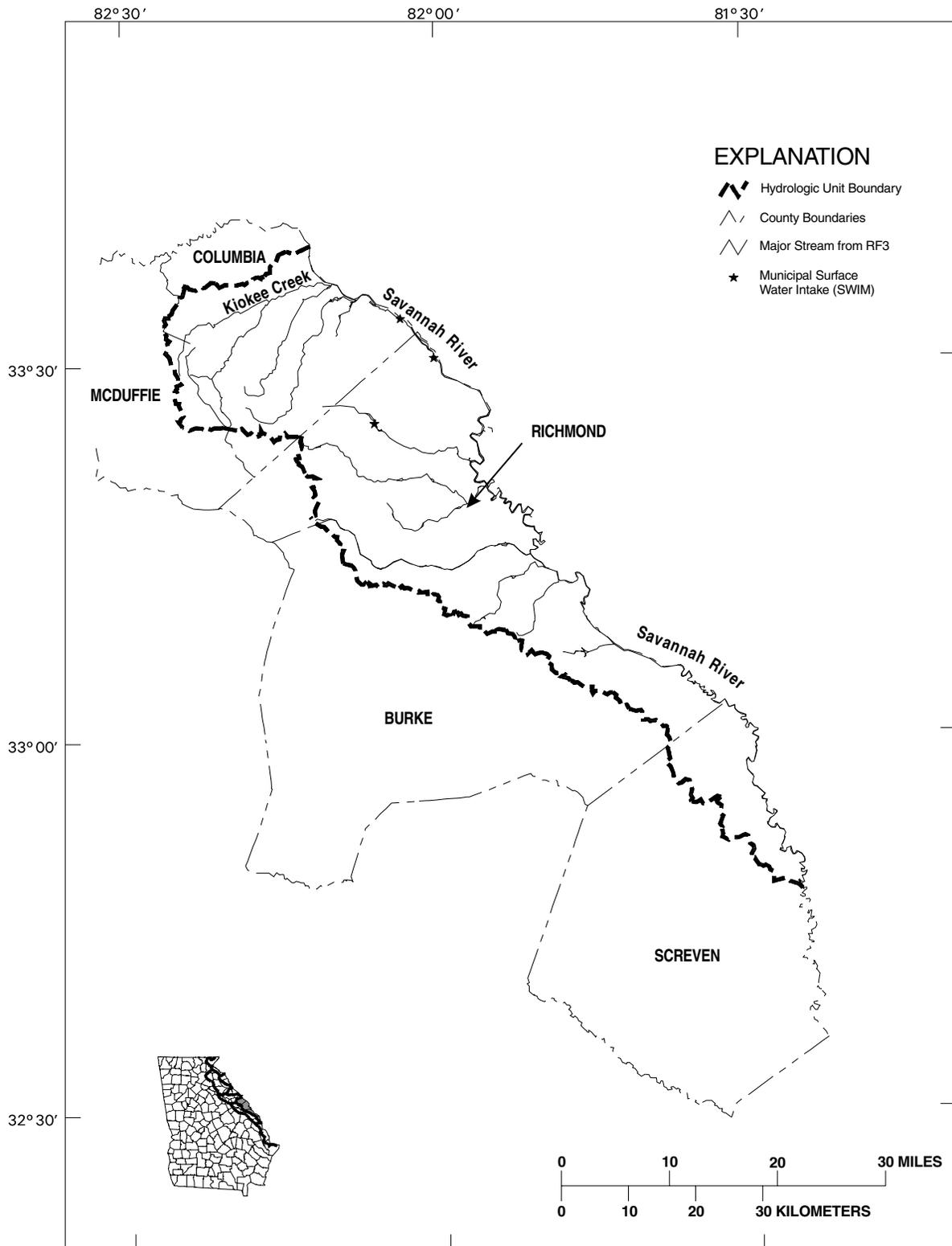


Figure 3-5. Surface Water Intakes, Savannah River Basin, HUC 03060106

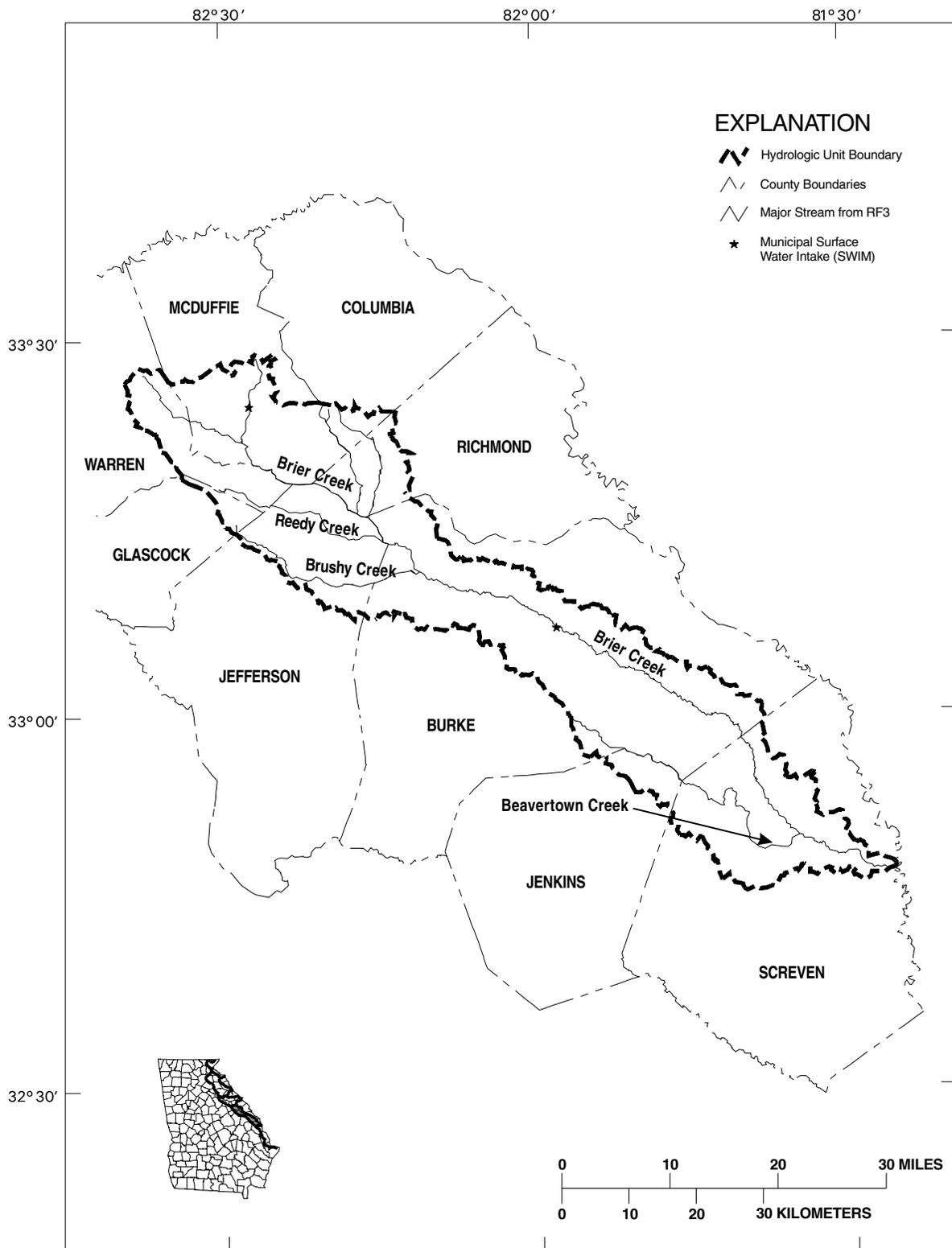


Figure 3-6. Surface Water Intakes, Savannah River Basin, HUC 03060108

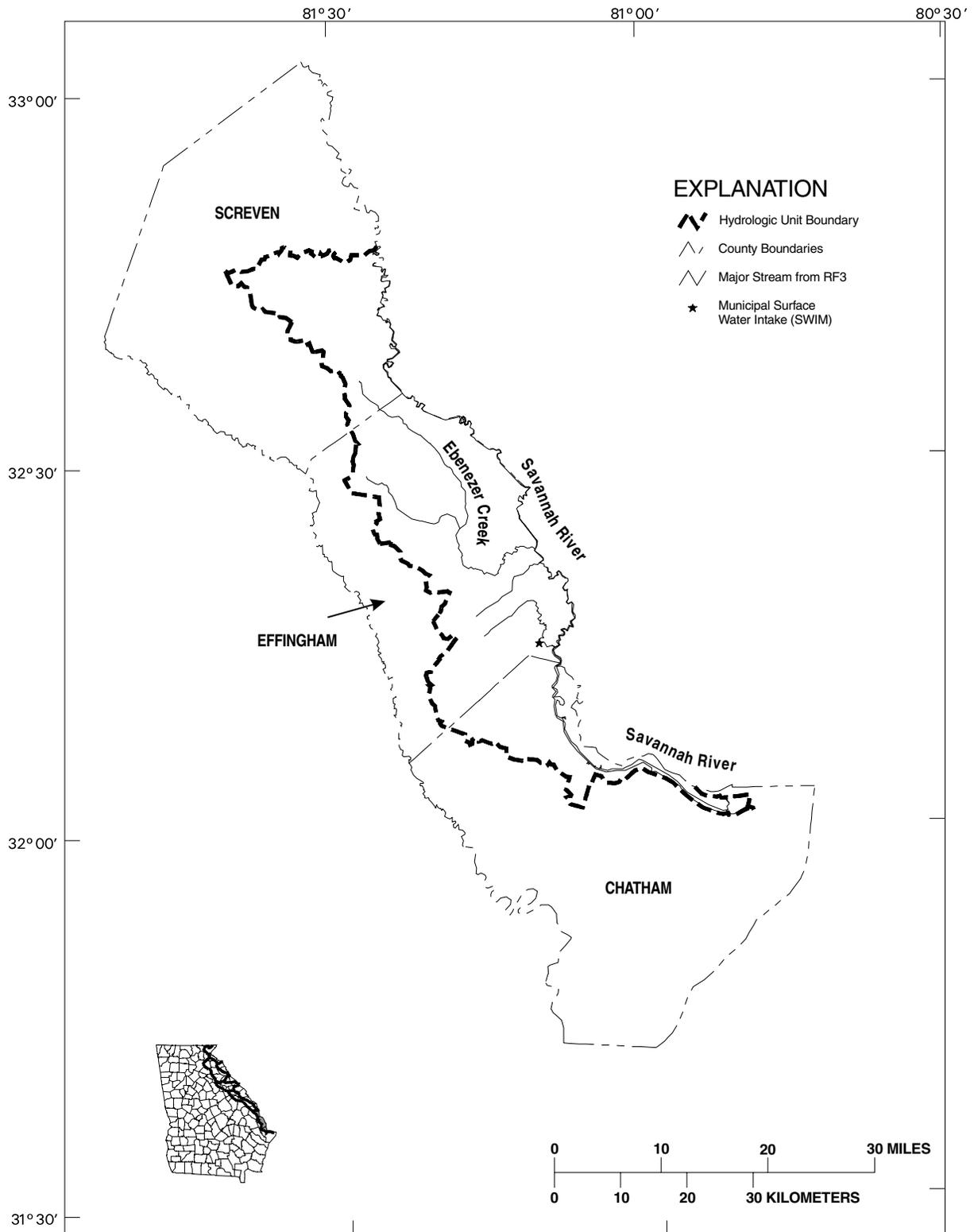


Figure 3-7. Surface Water Intakes, Savannah River Basin, HUC 03060109

the intake. Augusta-Richmond County currently has an intake on the Augusta Canal (part of the Savannah River) and numerous wells scattered in the county area. Augusta-Richmond County have future plans to expand the current intake or build a new one. Also Habersham County, located in the headwaters of the Savannah River, has plans to withdraw water from the Savannah River basin for drinking water uses.

Water Conservation techniques including low flow household plumbing in new construction, can help to mitigate increasing water demand. In 1990, Georgia became one of the first states to adopt ultra-low flow standards for plumbing fixtures. Under this law, local governments were required to adopt ultra-low flow standards (1.6 gpf toilets, 2.5 gpm showerheads, 1.0 gpf urinals, etc.) In order to remain eligible to receive any state water or wastewater grant or loan. These requirements were implemented in 1991 and 1992 and apply to new residential and commercial construction and renovations that include replacement of plumbing fixtures.

