
In This Section

- Drinking Water Supply
- Surface Water Quantity
- Ground Water Quantity

Section 3

Water Quantity

This section addresses water quantity issues (availability and use) in the Oconee, whereas water quality in the basin is discussed in Section 4. Water use in the Oconee River basin is measured by estimates of freshwater withdrawn from ground and surface water sources. Water availability is assessed based on annual surface water flows and ground water storage. Saline water is not used in the basin. Uses of water include both consumptive uses (in which the water is no longer available to the basin) and nonconsumptive uses (in which the water is returned to the basin after use).

Surface water is the primary water source in the Piedmont province of the Oconee 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. 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.

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 Oconee River Basin

The Oconee River and its tributaries serve most of the city municipalities in the Oconee River basin, such as Athens, Winder, Jefferson, Greensboro, Madison, Monticello, Eatonton, Sparta, Milledgeville, and Dublin. Most surface water intakes in the Oconee basin are located above the Fall Line, with the exceptions of Milledgeville and Dublin. Most private communities and rural cities located below the Fall Line use

ground water pumped from wells as a source of drinking water. Also a cluster pattern of smaller subdivisions located near Athens, Dublin, Lake Oconee, and Lake Sinclair use ground water since they are located too far from a public water system that sells surface water.

The Oconee River basin provides drinking water for about 281,614 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 systems 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 6 months per year. Examples of non-community non-transient systems are schools, office buildings, and factories that are served by a well or privately owned surface water plant.

A non-community transient public water system does not meet the definition of a non-community non-transient. A non-community transient public water system provides piped water for human consumption to at least 15 service connections or regularly serves at least 25 persons at least 60 days a year. Examples of a non-community transient systems 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 ensuring water quality.

In the Oconee River Basin there are approximately 20 community public water systems utilizing surface water and serving 201,279 people and 178 community public water systems utilizing ground water and serving approximately 59,154 people (Table 3-1). The locations of surface water intakes within each of the Hydrologic Units of the Oconee River basin are shown in Figures 3-1 and 3-2.

3.1.2 Drinking Water Demands

Drinking water demands for surface and ground water located in the basin are expected to increase due to the growth in the Athens, Lake Oconee, and Lake Sinclair area. A regional drinking water reservoir on Bear Creek for Clarke, Oconee, Jackson, and Barrow Counties is being built and expected to be finished in the year 2000.

Table 3-1. Community Public Water Systems in the Oconee River Basin

Public Water System Name	Water System ID	County	Source Name
<i>Systems Directly Supplied by Surface Water</i> (arranged by HUC)			
Oconee River Above Lake Sinclair Dam HUC 03070101			
City of Jefferson	1570003	Jackson	Curry Creek
City of Winder	0130002	Barrow	1. Cedar Creek 2. Fort Yargo Lake 3. Mulberry River
City of Athens - Clarke County	0590000	Clarke	1. Sandy Creek (Inactive) 2. North Oconee River 3. Middle Oconee River
City of Statham	0130001	Barrow	Barber Creek Reservoir
City of Madison	2110002	Morgan	1. Hard Labor Creek 2. Speeds Branch 3. Lake Oconee
City of Greensboro	1330000	Greene	Lake Oconee
City of Monticello	1590000	Jasper	1. Lowery Branch 2. Pope's Branch
Eatonton	2370000	Putnam	Little River
Oconee River Below Lake Sinclair Dam HUC 03070102			
City of Milledgeville	0090001	Baldwin	1. Oconee River 2. Oconee River (Central State Hospital)
City of Dublin	1750002	Laurens	Oconee River
City of Sparta	1410001	Hancock	1. Lake Sinclair 2. Fort Creek
<i>Systems Supplied by Other Sources</i> (arranged by county)			
Meriwether-Golden Pond S/D	0090042	Baldwin	Groundwater
Mallard Glen Subdivision	0090045	Baldwin	Groundwater
Lands End Subdivision	0090046	Baldwin	Groundwater
Baldwin County	0090000	Baldwin	Purchased Surface Water
Green Tree Acres Subdivision	0130007	Barrow	Groundwater
Great SE-Bent Creek S/D	0130008	Barrow	Groundwater
Auburn Mobile Home Park	0130011	Barrow	Groundwater
Oak Hills Water System	0130032	Barrow	Groundwater
River Bluff Subdivision	0130033	Barrow	Groundwater
Auburn	0130000	Barrow	Purchased Surface Water
Barrow County Water System	0130031	Barrow	Purchased Surface Water
Country Corners Mobile Home Pk	0590003	Clarke	Groundwater
Hallmark Mobile Home Estates	0590004	Clarke	Groundwater
Great SE-Sandy Springs S/D	0590007	Clarke	Groundwater
Pinewoods Mobile Home Comm.	0590009	Clarke	Groundwater
Cherokee Mobile Home Park	0590013	Clarke	Groundwater
Seminole Mobile Home Park	0590014	Clarke	Groundwater
Whispering Pines Subdivision	0590017	Clarke	Groundwater
Great SE-Norwood Village S/D	0590018	Clarke	Groundwater

