GEORGIA
WATER PLANNING

Coastal Georgia Regional Water Planning Council

WATER & WASTEWATER FORECASTING TECHNICAL MEMORANDUM

Supplemental Material | Coastal Georgia Regional Water Plan

APRIL 2024

Table of Contents

List of Figures

List of Tables

Section 1
Introduction

Municipal and Industrial Water and Wastewater Forecasts were originally developed for the Coastal Georgia Regional Water Planning Council as part of the Georgia Comprehensive Statewide Water Management Plan (CSWMP) in 2011. Agricultural and Energy water needs were also identified and forecasted during the 2011 planning process. As part of the first 5-year review and revision of that plan, all of these forecasts, with the exception of Industrial water and wastewater forecasts, were updated in 2017. In support of the 2023 plan update, the Agricultural, Energy, Municipal, and Industrial water and wastewater forecasts have been updated. This Technical Memorandum describes how the forecasts have been modified to account for changes in population and water use that have occurred since the 2017 forecasts were produced.

Throughout this report, the prior Regional Planning process that occurred in 2009 – 2011 is referred to as "Round 1" and the 2017 update is referred to as "Round 2". Thus, the current (2023) update is referred to as "Round 3".

The basic approach to updating the forecasts starts with the same methodology used in developing the Round 2 forecasts, which are described in various Technical Memoranda, which were included as supplemental materials to the 2017 Coastal Georgia Regional Water Plan.[1] The purpose of this Technical Memorandum is to describe where modifications to the Round 2 forecast methodology were made and to provide the revised forecast values.

1.1 General Methodology

The basic methodology for forecasting water demand is to estimate demand separately for each major water use sector. For each sector, water demand is estimated using a 'driver' multiplied by the 'rate of use'. The driver is defined as a countable unit that can be projected in future years, such as number of people, acres irrigated or megawatts of power. The rate of use is defined as the quantity of water used by the driving unit per unit of time, such as gallons per person per day, gallons per day per acre, or gallons per megawatt produced.

The planning process examines and forecasts water demand for four major sectors:

- **Municipal** – this sector includes domestic, commercial, and low water use industries
- **Industrial** – this sector includes higher water use industries

[1] See "Coastal Georgia Regional Water Plan," dated June 2017 (available at https://waterplanning.georgia.gov/coastal-georgia-regional-water-plan);

"Coastal Georgia Water and Wastewater Forecasting Technical Memorandum," dated March 2017 (available at https://waterplanning.georgia.gov/coastal-georgia-region-technical-information).

- **Agricultural** – this sector includes major crops such as cotton, corn, peanuts, soybean, pecans, specialty crops, and nursery and horticulture; a snapshot of major livestock water use and golf course water use
- **Energy** – this sector includes thermoelectric power generation

The total water demand forecast per sector is then divided between surface water and groundwater sources. Surface water withdrawals are further assigned to various surface water basins, while groundwater withdrawals are assigned to specific aquifers. During the current plan update a set of seven priority aquifers were utilized for aquifer assignments: Brunswick, Claiborne, Clayton, Cretaceous, Crystalline Rock, Floridan, and surficial. Other aquifer classifications per permits records were reassigned to one of these seven major aquifers.

1.2 Population Update

State and County population projections are provided by the Governor's Office of Planning and Budget (OPB). These projections are used consistently throughout the state for multiple purposes such as transportation planning and allocation of education funds. The Georgia Environmental Protection Division (EPD) is required to use these population projections in statewide water planning. The 2010 Census statewide population count was lower than had been projected for 2010 in the Round 1 projections, although this trend of lower population than projected does not hold true for all counties. The Round 1 forecast had the State's population growing at an annual rate of 1.83 percent while the 2019 updated forecast grows at an annual rate of only 0.87 percent as shown in **Figure 1-1**.

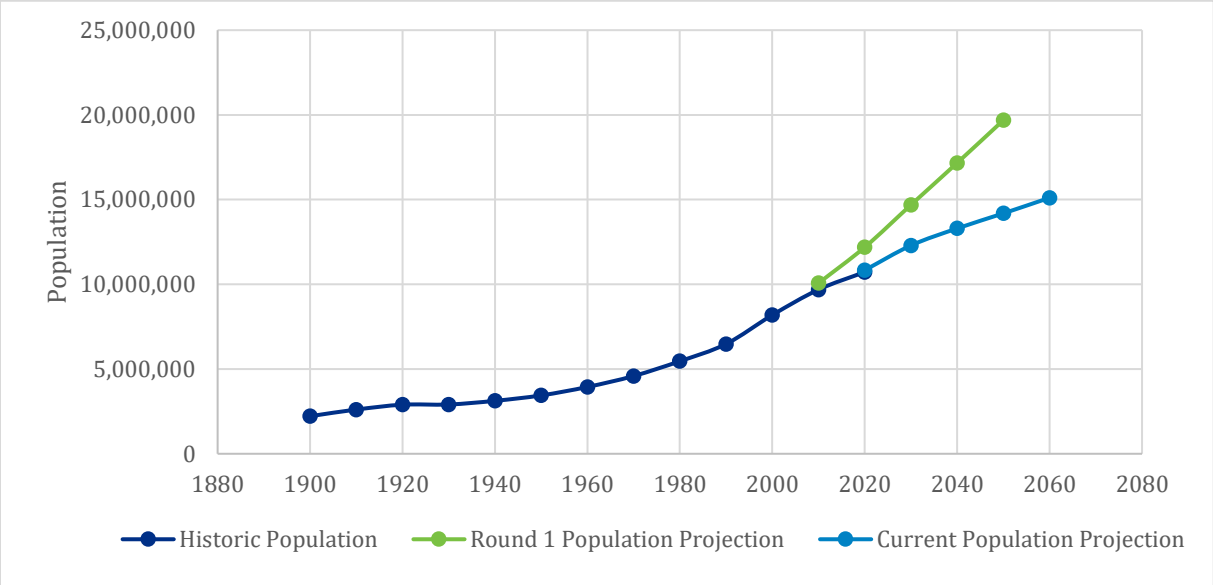


Figure 1-1
Georgia's Historic Population and Growth Projections

While the trend of a lower population than originally projected in 2020 was seen statewide, each county had its own individual trend. For the region as a whole, the OPB 2019 population projection is 9 percent lower than the Round 1 projection for 2020 and 35 percent less than the Round 1 estimate for 2050 as shown in **Figure 1-2**. The new population projections (OPB, 2019) by county are shown in **Table 1-1**.

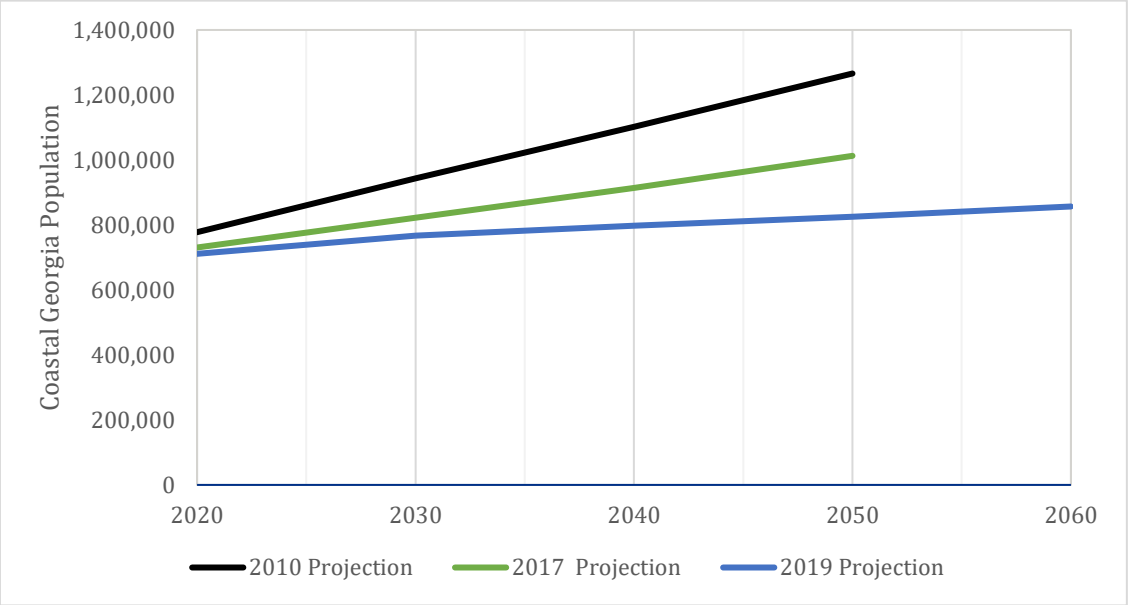


Figure 1-2. Coastal Georgia Population Projections

Table 1-1 2019 Population Projections per County

County	2020	2025	2030	2035	2040	2045	2050	2055	2060
Bryan	39,137	41,719	44,300	45,831	47,361	48,278	49,194	49,475	49,755
Bulloch	79,467	82,767	86,066	84,777	83,487	81,196	78,905	77,114	75,322
Camden	53,924	54,820	55,715	55,994	56,272	56,392	56,512	56,730	56,948
Chatham	292,176	302,782	313,387	321,021	328,655	336,403	344,151	353,662	363,173
Effingham	64,026	68,160	72,294	74,437	76,579	77,268	77,957	77,846	77,734
Glynn	86,047	89,566	93,084	96,198	99,312	102,749	106,185	110,549	114,913
Liberty	61,904	62,095	62,286	62,007	61,727	61,606	61,485	61,252	61,018
Long	19,915	22,506	25,096	28,210	31,324	34,941	38,558	42,943	47,328
McIntosh	14,567	14,637	14,707	14,051	13,394	12,589	11,784	11,209	10,633
Total	**711,163**	**739,049**	**766,935**	**782,523**	**798,111**	**811,421**	**824,731**	**840,778**	**856,824**