3.1.3 Drinking Water Permitting

The Georgia Safe Drinking water Act of 1997, the Rules for Safe Drinking Water (391-3-5) adopted under the act require any person who owns and/or operates a public water system to obtain a permit to operate a public water system from the Environmental Protection Division. The permitting process has three phases: Inquiry and Discovery, Technical Review, and Permitting. During these phases the owners must provide a detailed description of the project; demonstrate the reliability of the water source; render engineering plans and specifications prepared by a professional engineer demonstrating the construction integrity of wells, treatment and distribution; conduct preliminary water sample testing; and legal documentation including an application to operate a public water system. Permits contain specific conditions the owner must meet for different types of public water systems, including a list of approved water sources, filter rates, disinfection and treatment requirements, compliance with sample testing schedule, and number of allowed service connections. Permits are issued for 10 years and are renewable.

3.2 Surface Water Quantity

3.2.1 Surface Water Supply Sources

Surface water supplies in the Savannah basin include water in rivers, ponds, small reservoirs and major federal impoundments. The Savannah River flows in a southeasterly direction for 300 miles from its headwaters in the Blue Ridge Mountains, through Hartwell Lake, Richard B. Russell Lake, and Clarks Hill Lake, and past the cities of Augusta and Savannah, before emptying into the Atlantic Ocean. Total mean annual flow in the Savannah Basin has been estimated to be 13,100 cubic feet per second (cfs) or 8500 million gallons per day (mgd).

3.2.2 Surface Water Supply Demands and Uses

Municipal and Industrial Demand

Municipal and industrial (M&I) water demands include publicly supplied and privately supplied residential, commercial, governmental, institutional, industrial, manufacturing, and other demands such as distribution system water losses. The Army Corps of Engineers, Savannah District, along with the states of Georgia and South Carolina are developing a new updated comprehensive water resources management

study to determine water supply allocations including future demands of the Savannah basin. The study will also examine flood control, hydropower, water quality, habitat, aquatic plant control and recreation issues and is scheduled to be completed in September 2003.

Existing M&I permits for municipal and industrial (nonagricultural) surface water withdrawals in the Savannah River Basin are shown in Table 3-2.