Public Water System Name	Water System ID	County	Source Name
Ramble Hills Subdivision	0590020	Clarke	Groundwater
Beacon Point Mobile Home Park	0590023	Clarke	Groundwater
Glenn Forest Mobile Homes	0590024	Clarke	Groundwater
Beaver Dam Estates M. H. P.	0590054	Clarke	Groundwater
Great SE-Mineral Springs S/D	0590055	Clarke	Groundwater
Fairfax Hall	0590063	Clarke	Groundwater
Great SE-Fowler's Mill S/D	0590070	Clarke	Groundwater
Crestmont Farms Sd	0590071	Clarke	Groundwater
Siloam	1330001	Greene	Groundwater
Rocky Creek Subdivision	1330007	Greene	Groundwater
Park Mill Crossing Subdivision	1330008	Greene	Groundwater
Whispering Pines Subdivision	1330011	Greene	Groundwater
Deerfield-Sandy Creek S/D	1330012	Greene	Groundwater
Beaverdam-West Place S/D	1330013	Greene	Groundwater
Oconee Heights Subdivision	1330014	Greene	Groundwater
Richland Subdivision	1330015	Greene	Groundwater
Indian Hill Estates S/D	1330016	Greene	Groundwater
Port Armour Development	1330041	Greene	Groundwater
Reynolds Plantation	1330046	Greene	Groundwater
Great SE-Cherokee Point	1330048	Greene	Groundwater
Great SE-Hidden Point	1330049	Greene	Groundwater
Carey Station Water Works	1330050	Greene	Groundwater
Salem Plantation Subdivision	1330051	Greene	Groundwater
Harbor Club on Lake Oconee	1330052	Greene	Groundwater
Parks Mill Subdivision	1330054	Greene	Groundwater
Double Branches Subdivision	1330055	Greene	Groundwater
Armour Point	1330056	Greene	Groundwater
The Vintage Club Subdivision	1330057	Greene	Groundwater
Granite Cove Subdivision	1330058	Greene	Groundwater
Twin Rivers-Twin Rivers Farms	1330059	Greene	Groundwater
Northwoods S/D	1330067	Greene	Groundwater
Lula (one well)	1390002	Hall	Groundwater
Shady Grove Trailer Park	1390015	Hall	Groundwater
Trailwood Acres Mobile Home Pk	1390032	Hall	Groundwater
Woodland Valley Subdivision	1410004	Hancock	Groundwater
Island Creek Subdivision	1410006	Hancock	Groundwater
Scenic Shores Subdivision	1410007	Hancock	Groundwater
Holiday Shores Subdivision	1410016	Hancock	Groundwater
Hancock Co-GA15E/Devereau	1410019	Hancock	Purchased Surface Water
Braselton	1570000	Jackson	Groundwater
Hoschton	1570002	Jackson	Groundwater
Nicholson Water Association	1570004	Jackson	Groundwater
Pleasant Acres Subdivision	1570009	Jackson	Groundwater

Public Water System Name	Water System ID	County	Source Name
Charclar Subdivision	1570010	Jackson	Groundwater
Crooked Creek Subdivision	1570011	Jackson	Groundwater
Arcade Mobile Home Park	1570014	Jackson	Groundwater
Forest Lakes Subdivision	1570019	Jackson	Groundwater
Pleasant Hill Mobile Home Park	1570030	Jackson	Groundwater
Atl Union Mission-Potter's H	1570058	Jackson	Groundwater
Colony Mobile Home Park	1570064	Jackson	Groundwater
Countryside Mobile Home Park	1570088	Jackson	Groundwater
Suni-Pines Mobile Home Park	1570109	Jackson	Groundwater
Ponderosa Mobile Home Park	1570119	Jackson	Groundwater
Trotter's Ridge Subdivision	1570120	Jackson	Groundwater
Jackson County Water Authority	1570116	Jackson	Purchased Surface Water
Western Jackson Co Water Sys	1570117	Jackson	Purchased Surface Water
Shady Dale	1590001	Jasper	Groundwater
Gray	1690000	Jones	Groundwater
Haddock Water Commission, Inc.	1690001	Jones	Groundwater
Kitchen's Trailer Park	1690024	Jones	Groundwater
Cadwell	1750000	Laurens	Groundwater
Dexter	1750001	Laurens	Groundwater
Dudley	1750003	Laurens	Groundwater
East Dublin	1750004	Laurens	Groundwater
Montrose	1750005	Laurens	Groundwater
Rentz	1750006	Laurens	Groundwater
Meadowdale Mobile Home Park	1750018	Laurens	Groundwater
Tarpley's Mobile Home Park	1750020	Laurens	Groundwater
Woodland Trails Mobile Estates	1750025	Laurens	Groundwater
Pinedale Estates Subdivision	1750026	Laurens	Groundwater
Laurens Water Co-Holly Hills	1750030	Laurens	Groundwater
Shady Pines Mobile Home Park	1750033	Laurens	Groundwater
Thundering Springs Assoc., Inc.	1750043	Laurens	Groundwater
Chimney Hill Subdivision	1750104	Laurens	Groundwater
Hitchiti Mobile Home Park	1750110	Laurens	Groundwater
Pecan Mobile Home Park	1750121	Laurens	Groundwater
Ailey	2090000	Montgomery	Groundwater
Charlotte Water Association	2090002	Montgomery	Groundwater
Mount Vernon	2090003	Montgomery	Groundwater
Tarrytown	2090004	Montgomery	Groundwater
Three Rivers Estates	2090018	Montgomery	Groundwater
Bostwick	2110000	Morgan	Groundwater
Buckhead	2110001	Morgan	Groundwater
Rutledge	2110003	Morgan	Groundwater
Source of Light Mission	2110005	Morgan	Groundwater
Bell View Shores Subdivision	2110008	Morgan	Groundwater