Section 2
Municipal Water Forecasting

This section describes the methodology and results of municipal water demand forecasts for the Coastal Georgia Planning Region.

2.1 Methodology

The county level municipal water demand includes both public-supplied (i.e., utility) water demand and self-supplied (i.e., private well) water demand. The self-supplied water is associated with groundwater use, while the public-supply water is associated with either surface water or groundwater use as indicated by active permit data. Each county has an average weighted per capita water use value that was derived from an analysis of all reporting utilities within each county. In Round 1, 2005 utility data was used to determine the gpcd average for each county. In Round 2, the Round 1 gpcd values were adjusted based on the utility level data over the most recent four years. In Round 3, the county gpcd averages were based on utility water loss audits and then vetted through the regional councils. The following sections describe updates to the previous methodology used to produce the revised forecasts.

2.1.1 Percent Change in Gallons per Capita per Day

The Georgia EPD compiled and reviewed water loss audit data reported annually for water systems serving populations of 3,300 or more as mandated by the Georgia Water Stewardship Act (2011). The water supplied input value from the audit information was then divided by the population served from EPA's Safe Drinking Water Information System (SDWIS) database to calculate the total per capita water use of a system. A weighted average for counties with more than one system was developed using water loss audit data from 2015 to 2018. To account for treatment loss, three percent was added to counties that have a surface water treatment plant as these systems typically have an in-plant water use that offsets the water produced.

If no data were available to EPD, withdrawal information was divided by the population served value provided by the SDWIS database to calculate the per capita water use. Roughly three-fourths of the counties had a decrease in gpcd. Note that a decrease in gpcd could be due to conservation and water loss control efforts during this time period, or other factors such as an increase in population with less increase in water use, or a drop in water use (e.g., loss of industrial customer) with the same population. **Table 2-1** shows the current updated gpcd compared to the Round 2 gpcd for each county.

The self-supplied value for each county remains at 100 gpcd.

Table 2-1. Per Capita Demand Values by County, gpcd

County	Round 2 Per Capita	Updated Per Capita	% Change
Bryan	138	117	-15.2%
Bulloch	138	88	-36.2%
Camden	133	88	-33.8%
Chatham	136	106	-22.1%
Effingham	140	189	35.0%
Glynn	135	120	-11.1%
Liberty	136	87	-36.0%
Long	137	235	71.5%
McIntosh	132	119	-9.8%

2.1.2 Plumbing Code Adjustment Factor

In Rounds 1 and 2, the gpcd for each county was reduced over time due to the effects of plumbing codes based upon the age of housing stock in each county. Over time, as new houses are built with more efficiency fixtures, the county average gpcd will decrease. Previously a reduction (adjustment) was calculated for each county starting with zero in 2010 (the base year in Round 1) and increasing over time. For the current update, the plumbing code adjustment was extrapolated using the 2017 Regional Water Plan plumbing code adjustment. The revised plumbing code adjustment was then applied to both public-supplied and self-supplied water demand. **Table 2-2** shows the municipal public-supplied gpcd value over time for each county as used in the current forecast.

Table 2-2. Adjusted Public-Supplied GPCD

County	Time Adjusted Values								
	2020	2025	2030	2035	2040	2045	2050	2055	2060
Bryan	116.9	116.1	115.3	114.4	113.6	112.8	111.9	111.1	110.2
Bulloch	88.0	87.0	85.9	84.9	83.9	82.8	81.8	80.7	79.7
Camden	88.0	87.1	86.3	85.4	84.5	83.7	82.8	81.9	81.1
Chatham	106.1	104.8	103.5	102.1	100.8	99.5	98.2	96.8	95.5
Effingham	189.3	188.5	187.6	186.8	185.9	185.0	184.2	183.3	182.5
Glynn	119.9	118.7	117.5	116.3	115.1	113.9	112.7	111.5	110.3
Liberty	116.0	115.0	114.0	113.0	112.0	111.0	110.1	109.1	108.1
Long	235.3	234.4	233.4	232.5	231.6	230.6	229.7	228.8	227.8
McIntosh	118.6	117.5	116.4	115.3	114.3	113.2	112.1	111.0	109.9

2.2 Municipal Water Forecasting Results

Table 2-3 shows the forecasted municipal water demand in millions of gallons per day (MGD) (public-supplied and self-supplied) by county in the Coastal Georgia region. The total regional demand is shown graphically in **Figure 2-1** along with a comparison of the 2010 and 2017 estimates. The region-wide current municipal forecast is lower than in prior forecasts due to the combination of lower population projections and lower per capita water use values.

Table 2-3 Average Annual Municipal Water Demand Forecast by County (MGD)

County	2020	2030	2040	2050	2060
Bryan	4.4	4.9	5.2	5.3	5.3
Bulloch	7.2	7.6	7.2	6.7	6.2
Camden	4.8	4.9	4.8	4.8	4.7
Chatham*	63.5	64.9	65.7	66.3	67.2
Effingham	10.2	11.3	11.9	12.0	11.8
Glynn	10.1	10.7	11.2	11.7	12.4
Liberty	7.1	7.0	6.8	6.7	6.5
Long	2.7	3.4	4.2	5.1	6.2
McIntosh	1.6	1.6	1.4	1.2	1.1
Total	**111.7**	**116.5**	**118.4**	**119.7**	**121.4**

*Chatham County municipal water demand includes 31.47 MGD of industrial water demand from public supply.