Table 3-2. Permits for Surface Water Withdrawals in the Savannah River Basin

Facility Name	Source Water	Max Day Withdrawal (Mgd)	Monthly Average (Mgd)	County
Augusta-Richmond County	Augusta Canal	50.00	45.00	Richmond
Augusta-Richmond County	Savannah River	37.00	30.00	Richmond
Banks County Board of Commissioners	Mtn. Cr. Res. Strctr 11	1.00	0.70	Banks
Clayton-Rabun Co. Water & Sewer Authority	Lake Rabun	2.00	2.00	Rabun
Columbia County Board of Commissioners	Clarks Hill Reservoir	2.00	2.00	Columbia
Columbia County Water System	Stevens Creek Reservoir	25.00	20.00	Columbia
Commerce, City of	Grove Creek	2.00	1.70	Jackson
Crawford, City of	Trib to Long Creek	0.43	0.25	Oglethorpe
DSM Chemicals Augusta, Inc.	Savannah River	8.20	6.80	Richmond
Elberton, City of	Lake Russell	4.10	3.70	Elbert
Elberton, City of	Beaverdam Creek	2.20	1.70	Elbert
Fort Gordon - Butler Creek	Butler Creek	5.40	5.00	Richmond
Fort Gordon - Cow Branch	Cow Branch	0.60	0.50	Richmond
Fort James Operating Company	Savannah River	35.00	35.00	Effingham
Hartwell, City of	Lake Hartwell	4.50	3.50	Hart
International Paper Board Company, Inc.	Savannah River	85.00	80.00	Richmond
J M Huber Corp - Brier Creek	Brier Creek	4.50	2.50	Warren
J M Huber Corp - Reedy Creek	Reedy Creek	5.80	4.00	Jefferson
Kerr-Mc Gee Chemical	Savannah River	30.00	20.00	Chatham
Kingwood County Club	Trib to Chechero Creek	0.20	0.20	Rabun
Lavonia, City of	Crawford Creek	1.50	1.50	Franklin
Lavonia, City of	Lake Hartwell	0.80	0.20	Franklin
Lee Arrendale Correctional Institute	Little Hudson Creek	0.25	0.22	Banks
Lincolnton, City of	Clarks Hill Reservoir	0.63	0.63	Lincoln
Martin Marietta Aggregates-Augusta Quarry	Sump Pit	3.30	1.20	Richmond
Martin Marietta Aggregates-Camak Quarry	Sump Pit	2.30	0.60	Warren
Martin Marietta Aggregates-Homer Quarry	Sump Pit	1.50	0.60	Banks
Olin Corporation	Savannah River	4.00	2.21	Richmond
PCS Nitrogen Fertilizer, L.P.	Savannah River	21.60	10.80	Richmond
Peridot	Savannah River	5.65	5.30	Richmond
Royston, City of	N Fork of Broad River	0.70	0.40	Franklin
Savannah Electric & Power Co-Effingham	Savannah River	130.00	130.00	Effingham
Savannah Electric & Power Co-Riverside	Savannah River	174.00	174.00	Chatham
Savannah Electric & Pwr Co-Pt Wentworth	Savannah River	267.00	267.00	Chatham
Savannah Ind. & Domestic Water	Abercorn Creek	55.00	50.00	Effingham
Southern Nuclear Operating Co., Inc.	Savannah River	127.00	85.00	Burke
Thiele Kaolin Company	Newsome's Pond	0.75	0.50	Warren
Thomson-McDuffie County W/s Commission	Usry's Lake	2.00	1.50	McDuffie
Thomson-McDuffie County W/s Commission	Clarks Hill Reservoir	3.00	2.00	McDuffie
Toccoa, City of - Lake Toccoa	Lake Toccoa	7.50	6.50	Stephens

Facility Name	Source Water	Max Day Withdrawal (Mgd)	Monthly Average (Mgd)	County
Turner Concrete Company, Incorporated	Broad River	0.60	0.35	Madison
Union Camp Corporation	Savannah River	58.00	50.00	Chatham
Union Point, City of	Sherrill Cr Reservoir	0.45	0.33	Greene
Washington, City of - Clarks Hill	Clarks Hill Reservoir	2.20	2.00	Wilkes
Washington, City of - Old Plant	Little Beaverdam Cr	2.20	1.80	Wilkes
Waynesboro, City of	Brier Creek	1.50	1.00	Burke
Willamette Industries, Inc.	Savannah River	30.50	27.50	Chatham
Willamette Industries, Inc.	Savannah River	60.00	30.00	Chatham

Agricultural Water Demand

The total water demand from agriculture, including both surface water and ground water demand, may be estimated using a variety of agricultural data collected by multiple sources. NRCS has attempted to combine this information for the purpose of estimating current, and future, agricultural water use in the basin. Table 3-3 shows historical irrigated acreage in the basin from 1974 to 1995.

Irrigated acres in the Savannah River basin grew from 546 in 1974 to an all time maximum for the basin of 44,612 in 1982. However, approximately 16,450 of these irrigated acres were lost between 1982 and 1984. Since 1984, irrigated acreage has moderated with a steady annual increase to a 1995 total of 33,781 acres. Assuming the 1.8 percent annual growth rate observed between 1984 and 1995 continues, there will be approximately 52,000 acres under irrigation by 2020.

Water Demand

Agricultural water demand is dependent upon a number of variable that include, but are not limited to, irrigated acreage, cropping mix and patterns, soil characteristics, climatic conditions, type of animal operation, best management practices, and market conditions. Water use in the Savannah River basin reflects the influence of these variables (Table 3-4). No distinct trend can be observed; however, from 1980 to 1995 there was an increase of 7 MGD from 24 MGD in 1980 to 31 MGD in 1995. Much of this increase can be attributed to increased acreage under irrigation in the basin.

Table 3-3. Irrigated Acres in the Savannah River Basin, 1974-1995 (shown by HUC and Basin Total)

Savannah River Basin - Irrigated Acres								
	3060102	3060103	3060104	3060105	3060106	3060108	3060109	Basin Total
1974	3.53	8.56	83.83	15.24	145.69	216.14	73.88	546.87
1978	162	160	510	158	3997	7421	647	13054
1979	239	240	470	780	6728	12339	1665	22461
1980	211	325	805	609	9884	17412	3588	32834
1981	347	899	1369	979	11215	21107	4140	40055
1982	374	1457	2585	667	12221	22708	4601	44612
1984	107	530	1792	1050	7239	14047	3399	28164
1986	269	593	1351	969	7404	14317	3864	28768
1989	740	1327	1388	194	8013	15179	4445	31285
1992	778	2095	1849	996	7858	15210	3860	32647
1995	1273	3219	1279	726	8433	16000	2851	33781

USDA-NRCS estimates are based on county level data extrapolated to the basin.

