GEORGIA
WATER PLANNING

Regional Water Plan

SUWANNEE-SATILLA

JUNE 2023

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Supplemental Documents

The following supplemental materials have been developed in support of the Suwannee-Satilla Regional Water Plan and are available electronically at https://waterplanning.georgia.gov/forecasting and www.waterplanning.georgia.gov/suwannee-satilla:

- Energy Sector Demand Forecast Technical Memorandum
- Industrial Water Demand Forecasting Technical Memorandum
- Municipal Water Demand and Wastewater Flow Forecasting Methods Report
- Water and Wastewater Forecasting Technical Memorandum
- Gap Analysis Technical Memorandum

Acknowledgments

The Suwannee-Satilla Council should be acknowledged for contributing significant amounts of time and talent toward the development of the Regional Water Plan. Since the inception of the 2011 Regional Water Plan, members have participated in council meetings, subcommittee meetings, conference calls, and report development and review. The members (current and previous) of the Suwannee-Satilla Council include:

Name	City	County
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Carroll H. Coarsey	Brookfield	Tift
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Eugene Dyal	Alma	Bacon
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Alva J. Hopkins	Folkston	Charlton
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The Suwannee-Satilla Council would like to thank Shayne Wood with CDM Smith and Cliff Lewis of Georgia EPD for providing the planning and technical guidance toward the development of this Plan. In addition, the Suwannee-Satilla Council would like to recognize Brent James and John McCall for his contributions in serving as a proxy and contributing his input and perspective in updating the water plan.

Acronyms

AAD-MGD	Annual Average Day in million gallons per day
ASR	Aquifer Storage and Recovery
ASWS	Additional/Alternate Surface Water Supply
BEAM	Basin Environmental Assessment Model
BMP	best management practice
cfs	cubic feet per second
CRD	Coastal Resources Division
CWA	Clean Water Act
CWCS	Comprehensive Wildlife Conservation Strategy
CWSRF	Clean Water State Revolving Fund
DCA	Department of Community Affairs
DCAR	Data Collection/Additional Research
DNR	Department of Natural Resources
DO	dissolved oxygen
DWSRF	Drinking Water State Revolving Fund
EDU	Educational Needs
EPA	U.S. Environmental Protection Agency
EPD	Environmental Protection Division
FERC	Federal Energy Regulatory Commission
GDP	Gross Domestic Product
GEFA	Georgia Environmental Finance Authority
Georgia DOA	Georgia Department of Agriculture
GFC	Georgia Forestry Commission
gpcd	gallons per capita per day
GSWCC	Georgia Soil and Water Conservation Commission

GW	groundwater
GWPPC	Georgia Water Planning & Policy Center
I/I	inflow and infiltration
IGWPC	Industrial Groundwater Permit Capacity
IWWPC	Industrial Wastewater Permit Capacity
LAS	land application system
LDA	local drainage area
M	million
MG	million gallons
MGD	million gallons per day
MGWPC	Municipal Groundwater Permit Capacity
MNGWPD	Metropolitan North Georgia Water Planning District
MOA	Memorandum of Agreement
MWWPC	Municipal Wastewater Permit Capacity
N/A	not applicable
NPDES	National Pollutant Discharge Elimination System
NPS	non-point source
NPSA	Agricultural Best Management Practices
NPSF	Forestry Best Management Practices
NPSR	Rural Best Management Practices
NPSU	Urban Best Management Practices
NRCS	Natural Resources Conservation Service
NUT	nutrients
O.C.G.A.	Official Code of Georgia Annotated
OCP	Ordinance and Code Policy
OPB	Office of State Planning and Budget

OSSMS	on-site sewage management systems
PIP	Public Involvement Plan
PS	point source
PSDO	Point Sources – Dissolved Oxygen
mi^2	square miles
SW	surface water
SWAP	State Wildlife Action Plan
TMDL	total maximum daily load
UGA	University of Georgia
USDA	U.S. Department of Agriculture
USFS	U.S. Forest Service
USGS	U.S. Geological Survey
WC	Water Conservation
WCIP	Water Conservation Implementation Plan
WPCP	Water Pollution Control Plant
WRD	Wildlife Resources Division
WWTP	Wastewater Treatment Plant

Conversion of Units (Water Flow and Volume) Used in Plan (values rounded)

1 cubic foot = 7.48 gallons

1 cubic foot per second = 0.646 million gallons per day or 646,272 gallons per day

1 million gallons per day = 1.55 cubic feet per second

1 million gallons = 3.069 acre-feet (1 acre-foot is enough water to cover a football field with about 9 inches of water)

1 cubic foot per second = 1.98 acre-feet per day

1 acre-foot = 325,851 gallons

1 acre-foot = 0.326 million gallons

EXECUTIVE SUMMARY

Executive Summary

Introduction and Overview of the Suwannee-Satilla Region

Of all of Georgia's natural resources, none is more important to the future of our State than water. Over the last several decades, Georgia continues to be one of the most populous states in the nation. According to the U.S. Census Bureau, between 2010 and 2020, Georgia ranked fifth in total population gain (1.02 million new residents) and 12th in percentage increase in population (10.6%). During a portion of this same period, our State also experienced critical areas of severe drought. Georgia's growth and economic prosperity are vitally linked to our water resources.

As our State has grown, the management and value of water resources has also changed. Ensuring a bright future for our State requires thoughtful planning and wise use of our water resources. The water planning process began in 2008, when the State of Georgia's leadership authorized a comprehensive state-wide water planning process to help address these challenges and take a forward look at how our State is expected to grow and use water through 2060. The Suwannee-Satilla Regional Water Planning Council (Suwannee-Satilla Council) was established in February 2009 as part of this state-wide process. The Suwannee-Satilla Council completed the initial Regional Water Plan in 2011, and in 2016-2017 the Suwannee-Satilla Council updated the Regional Water Plan. This current update builds upon the original

Water Resource Trends and Key Findings for the Suwannee-Satilla Region

The Suwannee-Satilla Region includes 18 counties in the south central portion of Georgia. Over the next 40 years, the population of the region is projected to increase by 4% growing from approximately 416,000 to 435,000 residents.

Key economic drivers in the region include agriculture, forestry, professional and business services, education, healthcare, manufacturing, public administration, and construction. Recreation and fishing are also important to the area. Water supplies, wastewater treatment, and related infrastructure will need to be developed and maintained to support these economic drivers and maintain a high quality of life.

The rivers in the region are unique in comparison to most of Georgia Rivers in that the watersheds are much smaller in size. This results in more frequent surface water lower flow conditions and increases the importance of groundwater to the region.

Surface water is forecasted to meet about 21% of the region's water use and agriculture accounts for 99% of this use. Surface water use in the region is highest in the Suwannee River basin, followed by the Satilla River basin.

Groundwater is predominately used from the Floridan aquifer and is needed to meet about 79% of the region's water needs. Agriculture, municipal, domestic, and industry are the major demand sectors for groundwater.

Water resource challenges in the region include projected surface water shortfalls during some periods of time throughout the region, associated with flows that would likely be unable to satisfy withdrawal needs or adequately assimilate wastewater discharges; and water quality challenges associated with trophic-weighted residual mercury in fish tissue, fecal coliform, and low dissolved oxygen in some portions of the region.

Management practices are needed to address these challenges including: water conservation; refining planning information; use of existing or new storage to help reduce the frequency/severity of critical low flow conditions; sustainable use of groundwater during times of limited surface water flows; improving/upgrading wastewater treatment; and addressing non-point sources of pollution.

2011 Regional Water Plan and 2017 update. The Suwannee-Satilla Council is one of 11 planning regions charged with developing Regional Water Plans and encompasses 18 counties in the southeastern portion of Georgia (shown in Figure ES-1). An overview of the updated findings and recommendations for the Suwannee-Satilla Region are provided in this Executive Summary. The Suwannee-Satilla Council's Regional Water Plan is available on the Council's website.

Figure ES-1 Suwannee-Satilla Regional Water Planning Council

Georgia has ample water resources, with 14 major river systems and multiple groundwater aquifer systems. These waters are shared natural resources; streams and rivers run through many political jurisdictions. Rainfall that occurs in one region of Georgia may replenish the aquifers used by communities many miles away. And, while ample water in Georgia is available, it is not an unlimited resource. It must be carefully managed to meet long-term water needs. Since water resources vary greatly across the State, water supply planning on a regional and local level is the most effective way to ensure that current and future water resource needs are met.

The Suwannee, Satilla, and St. Marys Rivers are a popular fishing resource to the region. There are several species of fish found in the rivers, offering excellent fishing for chain pickerel, warmouth, largemouth bass, bluegill, topminnow, sunfish, crappie, and catfish. The coastal estuaries of the Satilla and St. Mary's Rivers also provide recreationally and commercially important ecosystems for fish, crustaceans, and shellfish. Several parks along these rivers provide an important recreational resource for the region, offering opportunities for various outdoor activities. Perhaps the most well-known natural habitat and recreational resource in the region is the Okefenokee National Wildlife Refuge. The Okefenokee Swamp is home to 234 bird species, 50 mammal species, 39 fish species, 64 reptile species, and 37 amphibian species. The swamp is also home to over 620 species of plants.

The Suwannee-Satilla Region encompasses several population centers, including the cities of Valdosta, Tifton, and Douglas. The Suwannee-Satilla Region is projected to grow by approximately 18,000 residents, or 4%, from 2020 to 2060 with the highest growth occurring in Lowndes and Clinch Counties (Georgia's Office of Planning and Budget, 2019). To accommodate this growth, the region requires reliable water supplies and sufficient wastewater treatment to

meet its growing needs. In addition, the region has a vibrant agricultural base that requires water supply to continue supporting the economics of the region.

The primary economic sectors in the region include agriculture, forestry, professional and business services, education, healthcare, manufacturing, public administration, and construction. The rural economies of five counties in the region (Atkinson, Brantley, Charlton, Clinch, and Pierce Counties) are categorized as very or critically dependent on the forestry industry by the Georgia Forestry Commission in the 2008 report "Economic Impact of Forest Products Manufacturing in Georgia." Forested lands and agriculture are major land covers in the region, which are also important drivers for the region's economy.

Establishing a Water Resource Vision for the Suwannee-Satilla Region

A foundational part of the water planning process was the development of a vision for the region that describes the economic, population, environmental, and water use conditions that are desired for the region. On September 23, 2009, the Suwannee-Satilla Council adopted the following Vision for the region.

> *"The Vision of the Suwannee-Satilla Regional Council is to manage water resources in a sustainable manner under Georgia's regulated riparian and regulated reasonable use laws to support the state's and region's economy, to protect public health and natural resources, and to enhance the quality of life for all citizens; while preserving the private property rights of Georgia's landowners, and in consideration of the need to enhance resource augmentation and efficiency opportunities."*

On November 11, 2009, the Suwannee-Satilla Council identified 13 goals to complement the Vision. These goals can be found in Section 1 of the Regional Water Plan.

In addition to providing these regional vision and goals, the Suwannee-Satilla Council believes it is critically important for the Council to have an ongoing role in regional water planning. The information in the Regional Water Plan is complex and will require ongoing education and an emphasis on cooperation to help obtain local support for, and maximize the effectiveness of the Plan's recommendations. The leadership, knowledge and experience of the Suwannee-Satilla Council establishes a uniquely qualified group to assist in facilitating implementation of the Plan, clarifying questions regarding the intent of the Regional Water Plan recommendations, and refining and updating existing information as well as executing future planning efforts. More information regarding the region and its water resource needs, challenges, and solutions is provided below.

Overview of Water Resources and Use in the Suwannee-Satilla Region

Surface Water

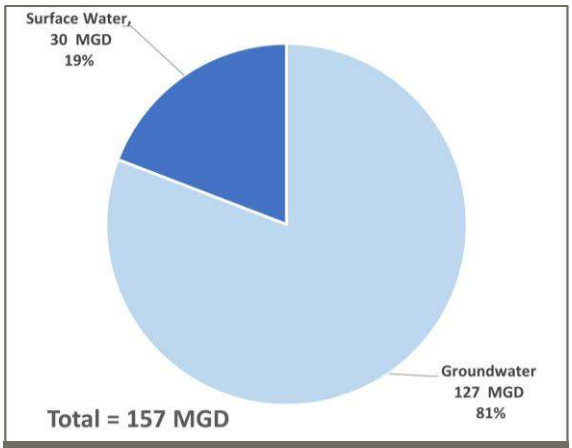
Major surface water features in the region include the Alapaha, Satilla, St. Marys, Suwannee, and Withlacoochee Rivers. The Alapaha and Withlacoochee Rivers are major tributaries to the Suwannee River, which flows through Florida into the Gulf of Mexico downstream of these confluences. The headwaters of the Suwannee River are in the Okefenokee Swamp. The Satilla

River flows to the southeast and discharges to the Atlantic Ocean between Cumberland and Jekyll Islands. This water body is a blackwater stream consisting of tannins and other natural leachates, which cause the river to have a darkly stained appearance and have unique physical and chemical characteristics and dissolved oxygen dynamics. Over half (59%) of the St. Marys River tributary area lies in Georgia and the remainder is in Florida. The St. Marys River is also a blackwater stream. However, the St. Marys River flows north and east, forming the border between southeast Georgia and northeast Florida and discharges into the Atlantic Ocean.

As shown in Figure ES-2, in 2015 surface water provided 19% of the water supply within the region (USGS, 2019). Based on water use trends and forecast information through 2060, the majority of the agricultural and industrial surface water use in the region is projected to come from the Suwannee River basin (72%) and Satilla River basin (27%). This information is based on the assumption that future use will follow current practices and trends.

Groundwater

As shown in Figure ES-2, groundwater provided 81% of the region's water supply needs in 2015. Based on 2020 groundwater withdrawal data, approximately 99% of groundwater in the region is supplied from the Floridan aquifer, which is one of the most productive groundwater aquifers in the United States.



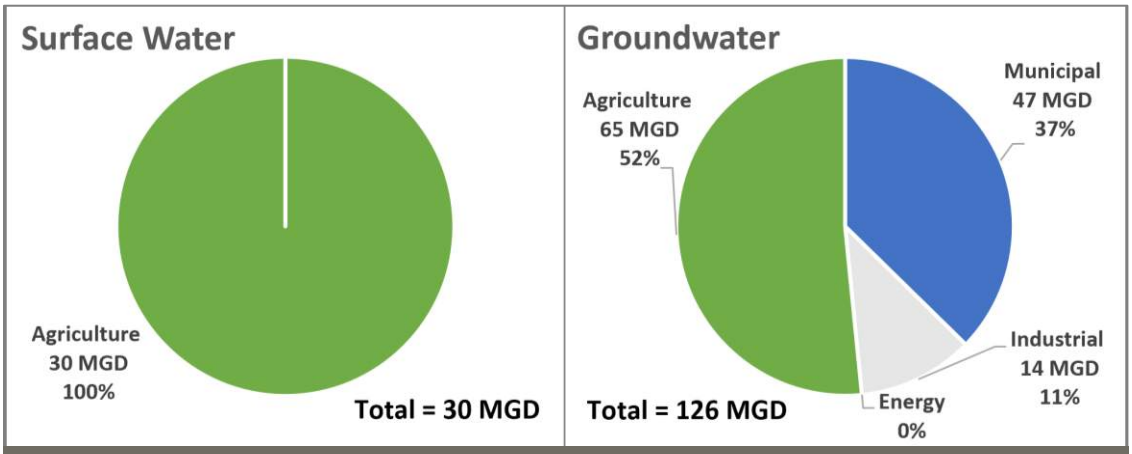
Data Source: "Water Use in Georgia by County for 2015; and Water-Use Trends, 1980-2015" (USGS, 2019).

Figure ES-2 2015 Water Supply by Source

Water and Wastewater Needs in the Suwannee-Satilla Region – A Closer Look

Figure ES-3 presents 2015 surface water and groundwater use by sector in the Suwannee-Satilla Region. All surface water withdrawals in the region are for the agricultural sector. Of the 127 MGD of groundwater withdrawn in 2015, 52% was used to supply agricultural, 37% municipal users and 11% industrial users.

Wastewater treatment types representing current conditions in the region are shown in Figure ES-4. According to the Suwannee-Satilla Wastewater Forecast developed for the Regional Water Plan (CDM Smith, 2022), 51% of treated wastewater in the region is disposed of as a municipal/industrial point source discharge or to a land application system (25%). The remaining wastewater is treated by on-site sewage treatment (septic) systems (24%).

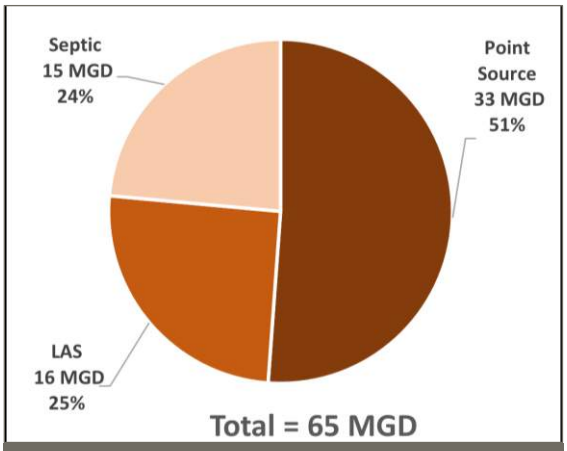


Data Source: "Water Use in Georgia by County for 2015; and Water-Use Trends, 1980-2015" (USGS, 2019).
Note: Surface water withdrawals for municipal and industrial categories were adjusted based upon feedback from water providers.

Figure ES-3 2015 Water Use by Category

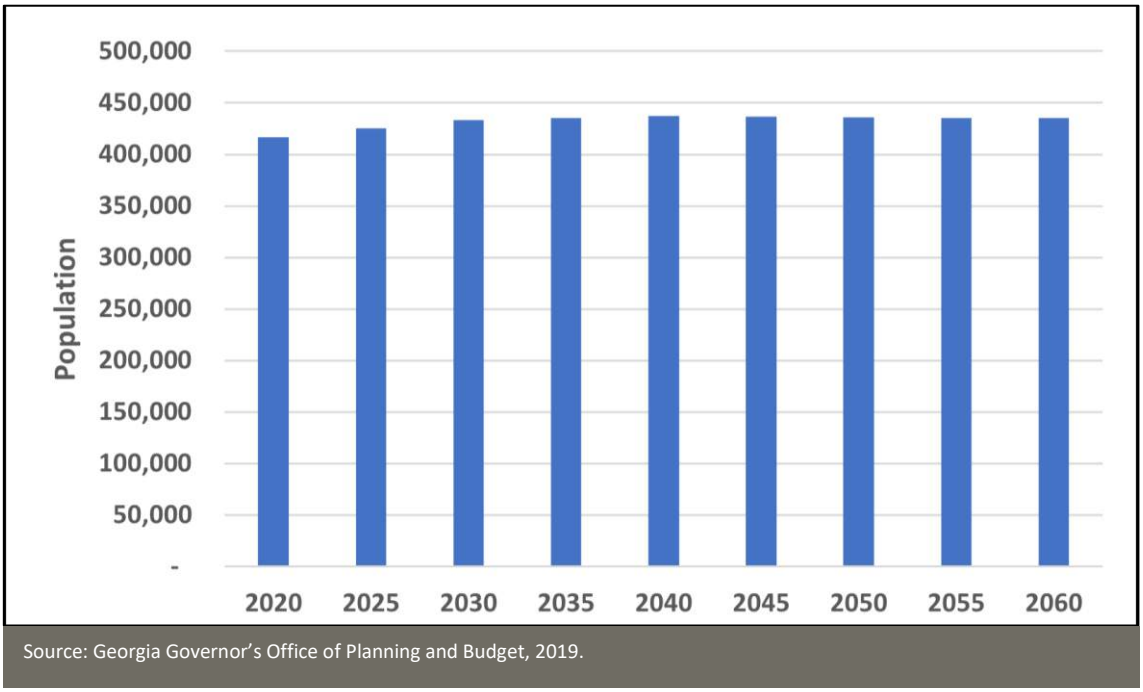
Suwannee-Satilla Forecasted Water Resource Needs from the Year 2020 to 2060

Municipal water and wastewater forecasts are closely tied to population projections for the counties within the Suwannee-Satilla Region. The population projections were developed by the Georgia Governor's Office of Planning and Budget and are shown in Figure ES-5. Industrial, energy, and agricultural water and wastewater forecasts were estimated separately from population projections. Overall, the region's water supply needs are expected to grow by 23% (74 MGD) in demand from 2020 through 2060. Wastewater return flows are expected to grow by 5% (3 MGD) from 2020 through 2060.



Data Source: Suwannee-Satilla Water and Wastewater Forecasting Technical Memorandum; CDM Smith, 2022.

Figure ES-4 2020 Patterns of Wastewater Discharge and Return Flows



Source: Georgia Governor's Office of Planning and Budget, 2019.

Figure ES-5 Suwannee-Satilla Region Population Projections (2020-2060)

Comparison of Available Resource Capacity to Future Water Resource Needs

Groundwater Availability

Groundwater is projected to meet about 79% of the region's water supply needs. Groundwater from the Floridan aquifer is a vital resource for the Suwannee-Satilla Region. Overall, the results from the Groundwater Availability Resource Assessment (EPD, March 2010) indicate that the sustainable yield for the modeled portions of the regional aquifer(s) is greater than the forecasted demands. Therefore, at this time no groundwater resource shortfalls are expected to occur in the Suwannee-Satilla Region over the planning horizon. However, localized issues such as excessive drawdown or reduction in baseflow to streams could arise in areas where there is a high well density and/or high volumes of groundwater withdrawal.

Surface Water Availability

Surface water is an important resource used to meet current and future needs of the Suwannee-Satilla Region, especially in the agricultural sector. There are many surface water model nodes located in and around the Suwannee-Satilla Region. The modeling tools currently used to assess surface water availability are described in Section 3. From the updated Surface Water Availability Resource Assessment (EPD, 2023b), the basic conclusions of the current and future conditions modeling show that some potential surface water challenges (i.e., times when there may be insufficient water to meet off-stream demands and also meet the targets for support of instream uses) do exist in the region.

An important update to this plan was the conversion of surface water modeling to a more detailed simulation platform (BEAM), which includes all water users (withdrawals and discharges) as specific nodes instead of aggregating their impacts into downstream nodes as was done in previous rounds of planning. It should be noted that due to the utilization of BEAM in resource assessment modeling, some of the previous approaches in expressing potential issues at the planning nodes have become obsolete. The resource issues identified previously are now replaced by these new resource assessment results (higher level of site-specific detail). Table ES-1 summarizes potential surface water challenges by 2060. Many of the challenges involve streamflows that are insufficient to adequately assimilate wastewater discharges. Others involve shortfalls relative to withdrawal needs.

Table ES-1 Summary of Modeled 2060 Potential Surface Water Challenges

BEAM Model Node	% of Total Days with Projected Challenge by 2060	Total Volume of Shortage	Corresponding 7Q10 Flow (Reference, used to determine ability to assimilate wastewater)	Change in Duration of Challenge from Current Condition
2188 (Town of Alapaha (Alapaha WPCP))	17.9%	4,543 MG	1.4 cfs (0.90 MGD)	729 (2.5%)
2198 (City of Fitzgerald (C.A. Newcomer))	2.8%	172 MG	0.25 cfs (0.16 MGD)	520 (1.7%)
2248 (City of Lakeland (Lakeland WPCP))	0.6%	84.2 MG	2.0 cfs (1.29 MGD)	26 (0.1%)
2568 (City of Nashville (Nashville WPCP))	20.7%	3,558 MG	0.01 cfs (0.006 MGD)	4,577 (15.7%)
2578 (City of Tifton (New River WPCP))	9.6%	490 MG	0.06 cfs (0.04 MGD)	-1,749 (-6.0%)
2598 (City of Sparks (Sparks WPCP))	2.5%	14.6 MG	0.02 cfs (0.01 MGD)	-6,992 (-23.9%)
2628 (Ray City (Ray City WPCP))	7.8%	410 MG	0.26 cfs (0.17 MGD)	152 (0.5%)
2868 (City of Valdosta (Withlacoochee WPCP))	2.8%	1,076 MG	4.3 cfs (2.78 MGD)	756 (2.6%)
3158 (City of Alma (Alma WPCP))	11.5%	1763 MG	1.77 cfs (1.14 MGD)	-87 (-0.3%)
3188 (Milliken & Company (Alma Plant))	2.5%	222 MG	0.55 cfs (0.36 MGD)	246 (0.9%)
3258 (City of Douglas (Southeast WPCP))	12.9%	11,033 MG	0.04 cfs (0.03 MGD)	286 (1.0%)
3298 (City of Pearson (Pearson WPCP))	0.4%	7.8 MG	0.29 cfs (0.19 MGD)	-15 (-0.1%)
3418 (City of Waycross (Waycross WPCP))	14.3%	34,233 MG	14.2 cfs (9.18 MGD)	746 (2.6%)
3528 (City of Patterson (Patterson WPCP))	0.6%	13.6 MG	0.21 cfs (0.14 MGD)	1 (0.0%)

BEAM Model Node	% of Total Days with Projected Challenge by 2060	Total Volume of Shortage	Corresponding 7Q10 Flow (Reference, used to determine ability to assimilate wastewater)	Change in Duration of Challenge from Current Condition
4238 (City of Folkston (Folkston WPCP (Pond))	0.7%	12.3 MG	0.15 cfs (0.10 MGD)	0 (0.0%)
4248 (City of Folkston (Folkston WPCP Wetlands))	0.6%	136 MG	1.83 cfs (1.18 MGD)	18 (0.0%)

Source: Surface Water Availability Resource Assessment, 2023b, EPD.
Note: Surface Water Availability modeling simulation period is from 1939 to 2018.

Assessment of Water Quality Conditions

One measure of the capacity of surface water to maintain its health and the health of the aquatic species living therein is the amount of residual dissolved oxygen in the water. As part of the Water Quality (Assimilative Capacity) Resource Assessment (EPD, 2017 and 2023a), modeling of dissolved oxygen concentrations was performed for each surface water reach in the region that has upstream wastewater discharges to the reach. The modeling estimates the ability of the surface water to assimilate the amount of waste being discharged without creating adverse conditions (also referred to as assimilative capacity). Each modeled river segment was classified as exceeding dissolved oxygen capacity, meeting dissolved oxygen capacity, or having available dissolved oxygen capacity. The assimilative capacity assessment for dissolved oxygen at baseline and/or permitted conditions is presented in Section 3 and Section 5, and Section 6 (Management Practices) outlines the recommendations that have been made to address these impairments in the future. Assimilative capacity assessments indicate the potential need for improved wastewater treatment in some facilities within the Suwannee, Satilla, St. Marys, and Ochlockonee River Basins.

Under Section 303d of the federal Clean Water Act, a total maximum daily load (TMDL) must be developed for waters that do not meet their designated uses. A TMDL represents the maximum pollutant loading that a water body can assimilate and continue meeting its designated use (i.e., not exceeding State water quality standards). A water body is deemed to be impaired if it does not meet the applicable criteria for a particular pollutant; consequently, TMDLs are required to be established for these waters to reduce the concentrations of the exceeding parameters in order to comply with State water quality standards.

For the Suwannee-Satilla Region, there are 118 impaired stream reaches (total impaired length of 1,279 miles) and 3 impaired lakes (total impaired area of 3,181 acres).

All impaired lakes in the region are impaired for trophic-weighted residual mercury in fish tissue. TMDLs have been completed for 95 of the impaired stream reaches. A full list of impaired waters can be found on the EPD website (epd.georgia.gov/georgia-305b303d-list-documents). This list is updated every 2 years by EPD; the above information is based upon the approved 2022 list.

Identifying Water Management Practices to Address Water Resource Challenges and Future Needs

The comparison of the Resource Assessments and forecasted demands identified the region's likely resource shortfalls or potential challenges and demonstrated the necessity for region and resource specific water management practices. In selecting the actions needed (i.e., water management practices), the Suwannee-Satilla Council considered practices identified in existing plans, the Region's Vision and Goals, and coordinated with local governments and water providers as well as neighboring Councils that share these water resources.

Summary of Resource Assessment Results

Management Practices should be developed and implemented to address water resource shortfalls as determined by the three Resource Assessments.

Groundwater: Overall, results indicate that the sustainable yield for the modeled portions of the regional aquifer(s) is greater than the forecasted demands, but site-specific challenges could arise without careful planning.

Surface Water Quantity: Refined modeling suggests that there are numerous challenges with the ability of surface water to provide sufficient flow for wastewater assimilation or withdrawals throughout the region.

Surface Water Quality: Throughout the region, 1,279 miles of stream reaches are impaired, principally for trophic-weighted residual mercury in fish tissue, E. coli, and dissolved oxygen.

The Suwannee-Satilla Council developed a management practice strategy based on the best data and modeling results available. The Council recognizes that as data are refined and modeling results improve—including water and wastewater projections and Resource Assessments—the resulting future needs and challenges may change. Therefore, the Council has prioritized short-term management practices to address challenges with the understanding that more complex management practices may be required in the future. These short-term management practices are presented in Table ES-2 and Table ES-3.

Table ES-2 Short-Term Water Quantity Management Practices (0 – 10 Years)

Utilize surface water and groundwater sources within the available resource capacities
Water conservation
Data collection and research to confirm the frequency, duration, severity, and drivers of surface water challenges (forecast methodology assumptions and Resource Assessment modeling)
Evaluate and ensure that current and future surface water permit conditions do not contribute to challenges/low flow concerns
Encourage sustainable groundwater use as a preferred supply in regions with surface water challenges/low flow concerns
Identify incentives and a process to sustainably replace a portion of existing agricultural surface water use with groundwater use (for agricultural irrigation) to address challenges/low flow concerns
Evaluate the potential to use existing storage to address challenges/low flow concerns
Education to reduce shallow aquifer groundwater use where it impacts surface water in areas with challenges/low flow concerns

Table ES-3 Short-Term Water Quality Management Practices (0 – 10 Years)

Point Sources: ▪ Support current permitting and waste load allocation process to improve treatment of wastewater and increase treatment capacity ▪ Data collection and research to confirm discharge volumes and waste concentrations as well as receiving stream flows and chemistry
Non-point Sources: ▪ Data collection to confirm source of pollutants and causes; encourage stormwater ordinances, septic system maintenance, and coordinated planning ▪ Ensure funding and support for Best Management Practices programs by local and state programs, including urban, rural, forestry, and agricultural Best Management Practices
Non-point Source Existing Impairments: ▪ Total maximum daily load listed streams: Improve data on source of pollutant and length of impairment; Identify opportunities to leverage funds and implement non-point source Best Management Practices

Members of the Suwannee-Satilla Council have invested significant time and expertise into the planning process and wish to capitalize on the expertise gained by the Council prior to the end of their third term as Council members.

The Suwannee-Satilla Council believes the Regional Water Plan should be reviewed in defined increments in the future such as every 5 years to evaluate how the implemented management practices are performing toward addressing challenges and meeting forecasted needs and what additional measures might be required. This is the second of such updates. If the selected management practices have not sufficiently addressed the challenges identified by the Resource Assessments, then additional management practices should be selected and implemented. Over time, the selected management practices will address identified challenges and meet future uses. Addressing surface water challenges will require that management practices also be implemented by adjacent water planning councils that share resources with the Suwannee-Satilla Council.

Implementing Water Management Practices

The Suwannee-Satilla Council supports the concept of regional water resource planning with a focus on planning Councils composed of local governments, water users, water providers, industry, business and affected stakeholders. Local representatives are typically most familiar with local water resource issues and needs. The State has a vital role providing technical support, guidance, and funding to support locally focused water resource planning.

Implementation of the Suwannee-Satilla Regional Water Plan will be primarily by various water users and wastewater utilities in the region. The most cost-effective and more readily implemented management practices will be prioritized for short-term implementation via an incremental and adaptive approach as shown in Figure ES-6. If resource needs are not met and/or challenges are not addressed, then more complex management practices will be pursued. Future planning efforts should confirm current assumptions and make necessary revisions and/or improvements to the conclusions reached during this round of planning.

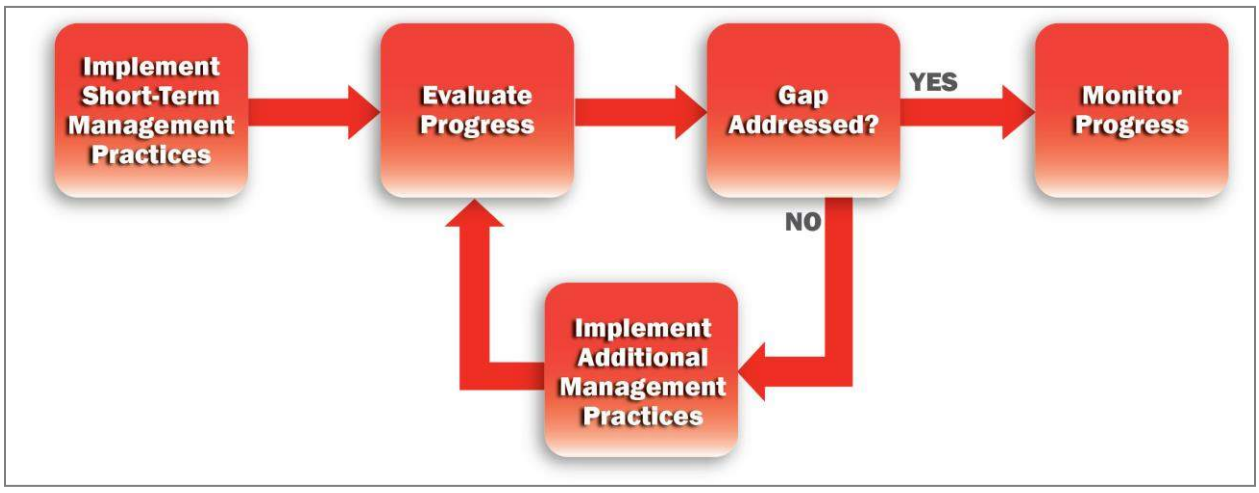


Figure ES-6 Implementation of Management Practices

Cost Considerations

Planning level cost estimates were prepared for the various categories of management practices. A detailed summary of costs can be found in Section 7 of the Regional Water Plan. In general, addressing surface water needs in the region from both a water supply and a water quality perspective are expected to present the largest challenges and have the most fiscal impact. For the Regional Water Plan to be most effective, wastewater utilities and agricultural water users will need planning and implementation support to help them meet current and future needs. It is anticipated that several different funding sources and options will be used to secure funding for the various management practices outlined in the Regional Water Plan, and adequate funding will be a critical component of the successful implementation of the state-wide water planning effort.

Water conservation remains a cost-effective means to address future water supply needs and could be applied region-wide, especially in areas of limited future surface water withdrawals. Wastewater treatment will likely also require funding sources, both to upgrade plants and to address aging infrastructure.

Implementation Considerations and Benchmarks – Helping Ensure Progress toward Meeting Future Needs

Effective implementation of the Regional Water Plan will require the availability of sufficient funding in the form of loans, and in some cases, possibly grants. In addition, many of the proposed management practices require ongoing coordination with affected stakeholders/water users and collaboration to help ensure successful solutions are identified and implemented. Finally, in many cases monitoring progress toward addressing future needs will require improved data and information on the current actions and management practices that are already in place.

To assess progress toward meeting regional needs, the Suwannee-Satilla Council identified several benchmarks, which can be used to evaluate the effectiveness of the Regional Water Plan. The benchmarks are shown in Section 8 of the Regional Water Plan and include both the activities to be accomplished and the measurement tools that can be used to assess progress.

The Suwannee-Satilla Council supports the concept of regional water planning led by local representatives. The Council members wish to express their gratitude to the Governor, Lieutenant Governor, and Speaker of the House for their nomination to the Suwannee-Satilla Council. The Regional Water Plan provides a recommended path forward to help achieve social, economic, and environmental prosperity for the region. The Council members are grateful for the opportunity to serve the region and State. The Suwannee-Satilla Council members wish to remain involved in facilitating attainment of the Regional Water Plan benchmarks and making necessary revisions to the Plan.

