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Section 3

Water Quantity

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 Water use in the St. Marys River basin is measured by estimates of freshwater withdrawn from groundwater and surface water.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

Groundwater is the primary water source in the Coastal Plain Province of the St. Marys River basin. Principal aquifers of the Coastal Plain include the Upper Brunswick and Lower Brunswick aquifers, the Floridan aquifer system, the Claiborne and Clayton aquifers and the Cretaceous aquifer system.

The Floridan aquifer system supplies most of the ground water used in the St. Marys basin. This system consists primarily of limestone, dolostone and calcareous sand. It is generally confined, but is semiconfined to unconfined near its northern limit. Wells in this aquifer system are generally high-yielding and are extensively used for irrigation, municipal supplies, industry and private domestic supply.

Water use in the St. Marys River basin is expected to remain stable in the near future due to 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 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 St. Marys 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 ground water pumped to the surface from wells or naturally flowing from springs. The main source of drinking water in the St. Marys basin is provided by groundwater. 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.

3.1.2 Drinking Water Demands

Over the next few years it is estimated that there will be a slight increase in the use of groundwater to be used for drinking water from the St. Marys River basin. One particular area of noted increase will be the Kingsland/St. Marys area.

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

The St. Marys River basin is a 765 square-mile landmass in southeast Georgia, the smallest of the area's four basins. An additional 535 square-mile portion of the basin lies in Florida. The basin is one of three basins in the area whose hydrologic boundaries continue into Florida.

The upstream boundary of the St. Marys basin is the Okefenokee Swamp. From this point the Georgia portion of the basin extends eastwards and northward to include parts of Ware, Charlton and Camden counties.

Surface water resources in the basin are limited by its small size. The main stem of the St. Marys River is the principal surface water resource, with an annual average flow at its mouth of about 1400 cfs. The North Prong St. Marys River and Spanish Creek, with tributary areas of 540 square miles and 109 square miles, respectively, are the only significant tributaries.

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 St. Marys River basin contains two industrial surface water withdrawal permits. These are listed in Table 3-1, sorted by county. These 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.

Table 3-1. Surface Water Withdrawals

Facility	Type	Source	Mon Avg (Mgd)	Max Day (Mgd)	County
Gilman Paper Co. St. Marys Kraft	Industrial	North River	7.5	8.7	Camden
Gilman Paper Co.	Industrial	North River 02 Injection	12.0	12.0	Camden

Agricultural Water Demand

The demands on 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 1996, the EPD had issued 7 agricultural permits for water withdrawal permits to entities located within the St. Marys River Basin. Within Georgia, agricultural permit holders are by law (O.C.G.A. Section 12-5-31 et seq.) exempted from requirements to report their water use, which make determining exact historical, current, and future agricultural water demand rather challenging.

Irrigated Acreage

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 historical, current, and future, agricultural water use in the basin. Table 3-2 shows historical irrigated acreage in the basin from 1974 to 1998.

Table 3-2. Irrigated Acres in the St. Marys River Basin, 1974-1998.

St. Marys River Basin - Irrigated Acres	
Year	Basin
1974	40
1978	260
1979	85
1980	182
1981	216
1982	235
1984	365
1986	392
1989	387
1992	457
1995	465
1998	471

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

Irrigated acres in the St. Marys River Basin grew from 40 in 1974 to an all time maximum, for the Basin, of 471 in 1998. This represents an annual growth rate of 20.23 percent during the period of record. Because of the relatively small number of acres under irrigation, the actions of a few landowners can have a significant impact on irrigated acres and agricultural water demand in the Basin. Since 1982, irrigated acreage across Georgia has continued to grow, but at a much slower rate, approximately 1.6 percent annually. By comparison, the St. Marys River Basin over the same time period has experienced an annual growth rate of 6.3 percent.

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 St. Marys River basin reflects the influence of these variables (Table 3-3). A distinctly positive trend can be observed. From 1980 to 1995 there was an increase of .52 MGD from .10 MGD in 1980 to .62 MGD in 1995.

Table 3-3. Historical Agricultural Water Use in the St. Marys River Basin, 1980-1995.

St. Marys River Basin - Agricultural Water Use	
Year	Basin total
1980	0.11
1985	0.16
1987	0.18
1990	0.20
1995	0.62

Source: Georgia Geological Survey

Over 91 percent of the agricultural water used in 1995 was for irrigation purposes (.56 MGD). The remaining 9 percent (.05 MGD) was used for animal operations. Ground water sources provided 84 percent of the water used by this industry in 1995.

Future Water Use

Agricultural producers are constantly reacting to changing climate and market conditions; thus, rendering any projections regarding future agricultural water use extremely difficult. Projecting irrigated acreage based on historical trends, and then assuming various water application rates, is likely the most stable approach to estimating

future water use in this industry. Irrigation systems represent a significant investment for agricultural producers. Operational modifications based on changing climate and market conditions will occur on land under irrigation.

