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Section 3

Water Quantity

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 Water use in the Ocmulgee River basin is measured by estimates of freshwater withdrawn from groundwater and surface water.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

Surface water is the primary water source in the Piedmont province of the Ocmulgee River basin because groundwater yields from crystalline rock aquifers tend to be low. Within the Coastal Plain province, aquifer yields are higher and groundwater withdrawals are the primary part of the total water budget. Although most public water 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 groundwater sources. As previously mentioned, the two sources of supply are not independent because groundwater discharge to streams is important in maintaining dry-weather flow. Thus, withdrawal of groundwater can, under certain conditions, also result in reduction in surface water flow.

Water use in the Ocmulgee River basin is expected to increase in the near future especially in Gwinnett, Bibb and Houston counties due to above average population growth rates.

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 groundwater supplies. Then, general surface water availability is presented, followed by groundwater availability.

3.1 Drinking Water Supply

3.1.1 Drinking Water Supplies in the Ocmulgee River Basin

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

groundwater pumped to the surface from wells or naturally flowing from springs. Unlike other basins in Georgia, the main source of drinking water in the Ocmulgee basin is provided by groundwater, although there are several surface water systems. 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 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 Ocmulgee River basin, there are approximately 120 community public water systems utilizing surface water and groundwater.

3.1.2 Drinking Water Demands

Over the next few years, it is estimated that there will be an increase in the use of groundwater from the Ocmulgee River basin.

3.1.3 Drinking Water Permitting

The Rules for Safe Drinking Water (391-3-5), adopted under the Georgia Safe Drinking Water Act of 1997, 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 provide 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

The Ocmulgee River basin has a drainage area of 6,080 square miles. The basin lies in central Georgia and extends from the Piedmont physiographic province into the lower Coastal Plain province. Roughly half of the basin's acreage lies north of the transition between the two provinces, the Fall Line.

Small impoundments in the basin, all low head hydroelectric projects, include Lake Tobesofkee on Tobesofkee Creek, the Porterdale impoundment on the Yellow River, the river industrial impoundment on the Yellow River, the Panola Shoals impoundment on the South River, and the High Falls impoundment on the Towaliga River.

The Ocmulgee River basin's northern region is limited in the quantity of surface water available. Municipal water supplies are almost exclusively dependent on surface waters. In times of low flow, the ability to withdraw water from the basin may be severely limited. In the southern region of the basin, water resources become much more abundant.

In this Coastal Plain region, the flow of the Ocmulgee River is augmented by groundwater discharge from the underlying aquifer systems. Municipal drinking water supplies, unlike those in the northern region, are almost exclusively dependent on groundwater sources.

The upper Ocmulgee River basin has the greatest demand for water use and the least available supply. The lower half of the basin has relatively low demand, has relatively abundant water resources, and provides the greatest opportunity for future water use development.

3.2.2 Surface Water Supply Demands and Uses

Municipal and Industrial Demand

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

Currently, the Ocmulgee River basin has 30 surface water withdrawal permits. Surface water withdrawal permits are for users equal to or greater than 100,000 gallons per day. Users below this amount of surface water are not required to have a permit for their withdrawals.

Agricultural Water Demand

Agricultural surface water demand in the Ocmulgee River basin is considerable. The counties to the north of the Fall Line do not generally contain large areas of irrigated farmland. Major irrigation takes place on crops grown throughout Pulaski, Houston, Dodge, Telfair, and Ben Hill Counties.

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.

Irrigated Acreage

The total water demand from agriculture, including both surface water and groundwater 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 3-1 shows historical irrigated acreage in the basin from 1974 to 1998.

Irrigated acres in the Ocmulgee River basin grew from about 6,400 in 1974 to an all time maximum for the basin of about 161,000 in 1998. Assuming growth rates continue as observed in the Ocmulgee River basin between 1982 and 1998, there will be approximately 235,000 acres under irrigation by 2020.

Table 3-1. Irrigated Acres in the Ocmulgee River Basin, 1974-1995

Year	HUC 03070103	HUC 03070104	HUC 03070105	Basin Total
1974	158	3,762	477	4,397
1978	2,232	42,438	11,886	56,556
1979	3,338	56,277	15,432	75,047
1980	1,587	65,427	18,308	85,322
1981	7,315	86,559	21,367	115,241
1982	8,907	88,866	19,705	117,478
1984	5,267	100,439	19,858	125,564
1986	3,943	106,467	21,970	132,380
1989	4,678	110,573	22,354	137,605
1992	5,280	115,373	22,896	143,549
1995	5,856	121,116	25,095	152,067
1998	6,432	126,858	27,295	158,908

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

Water Demand

Agricultural water demand is dependent upon a number of variables 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 Ocmulgee River basin reflects the influence of these variables (Table 3-2). There has been a relatively steady increase in agricultural water use in the Ocmulgee River basin from 52.61 MGD in 1980 to 106.54 MGD in 2000.

Table 3-2. Historical Agricultural Water Use (MGD) in the Ocmulgee River Basin, 1980-1995

Year	HUC 03070103	HUC 03070104	HUC 03070105	Basin Total
1980	3.69	37.07	11.85	52.61
1985	12.82	53.84	6.92	73.58
1987	12.19	70.97	9.73	92.90
1990	11.10	42.36	6.67	60.14
1995	12.76	60.16	10.97	83.89
2000	12.75	76.13	17.67	106.54

Source: Georgia Geological Survey

Approximately 93 percent of the agricultural water used in 1998 was for irrigation purposes (99.17 MGD). The central portion of the basin just below the Fall Line is where the majority of agricultural irrigation occurs. The remaining 7 percent (7.37 MGD) was used for animal operations.