SECTION 1

Introduction

Section 1 Introduction

The Suwannee-Satilla Council intends this Regional Water Plan to be a working document, and work on this document is a continual planning process.

Georgia continues to be one of the fastest growing states in the nation. According to the 2020 Census, Georgia is the eighth most populous state in the country. and ranks fifth in the nation for total population (numerical) growth. Couple that with unprecedented drought in the mid-2000s and more extreme weather patterns, increased competition for water supplies, and changing perspectives on how the State of Georgia uses and values water. Based on these factors, Georgia recognizes the challenges of managing our valuable water resources. In response to these challenges, a State Water Council was formed to develop a state-wide water planning process.

Summary

The Suwannee-Satilla Regional Water Planning Council, established in February 2009 under the State Water Plan, has adopted a Vision and Goals for prioritizing water resource use and management within the region.

These guiding principles were used to identify and select water management practices that best address the needs and resource conditions of the Suwannee-Satilla Region.

The water planning process began in 2008 when the State Water Council submitted the *Georgia Comprehensive State-wide Water Plan* (State Water Plan) to the Georgia General Assembly and the water planning process was approved. The purpose of the State Water Plan is to guide Georgia in managing water resources in a sustainable manner to support the State's economy, protect public health and natural systems, and to enhance the quality of life for all our citizens. The State Water Plan identifies state-wide policies, provides planning guidance, and establishes a planning process for completion of Regional Water Development and Conservation Plans (Regional Water Plans). The Suwannee-Satilla Regional Water Planning Council (Suwannee-Satilla Council) was formed to help guide the completion of the original (2011) Regional Water Plan and updates are required every five years. The Suwannee-Satilla Council is composed of membership based on a nomination and appointment process by the Governor, Lieutenant Governor, and Speaker of the House.

The Suwannee-Satilla Regional Water Plan was first completed and adopted in 2011. During the 2016–2017 plan update process, this document was updated from the original 2011 Regional Water Plan for the Suwannee-Satilla Region based on updated regional water demand forecasts, updated resource assessment modeling, evaluation of potential gaps in water availability and water quality, and revised management practices recommended by the Suwannee-Satilla Council to either address future water resource management needs or to refine or clarify management practices. This current update builds upon the original 2011 Regional Water Plan and 2017 update. A table is provided in Appendix A that identifies the portions of the plan that have been updated and provides a short explanation for why the update was made (for instance, a change in circumstance in the region, or an update to the technical work such as updated projections or forecast).

1.1 The Significance of Water Resources in Georgia

Of all Georgia's natural resources, none is more important to the future of our State than water. The wise use and management of water is critical to support the State's economy, to protect public health and natural systems, and to enhance the quality of life for all citizens.

Georgia has abundant water resources, with 14 major river systems and multiple groundwater aquifer systems. These waters are shared natural resources as streams and rivers run through many political jurisdictions. Rainfall that occurs in one region of Georgia may replenish the aquifers used by communities many miles away. And, while water in Georgia is abundant, it is not an unlimited resource. It must be carefully managed to meet long-term water needs.

Since water resources and their uses vary greatly across the State, selection and implementation of management practices on a regional and local level is the most effective way to ensure that current and future needs for water supply and assimilative capacity are met. Therefore, the State Water Plan calls for the preparation of 10 Regional Water Plans. The eleventh regional water planning district, the Metropolitan North Georgia Water Planning District (MNGWPD, also known as "the District"), was created by State law in 2001 and had existing Plans in place. Figure 1-1 illustrates the 11 council boundaries.

This Regional Water Plan prepared and updated by the Suwannee-Satilla Council describes the current and projected water resource needs of the region and summarizes regionally appropriate management strategies (also referred to as water management practices) to be employed in Georgia's Suwannee-Satilla Water Planning Region over the next 35 years to help meet these needs.

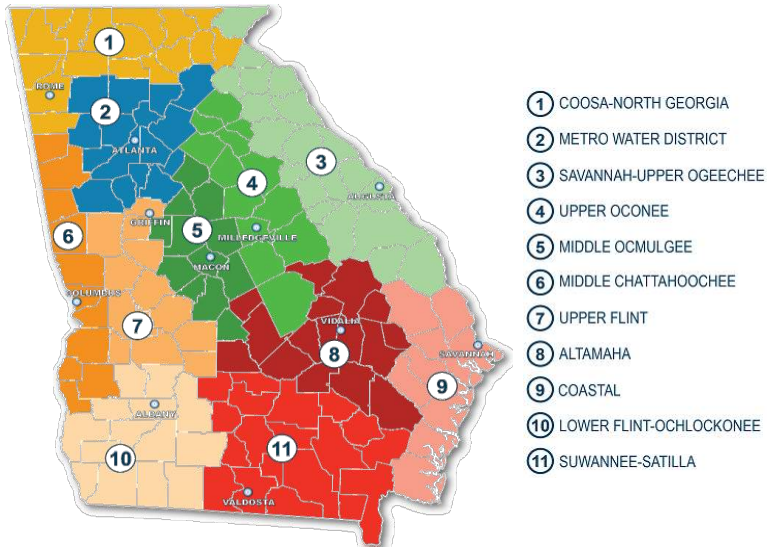


Figure 1-1 Regional Water Planning Councils

1.2 State and Regional Water Planning Process

The State Water Plan calls for the preparation of Regional Water Plans designed to manage water resources in a sustainable manner through 2050. The original (2011) Regional Water Plan was prepared following a consensus-based planning process illustrated in Figure 1-2.

As detailed in the Suwannee-Satilla Council's Memorandum of Agreement (MOA) with the Georgia Environmental Protection Division (EPD) as well as the Suwannee-Satilla Council's Public Involvement Plan (PIP), the process required and benefited from input of other regional water planning councils, local governments, and the public. For this plan update, a similar approach was followed, including a review of the vision and goals, updates to the water and

wastewater demands, updates to the resource assessments, and a re-evaluation of potential water resource challenges associated with comparing the water resource assessments versus the water resource demands. Public/local government input and coordination with other regional water planning councils also informed the plan update.

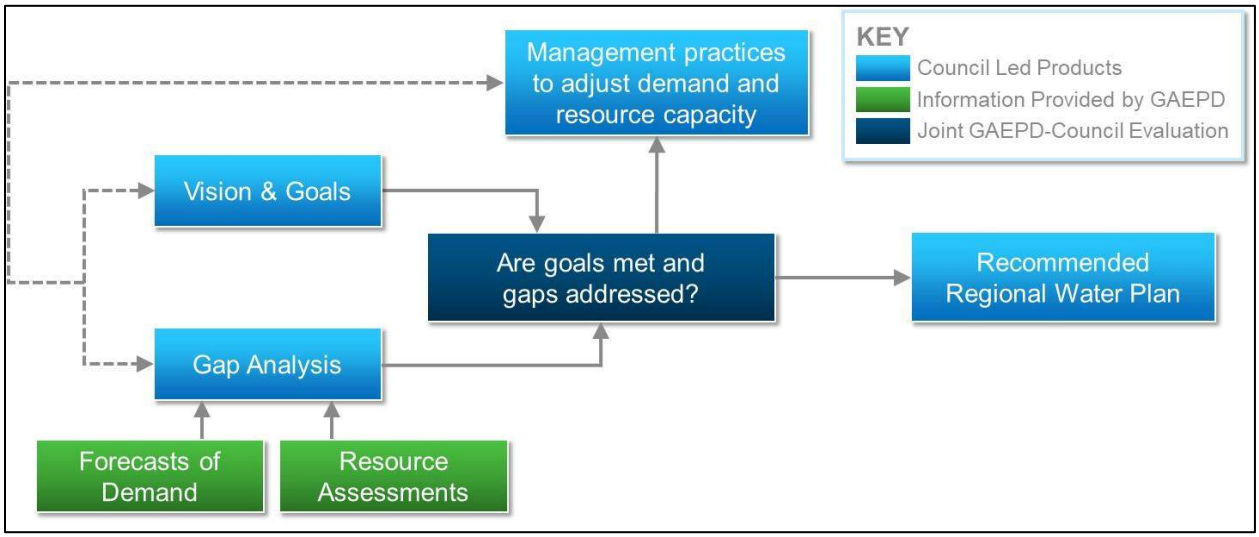


Figure 1-2 State Water Planning Process

1.3 The Suwannee-Satilla Water Planning Region Visions and Goals

Following the process established in the State Water Plan, the Suwannee-Satilla Council was established in February 2009. The Suwannee-Satilla Council has 26 members, which includes 2 alternates and 1 Ex-Officio Members. Figure 1-3 provides an overview of the Suwannee-Satilla Region and the residential locations of the Suwannee-Satilla Council members.

To develop the original (2011) Regional Water Plan, the Suwannee-Satilla Council met collectively for the first time on March 13, 2009 at a kickoff meeting for the 10 regional water planning councils. The meeting focused on: providing an orientation to the water planning process; a preliminary overview of Georgia's water resources; and establishing an understanding of the schedule for completing the Regional Water Plan, the Council's meeting schedule, and requirements. As part of this update, the Suwannee-Satilla Council met over a series of meetings in 2021 and 2022 to revise and update each of the sections of the plan, as appropriate.

Developing the Region's Council Procedures

Initially, the planning process focused on establishing the Suwannee-Satilla Council's leadership along with operating procedures and rules for conducting meetings. The operating procedures and rules were appended to the Memorandum of Agreement that was executed between the Suwannee-Satilla Council, EPD, and DCA. The Memorandum of Agreement was unanimously approved by the Suwannee-Satilla Council and executed on June 24, 2009.

Figure 1-3 Location of Suwannee Satilla Council Members

In support of the Memorandum of Agreement, the Suwannee-Satilla Council formed six subcommittees to provide planning guidance during various development stages of the development of the original (2011) Regional Water Plan. The subcommittees consisted of the following: Vision and Goals, Municipal Water and Wastewater Forecasting, Public Involvement Plan, Plan Drafting (Table of Contents), Plan Drafting (Report), and Management Practices.

Developing Regional Vision and Goals

A major element of Georgia's state and regional water planning process is the identification of the region's Vision and Goals that describe the economic, population, environmental and water use conditions desired for each region. The Vision and Goals described below summarize the Suwannee-Satilla Council's priorities for water resource use and management. This information is used to help guide the identification and selection of water management practices for the Suwannee-Satilla Region and to communicate these priorities and values to other regions of the State.

Figure 1-4 Goals for the Suwannee-Satilla Region

Vision Statement (as established September 23, 2009)

"The Vision of the Suwannee-Satilla Regional Council is to manage water resources in a sustainable manner under Georgia's regulated riparian and regulated reasonable use laws to support the state's and region's economy, to protect public health and natural resources, and to enhance the quality of life for all citizens; while preserving the private property rights of Georgia's landowners, and in consideration of the need to enhance resource augmentation and efficiency opportunities."

Goals (as established November 11, 2009)

The Suwannee-Satilla Council identified 13 goals (Figure 1-4) for the region. It is important to note that the goals summarized below are not presented in order of priority, but rather were assigned a number to identify specific goals addressed as part of the water management practice selection process (Section 6).

More information regarding the region's Vision and Goals can be found at the Council's website.

The Suwannee-Satilla Council's Public Involvement Plan

A foundational principle of the Georgia water planning process is public and stakeholder participation and coordination among multiple interests. The Suwannee-Satilla Council developed a Public Involvement Plan to help guide and implement an inclusive planning process. The Public Involvement Plan was adopted by the Suwannee-Satilla Council on November 11, 2010.

Outreach to the public, local governments, water providers and users was accomplished by e-mail correspondence, direct communication, and updates provided by Council members at local government and other interest group meetings. Opportunity for public and local government comment was provided at each Council meeting.

SECTION 2

The Suwannee-Satilla Water Planning Region

Section 2 The Suwannee-Satilla Water Planning Region

2.1 History and Geography

Summary

The Suwannee-Satilla Region encompasses 18 counties in the south-central portion of Georgia. Predominant land cover in the region includes agriculture, forest, and wetland areas.

The major surface water resources in the region include the Alapaha, Satilla, St. Marys, Suwannee, and Withlacoochee Rivers.

The Floridan aquifer, one of the most productive aquifers in the United States, is the primary source of groundwater in the region.

The Suwannee-Satilla Region is located within the Coastal Plain Physiographic Province. The topography of the region is characterized by gentle slopes that reflect the geologic history of marine incursions and regressions. Approximately 90% of the Coastal Plain's sediments exposed in the area are sands and clays. The major land covers in the region are forested lands and agriculture, which are important drivers for the region's economy.

2.1.1 Surface Water Resources

Figure 2-1 provides an overview of the surface water resources in the Suwannee-Satilla Region. Major surface water features in the region include the Alapaha, Satilla, St. Marys, Suwannee, and Withlacoochee Rivers. Major lakes in the region include Banks Lake.

The Alapaha and Withlacoochee Rivers are major tributaries to the Suwannee River, which flows into the Gulf of Mexico downstream of these confluences. The headwaters of the Suwannee River are in the Okefenokee Swamp. The Suwannee River is 266 miles long and has a drainage area of approximately 11,000 square miles (mi2), 51% of which lies in Georgia (EPD, 2002) and the remainder in Florida. This water body is a blackwater stream consisting of tannins and other natural leachates, which cause the river to have a darkly stained appearance and unique physical and chemical characteristics, including dissolved oxygen dynamics.

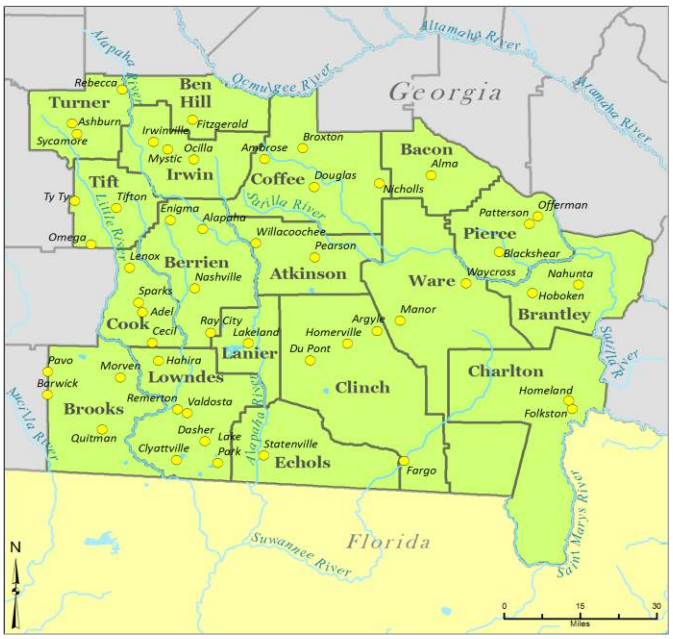


Figure 2-1 Surface Water Resources, Counties, and Major Cities

The Satilla River flows to the southeast across the region from its headwaters in Ben Hill County and discharges to the Atlantic Ocean between Cumberland and Jekyll Islands (EPD, 2002). The Satilla River is 200 miles long and has a drainage area of approximately 3,940 mi2, which is completely contained within Georgia. Like the Suwannee River, the Satilla River is a blackwater stream.

The St. Marys River is 90 miles long and has a drainage area of approximately 1,300 mi2, 59% of which lies in Georgia (EPD, 2002) and the remainder in Florida. Like the Suwannee River, the St. Marys River is a blackwater stream. The St. Marys River flows north and east, forming the border between southeast Georgia and northeast Florida before discharging into the Atlantic Ocean.

The Suwannee, Satilla, and St. Marys Rivers are popular fishing resources to the region. There are several species of fish found in the rivers, offering excellent fishing for chain pickerel, warmouth, largemouth bass, bluegill, topminnow, sunfish, crappie, and catfish. The coastal estuaries of the Satilla and St. Marys Rivers also provide recreationally and commercially important ecosystems for fish, crustaceans, and shellfish.

Several parks along these rivers provide an important recreational resource for the region, offering opportunities for various outdoor activities. Some of the more popular parks in the region include General Coffee State Park in Nichols, the Cumberland Island National Seashore, Reed Bingham State Park near Adel, and Crooked River State Park. Perhaps the most well-known natural habitat and recreational resource in the region is the Okefenokee National Wildlife Refuge. The Okefenokee Swamp is home to 234 bird species, 50 mammal species, 39 fish species, 64 reptile species, and 37 amphibian species. The swamp is also home to over 620 species of plants.

2.1.2 Groundwater Resources

Groundwater is a very important resource for the Suwannee-Satilla Region. Figure 2-2 depicts the major aquifers of Georgia. Based on 2019 pumping data provided by Georgia EPD, nearly all groundwater supplied in the region is from the Floridan aquifer, which is one of the most productive groundwater aquifers in the United States. The Floridan aquifer is primarily comprised of limestone, dolostone, and calcareous sand. The aquifer is generally confined, but at its northern extent there are unconfined and semi-confined zones. The Floridan aquifer increases in thickness eastwardly across the State and is approximately 400 feet thick in Glynn County. The aquifer is very productive, with typical well yields of 1,000-5,000 gallons per minute.

The eastern portion of the Suwannee-Satilla Region is within the Brunswick aquifer area, which consists of sands and limestones. Where this aquifer exists, it is used in addition to the Floridan aquifer for water supply. The surficial aquifer, which is present beneath most of the Coastal Plain area, is usually not very thick and not typically used as a primary source of water supply.

The Suwannee-Satilla Region shares its groundwater resources with portions of North Florida. EPD coordinated with the Suwannee River Water Management District and St. Johns River Water Management District to obtain current Florida groundwater use data, which were incorporated into groundwater modeling efforts.

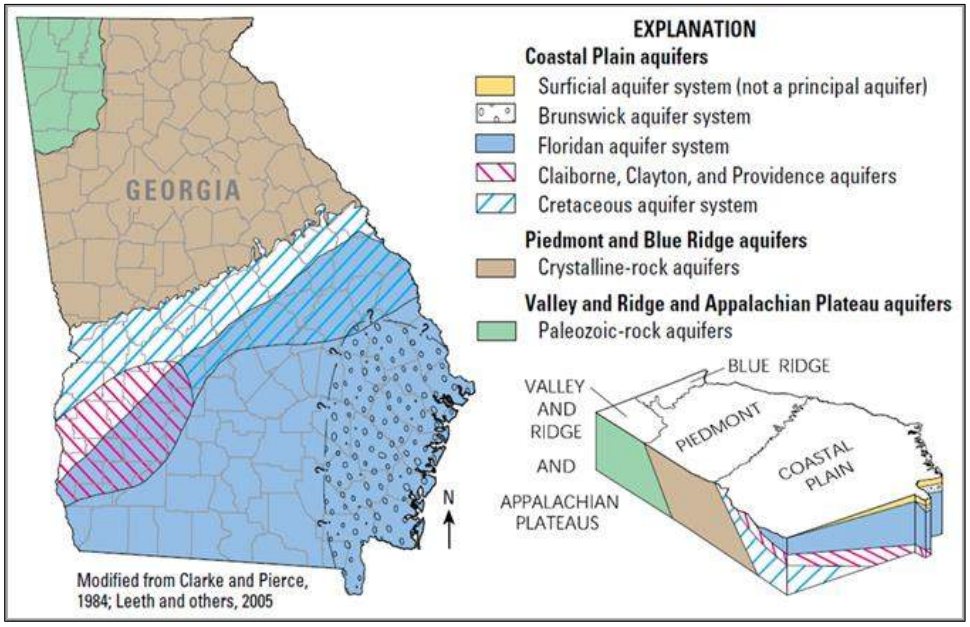


Figure 2-2 Major Georgia Aquifers

2.1.3 Climate

A review of data for the region from the Southeast Regional Climate Center indicates that the climate is temperate with mild winters and hot summers. Average maximum temperatures are around 92°F in July and average minimum temperatures are near 40°F in January. The area receives abundant rainfall, approximately 46-52 inches per year, with the greatest rainfall occurring during July and August. The driest month in the region is November. Snowfall is rare and the historical average for the region is 0.1 inch near the coast to 0.3 inch further inland.

2.2 Characteristics of Region

The Suwannee-Satilla Council encompasses 18 counties in the southeastern portion of Georgia, with a 2020 population of 416,370 (U.S. Census, 2020). The counties and major towns and cities are shown in Figure 2-1. The major population centers in the region include the cities of Valdosta, Tifton, and Douglas.

Based on information obtained from Georgia Department of Labor Local Area Profiles, major employers in the region include public schools and colleges, hospitals and medical centers, retail stores, manufacturers, and paper products industries. The rural economies of five counties in the region (Atkinson, Brantley, Charlton, Clinch, and Pierce Counties) are categorized as very or critically dependent on the forest community by the Georgia Forestry Commission in the 2008 report “Economic Impact of Forest Products Manufacturing in Georgia.” There are five forestry products manufacturing facilities within the region. The raw materials to sustain these facilities are also supplied by the region. Two examples of industries that rely on the region’s water resources for its operations are Pilgrim’s Pride (chicken processing) and Premium Waters, Inc.

(bottled water), which are both located in Coffee County. The primary economic sectors in the region include agriculture, forestry, professional and business services, education, healthcare, manufacturing, public administration, and construction.

Agriculture has historically played a dominant role in the economy of the Suwannee-Satilla Region and the State. In 2017, Georgia agriculture generated more than $9.6 billion in cash receipts to the State's economy, with the Suwannee-Satilla Region contributing approximately $1,055 million (2017 Census of Agriculture; U.S. Department of Agriculture). According to the USDA Economic Research Service, farming's contribution to state and national economies can be determined by calculating the net value added, which is the total value of the agricultural sector's production of goods and services less payments to other sectors of the economy. The farm production net value added for the Suwannee-Satilla Region represents 11% of the total state farm net value added in 2017. The Suwannee-Satilla farm production net value added represents 0.20% of the total State gross domestic product (GDP), which was $525 billion in 2017 (U.S. Department of Commerce Bureau of Economic Analysis). Turner, Irwin, Tift, Brooks, Berrien, and Cook Counties are expected to continue to be the higher agricultural water use areas of the region.

While forestry and agriculture have and will continue to be major economic drivers in the region, a number of areas will experience increased urbanization and increases in commercial and industrial growth. These trends are especially likely to be seen in Coffee, Lowndes, and Tift Counties among others.

The region includes four colleges and universities within the University System of Georgia: Abraham Baldwin Agricultural College in Tifton, Valdosta State University, South Georgia College in Douglas, and Waycross College. The region also includes three colleges within the Technical College System of Georgia: Wiregrass Technical College in Valdosta, Douglas, and Fitzgerald, Okefenokee Technical College in Waycross, and Moultrie Technical College in Tifton. In addition to county jails, there are six correctional facilities that are important employers and water users in the Suwannee-Satilla Region.

A summary of 2015 land cover distribution is shown in Figure 2-3, based on data obtained from the University of Georgia Natural Resources Spatial Analysis Laboratory. Forests cover 35% of the Suwannee-Satilla Region, and wetlands and agriculture cover 34% and 23% of the region, respectively. It should be noted that the term wetland refers to land cover and does not infer a regulatory determination. Urban development accounts for only 6% of the land cover within the region. The remaining land cover (3%) consists of water and open spaces. Based on the inventory of Georgia's irrigated cropland developed as part of the agricultural demand assessment in 2020, cotton, peanuts, and corn account for 84 percent of crops irrigated in the Suwannee-Satilla Region. Pecans and vegetables are also planted widely in the region.

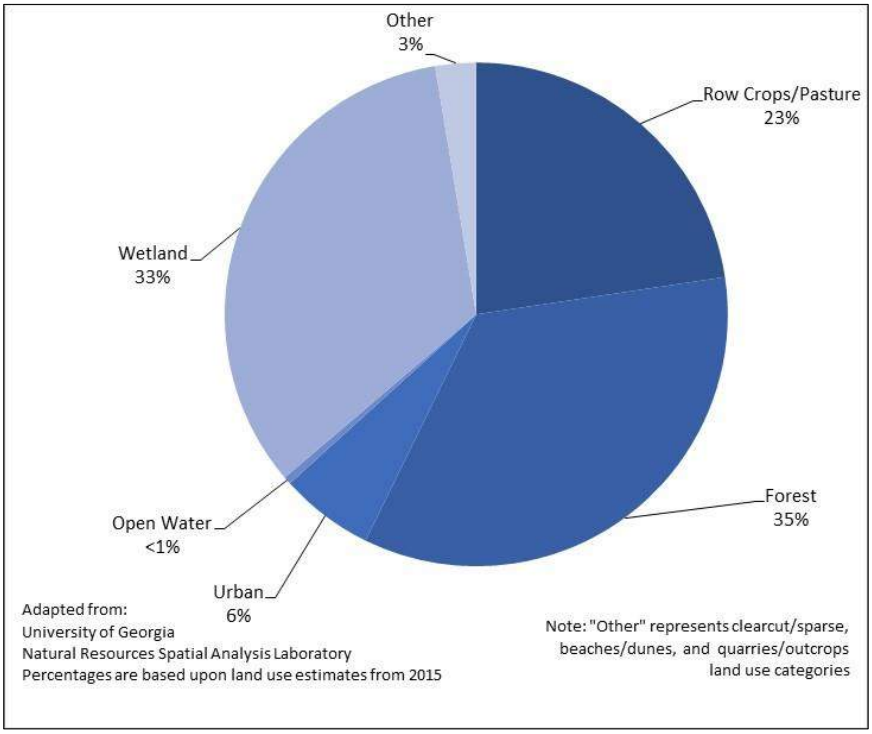


Figure 2-3 Land Cover Distribution

2.3 Local Policy Context

2.3.1 Regional Commissions

Regional Commissions are agencies of local governments and representatives from the private sector that facilitate coordinated and comprehensive planning at the local and regional levels. Regional Commissions often assist their membership with conformity to minimum standards and procedures and serve as liaisons with state and federal agencies. There are 12 Regional Commissions in Georgia. The Southern Georgia Regional Commission covers the same counties as the Suwannee-Satilla Council.

In July 2009, the Georgia Department of Community Affairs required the Regional Commissions to adopt, maintain, and implement a Regional Plan (DCA Rule 110-12-6). The Southern Georgia Regional Commission's Regional Plan provides guidance to regional and local business leaders, local governments, state and federal agencies, and citizens to promote quality growth in region. It is a vision of the future for the region and includes quality community based objectives related to water resources such as water supply, wastewater, and stormwater management. A key component is the establishment of "performance standards", which are actions, activities, or programs a local government can implement or participate in that will advance their efforts to meet the vision of the Regional Plan. The Southern Georgia Regional Commission's Regional Plan defines two achievement thresholds (Minimum and Excellence), which are attained by implementing the performance standards. The Department of Community Affairs maintains the

list of Qualified Local Governments (QLG) for the state of Georgia. Local governments remain eligible for State funding (i.e., CDBG grants, GEFA loans, etc.) while they are current on their QLG status. QLG status is maintained by completing required reports and by updating the local government's Comprehensive Plan every five years. The Southern Georgia Regional Commission completed their Regional Plan in 2013 and it was updated in 2018. The Southern Georgia Regional Commission is expected to adopt their updated regional plan by September 1, 2023.

SECTION 3

Water Resources of the Suwannee-Satilla Region

Section 3 Water Resources of the Suwannee-Satilla Region

3.1 Current Major Water Use in Region

Based on data summarized from the 2019 U.S. Geological Survey (USGS) report "Water Use in Georgia by County for 2015; and Water-Use Trends, 1985-2015," water supply in the Suwannee-Satilla Region for 2015 totaled approximately 157 million gallons per day (MGD) and was comprised of 81% groundwater and 19% surface water, as shown in Figure 3-1. Figure 3-2 shows surface water in the region was used entirely for agriculture. A total of 126 MGD of groundwater were withdrawn to supply agricultural (52%), municipal users (37%), and industry (11%), as shown in Figure 3-3. Nearly all (99%) of groundwater withdrawals came from the Floridan aquifer. Most (99%) of the surface water returns in the region are from public wastewater treatment facilities as shown in Figure 3-4.

3.2 Current Conditions Resource Assessments

EPD developed three Resource Assessments to evaluate surface water quality, surface water availability, and groundwater availability throughout the State. These assessments analyzed the capacity of water resources to meet demands for water supply and wastewater discharge without causing unreasonable impacts according to metrics established by EPD. The assessments were completed on a resource basis (river basins and aquifers) but are summarized herein as they relate to the Suwannee-Satilla Region. As described in more detail below, the term "challenge" is used to indicate when the current or future use of water has been identified as potentially causing unreasonable local or regional impacts.

Summary

In 2015, surface water and groundwater withdrawal in the region totaled approximately 157 MGD to accommodate municipal, self-supply, industrial, and agricultural demands.

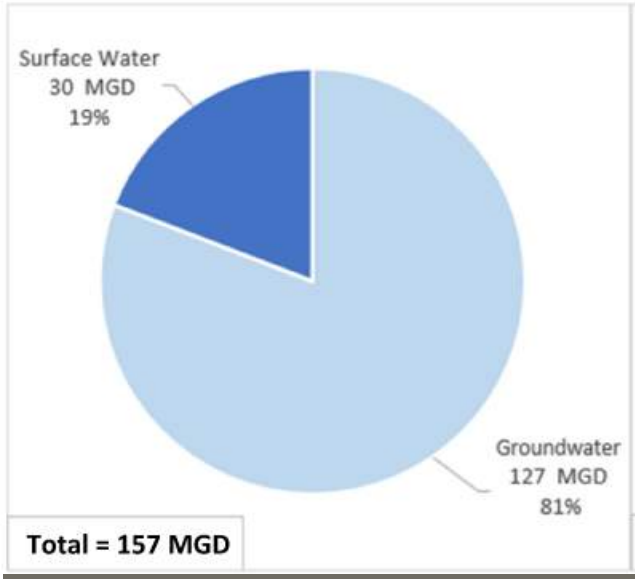
The majority of wastewater in the region is disposed of as a point source discharge from municipal and industrial uses.

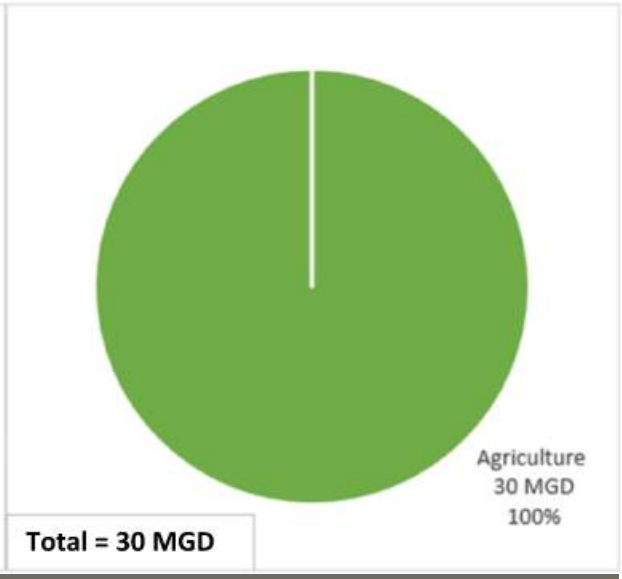
The availability of surface water to meet current uses varies across the region. Unlike many areas in Georgia the watersheds in the region are much smaller in size and therefore generally have lower flow conditions and are more vulnerable to drought. Consequently, on several of these smaller rivers (i.e., Alapaha, Satilla, and Withlacoochee Rivers) with higher water use, river flows are at times (during drier years) insufficient to meet both off-stream uses and instream needs.

Groundwater supplies are currently sufficient on a regional basis to meet uses across the region.

Under current conditions, there are several locations in the region where dissolved oxygen levels may be insufficient to assimilate wastewater discharges.

Water quality in several river reaches and water bodies does not meet the designated use for the resource. The majority of these occurrences are associated with low dissolved oxygen and fecal coliform.

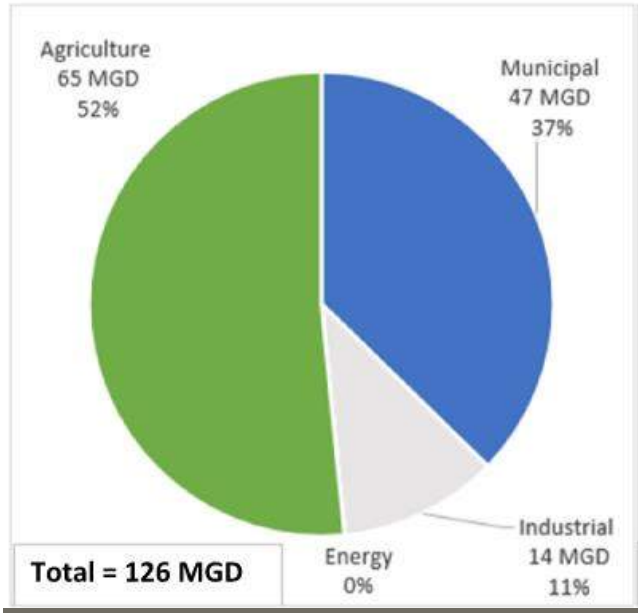


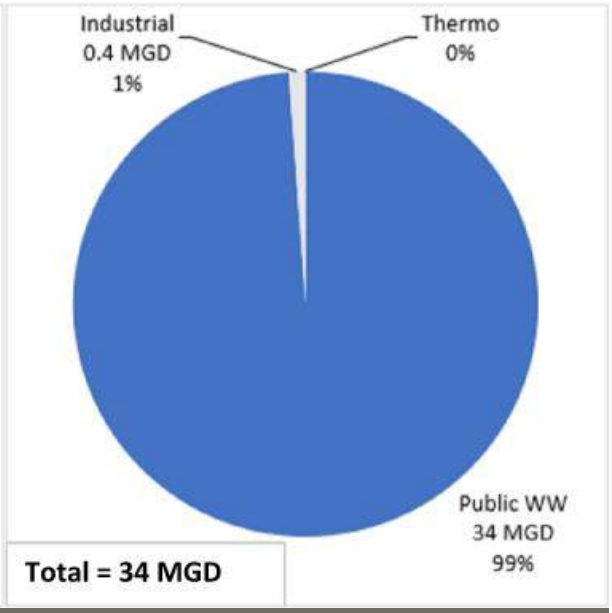


Data Source: USGS Water Use in Georgia 2015.
Note: Values shown in figures reflect current updated values.

Figure 3-1 2015 Water Supply by Source

Figure 3-2 2015 Surface Water Supply by Sector





Data Source: USGS Water Use in Georgia 2015.
Note: Values shown in figures reflect current updated values.

Figure 3-3 2015 Groundwater Supply by Sector

Figure 3-4 2015 Surface Water Returns by Sector

3.2.1 Current Surface Water Quality (Assimilative Capacity)

The Water Quality (Assimilative Capacity) Resource Assessment (EPD, 2017 and 2023a) estimates the capacity of Georgia's surface waters to absorb pollutants without unacceptable degradation of water quality. The term assimilative capacity refers to the ability of a water body to naturally assimilate pollutants via chemical and biological processes without exceeding State water quality standards or harming aquatic life. The Water Quality (Assimilative Capacity) Resource Assessment evaluated the capacity of surface waters to process pollutants without violating water quality standards. The current (also referred to as baseline) assimilative capacity results focus on dissolved oxygen (DO), and nutrients in some areas of the State (specifically nitrogen and phosphorus), and chlorophyll-a (a parameter that is closely tied to lake water quality). The assessments evaluate the impact of current wastewater and stormwater discharges with current withdrawals, land use, and meteorological conditions.