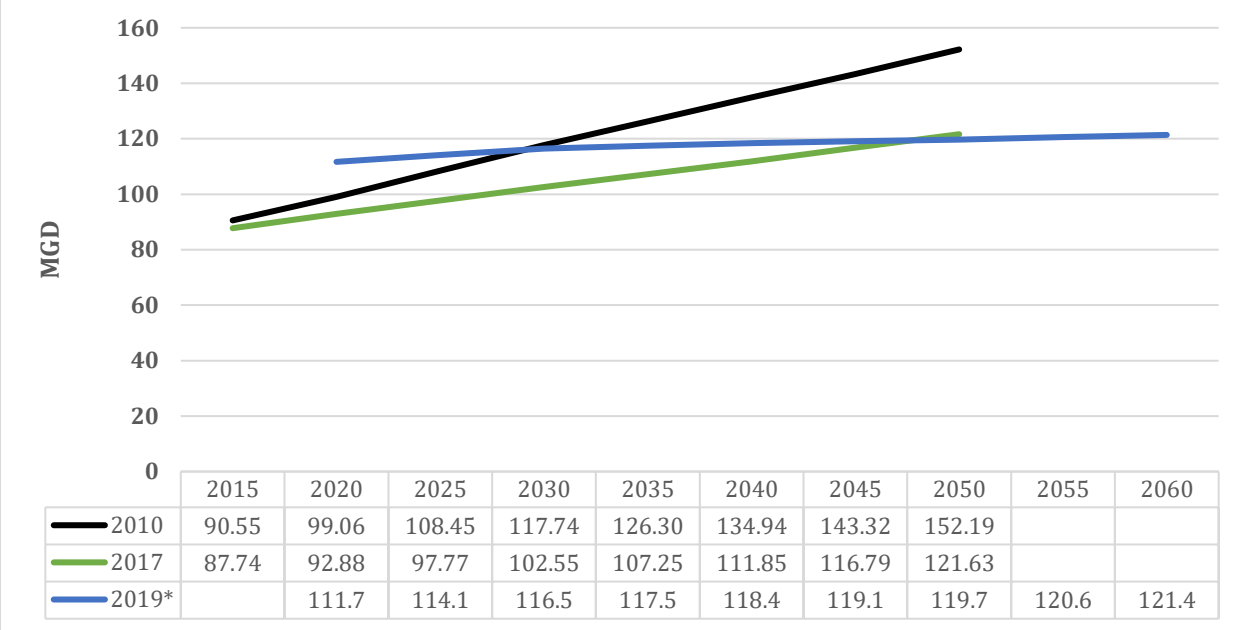


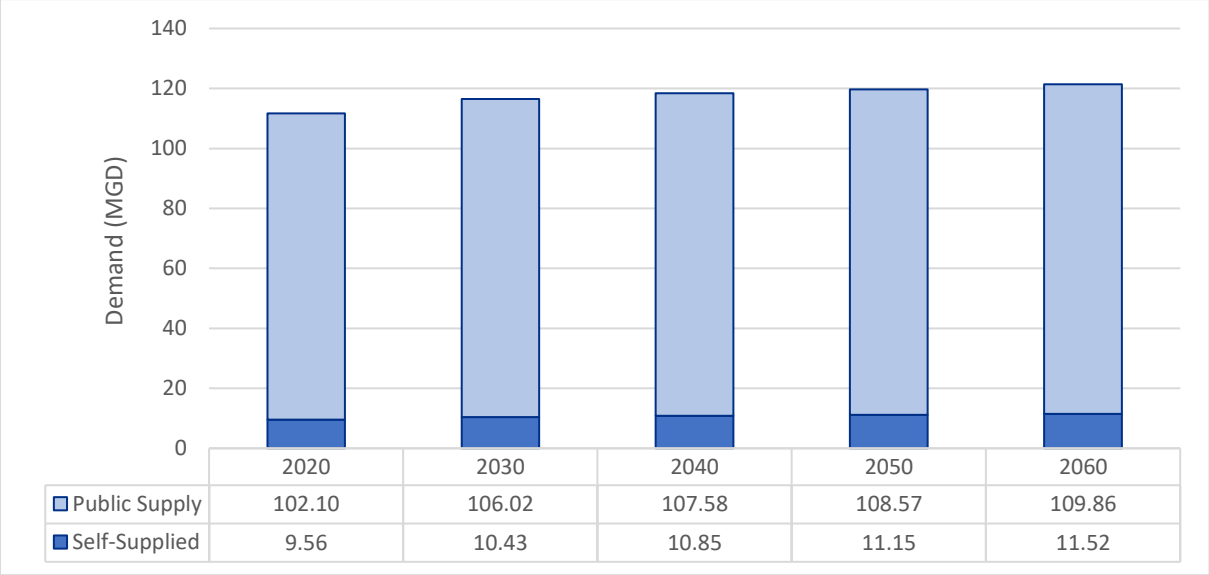
Figure 2-1
Forecasted Municipal Water Demand for Coastal Georgia Planning Council
*Chatham County municipal water demand includes 31.47 MGD of industrial water demand from public supply not included in prior forecasts.

2.3 Municipal Water Forecast Allocations

As noted above, the municipal water demand for each county is the summation of the public-supplied and self-supplied water demand estimates for each county. The percent of county population that is public-supplied and self-supplied are held constant in the future years. This split of county population was derived from USGS estimates and were vetted through the regional council review process. **Figure 2-2** shows the split between self-supply versus public-supply for the region.

It is assumed that all self-supplied (i.e., domestic residential) water use is from groundwater. The allocation of public-supplied municipal water among surface water and groundwater sources was determined by an analysis of surface water and groundwater permitted water withdrawals for municipal use by county.

Thus, the updated county municipal water demand forecasts are allocated among surface water and groundwater aquifers for analysis with other components of the state water plan update. For the Coastal Georgia region, the majority of municipal water is groundwater from the Floridan aquifer with some groundwater supply from surficial aquifers and some surface water supply from the Savannah River, as shown in **Figure 2-3**.



	2020	2030	2040	2050	2060
Public Supply	102.10	106.02	107.58	108.57	109.86
Self-Supplied	9.56	10.43	10.85	11.15	11.52

Figure 2-2
Self-Supply Versus Public-Supply of Municipal Water Demand

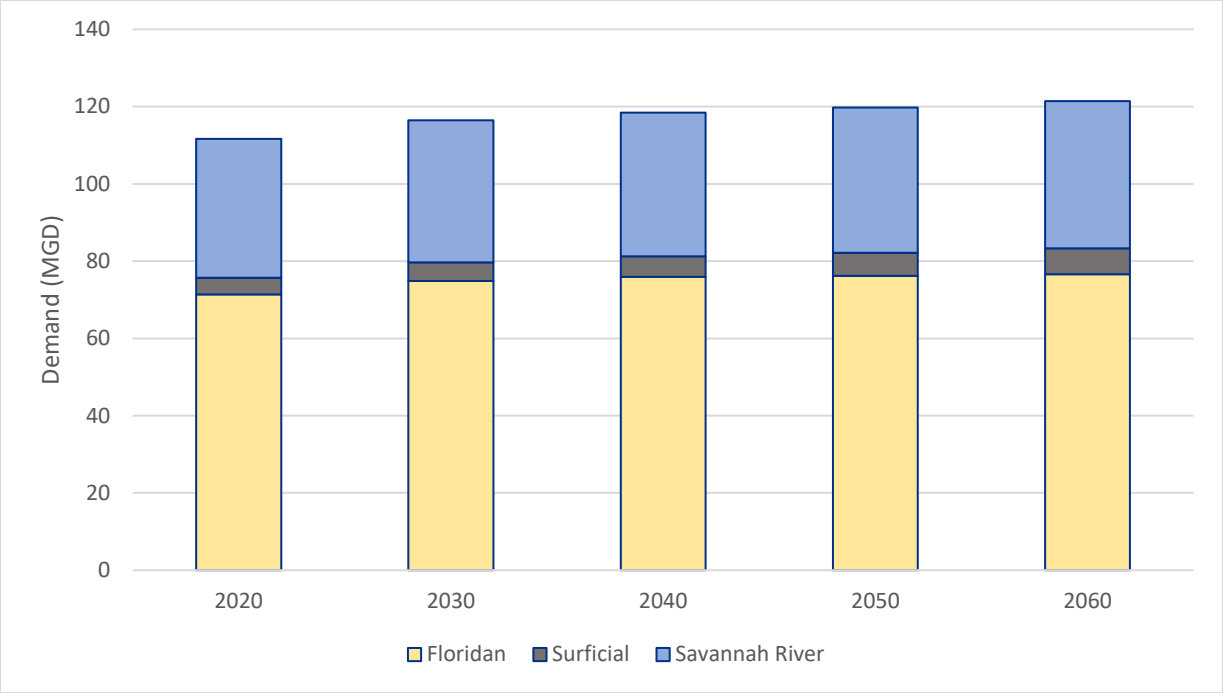


Figure 2-3
Municipal Water Demand for Coastal Georgia Planning Council by Aquifer and Basin

Section 3
Municipal Wastewater Forecasting

This section describes the methodology and results of the update of the municipal wastewater demand forecasts for the Coastal Georgia Planning Region.

3.1 Methodology

In the Round 1 forecast, the municipal water demand served as the basis for estimating the municipal wastewater flows for each county with a portion of the water demand assumed to be indoor use that entered the centralized wastewater treatment system. While self-supplied water demand was assumed to go to a septic system, public-supplied water in each county had a proportion going to septic and a portion to centralized treatment. A percentage was then added to centralized flows for inflow and infiltration (I/I) that occurs on the way to the treatment facility. The centralized flow estimate was then allocated between point discharge (NPDES) and land application systems (LAS).

For the 2017 update, the Georgia EPD provided an analysis of 2014 NPDES permitted discharges by county and a recommended methodology for the municipal wastewater forecast update for each county.

For the 2020 Update, the municipal wastewater flow forecasts were developed using 2019 discharge flow data and the population change in each county. Estimates of municipal wastewater disposal were determined for each county and watershed within the planning region. Discharge data provided by EPD for 2019 was utilized for forecasting future wastewater flows by county. The percent change between the updated population projection base year (2019) and each planning year (2020, 2030, 2040, 2050, and 2060) was applied to the wastewater discharge totals for each county from 2019 to obtain estimated total county discharge flows for each planning year. For the forecasting effort, the conservative assumption that no reduction in discharge flow from water conservation efforts was made, which should slightly overestimate discharge flow. Future forecasts were assumed to maintain the same split between point source discharges and LAS discharges in each county in the absence of additional information. Where forecasted LAS flow increases exceeded current permit limits, it was assumed that flow over the current limits will be routed to point source discharge(s) in the county.