Public Water System Name	Water System ID	County	Source Name
Sugar Bend-Lake Oconee S/D	2110009	Morgan	Groundwater
Blue Spring S/D Units 1-2	2110010	Morgan	Groundwater
Appalachee Woods Subdivision 1	2110011	Morgan	Groundwater
Morgan Estates Subdivision	2110049	Morgan	Groundwater
Morgan Co Detention Facility	2110054	Morgan	Groundwater
Cedar Grove Mobile Home Ldg.	2170018	Newton	Groundwater
Northwest Woods	2190002	Oconee	Groundwater
Pleasant Hill Subdivision	2190003	Oconee	Groundwater
Great SE-Indian Hills S/D	2190005	Oconee	Groundwater
Great SE-Northwest Woods S/D	2190006	Oconee	Groundwater
Great SE-Woodlands/Oconee Vill	2190015	Oconee	Groundwater
Great SE-Deerwood Est. S/D	2190018	Oconee	Groundwater
Great SE-Osceola Village S/D	2190019	Oconee	Groundwater
Family Life Enrichment Center	2190020	Oconee	Groundwater
Great SE-Brookwood Est. S/D	2190021	Oconee	Groundwater
Great SE-Oak Grove S/D	2190022	Oconee	Groundwater
Great SE-Birchmore Hills S/D	2190023	Oconee	Groundwater
Great SE-Killarney West S/D	2190026	Oconee	Groundwater
Carrs Circle C Mobile Home Pk	2190031	Oconee	Groundwater
Great SE-Pinehill S/D	2190035	Oconee	Groundwater
Great SE-Elder Heights S/D	2190045	Oconee	Groundwater
Great SE-Fieldstone/Canyon Ck.	2190049	Oconee	Groundwater
Barnetts Bluff	2190053	Oconee	Groundwater
Ashland Subdivision	2190054	Oconee	Groundwater
Fernwood Subdivision	2190055	Oconee	Groundwater
Oconee Co.-Oakpoint	2190056	Oconee	Groundwater
Eaglewood Subdivision	2190057	Oconee	Groundwater
Old Mill Chase Subdivision	2190058	Oconee	Groundwater
Harrowford Subdivision	2190060	Oconee	Groundwater
Oconee Co-Skip Stone S/D	2190064	Oconee	Groundwater
Oconee Co-Appalachee Pointe	2190067	Oconee	Groundwater
Oconee Co-Eastville Village	2190068	Oconee	Groundwater
Oconee Co.-Watkinsville	2190000	Oconee	Purchased Surface Water
Oconee Co.-Bishop	2190024	Oconee	Purchased Surface Water
Oconee Co.-Tanglebrook S/D	2190062	Oconee	Purchased Surface Water
Lexington	2210001	Oglethorpe	Groundwater
Maxeys	2210002	Oglethorpe	Groundwater
Arnoldsville	2210004	Oglethorpe	Groundwater
Forest Lake Village S/D	2370002	Putnam	Groundwater
Pine Forest Subdivision	2370006	Putnam	Groundwater
Tanglewood Subdivision	2370007	Putnam	Groundwater
Tall Timbers-Oak Openings	2370008	Putnam	Groundwater
Long Shoals Crossing S/D	2370012	Putnam	Groundwater

Public Water System Name	Water System ID	County	Source Name
Cedar Cove Subdivision	2370013	Putnam	Groundwater
Parks Mill Landing Subdivision	2370014	Putnam	Groundwater
Bayside Haven MHP	2370037	Putnam	Groundwater
Thunder Valley Subdivision	2370043	Putnam	Groundwater
Phoenix Lake Subdivision	2370044	Putnam	Groundwater
River Bend/Horseshoe Bend	2370045	Putnam	Groundwater
Lake Oconee Plantation S/D	2370046	Putnam	Groundwater
Timber Lake/Rock Isl Point	2370047	Putnam	Groundwater
Long Island Forest Subdivision	2370048	Putnam	Groundwater
Martin-River Lk Landing/Place	2370049	Putnam	Groundwater
Eagle Nest/Eagle Ridge	2370051	Putnam	Groundwater
Sebastian Cove Subdivision	2370052	Putnam	Groundwater
Martin Oaks Subdivision	2370053	Putnam	Groundwater
Oconee Springs Landing	2370057	Putnam	Groundwater
Great Waters at Reynolds Plant	2370059	Putnam	Groundwater
Flat Rock Subdivision	2370060	Putnam	Groundwater
Misty River Landing	2370062	Putnam	Groundwater
Whippoorwill Cove	2370063	Putnam	Groundwater
Soperton	2830000	Treutlen	Groundwater
Danville	2890000	Twiggs	Groundwater
Jeffersonville	2890001	Twiggs	Groundwater
Twiggs County Water System	2890009	Twiggs	Groundwater
Kalonia Heights Subdivision	2890012	Twiggs	Groundwater
Twiggs Co.-Blackbottom WS	2890023	Twiggs	Groundwater
Little Bethlehem	2970005	Walton	Groundwater
Hillside Village MHP, Inc.	2970020	Walton	Groundwater
Wildwood Estates	2970041	Walton	Groundwater
Deepstep	3030001	Washington	Groundwater
Oconee	3030003	Washington	Groundwater
Sandersville	3030005	Washington	Groundwater
Warthen Water Association	3030007	Washington	Groundwater
Alamo	3090000	Wheeler	Groundwater
Glenwood	3090001	Wheeler	Groundwater
Allentown	3190000	Wilkinson	Groundwater
Gordon	3190001	Wilkinson	Groundwater
Irwinton	3190002	Wilkinson	Groundwater
Ivey	3190003	Wilkinson	Groundwater
McIntyre	3190004	Wilkinson	Groundwater
Toombsboro	3190005	Wilkinson	Groundwater