Assimilative Capacity Modeling (Dissolved Oxygen)

One measure of the capacity of a stream to maintain its health and the health of the aquatic species living therein is the amount of residual DO in the stream. As shown in Table 3-1 and Figure 3-5, DO modeling was performed by EPD for each reach that has upstream wastewater dischargers (light blue segments). Each segment was classified as exceeding DO capacity, meeting DO capacity, or having available DO capacity. The results of the current DO modeling are presented in Figure 3-6 for the Suwannee-Satilla Region, which primarily includes portions of the Suwannee, Satilla, and St. Marys River basins as well as small portions of the Ochlockonee and Ocmulgee basins. The current assimilative capacity results represent municipal and industrial wastewater facilities operating at their full permitted discharge levels (flow and effluent discharge limits as of 2019). It should be noted that most permit holders do not operate at their full permitted capacity, and therefore, these results should not

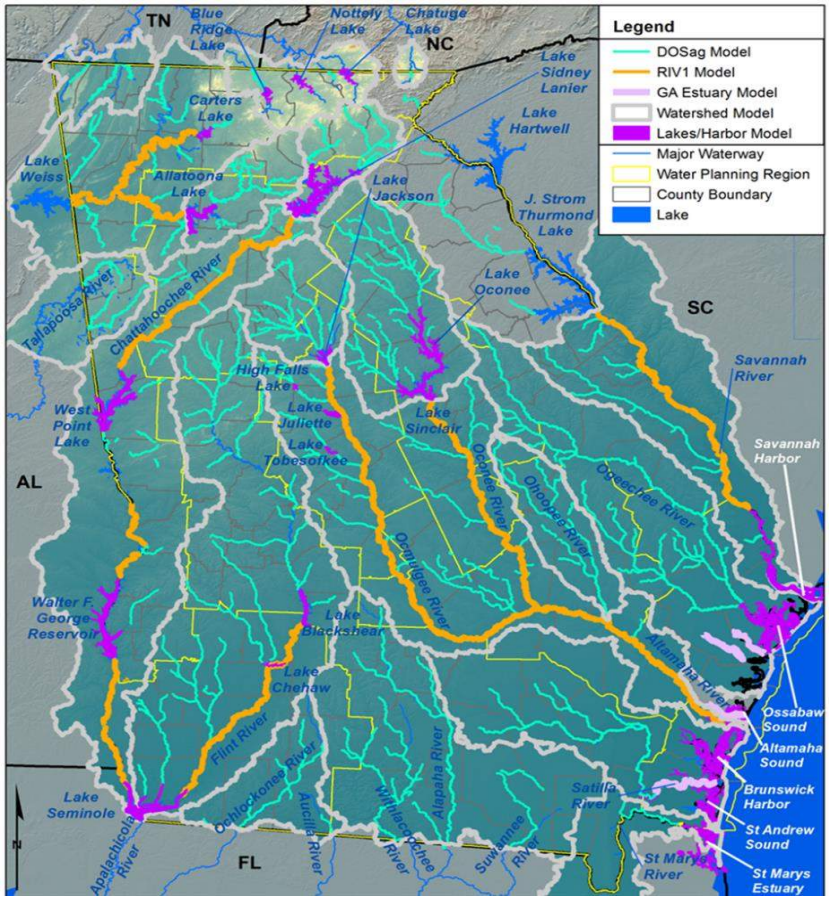


Figure 3-5 Assimilative Capacity Models

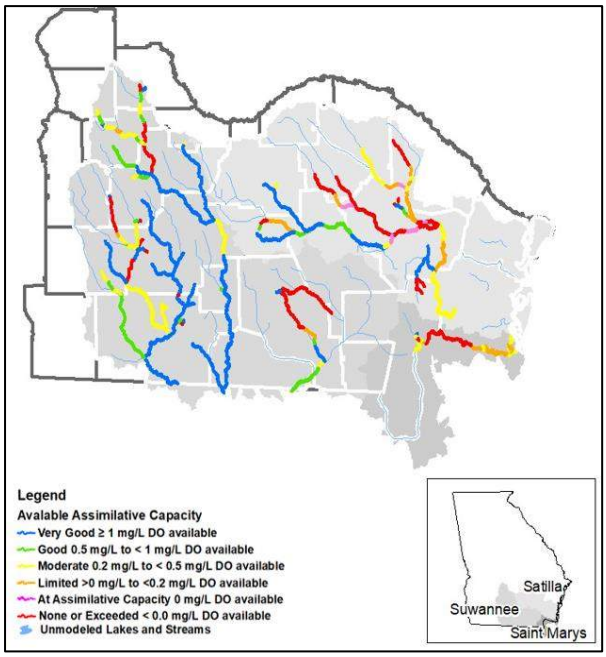
necessarily be viewed as reflective of actual current conditions. When reviewing the figures, the following points should be kept in mind: segments shown with exceeded assimilative capacity may result from a number of factors including point and/or non-point sources of pollutants, modeling assumptions regarding wastewater discharge, stream flow and temperature, and naturally low DO conditions in the receiving stream. When model results show DO assimilative capacity as exceeded, a potential "challenge" exists between the amount of pollutants discharged and the ability of the receiving stream to assimilate the pollutants. These points were considered when developing recommended strategies to address water quality needs in the region.

Table 3-1 Assimilative Capacity for DO in Suwannee-Satilla Planning Council (under current permit conditions)

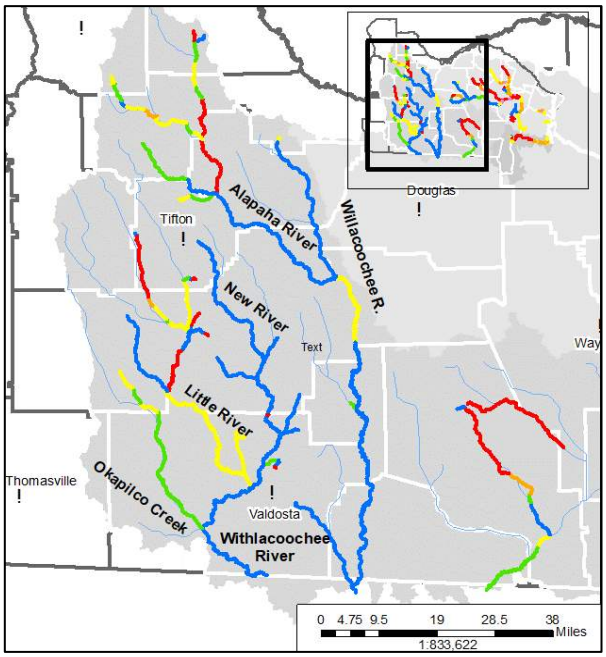
Basin	Available Assimilative Capacity (Total Mileage)						Total River Miles Modeled in the Council Area
	Very Good (≥1.0 mg/L)	Good (0.5 to <1.0 mg/L)	Moderate (0.2 to <0.5 mg/L)	Limited (>0.0 to <0.2 mg/L)	None or Exceeded (<0.0 mg/L)	At Assimilative Capacity (0.0 mg/L)	
Ochlockonee	0	0	0	0	3	0	3
Ocmulgee	29	7	0	0	0	0	36
Satilla	81	35	51	54	92	29	340
St Marys	1	0	8	2	11	0	22
Suwannee	308	71	103	9	84	0	575

Source: GIS Files from the Dissolved Oxygen Assimilative Capacity Resource Assessment Report; EPD, 2023a.
Notes: Suwannee Basin includes many local creeks and rivers such as the, Willacoochee River, Alapaha River, New River, Withlacoochee River, Alapahoochee River, Woodyard Creek, Cane Creek and many other smaller tributaries. The Ocmulgee River makes up the northeastern boarder of Ben Hill County and the northern board of Coffee County. The Aucilla River is a tributary to the Ochlockonee but only 3 river miles are actually in the Suwannee – Satilla region near the southwest corner of Brooks County near Thomas County and the Florida State line. Approximately 34 of those river miles originate in Thomas County and then flow into Brooks County. Since the 2017 update, additional stream segments were modeled for the Satilla and Suwannee Basins such as Middle Creek and additional segments of the Satilla River.

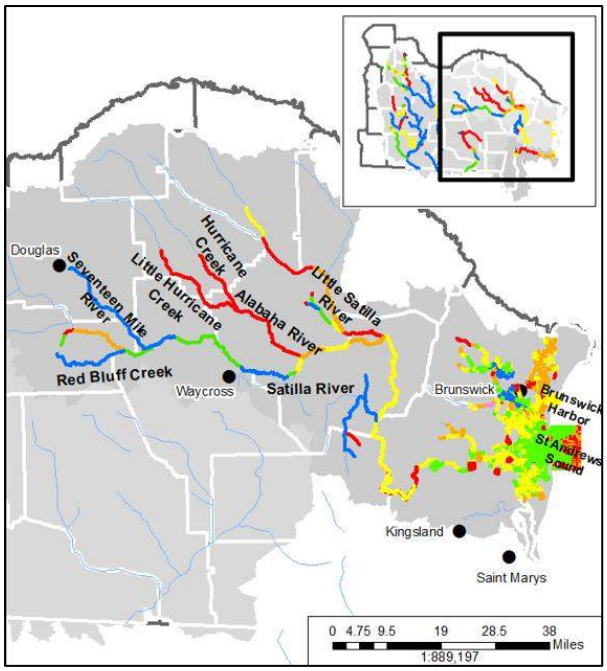
SUWANNEE SATILLA BASIN



SUWANNEE BASIN



SATILLA BASIN



ST. MARYS BASIN

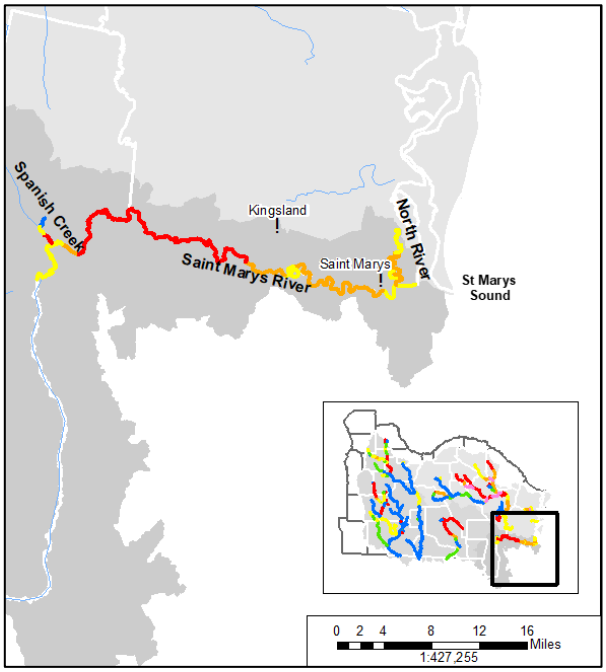


Figure 3-6 Results of Assimilative Capacity Assessment – DO under Current Permit Conditions

Nutrient Modeling

In addition to Assimilative Capacity modeling for DO, EPD completed nutrient (total nitrogen and total phosphorous) modeling for the watersheds in the Suwannee–Satilla region. The location of the watershed model boundaries, and harbors and estuaries model locations are shown in Figure 3-5. There are currently no nutrient standards for total nitrogen and total phosphorus, but these standards may be developed within this region following a public stakeholder process(es). The watershed models evaluate point and non-point source nutrient loadings of total phosphorus and total nitrogen to the Brunswick Harbor and to the state line. The Suwannee-Satilla Council proactively identified several non-point source best management practices (BMPs) that can be used to help reduce nutrient loading as discussed in Section 6.

3.2.2 Surface Water Availability

The Surface Water Availability Resource Assessment (EPD, 2023b) estimates the availability of surface water to meet current and future municipal, industrial, agricultural, and thermal power water needs as well as the needs of instream and downstream users. The assessment evaluated the impact of water consumption on stream flows at certain locations in each river basin. Modeled stream flows were compared with a flow regime based on low flow thresholds (7Q10 from state policy) selected as indicators of the potential for water consumption to impact instream uses such as fishing, boating, and aquatic life habitat. A permitted discharge facility may have its permit limitations determined by State water quality standards (i.e., water quality standards determined effluent limitations). In this situation, there is a regulatory flow threshold that is used in determining what effluent limitations are for various water quality constituents. This regulatory flow threshold is typically (but not always) 7Q10 at the location of the discharge. By definition, this is a seven-day average flow that is not exceeded 10 percent of the time and it is breached a small percentage of the time under natural conditions.

Since the 2017 update, there has been an evolving process in tools used by EPD to assess surface water availability. The model currently used to assess surface water availability is the Basin Environmental Assessment Model (BEAM). This model enables the assessment of river basin resources at spatial scales much finer than the previous models and explicitly represents permitted water withdrawal intakes, water supply reservoirs, refilling pump stations, federal reservoirs, private power generating reservoirs, National Pollution Discharge Elimination System (NPDES) permitted discharging facilities, and long-term USGS gages as nodes or junctions in BEAM. All permitted water withdrawal facilities are incorporated in the BEAM models as junctions where hydrologic information is available.

As shown in Figure 3-7, the model contains a more detailed node type representation that takes into account the various types of inputs and outputs throughout the system. The USGS gage nodes are locations along a river where there is a long-term record of river flow measurements. At each node, the surface water availability models applied the average 2010 – 2018 water supply needs (i.e., withdrawals and discharges) and authorized reservoir operations to stream flows from 1939 to 2018. With information on sequences of inflow, water demand of current or future conditions, permit conditions on instream flow protection, permit limitations, and prescribed reservoir operations, resulting surface water flows can be simulated and "potential challenges" revealed.

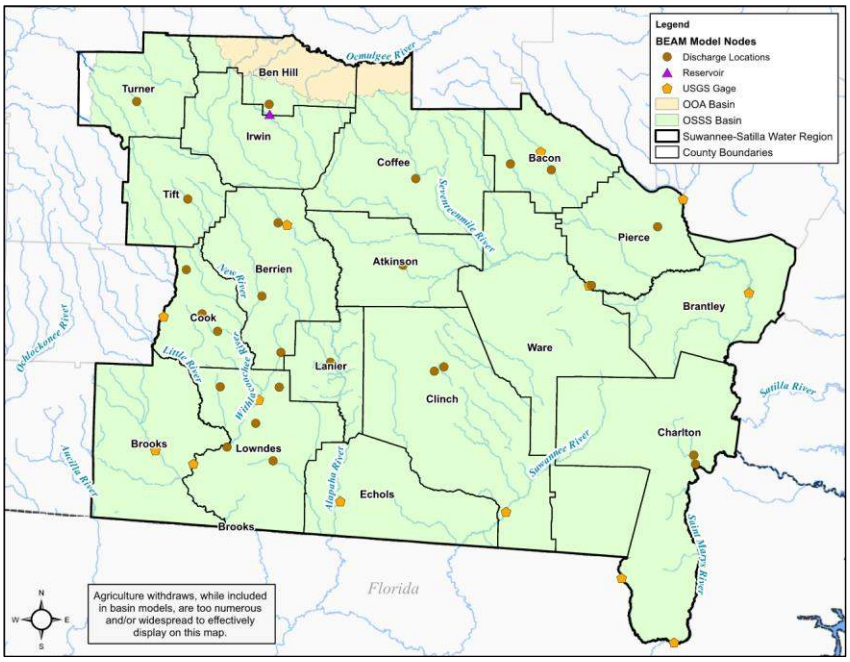


Figure 3-7 Model Nodes for the Suwanee-Satilla Region

There are currently 23 permitted municipal facilities and 2 permitted industrial facilities that discharge to surface waters in the Suwanee-Satilla Region. There are currently no municipal, industrial or energy withdrawal facilities in the region. Therefore potential surface water challenges are associated with wastewater assimilation under current conditions at a number of model (facility) nodes within the region as shown in Table 3-2. Challenges to wastewater assimilation result from the quantity of water withdrawal, quantity of return flow, and changes of such projected for the future. As stated earlier, the regulatory flow used to determine effluent limitations is typically 7Q10 at the point of such a discharge. At the nodes with potential challenges, during certain low flow periods, there is not sufficient surface water to meet current off-stream demands and also meet the targets for support of instream uses. When low flow thresholds (7Q10) are not met, water quality in receiving waters may be impacted. More detailed information about potential challenges at these nodes under future conditions is included in Section 5.

In the Suwannee-Satilla Region and surrounding area, critical low flow conditions occur on river systems that do not have any upstream storage reservoirs. It is important to note that when a potential challenge exists, management practices are needed to address times when off-stream uses increase the severity and/or frequency of low flow conditions. Low flow conditions have been and will continue to occur; and the Suwannee-Satilla Council's management practices are not utilized to address naturally occurring low flow conditions. The results of the current conditions

potential challenges are shown in Table 3-2. The future (2060) modeled potential challenges are summarized in Section 5 along with a comparison to the current conditions.

Table 3-2 Summary of Modeled Current Conditions Surface Water Challenges

BEAM Node	Duration of Potential Challenges (% of total days)	Total Volume Shortage (MG)	7Q10 Flow at Node Location
2188 (Town of Alapaha (Alapaha WPCP))	4,498 (15.4%)	3,694.9	1.4 cfs (0.90 MGD)
2198 (City of Fitzgerald (C.A. Newcomer))	308 (1.1%)	28.9	0.25 cfs (0.16 MGD)
2248 (City of Lakeland (Lakeland WPCP))	149 (0.5%)	69.6	2.0 cfs (1.29 MGD)
2568 (City of Nashville (Nashville WPCP))	1459 (5.0%)	491.5	0.01 cfs (0.006 MGD)
2578 (City of Tifton (New River WPCP))	4,552 (15.6%)	483.9	0.06 cfs (0.04 MGD)
2598 (City of Sparks (Sparks WPCP))	7,718 (26.4%)	1,684.0	0.02 cfs (0.01 MGD)
2608 (City of Adel (Adel WPCP))	3,949 (13.5%)	334.4	0.15 cfs (0.10 MGD)
2628 (Ray City (Ray City WPCP))	2,136 (7.3%)	344.7	0.26 cfs (0.17 MGD)
2868 (City of Valdosta (Withlacoochee WPCP))	48 (0.2%)	42.7	4.3 cfs (2.78 MGD)
3158 (City of Alma (Alma WPCP))	3,450 (11.8%)	1807.4	1.77 cfs (1.14 MGD)
3188 (Milliken & Company (Alma Plant))	472 (1.6%)	129.5	0.55 cfs (0.36 MGD)
3258 (City of Douglas (Southeast WPCP))	3,474 (11.9%)	7,271.0	0.04 cfs (0.03 MGD)
3298 (City of Pearson (Pearson WPCP))	131 (0.5%)	8.0	0.29 cfs (0.19 MGD)
3418 (City of Waycross (Waycross WPCP))	3,424 (11.7%)	24,161.6	14.2 cfs (9.18 MGD)
3528 (City of Patterson (Patterson WPCP))	176 (0.6%)	12.9	0.21 cfs (0.14 MGD)
4238 (City of Folkston (Folkston WPCP (Pond))	217 (0.7%)	12.3	0.15 cfs (0.10 MGD)
4248 (City of Folkston (Folkston WPCP Wetlands))	168 (0.6%)	109.1	1.83 cfs (1.18 MGD)

Source: Surface Water Availability Assessment, EPD, 2023b.
Note: Surface Water Availability modeling simulation period is from 1939 to 2018. The simulation period totals 29,220 days.

It should be noted that due to the utilization of BEAM in resource assessment modeling, some of the previous approaches in expressing potential issues at the planning nodes become obsolete. The resource issues identified previously are now replaced by these new resource assessment results. For example, the exhaustion of storage within a reach or the breaching of instream minimum flow requirements as a way of showing a "potential resource challenge" at the planning node representing that reach was previously used. With the new modeling platform, there are now specific facilities for that assessment in lieu of planning nodes. For example, where there is the exhaustion of a water supply storage, there is likely also a shortage in meeting water demand at the facility, which is now called a water supply challenge.

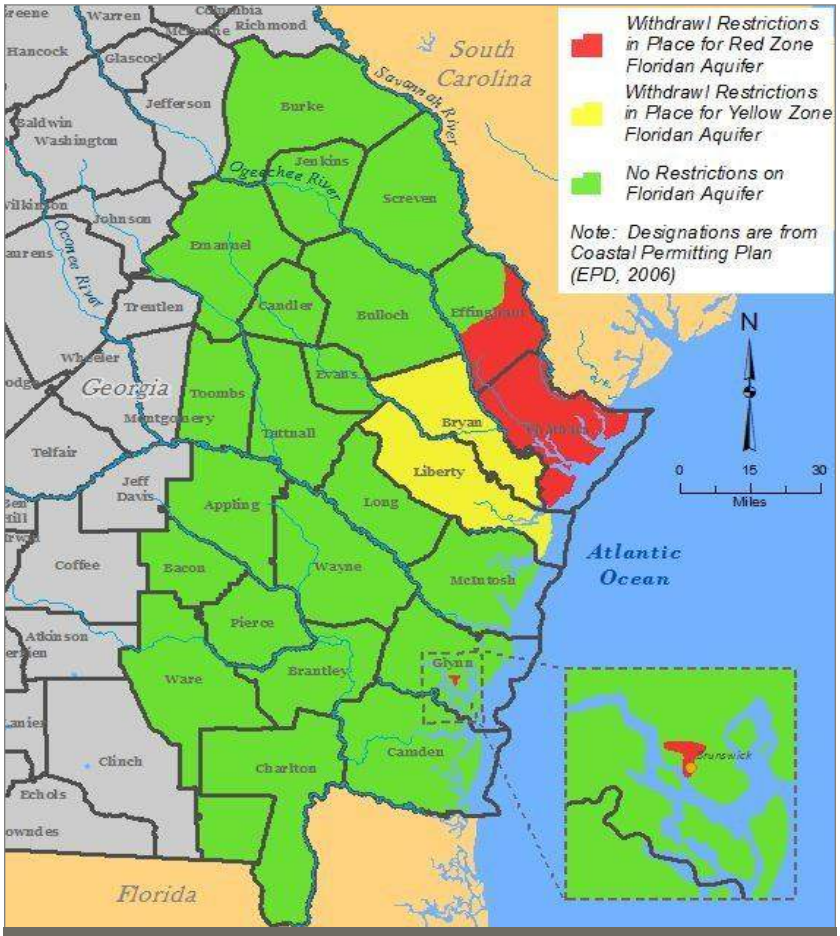
3.2.3 Current Groundwater Availability

The Groundwater Availability Resource Assessment (EPD, March 2010) estimates the sustainable yield for prioritized groundwater resources based on existing data. EPD prioritized the aquifers based on the characteristics of the aquifer, evidence of negative effects, aquifer availability and anticipated use, and other considerations. This assessment identified the sustainable yield, or a range of groundwater volumes that can be withdrawn without causing adverse impacts (such as 30-feet drawdown between pumping wells that limits use of neighboring wells, reducing groundwater stream baseflow, and continual declines in groundwater levels). If negative impacts occur or are expected to occur, then a groundwater "challenge" exists. The Suwannee-Satilla Region will coordinate usage with other water planning regions to meet the sustainable yield for each groundwater source.

Groundwater from the Floridan aquifer is a vital resource for the Suwannee-Satilla Region. In 2005, groundwater was relied upon to meet about 81% of the water use in the region (USGS, 2019). The Suwannee-Satilla Region shares its groundwater resources with portions of North Florida. Coordination was conducted with the Suwannee River Water Management District and St. Johns River Water Management District to obtain current Floridan groundwater use data, which were incorporated into the Groundwater Availability Resource Assessment. The current demand from the Floridan aquifer within the Suwannee-Satilla Region is 183 MGD in 2020 which is projected to increase by 46 MGD to 229 MGD in 2060. The 2060 projected demand is well within the low end of the sustainable yield (868 MGD) of the Floridan aquifer in South Central Georgia and Coastal Plain. A relatively small number of wells in Cook and Turner counties withdraw water from the Claiborne aquifer. The 2020 withdrawal rate from these wells were 0.38 MGD and it is projected to increase to 0.41 MGD in 2060 which is less than the low end of the sustainable yield (140 MGD) of the Claiborne aquifer. Overall, the results from the Groundwater Availability Resource Assessment indicate that on a regional basis, for the prioritized aquifers, there is sufficient groundwater supply to meet current needs. EPD conducted some additional assessments of the Floridan aquifer in 2017. The Regional Coastal Plain model was run in transient mode with monthly stress periods and seasonally varying pumping rates from the agricultural wells in the model. The agricultural wells in the model pumped at higher pumping rates during the months of the growing season and at lower pumping rates during the months of the non-growing season. The transient groundwater model simulated 2010 baseline pumping using varying hydrologic conditions of a wet year (2009), an average year (2010), and two dry years (2011 and 2012). In addition to the 2010 baseline pumping, the model was also used to

simulate 15%, 50%, and 100% increases to baseline pumping. The results showed that during the growing season, the 30-feet drawdown threshold was exceeded. However, during the non-growing season, the water levels in the aquifer recovered to the base level. This indicates that wells may need to be set deeper to ensure they do not go dry during the growing season if those higher pumping thresholds were to be reached. Localized issues may occur if groundwater well densities or withdrawal rates are greater than the scenarios evaluated in the Resource Assessment.

As shown in Figure 3-8, 24 counties in southeast Georgia are subject to the Coastal Georgia Water and Wastewater Permitting Plan for Managing Salt Water Intrusion (Coastal Permitting Plan) (www.gadnr.org/cws/). There are five counties (Bacon, Brantley, Charlton, Pierce, and Ware Counties) in the Suwannee-Satilla Region that are located within the Green Zone. Per the Coastal Permitting Plan, there are no pumping restrictions from the Floridan aquifer in this area; however, there are water conservation requirements related to groundwater withdrawals.



Source: Coastal Georgia Water and Wastewater Permitting Plan for Managing Salt Water Intrusion.

Figure 3-8 Sub-regions Associated with the Coastal Permitting Plan

3.3 Current Ecosystem Conditions and Instream Uses

The Suwannee-Satilla Region encompasses parts of the Southern Coastal Plain and Southeastern Plains ecoregions. The rivers in these ecoregions support a diversity of fish and wildlife species and provide numerous recreational opportunities. The Department of Natural Resources manages one Public Fishing Area (Berrien County) and two Wildlife Management Areas (Coffee and Ware Counties) in the Suwannee-Satilla Region. The Okefenokee National Wildlife Refuge (Ware, Charlton, and Clinch Counties) contains one of the largest peat-based freshwater swamps in the world and is home to over 400 species of animals. All of these areas provide public access to rivers and lakes for fishing, hunting, and other recreational activities.

With over 1.29 million resident anglers, fishing is the most popular wildlife-related activity in Georgia (GADNR-WRD 2006). The Suwannee River, which begins in Georgia and discharges into the Gulf of Mexico, is well-known to anglers for its warmouth, flier, chain pickerel, and bullhead catfish. The Satilla and St. Marys rivers, which discharge into the Atlantic Ocean, are better known for their redbreast sunfish, bluegill, redear sunfish, black crappie, largemouth bass, and catfish. Because they are directly linked to Georgia's coastal ecosystem, the Satilla and St. Marys rivers also support commercial fisheries in Georgia for blue crabs, shrimp, and eels, and recreational fisheries for nearshore species such as red drum and sea trout.

The Satilla and St. Marys rivers provide important riverine habitat for small populations of shortnose sturgeon, Atlantic sturgeon, American shad, and American eel—all diadromous species that travel between the ocean and freshwater rivers to breed—as well as striped bass, a very popular sport fish. Because these populations are small and depend on varying mixtures of salt and fresh water at different life stages, they are susceptible to changes in water quality and flow.

The 2015 State Wildlife Action Plan (formerly the Comprehensive Wildlife Conservation Strategy) identified 120 high priority animals that inhabit the southern Coastal Plain ecoregion and 145 high priority animals in the Southeastern Plains ecoregion (more information is available at georgiawildlife.com/WildlifeActionPlan). Several of these amphibians, fish, mammals, mollusks, and reptiles depend on rivers for part or all of their lifecycle. Federally endangered species in the Suwannee-Satilla Region that inhabit rivers include the shortnose sturgeon (Acipenser brevirostrum). There are 26 identified high priority habitats in the Southern Coastal Plain ecoregion and 27 high priority habitats in the Southeastern Plains (State Wildlife Action Plan (SWAP), 2015) (for more information on high priority waters and protected species go to georgiawildlife.com/WildlifeActionPlan). Riverine systems and processes are important to many of these habitats such as alluvial rivers and swamps, bottomland hardwood forests, blackwater streams, canebreaks, and open-water ponds and lakes.

In the Southern Coastal Plain ecoregion, conservation lands make up 17% of the land area. The percentage of lands in conservation is lower in the Southeastern Plains ecoregion at 4.5% (SWAP, 2015). Several rivers and watersheds in this planning region have been identified as ecologically important, including the St. Marys, Ocmulgee, and Suwannee rivers. The 2015 SWAP identified two additional high priority watersheds in the Satilla River System based on previous lack of watersheds represented in the ecological drainage unit (Watershed 128 (Satilla-Southeastern Plains)) and low urban cover and relatively diverse fish communities in Guest Mill Pond and the upper Satilla River (Watershed 126 (Satilla-Southern Coastal Plain)).

The Satilla and St. Marys Rivers flow from the Suwannee-Satilla Region through the Coastal Regional Council boundary and discharge to the Atlantic Ocean. The coastal area contains a unique combination of fresh, brackish and salt water environments. The area is defined by barrier islands, sand beaches, open Atlantic Ocean, and there are 9 major estuaries including 350,000 acres of salt marsh and 150,000 acres of open water. Shipping channels are maintained in three estuaries – the lower Savannah River, St. Simons, and Cumberland. Otherwise, the remainder are very similar in depth, size and other physical characteristics as they were at the time of European settlements of Georgia.

An estuary is a semi-enclosed body of water, which has a free connection with the sea and within which sea water is measurably diluted with fresh water. Without the fresh water input, such areas in Georgia would be salt water lagoons or bays. A key characteristic of an estuary is salinity, which can be highly variable depending on the location within the estuary and the estuaries itself. Sources of fresh water for an estuary include: fresh water river discharges, industrial and municipal discharges of groundwater after use and treatment, and upwelling of groundwater through geologic features. Estuarine environments support a diversity of life, both aquatic and terrestrial, unparalleled in other portions of the State. Hundreds of species of animals and plants exist because of the unique mixing of salt water and fresh water. If the fresh water were removed, the diversity would change immensely from what is found today. Maintaining freshwater inputs to Georgia's estuaries is vital for maintaining a unique coastal environment, which provides a myriad of social and economic benefits, as well as invaluable ecological services to the citizens of Georgia. (Personal Communication: Spud Woodward, Coastal Resources Division, Georgia Department of Natural Resources).

Impaired Water Bodies

Under Section 303(d) of the federal Clean Water Act (CWA), a total maximum daily load (TMDL) must be developed for waters that do not meet their designated uses. A TMDL represents the maximum pollutant loading that a water body can assimilate and continue meeting its designated use (i.e., not exceeding State water quality standards). A water body is deemed to be impaired if it does not meet the applicable criteria for a particular pollutant; consequently, TMDLs are required to be established for these waters to reduce the concentrations of the exceeding parameters in order to comply with State water quality standards. For the Suwannee-Satilla Region, there are 118 impaired stream reaches (total impaired length of 1,279 miles) and 3 impaired lakes (total impaired area of 3,181 acres) as shown in Figure 3-9.

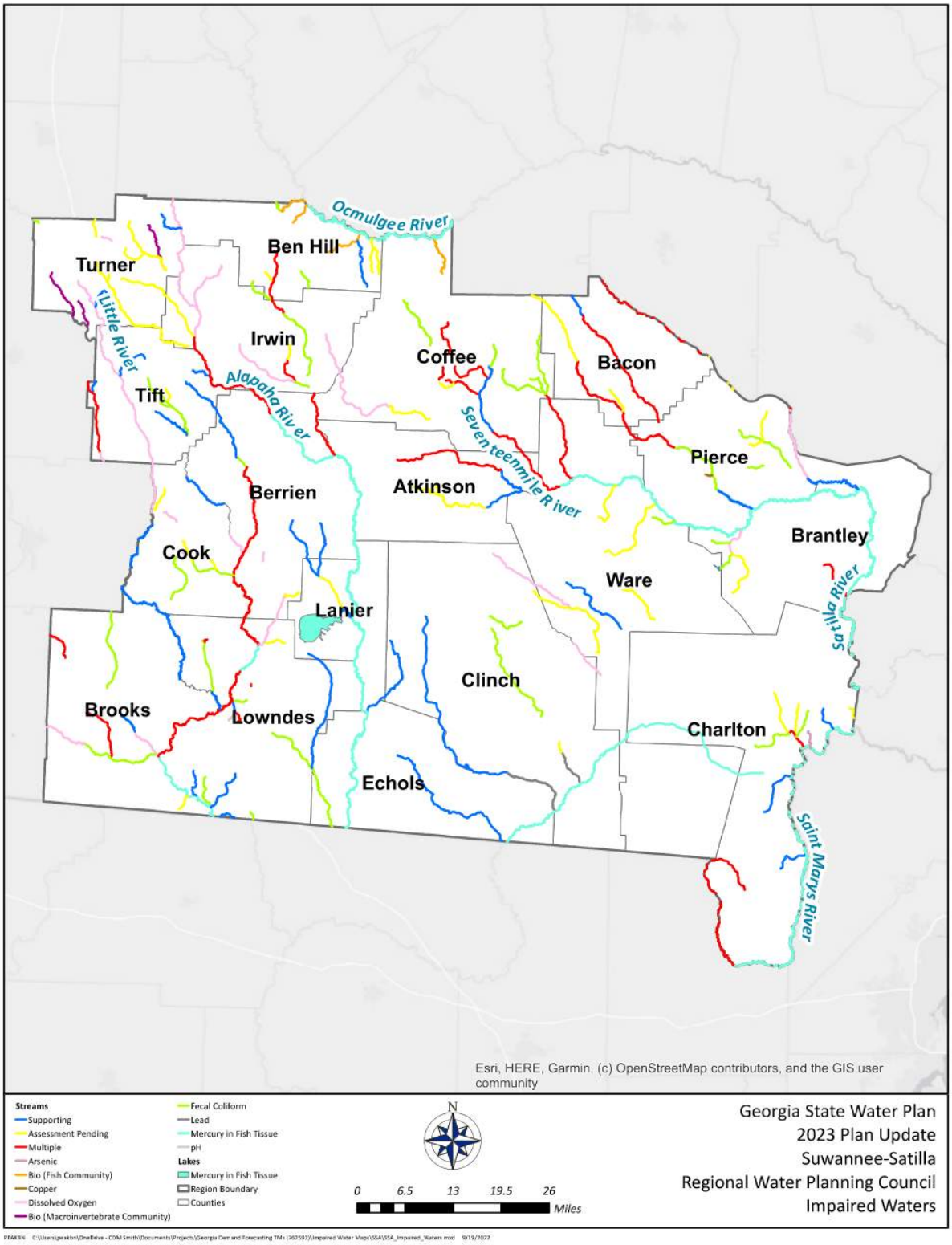


Figure 3-9 Suwannee-Satilla Region Impaired Waters

Of the impaired reaches in the region (note that a reach may be impaired for more than one parameter):

- 53% are impaired for fecal coliform
- 41% are impaired for low dissolved oxygen
- 18% are impaired for trophic-weighted residual mercury in fish tissue
- 3% are impaired for ammonia toxicity
- 3% are impaired for lead
- 3% are impaired for Biological (Fish Community)
- 3% are impaired for Biological (Macroinvertebrate Community)
- 2% are impaired for copper
- <2% are impaired for pH
- <1% are impaired for algae
- <1% are impaired for Arsenic
- <1% are impaired for Chrysene and Benzo(a)Anthracene

All impaired lakes in the region are impaired for trophic-weighted residual mercury in fish tissue. TMDLs have been completed for 95 of the impaired stream reaches. A full list of impaired waters can be found on the EPD website (epd.georgia.gov/georgia-305b303d-list-documents). This list is updated every 2 years by EPD; the above information is based upon the approved 2022 list.