Table 3-4 Historical Agricultural Water Use in the Savannah River Basin, 1980-1995 (shown by HUC and Basin Total)

Year	3060102	3060103	3060104	3060105	3060106	3060108	3060109	Basin Total
1980	0.62	0.49	1.96	0.93	6.57	10.48	2.89	23.94
1985	0.41	1.13	2.33	0.9	4.84	7.79	3	20.4
1987	0.58	0.68	2.42	0.86	5.24	9.1	4.59	23.47
1990	0.86	1.47	5.88	0.78	2.96	4.79	2.77	19.51
1995	1.11	1.92	4.78	2.91	8.69	8.49	2.78	30.68

Source: Georgia Geological Survey

Approximately 86 percent of the agricultural water used in 1995 was for irrigation purposes (26.66 MGD). The central portion of the basin just below the Fall Line is where the majority of agricultural irrigation occurs in the basin, the remaining 14 percent (4.34 MGD) was used for animal operations. Ground water sources provided 56 percent of the water used by this industry in 1995.

Future agricultural water demand is expected to increase slightly within the basin to 40.61 MGD by the year 2020. However, undesirable climate and market conditions could force producers to demand as much as 60 MGD on the projected 52,000 acres under irrigation by that time. Table 3-5 shows the likely range of agricultural water demand in the basin through the year 2020. The reader should note that significant increases in irrigated acreage will have the potential to result in a much higher demand.

Power Generation Water Demand

There are three Corps of Engineers power generating plants located within the Savannah basin that use the water resources of the basin. These include Hartwell Lake and Dam, Richard B. Russell Lake and Dam, J. Strom Thurmond Lake and Dam.

Table 3-5 Projected Water Use in the Savannah River Basin, 1995-2020

Irrigated Acres	1995	2000	2005	2010	2015	2020
1.8% growth	33781	36821	40135	43747	47685	51976
Irrigated Water Use (MGD)						
High		32.87	35.82	39.05	42.56	46.39
Medium	26.66	19.17	20.90	22.78	24.83	27.06
Low		13.69	14.93	16.27	17.73	19.33
Animal Water Use		13.55	13.55	13.55	13.55	13.55
Total Water Use (MGD)						
High		46.42	49.37	52.60	56.11	59.94
Medium		32.72	34.45	36.33	38.38	40.61
Low		27.24	28.48	29.82	31.28	32.88

Navigational Water Demand

The Hartwell, Russell and Thurmond projects allow adequate flows to be maintained for navigation other than during low flow periods. The New Savannah Bluff Lock and Dam (Savannah River Mile 202.6), part of the inactive Savannah River Below Augusta Navigation Project, has little commercial navigation above the Savannah Harbor.

Recreation

Recreation in the Savannah River Basin includes fishing activities, boating, swimming, picnicking and other activities.

Fish and Wildlife Water Demand

Three state fish hatcheries are located in the Georgia portion of the Savannah River basin, which include Lake Burton Trout Hatchery (Rabun County), McDuffie Fish Hatchery (McDuffie County), and Richmond Hill Fish Hatchery (Bryan County). Lake Burton Hatchery obtains water from Mocassin Creek about 50 yards upstream from the backwaters of Lake Burton. Mean monthly flow through the raceway system at Burton Hatchery ranges from 6,232 gpm in January to 4,876 gpm in September, with an annual average of 5,461 gpm. For peak efficiency and maximum production, Lake Burton Hatchery requires 6,600 gpm through the raceway system.

Waste Assimilation Water Demand

Water quality, wastewater treatment, and wastewater discharge permitting are addressed in Section 4. However, it should be noted that the guidelines for discharge of treated effluent into the rivers and streams of the Savannah River basin assume that sufficient surface water flow will be available to assimilate waste and ensure that water quality criteria will be met.

Environmental Water Demands

Through the FERC relicensing process, tributary reservoirs were required to maintain agreed upon minimum flows. The three mainstream reservoirs, Hartwell, Russell, and Thurmond, are operated by the United States Army Corps of Engineers and are, therefore, exempt from compliance with state water quality and quantity standards. Aquatic habitat below these federal impoundments is negatively affected by existing operational guidelines for these reservoirs, which result in poor water quality and dewatering of aquatic habitat during non-generation periods.

3.2.3 Surface Water Withdrawal Permitting

The 1977 Surface Water Amendments to the Georgia Water Quality Control Act of 1964 require all nonagricultural users of more than 100,000 GPD on a monthly average (from any Georgia surface water body) to obtain a permit from EPD for this withdrawal. These users include municipalities, industries, military installations, and all other nonagricultural users. The statute stipulates that all pre-1977 users who could establish the quantity of their use prior to 1977 would be “grandfathered” for that amount of withdrawal. Table 3-2 lists the permits in effect in the Savannah River basin.

Applicants are required to submit details relating to the source of withdrawals, demand projections, water conservation measures, low flow protection measures (for nongrandfathered withdrawals), and raw water storage capacities. An EPD-issued permit identifies the source of withdrawal, the monthly average and maximum 24-hour withdrawal, the standard and special conditions under which the permit is valid, and the expiration date of the permit. The standard conditions section of the permit generally defines the reporting requirements (usually annual submission of monthly average withdrawals); the special conditions section of the permit usually specifies measures the permittee is required to undertake so as to protect downstream users and instream uses (e.g. waste assimilation, aquatic habitat). The objective of these permits is to manage and allocate water resources in a manner that both efficiently and equitably meets the needs of all the users.

Farm Irrigation Permits

The 1988 Amendments to the Water Quality Control Act establish the permitting authority within EPD to issue farm irrigation water use permits. As with the previously mentioned surface water permitting statute, the lower threshold is 100,000 GPD; however, users of less water may apply for and be granted a permit. With two exceptions, farm use is defined as irrigation of any land used for general farming, aquaculture, pasture, turf production, orchards, nurseries, watering for farm animals and poultry, and related farm activities. One relevant exception is that the processing of perishable agricultural products is not considered a farm use.