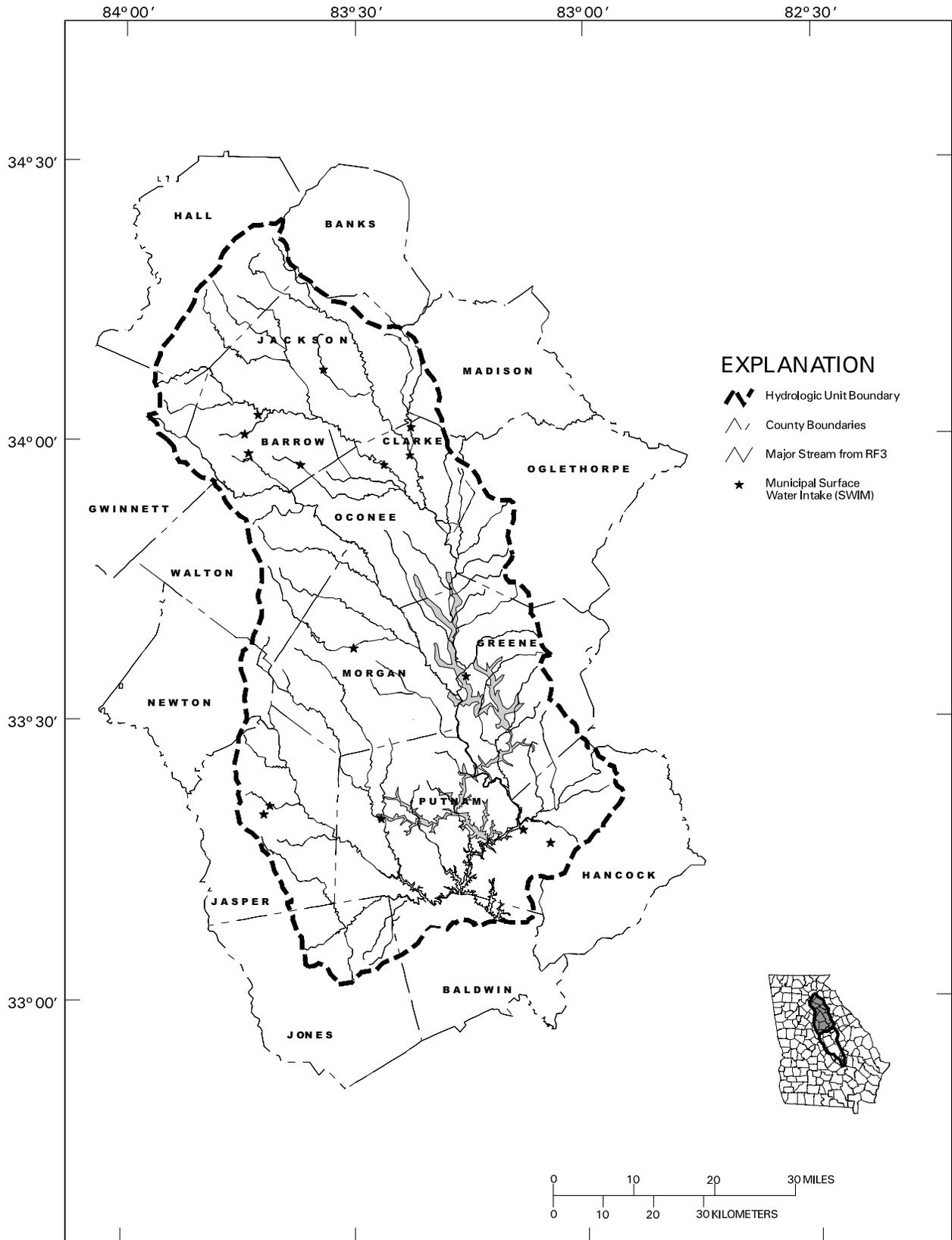


Figure 3-I. Surface Water Intakes, Upper Oconee River Basin, HUC 03070101

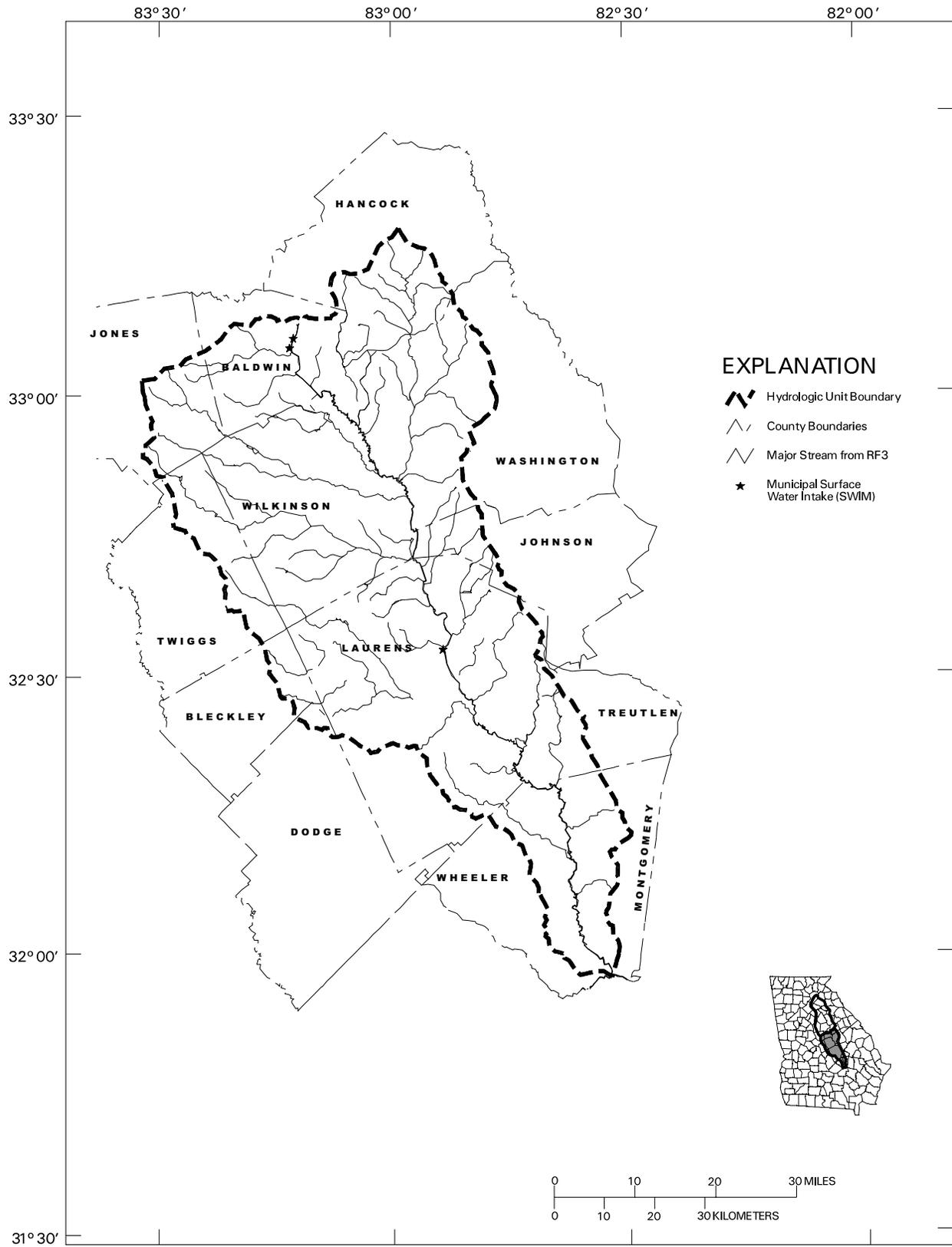


Figure 3-2. Surface Water Intakes, Lower Oconee River Basin, HUC 03070102

3.1.3 Drinking Water Permitting

The Georgia Safe Drinking Water Act of 1977 and 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 owner must provide detailed description of the project; demonstrate the reliability of the water source site; render plans and specifications demonstrating the construction integrity of wells, plants, and distribution systems; conduct preliminary water sample testing; and submit legal documentation including application to operate a public water system. Permits contain specific conditions the owner must meet for different types of water sources, plants, and distribution systems, including a list of approved water sources, filter rates, disinfection and treatment requirements, operator certification, documentation and reporting requirements, compliance with water sample testing schedule, and number of allowed service connections. Permits are issued for 10 years and are renewable. The Drinking Water Program has 285 active and permitted systems in the Oconee River basin.