SECTION 4

Forecasting Future Water Resource Needs

Section 4 Forecasting Future Water Resource Needs

Summary

Over planning horizon, the population in the Suwannee-Satilla Region is projected to grow by 4%, increasing the demands for surface water and groundwater and increasing the quantity of wastewater generated.

Total water withdrawals by municipal, industrial, and agricultural sectors are forecasted to increase by 23% (74 MGD) from 2020 to 2060.

Total wastewater flows are projected to increase by 5% (3.4 MGD) over the same period.

Water and wastewater demand forecasts, along with the Resource Assessments (Section 3), form the foundation for water planning in the Suwannee-Satilla Region and serve as the basis for the selection of management practices (Sections 6 and 7). This section presents the regional water and wastewater forecasts from 2020 through 2060 for four water use sectors: municipal, industrial, agriculture, and thermoelectric generation.

During the regional planning process, the majority of Suwannee-Satilla Council members identified the following objectives for the forecast process. The two primary objectives were:

- Ensuring accurate data, and
- Ensuring that data are not used to establish regional or local mandates.

Central to these objectives is the overarching goal to develop consistent and comparable sets of data. This means that select data sets (common year for data inputs and comprehensive coverage of the State) in many cases have broader coverage of the State, but may not be as precise as local provider level data. During development of the Regional Water Plan, there was a concerted effort to strike a balance between broad coverage and local data. This was accomplished by using consistent data collection on a regional basis modified as appropriate with local provider input. These data and resulting forecasts are not applicable between regions or between providers within the region.

The methodology to forecast water and wastewater demands is based primarily on the assumption that there will be a continuation of existing trends and practices. It does not make a determination regarding the efficiency or inefficiency of forecasted demands, only that they are expected to occur given current trends. Initial forecasting does not take into account management practices, including water conservation (other than passive conservation as described in more detail below) that may be adopted by Regional Water Planning Councils to reduce the expected magnitude of demand (see Sections 6-8 for additional details on water conservation and other management practices). Additionally, this forecasting effort does not change EPD requirements related to individual permitting decisions but represents a forecast for regional water planning that will help guide permitting and funding decisions.

4.1 Municipal Forecasts

Municipal water includes water supplied to residences, commercial businesses, and small industries (water use in industry are forecasted separately and those major industrial sectors are identified in Section 4.2). Residential water uses include water for normal household purposes: cooking, bathing, and clothes washing, among others. Commercial water uses include water used by hotels, restaurants, retail stores, and office buildings, among others. Municipal water demands may be served by public water systems, private water systems, or self-supplied by the user (such as individual wells).

Population Projections

Municipal water and wastewater forecasts are closely tied to population projections for the counties within the Suwannee-Satilla Region. The population projections were developed by the Georgia Governor's Office of Planning and Budget, which is charged in State law (O.C.G.A. § 45-12-171) with the responsibility for preparing, maintaining, and furnishing official demographic data for the State. The population projections by county are shown in Table 4-1.

Table 4-1 Population Projections by County

County	2020	2030	2040	2050	2060	Difference (2020 to 2060)	% Increase (2020 to 2060)
Atkinson	8,330	8,560	8,607	8,545	8,459	129	2%
Bacon	11,404	12,157	11,927	11,364	10,720	-684	-6%
Ben Hill	16,645	16,361	15,722	14,920	14,286	-2,359	-14%
Berrien	19,276	19,932	20,219	20,243	20,370	1,094	6%
Brantley	19,202	20,326	19,836	18,495	16,678	-2,524	-13%
Brooks	15,727	16,164	15,270	13,921	12,681	-3,046	-19%
Charlton	13,251	13,751	13,116	12,133	11,008	-2,243	-17%
Clinch	6,656	6,859	6,999	7,260	7,718	1,062	16%
Coffee	43,042	43,555	43,277	42,714	42,169	-873	-2%
Cook	17,437	18,202	17,574	16,369	14,929	-2,508	-14%
Echols	3,969	3,861	3,668	3,380	3,087	-882	-22%
Irwin	9,433	9,815	10,050	10,240	10,484	1,051	11%
Lanier	10,351	10,402	10,473	10,479	10,575	224	2%
Lowndes	117,878	125,675	130,605	134,992	140,334	22,456	19%
Pierce	19,545	20,362	20,967	21,429	21,894	2,349	12%
Tift	40,830	42,209	42,983	43,212	43,510	2,680	7%
Turner	8,076	8,334	7,865	7,330	6,795	-1,281	-16%
Ware	35,853	37,027	37,923	38,636	39,738	3,885	11%
Total	**416,905**	**433,552**	**437,081**	**435,662**	**435,435**	**18,530**	**4%**

Source: Governor's Office of Planning and Budget (2019).
Note: Values shown in tables reflect current updated values.

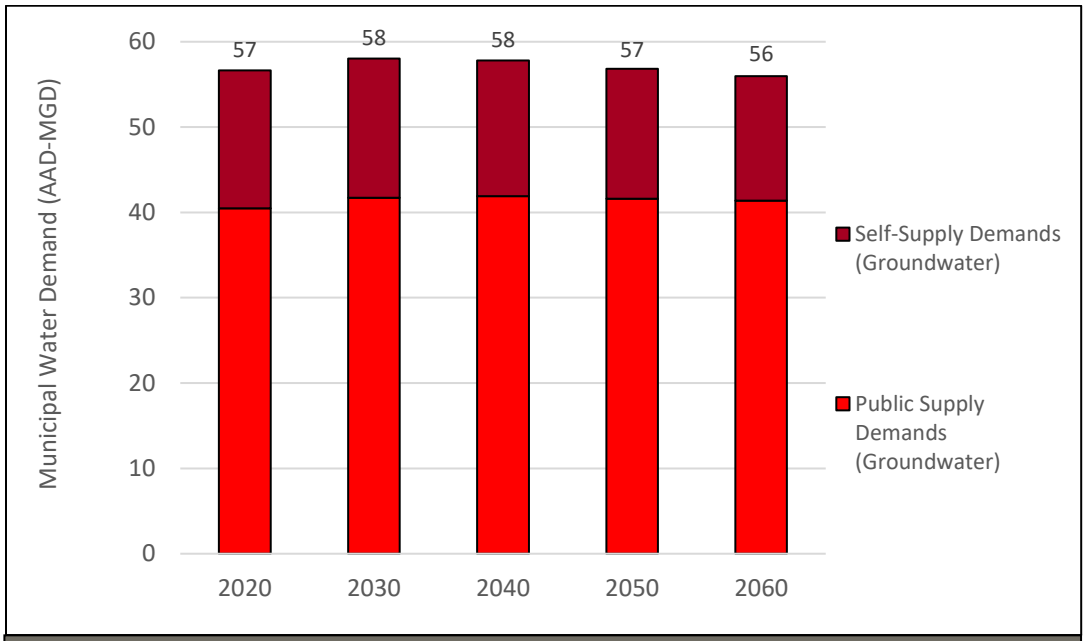
Municipal Water Forecasts

The municipal water forecasts were calculated by multiplying the baseline per capita water use rate by the population served. Per capita water use rates are different for public water systems in comparison to self-supplied water use; therefore, the demands are calculated separately and then summed together. The publicly-supplied water use rate was determined for each county within the region. The self-supply per capita demand is estimated at 100 gallons per capita per day (gpcd).

To support this Plan update, EPD reviewed water loss audit data and the estimated population served reported by permitted municipal water systems from the years 2015 through 2018. A county weighted average was then calculated using those data for the public-supplied municipal demand. The self-supplied per capita values remained unchanged.

The municipal water use rates for the Suwannee-Satilla Region were adjusted based on two plumbing code changes, which mandate new water saving lavatory fixtures. The National Energy Policy Act of 1992 reduced the maximum toilet flush volume from 3.5 to 1.6 gallons per flush for all toilets available in the U.S. starting in 1994. The Georgia Water Stewardship Act of 2010 reduces the maximum flush volume to 1.28 gallons per flush for all new toilets installed in Georgia after July 1, 2012. As new homes are constructed and less efficient toilets are replaced within existing housing stock, the water use rate is reduced over time. Additional information on plumbing code efficiency adjustments and rationale for per capita water use is available in the Suwannee-Satilla Water and Wastewater Forecasting Technical Memorandum (CDM Smith, 2022).

Total regional municipal water demands are shown in Figure 4-1 for the Suwannee-Satilla Region. In addition, this figure shows the demands by public water systems and self-supply users. In the Suwannee-Satilla Region, all municipal water demands are satisfied by utilizing groundwater as the sole source for withdrawals.



Source: Suwannee-Satilla Water and Wastewater Forecasting Technical Memorandum (2022).
Notes: Values represent forecasted annual average demand (AAD) in million gallons per day (MGD). Values shown in graph reflect current updated values.

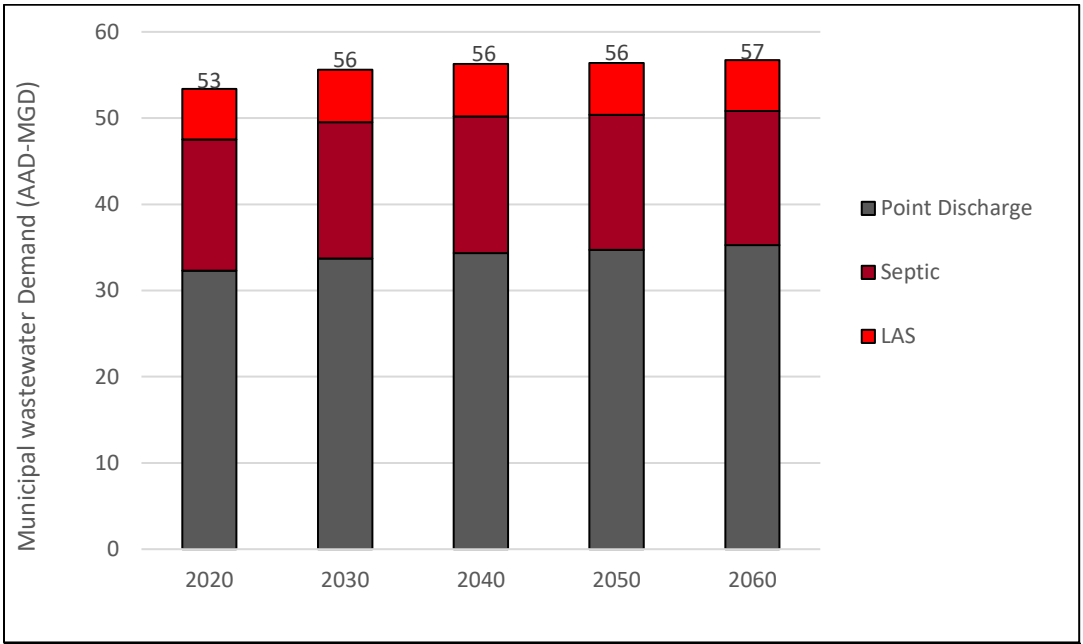
Figure 4-1 Total Municipal Water Use Forecast (in AAD-MGD)

Municipal Wastewater Forecasts

Municipal wastewater may be treated by centralized treatment plants or onsite sanitary sewage (septic) systems. Wastewater effluent flow from centralized treatment facilities is either discharged as a point source to a receiving water body or delivered to a land application system (LAS). EPD permit data as well as feedback from municipal suppliers were used to determine volume of discharge from centralized treatment and the ratio of point discharge to land application system for each county.

U.S. Census data on the percent of households with septic systems were obtained by county. For planning purposes, it was estimated that households with septic systems use 100 gpcd and 80 percent of the water is disposed of via a septic system. The percent of households on septic systems by county is held constant for the future. Wastewater effluent flow from centralized treatment facilities is either discharged as a point source to a receiving water body or to an LAS. Information obtained from existing EPD permit data as well as feedback from municipal suppliers was used to determine the ratio of point discharge to land application systems for each county. This ratio is held constant for the future. The centralized wastewater flows by county derived from 2019 EPD permit data change over time in the forecast in proportion to the change in the projected county population.

Municipal wastewater forecasts are shown in Figure 4-2.



Source: Suwannee-Satilla Water and Wastewater Forecasting Technical Memorandum (2022).
Notes: Values represent forecasted annual average demand (AAD) in million gallons per day (MGD). Values shown in graph reflect current updated values.

Figure 4-2 Total Municipal Water Generation Forecast (in AAD-MGD)

4.2 Industrial Forecasts

Industrial water and wastewater forecasts anticipate the future needs from the following major water-using industries within the Suwannee-Satilla Region: food processing, manufacturing, paper and forestry products, and mining. Industries require water for processes, sanitation, cooling, and other purposes. Some industries, such as poultry processors, operate under strict U.S. Department of Agriculture guidelines that require water use to maintain sanitary conditions within the facilities. Water need (i.e., the total water requirements of an industry, or the water withdrawals) was previously based on either production or employment, depending on the available information. The current industrial water need was determined through permit information and representative input from each industrial sub-sector (paper and forestry products, food processing, manufacturing, and mining).

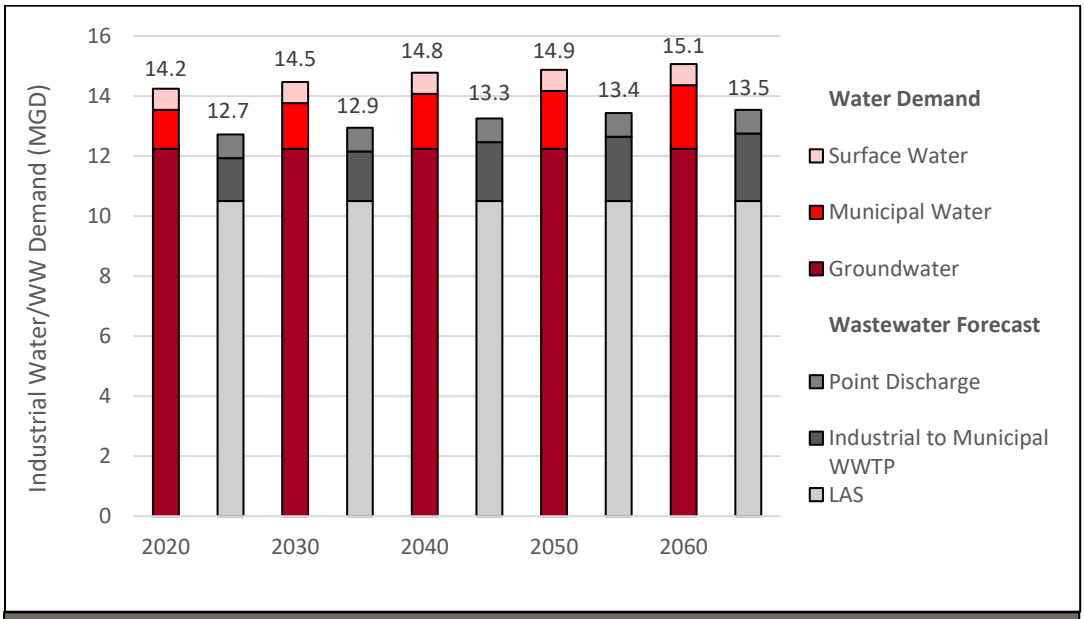
Advisory Group Review Process

EPD identified experts throughout the State of Georgia to form an industrial stakeholder advisory group representing the state's thirteen largest industrial sectors. Through the advisory group's review of the previous methodology, it was determined that employment projections were no longer a valid basis for estimating future industrial water requirements as increased automation has reduced the number of employees per unit of production, and therefore water use per employee. The advisory group subsequently formed sub-sector advisory groups to review water trends and investigate a variety of considerations for paper and forestry products, food

processing, manufacturing, and mining industries. Both common and sector-specific conclusions were determined.

Industrial Water Forecasts

In addition to sub-sector advisory group feedback, confidential trade association surveys were collected for additional input. This information was used in conjunction with municipal water purchases and facility withdrawal permit information to develop the water withdrawals forecast by county and sub-sector. The average water withdrawal from 2010 to 2019 for the majority of industrial facilities was used as the basis for projected water use. Figure 4-3 shows the industrial water and wastewater forecast over the planning period. Water withdrawals are estimated to remain constant over time for all sub-sectors except for an expected increase in water demand for food processing.



Source: Suwannee-Satilla Water and Wastewater Forecasting Technical Memorandum (2022).
Notes: Values represent forecasted annual average demand (AAD) in million gallons per day (MGD). Values shown in graph reflect current updated values.

Figure 4-3 Total Industrial Water and Wastewater Forecast (in AAD-MGD)

Industrial Wastewater Forecasts

Similar to the industrial water forecast, the industrial wastewater forecast is estimated using facility discharge permit information from 2015 to 2019. Trade association surveys also reported industrial discharges, however, the information was limited to 2019 data in some cases. It should be noted that some facility types (i.e., mining) may recycle stormwater discharges causing an increase in overall discharges but a decrease in water withdrawal. Discharges are estimated to remain constant over time for all sub-sectors except for an expected increase for food processing.

Once the industrial wastewater flows were estimated, the flows were separated between point discharges and land application based on EPD permit data. This allows the planning regions to account for flows discharging to surface water bodies. The industrial wastewater forecasts are presented in Figure 4-3 by the anticipated disposal system type: industrial wastewater treatment (point discharge), LAS, or discharge for municipal wastewater treatment.

4.3 Agricultural Forecasts

The agricultural water use forecasts include irrigation demands for both crop and non-crop (including livestock, nurseries, and golf courses) uses. The crop forecasts, developed 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 for 2020 through 2060, provide a range of irrigation water use from dry to wet climate conditions based on the acres irrigated for each crop. Table 4-2 lists a drier-than-normal year crop irrigation forecast for each county.

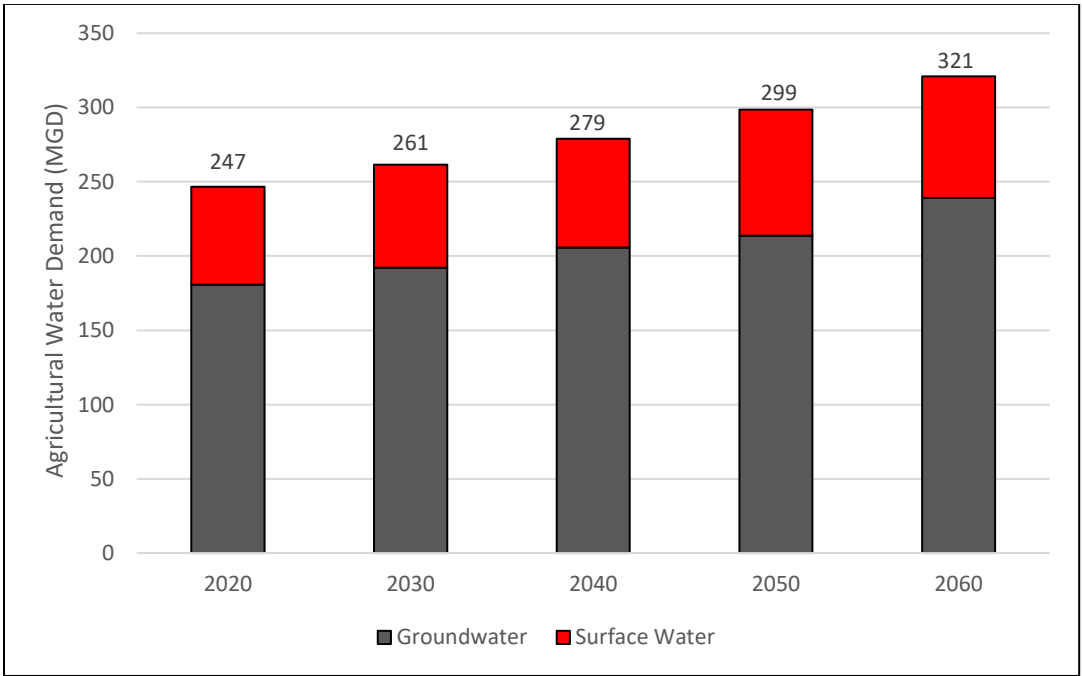
Table 4-2 Agricultural Water Forecast by County (in AAD-MGD)

County	2020	2030	2040	2050	2060	% Change
Atkinson	9.2	9.7	10.2	10.7	11.2	22%
Bacon	8.2	8.6	9.1	10.1	10.4	27%
Ben Hill	11.1	11.7	12.4	13.0	14.2	28%
Berrien	24.6	26.3	28.6	31.3	34.2	39%
Brantley	0.73	0.77	0.81	0.83	0.92	26%
Brooks	29.6	31.8	33.9	36.3	39.1	32%
Charlton	0.02	0.02	0.02	0.02	0.02	0%
Clinch	3.3	3.4	3.7	3.9	4.3	30%
Coffee	19.2	20.1	21.1	22.1	23.4	22%
Cook	16.9	17.8	18.9	20.2	21.5	27%
Echols	2.5	2.4	2.5	2.6	2.7	8%
Irwin	36.9	38.6	40.7	43.0	45.5	23%
Lanier	6.3	6.8	7.6	8.5	9.5	51%
Lowndes	11.9	13.2	14.9	16.9	19.2	61%
Pierce	11.9	12.4	13.1	13.9	14.9	25%
Tift	21.4	22.8	24.0	25.5	27.0	26%
Turner	27.7	29.4	31.2	33.3	35.6	29%
Ware	5.5	5.8	6.2	6.7	7.2	31%
Total	**246.7**	**261.4**	**279.0**	**298.7**	**321.0**	**30%**

Source: Suwannee-Satilla Water and Wastewater Forecasting Technical Memorandum (2022).
Notes: Crop demands represent dry year conditions, in which 75% of years had more rainfall and 25% of years had less. Agricultural withdrawals (crop and non-crop) are supplied by groundwater and surface water. Values shown in table reflect current updated values.
AAD-MGD: average annual demand represented as million gallons per day.

Non-crop (including non-permitted) agricultural water demands were identified with the assistance of industry associations. Similar to crop irrigation, forecasts for nursery and greenhouse water use were also developed for a range of climate conditions over the planning period. For planning purposes, the drier-than-normal nurseries/greenhouse forecasts are presented in Table 4-2. For golf courses, livestock production, and nurseries, estimates of current water use were developed. Current water demands were held constant throughout the planning period for these agricultural water use types.

Figure 4-4 shows the regional agricultural demands by source of supply. Agriculture is a very important economic driver in the Suwannee-Satilla Region. Throughout the planning period, forecasted agricultural water demand for the region is approximately 4 times the combined municipal and industrial water demand. The Suwannee-Satilla Region as a whole is expected to see an increase of 30% in agricultural water demand by 2060. The largest increase in forecasted demand occurs in Lowndes County, with a 61% increase by 2060. Lanier, Berrien, and Brooks Counties have the next largest forecasted demand increases, at 51%, 39%, and 32% respectively. All other counties in the region are forecast to have increases of 20% or higher through 2060, except Echols County. Charlton County has no forecasted increase in agricultural water demand through 2060. As shown in Figure 4-4, the majority of the agricultural withdrawals (approximately 75%) are supplied by groundwater and the remainder by surface water.



Source: Suwannee-Satilla Water and Wastewater Forecasting Technical Memorandum (2022).
Notes: Values represent forecasted annual average demand (AAD) in million gallons per day (MGD). Values shown in graph reflect current updated values.

Figure 4-4 Total Agricultural Water Use Forecast (in AAD-MGD)

4.4 Water for Thermoelectric Power Forecasts

Thermoelectric water withdrawal and consumption demands were developed for the State of Georgia based on forecasted power generation needs and assumptions regarding future energy generation processes. There is no existing or currently planned thermoelectric power generated in the Suwannee-Satilla Region, so the associated water demand is zero for 2020 through 2060 as shown in Table 4-3.

Table 4-3 Regional Thermoelectric Water Forecast (in AAD-MGD)

Category	2020	2030	2040	2050	2060
Existing and Planned Facilities' Withdrawals	0	0	0	0	0
Existing and Planned Facilities' Consumption	0	0	0	0	0

Source: Suwannee-Satilla Water and Wastewater Forecasting Technical Memorandum (2022).
Note: Values shown in table reflect current updated values.

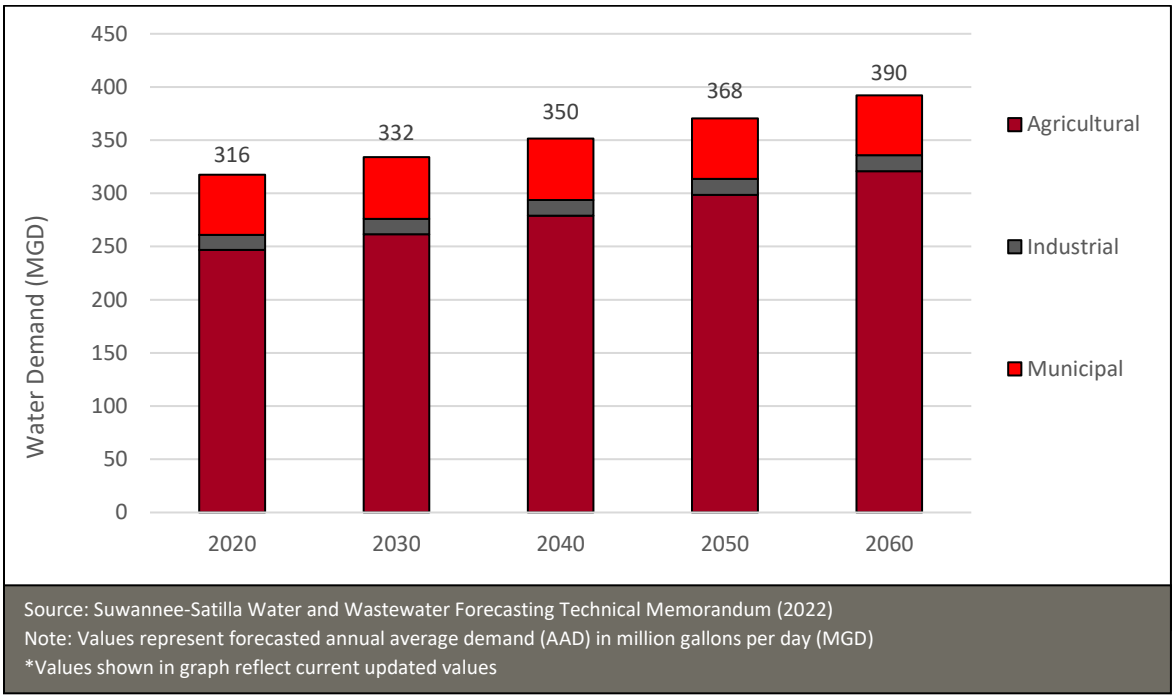
Within the previous statewide analysis, the generating capacity of the existing and planned facilities was not able to meet the projected statewide power needs through 2050 and additional generating capacity was estimated to be developed beyond 2020. In the updated analysis, it was determined that planned generation levels will be sufficient enough to meet the expected need up to 2036. Because coal-fired generation is expected to decline and expire by 2040, renewable and natural gas-fired facilities will be increased to generate the additional energy required to meet the expected demand.

Suwannee-Satilla Council has elected to qualitatively assess the potential for energy development in the region by continuing to monitor renewable energy policy.

4.5 Total Water Demand Forecasts

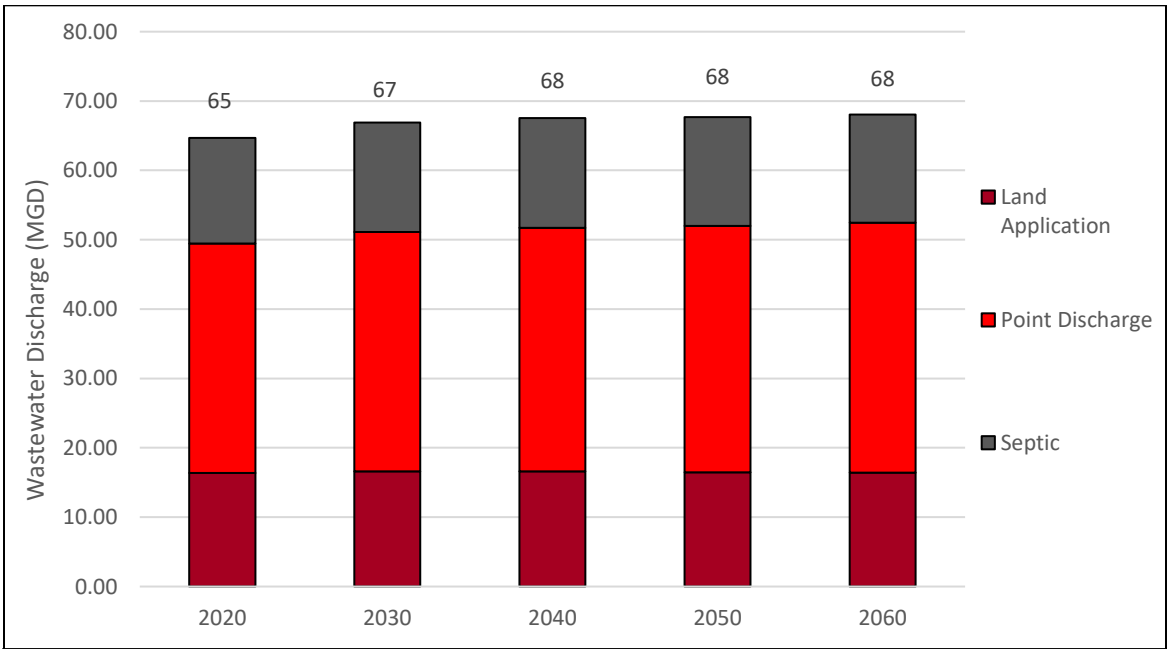
Total water demand forecasts for the years 2020-2060 for the Suwannee-Satilla Region are summarized in Figure 4-5. This figure presents the forecasts for municipal, industrial, and agricultural uses. Overall, the region is expected to grow by 23% (74 MGD) in water demand from 2020 through 2060.

Total wastewater flow forecasts from 2020 through 2060 for the Suwannee-Satilla Region are summarized in Figure 4-6. This figure presents the forecasts for municipal and industrial flows by the anticipated disposal system type: point discharge, LAS, or discharge into a septic system. Overall, the region is expected to grow by 5% (3.4 MGD) in wastewater flows from 2020 through 2060.



Source: Suwannee-Satilla Water and Wastewater Forecasting Technical Memorandum (2022)
Note: Values represent forecasted annual average demand (AAD) in million gallons per day (MGD)
*Values shown in graph reflect current updated values

Figure 4-5 Water Demand per Sector (in AAD-MGD)



Source: Suwannee-Satilla Water and Wastewater Forecasting Technical Memorandum (2022)
Note: Values represent forecasted annual average demand (AAD) in million gallons per day (MGD)
*Values shown in graph reflect current updated values

Figure 4-6 Total Wastewater Flow (in AAD-MGD)

SECTION 5

Comparison of Available Resource Capacity and Future Needs

Section 5 Comparison of Available Resource Capacity and Future Needs

Summary

Forecasted surface water demands within the region are projected, at times, to exceed the available resources at several locations in the Region (Atkinson, Bacon, Ben Hill, Berrien, Charlton, Cook. Coffee, Lanier, Lowndes, Pierce, Tift, and Ware counties).

Regionally, there is sufficient groundwater to meet forecasted needs over the next 40 years.

Water quality conditions indicate the potential need for improved wastewater treatment within the Suwannee, Satilla, and St. Marys River basins.

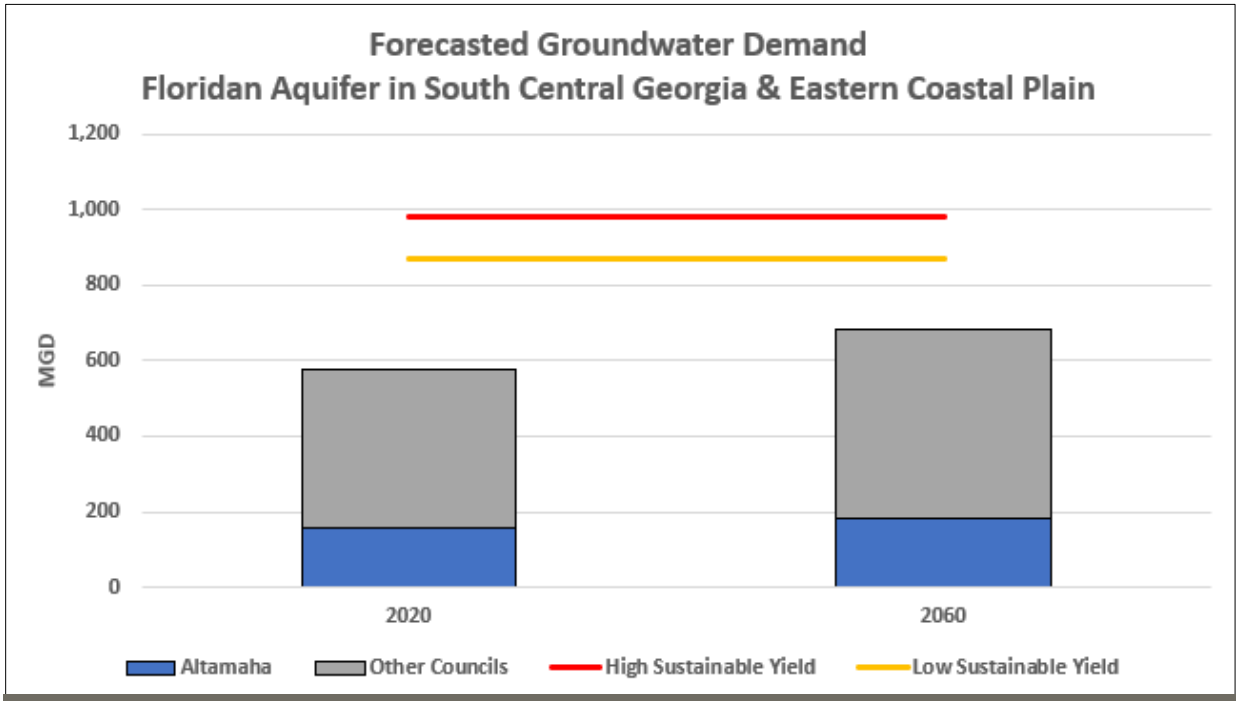
Addressing non-point sources of pollution and existing water quality impairments will be a part of addressing the region's future needs.

This Section compares the water and wastewater demand forecasts (Section 4), along with the Resource Assessments (Section 3), providing the basis for selecting water management practices (Sections 6 and 7). Areas where projected future demands exceed the estimated capacity of the resource will be addressed through water management practices. This Section summarizes the potential challenges and water supply needs for the Suwannee-Satilla Region.

5.1 Groundwater Availability Comparisons

Groundwater from the Floridan aquifer is a vital resource for the Suwannee-Satilla Region. Overall, the results from the Groundwater Availability Resource Assessment (EPD, March 2010) indicate that the estimated range of sustainable yield for the modeled portions of the regional aquifer(s) is greater than the updated forecasted demands (see Figure 5-1).

At this time, no regional groundwater resource challenges are expected to occur in the Suwannee-Satilla Region over the planning horizon. However, depending on the pattern of groundwater development, local groundwater availability may not be able to meet all needs. In addition, Brantley County may need additional permitted capacity if future demand for groundwater exceeds permitted groundwater withdrawal limits. The comparison of existing municipal groundwater permitted capacity to forecasted future demand in the Suwannee-Satilla Region is shown in Table 5-1. Please note that sufficient capacity at the county level does not preclude localized municipal permit capacity shortages. Local water providers in counties with large demand forecasts should review their permitting needs.



Sources: Groundwater Availability Assessment, January 2011, EPD. Technical Memorandum: Suwannee- Satilla Water and Wastewater Forecasting, 2022.