Applicants for these permits who could establish that their use existed prior to July 1, 1988, *and* when these applications were received prior to July 1, 1991, were “grandfathered” for the operating capacity in place prior to July 1, 1988. Other applications are reviewed and granted with an eye towards protection of grandfathered users and the integrity of the resource. Generally, agricultural users are not required to submit any water use reports.

3.2.4 Flooding and Floodplain Management

The Savannah River Basin was unaffected by the massive flooding that occurred in parts of Georgia in 1994, however, seventeen counties within the basin were included in Federal Disaster Declaration #1209 as a result of the 1998 floods that affected a total of 115 counties across the State. The Floods of 1998 further substantiated the fact that flooding is the number one natural hazard in Georgia.

With the exception of Candler, Emanuel and Evans Counties, all disaster declared counties in the Savannah River Basin participate in the National Flood Insurance Program (NFIP). Of the 35 counties associated with the basins, 62 percent are NFIP communities.

Floodplain development is a constant concern, because development within floodplain areas can increase flood levels, thereby increasing the number of people and the amount of property at risk. The term “floodplain management” is often used as a synonym for program or agency-specific projects and regulations. It is in fact quite a broad concept. Floodplain management is a continuous process of making decisions about whether flood plains are to be used for development and how they are to be developed.

The majority of communities in the Savannah River basin are impacted by riverine flooding. As for communities along the coast, they are susceptible to both riverine flooding and flooding from storm-induced waves. Coastal floodplain areas are divided into two adjacent zones that define the different degrees of hazard present. The V zone

(velocity zone), as referenced on the community's flood map, is that portion of the coastal 100-year floodplain that would be inundated by tidal surges with velocity wave action. The A zone is that portion of the 100-year floodplain not subject to wave actions (riverine flooding). The minimum standards for construction in coastal A zones (riverine areas). These minimum standards are incorporated into local flood ordinances adopted by communities as required for participation in the NFIP.

Floodplain Management Activities

To increase understanding and maintain a working knowledge of floodplain management, Georgia's Floodplain Management Office periodically conducts training workshops throughout the State for local officials. On March 24, 1998 at the Regional Development Center (RDC) in Augusta, a floodplain management workshop was held for elected officials and floodplain administrators from communities within the Savannah River Basin. On February 25, 1998, the City of Savannah was host to a floodplain management technical workshop for local building officials from coastal communities participating in the National Flood Insurance Program (NFIP). Savannah was also the site for a Community Rating System (CRS) workshop on November 18, 1997. The CRS is a Federal Emergency Management Agency (FEMA) program that rewards communities that implement floodplain management measures that exceed the minimum standards of the NFIP. Citizens within CRS communities receive discounts on their flood insurance premiums ranging from 5 percent to 45 percent. Chatham County and the cities of Pooler, Savannah and Tybee Island currently participate in the CRS.

The City of Savannah as well as Chatham County and neighboring Bryan, Liberty and McIntosh Counties in the Ogeechee River Basin have joined a new effort of the Federal Emergency Management Agency (FEMA) to create more disaster resistant communities. This new initiative is called "Project Impact." Project Impact works with state and local governments across the country to build communities that are more likely to withstand the ravages of natural disasters. The Savannah area's low elevation makes it vulnerable to tidal flooding and hurricanes. Project Impact's goal is to erase the ceaseless damage-repair-damage cycle by implementing preventive measures before disaster occurs.

3.3 Ground Water Quantity

3.3.1 Ground Water Sources

Generally the Savannah River basin in Georgia is divided into three groundwater regimes. North of the fall line (north of Augusta) is the Piedmont area, a region underlain by igneous and metamorphic crystalline basement rocks. Water is to be found in the overlying weathered zone, in cracks and crevices in the solid rock and in the zones of lithologic contacts. This lack of extensive aquifer greatly limits the amounts of groundwater that can be produced in the Piedmont, so most of the water used is from surface water.

In Richmond, Burke and northern Screven counties, the aquifer of choice is the Cretaceous Sand aquifer. This is a sheet of sand and clay sediments deposited on top of the crystalline basement rock. While the aquifers can deliver a lot of water, high demands in concentrated areas may lead to extensive drawdown, since the aquifer cannot deliver large amounts of water quickly. This is of concern in Augusta, where subdivision growth is putting quite a strain on the resource.

From Screven County south to the coast, the main groundwater source is the Floridan aquifer. This delivers tremendous amounts of water quickly, leading to heavy municipal, industrial and agricultural usage from this source.

3.3.2 Ground Water Supply Demands

Municipal and Industrial Uses

Municipal and Industrial (M&I) water demands include public supplied and private supplied residential, commercial, governmental, institutional, manufacturing and other demands such as distribution system losses.

Existing permitted municipal and industrial groundwater users are shown in the Table 3-6, by county. These permits are for users equal to or greater than 100,000 gallons per day. Users below this amount of groundwater are not required to have a permit for their withdrawals.

Agricultural Water Demand

EPD has issued 201 agricultural permits for surface water withdrawal permits located within the Savannah River basin. The combined permitted capacity pumping capacity of these permits is 220,155 GPM (317 MGD). According to the support information provided with each application, these permits are used to supply water to irrigate some 24, 408 acres of crops, orchards, turf, etc.

Total agricultural water demand for the Savannah River basin is discussed above in Section 3.2.2, and is derived from surface and ground water sources. Agricultural groundwater demand in the Savannah basin is relatively limited. The counties to the north of Richmond are not generally used for farmland. Richmond and Burke counties are now highly developed or becoming more developed and suburban. Screven County and northernmost Effingham County are the only areas where irrigated crops are generally grown. These areas use the Floridan aquifer for their source of groundwater.