3.2 Surface Water Quantity

3.2.1 Surface Water Supply Sources

Surface water supplies in the Oconee basin include water in rivers, ponds, and reservoirs, including two major impoundments (see Section 2.1.4). Total annual flow in the Oconee is estimated at 1,190,000 million gallons per year (based on average flow at Dublin gage since completion of Wallace Dam in 1979). Reservoirs provide a storage capacity within the basin of approximately 260,700 million gallons (800,000 acre-feet).

Storage capacity in the basin will be increased somewhat with the completion of the Bear Creek Regional Reservoir in mid-2001 (see Section 2.1.4). This reservoir is designed to hold 14,980 acre-feet of water at normal pool and is expected to satisfy water needs for Clarke, Oconee, Jackson, and Barrow Counties through the year 2050.

Other than the Middle Oconee, North Oconee, and Apalachee Rivers, the remaining tributaries (e.g., Mulberry River, Hard Labor Creek, Murder Creek) have relatively small flows because the fairly narrow Oconee Basin does not provide much drainage area upstream of the points of confluence with the Oconee River. Consequently, these tributaries do not provide very dependable flow and are not widely used as significant water supply sources.

3.2.2 Surface Water Supply Demands and Uses

Municipal and Industrial Demand

Municipal and industrial (M&I) water demands include publicly and privately supplied residential, commercial, governmental, institutional, industrial, manufacturing, and other demands such as distribution system water losses. There are 30 municipal and industrial (15 each) surface water withdrawal permits in place in the Oconee River basin.

The largest municipal user of surface water in the basin is the City of Athens, which withdraws water to serve the city, Athens-Clarke County, and other potable water customers. Athens has two surface water withdrawal permits totaling 28 million gallons per day (MGD) on a monthly average (16 MGD from the North Oconee River and 12 MGD from the Middle Oconee River). Other municipalities with permits to withdraw at

least 1.0 MGD include the City of Dublin (Laurens County), the City of Eatonton (Putnam County), the City of Greensboro (Greene County), the City of Jefferson (Jackson County), the City of Madison (Morgan County), the City of Milledgeville (Baldwin County), and the City of Winder (Barrow County).

Industrial surface water use is dominated by the largely nonconsumptive use of water by hydropower generation facilities. For example, Georgia Power Company has a permit to use 1,245 MGD from the Oconee River at Lake Sinclair. This flow is primarily a pump-back operation in which the company pumps water from Lake Sinclair to Lake Oconee during off-peak hours (i.e., during periods of low demand for electricity) and then uses this water to drive the turbines at Lake Oconee to produce electricity at other times of the day. Oglethorpe Power Company has a permit to “withdraw” some 533 MGD from the Middle Oconee River to produce power, but again this is a nonconsumptive use of the river’s waters. Southeast Paper Manufacturing Company (Laurens County) is the largest off-stream industrial user of water with a permit for the use of 17 MGD from the Oconee River. Forstmann and Company and the kaolin industries are also fairly large off-stream users of surface water in the central and southern portions of the basin.

Additional data on existing permit holders for municipal and industrial (nonagricultural) surface water withdrawals in the Oconee River basin are shown in Table 3-2.

Agricultural Water Demand

The demands on surface water resources for agricultural activities include irrigation for crops, nursery, and turf; drinking water for livestock and poultry; and, to a much lesser extent, water for aquacultural purposes.

As of 1993, the EPD had issued 360 agricultural surface water withdrawal permits to entities located within the Oconee River basin. The combined permitted pumping capacity of these permits is 258,000 GPM (370 MGD). According to the support information provided with each application, these permits are used to supply water to irrigate some 29,260 acres of crops, orchards, turf, etc. Within Georgia, surface water agricultural permit holders are by law (O.C.G.A. Section 12-5-31 et seq.) exempted from required reporting of their water use; however, agricultural water use trend information available to EPD suggests that Oconee River basin agricultural water use is on the order of 5 to 10 percent of permitted capacity. This 5 to 10 percent (i.e., 19 to 38 MGD) occurs primarily during the peak months of May to August.

The total water demand from agriculture, including both surface water and ground water demand, may be estimated using agricultural census data. NRCS data indicate that in 1995 the Oconee basin contained approximately 19,700 acres of irrigated farmland, which were responsible for approximately 4,000 million gallons per year (MGY) of water demand. Animal operations in the basin include approximately 158,000 cattle, 61,000 hogs, and 140,000,000 chickens, which together accounted for about 3,800 MGY of water demand. Total agricultural water demand (surface water and ground water) in the Oconee basin in 1995 was therefore approximately 7,800 MGY (21 MGD on average). Agricultural water demand can change substantially over the short term (1 to 2 years) as a result of a change in crops grown and natural variation in precipitation and evaporation.

Unlike municipal, industrial, and cooling water withdrawals, only approximately 40 percent of the water withdrawn for agricultural use is returned to streams, depending on crops grown.