Future agricultural water demand is expected to increase significantly within the basin to 130 MGD by the year 2020 on a projected 235,000 acres under irrigation by that time, assuming growth rates in the basin between 1982 and 1998 continue as observed. Table 3-3 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.

Table 3-3. Projected Agricultural Water Use in the Ocmulgee River Basin, 1995-2020

Year	Projected Water Use (MDG)
2005	101.6
2010	110.9
2015	120.2
2020	129.5

Power Generation Water Demand

There are four power generating plants located within the Ocmulgee basin that use the water resources of the basin.

Navigational Water Demand

There is no commercial navigation in the Ocmulgee basin.

Recreation

Recreation activities in the Ocmulgee River basin include fishing, camping, boating, swimming, picnicking, and other activities.

Waste Assimilation Water Demand

Water quantity, 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 Ocmulgee 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

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.

A significant issue that is receiving increasing attention from EPD is the minimum stream flow policy. EPD's current minimum stream flow policy is to protect the lowest seven-day average flow, which would have occurred during any ten-year period for a stream (commonly called the 7Q10). EPD is considering increasing the minimum flow requirement under recommendations of the Wildlife Resources Division.

3.2.3 Surface Water Withdrawal Permitting

The 1977 Surface Water Amendments to the Georgia Water Quality Control Act of 1964 require all non-agricultural users of more than 100,000 gallons per day (GPD) on a monthly average (from any Georgia surface water body) to obtain a permit for this withdrawal from EPD. These users include municipalities, industries, military installations, and all other non-agricultural 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.

Applicants are required to submit details relating to the source of withdrawals, demand projections, water conservation measures, low flow protection measures (for non-grandfathered withdrawals), and raw water storage capacities. 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 can 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.

In the Ocmulgee River Basin, a total of 2,233 surface and/or groundwater permits have been issued.

3.2.4 Flooding and Floodplain Management

Portions of the Ocmulgee River basin were severely affected by the massive flooding that occurred in parts of Georgia in 1994 and some counties on the western side of the basin were included in Federal Disaster Declaration #1209 as a result of the 1998 floods. The floods of 1994 and 1998 further substantiated the fact that flooding is the number one natural hazard in Georgia.

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 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.

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. The workshop covers the related aspects of the National Flood Insurance Program (NFIP), administration and enforcement of local flood ordinances, the effects of floodplain management on flood insurance rates and flood hazard mitigation.

The Floodplain Management Office also participates in the annual Governor's Severe Weather conference. The purpose of this conference is to increase awareness and preparedness regarding all types of severe weather – flooding, hurricanes, tornadoes, thunderstorms, and ice storms. Flooding is the number one natural disaster in Georgia according to the Georgia Emergency Management Agency (GEMA), coordinator of the conference. The conference is an opportunity for emergency managers, public safety personnel, medical professionals, elected officials, and other interested persons to gather and discuss means to better protect against loss of lives and property.

EPD is also working with a 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. Project Impact's goal is to erase the ceaseless damage-repair-damage cycle by implementing preventive measures before disaster occurs.

3.3 Groundwater Quantity

3.3.1 Groundwater Sources

Groundwater sources in the Ocmulgee River basin are related to physiographic provinces. Groundwater 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 groundwater 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 less than 50 GPM. Techniques for locating these reliable sources have improved greatly over the past 10 years and will likely continue to do so.

The southern part of the Ocmulgee River basin is in the Coastal Plain physiographic province. The Coastal plain area lies south of the Fall Line. It is a region underlain by alternating layers of sand, clay, and limestone that generally become deeper and thicker to the southeast.

The Coastal Plain part of the Ocmulgee basin includes parts of Bibb, Peach, Houston, Twiggs, Macon, Bleckley, Pulaski, Dooley, Laurens, Dodge, Wilcox, Ben Hill, Telfair, Wheeler, Coffee, and Jeff Davis Counties. The main groundwater source in these counties is the Floridan aquifer system. This aquifer system delivers tremendous amounts of water quickly, leading to very heavy municipal, industrial, and agricultural usage from this source.

3.3.2 Groundwater 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.

The groundwater permits are for users equal to or greater than 100,000 GPD. Users below this amount of groundwater are not required to have a permit for their withdrawals.

Agricultural Water Demand

Agricultural surface water demand in the Ocmulgee River basin is considerable. The counties to the north of the Fall Line do not generally contain large areas of irrigated farmland. Major irrigation takes place on irrigated crops are grown throughout Pulaski, Houston, Dodge, Telfair, and Ben Hill Counties.

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.

3.3.3 Groundwater Supply Permitting

Nonagricultural Permits

The Georgia Ground Water Use Act of 1972 requires permits from EPD for all non-agricultural users of groundwater 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. Groundwater use reports are generally required of the applicant on a semi-annual basis. The objective here is the same as with surface water permits.

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 groundwater permitting statute, the lower threshold is 100,000 GPD; however users of less water may apply and be granted a permit. A total of 2,233 surface and groundwater agricultural withdrawal permits have been issued.

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. Presently, agricultural users are not required to submit any water use reports; however, recent legislation will institute a metering and reporting program.

Excessive Groundwater Withdrawals

Excessive groundwater withdrawals can lead to lowering or drawdown of the water table. Localized groundwater drawdowns are generally discovered only after 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 pumped safely, without endangering other users or drawing down the aquifer too greatly. Permit withdrawal limits may then be set at some safer yield that is determined by these pumping tests. These tests may also indicate that proposed pumping amounts may require more wells to be drilled to spread out the ultimate production impact on the aquifer.

References

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