3.2 Results

Table 3-1 shows the forecasted municipal wastewater generated per county in the Coastal Georgia region. The total regional wastewater generated is then shown graphically in **Figure 3-1** separated between septic treatment and centralized treatment that is discharged via a point source or land application. **Figure 3-2** gives a snapshot of how the generated wastewater is discharged per watershed for 2020.

Table 3-1 Total Wastewater Generated in Coastal Georgia Planning Region per County (MGD)

County	2020	2030	2040	2050	2060	% Change 2020 to 2060
Bryan	3.7	4.1	4.4	4.6	4.6	27%
Bulloch	13.1	14.2	13.8	13.0	12.4	-5%
Camden	7.3	7.6	7.6	7.7	7.7	6%
Chatham	39.2	42.1	44.1	46.2	48.8	24%
Effingham	4.5	5.1	5.4	5.5	5.4	21%
Glynn	13.8	15.0	16.0	17.1	18.5	34%
Liberty	2.5	2.5	2.5	2.5	2.4	-1%
Long	1.1	1.4	1.8	2.2	2.7	138%
McIntosh	1.0	1.0	0.9	0.8	0.7	-27%
Total	**86.2**	**92.9**	**96.5**	**99.5**	**103.4**	**20%**

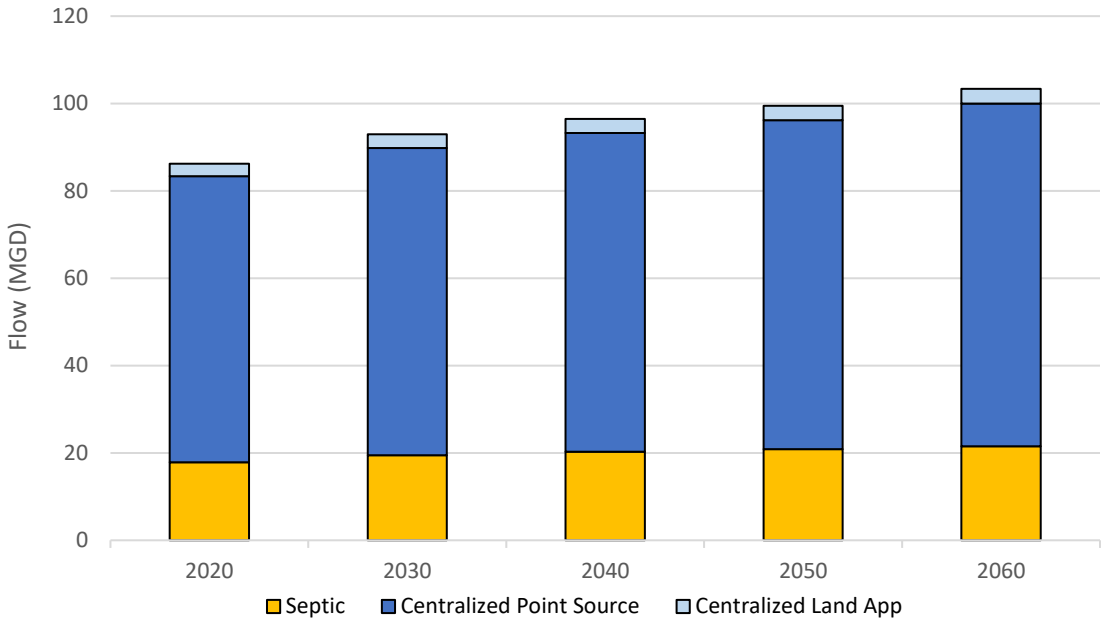


Figure 3-1
Total Wastewater Generated Coastal Georgia Planning Region by Type

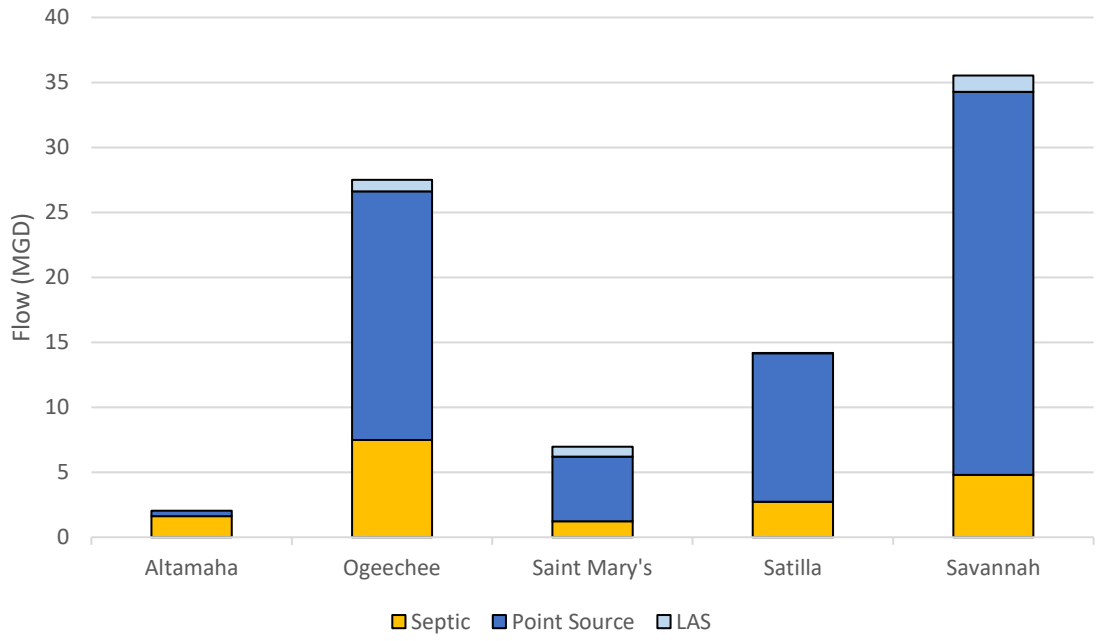


Figure 3-2
2020 Snapshot of Wastewater Discharge Type per Watershed

Section 4
Industrial Forecasting

This section describes the methodology and results of industrial water and wastewater demand forecasts for the Coastal Georgia Planning Region.

4.1 Methodology

The original (Round 1) methodology forecasted industrial water demand based on employment projections per industry with the 2010 water use multiplied by the expected employment growth rate into the future for that type of industry. The industrial wastewater flow was then estimated from a wastewater to water ratio developed for each industrial category.

In the Coastal Georgia region, the Council elected to also develop an alternate forecast for Round 1 that included a higher industrial growth rate than the baseline forecast as it was believed that past trends may not accurately reflect future trends in industrial growth for the region. Locations for potential future industrial development were identified and the council estimated an increase of 35 MGD in industrial water use over the planning horizon which represented a 22 percent increase compared to the 0.3 percent growth predicted under the baseline conditions. This same industrial forecast from Round 1 was used again in Round 2 as there were no updated industrial employment projections.

In support of the current update, EPD identified industrial representatives throughout the State of Georgia to form an industrial water demand forecast stakeholder advisory group to represent the state's thirteen largest industrial water use sectors. It was then determined that employment projections were not a valid basis for estimating future water requirements of industries as water requirements are a function of production of which automation has reduced the number of employees per unit of production. Separate industrial sub-sector groups were subsequently formed to examine trends in water use for food processing, paper and forest products, mining, and manufacturing. The sub-sector advisory groups worked independently to review a variety of considerations for estimating future water demand and determined a variety of common and sector-specific conclusions.

Data was confidentially collected within the sub-sectors through trade association surveys and merged with EPD withdrawal data. The basis of projected water use for the majority of industrial facilities used the 10-year average water withdrawals from 2010 to 2019, however, there were some instances where data was limited to a 5-year average from 2015 or 2019 or reported water use for 2019.

It should be noted that information was shared between the industrial forecast team and the municipal forecast team to adjust for large industries supplied by municipal water systems. As a result, the municipal forecast excludes large industrial users from the municipal water use per capita and municipal water demand calculations.

4.2 Results

4.2.1 Industrial Water Forecasts

Table 4-1 shows the industrial water demand by county as well as the percent increase in demand between 2020 and 2060 for the forecast. **Table 4-2** shows the same water demand broken down by industry. Industrial water demand in the region is currently supplied 30 percent from surface water, 60 percent from groundwater, and 10 percent from municipal water supply.