3.3.3 Ground Water Supply Permitting

Nonagricultural Permits

The Georgia Ground Water Use Act of 1972 requires permits from EPD for all non-agricultural users of ground water of more than 100,000 GPD. General information required of the applicant includes location (latitude and longitude); past, present, and expected water demand; expected unreasonable adverse effects on other users; the aquifer system from which the water is to be withdrawn; and well construction data. The permits issued by EPD stipulate both the allowable monthly average and annual average withdrawal rates, standard and special conditions under which the permit is valid, and the expiration date of the permit. Ground water use reports are generally required of the applicant on a semi-annual basis. The objective here is the same as with surface water permits. There are no active Georgia municipal and industrial ground water withdrawal permits in the Savannah basin.

Table 3-6 Permits for Groundwater Withdrawals from the Savannah River Basin

County	Permit Number	Permit User Name	Permitted Monthly Avg W/D (MGD)	Permitted Yearly Avg W/D (MGD)	Permitted Aquifer
Burke	017-0001	Sardis, City of	0.200	0.200	Floridan
Burke	017-0002	Waynesboro, City of	4.000	3.500	Cretaceous Sand
Burke	017-0003	Southern Nuclear Operating Co-Plant Vogtle	6.000	5.500	Cretaceous Sand
Chatham	025-0004	National Gypsum - Gold Bond Building Products	0.190	0.185	Floridan
Chatham	025-0005	Pooler, City of	1.136	0.900	Floridan
Chatham	025-0006	Savannah Sugar Refinery	1.080	1.080	Floridan
Chatham	025-0007	Garden City, City of	2.000	1.500	Floridan
Chatham	025-0008	Kemira, Incorporated	4.700	4.400	Floridan
Chatham	025-0009	Union Camp - Savannah Plant	30.100	25.300	Floridan
Chatham	025-0010	Landings Club, Inc - Golf Well #1	0.500	0.225	Floridan
Chatham	025-0011	Southern States Phosphate & Fertilizer	1.512	1.512	Floridan
Chatham	025-0012	Citgo Asphalt Refining Co	0.100	0.100	Floridan
Chatham	025-0013	GAF Corporation	0.450	0.370	Floridan
Chatham	025-0015	Savannah Electric & Power – Riverside	2.600	2.000	Floridan (Non-consumptive)
Chatham	025-0018	Savannah, City of – Main	31.680	25.740	Floridan
Chatham	025-0019	Georgia-Pacific Corp	0.100	0.100	Floridan
Chatham	025-0021	Port Wentworth, City of	1.040	0.690	Floridan
Chatham	025-0022	Thunderbolt, Town of	0.400	0.350	Floridan
Chatham	025-0023	Memorial Medical Center	0.258	0.258	Floridan
Chatham	025-0024	Savannah Electric & Power - Plant Kraft	1.728	1.728	Floridan (some Non-consumptive)
Chatham	025-0025	Hercules, Incorporated	2.500	1.500	Floridan
Chatham	025-0027	Tybee Island, City of	1.600	0.960	Floridan
Chatham	025-0028	Skidaway Island Utilities	4.700	2.610	Floridan
Chatham	025-0030	E.M. Laboratories, Inc	0.400	0.400	Floridan
Chatham	025-0031	Savannah, City of - Travis Field	1.500	1.250	Floridan
Chatham	025-0032	Savannah, City of - Wilmington Island	1.800	1.400	Floridan
Chatham	025-0034	Hunter Army Airfield	1.380	1.030	Floridan
Chatham	025-0035	Bloomingtondale, City of	0.156	0.156	Floridan
Chatham	025-0038	Savannah, City of - Gateway Utility	0.613	0.590	Floridan
Chatham	025-0040	Chatham County - Glen of Robin Hood	0.700	0.460	Floridan
Chatham	025-0041	Consolidated Utilities	0.500	0.500	Floridan
Chatham	025-0042	Savannah, City of - Georgetown	1.000	0.870	Floridan
Chatham	025-0044	Landings Club, Inc - Golf Well #2	0.500	0.200	Floridan
Chatham	025-0045	West Chatham County - Hunters Ridge	0.100	0.100	Floridan
Chatham	025-0046	Candler General Hospital	0.100	0.100	Floridan
Chatham	025-0047	Savannah, City of - Whitemarsh Island	0.759	0.656	Floridan
Chatham	025-0048	Chatham County - Sav Port Auth Ind Park	0.173	0.116	Floridan
Chatham	025-0050	Savannah, City of - Dutch Island	0.384	0.282	Floridan
Chatham	025-0051	Savannah, City of - Savannah Quarters	0.646	0.431	Floridan
Chatham	025-0052	Chatham County - Henderson Golf Course	0.116	0.100	Surficial
Chatham	025-0054	Skidaway Institute of Oceanography	0.120	0.120	Floridan