Figure 5-1 Floridan Aquifer Demand vs. Estimated Yield

Table 5-1 2060 Municipal Forecast versus Groundwater Permitted Capacity

County	2020 Public Demand Forecast (AAD – MGD)	2060 Public Demand Forecast (AAD – MGD)	Existing Groundwater Permitted Capacity (AAD-MGD)	Additional Permitted Capacity Needed in 2060 (MGD)[1]
Atkinson	0.48	0.44	0.90	
Bacon	0.70	0.60	1.50	
Ben Hill	2.02	1.62	5.50	
Berrien	0.98	0.95	1.93	
Brantley	0.28	0.23	0.20	0.03
Brooks	1.25	0.94	1.55	
Charlton	0.82	0.62	1.40	
Clinch	0.52	0.56	0.75	
Coffee	5.13	5.68	7.40	
Cook	1.54	1.24	4.00	
Echols	-	-	-	
Irwin	0.54	0.56	0.70	
Lanier	0.41	0.38	0.70	
Lowndes	15.79	17.79	19.04	

County	2020 Public Demand Forecast (AAD – MGD)	2060 Public Demand Forecast (AAD – MGD)	Existing Groundwater Permitted Capacity (AAD-MGD)	Additional Permitted Capacity Needed in 2060 (MGD)[1]
Pierce	0.59	0.57	0.83	
Tift	4.91	4.94	9.18	-
Turner	1.12	0.90	1.90	-
Ware	3.41	3.35	7.40	-

Note:
[1] Analysis does not account for demands in one County that may be met by permits from another County.

5.2 Surface Water Availability Comparisons

Surface water is an important resource used to meet current and future needs of the Suwannee-Satilla Region, especially in the agricultural sector. There are many surface water model nodes located in and around the Suwannee-Satilla Region. The modeling tools currently used to assess surface water availability were described in Section 3. From the updated Surface Water Availability Resource Assessment (EPD, 2023b), the basic conclusions of the current and future conditions modeling show that some potential surface water challenges (i.e., times when there may be insufficient water to meet off-stream demands and also meet the targets for support of instream uses) do exist in the region.

The locations of the model nodes within the Planning Region are shown in Figure 5-2. A summary of the modeled potential surface water challenges in 2060 is provided in Table 5-2. In order to better assess these potential challenges and to better understand the types of management practices that may be required, the anticipated duration (in days) when these challenges may occur is provided as well as the potential shortage (reported as million gallons (MG). It should be noted that due to the utilization of BEAM in resource assessment modeling, some of the previous approaches in expressing potential issues at the planning nodes have become obsolete. The resource issues identified previously are now replaced by these new resource assessment results (higher level of site-specific detail). For example, the exhaustion of storage within a reach or the breaching of instream minimum flow requirements as a way of showing a “potential resource challenge” at the planning node representing that reach was previously used. With the new modeling platform, there are now specific facilities for that assessment in lieu of the previously used planning nodes that summarized results without site specific detail. For example, where there is the exhaustion of a water supply storage, there is likely also a shortage in meeting water demand at the facility, which is now referred to as a water resource challenge.

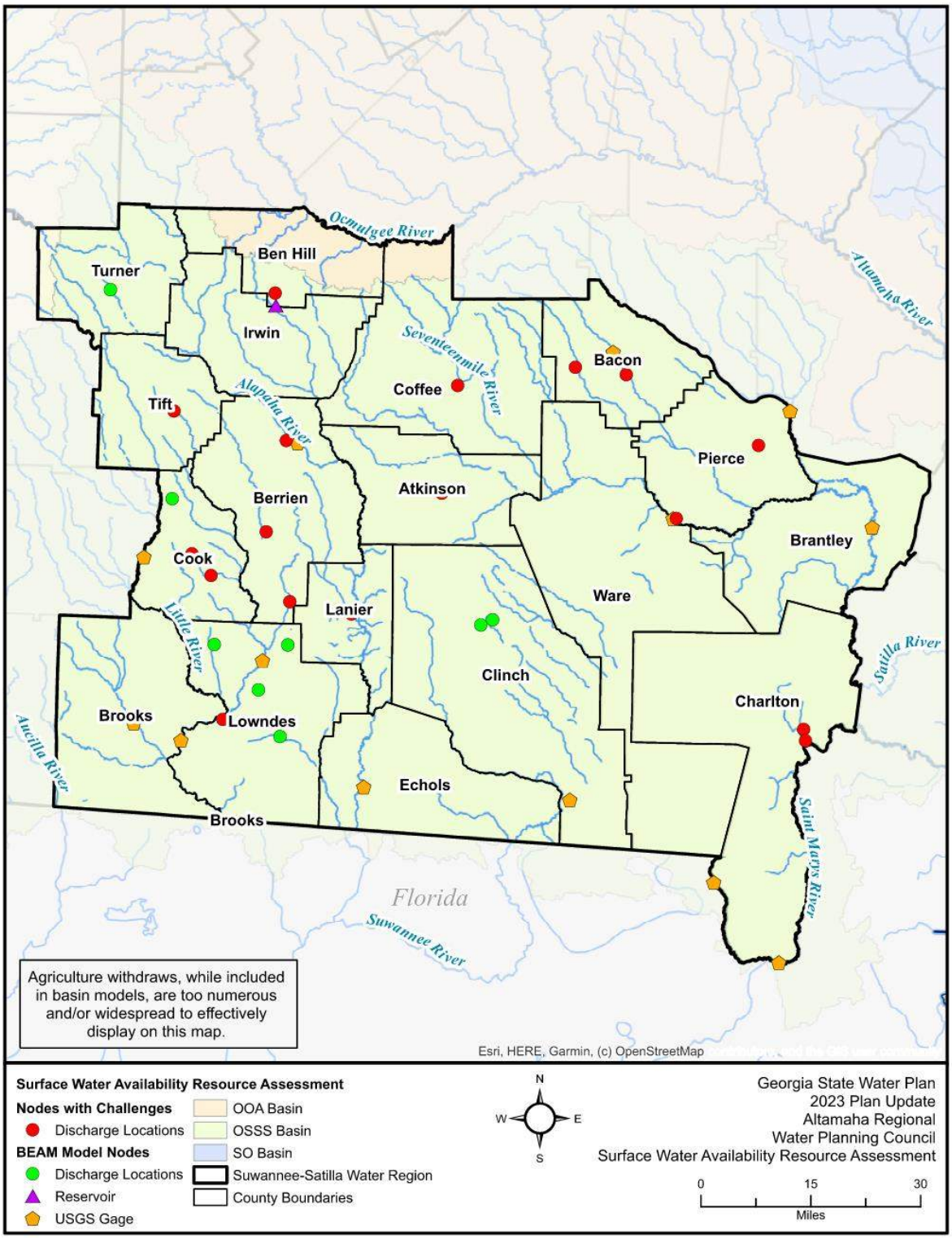


Figure 5-2 2060 Potential Surface Water Challenge Summary

Table 5-2 Summary of Modeled 2060 Potential Surface Water Challenges

BEAM Model Node	Duration of Challenge (% of total days)	Total Volume Shortage	Corresponding 7Q10 Flow	Change in Duration of Challenge from Current Condition
2188 (Town of Alapaha (Alapaha WPCP))	5,227(17.9%)	4,543 MG	1.4 cfs (0.90 MGD)	729 (2.5%)
2198 (City of Fitzgerald (C.A. Newcomer))	828 (2.8%)	172 MG	0.25 cfs (0.16 MGD)	520 (1.7%)
2248 (City of Lakeland (Lakeland WPCP))	175 (0.6%)	84.2 MG	2.0 cfs (1.29 MGD)	26 (0.1%)
2568 (City of Nashville (Nashville WPCP))	6,036 (20.7%)	3,558 MG	0.01 cfs (0.006 MGD)	4,577 (15.7%)
2578 (City of Tifton (New River WPCP))	2,803 (9.6%)	490 MG	0.06 cfs (0.04 MGD)	-1,749 (-6.0%)
2598 (City of Sparks (Sparks WPCP))	726 (2.5%)	14.6 MG	0.02 cfs (0.01 MGD)	-6,992 (-23.9%)
2608 (City of Adel (Adel WPCP))	0 (0.0%)	0.00 MG	0.15 cfs (0.10 MGD)	-3,949 (-13.5%)
2628 (Ray City (Ray City WPCP))	2288 (7.8%)	410 MG	0.26 cfs (0.17 MGD)	152 (0.5%)
2868 (City of Valdosta (Withlacoochee WPCP))	804 (2.8%)	1,076 MG	4.3 cfs (2.78 MGD)	756 (2.6%)
3158 (City of Alma (Alma WPCP))	3,363 (11.5%)	1763 MG	1.77 cfs (1.14 MGD)	-87 (-0.3%)
3188 (Milliken & Company (Alma Plant))	718 (2.5%)	222 MG	0.55 cfs (0.36 MGD)	246 (0.9%)
3258 (City of Douglas (Southeast WPCP))	3,760 (12.9%)	11,033 MG	0.04 cfs (0.03 MGD)	286 (1.0%)
3298 (City of Pearson (Pearson WPCP))	116 (0.4%)	7.8 MG	0.29 cfs (0.19 MGD)	-15 (-0.1%)
3418 (City of Waycross (Waycross WPCP))	4,170 (14.3%)	34,233 MG	14.2 cfs (9.18 MGD)	746 (2.6%)
3528 (City of Patterson (Patterson WPCP))	177 (0.6%)	13.6 MG	0.21 cfs (0.14 MGD)	1 (0.0%)
4238 (City of Folkston (Folkston WPCP (Pond))	217 (0.7%)	12.3 MG	0.15 cfs (0.10 MGD)	0 (0.0%)
4248 (City of Folkston (Folkston WPCP Wetlands))	186 (0.6%)	136 MG	1.83 cfs (1.18 MGD)	18 (0.0%)

Source: Surface Water Availability Resource Assessment, 2023b, EPD.
Note: Surface Water Availability modeling simulation period is from 1939 to 2018.

While there are currently no municipal, industrial or energy withdrawal facilities in the region as discussed in Section 3, there are still agricultural surface water withdrawals that occur throughout the region. Therefore, the projected increased use of surface water for the counties within the Suwannee-Satilla Region is shown in Table 5-3.

Table 5-3 2060 Increased Annual Average Surface Water Demand by County

County	Withdrawal Type	Increase in Surface Water Demand by 2060[1] (MGD)	Increase in Surface Water Demand by 2060[1] (cfs)
Atkinson	Agriculture	0.42	0.65
Bacon	Agriculture	0.36	0.56
Ben Hill	Agriculture	0.78	1.21
Berrien	Agriculture	1.89	2.92
Brantley	Agriculture	0.05	0.07
	Industrial	0.00	0.00
Brooks	Agriculture	0.27	0.42
Charlton	Agriculture	--	--
	Industrial	0.00	0.00
Clinch	Agriculture	0.05	0.08
Coffee	Agriculture	1.81	2.80
Cook	Agriculture	1.06	1.64
Echols	Agriculture	0.06	0.09
Irwin	Agriculture	3.15	4.87
Lanier	Agriculture	0.17	0.26
Lowndes	Agriculture	0.71	1.11
Pierce	Agriculture	0.40	0.61
Tift	Agriculture	2.11	3.27
Turner	Agriculture	2.22	3.43
Ware	Agriculture	0.47	0.73

Note:

[1] All surface water demands within the planning region are agricultural except for the industrial demand noted in Brantley and Charlton Counties which did not forecast any increases in industrial water use.

5.3 Surface Water Quality Comparisons (Assimilative Capacity)

This Section summarizes the results of the Water Quality (Assimilative Capacity) Resource Assessment modeling when all municipal and industrial wastewater treatment facilities operate at permit conditions, and provides a comparison of existing wastewater permitted capacity to the projected 2060 wastewater forecast flows. A discussion on non-point source pollution is also included.

5.3.1 Future Treatment Capacity Needs

Existing municipal and industrial wastewater permitted capacities were compared to projected 2060 wastewater flows to estimate future treatment capacity needs by county. This analysis was done for both point sources and LAS that are permitted under the National Pollutant Discharge Elimination System (NPDES) or state LAS permits. As shown in Table 5-4, Brooks, Echols, and Lowndes counties may exceed their current permitted capacity by 2060. It should be noted that the comparison in Table 5-4 was completed at the county level and localized shortages in treatment capacity may exist.

Table 5-4 2060 Wastewater Forecast versus Existing Permitted Capacity (MGD)

County	Point Source (PS)			Land Application Systems (LAS)		
	2060 Forecast[1]	Permitted Capacity	2060 Surplus or Challenge (-)	2060 Forecast[1]	Permitted Capacity	2060 Surplus or Challenge (-)
Atkinson	0.31	0.90	0.59	0.09	0.34	0.24
Bacon	0.44	0.75	0.31	0.32	0.75	0.43
Ben Hill	1.94	6.00	4.06	0.21	0.30	0.09
Berrien	0.90	1.20	0.30	0	0	0
Brantley	0	0	0	0.02	0.12	0.10
Brooks	0	0	0	1.38	1.32	**(0.06)**
Charlton	0.46	0.78	0.32	0	0	0
Clinch	0.64	0.75	0.11	0	0	0
Coffee	3.76	6.00	2.24	0.52	0.66	0.14
Cook	1.01	3.19	2.18	0	0	0
Echols	0	0	0	0.40	0	**(0.40)**
Irwin	0	0	0	0.70	0.85	0.15
Lanier	0.15	0.50	0.35	0	0	0
Lowndes	19.76	16.38	**(3.38)**	2.33	2.05	**(0.28)**
Pierce	0.09	0.21	0.12	0.31	0.50	0.19
Tift	4.66	8.11	3.45	0.09	0.13	0.04
Turner	0.52	1.16	0.64	0.06	0.08	0.03
Ware	1.43	6.70	5.27	0	0	0
Total	**36.06**	**52.63**	**16.57**	**6.42**	**7.10**	**0.68**

Note:
[1] Includes industrial wastewater expected to be treated at municipal facilities.

5.3.2 Assimilative Capacity Assessments

The Water Quality (Assimilative Capacity) Resource Assessment drew upon water quality modeling tools to estimate the ability of streams and estuaries to assimilate pollutants under current and future conditions. Modeling focused on instream dissolved oxygen (DO) and incorporated all municipal and industrial wastewater facilities operating at their full permitted discharge levels (flow and effluent discharge limits as of 2019). The results of the DO modeling at current permitted conditions are presented in Figure 5-3 and Table 5-5 for the Suwannee-Satilla Region, which includes portions of the Ochlockonee, Ocmulgee, Satilla, St. Marys, and Suwannee River basins. The results show the modeled effects of oxygen-demanding compounds in wastewater and other factors on instream DO levels. A stream segment with “none or exceeded” available assimilative capacity (denoted as red lines in Figure 5-3) have estimated instream DO levels that are at or below the DO water quality criteria and therefore indicate conditions of no available assimilative capacity or exceeded assimilative capacity. It is important to note that an exceedance of DO assimilative capacity on a stream segment could be the result of a point source discharge, non-point source loading, or a naturally low instream DO condition. Reaches within the Suwannee-Satilla Planning Council that have exceeded their full assimilative capacity under the current conditions assessment include:

- Alapaha River, Woodyard Creek, Tatum Creek, Little River, Ty Ty Creek, Cane Creek, Flat Creek, and a small portion of Cherry Creek in the Suwannee Basin;
- Seventeen Mile River, Little Hurricane Creek, Hurricane Creek, Alabaha River, Little Buffalo Creek, Cross Swamp, Zero Bay, Satilla River, and Little Satilla River in the Satilla Basin;
- Spanish Creek and the main stem of the Saint Marys River in the St. Marys Basin; and
- Aucilla River in the Ochlockonee Basin

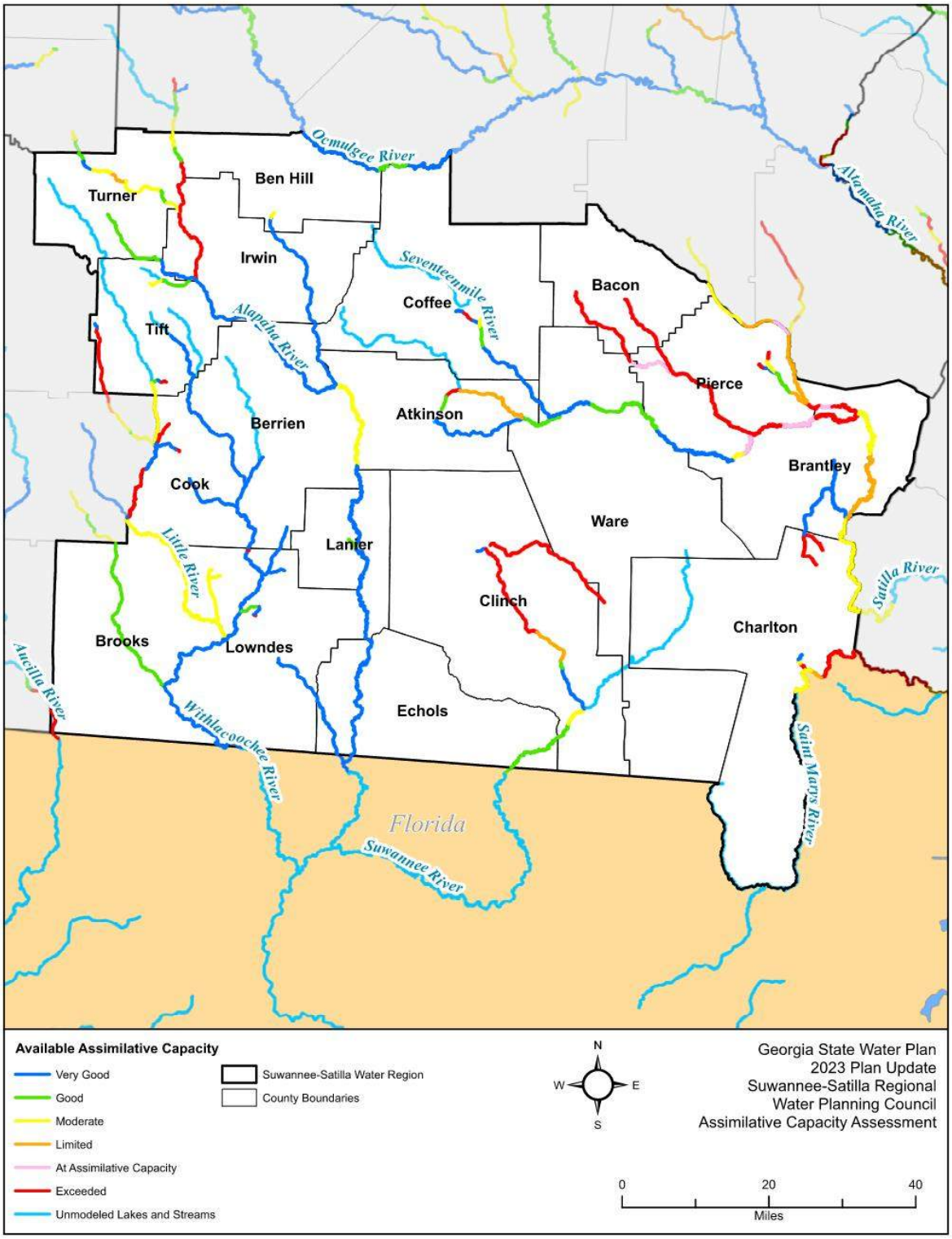


Figure 5-3 Results of Assimilative Capacity Assessment – DO at Permitted Conditions

Table 5-5 Assimilative Capacity for DO under Current Permit Conditions in Suwannee-Satilla Planning Council

Basin	Available Assimilative Capacity (Total Mileage)						Total River Miles Modeled in the Council Area
	Very Good (≥1.0 mg/L)	Good (0.5 to <1.0 mg/L)	Moderate (0.2 to <0.5 mg/L)	Limited (>0.0 to <0.2 mg/L)	None or Exceeded (<0.0 mg/L)	At Assimilative Capacity (0.0 mg/L)	
Ochlockonee	0	0	0	0	3	0	3
Ocmulgee	29	7	0	0	0	0	36
Satilla	81	35	51	54	92	29	340
St Marys	1	0	8	2	11	0	22
Suwannee	308	71	103	9	84	0	575

Source: GIS Files from the Dissolved Oxygen Assimilative Capacity Resource Assessment Report; EPD, 2023.
Notes: Suwannee Basin includes many local creeks and rivers such as the, Willacoochee River, Alapaha River, New River, Withlacoochee River, Alapahoochee River, Woodyard Creek, Cane Creek and many other smaller tributaries. The Ocmulgee River makes up the northeastern boarder of Ben Hill County and the northern board of Coffee County. The Aucilla River is a tributary to the Ochlockonee but only 3 river miles are actually in the Suwannee – Satilla region near the southwest corner of Brooks County near Thomas County and the Florida State line. Approximately 34 of those river miles originate in Thomas County and then flow into Brooks County. Since the 2017 update, additional stream segments were modeled for the Satilla and Suwannee Basins such as Middle Creek and additional segments of the Satilla River.

Based on the results shown in Figure 5-3, EPD also conducted modeling under future conditions. In order to address areas of limited or no assimilative capacity for DO, EPD incorporated some assumptions regarding future (2060) permitted flows and modifications to permit effluent limits. Since EPD cannot issue permits that will violate water quality standards, EPD will continue to evaluate and modify future permit requests and adjust permit limits to avoid potential DO violations. Figure 5-4 shows the assimilative capacity at assumed future (2060) permitted flows and effluent limits.

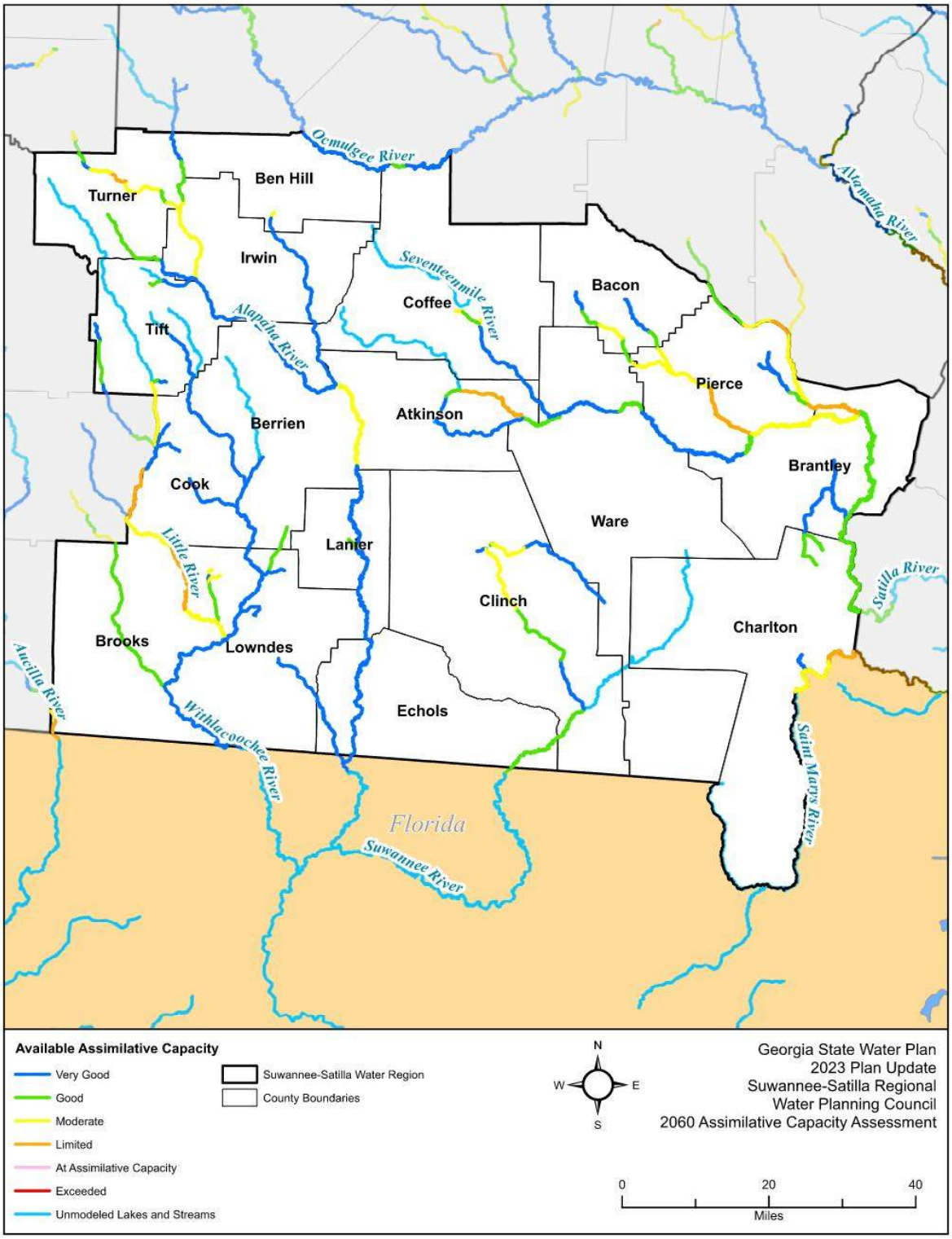


Figure 5-4 Results of Assimilative Capacity Assessment – DO at Assumed Future (2060) Permitted Conditions

5.3.3 Non-Point Source Pollution

Non-point source pollution accounts for the majority of surface water impairments in the region according to the 2022 303(d) list of Rivers, Streams, Lakes, and Reservoirs published by EPD (see Section 3 discussion). Non-point source pollution can occur as a result of human activities, including urban development, agriculture, and silviculture, and as a result of non-human influences such as wildlife and naturally-occurring nutrients. An important component of any non-point source management program is identifying those pollutant sources that are resulting from human activities.

An analysis of nutrients (total nitrogen and total phosphorus) that may occur due to point sources and nonpoint sources in watersheds was conducted. The goal was to identify nutrient loading rates from different portions of the watersheds under various hydrologic conditions and evaluate them in relation to corresponding land uses and potential non-point source contributions. Results of watershed nutrient modeling identify portions of the watershed where there are higher concentrations of nutrients (total nitrogen and total phosphorus) in stormwater runoff than other parts of the watershed.

There are currently no nutrient standards in place for the Suwannee-Satilla Region, so there is no absolute threshold against which these nutrient loadings are compared. Rather, the nutrient model results are beneficial for relative comparisons to target areas where implementation of non-point source control management practices will have the greatest benefit. More detail regarding the nutrient model results is available in The Synopsis Report - Water Quality (Assimilative Capacity) Resource Assessment (EPD, 2017). Nutrient and non-point source control management practices specific to land uses within the Suwannee-Satilla Region are discussed in Section 6.

5.4 Summary of Potential Water Resource Issues

This section summarizes the potential water resource issues in the Suwannee-Satilla Region. These potential water resource issues are the basis for the recommended management practices in Section 6. Table 5-6 summarizes the potential water resource issues and permitted capacity needs in the Suwannee-Satilla Region by County.

- Over the planning horizon, forecasted surface water demands within the region are projected to result in potential challenges in several Counties throughout the Region including Atkinson, Bacon, Ben Hill, Berrien, Charlton, Cook, Coffee, Lanier, Lowndes, Pierce, Tift, Ware.

- Regionally, there is sufficient groundwater to meet forecasted needs over the planning horizon.

- Water quality conditions indicate the potential need for improved wastewater treatment within the Suwannee, Satilla, and St. Marys River basins.

Addressing non-point sources of pollution and existing water quality impairments will be a part of addressing the region's future needs.

Table 5-6 Summary of Potential Water Resource Issues by County

County	Municipal Water Permitted Capacity Need	Counties with Modeled Surface Water Challenges	Municipal Wastewater Permitted Capacity Need	Water Quality – DO Assimilative Capacity Issues
Source	*Table 5-1*	*Figure 5-2*	*Table 5-4*	*Figure 5-3*
Atkinson	-	Yes	-	Yes
Bacon	-	Yes	-	Yes
Ben Hill	-	Yes	-	Yes
Berrien	-	Yes	-	-
Brantley	Yes	No	-	Yes
Brooks	-	No	Yes	Yes
Charlton	-	Yes	-	Yes
Clinch	-	No	-	Yes
Coffee	-	Yes	-	Yes
Cook	-	Yes	-	Yes
Echols	-	No	Yes	-
Irwin	-	No	-	Yes
Lanier	-	Yes	-	-
Lowndes	-	Yes	Yes	Yes
Pierce	-	Yes	-	Yes
Tift	-	Yes	-	Yes
Turner	-	No	-	Yes
Ware	-	Yes	-	Yes

Notes: "Yes" indicates a predicted challenge in the indicated county.
Permitted capacity need is based on the comparison of permitted municipal capacity versus 2060 forecasted demand.

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SECTION 6

Addressing Water Needs and Regional Goals

Section 6 Addressing Water Needs and Regional Goals

Summary

The Suwannee-Satilla Council selected management practices to help address surface water low flow conditions within the region, including partnering and collaborating with neighboring regions such as Altamaha and the Coastal Georgia region.

Water quality management practices focus on addressing dissolved oxygen conditions at select locations and best management practices to address non-point sources of pollution and help reduce nutrient sources.

Additional water and wastewater permit capacity, data collection, and new/upgraded infrastructure will be needed to address existing and/or future uses.

This Section presents the Suwannee-Satilla Council's water management practices selected to address resource shortfalls or challenges identified and described in Section 5, and/or meet the Council's Vision and Goals described in Section 1.

6.1 Identifying Water Management Practices

The comparison of Resource Assessments and forecasted needs presented in Section 5 identifies the Region's likely resource shortfalls or challenges and demonstrates the need for region and resource specific water management practices. In the cases where shortfalls or challenges appear to be unlikely based on the comparison of the Region's Resource Assessments and forecasted needs, the management practices described in this section have been selected to also meet those needs specified by the Council (e.g., facility/infrastructure needs and practices, programmatic practices, etc.) that are aligned with the Region's Vision and Goals. In selecting the actions needed (i.e., water management practices), the Council considered practices identified in existing plans, the Region's Vision and Goals, and coordinated with local governments and water providers as well as neighboring Councils who share these water resources.

6.1.1 Review of Existing Plans and Practices

The Council conducted a comprehensive review of existing local and regional water management plans and relevant related documents to frame the selection of management practices. The types of plans/studies that were reviewed to support identification and selection of management practices for the Suwannee-Satilla Region consisted of the following:

- Comprehensive Work Plans (local and regional scale)
- Regional infrastructure and permitting plans
- EPD databases (permitted withdrawals, planned projects, and proposed reservoirs)
- State-wide guidance documents (conservation, cost, and water planning)
- Best Management Practices (forestry, agriculture, and stormwater management)

- Water quality studies including Watershed Protection Plans (basin, watershed, and local scale)
- TMDL evaluations

When possible, successful management practices already planned for and/or in use in the Suwannee-Satilla Region formed the basis for the water management practices selected by the Council.

6.2 Selected Water Management Practices for the Suwannee-Satilla Region

Table 6-1 summarizes the Suwannee-Satilla Council's selected management practices by source of supply for the relevant demand sector(s), including surface water supply for agricultural irrigation, permitted municipal and industrial water and wastewater capacity, water quality assimilative capacity (dissolved oxygen) challenges, current water quality impairments, and nutrient considerations for the Satilla River watershed. Information on shared resources is provided to identify where management practices in other regional Councils are also needed to address identified challenges. The table summarizes general information regarding management practices needed to meet forecasted needs, and more detailed information on management practices needed to address challenges between available resources and forecasted needs. The Suwannee-Satilla Council reviewed a number of existing local and regional water management plans and related documents during the development and selection of management practices. A detailed list of plans and documents that were considered can be found in the Suwannee-Satilla Plans Reviewed in Selecting Water Management Practices Technical Memorandum (CDM Smith, 2011).

Similar to when the original water plan was completed in 2011, the most significant challenges in the Suwannee-Satilla Region are potential surface water availability challenges driven by agricultural irrigation usage. As such, the majority of water supply management practices in Table 6-1 are intended to address agricultural surface water use. The Suwannee-Satilla Council considered a number of practices to address these potential surface water availability challenges, ranging from agricultural conservation to one or more regional reservoirs. While reservoirs would provide multiple potential benefits, the flat topography of the region makes siting of regional reservoirs difficult, expensive, and may have associated impacts. The Council concluded that integrating practices, rather than using a single practice, would be more effective at addressing challenges and more economically feasible. Figure 6-1 illustrates the Suwannee-Satilla Council's recommended suite of surface water availability management practices in a phased approach. Those practices that are less costly and more readily implemented are prioritized for short-term implementation. If resource needs are not met and/or challenges are not addressed, then more costly and complex management practices will be pursued.