Table 4-1 Industrial Water Demand Forecast per County (MGD)

County	2020	2030	2040	2050	2060	% Change 2020 to 2060
Bryan	0.00	0.00	0.00	0.00	0.00	0%
Bulloch	0.00	0.00	0.00	0.00	0.00	0%
Camden	0.00	0.00	0.00	0.00	0.00	0%
Chatham	41.14	39.83	39.83	39.83	39.83	-3%
Effingham	14.47	14.47	14.47	14.47	14.47	0%
Glynn	32.38	32.38	32.38	32.38	32.38	0%
Liberty	10.71	10.71	10.71	10.71	10.71	0%
Long	0.00	0.00	0.00	0.00	0.00	0%
McIntosh	0.00	0.00	0.00	0.00	0.00	0%
Total	**98.70**	**97.38**	**97.38**	**97.38**	**97.38**	**-1.3%**

Table 4-2 Industrial Water Demand Forecast per Industry (MGD)

Industry	2020	2030	2040	2050	2060
Food	1.69	1.69	1.69	1.69	1.69
Manufacturing	15.39	15.39	15.39	15.39	15.39
Mining	0.48	0.48	0.48	0.48	0.48
Paper	81.13	79.82	79.82	79.82	79.82
Total	**98.70**	**97.38**	**97.38**	**97.38**	**97.38**

4.2.2 Industrial Wastewater Results

Table 4-3 provides the forecast of industrial wastewater generated per County. All of industrial wastewater in the Planning Region is discharged via a permitted point source for the industrial facility.

Table 4-3 Industrial Wastewater Generation Forecast per County (MGD)

County	2020	2030	2040	2050	2060	% Change 2020 to 2060
Bryan	0.00	0.00	0.00	0.00	0.00	0%
Bulloch	0.00	0.00	0.00	0.00	0.00	0%
Camden	0.00	0.00	0.00	0.00	0.00	0%
Chatham	31.12	31.12	31.12	31.12	31.12	0%
Effingham	14.47	14.47	14.47	14.47	14.47	0%
Glynn	31.99	31.99	31.99	31.99	31.99	0%
Liberty	10.13	10.13	10.13	10.13	10.13	0%
Long	0.00	0.00	0.00	0.00	0.00	0%
McIntosh	0.00	0.00	0.00	0.00	0.00	0%
Total	**87.71**	**87.71**	**87.71**	**87.71**	**87.71**	**0.00%**

Section 5
Agricultural Water Forecasting

This section describes the methodology and results of agricultural water demand forecasting for the Coastal Georgia Planning Region.

5.1 Methodology

Agricultural water demand forecasts were originally developed, and recently updated, by the Georgia Water Planning & Policy Center at Albany State University (GWPPC), with support from the University of Georgia's (UGA) College of Agricultural and Environmental Sciences. GWPPC was contracted by Georgia Environmental Protection Division (GAEPD) to prepare estimates of current and future use of water by the agricultural sector in Georgia. The basic methodology involved estimating the projected irrigated area for each crop type and multiplying that area by the predicted monthly irrigation need in inches per each crop type. The proportion of irrigation water derived from different water source types was also considered. The projections cover row and orchard crops as well as most vegetable and specialty crops accounting for more than 95 percent of Georgia's irrigated land. Additionally, estimates of current use are made for animal agriculture, horticultural nurseries and greenhouses, as well as golf courses.

Field observations, aerial surveys, and remote sensing were used to identify the 2020 irrigated acres by county. USDA projections, the Southeast Model, Georgia Model and data trends were used by the project team to project crop acreage by county through 2060. The number of irrigated acres has increased from 2015 to 2020 in most counties. Therefore, the projected irrigated crop acreage for 2060 is higher than previous forecasts for most counties. Crop water needs estimates from 2015-2016 were reviewed and updated with data from recent crop metering data. Prior agricultural forecasts assumed that only 70 percent of surface water withdrawals were applied. This assumption was removed for the updated forecast. Estimates were developed for crop irrigation from groundwater and surface water from 2020 to 2060. Water use estimates for animals and horticulture were estimated by county for 2020 and held constant over time. Water use for animals and horticulture is assumed to be groundwater.

To address potential climate extremes, a range of agricultural demand scenarios were considered including wet, normal and dry years. The 75th percentile of water demand was selected to represent dry year conditions when higher irrigation demands are expected. For planning purposes, GWPPC used the 75th percentile values for each region to represent a more conservative scenario than the median value. It is the 75th percentile demands that are presented in this report.

5.2 Results

Table 5-1 shows the forecasted agricultural water needs by county in the Coastal Georgia region. The Coastal Georgia region as a whole is expected to see an increase of 24 percent in agricultural water demand by 2060. **Figure 5-1** shows the agricultural demands split by basin for surface water and aquifer for groundwater with the same data also provided in **Table 5-2**. Currently 64 percent of the agricultural demand in the Coastal Georgia region is met from groundwater.

Table 5-1 Coastal Georgia Agricultural Demand Forecast by County (MGD)

County	2020	2030	2040	2050	2060	Percent Increase 2020 to 2050
Bryan	0.05	0.05	0.05	0.05	0.05	0%
Bulloch	13.6	14.5	15.3	16.3	17.3	27%
Camden	0.07	0.07	0.07	0.07	0.07	0%
Chatham	0.46	0.46	0.46	0.46	0.46	0%
Effingham	2.3	2.4	2.5	2.6	2.7	19%
Glynn	0.02	0.02	0.02	0.01	0.02	0%
Liberty	0.05	0.05	0.05	0.05	0.05	4%
Long	0.63	0.68	0.71	0.75	0.79	25%
McIntosh	0.24	0.24	0.25	0.24	0.26	10%
Total	**17.4**	**18.5**	**19.5**	**20.5**	**21.7**	**24%**

Table 5-2 Coastal Georgia Agricultural Demand Forecast per Source (MGD)

Source Water Type	Basin/Aquifer	2020	2030	2040	2050	2060	Percent Increase 2020 to 2060
Surface Water	Altamaha	0.32	0.35	0.37	0.32	0.41	27.6%
	Ogeechee	5.68	6.03	6.33	5.63	6.99	23.1%
	Satilla	0.02	0.02	0.02	0.01	0.02	0.0%
	Savannah	0.18	0.19	0.20	0.42	0.22	21.1%
	Sub Total	**6.20**	**6.59**	**6.92**	**6.37**	**7.64**	**23.2%**
Groundwater	Surficial	0.14	0.15	0.15	0.22	0.16	12.7%
	Floridan	11.09	11.75	12.39	13.90	13.89	25.3%
	Sub-Total	**11.23**	**11.89**	**12.54**	**14.12**	**14.05**	**25.1%**
Total		**17.44**	**18.48**	**19.45**	**20.49**	**21.70**	**24.4%**

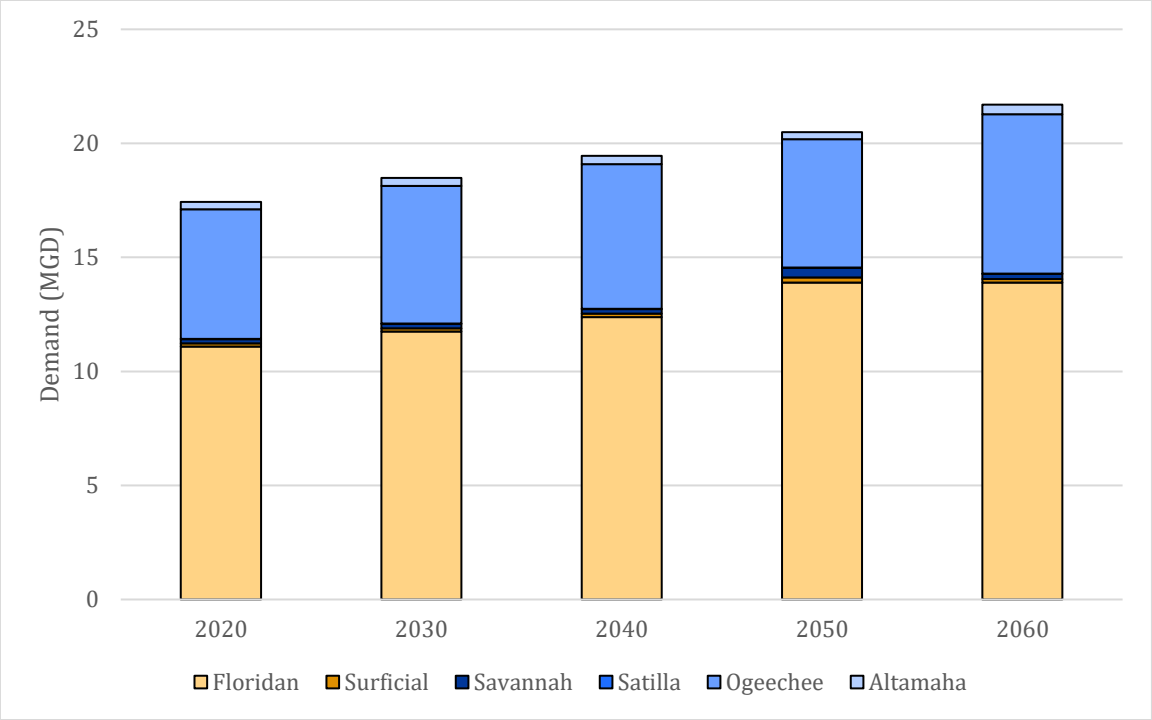


Figure 5-1
Agricultural Water Demand by Source Water Type

Section 6
Energy Water Forecasting

This section describes the methodology and results of energy sector water demand for the Coastal Georgia Planning Region.