County	Permit Number	Permit User Name	Permitted Monthly Avg W/D (MGD)	Permitted Yearly Avg W/D (MGD)	Permitted Aquifer
Chatham	025-0055	Savannah, City of - Daffin Park	0.864	0.864	Miocene
Columbia	036-0001	Harlem, City of	0.280	0.250	Crystalline Rock
Columbia	036-0002	Grovetown, City of	0.900	0.900	Crystalline Rock
Columbia	036-0003	Columbia County Water Department	0.576	0.576	Crystalline Rock
Columbia	036-0004	Southern Beverage Packers, Inc	0.138	0.138	Crystalline Rock
Effingham	051-0001	Rincon, City of	1.150	0.770	Floridan
Effingham	051-0002	Springfield, City of	0.400	0.375	Floridan
Effingham	051-0004	Savannah Electric & Power - Plant McIntosh	0.550	0.450	Floridan
Effingham	051-0006	Fort James Operating Company	4.000	3.000	Floridan
Effingham	051-0008	Willowpeg Golf Course	0.720	0.720	Floridan
Effingham	051-0009	Springfield, City of - Industrial Park Effingham County	0.400	0.400	Floridan
Effingham	051-0010	Coastal Water & Sewerage Company	0.200	0.200	Floridan
Franklin	059-0001	Franklin Springs, City of	0.125	0.125	Crystalline Rock
Franklin	059-0002	Canon, City of	0.100	0.100	Crystalline Rock
Glascocock	062-0001	Thiele Kaolin Co - Reedy Creek Plant	0.100	0.100	Barnwell
Habersham	068-0003	Baldwin, Town of	0.220	0.220	Crystalline Rock
Hart	073-0001	Hartwell Energy Limited Partnership	0.259	0.259	Crystalline Rock
Hart	073-0002	Engelhard Corp – Hartwell	0.400	0.350	Crystalline Rock
Jefferson	081-0001	J.M. Huber Corp - Wrens Plant	1.870	1.690	Dublin - Midville
Jefferson	081-0004	Wrens, City of	0.800	0.650	Cretaceous Sand
Jefferson	081-0006	ECC International - Wrens Plant	0.500	0.300	Cretaceous Sand
Lincoln	090-0002	Lincoln County Water System	0.350	0.300	Crystalline Rock
Lincoln	090-0003	Crider, Inc.	0.280	0.280	Crystalline Rock
Madison	095-0001	Danielsville, City of	0.100	0.100	Crystalline Rock
Madison	095-0002	Comer, City of	0.100	0.100	Crystalline Rock
Madison	095-0003	Trus Joist MacMillan	0.144	0.144	Crystalline Rock
Rabun	119-0002	Sky Valley, City of	0.300	0.300	Crystalline Rock
Richmond	121-0001	Solutia, Inc (ex-Monsanto)	0.422	0.384	Cretaceous Sand
Richmond	121-0002	Amity Dyeing & Finishing Partnership	1.350	1.200	Cretaceous Sand
Richmond	121-0003	Hephzibah, City of	0.450	0.400	Cretaceous Sand
Richmond	121-0006	Arcadian Fertilizer, LP	0.580	0.580	Cretaceous Sand
Richmond	121-0007	Augusta-Richmond Utilities Department	18.400	17.400	Cretaceous Sand
Richmond	121-0008	Gracewood State School & Hospital	0.500	0.400	Cretaceous Sand
Richmond	121-0009	Olin Corp	1.224	1.224	Cretaceous Sand
Richmond	121-0010	Thermal Ceramics	0.900	0.900	Cretaceous Sand
Richmond	121-0013	Procter & Gamble Manufacturing Company	0.700	0.700	Cretaceous Sand
Richmond	121-0014	Olin Corp - Corrective Action Wells	0.907	0.907	Cretaceous Sand, KT-3, KT-1
Richmond	121-0015	Alternate Energy Resources, Inc	0.432	0.432	Cretaceous Sand (Upper)
Richmond	121-0016	Southern Wood Piedmont Company	0.790	0.790	Gaillard
Richmond	121-0017	Augusta Recycling Associates, LP	3.312	3.312	Cretaceous Sand, (KT-5)
Screven	124-0002	Sylvania, City of	1.500	1.300	Floridan
Warren	149-0001	J.M. Huber Clay - Warren County Mine	0.864	0.864	Cretaceous Sand

Farm Irrigation Permits

The 1988 Amendments to the Ground Water Use Act establishes the permitting authority within EPD to issue farm irrigation water use permits. As with the previously mentioned ground water permitting statute, the lower threshold is 100,000 GPD; however users of less water may apply and be granted a permit. Agricultural withdrawal permits are too numerous to list in this document.

Applicants for these permits who could establish that their use existed prior to July 1, 1988, *and* when their applications were received prior to July 1, 1991, were “grandfathered” for the operating capacity in place prior to July 1, 1988. Other applications are reviewed and granted with an eye towards protection of grandfathered users and the integrity of the resource. Generally, agricultural users are not required to submit any water use reports.

Excessive Ground Water Withdrawals

Excessive ground water withdrawal can lead to lowering or drawdown of the water table. Localized groundwater drawdowns are generally discovered only after the fact of permitting has occurred and withdrawal operations begun. To avoid such a possibility, if an application for a very large use of groundwater is received, the Water Resources Management Program of the Georgia EPD can take certain steps to possibly contain drawdowns effects. Modeling the hydrogeologic impact of such a large user may be required of the potential permittee. If this computer analysis indicates no unreasonable impact on existing users, such a water use permit may be approved. Another recommended possibility is a negotiated reduction in permit amounts to a more moderate amount of withdrawal, with lessened impacts. Prior to full scale production of a well field, well pumping tests run at or near actual production rates can be required. These may give the permittee and the EPD some real idea of the amount of water that may be pumped safely, without endangering other users nor drawing down the aquifer too greatly. Permit withdrawal limits may then be set at some safer yield which is determined by these pumping tests. These tests may also indicate that proposed pumping amounts may require more wells drilled to spread out the ultimate production impact on the aquifer.