Table 6-1 Management Practices Selected for the Suwannee-Satilla Region

Management Practice Number	Issue(s) to be Addressed by Action(s)	Description/Definition of Action	Relationship of Action or Issue to Vision and Goals (Section 1.4)
Action Needed - Address Current and Future Surface Water Use in Challenge Areas Data Collection/Additional Research (DCAR) to confirm frequency, duration, severity, and drivers of surface water challenges and identify significant causes (climate, timing, water use, land cover, etc.) of 7Q10* low flow conditions and advance research/feasibility of potential solutions *Note: 7Q10 refers to the 1 in 10 year 7 day monthly low flow condition			
DCAR-1[1] Collect Agricultural Consumption Data; Refine Resource Assessment	Improve understanding and quantification of agricultural water use and the projected surface water challenges on the Satilla River, the Alapaha River and the Withlacoochee River (hereafter referred to as "surface water challenges")	Acquire additional data/information on agricultural consumptive use to confirm or refine if agricultural consumption is less than 100% consumptive Conduct "modeling scenario analysis to bracket a reasonable range of consumption" with Resource Assessment models with "new" information on consumptive use to assess effect on surface water the potential for challenges	1,4,5,13
DCAR-2[1] Improve Forecast and Resource Data; Analyze Storage Impacts on Challenges		Refine and improve surface water Resource Assessment and agricultural forecasts to address spatial and temporal hydrologic variations (i.e., including but not limited to evapotranspiration, infiltration, runoff, and groundwater/surface water interconnections) in relationship to forecasts, climate conditions, and other non-water use variables. This includes developing a better understanding of agricultural and residential water storage systems (ponds) and their effect on low flow conditions.	1,4,5,13
DCAR-3[1] Improve Data Quality and Analysis Capabilities	Obtain additional data and improved understanding of actual versus forecasted water use	Continue to fund, improve, and incorporate metering data regarding agricultural water use; Collect and use this information in Water Plan updates, including expanding the number of GSWCC continuously monitored real-time meter sites in surface water challenge areas	5,6,13

Management Practice Number	Issue(s) to be Addressed by Action(s)	Description/Definition of Action	Relationship of Action or Issue to Vision and Goals (Section 1.4)
DCAR-4[1] Irrigation Efficiency Education and Research	Improvement of surface water flows via reduced surface water use while maintaining/improving crop yields	Collaborate/support research (In-State University, State, and Corporate) on improved irrigation efficiency measures and development of lower water use crops and lower water use plant strains for existing and future crop types	5,6,13
DCAR-5[1] Understand Optimum Application Methods		Improve education and research on when and how much water is needed to maximize crop yield with efficient irrigation	5,6,13
DCAR-6 Minimize Groundwater Impacts to Surface Water	Improvement of surface water flows in areas where groundwater and surface water are hydraulically connected and groundwater use impacts surface water flows	Promote management practices and educate water users to minimize impacts to surface water associated with excessive pumping/use of shallow/surficial aquifers that may impact surface water flows	1,5,6,13
DCAR-7 Analyze Addressing Extreme Conditions	Evaluate the cost versus benefit of closing the largest, most infrequent surface water challenges	Conduct analysis of the socioeconomic benefits and cost in comparison to ecological benefits of addressing surface water challenges. Council discussion, and additional detail provided by EPD during the 2022 updates to the resource assessments, indicated the need to focus this Management Practice on the more frequent, smaller magnitude challenges, rather than the larger, longer duration challenges that would likely be managed through drought management measures.	1,5,11
DCAR-8 Study Potential Use of Aquifers to Address Challenges	Improvement of surface water flows (in challenge areas)	Conduct research to determine the feasibility and potential benefits and limitations of aquifer storage and recovery for confined aquifers; and determine the feasibility and potential benefits to recharge surficial aquifers to increase stream baseflow to address challenges	4,5,6,7

Management Practice Number	Issue(s) to be Addressed by Action(s)	Description/Definition of Action	Relationship of Action or Issue to Vision and Goals (Section 1.4)
DCAR-9 Restoration Impact on Low Flow Conditions Analysis	Examine potential role of wetlands restoration and water retention structures in addressing surface water low flow conditions. Evaluate implementation considerations for each option.	Develop plan of study and research opportunities and limitations associated with improving river flow conditions via creation/restoration of wetlands and potential water retention structures including streams. If feasible, identify potential location(s) and estimate improvements to stream flow conditions. Identify incentives to make this a viable water supply option and develop a cost-benefit analysis of these incentives.	4,8
Action Needed - Water Conservation (WC) - Address current and future challenges and meet water needs by efficient water use. The Suwannee-Satilla Council supports the 25 water conservation goals contained in the March 2010 Water Conservation Implementation Plan (WCIP). Note: Water Conservation Tiers can be found here: http://www.georgiawaterplanning.org/documents/DetailedGuidanceforEvaluatingPracticestoManageDemand-WebDocument_000.pdf			
WC-1 Tier 3 and Tier 4 Measures for Municipal and Industrial Users	Help meet current and forecasted municipal and industrial surface water and groundwater supply needs throughout the region	Encourage Municipal and Industrial water users to continue implementation and adherence to Tier 3 and Tier 4 practices Water Stewardship Act of 2010 and 2015 rules for public water systems to improve water supply efficiency through water loss audit and water loss control programs (391-3-33) by local governments/utilities.	6
WC-2 Tier 1 and Tier 2 Measures for Agricultural Users	Help meet current and forecasted agricultural surface water and groundwater supply needs throughout the region	Encourage implementation of Tier 1 and Tier 2 conservation measures and adherence to WCIP by agricultural and surface water groundwater users	6
WC-3 Audits	▪ Help meet current and forecasted agricultural ground and surface water supply needs ▪ Help address surface water challenges on the Satilla River, the Alapaha River and the Withlacoochee River	Conduct irrigation audits	6,13
WC-4 Metering		Meter irrigation systems	
WC-5 Inspections		Inspect pipes and plumbing to control water loss	

Management Practice Number	Issue(s) to be Addressed by Action(s)	Description/Definition of Action	Relationship of Action or Issue to Vision and Goals (Section 1.4)
WC-6 Minimize High-Pressure Systems	▪ Help meet current and forecasted agricultural ground and surface water supply needs ▪ Help address surface water challenges on the Satilla River at Atkinson, the Alapaha River at Statenville and Jennings, and the Withlacoochee River at Pinetta	Minimize or eliminate the use of high-pressure spray guns on fixed and traveler systems where feasible	6,13
WC-7 Efficient Planting Methods		Utilize cropping and crop rotation methods that promote efficiency	
WC-8 Conservation Tillage	See issues addressed by WC-3 through WC-7	Practice conservation tillage	6,13
WC-9 Control Loss		Control water loss	
WC-10 End-Gun Shutoffs		Install and use end-gun shutoff with pivots	
WC-11 Low Pressure Systems		Install low pressure irrigation systems where feasible (soil specific)	
WC-12 Application Efficiency Technologies		Encourage and improve use of soil moisture sensors, evapotranspiration sensors, fertigation, precision agriculture and/or crop water use model(s) to time cycles	
Additional/Alternate to Existing Surface Water Supply Sources (ASWS)[1]			
ASWS-1 Consider Low Flow Conditions in Future Surface Water Permitting	Help ensure that future surface water use does not contribute to frequency and severity of low flow conditions	Future surface water uses - If surface water (ponds and withdrawals) is sought for future water supply (new permits), Applicant, GSWCC, and EPD should work collaboratively to demonstrate that future surface water uses will not contribute to frequency or magnitude of challenges	1,4,5

Management Practice Number	Issue(s) to be Addressed by Action(s)	Description/Definition of Action	Relationship of Action or Issue to Vision and Goals (Section 1.4)
ASWS-2 Incentives for Dry-Year Releases from Ponds	Help improve surface water flow on the Satilla River, the Alapaha River and the Withlacoochee River during low flow conditions	Future surface water uses - Utilizing incentives and collaborative partnerships, examine opportunities to optimize farm and other pond operations to obtain releases in dry/challenge years	1,3,4,5
ASWS-3 Substitute Future Surface Water Use with Groundwater in Challenge Areas		Future surface water uses - Encourage additional groundwater development as a preferred source of supply for future demand in surface water challenge areas	1,2,5,11
ASWS-4 Substitute Existing Agricultural Surface Water Use with Groundwater in Dry Years		Existing surface water uses - Encourage replacement of a portion of existing agricultural surface water irrigation use with groundwater in times of shortage to 7Q10 dry periods; so long as use of the groundwater source does not impact surface water flow in other areas	1,4,5
ASWS-5 Opportunities and Incentives for Dry-Year Releases from Ponds		Existing surface water uses- Utilizing incentives and collaborative partnerships, identify opportunities that allow for use of agricultural pond storage to augment river flows in times of shortage to 7Q10 dry periods	1,3,4,5
ASWS-6 Consider Phased Seasonal Agricultural Permit Conditions		Existing surface water uses - Identify need for, and feasibility of, seasonal surface water permit conditions for existing agricultural uses to address times of shortage to 7Q10 dry periods; Phase implementation as follows: Phase 1 (Direct stream withdrawals); Phase 2 (Consider pond storage effects based on outcome of research from DCAR-2)	1,4,5
ASWS-7 Ecological Restoration Incentive Program	Help improve surface water flow on the Satilla River, the Alapaha River, and the Withlacoochee River during low flow conditions	Based on outcome of research (DCAR-9 above), consider incentive-based programs to restore wetlands and other areas if this practice can improve river flows during shortages to 7Q10 dry periods	1,4,5,8

Management Practice Number	Issue(s) to be Addressed by Action(s)	Description/Definition of Action	Relationship of Action or Issue to Vision and Goals (Section 1.4)
ASWS-8 Land Management Incentives		Evaluate incentive-based land use practices to help promote infiltration and aquifer recharge	1,4,5,7
ASWS-9 Incentives for Greater Wastewater Return Flows; Coordinated Management		Evaluate incentive-based programs to increase wastewater returns; modify land application system, septic systems, and manage stormwater to improve return flows while maintaining water quality Evaluate feasibility, and encourage use of, regional storm water management, and if feasible, implement coordinated stormwater management to attenuate high flows and help augment low flows and improve water quality for the Withlacoochee River	1,4,5,10
ASWS-10 Multi-Region Reservoir		Possible joint non-main stem reservoir to serve multiple regions/regional council boundaries with Upper Flint and/or Lower Flint-Ochlockonee Councils	1,4,5,9
ASWS-11 Inter-Basin Transfers		Regional inter-basin transfers (i.e., Ocmulgee to Alapaha and Altamaha to Little Satilla); Collaborating between regions to meet regional water needs and benefit both the areas from which the transferred water is withdrawn and the area receiving the water	1,4,5
Action Needed - Address Water Quality (Dissolved Oxygen Levels)			
Point Sources – Dissolved Oxygen (PSDO)			
PSDO-1 Collect Water Quality Data	Verification of Water Quality Resource Assessment Data and Assumptions to determine dissolved oxygen conditions (see Figure 5-3 for more information)	Data collection to confirm loading and/or receiving stream chemistry	1,4,5,13
PSDO-2 Point Source Discharge Relocation	Improve dissolved oxygen levels in receiving streams (see Figure 5-3 for more information)	Modification of wastewater discharge location	4,5

Management Practice Number	Issue(s) to be Addressed by Action(s)	Description/Definition of Action	Relationship of Action or Issue to Vision and Goals (Section 1.4)
PSDO-3 Improve Treatment Facilities		Upgrade or replacement of treatment facilities	4,5,8
Action Needed - Address Wastewater Permit Capacity Needs/Challenges			
Available Municipal Wastewater Permit Capacity (MWWPC)			
MWWPC-1 Increase Wastewater Permit Capacity	Additional municipal wastewater treatment capacity may be needed in Bacon and Pierce Counties	Obtain additional wastewater permit capacity to meet forecasted needs	5
Available Industrial Wastewater Permit Capacity (IWWPC)			
IWWPC-1[2] Collect Additional Industrial Permit Data	Collect additional data where needed on industrial flow volumes and permit conditions to verify permitted versus forecasted needs	Obtain additional permit data regarding flow volumes and permit conditions for industrial wastewater facilities forecasted needs	5
Action Needed - Address Water Withdrawal Permit Capacity Needs			
Municipal Groundwater Permit Capacity (MGWPC)			
MGWPC-1 Increase Municipal Groundwater Permit Capacity	In areas of need, acquire additional municipal groundwater permit capacity	Obtain groundwater permit capacity	1,4,5
Industrial Groundwater Permit Capacity (IGWPC)			
IGWPC-1 Increase Industrial Groundwater Permit Capacity	In areas of need, acquire additional industrial groundwater permit capacity	Obtain groundwater permit capacity	1,4,5
The following Suwannee-Satilla Council Management Practices are programmatic in nature and are therefore described in general terms.			
Action Needed - Address Current and Future Groundwater (GW) Needs			
GW-1 Sustainable Groundwater Development	Continue to sustainably drill wells, use, and develop water from the Floridan and other significant aquifers		1,4,5
GW-2 Promote Aquifer-Friendly Land Uses	Encourage land use practices that sustain and protect aquifer recharge areas (both inside and outside the region) for the aquifers that are present in the region		4,5,7

Management Practice Number	Issue(s) to be Addressed by Action(s)	Description/Definition of Action	Relationship of Action or Issue to Vision and Goals (Section 1.4)
GW-3 Research Groundwater Sustainability	Continue to refine sustainable yield metrics, monitor and improve understanding of historic, current, and future trends in groundwater levels; Continue to refine modeling and other tools		1,4,5,13
GW-4 Inter-State Resource Planning	Collaborate with Florida regarding shared resource issues and water planning		1,4,5,13
Management Practices to Address Current and Future Surface Water (SW) Needs			
SW-1 Surface Water Use Within Available Capacity	Continue to apply for permits and use surface water within the available surface water resource capacity		1,4,5
SW-2 Monitor and Evaluate Estuaries	Monitor St. Marys River flow conditions to help determine flow conditions that sustain estuary conditions		4,8,9,13
Management Practices to Address Water Quality Non-Point Source (NPS) Needs			
(Dissolved oxygen, E. Coli, nutrients, and other impairments)			
NPS-1 Study Human Impacts on Water Quality	Data collection/analysis to confirm if dissolved oxygen and/or E. Coli and/or Entero bacteria are present above action levels		4,8,13
NPS-2 Monitor and Address NPS Nutrient Loading	Support efforts to monitor and determine the sources of nutrient loading and other NPS impairments to rivers, lakes, and streams, and upon confirmation of source, develop specific management programs to address water quality needs		4,8,10,13
The following practices are selected by the Suwannee-Satilla Council to encourage implementation by the applicable local or state program(s).			
Urban Best Management Practices (NPSU)			
NPSU-1 Control Erosion	Use soil erosion and sediment control measures		4,8,10
NPSU-2 Manage Stormwater Runoff	Stormwater retention ponds, wetlands, and bioretention areas to manage runoff quality and flow rate and help support river flows (as found in City of Valdosta Watershed Protection Plan, 2009)		4,8,10
NPSU-3	Consider measures to reduce directly-connected impervious area and promote increased		4,8,10

Management Practice Number	Issue(s) to be Addressed by Action(s)	Description/Definition of Action	Relationship of Action or Issue to Vision and Goals (Section 1.4)
Increase Stormwater Infiltration	infiltration of stormwater to help reduce nutrient and other pollutant runoff (as found in City of Baxley Watershed Protection Plan, 2007)		
NPSU-4 Riparian Buffers	Protect and maintain riparian buffers along urban streams		4,8,10
NPSU-5 Street Sweeping	Implement street sweeping program (as found in City of Pearson Watershed Protection Plan, 2008)		4,8,10
Rural Best Management Practices (NPSR)			
NPSR-1 Advocate Implementing Road Runoff BMPs	Implement BMPs to control runoff from dirt roads by encouraging County implementation of the BMPs identified in Georgia Resource Conservation and Development Council, “Georgia Better Back Roads – Field Manual”		4,8,10
Forestry Best Management Practices (NPSF)			
NPSF-1 Support Forestry Commission Water Quality Program	Support Georgia Forestry Commission water quality program consisting of BMP development, education/outreach, implementation/compliance monitoring, and complaint resolution process		4,8,10,13
NPSF-2 Improve BMP Compliance	Improve BMP compliance through State-wide biennial BMP surveys and BMP assurance exams, Master Timber Harvester workshops, and continuing logger education		4,8,10,13
NPSF-3 Conservation Land Use Planning	Seek long-term conservation easements or purchase development rights by willing landowners and conservation groups		4,8,10
NPSF-4 Forest Restoration Incentives and Support	Where applicable, support United States Department of Agriculture incentive programs through the Farm Service Agency and NRCS to restore converted wetlands back to forested conditions		4,8
Agricultural Best Management Practices for Crop and Pasture Lands (NPSA) - Support and encourage implementation of GSWCC BMP and Education Programs			
NPSA-1 Soil Erosion Reduction Measures	Conservation tillage and cover crop		4,6,8,10

Management Practice Number	Issue(s) to be Addressed by Action(s)	Description/Definition of Action	Relationship of Action or Issue to Vision and Goals (Section 1.4)
NPSA-2 Utilize Buffers	Field buffers, riparian forested buffers, and strip cropping to control runoff and reduce erosion		4,6,8,10
NPSA-3 Livestock Management	Livestock exclusions from direct contact with streams and rivers and vegetation buffers		4,8,10
NPSA-4 Manure Control	Responsible manure storage and handling		4,8,10
NPSA-5 Wetland and Forest Restoration Incentives	Incentives to restore wetlands and historically drained hardwood and other areas		4,8
Existing Impairments and Total Maximum Daily Load Listed Streams (TMDL)			
TMDL-1 Evaluate Impairment Sources	Data collection and confirmation of sources to support modify stream standards to reflect "natural sources" and/or to reflect naturally low dissolved oxygen streams		4,13
TMDL-2 Analyze Impaired Segments and Sources	Data collection to refine river/stream reach length for impaired waters; focus on longest reaches to refine location and potential sources of impairments		4,13
TMDL-3 Stormwater Management BMPs	Stormwater Management: ▪ Agricultural BMPs ▪ Forestry BMPs ▪ Rural BMPs ▪ Urban BMPs *See Above Non-Point Source for Details*		4,8,10,13
Nutrients – Satilla River Watershed Model (NUT)			
NUT-1 Link Nutrient Loading with Current Land Use	Align current land use with phosphorus and nitrogen loading data to help optimize effectiveness of management practices based on consideration of land uses and actual nutrient loading contribution to surface water resources (i.e., predominant land use is not necessarily the predominant source of nutrient load) ▪ Agricultural, Forestry, Rural, and Urban BMPs *See Above Non-Point Source for Details*		4,8,10,13

Management Practice Number	Issue(s) to be Addressed by Action(s)	Description/Definition of Action	Relationship of Action or Issue to Vision and Goals (Section 1.4)
Management Practices to Address Future Educational Needs (EDU)			
EDU-1 Promote Conservation Programs	Support Water Conservation Programs		1,4,5,6,13
EDU-2 Stormwater Education	Support Stormwater Educational Programs		4,5,8,11
EDU-3 Septic System Maintenance Education	Support Septic System Maintenance Programs		4,5,8
EDU-4 Forestry BMP Education	Support Georgia Forestry Commission Forestry BMP and UGA-SFI Logger Education Programs		4,8,10
EDU-5 Funding and Support for BMP Education	Prioritize funding and support for existing and future education, awareness, and BMP programs on non-point source pollution, including but not limited to: Agricultural BMPs, Forestry BMPs, Rural BMPs, Urban BMPs, Georgia Adopt-a-Stream, UGA Extension Service, and Georgia Forestry Commission		4,5,8,10
Management Practices to Address Future Ordinance and Code Policy Needs (OCP)			
OCP-1 Engage Local Governments	Encourage local government to develop ordinances and standards to implement and/or update stormwater and land development regulations. Possible resource documents include: Georgia Stormwater Management Manual, Coastal Stormwater Supplement, and Metro North Georgia Water Planning District Model Ordinances		4,8,10
OCP-2 Green Space Opportunities and Incentives	Identify opportunities for green space on incentive and voluntary basis		1,4,5
OCP-3 Promote Integrated Planning	Encourage coordinated environmental planning, land use, stormwater, and wastewater		1,2,4,5,10,13
OCP-4 Local Government Erosion Control Measures	Encourage local governments to enforce Erosion and Sedimentation Control Ordinance (as found in Cities of Pearson and Valdosta Watershed Protection Plans, 2008 and 2009)		4,8,10

Management Practice Number	Issue(s) to be Addressed by Action(s)	Description/Definition of Action	Relationship of Action or Issue to Vision and Goals (Section 1.4)
Shared Resources			
The Suwannee - Satilla Region will continue to coordinate and collaborate with its neighboring Councils to address potential shared water resource challenges. The Suwannee - Satilla Region will combine its management practices with Coastal Georgia, Suwannee - Satilla and Altamaha to address shared resource challenges related to surface water availability, groundwater availability, and surface water quality.			
Notes: [1] Seek to reduce frequency and severity of human impacts to 7Q10 low flow conditions in the region associated with agricultural water use. Focus on surface water permit holders and new surface water permit requests in Satilla Watershed [(Atkinson, Bacon, Brantley, Coffee, Irwin, Pierce, and Ware Counties], Alapaha Watershed [Atkinson, Ben Hill, Berrien, Echols, Irwin, Lanier, Lowndes, Tift, and Turner Counties], and Withlacoochee Watershed [(Berrien, Brooks, Cook, Lowndes, Tift, and Turner Counties]. [2] Additional industrial wastewater capacity may be needed. EPD to update and refine discharge limit databases.			

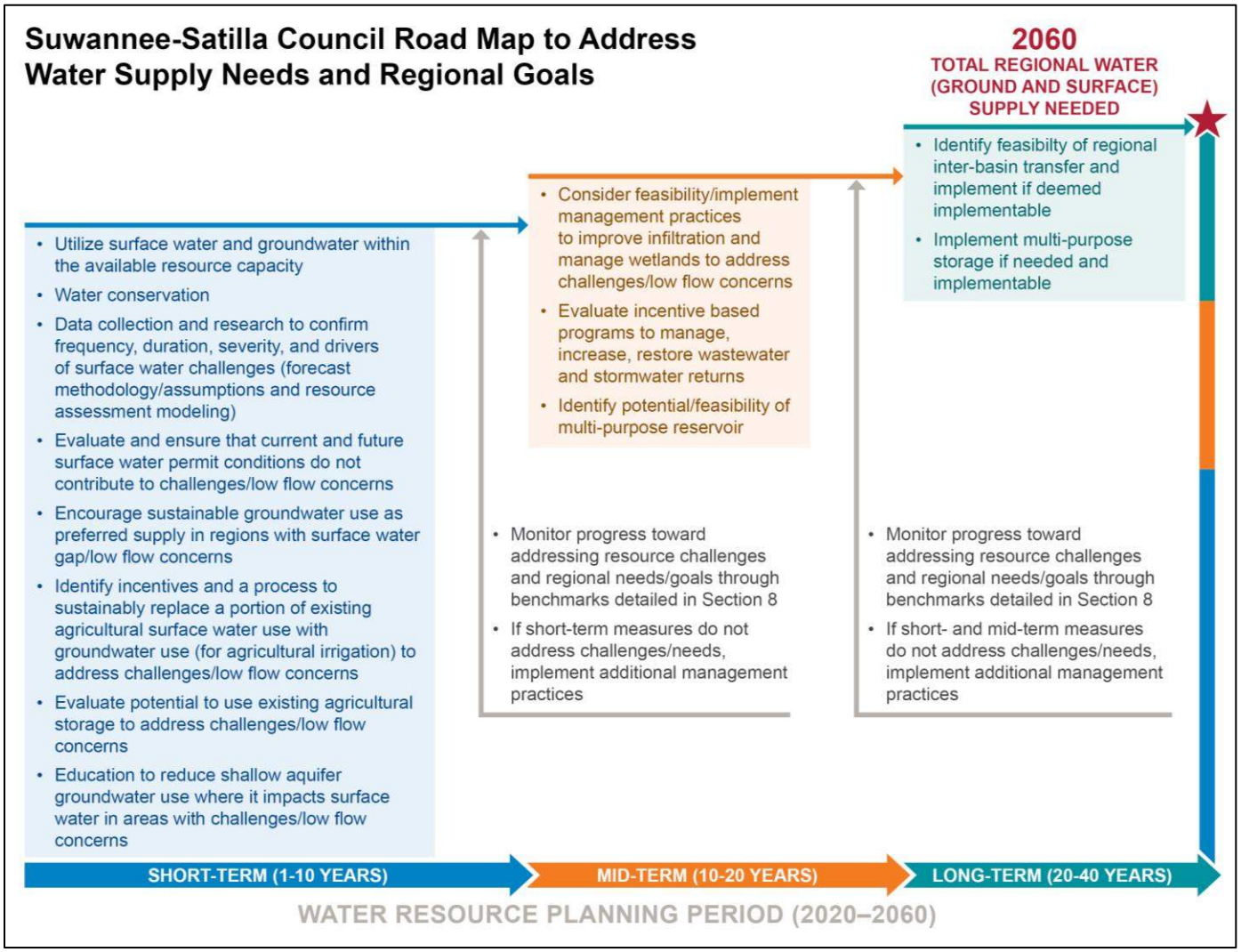

Figure 6-1 Recommended Surface Water Availability Management Practices in a Phased Approach

Potential surface water challenges in the region exist at times under current and future conditions within the Satilla River, the Alapaha River and the Withlacoochee River will be addressed by management practices including those that reduce net consumption, replace surface water use with groundwater use, improve data on frequency and magnitude of challenges, and assess the impact of infrequent surface water challenges and the associated costs associated with these challenges, among others. These potential challenges occur primarily as a result of net consumption associated with agricultural water use in the May–July timeframe. As described in Section 5.2, it is important to keep in mind that shortage to low flow conditions do not occur every year, and in some cases for years with shortages, the shortages do not occur for the entire year.

Figure 6-2 illustrates the Suwannee-Satilla Council's recommended suite of surface water quality management practices in a phased approach. Table 6-1 also includes the Suwannee-Satilla Council's recommended management practices to address water quality challenges, including stream segments with limited localized dissolved oxygen assimilative capacity and insufficient wastewater permit capacity. The Suwannee-Satilla Council addresses challenges by: identifying and recommending specific actions to add/improve infrastructure and improve flow and water quality conditions. Management practices that help improve river flows may also help improve water quality.

In addition to addressing challenges, the Suwannee-Satilla Council identified several management practice recommendations in Table 6-1 to address forecast future uses. These recommendations include such practices as the additional sustainable development of groundwater and surface water in areas with sufficient water supply; best management practices for water quality issues such as non-point source runoff, nutrient loadings, and TMDLs in the region; and additional educational and ordinance practices. The selected management practices will over time address identified challenges and meet future uses when combined with practices for all shared resource regions.

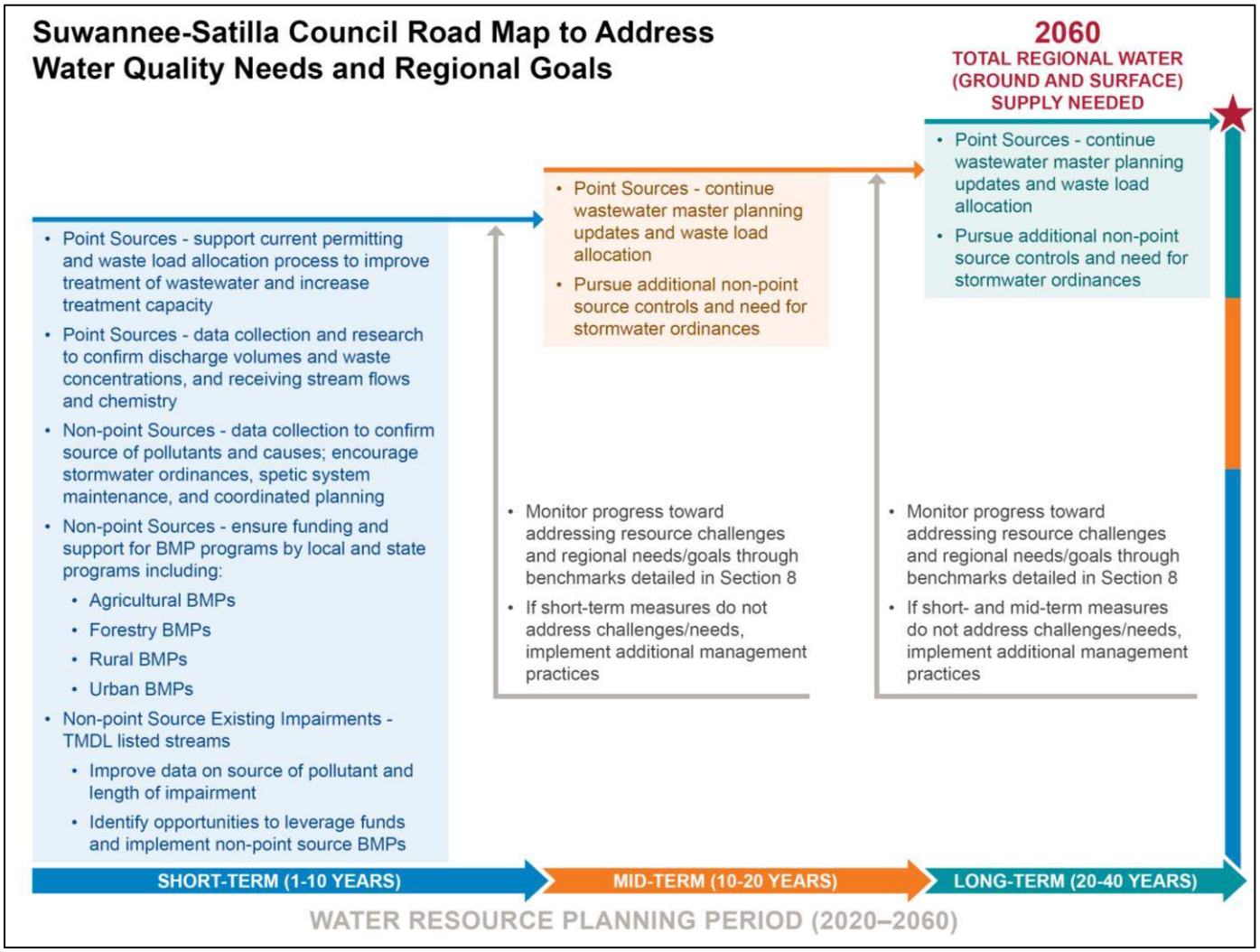

Figure 6-2 Recommended Surface Water Quality Management Practices in a Phased Approach

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SECTION 7

Implementing Water Management Practices

Section 7 Implementing Water Management Practices

Summary

Implementation of the Suwannee-Satilla Regional Water Plan will be primarily by various water users and wastewater utilities in the region. The most cost effective and more readily implemented management practices will be prioritized for short-term implementation via an incremental and adaptive approach. If resource needs are not met and/or challenges are not addressed, then more costly and complex management practices will be pursued.

As new information becomes available, it is important the Plan remain a living document and be updated to incorporate new findings.

This section presents the Suwannee-Satilla Council's estimated timeframes for the implementation of the water management practices identified in Section 6. Schedules for implementation, in addition to the early step(s) required to initiate implementation of a given practice, are presented for both short- and long-term actions. The Suwannee-Satilla Council has defined short-term as 2025 to 2030 and long-term as 2030 to 2060. As the State Water Plan provides, this Plan will be primarily implemented by the various water users in the region; therefore, the Suwannee-Satilla Council has described the roles and responsibilities of the implementing parties as well as the fiscal implications of the practices.

The Council also emphasizes that the implementation of recommended management practices are predicated on a number of planning assumptions and/or may be impacted by unanticipated or currently unknown factors including: projected growth of population, industry, agricultural and energy needs; data sets and assumptions related to water use, water withdrawals and returns; data regarding water quality and watershed models; rules and regulations regarding water resource use and management; and Resource Assessment tools for surface water availability, surface water quality, and groundwater availability. Consequently, significant changes or departures from these planning assumptions, forecasts, and Resource Assessment tools may require a modification of the recommended management practices, the implementation schedule, and/or the implementing entities/affected stakeholders. Future planning efforts should confirm current assumptions and make necessary revisions and/or improvements to the conclusions reached during this round of planning.

7.1 Implementation Schedule and Roles of Responsible Parties

Table 7-1 ties the resource shortfalls and the needs specified by the Council and the corresponding management practices detailed in Table 6-1 to the parties who will implement those practices. This table also describes the timeframe for implementation and the specific steps required for implementation.

Table 7-1 Implementation Schedule

Management Practice Number (See Table 6-1)	Issues to be Addressed and Resource(s) Affected	Permittee Category of Responsible Parties (if applicable)	For All Actions: Initial Implementation Step(s) and Associated Date(s)	For Short-term Actions (2025-2030): Further Action to Complete Implementation and Associated Dates	For Long-term Actions (2030-2060): Further Action to Complete Implementation and Associated Dates	Responsible Parties
Data Collection/Additional Research (DCAR)						
DCAR-1 through DCAR-6[1] Agricultural Data Collection and Irrigation Research	Current and Future Surface Water Use in Challenge Areas (Satilla River, the Alapaha River, and the Withlacoo-chee River	N/A	Develop scope of work (01/2024-06/2024) and key partnering agencies (06/2024-01/2025). Renew scope of work in 2025-26 to continue study.	Complete data collection, research, and evaluation by 01/2025 Incorporate data/findings in next Water Plan revision Georgia Department of Agriculture (Georgia DOA) identify funding sources and seek legislative authorization and funding through the legislative process (DCAR-1 through DCAR-5) Develop fact sheets, conduct landowner outreach, and work with applicable trade groups (DCAR-6 only)	N/A	EPD, Georgia Soil and Water Conservation Commission (GSWCC), In-State Universities, Georgia DOA, and agricultural stakeholders
DCAR-7 Analyze Addressing Extreme Conditions						EPD
DCAR-8 Study Aquifer Potential to Address Challenges						EPD, GSWCC, In-State Universities, Georgia DOA
DCAR-9 Restoration Impact on Low Flow Analysis						EPD and other research agencies/ entities; USDA and other agencies for funding/incentives

Management Practice Number (See Table 6-1)	Issues to be Addressed and Resource(s) Affected	Permittee Category of Responsible Parties (if applicable)	For All Actions: Initial Implementation Step(s) and Associated Date(s)	For Short-term Actions (2025-2030):	For Long-term Actions (2030-2060):	Responsible Parties
				Further Action to Complete Implementation and Associated Dates		
Water Conservation (WC)						
WC-11 Tier 3 and Tier 4 Measures for Municipal and Industrial Users	Current and Future Surface and Groundwater Supply Needs	Agricultural Surface and Groundwater Withdrawal	Conduct outreach/ education incentives to encourage implementation of conservation measures	Implement water conservation practices thorough 01/2030	Verify conservation savings estimates	EPD, Georgia Municipal Association, Georgia Association of County Commissioners, and Water Providers in the Suwannee-Satilla Region
WC-2 through WC-12[1] Tier 1 through Tier 4 Measures for Agricultural Users	Current and Future Surface and Groundwater Use					EPD, GSWCC, and Georgia DOA and Natural Resources Conservation Service (NRCS)- Leverage funds and create incentives Agricultural surface water users in the Suwannee-Satilla Region for implementation

Management Practice Number (See Table 6-1)	Issues to be Addressed and Resource(s) Affected	Permittee Category of Responsible Parties (if applicable)	For All Actions: Initial Implementation Step(s) and Associated Date(s)	For Short-term Actions (2025-2030): Further Action to Complete Implementation and Associated Dates	For Long-term Actions (2030-2060): Further Action to Complete Implementation and Associated Dates	Responsible Parties
Additional/Alternatives to Existing Surface Water Supply Sources (ASWS)						
ASWS-1[2] Consider Low Flow Conditions in Future Surface Water Permitting	Future Surface Water Use in Challenge Areas	Agricultural Surface Withdrawal	EPD to develop Data Needs and Guidance for Analysis Requirements Applicants to submit analysis from 2025 - 2030	GSWCC to collaborate with EPD, Georgia DOA, and current/future surface water users to develop application process and data needs to streamline application and review process (by 01/2025) Coordinate pond/irrigation permitting processes	Determine if expedited or revised permitting process is warranted to allow for use of the resource and protection of critical low flows	EPD, GSWCC, and Georgia DOA to develop strategy Agricultural surface water users in the Suwannee-Satilla Region for implementation
ASWS-2[2] Incentives for Dry-Year Releases from Ponds			Develop strategy and work with potential participants/ impacted users to increase support for and implementation of strategy	Examine opportunities to modify farm and other pond operations to obtain releases in dry/challenge years (by 01/2025)	Modify farm and other pond operations to obtain releases in dry/challenge years (by 01/2030)	
ASWS-3[2] Substitute Future Surface Water Use with Groundwater in Challenge Areas		Agricultural Groundwater Withdrawal		Identify the need for, and feasibility of, incentive based seasonal surface water permit conditions to address 7Q10 low flow conditions (by 01/2025) Replace surface water supply (by 01/2025)	N/A	

Management Practice Number (See Table 6-1)	Issues to be Addressed and Resource(s) Affected	Permittee Category of Responsible Parties (if applicable)	For All Actions: Initial Implementation Step(s) and Associated Date(s)	For Short-term Actions (2025-2030): Further Action to Complete Implementation and Associated Dates	For Long-term Actions (2030-2060): Further Action to Complete Implementation and Associated Dates	Responsible Parties
ASWS-4 Substitute Existing Agricultural Surface Water Use with Groundwater in Dry Years	Current Surface Water Use Challenges	Agricultural Groundwater Withdrawal	Develop strategy and work with potential participants/ impacted users to increase support for and implementation of strategy	Replace surface water supply (by 01/2025) Confirm that use of groundwater source does not impact surface water flow in other areas	N/A	EPD, GSWCC, and Georgia DOA Agricultural surface water users in the Suwannee-Satilla Region for implementation
ASWS-5 Opportunities and Incentives for Dry-Year Releases from Ponds		Agricultural Surface Withdrawal		Examine opportunities to modify farm and other pond operations to obtain releases in dry/challenge years (by 01/2025)	Modify farm and other pond operations to obtain releases in dry/challenge years (by 01/2030)	
ASWS-6 Consider Phased Seasonal Agricultural Permit Conditions				Identify the need for, and feasibility of, incentive based seasonal surface water permit conditions to address 7Q10 low flow conditions Phase 1 implementation: Direct stream withdrawals (by 01/2025)	Phase 2 implementation: Consider pond storage effects based on outcome of research from DCAR-2 (by 01/2030)	