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

Facility	Source	24 Hr Max (Mgd)	Mo. Avg (Mgd)	County
Cherokee Products Company	Fishing Creek	0.58	0.30	Jones
Engelhard Kaolin Corporation	Engelhard Mine at Deepstep	5.76	5.00	Washington
Engelhard Kaolin Corporation	Little Commissioner Creek	0.80	0.50	Wilkinson
Englehard Corporation	Little Commissioner Creek	2.25	1.15	Wilkinson
Feldspar Corporation - Bowdon	Bowdon Creek	0.50	0.40	Greene
Feldspar Corporation - Cedar	Cedar Creek	1.20	1.20	Jasper
Forstmann and Company, Inc. - Dub	Oconee River	7.00	5.50	Laurens
Forstmann and Company, Inc. - Mill	Oconee River	3.00	3.00	Baldwin
Georgia Power Co - Branch	Lake Sinclair	1245	1245	Baldwin
High Shoals Hydro - G. Bracewell	Apalachee River	183.17	103.63	Oconee
Martin Marietta Aggregates - Auburn Quarry	Auburn Quarry Pit Sump	2.30	0.90	Barrow
Martin Marietta Aggregates - Ruby Quarry	Ruby Quarry Sump Pit	2.30	0.60	Jones
New Holland Mills	Spring Source	0.36	0.32	Hall
Oglethorpe Power Corp - Middle	Middle Oconee River	533.25	533.25	Clarke
Southeast Paper Manuf. Co.	Oconee River	19.00	17.00	Laurens
Athens, City of - Middle	Middle Oconee River	16.00	12.00	Clarke
Athens, City of - North	North Oconee River	21.00	16.00	Clarke
Dublin, City of	Oconee River	5.00	5.00	Laurens
Eatonton, City of	Little River	1.10	1.00	Putnam
Greensboro, City of	Lake Oconee	1.50	1.00	Greene
Jefferson, City of	Big Curry Creek	2.25	1.75	Jackson
Madison, City of - Hard Labor	Hard Labor Creek	1.50	1.50	Morgan
Milledgeville, City of	Oconee River	3.00	2.50	Baldwin
Milledgeville, City of	Oconee River	8.00	7.00	Baldwin
Monticello, City of - Pope's	Pope's Branch	0.75	0.50	Jasper
Sparta, City of - Lake Sinclair	Lake Sinclair	0.90	0.90	Hancock
Statham, City of	SCS Res. #6 at Barber Crk.	0.50	0.40	Barrow
Watkinsville, City of	Call's Creek	0.14	0.14	Oconee
Winder, City of - Cedar Crk & Yargo Lk	Cedar Creek Res.	1.00	1.00	Barrow
Winder, City of - Mulberry	Mulberry River	5.70	4.10	Barrow

Note: Permits are not required for withdrawals of less than 100,000 gallons per day on a monthly average.

Power Generation Water Demand

Four power-generating plants use the water resources of the basin (Figure 2-7), including three hydropower facilities, and one fossil fuel generating facility. Instream water use by the hydroelectric plants constitutes nearly the entire flow within the river, except during flood conditions, but is nonconsumptive. Water for thermoelectric power

generation is considered an off-stream use of water and generally is moderately consumptive to nonconsumptive.

Navigational Water Demand

There are no sections of the Oconee River or its tributaries for which the federal government maintains a navigation channel. Additionally, no federal projects have been constructed in the basin for purposes of storing water to meet navigation needs.

Recreation

The demand for outdoor recreation opportunities increases as Georgia's population increases. The two Georgia Power Company reservoirs along the Oconee River are moderately used for recreational activities such as boating, fishing, and water sports. The rivers, their tributaries, and the environs are also used quite extensively for recreational activities such as hunting, fishing, and sight-seeing.

Waste Assimilation Water Demand

Water quantity, wastewater treatment, and wastewater discharge permitting are addressed in Section 4. It should be noted, however, that the guidelines for discharge of treated effluent into the rivers and streams of the Oconee 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 Demand

EPD recognizes the importance of maintaining suitable aquatic habitat in Georgia's lakes and streams to support viable communities of fish and other aquatic organisms. Portions of the mainstem of the Oconee River have been altered by human activities, both physically and with regard to flows. From a water quantity perspective, aquatic habitat is adversely affected in some locations by unnatural extreme variations in lake levels and river flow, especially below Carters Lake and Lake Allatoona. One significant issue which is receiving increasing attention from EPD is that of the minimum stream flow rate which must be maintained below a reservoir. A current state requirement is to maintain the 7Q10 flow (7-day average low flow with a once in ten years recurrence interval), when water is available upstream. Consideration is being given to an increase in this minimum flow requirement under recommendations of the Wildlife Resources Division (Evans and England, 1995).

3.2.3 Surface Water Withdrawal Permitting

The 1977 Amendments to the Georgia Water Quality Control Act require that all nonagricultural withdrawers 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 for the Oconee River basin as of February 1998.

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

Sometimes the issue is not the lack of water, but too much water. Floods, as well as droughts, can be very damaging natural hazards. Almost all of Georgia is susceptible to the threat of floods. The Georgia Emergency Management Agency (GEMA) ranks floods as the number one natural hazard in Georgia. Over the past 20 years more than 60 lives have been lost in Georgia due to flooding, with hundreds of millions of dollars in losses associated with destruction of crops, personal property, and public property.

Across the Oconee River basin, no major reservoirs (federal, state, local, or private) have been constructed with the principal purpose of abating the effects of flood flows. The previously mentioned Georgia Power Company facilities (i.e., Lake Oconee and Lake Sinclair) were constructed for power production purposes and are not capable of retaining large flood flows. Consequently, rainfall events that lead to the production of higher-than-normal stream flows frequently result in local and regional flooding conditions. This is especially true in the lower portions of the Oconee River basin. These conditions are expected to continue.

Continued growth and development within the headwaters region of the basin without due consideration to the downstream flooding impacts is a concern. Also of concern is continued development in the flood hazard areas of the lower portions of the basin. These circumstances increase flood levels and worsen the associated human and property damage.

Local governments with recognized flood hazard areas may elect to participate in the National Flood Insurance Program (NFIP). The NFIP was created by congress through the enactment of the National Flood Insurance Act of 1968, to provide property owners with access to previously unavailable flood insurance. Local government participation in the NFIP is voluntary. The NFIP requires participating communities to adopt and enforce a local flood ordinance designed to reduce flood losses by regulating development located in federally defined flood hazard areas within the jurisdiction.

3.3 Ground Water Quantity

3.3.1 Ground Water Sources

Ground water sources in the Oconee River basin are related to physiographic provinces. Ground water supplies are concentrated in the lower half of the basin in the Coastal Plain province. In the upper half of the basin, north of the Fall Line, the crystalline rock formation that underlies the Piedmont province greatly restricts ground water availability. Some studies have shown that there may be contact zones, fractures, and shear planes capable of producing water yields as high as 400 gallons per minute (GPM) in the Piedmont, though the common range of production is closer to 50 GPM. Techniques for locating these reliable sources have improved greatly over the past 10 years and will likely continue to do so.