Table 3-4 shows the historical and projected acres under irrigation for the St. Marys River Basin. Assuming the 2.35 percent annual growth rate, observed in the St. Marys River Basin between 1992 and 1998, continues; irrigated acreage in the Basin will reach 777 acres by the year 2020.

Table 3-4. Irrigated Acreage 1974-1998, Projected through 2020.

St. Marys River Basin - Irrigated Acres	
Year	Basin
1974	40
1978	260
1979	85
1980	182
1981	216
1982	235
1984	365
1986	392
1989	387
1992	457
1995	465
1998	471
2000	488
2005	548
2010	616
2015	692
2020	777

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

Future agricultural water demand is expected to increase significantly within the basin to .43 MGD by the year 2020. Undesirable climate and favorable market conditions could force producers to demand as much as .69 MGD on the projected 777 acres under irrigation by that time. Conversely, desirable climate conditions and unfavorable market conditions may result in a much lower demand, .29 MGD by 2020. 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. However, a significant increase is unlikely considering current land use trends.

Power Generation Water Demand

There are no power generating plants located within the St. Marys basin that use the water resources of the basin.

Navigational Water Demand

There is no commercial navigation in the St. Marys basin.

Table 3-5. Projected Agricultural Water Use [MGD] through 2020.

St. Marys River Basin - Agricultural Water Use				
Year	Low Scenario	Projected Scenario	High Scenario	
2000	0.18	0.27	0.44	
2005	0.20	0.31	0.49	
2010	0.23	0.34	0.55	
2015	0.26	0.39	0.62	
2020	0.29	0.43	0.69	

Source: USDA-NRCS estimates are based on average water application rates for all commodities.

Recreation

Recreation activities in the St. Marys River basin includes 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 St. Marys 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 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. Table 3-6 lists the permits in effect in the St. Marys River basin.

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.

Table 3-6. Active Municipal and Industrial Ground Water Withdrawal Permits in the St. Marys River Basin

Georgia County	Permit Number	Permit User Name	Permitted Monthly Avg W/D (Mgd)	Permitted Yearly Avg W/D (Mgd)	Permitted Aquifer
Camden	020-0003	Gilman Paper Co - Kraft Division	44.500	40.000	Floridan
Camden	020-0010	Kings Bay Naval Sub Base	2.900	2.900	Floridan
Camden	020-0001	Kingsland, City of	3.000	2.500	Floridan
Camden	020-0002	St. Marys, City of	3.000	2.500	Floridan
Charlton	024-0001	Folkston, City of	1.500	1.250	Floridan
Camden	020-0012	Kings Bay Naval Sub Base - Irrigation	1.000	1.000	Miocene
Camden	020-0004	Gilman Paper Co - Kraft Bag Division	0.169	0.169	Floridan, Miocene-Pliocene

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 are received prior to July 1, 1991, are “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 St. Marys River basin was unaffected by the massive flooding that occurred in parts of Georgia in 1994, however, many counties within the St. Marys, Suwannee, Satilla and Ochlockonee basins were included in Federal Disaster Declaration #1209 as a result of the 1998 floods. The Floods of 1998 further substantiated the fact that flooding is the number one natural hazard in Georgia.

In March 1991, severe storms caused flooding in counties within St. Marys, Suwannee and Satilla river basins. Also the counties of Appling, Atkinson, Bacon, Berrien, Clinch, Coffee, Jeff Davis, Johnson, Lanier, Laurens, Lowndes, Pierce, Thomas and Ware were declared disaster areas.

All of the counties within the St. Marys River basin currently participate in the National Flood Insurance Program (NFIP).

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.

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 Floodplain Management Office held a workshop on May 13, 1999, for local officials from Glynn and Camden counties at the City of Brunswick government offices. The workshop covered the related aspects of the National Flood Insurance Program (NFIP), administration and enforcement of local flood ordinance, 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 held on Jekyll Island. 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.

3.3 Ground Water Quantity

3.3.1 Ground Water Sources

The St. Marys River basin in Georgia is in the physiographic province known as the Coastal Plain province. South of the fall line is the Coastal plain area, a region underlain by alternating layers of sand, clay, and limestone which get deeper and thicker to the southeast.

The St. Marys basin includes portions of Charlton and Camden counties. The main groundwater source in these counties is the Floridan Aquifer. This aquifer system delivers tremendous amounts of water quickly, leading to very 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 on 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

Agricultural groundwater demand in the St. Marys River basin is limited. Generally agriculture areas use the Floridan aquifer as 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. A list of active Georgia municipal and industrial ground water withdrawal permits is provided in Table 3-6.

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.

References

DRI/McGraw-Hill. 1996. The Regional Economic Forecast of Population and Employment Comprehensive Study Volume 1. Prepared for: The Georgia Department of natural Resources Environmental Protection Division. DRI/McGraw-Hill, Lexington, MA.

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