Management Practice Number (See Table 6-1)	Issues to be Addressed and Resource(s) Affected	Permittee Category of Responsible Parties (if applicable)	For All Actions: Initial Implementation Step(s) and Associated Date(s)	For Short-term Actions (2025-2030): Further Action to Complete Implementation and Associated Dates	For Long-term Actions (2030-2060): Further Action to Complete Implementation and Associated Dates	Responsible Parties
ASWS-7 Ecological Restoration Incentive Program	Current and Future Surface Water Use Challenges	Wetland Restoration	Encourage research to determine effectiveness and feasibility of restoring wetlands (see DCAR-9)	Determine effectiveness and feasibility of restoring wetlands in relation to improving low flow conditions (by 01/2025)	Restore wetland characteristics (by 01/2030), if deemed effective and feasible	EPD
ASWS-8 Land Management Incentives		City and County Land Use	Incentive-based practices to promote infiltration and aquifer recharge	Determine effectiveness and feasibility of implementing practice (by 01/2025)	If deemed effective and feasible, implement practice based on status of challenge closure (by 01/2030)	EPD, Municipalities and Water/Wastewater Utilities in the Suwannee-Satilla Region
ASWS-9 Incentives for Greater Wastewater Return Flows; Coordinated Management		Wastewater/ Stormwater NPDES Discharge, Sanitary Sewer Extension	N/A		Continue to monitor land use and hydrologic relationships	

Management Practice Number (See Table 6-1)	Issues to be Addressed and Resource(s) Affected	Permittee Category of Responsible Parties (if applicable)	For All Actions: Initial Implementation Step(s) and Associated Date(s)	For Short-term Actions (2025-2030): Further Action to Complete Implementation and Associated Dates	For Long-term Actions (2030-2060): Further Action to Complete Implementation and Associated Dates	Responsible Parties
ASWS-10 Multi-Region Reservoir	Future Surface Water Use Challenges	Surface Water Withdrawal	Monitor challenge closure	Based on rate of challenge closure, consider reservoir reconnaissance/ feasibility study (by 01/2025)	Construct joint regional reservoir and/or multiple new smaller reservoirs (and/or utilize existing reservoirs) (by 01/2030)	EPD, Agricultural water users in the Suwannee-Satilla Region, other collaborating regions
ASWS-11 Inter-Basin Transfers	Future Surface Water Use Challenges	Surface Water Withdrawal	Monitor challenge closure	Based on rate of challenge closure, consider inter-basin transfer reconnaissance/ feasibility study (by 01/2030)	Construct infrastructure for inter-basin transfers, if feasible and needed (by 01/2060)	EPD, Agricultural water users in the Suwannee-Satilla Region, other collaborating regions
Point Sources – Dissolved Oxygen (PSDO)						
PSDO-1 Collect Water Quality Data	Water Quality Challenges	General Wastewater	EPD to work with potentially effected entities as part of permitting process (by 01/2025)	Collect data to confirm loading and/or receiving stream chemistry (by 01/2030)	N/A	EPD, Municipalities and/or wastewater utilities in the Suwannee-Satilla Region
PSDO-2 Point Source Discharge Relocation				Identify feasibility to move discharge location to higher flow streams with greater assimilative capacity (by 01/2024)	If feasible and cost effective, relocate discharge location (by 01/2030)	

Management Practice Number (See Table 6-1)	Issues to be Addressed and Resource(s) Affected	Permittee Category of Responsible Parties (if applicable)	For All Actions: Initial Implementation Step(s) and Associated Date(s)	For Short-term Actions (2025-2030): Further Action to Complete Implementation and Associated Dates	For Long-term Actions (2030-2060): Further Action to Complete Implementation and Associated Dates	Responsible Parties
PSDO-3 Improve Treatment Facilities	Water Quality Challenges	General Wastewater	Confirm wastewater facilities to upgrade/improve treatment to address low dissolved oxygen conditions in receiving streams (by 01/2025)	Upgrade/improve treatment of identified wastewater facilities (by 01/2030)	Continue to upgrade/improve treatment of identified wastewater facilities (by 01/2050)	EPD, Municipalities and/or wastewater utilities in the Suwannee-Satilla Region
Available Municipal Wastewater Permit Capacity (MWWPC)						
MWWPC-1 Increase Wastewater Permit Capacity	Wastewater Permit Capacity	Municipal Wastewater	EPD and entities to confirm assumptions and needs (by 01/2025)	Expand or construct new facilities and/or obtain additional wastewater permit capacity to meet forecasted needs (by 01/2030)	N/A	EPD, Municipal wastewater utilities in the Suwannee-Satilla Region
Available Industrial Wastewater Permit Capacity (IWWPC)						
IWWPC-1[3] Collect Additional Industrial Permit Data	Wastewater Permit Capacity	Industrial Wastewater	Obtain additional permit data on flow volumes and permit conditions for industrial wastewater facilities forecasted needs (by 01/2025)	Expand or construct new facilities and/or obtain additional wastewater permit capacity to meet forecasted needs (by 01/2025)	N/A	EPD, Industrial wastewater facilities in the Suwannee-Satilla Region

Management Practice Number (See Table 6-1)	Issues to be Addressed and Resource(s) Affected	Permittee Category of Responsible Parties (if applicable)	For All Actions: Initial Implementation Step(s) and Associated Date(s)	For Short-term Actions (2025-2030): Further Action to Complete Implementation and Associated Dates	For Long-term Actions (2030-2060): Further Action to Complete Implementation and Associated Dates	Responsible Parties
Municipal Groundwater Permit Capacity (MGWPC)						
MGWPC-1 Increase Municipal Groundwater Permit Capacity	Groundwater Permit Capacity	Municipal Groundwater Withdrawal	EPD and entities to confirm assumptions and needs (by 01/2025)	Evaluate short-term needs and, if needed, work with EPD to obtain additional permit capacity (by 01/2030)	Evaluate long-term needs and, if needed, work with EPD to obtain additional permit capacity (by 01/2050)	EPD, Municipal water utilities in the Suwannee-Satilla Region
Industrial Groundwater Permit Capacity (IGWPC)						
IGWPC-1 Increase Industrial Groundwater Permit Capacity	Groundwater Permit Capacity	Industrial Groundwater Withdrawal	EPD and entities to confirm assumptions and needs (by 01/2025)	Evaluate short-term needs and, if needed, work with EPD to obtain additional permit capacity (by 01/2030)	Evaluate long-term needs and, if needed, work with EPD to obtain additional permit capacity (by 01/20600)	EPD, Industrial water facilities in the Suwannee-Satilla Region
Groundwater (GW)						
GW-1 Sustainable Groundwater Development	Current and Future Groundwater Needs	Groundwater Withdrawal (Municipal, Industrial, and Agricultural)	Continue to drill wells and withdraw groundwater to meet regional needs Verify sustainable yield metrics and consider relevant localized impacts (by 01/2025)	Provide guidance and implement sustainable groundwater withdrawal rates through 01/2030	Modify Resource Assessments and sustainable yield criteria, if necessary (by 01/2060)	EPD, Cities, Counties, and Utilities in the Suwannee-Satilla Region

Management Practice Number (See Table 6-1)	Issues to be Addressed and Resource(s) Affected	Permittee Category of Responsible Parties (if applicable)	For All Actions: Initial Implementation Step(s) and Associated Date(s)	For Short-term Actions (2025-2030): Further Action to Complete Implementation and Associated Dates	For Long-term Actions (2030-2060): Further Action to Complete Implementation and Associated Dates	Responsible Parties
GW-2 Promote Aquifer-Friendly Land Uses	Current and Future Groundwater Needs	N/A	Monitor land use changes and further delineate aquifer recharge areas (by 01/2025)	Encourage land use practices that sustain and protect aquifer recharge areas (by 01/2030)	Continue to monitor land use and hydrologic relationships	Cities and Counties in aquifer recharge areas for implementation. State agencies for research and data transfer to local governments.
GW-3 Research Groundwater Sustainability GW-4 Inter-State Resource Planning	Current and Future Groundwater Needs	Groundwater Withdrawal (Municipal, Industrial, and Agricultural)	Continue to drill wells and withdraw groundwater to meet regional needs Verify sustainable yields and consider relevant localized impacts (by 01/2025)	Provide guidance and implement sustainable groundwater withdrawal rates through 01/2030	Modify Resource Assessments and sustainable yield criteria, if necessary (by 01/2060)	EPD
Surface Water (SW)						
SW-1 Surface Water Uses Within Available Capacity	Current and Future Surface Water Use Outside Challenge Areas	Surface water Withdrawal	Confirm non-challenge areas and available surface water resource capacity (by 01/2025)	Continue to apply for permits and use surface water in non-challenge areas within available resource capacity (by 01/2030)	Verify flow conditions and challenges	EPD, applicable federal agencies, and surface water users in Suwannee-Satilla Region
SW-2 Monitor and Evaluate Estuaries	Current and Future Surface Water Use Outside Challenge Areas	N/A	Monitor St. Marys River flow conditions	Determine flow conditions that sustain estuary health (by 01/2030)	N/A	EPD, Coastal Resources Division, Wildlife Resources Division

Management Practice Number (See Table 6-1)	Issues to be Addressed and Resource(s) Affected	Permittee Category of Responsible Parties (if applicable)	For All Actions: Initial Implementation Step(s) and Associated Date(s)	For Short-term Actions (2025-2030): Further Action to Complete Implementation and Associated Dates	For Long-term Actions (2030-2060): Further Action to Complete Implementation and Associated Dates	Responsible Parties
Non-Point Sources (NPS) – Urban, Rural, Agricultural and Forestry Uses						
NPS-1 Study Human Impacts on Water Quality	Water Quality Outside Challenge Areas	Stormwater (NPDES Discharges)	Collect data to determine DO, E. Coli, and nutrient sources	Confirm sources of loading and develop programs to address (by 01/2030)	N/A	EPD, Municipalities and Utilities within the Suwannee-Satilla Region
NPS-2 Monitor and Address NPS Nutrient Loading						
NPSU-1 through NPSU-5 Various Practices Related to Stormwater Management			Select best management practices (BMPs) needed for treating stormwater from urban and rural uses	Implement a variety of stormwater BMPs related to urban uses (by 01/2030)		
NPSR-1 Advocate Implementing Road Runoff BMPs	Water Quality Outside Challenge Areas	Stormwater (NPDES Discharges)	Continue to support existing best management practices programs	Implement a variety of stormwater BMPs related to dirt road maintenance (by 01/2025)	N/A	EPD, Counties (Public Works/Roads and Bridges Departments) within the Suwannee-Satilla Region

Management Practice Number (See Table 6-1)	Issues to be Addressed and Resource(s) Affected	Permittee Category of Responsible Parties (if applicable)	For All Actions: Initial Implementation Step(s) and Associated Date(s)	For Short-term Actions (2025-2030): Further Action to Complete Implementation and Associated Dates	For Long-term Actions (2030-2060): Further Action to Complete Implementation and Associated Dates	Responsible Parties
NPSF-1 through NPSF-4 Various Management Practices Related to Forestry BMPs	Water Quality Outside Challenge Areas	Stormwater (NPDES Discharges)	Continue to support existing best management practices programs	Implement a variety of best management practices related to forestry uses (by 01/2030)	N/A	Georgia Forestry Commission (GFC), Georgia Forestry Association, Georgia State Forestry Registration Board, Georgia Sustainable Forest Initiative, In-State Universities, Southern Wood Producers Association, and possibly county commissions USDA, NRCS, Non-profits, Non-governmental organizations (NSPF-4 only)
TMDL-1 through TMDL-3 Evaluate Impaired Segments and Sources			Collect data to confirm impairment and determine sources	Remove streams listed due to “natural sources” (by 01/2025) Refine river/stream reach length for impaired waters (by 01/2025)	Continue collecting data to monitor impairment sources and support reassessment of stream segment classifications (by 01/2060)	EPD, Municipalities and Utilities within the Suwannee-Satilla Region

Management Practice Number (See Table 6-1)	Issues to be Addressed and Resource(s) Affected	Permittee Category of Responsible Parties (if applicable)	For All Actions: Initial Implementation Step(s) and Associated Date(s)	For Short-term Actions (2025-2030): Further Action to Complete Implementation and Associated Dates	For Long-term Actions (2030-2060): Further Action to Complete Implementation and Associated Dates	Responsible Parties
NUT-1 Link Nutrient Loading with Current Land Use			Align current land use with nutrient loading data to optimize management practice based on consideration of land uses and actual nutrient loading	Support research and development of tools such as the Southern Group of State Foresters and USFS Sediment Prediction modeling tool being developed by Auburn University (by 01/2025)	N/A	EPD, GSWCC, GFC, Municipalities and Utilities within the Suwannee-Satilla Region, and county commissions
Educational Practices (EDU)						
EDU-1 through EDU-5 Various Educational and Outreach Programs on Conservation/Water Quality	Education/ Outreach Support	Entities' Applicable Programs	Develop educational programs on water conservation, septic system maintenance, and stormwater management	Complete educational programs on water conservation, septic system maintenance, and stormwater management	Continue educational programs on water conservation, septic system maintenance, and stormwater management	EPD, State Agencies with WCIP responsibilities, GFC, Municipalities and Utilities within the Suwannee-Satilla Region

Management Practice Number (See Table 6-1)	Issues to be Addressed and Resource(s) Affected	Permittee Category of Responsible Parties (if applicable)	For All Actions: Initial Implementation Step(s) and Associated Date(s)	For Short-term Actions (2025-2030): Further Action to Complete Implementation and Associated Dates	For Long-term Actions (2030-2060): Further Action to Complete Implementation and Associated Dates	Responsible Parties
Ordinance and Code Policy Practices (OCP)						
OCP-1 through OCP-4 Stormwater Management through Ordinance/ Code Updates and Integrated Planning	Ordinances and Code Policies	N/A	Identify ordinances and standards to implement/update on stormwater and land development (including green space and Erosion and Sedimentation Control Measures) Encourage coordinated environmental planning	Pass ordinances and develop standards on stormwater management and land development (by 01/2025) Conduct regional environmental planning (e.g., land use, stormwater, wastewater)	N/A	EPD, Regional Commissions, Municipalities and Utilities within the Suwannee-Satilla Region, and county commissions

Notes:

[1] Seek to reduce frequency and severity of human impacts to 7Q10 low flow conditions in the region, which are associated with agricultural water use in portions of the Suwannee-Satilla Region. Focus on surface water permit holders and new surface water permit requests in Satilla Watershed (Atkinson, Bacon, Brantley, Coffee, Irwin, Pierce, and Ware Counties), Alapaha Watershed (Atkinson, Ben Hill, Berrien, Echols, Irwin, Lanier, Lowndes, Tift, and Turner Counties), and Withlacoochee Watershed (Berrien, Brooks, Cook, Lowndes, Tift, and Turner Counties).

[2] Coordinate challenge closure with the following regional councils: Altamaha (Wilcox County), Lower Flint-Ochlockonee (Colquitt, Worth Counties), Upper Flint (Crisp County).

[3] Additional industrial wastewater capacity may be needed. EPD to update and refine discharge limit databases to confirm flow and quality assumptions.

7.2 Fiscal Implications of Selected Water Management Practices

The following subsections discuss planning level cost estimates for the water management practices selected by the Suwannee-Satilla Council and potential funding sources and options. Successful implementation of the Regional Water Plan is highly dependent on the ability of state and local governments, water providers, and utilities to fund the needed implementation actions.

7.2.1 Planning Level Cost Estimates

Planning level cost estimates were prepared for each management practice as shown in Table 7-2 using planning guidance documents, the knowledge base of previous state and utility planning efforts, and other sources of information, as listed below. The guidance documents and sources used to inform the planning level cost information in Table 7-2 have not been updated. Accordingly, the values shown below should only be used as a general guide. Specific costs should be further evaluated and updated before being relied upon.

- Georgia EPD Supplemental Guidance for Planning Contractors: Water Management Practice Cost Comparison dated March 2010 (Revised March 2011).
- Water Conservation Analysis Technical Memorandum to Supplement Council's Plan prepared by CDM Smith for Georgia EPD draft dated July 2011.
- CDM Water Supply Cost Estimation Study prepared for the South Florida Water Management District dated February 2007.
- EPA Report titled Costs of Urban Stormwater Control Practices – Preliminary Report dated February 5, 2006.
- EPA Report titled Costs of Urban Stormwater Control dated January 2002.
- St. Johns River Water Management District Report titled Water Supply Needs and Sources Assessment Alternative Water Supply Strategies Investigation, Water Supply and Wastewater Systems Component Cost Information dated 1997 (Publication Number SJ97-SP3).
- Preliminary estimates of production well yields and costs from local licensed well drillers in Georgia (Bishop Well and Pump Service and Grosch Irrigation Company.)
- Georgia Geologic Survey Project Report 32 titled Irrigation Conservation Practices Appropriate for the Southeastern United States. Prepared in cooperation with the Georgia DNR, EPD.
- Groundwater Flow Modeling of the Coastal Plain Aquifer System of Georgia. Draft Report completed for EPD as part of State of Georgia Groundwater Resource Assessment.
- FY 2004 Sussex Conservation District Cover Crop Program Fact Sheet. Sussex Conservation District, Georgetown, Delaware dated 2003.

- North Carolina State University Department of Forestry presentation titled Costs of Forestry Best Management Practices in the South: A Review dated 2002.
- Recent bid tabulations (as of 2020) for wastewater treatment facilities.

The cost estimates are unit cost estimates where there is a lack of detail or specificity about the management practice. For example, for an inter-basin transfer of water, the cost is driven by the length and size of the pipeline and the quantity to be transferred. If the connection locations and or the transfer quantity are not known, a unit cost per mile of pipeline is given. Where there is detail about the management practice, unit cost data were used to develop an approximate capital/programmatic cost. The capital costs were adjusted to 2023 dollars using the Engineering News Record Cost Index. In summary, some cost estimates are unit costs with different unit basis and some costs are approximate capital costs. Therefore, each management practice was assigned a cost (where applicable) rather than rolling up the costs into general categories since they may not be additive. The cost information provided in this document will be used to pursue loans, grants, and other funding options that can be prioritized throughout the region.

7.2.2 Funding Sources and Options

Several different funding sources and options will be used to secure funding for the different management practices outlined in this Plan including:

- The State Revolving Fund Program
- Other State of Georgia Funding Programs
- State and Federal Grants
- Water/Wastewater System Revenues
- State and local government incentive programs

More details on potential loan and grant programs are provided for the management practices in Table 7-2. Below is a list of some of the larger organizations and agencies that provide funding for the types of management practices recommended in this Plan. It is important to note that funding sources and opportunities change on a yearly basis.

Table 7-2 Cost Estimates for the Implementation Responsibilities

Management Practice No. (See Table 6-1)	Issues to be Addressed	Capital/ Programmatic Cost	Funding Sources and Options[1]	Notes and Sources for Costs
Data Collection/Additional Research (DCAR)				
DCAR-1 Collect Agricultural Consumption Data; Refine Resource Assessment	Current and Future Surface Water Use in Challenge Areas	$0.4M to $0.8M		Various recent similar projects
DCAR-2 Improve Forecast and Resource Data; Analyze Storage Impacts on Challenges		$0.8M to $1.5M		
DCAR-3 Improve Data Quality and Analysis Capabilities		$0.3M to $0.6M		
DCAR-4 Irrigation Efficiency Education and Research		$0.2M to $0.3M		
DCAR-5 Understand Optimum Application Methods		$0.1M to $0.2M		
DCAR-6 Minimize Groundwater Impacts to Surface Water	Current and Future Surface Water Use in Challenge Areas	$0.1M to $0.2M		Various recent similar projects
DCAR-7 Analyze Addressing Extreme Conditions		$0.2M to $0.3M		
DCAR-8 Study Aquifer Potential to Address Challenges		$0.2M to $0.3M		
DCAR-9 Restoration Impact on Low Flow Conditions Analysis		$0.3M to $0.8M		

Management Practice No. (See Table 6-1)	Issues to be Addressed	Capital/ Programmatic Cost	Funding Sources and Options[1]	Notes and Sources for Costs
Water Conservation (WC)				
WC-1 Tier 1 and Tier 2 Measures for Municipal and Industrial Users	Current and Future Surface Water and Groundwater Supply Needs Throughout the Region	$0.2M to $0.3M	Local governments; utilities	Supplemental Guidance
WC-2 Tier 1 and Tier 2 Measures for Agricultural Users		$0.2M to $0.3M		
WC-3 Audits	Current and Future Surface Water Use in Challenge Areas	$2,000/system	State/federal loan or grant	Irrigation Conservation Practices Appropriate for the Southeastern United States
WC-4 Metering		$7.9M		(6,021 existing irrigation pumps) times 10% increase in pumps times $800/totalizer
WC-5 Inspections	Current and Future Surface Water Use in Challenge Areas	$0 to $0.8M	State/federal loan or grant	$0 to $1.8 per capita per Supplemental Guidance. Total population in 2060:435,435
WC-6 Minimize High-Pressure Systems		$7,000/system		Irrigation Conservation Practices Appropriate for the Southeastern United States
WC-7 Efficient Planting Methods		$0.2M to $0.3M		Educate farmers on benefits of cropping and crop rotation
WC-8 Conservation Tillage		$0.2M to $0.3M		Educate farmers on benefits of conservation tillage
WC-9 Control Loss		$0.2M to $0.3M		Educate farmers on practices to prevent water loss through more efficient detention of rainfall
WC-10 End-Gun Shutoffs		$2,000/system		Irrigation Conservation Practices Appropriate for the Southeastern United States
WC-11 Low Pressure Systems		$6,000/system		

Management Practice No. (See Table 6-1)	Issues to be Addressed	Capital/ Programmatic Cost	Funding Sources and Options[1]	Notes and Sources for Costs
WC-12 Application Efficiency Technologies		$3,000/system		
Additional/Alternatives to Existing Surface Water Supply Sources (ASWS)				
ASWS-1 Consider Low Flow Conditions in Future Surface Water Permitting	Current and Future Surface Water Use in Challenge Areas	$0.2M to $0.3M per applicant	State incentive programs; utilities	Various recent similar projects. Includes modeling, permit application, and monitoring.
ASWS-2 Incentives for Dry-Year Releases from Ponds		$1.5M to $3M	State incentive programs	Various recent similar projects
ASWS-3 Substitute Future Surface Water Use with Groundwater in Challenge Areas	Current Surface Water Use in Challenge Areas	$0.1M to $0.2M per MGD	Georgia Reservoir and Water Supply Fund	Local well driller data and Supplemental Guidance
ASWS-4 Substitute Existing Agricultural Surface Water Use with Groundwater in Dry Years		$0.1M to $0.2M per MGD	Georgia Reservoir and Water Supply Fund	From local well driller data and Supplemental Guidance. Does not include pipeline costs and cost of treatment.
ASWS-5 Opportunities and Incentives for Dry-Year Releases from Ponds		$1.5M to $3M		Optimize farm and pond operations for existing use for 7Q10
ASWS-6 Consider Phased Seasonal Agricultural Permit Conditions		$0.2M to $0.3M per applicant		Various recent similar projects
ASWS-7 Ecological Restoration Incentive Program	Current and Future Surface Water Use in Challenge Areas	$200,000/ac	Clean Water Act Section 319(h) Grants	Supplemental Guidance

Management Practice No. (See Table 6-1)	Issues to be Addressed	Capital/ Programmatic Cost	Funding Sources and Options[1]	Notes and Sources for Costs
ASWS-8 Land Management Incentives		$0 to $10/capita	Clean Water State Revolving Fund Loan Program	Supplemental Guidance. Total population in 2060: 435,435
ASWS-9 Incentives for Greater Wastewater Return Flows; Coordinated Management		$0.2M to $1.5M per MGD		Supplemental Guidance
ASWS-10 Multi-Region Reservoir	Current and Future Surface Water Use in Challenge Areas	$0.1M to $0.6M per MG	GEFA Georgia Reservoir and Water Supply Fund	Supplemental Guidance
ASWS-11 Inter-Basin Transfers		$18.7M per mile		Supplemental Guidance. Inter-basin transfer is a function of piping cost and flow. Assume 84-in pipe.
Point Sources – Dissolved Oxygen (PSDO)				
PSDO-1 Collect Water Quality Data	Water Quality Challenges	$0.4M to $0.8M	Local governments; utilities	Various recent similar projects
PSDO-2 Point Source Discharge Relocation		$0.2M to $0.5M	GEFA Georgia Fund Loan; utilities	
PSDO-3 Improve Treatment Facilities		$10.4M to $14.8M per MGD	GEFA Georgia Fund Loan; utilities; CWSRF	Supplemental Guidance
Available Municipal Wastewater Permit Capacity (MWWPC)				
MWWPC-1 Increase Wastewater Permit Capacity	Wastewater Permit Capacity Challenge	$5.9M to $14.8M per MGD	GEFA Georgia Fund Loan	Supplemental Guidance
Available Industrial Wastewater Permit Capacity (IWWPC)				
IWWPC-1 Collect Additional Industrial Permit Data	Wastewater Permit Capacity Challenge	$0.2M to $0.3M		Various recent similar projects

Management Practice No. (See Table 6-1)	Issues to be Addressed	Capital/ Programmatic Cost	Funding Sources and Options[1]	Notes and Sources for Costs
Municipal Groundwater Permit Capacity (MGWPC)				
MGWPC-1 Increase Municipal Groundwater Permit Capacity	Groundwater Permit Capacity Challenge	$0.04M to $0.1M	Drinking Water State Revolving Fund (DWSRF) Loan Program	Various recent similar projects
Industrial Groundwater Permit Capacity (IGWPC)				
IGWPC-1 Increase Industrial Groundwater Permit Capacity	Groundwater Permit Capacity Challenge	$0.04M to $0.1M	DWSRF Loan Program	Various recent similar projects
Groundwater (GW)				
GW-1 Sustainable Groundwater Development	Current and Future Groundwater Needs	$0.02M to $0.2M per MGD	Georgia Reservoir and Water Supply Fund	Supplemental Guidance
GW-2 Promote Aquifer-Friendly Land Uses		$0 to $0.7M	GEFA Land Conservation Program	$0 to $1.6 per capita per Supplemental Guidance. Total population in 2060: 435,435
GW-3 Research Groundwater Sustainability		$0.3M to $0.6M	Georgia Reservoir and Water Supply Fund	State of Georgia Groundwater Resource Assessment
GW-4 Inter-State Resource Planning		$0.3M to $0.6M		Various recent similar projects
Surface Water (SW)				
SW-1 Surface Water Use Within Available Capacity	Current and Future Surface Water Uses Outside Challenge Areas	$0.1M to $0.2M per applicant	Local governments; utilities	Includes cost of permitting and impact evaluation
SW-2 Monitor and Evaluate Estuaries		$0.3M to $0.6M		Various recent similar projects

Management Practice No. (See Table 6-1)	Issues to be Addressed	Capital/ Programmatic Cost	Funding Sources and Options[1]	Notes and Sources for Costs
Dissolved Oxygen, E. Coli, Nutrients, and Other Impairments				
NPS-1 Study Human Impacts on Water Quality	Future Water Quality Non-Point Source (NPS) Needs	$0.3M to $0.6M	Clean Water Act Section 319(h) Grants	EPA Manual of Costs of Urban Stormwater Control (2002)
NPS-2 Monitor and Address NPS Nutrient Loading	Future Water Quality NPS Needs	$0.05M to $0.2M per impairment	Clean Water Act Section 319(h) Grants	Various recent similar projects
Urban Best Management Practices (NPSU)				
NPSU-1 Control Erosion	Future Water Quality NPS Needs	$1M to $2M	Clean Water Act Section 319(h) Grants; (Non-point Source Implementation Grant)	$2 to $5 per capita. Total population in 2060: 435,435
NPSU-2 Manage Stormwater Runoff		$9,000 to $100,000 per MG		EPA Manual of Costs of Urban Stormwater Control (2002)
NPSU-3 Increase Stormwater Infiltration		$0 to $0.8M	GEFA Land Conservation Program	$0 to $1.8 per capita per Supplemental Guidance. Total population in 2060: 435,435
NPSU-4 Riparian Buffers		$0 to $0.8M		
NPSU-5 Street Sweeping		$1M to $2M	Clean Water Act Section 319(h) Grants; (Non-Point Source Implementation Grant)	$2 to $5 per capita per Supplemental Guidance. Total population in 2060: 435,435
Rural Best Management Practices (NPSR)				
NPSR-1 Advocate Implementing Road Runoff BMPs	Future Water Quality NPS Needs	$1M to $2M	Clean Water Act Section 319(h) Grants; (Non-point Source Implementation Grant)/One Georgia Authority Equity Fund	$2 to $5 per capita. Total population in 2060: 435,435

Management Practice No. (See Table 6-1)	Issues to be Addressed	Capital/ Programmatic Cost	Funding Sources and Options[1]	Notes and Sources for Costs
Forestry Best Management Practices (NPSF)				
NPSF-1 Support Forestry Commission Water Quality Program	Future Water Quality NPS Needs	Continue to fund existing programs		
NPSF-2 Improve BMP Compliance		$0.2M to $0.4M		Costs of Forestry Best Management Practices in the South: A Review
NPSF-3 Conservation Land Use Planning		$0 to $0.8M	GEFA Land Conservation Program	$0 to $1.8 per capita per Supplemental Guidance. Total population in 2060: 435,435
NPSF-4 Forest Restoration Incentives and Support		$0 to $0.8M		
Agricultural Best Management Practices for Crop and Pasture Lands (NPSA)				
NPSA-1 Soil Erosion Control Measures	Future Water Quality NPS Needs	$0.2M to $0.3M		Irrigation Conservation Practices Appropriate for the Southeastern United States
NPSA-2 Utilize Buffers		$0 to $0.8M		$0 to $1.8 per capita per Supplemental Guidance. Total population in 2060: 435,435
NPSA-3 Livestock Management		$0 to $0.8M		
NPSA-4 Manure Control		$0.8M to $1.5M		Sussex (Delaware) Conservation District Cover Crop Program Fact Sheet
NPSA-5 Wetland and Forest Restoration Incentives		$0 to $0.8M		$0 to $1.8 per capita per Supplemental Guidance. Total population in 2060: 435,435
Total Maximum Daily Load Listed Streams (TMDL)				
TMDL-1 Evaluate Impairment Sources	Future Water Quality NPS Needs	$0.8M to $1.5M		Various recent similar projects

Management Practice No. (See Table 6-1)	Issues to be Addressed	Capital/ Programmatic Cost	Funding Sources and Options[1]	Notes and Sources for Costs
TMDL-2 Analyze Impaired Segments and Sources		$0.06M to $0.2M per impairment		
TMDL-3 Stormwater Management BMPs		$48M to $76M		$110 to $175 per capita. Total population in 2060: 435,435
Nutrients – Satilla and Savannah River Nutrient (Phosphorus and Nitrogen) Watershed Models (NUT)				
NUT-1 Link Nutrient Loading with Current Land Use	Future Water Quality NPS Needs	$100 to $300 per acre		Supplemental Guidance
Educational (EDU)				
EDU-1 Promote Conservation Programs	Future Educational Needs	$0 to $2.3M	State incentive programs; utilities; local governments	$0 to $5.3 per capita per Supplemental Guidance. Total population in 2060: 435,435
EDU-2 Stormwater Education		$0 to $2.3M		
EDU-3 Septic System Maintenance Education		$0 to $0.8M		$0 to $1.8 per capita per Supplemental Guidance. Total population in 2060: 435,435
EDU-4 Forestry BMP Education		$0.1M to $0.2M	State incentive programs; local governments	Management Practices in the South: A Review
EDU-5 Funding and Support for BMP Education	Future Educational Needs	$0.1M to $0.2M	State incentive programs; utilities; local governments	
Ordinance and Code Policy (OCP)				
OCP-1 Engage Local Governments	Future Ordinance and Code Policy Needs	$0 to $0.8M	State incentive programs; utilities; local governments	$0 to $1.8 per capita per Supplemental Guidance. Total population in 2060: 435,435
OCP-2 Green Space Opportunities and Incentives		$0.1M to $0.2M	State incentive programs; utilities, local governments; Georgia Land Conservation Program	Supplemental Guidance

Management Practice No. (See Table 6-1)	Issues to be Addressed	Capital/ Programmatic Cost	Funding Sources and Options[1]	Notes and Sources for Costs
OCP-3 Promote Integrated Planning		$0 to $0.8M	State incentive programs; utilities, local governments	$0 to $1.8 per capita per Supplemental Guidance. Total population in 2060: 435,435
OCP-4 Local Government Erosion Control Measures		$0 to $0.8M		

Notes:

[1] Where referenced, GEFA-administered loan programs (e.g., CSWRF, DWSRF) are intended to finance eligible activities related to construction of water infrastructure projects, including site-specific engineering and planning.

7.2.3 Environmental Protection Agency (EPA) Programs

The EPA provides grants to States, non-profits, and educational institutions to support high-quality research that will improve the scientific basis for decisions on national environmental issues and help the EPA to achieve its goals. The EPA provides research grants and graduate fellowships; supports environmental education projects that enhance the public's awareness, knowledge, and skills to make informed decisions that affect environmental quality; offers information for State and local governments and small businesses on financing environmental services and projects; and provides other financial assistance through programs such as the Drinking Water State Revolving Fund (DWSRF), the Clean Water State Revolving Fund (CWSRF), and the Brownfield Program. More information on the EPA can be accessed at: www.epa.gov.

The EPA offers the following grant programs:

- Continuing Program Grants
- Project Grants
- Clean Water State Revolving Fund Program
- Water Pollution Control Program
- Water Quality Cooperative Agreements Program
- Water Quality Management Planning Program
- Onsite Wastewater Management Planning Program
- Drinking Water State Revolving Fund Loan Program

Georgia Environmental Protection Division (EPD)

The mission of EPD is to help provide Georgia's citizens with clean air, clean water, healthy lives and productive land by assuring compliance with environmental laws and by assisting others to do their part for a better environment. As a result of the Clean Water Act, each year the State of Georgia receives funding from the U.S. Environmental Protection Agency to assist the State with addressing environmental issues. EPD offers the following grant programs:

- Section 319 (h) Grants
- Section 604 (b) Grants

7.2.4 U.S. Department of Agriculture – Natural Resource Conservation Service (USDA-NRCS) Conservation Programs

The USDA-NRCS offers a number of funding opportunities as a result of the Farm Security and Rural Investment Act of 2002. This Act is landmark legislation for conservation funding and for

focusing on environmental issues. The conservation provisions will assist farmers and ranchers in meeting environmental challenges on their land. This legislation simplifies existing programs and creates new programs to address high priority environmental and production goals. The USDA-NRCS offers the following funding options:

- Agricultural Conservation Easement Program
- Conservation of Private Grazing Land Program
- Environmental Quality Incentives Program
- Resource Conservation and Development Program

7.3 Alignment with Other Plans

The Suwannee-Satilla Council's Plan and management practices selection process were based on identifying and supporting existing policy, planning, and projects. Local comprehensive plans, planned and/or permitted projects were relied upon in developing the Regional Water Plan. This approach is tailored to maintain consistency with, and to maximize support for, locally driven water resource management decisions. The Suwannee-Satilla Council did identify potential challenges associated with both the cost and technical issues that the region may face; especially regarding water and wastewater needs for both new and aging infrastructure. In addition, addressing existing surface water challenges must be accomplished in a manner that does not cause adverse impacts to local water users and local governments.

The challenges of funding Plan recommendations and addressing future technical and regulatory issues is especially difficult for smaller towns and utilities, agricultural water uses, and small businesses that rely on natural resources. The successful implementation of the Regional Water Plan will be dependent on the principles of support and leadership by state agencies, in a collaborative setting, utilizing incentives and financial assistance to the extent possible.

7.4 Recommendations to the State

The Suwannee-Satilla Council supports the concept of regional water resource planning with a focus on planning Councils composed of local governments, water users, water providers, industry, business, and affected stakeholders. Local representatives are typically most familiar with local water resource issues and needs. The State has a vital role providing technical support, guidance, and funding to support locally focused water resource planning. This Plan should be viewed as a living, iterative document and the State should focus on the following principles:

7.4.1 Education, Incentives, Collaboration, Cooperation, Enabling, Supporting

The Suwannee-Satilla Council is sensitive to unintended consequences if Plan recommendations become mandates or infringe upon private property rights. The State must help balance Plan recommendations with assessing measurable progress toward Plan

implementation. If additional rules or other administrative or regulatory actions are deemed necessary, the State should work with Councils to help ensure workable solutions.