The Cretaceous sand aquifer system, located along the northern edge of the Coastal Plain, outcrops in a band about 40 miles wide across the central part of the basin, mainly in Twiggs, Wilkinson, and Washington Counties. In the northern portion of the Oconee River basin this unit is seen as one single aquifer and is sometimes referred to as the Dublin-Midville aquifer. The aquifer consists of interbedded sands and clays that begin in the northern part of the area at the Fall Line, and it is as thick as several hundred feet to the south. Ground water occurs in pore spaces of the largely unconsolidated sand layers, which are composed of largely angular to subangular quartz grains. The interbedded clay layers act as confining beds, causing the deeper ground water to occur under artesian conditions. Well yields in the portions of the Cretaceous sand aquifer underlying the Oconee River basin have been found to exceed 1,000 GPM. Recharge occurs through the sandy soil in the outcrop area near Milledgeville (Baldwin County).

The Gordon aquifer system overlies the Cretaceous sand aquifer in the Coastal Plain portion of the Oconee River basin and consists of saturated permeable sands. It is confined above and below by clay-rich layers, and it ranges in thickness from about 20 feet in northern Wilkinson County to about 150 feet in the southern part of the basin. Generally, well yields of up to 500 GPM can be found in southern portions of the basin. Gordon aquifer recharge occurs mainly through the outcrop areas in Washington and Wilkinson Counties.

The Floridan aquifer underlies the southernmost portions of the Oconee River basin. The aquifer is overlain by about 25 to 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 tens of feet toward the Fall Line to more than 400 feet in the extreme southern portion of the basin. Sands and shales compose the main units in the northern portions of this aquifer, while to the south the aquifer becomes ever more carbonate (limestone) in content. To the south the aquifer consists of three thick beds of limestone (i.e., Tampa limestone, Suwannee limestone, and Ocala limestone). Well yields range from about 40 GPM in the north to more than 10,000 GPM in the thickest, southernmost portions of the aquifer.

3.3.2 Ground Water Supply Demands

Municipal and Industrial Uses

Nonagricultural permitted water withdrawals in the basin total slightly above 83 MGD (annual average), with about 70 MGD used by industrial concerns and 13 MGD used by municipal withdrawers. For the foreseeable future ground water is likely to continue to be the primary source of raw water to meet municipal and industrial water needs in the lower half of the Oconee River basin.

Eighteen municipal facilities are permitted to withdraw ground water in the Oconee River basin, the largest being the City of Sandersville in Washington County (3.5 MGD annual average from the Cretaceous Sand Aquifer). Other municipalities with ground water withdrawals larger than 1.0 MGD (annual average) include the City of Dublin (Jones County), Oconee County, and the Jones County Water System.

The largest nonagricultural users of ground water in the Oconee River basin are industrial water users. Thirty-five ground water withdrawal permits are currently in place for industrial users in the basin. The largest of these are kaolin producers in Washington, Wilkinson, and Twiggs Counties. Engelhard Corporation has a permit to withdraw 13.43 MGD from the Cretaceous sand aquifer in Wilkinson County. This is the largest nonagricultural permit in the basin.

Agricultural Water Demand

Total agricultural water demand for the Oconee River basin is discussed above in Section 3.2.2, and is derived from both surface and ground water sources.

The demands on ground water resources for agricultural activities includes irrigation for crops, nursery, and turf, drinking water for livestock and poultry, and to a much lesser extent water for aquacultural purposes.

As of 1993, the Environmental Protection Division had issued 128 groundwater agricultural water withdrawal permits to entities located within the Oconee River basin. The combined permitted pumping capacity of these permits is 40,000 GPM (58 MGD). According to the support information provided with each application, these permits are used to supply water to irrigate some 9800 acres of crops, orchards, turf, etc. Within Georgia, agricultural groundwater permit holders are by law (O.C.G.A. Section 12-5-91 et seq.) exempted from required reporting of their water use, however agricultural water use trend information available to EPD suggests that Oconee River basin agricultural water use is on the order of 5 to 10 percent of permitted capacity. This 5 to 10 percent (i.e., 3 to 6 MGD) occurs primarily during the peak months of May through August.

3.3.3 Ground Water Supply Permitting

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. The statute also stipulates that all pre-1972 users who could establish the quantity of their use prior to 1972 would be “grandfathered” for that amount of withdrawal. Table 3-3 lists the permits in effect for the Oconee River basin as of February, 1998.

Farm Irrigation Permits

Applicants for ground water withdrawal permits are required to submit details relating to the source of withdrawals (i.e., the aquifer and location), water demand projections, and water conservation measures. EPD-issued permits identify the aquifer from which the withdrawal is to originate, the annual average and maximum monthly 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, while the special conditions section of the permit specifies measures the permit holder is required to undertake beyond the standard conditions (e.g., installation of leak detection mechanisms, installation of metering devices). These permits (including the information and data required in support of applications for the permits) are the means by which EPD manages Georgia’s ground water resources.

Table 3-3. Active Municipal and Industrial Ground Water Withdrawal Permits in the Oconee River Basin