6.1 Methodology

Demands forecasted in this section are associated with future energy sector utilities (NAICS 22) power generation. Water demands associated with power generation by facilities with other industry codes are captured as part of the municipal and industrial water demand forecasts discussed in previous sections.

The analysis covers both water withdrawal requirements and water consumption associated with energy generation. Information related to water withdrawals is an important consideration in planning for the water needed for energy production. However, water consumption is the more important element when assessing future resources because a large volume of water is typically returned to the environment following the energy production process.

Water requirements for thermoelectric power generation facilities are estimated based on future energy demands along with the water requirements and consumption rates in gallons per megawatt-hour (MWh) for different power generating configurations. For a full discussion of the original forecast methodology see the 2010 technical memorandum "Statewide Energy Sector Water Demand Forecast" or the "Update of GA Energy Needs & Generating Facilities" memorandum. The following modifications to the original methodology were incorporated into the current estimates:

- Projections of the statewide energy demand were updated using the new population projections to estimate "High Demand" and "Expected Demand" scenarios. Values of 10 MWh and 11 MWh per capita were assumed for the High Demand and Expected Demand scenarios, respectively.
- The list of existing facilities, facilities under construction, and planned and permitted new facilities was updated and reviewed by the stakeholder advisory group. In addition, some prior facilities were retired from service or converted from one generating configuration to another configuration. It was assumed that all coal-fired generating facilities in Georgia will be retired by 2040.
- The same water withdrawal and consumptive use factors (gallons per MWh) by generating configuration were maintained as previously developed.
- To meet the future energy demand, the energy generation of existing facilities is increased over time to a predetermined maximum sustainable generating capacity based on the generation configuration. As additional capacity is needed in the future, "new" capacity is added to the most likely to be developed generating configurations, which are assumed to

be provided by natural gas and renewable energy. The increase in natural gas generation was assigned geographically to locations in which natural gas generating facilities currently exist.

- The estimated future generating capacity of existing facilities, and associated water requirements, is allocated to regions based on the location of the existing facilities.

6.2 Results

Energy facilities within the Coastal Georgia Planning Region include: Effingham County Power Project, Plant McIntosh, Plant Boulevard. **Table 6-1** shows the projected expected scenario average annual daily withdrawal and consumption at these facilities over the planning horizon.

Table 6-1 Coastal Georgia Forecasted Expected Energy Sector Demands (MGD)

Demand Type	2020	2030	2040	2050	2060
Withdrawals	8.0	8.0	10.4	11.5	12.6
Consumption	7.0	7.0	9.2	10.1	11.1

In the previous statewide analysis, the generating capacity of the existing and planned facilities was not able to meet the projected statewide power needs through 2050 and additional generating capacity was assumed to be developed beyond 2020. Projections for the need of new energy capacity are less than estimated previously. Under the current energy forecasting effort, it was determined that planned generation levels will be sufficient enough to meet the expected need up to 2036. Because coal-fired generation is expected to decline and be retired by 2040, renewable energy and natural gas-fired facilities will be increased to generate the additional energy required to meet the expected demand.

Section 7
Regional Summary

This section summarizes the water and wastewater forecasts within the region for all the sectors combined.

7.1 Water Demand Summary

The full regional water demand including municipal, industrial, agricultural and energy uses are summarized in the figures and tables of this section. **Figure 7-1** shows the regional water demand per basin for surface water withdrawals and per aquifer for groundwater withdrawals with municipally supplied industrial and energy demand removed to avoid double-counting. **Figure 7-2** shows the regional water demand per sector with municipally supplied industrial and energy demand removed to avoid double-counting. **Figure 7-3** shows the county water demand per sector for the year 2020. **Table 7-1** provides a breakdown of the demand types and withdrawal locations per County.