The following specific recommendations to the State are provided to help aid in the successful implementation of the Plan.

Georgia Environmental Protection Division (EPD)

- Consider "institutionalizing" planning. This would entail a long-term commitment of staff and funding to: monitor and support Plan recommendations; coordinate improved data collection, management and analysis; continue to develop and improve Resource Assessment tools; and help provide funding, permitting, and technical support to address challenges and water resource needs.

- Work with EPD's Agricultural Water Metering Program, as well as other partners, including but not limited to, the University of Georgia and the Georgia Department of Agriculture, to improve agricultural water use data collection and management. This effort would focus on refining source(s) of supply for multiple irrigation sources, continuing to assess data on crop water requirements, evaluating the effects of farm ponds on direct irrigation withdrawals and the hydrologic cycle, and further research on crop consumptive use. This data in turn should be coordinated with Resource Assessment tools to ensure accurate simulation of any challenges and assumptions.

- Support completion, maintenance and improvement of the Agricultural Water Use Measurement Program, which is aimed at cost effectively collecting agricultural water use data across the State, and integrating cooperative arrangements with the private sector and partnerships with other State agencies. This program is a vital component to helping the State and regions effectively manage and utilize water resources.

- As applicable, work with local partners to expand water quality monitoring of tributaries on the State's 303(d) list and tributaries identified as having little or no dissolved oxygen assimilative capacity. Develop a new dissolved oxygen standard that reflects the naturally low concentrations in blackwater streams that are prevalent in this area.

- Focus funding support and permitting assistance to projects and programs aimed at addressing challenge areas. Where possible, leverage federal funds to help support and expedite project implementation.

- Consider collaborative approaches to collecting more standardized water use data and improving data on water demands. This would include continued improvement and updating databases used in the planning process. It would also involve working with the Georgia Municipal Association, Georgia Association of County Commissioners, and other relevant stakeholders to improve water use information.

- Working with Georgia Environmental Finance Authority, examine opportunities to improve coordination among water providers and users and create incentives to maximize existing infrastructure and coordinated operations.

- Continue to engage in dialogue and data-sharing with the States of Florida and South Carolina regarding current and forecasted groundwater use. South Georgia, North Florida, and South Carolina rely on the Floridan Aquifer to meet water supply needs and it is in EPD's best interest to include the most accurate available information on growth and groundwater use in both states in the Resource Assessment modeling.

Georgia Environmental Finance Authority (GEFA)

- Meeting forecasted water supply needs will require stable and flexible funding sources to assist water users and water and wastewater utilities in meeting forecasted needs. A stable GEFA financing source(s) should be provided for necessary water supply, water and wastewater plant construction, and plant upgrades to address current and future challenges.

Georgia Forestry Commission (GFC)

- Continue to support and fund the GFC Forestry Best Management Practices Program. Providing education and incentives to control erosion and segmentation will help the region prevent/address TMDL listed segments, reduce nutrient loadings, and support wetland areas. This will have the benefit of helping sustaining baseflow conditions of streams and water quality.

Georgia Soil and Water Conservation Commission (GSWCC)

GSWCC should continue to provide leadership and locally focused efforts in the following programs:

- Continue education and outreach associated with Urban Erosion and Sediment Control program including certification of individuals involved in land disturbing activities and on-site implementation of erosion, sedimentation, and pollution control plans. This will help address the water quality needs of the region.

- Continue education and outreach efforts to agricultural interests to inform farmers of available technologies and funding sources to make more efficient use of water resources without incurring hardship.

- Support Georgia Agricultural Conservation Incentive program, which provides funding support to help implement conservation practices. Funding for this program is essential to help implement conservation measures, especially in the regional watersheds where there are surface water challenges.

- Provide incentives to restore wetlands and historically drained hardwood swamps and other natural retention areas. Restoration of these features will replenish sources of headwaters by retaining surface runoff and releasing it over a longer period to offset loss of baseflows between rain events, while also providing additional recharge to surficial aquifers.

Office of State Planning and Budget (OPB)

- Obtain population census data and compare to population forecasts to track trends in the accuracy of population projections.
- Revise population forecasts and support ongoing state-wide planning.

Department of Community Affairs (DCA)

- Identify and encourage local governments to integrate Regional Water Plan management practices with land use and water quality/quantity nexuses into their comprehensive planning efforts.
- Continue to promote coordinated environmental planning.

In-State Universities and Colleges

- Research the percent loss and consumption of irrigation water applied to crops to estimate how much of the water that is applied to a crop is lost to evaporation, runs off into surface waters, and infiltrates to groundwater.
- Research varieties of crops that require less water and are more drought resistant.
- Research the impacts of development and various land uses on aquifer recharge areas.
- Research the effectiveness of management practices to control non-point source pollutants such as sediment, E. Coli, and nutrients in stormwater runoff from different land uses including urban and rural development, agriculture, and silviculture.
- Research the role played by wetlands in abating runoff flows from storm events, providing source water for surface water features, and treating surface water quality. Evaluate the benefits of restoring previously drained and/or developed wetlands to their natural state.

Georgia Department of Agriculture (DOA)

- Provide technical information and participate in needed studies to better characterize agricultural water uses and quantification of shortages to low flow conditions.

- Assist with outreach and education of agricultural users to obtain greater understanding of surface water resource limitations, both quality and quantity, and to help improve the implementation rate of management practices. Assist EPD and other state agencies in coordinating accomplishment of the above goals with the Georgia Farm Bureau.

Georgia Department of Natural Resources [Coastal Resources Division (CRD) and Wildlife Resources Division (WRD)]

- Continue to monitor resources and help sustain, enhance, protect and conserve Georgia's natural, historic, and cultural resources.
- Provide technical and ecosystem information to help support state water planning needs.

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SECTION 8

Monitoring and Reporting Progress

Section 8 Monitoring and Reporting Progress

Summary

The Suwannee-Satilla Council has identified several benchmarks and means to measure progress toward meeting regional needs and goals. In most cases, efforts will require significant coordination between affected water resource managers, and local and state government. Successful implementation will be dependent on adequate financing, leadership and support by state agencies, and collaboration by multiple stakeholders. New and/or changing information will likely influence how the recommended practices are ultimately implemented.

The selected water management practices identified in Section 6 will be primarily implemented (as described in Section 7) by the various water users in the Region, including local governments and others with the capacity to develop water infrastructure and apply for the required permits, grants, and loans.

8.1 Benchmarks

The benchmarks prepared by the Suwannee-Satilla Council and listed in Table 8-1 will be used to assess the effectiveness of this Plan's implementation and identify any required revisions. As detailed below, the Suwannee-Satilla Council selected both qualitative and quantitative benchmarks that will be used to assess whether the water management practices are closing water resource challenges over time and allowing the water planning region to meet its Vision and Goals. The benchmarks will be used to evaluate the Regional Water Plan effectiveness at the next 5-year Plan review.

Effective implementation of the Plan will require the availability of sufficient funding in the form of loans, and in some cases, possibly grants. In addition, many of the proposed management practices require ongoing coordination with affected stakeholders/water users and collaboration to help ensure successful solutions are identified and implemented. Finally, in many cases monitoring progress toward addressing future needs will require improved data and information on the current actions and management practices that are already in place. The benchmarks will be used to evaluate the Regional Water Plan effectiveness at the next 5-year Plan review and will require collection of information in the intervening years to better quantify and document resource conditions and progress toward meeting regional needs and goals. The successful implementation of the Regional Water Plan will require both leadership and supporting roles by Georgia EPD, other state agencies, local government and water and wastewater utilities, as well as individual water users.

Table 8-1 Benchmarks for Water Management Plans

Management Practice No. (See Table 6-1)	Benchmark	Measurement Tools	Time Period
Address Current and Future Surface Water Use in Challenge Areas Data Collection/Additional Research (DCAR) to confirm frequency, duration, and severity of agriculturally-driven shortages to 7Q10 low flow conditions			
DCAR-1 through DCAR-9 Research in Agricultural and Alternative Supply Management Practices	▪ Develop Plan of Study, obtain funding and stakeholder participation as needed ▪ Completion of work plans and study implementation and documentation of results ▪ Incorporate data and findings into forecasts, Resource Assessments, and Water Plan updates	▪ Survey or self-reporting of agencies/entities involved in studies ▪ Verify inputs and revisions to water planning tools	2-4 years 5 years
Groundwater quantity and surface water quantity throughout the region			
WC-1 and WC-2 Tier 1 and Tier 2 Measures for Municipal, Industrial, and Agricultural Users	▪ Maintain or reduce gallons per capita consistent with Tiers 1 and 2 conservation practices ▪ Implementation of Tiers 1 and 2 agricultural conservation practices	Assess regional municipal, industrial, and agricultural water use rate trends and practices via periodic survey	2-5 years
WC-3 through WC-12 Tier 3 and Tier 4 Measures for Agricultural Users	Reduction in agricultural surface water withdrawals while maintaining agricultural production and reduction in surface water challenges	▪ Survey of agricultural conservation practices implementation rates and trends in water use by GSWCC ▪ Assess flow conditions using water use data and Resource Assessment tools (EPD)	2-5 years
Address Current and Future Surface Water Use in Challenge Areas Additional/Alternate to Existing Surface Water Supply Sources (ASWS)			
ASWS-1 Consider Low Flow Conditions in Future Surface Water Permitting	▪ Formation of stakeholder group and consensus reached on new surface water application process in challenge areas ▪ Application process and permit conditions developed	Status report from stakeholder group; Report on usage of process and the number of permits issued with conditions	1-2 years 2-4 years
ASWS-2 Incentives for Dry-Year Releases from Ponds	Incentives and operating conditions identified as part of ASWS-1	Document and maintain volumetric accounting of participating storage facilities	2-5 years

Management Practice No. (See Table 6-1)	Benchmark	Measurement Tools	Time Period
ASWS-3 Substitute Future Surface Water Use with Groundwater in Challenge Areas	▪ Information and educational materials developed in conjunction with GSWCC and Georgia DOA to communicate details and goals of improving surface water flows ▪ Methods and incentives identified to increase implementation/participation	▪ Verify information and educational outreach via survey or direct agency reporting ▪ Monitor and track surface water versus groundwater permit applications	1-3 years 1-5 years
ASWS-4 Substitute Existing Agricultural Surface Water Use with Groundwater in Dry Years	▪ Develop information and educational materials in conjunction with GSWCC and Georgia DOA to communicate details and goals of improving surface water flows ▪ Identify methods and incentives to increase implementation/participation	Identify and monitor participation and conversion rates from surface water to groundwater	1-3 years 1-5 years
ASWS-5 Opportunities and Incentives for Dry-Year Releases from Ponds	▪ Completion of feasibility study ▪ Working with potential participants, opportunities and incentives identified	▪ Identification of largest storage facilities for potential participation in challenge areas ▪ Report summarizing opportunities and implementation	1-3 years 1-5 years
ASWS-6 Consider Phased Seasonal Agricultural Permit Conditions	▪ Identify need for permit seasonality on a resource (drainage basin) basis and feasibility of permit alterations ▪ Study magnitude of required permit alterations in identified basins through surface water availability modeling	▪ Inventory of basins that cannot support existing permitted uses in drought seasons ▪ Report summarizing study results	1-3 years 3-5 years
ASWS-7 Ecological Restoration Incentive Program	Pending feasibility study	Assess results of research	5 years
ASWS-8 through ASWS-11 Land Management Incentives and Alternative Supply Sources	▪ Feasibility studies completed (for short-term studies) ▪ Feasibility studies initiated (for long-term studies/actions)	Reevaluate need during next Regional Water Plan update	5 years (for ASWS 9: 1-3 years)

Management Practice No. (See Table 6-1)	Benchmark	Measurement Tools	Time Period
Address Water Quality (Dissolved Oxygen Levels) – Point Sources (PSDO)			
PSDO-1 Collect Water Quality Data	▪ Resource Assessment assumptions reviewed and, if necessary, new data collection efforts underway/completed ▪ New findings incorporated into updated Resource Assessment data sets	▪ EPD/agency summary report complete verifying assumptions and documentation of new data	1-4 years
PSDO-2 Point Source Discharge Relocation	▪ Outreach activities to dischargers completed and feasible options have implemented by dischargers ▪ EPD to conduct outreach and facilitate improved treatment in low dissolved oxygen reaches	Monitor permit applications and verify improved data collection for dischargers	5 years
PSDO-3 Improve Treatment Facilities			
Obtain Additional Municipal and Industrial Water and Wastewater Permit Capacity			
MWWPC-1, IWWPC-1, MGWPC-1, IGWPC-1 Expansion of Wastewater and Groundwater Permit Capacities to Address Challenges/Needs	▪ Outreach activities completed to water providers in high growth areas ▪ Need for additional permit capacity verified and improved data for discharges obtained	Monitor permit applications and verify improved data collection for dischargers	5 years
Addressing Current and Future Groundwater Needs for Challenge and Non-challenge Areas			
GW-1 Sustainable Groundwater Development	Sufficient permit capacity to meet forecasted needs; through the timely submittal and processing of permit applications	Monitor permit applications and issuance	1-5 years
GW-2 Promote Aquifer-Friendly Land Uses	Counties and local governments consider practices to promote infiltration and aquifer recharge	Evaluate trends in impervious land cover in areas of aquifer recharge	5 years
GW-3 Research Groundwater Sustainability	Sound science used to improve data and sustainably manage groundwater resources	Groundwater Resource Assessment updated	5 years
GW-4 Inter-State Resource Planning	Data sharing and cooperation with Florida; incorporation of Florida forecast uses into future modeling		

Management Practice No. (See Table 6-1)	Benchmark	Measurement Tools	Time Period
Addressing Current and Future Surface Water Needs for Challenge and Non-challenge Areas			
SW-1 Surface Water Use Within Available Capacity	Sufficient permit capacity exists to meet forecasted needs through timely submittal and processing of permit applications	Monitor permit applications and issuance	1-5 years
SW-2 Study Human Impacts on Water Quality	▪ Major water resources diversion/storage projects identified ▪ Upstream actions that would significantly impact flow conditions assessed	Monitoring data collected in estuaries and river flow trend data collected and reviewed	5 years
Programmatic Practices for Water Quality – The following management practices are associated with the Vision and Goals of the Region and are described in general terms as they are either associated with existing state and local programs or are not yet at a point where implementation frameworks have been established by the State			
▪ Ammonia and Nutrients Point Sources ▪ Nutrient Non-point sources Satilla Watershed Model ▪ Urban/Suburban, Rural, Forestry, and Agricultural Non-point source BMPs ▪ Total Maximum Daily Load Listed Streams BMPs	Additional assessments to align sources of contaminates (point and non-point sources) to water quality impairments and land use types ▪ Continue implementation and assessment of the effectiveness of existing state program including GFC, GSWCC, 319 Water Quality initiatives, and local efforts to improve watershed protection and water quality improvements ▪ Background/natural levels of potential sources established	▪ Review and assessment of programs and information ▪ Complete summaries of watershed conditions using Resource Assessment tools, improved data collection, and synthesis of relevant state program data	1-5 years
Management Practices to Support Educational Needs			
Support education programs for: Water Conservation, Stormwater Management, Septic System Maintenance, Logger Education, and, Forestry BMPs	▪ Data used to identify where future program efforts will be most effective ▪ Funding for programs maintained or improved	Survey and summarize program effectiveness and success stories	1- 5 years

Management Practice No. (See Table 6-1)	Benchmark	Measurement Tools	Time Period
Management Practices to Address Ordinance and Code Policy Needs			
▪ Encourage implementation and/or compliance with Stormwater ordinances and/or regulations ▪ Encourage improved conformance with Environmental Planning Criteria developed pursuant to Part V of the Georgia Planning Act ▪ Encourage local governments to improve conformance with erosion/sediment control measures	▪ Select local governments surveyed to identify current knowledge base and recommended areas of improvement ▪ Improved education at state and local government conferences and workshops ▪ Enhanced awareness in Comprehensive Planning by local governments across region	Select follow-up survey of local governments to identify changes and success stories	1-5 years
Shared Resources			
Combined management practices for surface water challenges (Altamaha, Upper Flint, Lower Flint-Ochlockonee Planning Regions)	Regional Council-specific management practices implemented	Evaluate project improvement of surface water flows using gauge data and Resource Assessment tools	1-5 years
Ongoing Planning coordination with Florida	▪ Outreach and coordination with states completed and water planning data collected ▪ Review Resource Assessment tools and make modifications if warranted	▪ Report summarizing planning data ▪ Information needs and issues documentation	1-5 years 5 years

8.2 Plan Updates

Meeting current and future water needs will require periodic review and revision of Regional Water Plans. The State Water Plan and associated rules provide that each Regional Water Plan will be subject to review by the appropriate Regional Water Planning Council every 5 years and in accordance with the guidance provided by the Director, unless otherwise required by the Director for earlier review. These reviews and updates will allow an opportunity to adapt the Regional Water Plan based on changed circumstances and new information arising in the 5 years after EPD's adoption of these plans. These benchmarks will guide EPD in the review of the Regional Water Plan.

The Councils appointed to prepare future Regional Water Plan updates will have the opportunity to review the recommendations of past Plans against current available data to make a determination as to which management practices are still appropriate and which ones need to be revised or augmented to meet changing conditions. Future Councils will also have the ability to judge the effectiveness of practices recommended in previous Plans against available benchmark data. This analysis will reveal which practices are effective and what adjustments are necessary to compensate for less effective practices.

8.3 Plan Amendments

The Suwannee-Satilla Council emphasizes that the recommendations in this Regional Water Plan are based on the best information available at the time the Plan was written. New information and issues that may impact the recommendations should be considered and incorporated into relevant implementation decisions and future Regional Water Plan updates. Future planning efforts should confirm current assumptions and make necessary revisions and/or improvements to the conclusions reached during this phase of planning.

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SECTION 9

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Section 9 Bibliography

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APPENDIX A

Appendix A Summary of Edits and Updates 2022-2023 Review and Revisions

Section	Location	Change	Description
ES	Trends and Key Findings	Updated summary box text with the most recent information.	▪ Population information was updated based on recent statewide population projections (Governor's Office of Planning and Budget, 2019). ▪ Updated water use information from the Suwannee-Satilla Water and Wastewater Forecasting Technical Memorandum (CDM Smith, 2022). ▪ Updated discussion of surface water challenges based on results from Surface Water Availability Resource Assessment (EPD, 2023b). ▪ Added fecal coliform based on results from Surface Water Quality (Assimilative Capacity) Resource Assessment (EPD, 2023a).
ES	Introduction/Overview	Updated state growth information	▪ Values for the state of Georgia were updated based on the recent information from the U.S. Census Bureau.
ES	Introduction/Overview	Minor text revisions/updates	▪ Text was updated to reflect the purpose of this document as an update to the original Plan completed in 2011 and 2017 Plan update. ▪ Updated wording.
ES	Introduction/Overview	Updated population projections	▪ Values were updated based on recent statewide population projections (Governor's Office of Planning and Budget, 2019).
ES	Water Resources and Use, Figure ES-2	Updated water use information and figure	▪ Surface water and groundwater information was updated based on Water Use in Georgia by County for 2015; and Water-Use Trends, 1980-2015" (USGS, 2019).
ES	Water and Wastewater Needs, Figure ES-3	Updated water use information and figure	▪ Surface water and groundwater use by sector was updated based on Water Use in Georgia by County for 2015; and Water-Use Trends, 1980-2015" (USGS, 2019).
ES	Water Resources and Use, Figure ES-4	Updated return flow information and figure	▪ Wastewater values updated based on the Suwannee-Satilla Water and Wastewater Forecasting Technical Memorandum (CDM Smith, 2022).
ES	Forecasted Water Resource Needs from the 2020-2060	Updated water and wastewater forecasts	▪ Water and wastewater projections updated based on the Suwannee-Satilla Water and Wastewater Forecasting Technical Memorandum (CDM Smith, 2022). ▪ Text added for clarification.
ES	Figure ES-5	Updated	▪ Population information was updated based on recent statewide population projections (Governor's Office of Planning and Budget, 2019).
ES	Groundwater Availability	Updated/modified text	▪ Groundwater use projection updated based on Suwannee-Satilla Water and Wastewater Forecasting Technical Memorandum (CDM Smith, 2022). ▪ Text added based on results from the Groundwater Availability Resource Assessment (EPD, 2010).
ES	Surface Water Availability	Updated/modified text	▪ Text was revised based on the new BEAM modeling approach from the Surface Water Availability Resource Assessment (EPD, 2023b). ▪ Results from the old (2017) modeling approach were removed.

Section	Location	Change	Description
ES	Table ES-1	Updated	▪ Replaced (2017) Table ES-1 with new (2023) Table ES-1 to describe the forecasted surface water challenges from BEAM modeling.
ES	Assessment of Water Quality Conditions	Updated/modified text	▪ Updated discussion and statistics of water quality impairments based on results from Surface Water Quality (Assimilative Capacity) Resource Assessment (EPD, 2023a).
ES	Summary of Resource Assessment Results	Updated summary box text with the most recent surface water quality information	▪ Updated summary of groundwater Groundwater Availability Resource Assessment (EPD, 2010). ▪ Updated summary of surface water quantity based on results from Surface Water Availability Resource Assessment (EPD, 2023b). ▪ Updated summary of assimilative capacity based on results from Surface Water Quality (Assimilative Capacity) Resource Assessment (EPD, 2023a).
ES	Identifying Water Management Practices to Address Water Resources Challenges and Future Needs	Minor text revisions/updates	▪ Updated word choice.
ES	Table ES-2	Updated	▪ Minor text updates to Management Practices based on Figure 6-1.
ES	Table ES-3	Updated	▪ Minor text updates to Management Practices based on Figure 6-2.
ES	Implementing Water Management Practices	Minor text revisions/updates	▪ Updated word choice.
1	Section 1	Minor text revisions/updates	▪ Updated text to reflect 2020 population trends. ▪ Text was revised/updated to reflect the purpose of this document as an update to the original Plan completed in 2011 and 2017 Plan update.
1	Section 1.1	Minor text revisions	▪ Revised sentence structures. ▪ Text removed for major watersheds since it is not incorporated in Figure 1-1.
1	Figure 1-1	Updated	▪ Replaced original graphic with one that provides better clarity on Region and County boundaries.
1	Section 1.2	Minor text revisions/updates	▪ Removed 'Department of Community Affairs (DCA) from the Council's Memorandum of Agreement (MOA) ▪ Updated word choice.
1	Figure 1-2	Updated	▪ Replaced original graphic with one that provides changes made to the water planning process.
1	Section 1.3	Minor text revisions/updates	▪ Text was revised/updated to reflect the purpose of this document as an update to the original Plan completed in 2011 and 2017 Plan update.

Section	Location	Change	Description
1	Section 1.3	Updated	▪ Replaced written text with Figure 1-4 that outlines the Council's goals.
1	Section 1.3	Minor text revisions	▪ Removed text and link to the Suwannee-Satilla website.
2	Section 2.1.1	Minor text revisions/updates	▪ Updated text regarding species in the Okefenokee Swamp.
2	Section 2.1.2	Updated percentage of groundwater supplied from the Floridan aquifer system	▪ Updated percentage of groundwater supplied to the Suwannee-Satilla Planning Region from the Floridan aquifer system based on 2019 forecasted groundwater withdrawal information.
2	Section 2.2	Updated population projection	▪ Population projections were updated based on recent statewide population projections (U.S. Census, 2020).
2	Section 2.2	Updated major employers	▪ Updated major employers in the region (Georgia Department of Labor Local Area Profiles).
2	Section 2.2	Updated agriculture statistics	▪ Agriculture statistics were updated for 2017 (2017 Census of Agriculture; U.S. Department of Agriculture, U.S. Department of Commerce Bureau of Economic Analysis).
2	Section 2.2 and Figure 2-3	Updated land cover distribution	▪ Updated land use values based on recent data (University of Georgia Natural Resources Spatial Analysis Laboratory).
2	Section 2.3	Minor text revisions/updates	▪ Updated text in second paragraph to reflect that the Southern Georgia Regional Commission's Regional Plan was updated in 2018.
3	Summary Box	Updated summary box text with the most recent information.	▪ Updated withdrawal values from 2015.
3	Section 3.1, Figure 3-1 to 3-4	Updated water use values and figures	▪ Updated water use values based on recent data from Water Use in Georgia by County for 2015; and Water-Use Trends, 1985-2015.
3	Section 3.2	Minor text revisions	▪ Updated word choice.
3	Section 3.2.1	Minor text revisions	▪ Reference was updated to 2023 for The Water Quality (Assimilative Capacity) Resource Assessment (EPD, 2023a).
3	Section 3.2.1, Assimilative Capacity Modeling (Dissolved Oxygen)	Minor text revisions	▪ Updated the reference to the year of the Resource Assessment (2019). ▪ Updated word choice.
3	Table 3-1	Updated	▪ Values and notes updated with most recent results of the assimilative capacity assessment.
3	Figure 3-6	Updated	▪ Figure updated with most recent results of the assimilative capacity assessment.

Section	Location	Change	Description
3	Section 3.2.2	Text revisions/updates	▪ Updated the reference to the year of the Resource Assessment. ▪ Updated descriptions of the new approach Surface Water Availability Resource Assessment to more accurately describe the nature of the analysis. ▪ Updated word choice and sentence structure. ▪ Text removed describing the old modeling approach and planning nodes.
3	Section 3.2.2	Paragraph addition	▪ The second paragraph was added to accurately describe the changes in approach to the Surface Water Availability Resource Assessment.
3	Figure 3-7	Updated	▪ Figure updated to show the new BEAM model nodes.
3	Table 3-2	Revised/Updated	▪ Table was revised to align with the 2023 approach and updates. Values presented are based on the Surface Water Availability Assessment, 2023b, EPD.
3	Section 3.2.2	Paragraph addition	▪ The sixth paragraph was added to accurately describe the changes in approach to the Surface Water Availability Resource Assessment.
3	Section 3.2.3	Text revisions/updates	▪ Updated the reference to the year of the Resource Assessment. ▪ Updated text based on the new modeling results from The Groundwater Availability Resource Assessment (EPD, 2010). ▪ Updated word choice and sentence structure.
3	Section 3.3	Text revisions/updates	▪ Updated the reference and website to the new 2015 State Wildlife Action Plan. ▪ Updated text based on new data from the 2015 State Wildlife Action Plan.
3	Section 3.3 Impaired Water Bodies	Minor text revisions/updates	▪ Total impaired length, area and percentages of impaired reaches/lakes was updated. ▪ Added text related to TMDLs and references.
3	Figure 3-9	Updated	▪ Values updated with most recent results of the Assimilative Capacity Assessment.
4	Summary	Updated projection values	▪ The text was updated to reflect the revised forecasts.
4	Section 4	Minor text revisions/updates	▪ Updated planning horizon in first paragraph.
4	Section 4.1	Minor text revisions/updates	▪ The text was updated to reflect industrial water use being forecasted separately.
4	Table 4-1	Updated	▪ Population projections were updated based on the most recent statewide population projections (Governor's Office of Planning and Budget, 2019).
4	Section 4.1 Municipal Water Forecasts	Text additions	▪ Text was added to describe updated methodology utilized during the Plan update. ▪ Updated word choice. ▪ Updated the reference to the year of the Technical Memorandum (CDM Smith, 2022).

Section	Location	Change	Description
4	Figure 4-1	Updated	▪ This figure was updated to reflect the revised municipal water forecasts based on Suwannee-Satilla Water and Wastewater Forecasting Technical Memorandum (2022). ▪ The text box was added to include the data source and notes.
4	Section 4.1 Municipal Wastewater Forecasts	Text revisions/updates	▪ The text was updated for the changes in methodology for municipal wastewater forecasts and septic system use. ▪ The last paragraph was removed due to changes in septic wastewater flow methodology.
4	Figure 4-2	Updated	▪ This figure was updated to reflect the revised municipal wastewater forecasts based on Suwannee-Satilla Water and Wastewater Forecasting Technical Memorandum (2022). ▪ The text box was added to include the data source and notes.
4	Section 4.2	Text revisions/updates	▪ Updated the text for the new categories for major water-using industries. ▪ The text was updated to reflect revised methodology for industrial forecasts. The data was previously based on production or employment and is now based on permit information and representative input from each industrial sub-sector.
4	Section 4.2 Advisory Group Review Process (Previously Employment Projections)	Text revisions/updates	▪ The previous section (Employment Projections) was replaced to reflect revised methodology for industrial forecasts. ▪ The data was previously based on production or employment and is now based on permit information and representative input from each industrial sub-sector.
4	Section 4.2 Industrial Water Forecasts	Text revisions/updates	▪ The text was updated to reflect revised methodology. ▪ The average water withdrawal from 2010 to 2019 for industrial facilities was used as the basis for projected water use.
4	Table 4-2 Baseline and Alternative Industrial Water Demands	Removed	▪ This table was removed to reflect revised methodology. Baseline and alternative industrial water use are no longer applicable.
4	Section 4.2 Industrial Wastewater Forecasts	Text revisions/updates	▪ The text was updated to reflect revised methodology. ▪ The industrial wastewater forecast is now estimated using facility discharge permit information from 2015 to 2019.
4	Figure 4-3	Updated	▪ This figure was updated to reflect the revised industrial water and wastewater forecasts based on Suwannee-Satilla Water and Wastewater Forecasting Technical Memorandum (2022). ▪ The text box was added to include the data source and notes.

Section	Location	Change	Description
4	Section 4.3	Text revisions/updates	▪ Updated planning horizon in first paragraph. ▪ The text was updated to reflect the updated methodology for agricultural demand forecasts. ▪ Agricultural forecasts were updated based on based on Suwannee-Satilla Water and Wastewater Forecasting Technical Memorandum (2022).
4	Table 4-2	Updated	▪ This table was updated to reflect the revised agricultural forecasts based on Suwannee-Satilla Water and Wastewater Forecasting Technical Memorandum (2022). ▪ The data source and notes were updated in the text box to reflect changes in methodology.
4	Figure 4-4	Updated	▪ This figure was updated to reflect the revised agricultural water use forecasts. ▪ The text box was added to include the data source and notes.
4	Section 4.4	Text revisions/updates	▪ Updated planning horizon in first paragraph. ▪ The text was updated to reflect the revised water forecasts for thermoelectric power based on Suwannee-Satilla Water and Wastewater Forecasting Technical Memorandum (2022).
4	Table 4-3	Updated	▪ The table was updated with the revised water forecasts data for thermoelectric power based on Suwannee-Satilla Water and Wastewater Forecasting Technical Memorandum (2022). ▪ The text box was updated.
4	Section 4.5	Text revisions/updates	▪ The text was updated based on the most recent data.
4	Figure 4-5	Updated	▪ This figure was updated with the revised water demand totals per sector. ▪ The text box was added to include the data source and notes.
4	Figure 4-6	Updated	▪ This figure was updated with the revised total wastewater flows. ▪ The text box was added to include the data source and notes.
5	Summary	Text revisions/updates	▪ Updated locations where potential surface water challenges occur.
5	Section 5 Introduction	Minor text revisions	▪ Updated word choice.
5	Section 5.1	Text revisions/updates	▪ Updated the reference for Groundwater Availability Resource Assessment (EPD, 2010). ▪ Updated word choice. ▪ Updated counties that may need additional permitted capacity for groundwater in the future.
5	Figure 5-1	Updated	▪ This figure was updated with projected groundwater demands compared to the calculated sustainable yield for all councils, as well as the portion of demand attributed to Suwannee-Satilla in the modeled aquifer area. ▪ The data sources in the text box were updated.

Section	Location	Change	Description
5	Table 5-1	Table revisions/updates	▪ Values in the table were updated based on revised permitted water withdrawal values and the updated demand forecasts.
5	Section 5.2	Text revisions/updates	▪ Updated word choice and sentence structure. ▪ List of planning nodes was removed due to new BEAM modeling approach. ▪ Text was added regarding the revised methodology, analysis and results of the Surface Water Availability Resource Assessment. ▪ Removed outdated text related to previous shortfall analysis.
5	Figure 5-2	Updated	▪ Figure 5-2 was replaced to reflect the new BEAM model nodes and highlight the nodes identified as having a potential challenge.
5	Table 5-2	Updated	▪ Table 5-2 was updated to include a summary of the potential challenges from the BEAM model nodes, which was previously planning nodes. ▪ The data source and notes were updated in the text box.
5	Table 5-3	Removed	▪ Table 5-3 was removed due to the outdated modeling approach.
5	Table 5-4	Updated	▪ Values in the table were updated based on the updated demands. ▪ The notes were updated in the text box.
5	Section 5.3	Minor text revisions	▪ Updated planning horizon in first paragraph.
5	Section 5.3.1	Text revisions/updates	▪ Industrial wastewater was included in the analysis. ▪ The text was updated to reflect the most recent data.
5	Table 5-5	Updated	▪ The table was updated with the latest permitted discharge flow values and the updated wastewater flow forecasts.
5	Section 5.3.2	Text revisions/updates	▪ Updated the date for flow and effluent discharge limits (2019). ▪ The text was updated to reflect the most recent data and modeling results. ▪ Updated planning horizon (2060).
5	Table 5-6	Updated	▪ This table was updated based on the results of the current assimilative capacity resource assessment. ▪ The data source and notes were updated in the text box.
5	Figure 5-3 and Figure 5-4	Updated	▪ The figures were updated to reflect current and future results from the Assimilative Capacity Assessment.
5	Section 5.3.3	Minor text revisions	▪ Updated the dates for references.
5	Section 5.4	Text revisions/updates	▪ The summary section was updated to recap major finding in the section.
5	Table 5-7	Updated	▪ Table 5-7 was updated to summarize the counties with specific identified issues.
6	Summary	Minor text revisions/updates	▪ Planning nodes from the 2017 Plan update were removed. ▪ Text added to include shared resources.

Section	Location	Change	Description
6	Section 6, 6.1 and 6.2	Minor text revisions/updates	▪ Updated word choice.
6	Table 6-1	Updated	▪ The Description/Definition of Action of various management practices were updated to align with 2023 updates and to capture the recommendations made by the council. ▪ Outdated text related to surface water availability challenges were removed. ▪ Additional updates: ▪ Previous DCAR-2 (Source of Supply Data to Refine Forecasts) was removed by Council. ▪ MGWPC-1 and IGWPC-1: Specific counties were removed for a more general approach. ▪ NPS-1: fecal coliform was replaced by E. Coli. ▪ Shared Resources: No updates on shared resource assessment. Shared resources were referenced generically.
6	Figure 6-1	Updated	▪ Updated timeline.
6	Figure 6-2	Updated	▪ Updated timeline.
7	Summary	Minor text revisions/updates	▪ Updated word choice.
7	Section 7	Minor text revisions/updates	▪ Updated dates.
7	Table 7-1	Updated	▪ Updated the dates in the columns "For All Actions: Initial Implementation Step(s) and Associated Date(s)" and "Further Action to Complete Implementation and Associated Dates" to reflect the planning horizon. ▪ Updated word choice. ▪ Removed specific counties for a more general approach. ▪ NPS: fecal coliform was replaced by E. Coli.
7	Section 7.2.1	Minor text revisions/updates	▪ Updated dates.
7	Table 7-2	Updated	▪ Costs were adjusted to 2023 dollars using the Engineering News Record Cost Index. ▪ Previous DCAR-2 (Source of Supply Data to Refine Forecasts) was removed by Council. ▪ Updated word choice, dates and population projections.
7	Section 7.3	Minor text revisions/updates	▪ Updated word choice.
7	Section 7.4.1	Minor text revisions/updates	▪ Updated word choice. ▪ Fecal coliform was replaced by E. Coli.
8	Section 8.1	Minor text revisions/updates	▪ Updated word choice.
8	Table 8-1	Updated	▪ Outdated text related to surface water availability challenges were removed.