County	Permit #	Type	Permit User	Monthly Permitted Flow (MGD)	Yearly Permitted Flow (MGD)	Aquifer
Barrow	007-0001	I	Harrison Poultry, Inc.	0.300	0.300	Crystalline Rock
Greene	066-0001	I	Port Armour Water System	0.180	0.180	Crystalline Rock
Jackson	078-0002	M	Braselton, Town of	0.300	0.250	Crystalline Rock
Jackson	078-0001	I	Wayne Poultry (Continental Grain Co)	0.600	0.500	Crystalline Rock
Jackson	078-0003	M	Hoschton, City of	0.150	0.150	Crystalline Rock
Jasper	079-0002	M	Monticello, City of	0.250	0.250	Crystalline Rock
Jasper	079-0001	I	Feldspar Corporation	0.800	0.800	Crystalline Rock
Jones	084-0002	M	Gray, City of	0.600	0.350	Crystalline Rock
Jones	084-0001	M	Jones County Water System	1.125	1.125	Cretaceous Sand, Crystalline Rock
Laurens	087-0003	M	Dublin, City of	2.000	1.600	Dublin - Midville
Laurens	087-0002	I	Mohawk Industries - Laurens Park Mill	1.400	1.200	Cretaceous Sand
Laurens	087-0004	M	Montrose, Town of	0.200	0.150	Cretaceous Sand
Laurens	087-0005	I	Forstmann & Company - Plant	0.300	0.300	Floridan
Laurens	087-0001	M	East Dublin, City of	1.000	0.800	Cretaceous Sand
Laurens	087-0006	I	Forstmann & Company - Remediation	0.500	0.500	Miocene, Unconfined Surficial
Montgomery	103-0001	M	Mount Vernon, City of	0.350	0.350	Floridan
Morgan	104-0001	M	Madison, City of	0.350	0.350	Crystalline Rock
Oconee	108-0001	M	Oconee County Utility Department	1.781	1.781	Crystalline Rock
Putnam	117-0001	I	Louisiana - Pacific Corp	0.355	0.355	Crystalline Rock
Treutlen	140-0001	M	Soperton, City of	0.750	0.650	Floridan
Twiggs	143-0006	M	Jeffersonville, City of	0.350	0.300	Cretaceous Sand
Twiggs	143-0005	I	Engelhard Corp - Griffin Mine	0.298	0.298	Cretaceous Sand
Twiggs	143-0001	I	Dry Branch Kaolin Co - Jeffersonville Plant	5.500	5.000	Dublin - Midville
Washington	150-0012	M	Tennille, City of	0.400	0.350	Cretaceous Sand
Washington	150-0016	I	Buffalo Clay China Clay Co (ECC Int)	0.700	0.700	Cretaceous Sand
Washington	150-0015	I	Lapp Insulator Division	0.300	0.210	Cretaceous Sand

County	Permit #	Type	Permit User	Monthly Permitted Flow (MGD)	Yearly Permitted Flow (MGD)	Aquifer
Washington	150-0014	M	Sandersville, City of	4.500	3.500	Cretaceous Sand
Washington	150-0018	I	Anglo-American Clays	1.440	1.440	Dublin - Midville
Washington	150-0004	I	ECC International - Plant 2 (Franklin)	0.744	0.744	Cretaceous Sand
Washington	150-0008	I	Engelhard Corp - Washington Co Mine	1.500	1.500	Cretaceous Sand
Washington	150-0007	I	ECC International - Plant 1	8.500	8.500	Dublin-Midville
Washington	150-0006	I	ECC International - Plant 2 (Main)	6.500	6.500	Cretaceous Sand
Washington	150-0005	I	ECC International - Plant 2 (Chambers)	0.744	0.400	Cretaceous Sand
Washington	150-0001	I	Thiele Kaolin Co - Avant Mine	0.850	0.660	Cretaceous Sand
Washington	150-0002	I	Thiele Kaolin Co - Sandersville Plant	3.350	3.000	Dublin - Midville
Washington	150-0017	I	Engelhard Corp - Deepstep Mine	4.300	4.300	Dublin - Midville
Washington	150-0003	I	Thiele Kaolin Co - Hall Mine	0.720	0.650	Cretaceous Sand
Washington	150-0011	I	Engelhard Corp - Scott Mine	1.750	1.750	Cretaceous Sand
Washington	150-0020	I	US Chips - Oconee Woodyard	0.432	0.432	Screens 350'-407'
Washington	150-0021	I	Thiele Kaolin Co - Limestone Plant	1.440	1.440	Dublin - Midville
Wilkinson	158-0007	I	Engelhard Corp - Dixie Mine	0.750	0.750	Cretaceous Sand
Wilkinson	158-0013	I	J.M. Huber Corp - Wilkinson County Plant	0.600	0.600	Cretaceous Sand
Wilkinson	158-0003	I	Engelhard Corp - Klondyke Mine	0.800	0.800	Cretaceous Sand
Wilkinson	158-0004	I	Engelhard Corp - Gibraltar Mine	2.064	2.064	Cretaceous Sand
Wilkinson	158-0005	M	Gordon, City of	0.400	0.400	Cretaceous Sand
Wilkinson	158-0014	I	Engelhard Corp - Hatfield Tract	1.440	1.440	Cretaceous Sand
Wilkinson	158-0006	M	McIntyre, Town of	0.220	0.220	Cretaceous Sand
Wilkinson	158-0002	I	Engelhard Corp - McIntyre Plant	13.434	13.434	Cretaceous Sand
Wilkinson	158-0009	M	Irwinton, Town of	0.320	0.250	Cretaceous Sand
Wilkinson	158-0012	I	Dry Branch Kaolin Co - M10 & M11	0.900	0.700	Cretaceous Sand
Wilkinson	158-0001	I	Engelhard Corp - Gordon Plant	6.460	6.460	Cretaceous Sand
Wilkinson	158-0011	I	Dry Branch Kaolin Co - M8 & M9	0.100	0.100	Cretaceous Sand
Wilkinson	158-0010	I	J.M. Huber Corp - Chambers Mine	2.450	2.450	Cretaceous Sand

The 1988 Amendments to the Georgia Ground Water Use Act establish the permitting authority within EPD to issue farm irrigation ground water use permits. As with the previously mentioned ground water permitting statute, the lower threshold is 100,000 gallons per day. 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. Applicants for these permits who could establish that their use existed prior to July 1, 1988, are “grandfathered” for the operating capacity if their applications were submitted prior to July 1, 1991. The previously cited statute exempts agricultural water users from required water use reporting.

Excessive Ground Water Withdrawals

Excessive ground water withdrawal can lead to lowering or drawdown of the water table. Localized ground water 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 ground water 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.

References

Couch, C.A., E.H. Hopkins, and P.S. Hardy. 1996. Influences of Environmental Settings on Aquatic Ecosystems in the Apalachicola-Chattahoochee-Flint River Basin. Water-Resources Investigations Report 95-4278. U.S. Geological Survey, Atlanta, GA.

Fanning, J.L., G.A. Doonan, V.P. Trent, and R.D. McFarlane. 1991. Power generation and Related Water Use in Georgia. Georgia Geological Survey Information Circular 87.