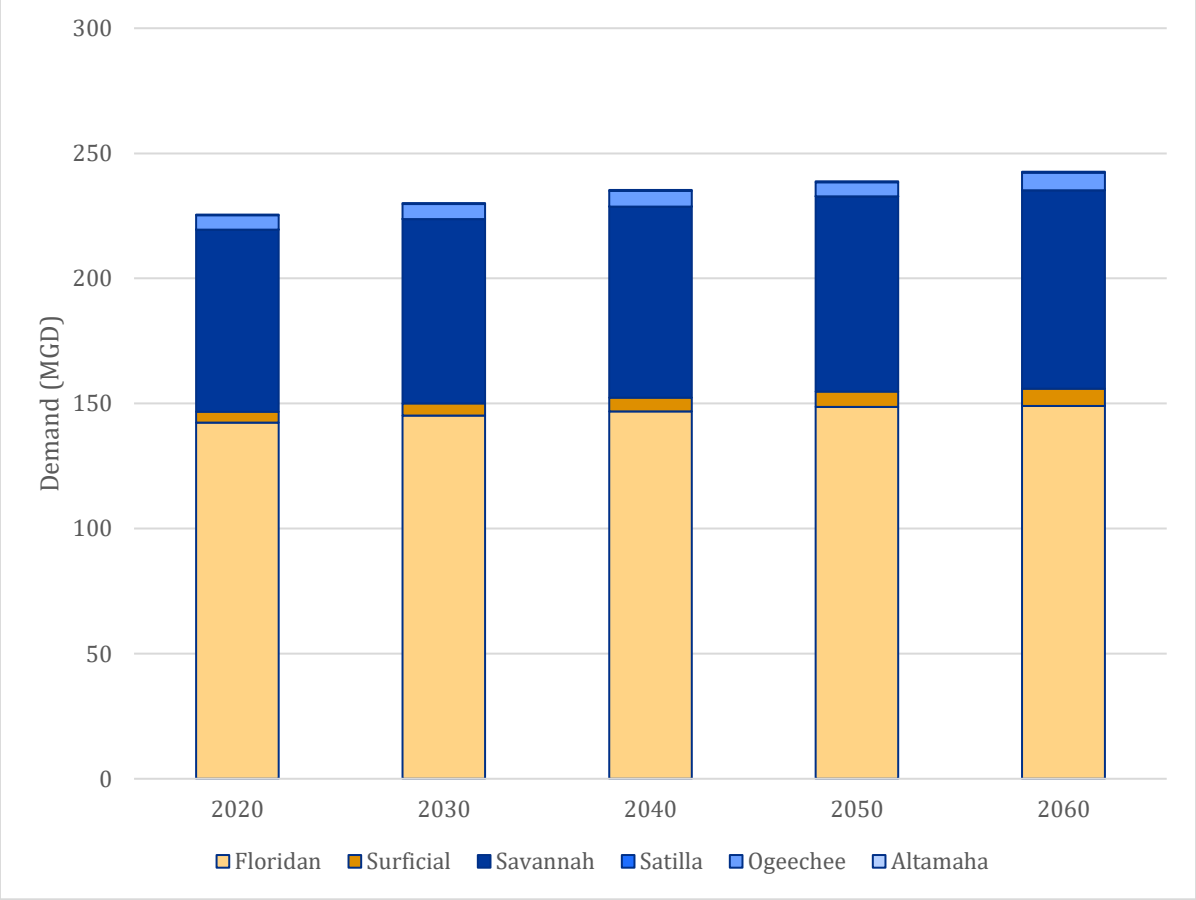


Figure 7-1
Regional Water Demand by Basin and Aquifer

Figure 7-2
Regional Water Demand by Sector

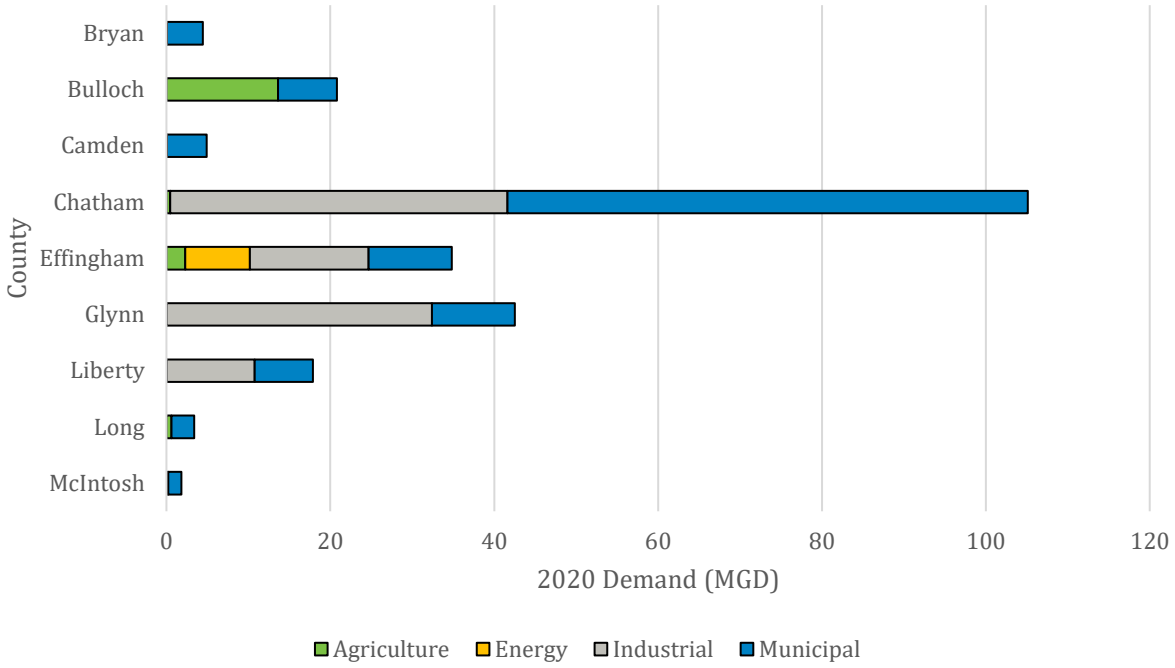


Figure 7-3 County Water Demand by Sector for 2020

Table 7-1 Summary of Water Demand per County (MGD)

County	Sector	Aquifer/Basin	2020	2030	2040	2050	2060
Bryan	GW Municipal	Floridan	4.41	4.92	5.18	5.29	5.27
	GW Agriculture	Floridan	0.05	0.05	0.05	0.05	0.05
		Total	**4.46**	**4.97**	**5.23**	**5.34**	**5.32**
Bulloch	GW Municipal	Floridan	7.20	7.61	7.21	6.65	6.19
	GW Agriculture	Floridan	8.22	8.77	9.32	11.03	10.62
		Groundwater Total	15.41	16.39	16.54	17.68	16.82
	SW Agriculture	Ogeechee River	5.41	5.74	6.03	5.25	6.66
		Total	**20.82**	**22.13**	**22.56**	**22.93**	**23.47**
Camden	GW Municipal	Floridan	4.83	4.89	4.85	4.77	4.71
	GW Agriculture	Floridan	0.05	0.05	0.05	0.06	0.05
		Groundwater Total	4.88	4.94	4.90	4.83	4.76
	SW Agriculture	Satilla River	0.02	0.02	0.02	0.01	0.02
		Total	**4.90**	**4.96**	**4.91**	**4.83**	**4.77**
Chatham	GW Municipal	Floridan	27.29	27.92	28.23	28.52	28.92
	GW Municipal	Surficial	0.22	0.22	0.22	0.23	0.23
	GW Industrial	Floridan	16.64	15.33	15.33	15.33	15.33
	GW Energy	Floridan	0.01	0.01	0.02	0.02	0.02
	GW Agriculture	Floridan	0.46	0.46	0.46	0.45	0.46
	GW Agriculture	Surficial	0.00	0.00	0.00	0.00	0.00
		Groundwater Total	44.62	43.94	44.26	44.54	44.95
	SW Municipal	Savannah River	35.98	36.79	37.20	37.57	38.09
	SW Industrial	Savannah River	15.15	15.15	15.15	15.15	15.15
		Surface Water Total	51.13	51.94	52.34	52.72	53.23
		Total	**95.75**	**95.88**	**96.60**	**97.26**	**98.19**
Effingham	GW Municipal	Floridan	10.03	11.20	11.74	11.82	11.65
	GW Municipal	Surficial	0.12	0.14	0.14	0.15	0.14
	GW Industrial	Floridan	0.84	0.84	0.84	0.84	0.84
	GW Agriculture	Floridan	2.01	2.10	2.19	1.97	2.38
	GW Agriculture	Surficial	0.02	0.03	0.03	0.02	0.03
		Groundwater Total	13.02	14.31	14.93	14.79	15.04
	SW Industrial	Savannah River	13.63	13.63	13.63	13.63	13.63
	SW Energy	Savannah River	7.45	7.45	9.81	10.86	11.90
	SW Agriculture	Ogeechee River	0.08	0.08	0.09	0.18	0.10
	SW Agriculture	Savannah River	0.18	0.19	0.20	0.42	0.22
		Surface Water Total	21.34	21.35	23.73	25.09	25.84
		Total	**34.36**	**35.66**	**38.66**	**39.88**	**40.88**
Glynn	GW Municipal	Floridan	8.44	8.95	9.35	9.78	10.36
	GW Municipal	Surficial	1.68	1.78	1.86	1.95	2.06
	GW Industrial	Floridan	32.38	32.38	32.38	32.38	32.38

County	Sector	Aquifer/Basin	2020	2030	2040	2050	2060
Glynn	GW Agriculture	Floridan	0.02	0.02	0.02	0.01	0.02
	GW Agriculture	Surficial	0.00	0.00	0.00	0.00	0.00
		Total	**42.53**	**43.13**	**43.61**	**44.12**	**44.82**
Liberty	GW Municipal	Floridan	6.73	6.66	6.48	6.34	6.18
	GW Municipal	Surficial	0.37	0.37	0.36	0.35	0.34
	GW Industrial	Floridan	9.97	9.97	9.97	9.97	9.97
	GW Agriculture	Floridan	0.03	0.03	0.03	0.03	0.03
	GW Agriculture	Surficial	0.00	0.00	0.00	0.00	0.00
		Groundwater Total	17.11	17.03	16.84	16.69	16.52
	SW Industrial	Mine Pit	0.39	0.39	0.39	0.39	0.39
	SW Agriculture	Ogeechee River	0.02	0.02	0.02	0.02	0.02
		Surface Water Total	0.41	0.41	0.41	0.41	0.41
		Total	**17.51**	**17.43**	**17.25**	**17.10**	**16.93**
Long	GW Municipal	Floridan	1.06	1.32	1.63	1.97	2.39
	GW Municipal	Surficial	1.68	2.09	2.57	3.12	3.78
	GW Agriculture	Floridan	0.05	0.05	0.05	0.10	0.06
	GW Agriculture	Surficial	0.08	0.08	0.09	0.16	0.09
		Groundwater Total	2.87	3.55	4.34	5.36	6.31
	SW Agriculture	Altamaha River	0.32	0.35	0.37	0.32	0.41
	SW Agriculture	Ogeechee River	0.17	0.19	0.20	0.17	0.22
		Surface Water Total	0.50	0.54	0.57	0.49	0.64
		Total	**3.37**	**4.08**	**4.90**	**5.84**	**6.95**
McIntosh	GW Municipal	Floridan	1.42	1.40	1.25	1.08	0.95
	GW Municipal	Surficial	0.19	0.19	0.17	0.14	0.13
	GW Agriculture	Floridan	0.21	0.21	0.22	0.21	0.23
	GW Agriculture	Surficial	0.03	0.03	0.03	0.03	0.03
		Total	**1.84**	**1.83**	**1.66**	**1.46**	**1.34**
Regional Groundwater Total			146.75	150.08	152.31	154.81	155.88
Regional Surface Water Total			78.80	80.00	83.09	83.96	86.79
Regional Total			**225.55**	**230.08**	**235.40**	**238.78**	**242.67**

7.2 Wastewater Summary

The full regional wastewater forecasts including municipal, industrial and energy discharges are summarized in the figures and tables of this section. **Figure 7-4** shows the wastewater discharges per basin while **Figure 7-5** shows the forecasted discharge per method. **Table 7-2** provides a summary of the discharge type per watershed while Table 7-3 shows the discharge type by county.

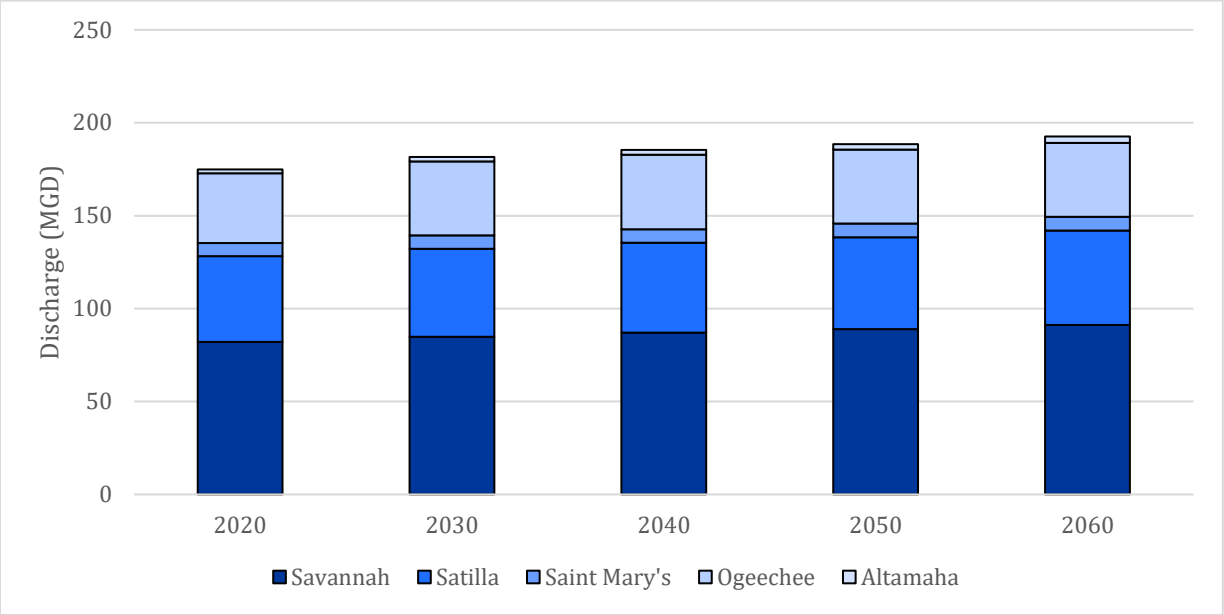


Figure 7-4
Regional Wastewater Discharge per Basin

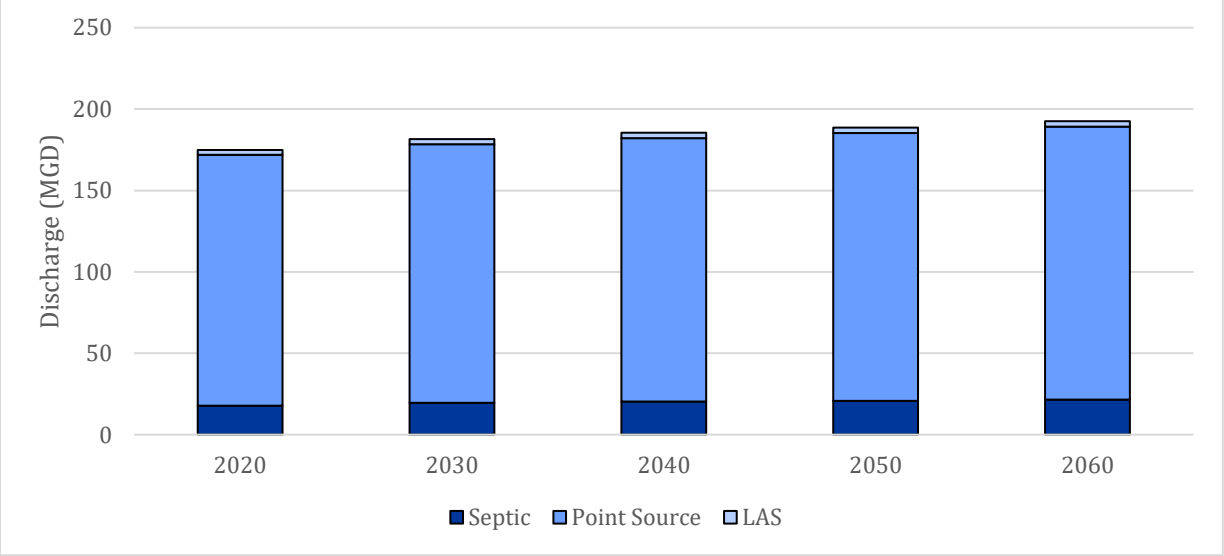


Figure 7-5
Regional Wastewater Discharge per Method

Table 7-2 Summary of Regional Wastewater Flows by Basin (MGD)

Basin	Discharge Type	2020	2030	2040	2050	2060
Altamaha	Point Source	0.43	0.47	0.49	0.52	0.56
	Septic	1.62	1.88	2.13	2.42	2.81
	Total	2.05	2.35	2.63	2.94	3.37
Ogeechee	LAS	0.89	0.96	0.99	1.00	1.00
	Point Source	29.26	30.79	30.99	30.91	30.99
	Septic	7.49	8.08	8.12	8.00	7.88
	Total	37.64	39.83	40.10	39.92	39.87
Saint Mary's	LAS	0.75	0.77	0.78	0.78	0.79
	Point Source	4.99	5.16	5.21	5.23	5.27
	Septic	1.22	1.26	1.27	1.28	1.29
	Total	6.96	7.19	7.26	7.29	7.35
Satilla	LAS	0.03	0.03	0.03	0.03	0.03
	Point Source	43.41	44.33	45.14	46.04	47.17
	Septic	2.74	2.96	3.15	3.36	3.64
	Total	46.18	47.32	48.33	49.43	50.84
Savannah	LAS	1.25	1.37	1.44	1.49	1.54
	Point Source	76.03	78.22	80.07	81.74	83.73
	Septic	4.80	5.31	5.60	5.76	5.88
	Total	81.12	83.94	85.86	87.61	89.64
Total	LAS	2.91	3.13	3.24	3.31	3.36
	Point Source	154.12	158.97	161.91	164.44	167.72
	Septic	17.86	19.49	20.27	20.84	21.50
Total		**174.90**	**181.59**	**185.42**	**188.58**	**192.58**

Table 7-3 Summary of Regional Wastewater Flows by County (MGD)

County	Discharge Type	2020	2030	2040	2050	2060
Bryan	LAS	0.38	0.43	0.46	0.48	0.48
	Point Source	1.58	1.79	1.91	1.99	2.01
	Septic	1.70	1.92	2.05	2.13	2.16
	Total	3.66	4.14	4.43	4.60	4.65
Bulloch	LAS	0.09	0.10	0.10	0.09	0.09
	Point Source	9.39	10.17	9.87	9.32	8.90
	Septic	3.61	3.91	3.79	3.59	3.42
	Total	13.09	14.18	13.76	13.00	12.41
Camden	LAS	0.78	0.80	0.81	0.82	0.82
	Point Source	5.26	5.44	5.49	5.51	5.56
	Septic	1.29	1.33	1.34	1.35	1.36
	Total	7.32	7.57	7.64	7.68	7.73

County	Discharge Type	2020	2030	2040	2050	2060
Chatham	LAS	0.80	0.85	0.89	0.94	0.99
	Point Source	67.14	69.76	71.64	73.55	75.89
	Septic	2.43	2.61	2.74	2.87	3.02
	Total	70.37	73.22	75.27	77.35	79.91
Effingham	LAS	0.54	0.61	0.65	0.66	0.66
	Point Source	16.31	16.43	16.79	16.94	17.07
	Septic	3.04	3.43	3.64	3.70	3.69
	Total	19.90	20.48	21.08	21.31	21.42
Glynn	LAS	0.00	0.00	0.00	0.00	0.00
	Point Source	43.14	44.06	44.86	45.75	46.88
	Septic	2.67	2.89	3.08	3.30	3.57
	Total	45.82	46.95	47.95	49.05	50.45
Liberty	LAS	0.32	0.32	0.32	0.32	0.31
	Point Source	10.84	10.85	10.84	10.84	10.83
	Septic	1.45	1.45	1.44	1.44	1.42
	Total	12.61	12.62	12.60	12.59	12.57
Long	LAS	0.00	0.00	0.00	0.00	0.00
	Point Source	0.15	0.19	0.24	0.29	0.36
	Septic	0.99	1.25	1.56	1.92	2.35
	Total	1.14	1.44	1.79	2.21	2.71
McIntosh	LAS	0.01	0.01	0.01	0.00	0.00
	Point Source	0.30	0.30	0.28	0.24	0.22
	Septic	0.69	0.69	0.63	0.56	0.50
	Total	0.99	1.00	0.91	0.80	0.72
Total	LAS	2.91	3.13	3.24	3.31	3.36
	Point Source	154.12	158.97	161.91	164.44	167.72
	Septic	17.86	19.49	20.27	20.84	21.50
Grand Total		**174.90**	**181.59**	**185.42**	**188.58**	**192.58**

Section 8
References

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