



# Savannah-Upper Ogeechee

## Regional Water Plan

June 2017

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## Supplemental Documents

Supplemental data and technical memorandums may be found at the Council website.



## Acronyms and Abbreviations

WATER DEVELOPMENT & CONSERVATION PLAN

AAD-MGD	Annual Average Day in Million Gallons per Day
AADF	Annual Average Daily Flow
ACCG	Association of County Commissioners
af	acre-feet
Ag	Agriculture
AWWA	American Water Works Association
cfs	cubic feet per second
cfsd	cubic feet per second-day
CMOM	Capacity Management Operations and Management
DCA	Department of Community Affairs
DNR	Department of Natural Resources
DO	Dissolved Oxygen
ED	Education
EI.	Elevation (in feet)
EPD	Environmental Protection Division
FERC	Federal Energy Regulatory Commission
GAWP	Georgia Association of Water Professionals
GEFA	Georgia Environmental Finance Authority
GIS	Geographic Information Systems
GLCP	Georgia Land Conservation Program
GLUT	Georgia Land Use Trends
GMA	Georgia Municipal Association
gpcd	gallons per capita per day
gpf	gallons per flush
gpm	gallons per minute
GMA	Georgia Municipal Association
GRWA	Georgia Rural Water Association
GSWCC	Georgia Soil and Water Conservation Commission
GWPPC	Georgia Water Planning & Policy Center
HEC DSS	Hydrological Engineering Center Data Storage System
I/I	inflow and infiltration
IWA	International Water Association
LAS	land application system
LDA	local drainage area
MPs	Management Practices
MGD	million gallons per day
mg/L	milligrams per litre
MMD	maximum monthly demand
MMF	maximum monthly flow

## Acronyms and Abbreviations



WATER DEVELOPMENT & CONSERVATION PLAN

MLRA	major land resource area
MWh	megawatt-hour
NPDES	National Pollutant Discharge Elimination System
OCGA	Official Code of Georgia
OPB	Office of Planning and Budget
OSSMS	Onsite Sewage Management Systems
PS	point source
PSC	Public Service Commission
SB	Senate Bill
SCDHEC	South Carolina Department of Health and Environmental Control
SCDNR	South Carolina Department of Natural Resources
sq mi	square mile
SSO	Sanitary Sewer Overflow
TM	Technical Memorandum
TMDL	total maximum daily load
UGA	University of Georgia
USDA	U.D. Department of Agriculture
USACE	U.S Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
WD	Water Demand
WQ	Water Quality
WRD	Wildlife Resources Division
WS	Water Supply



## Acknowledgments

WATER DEVELOPMENT & CONSERVATION PLAN

We would like to acknowledge the contributions of the following members of the Savannah-Upper Ogeechee Water Planning Council. The council members volunteered their time and talents over countless meetings and conference calls during the update of this Regional Water Plan.

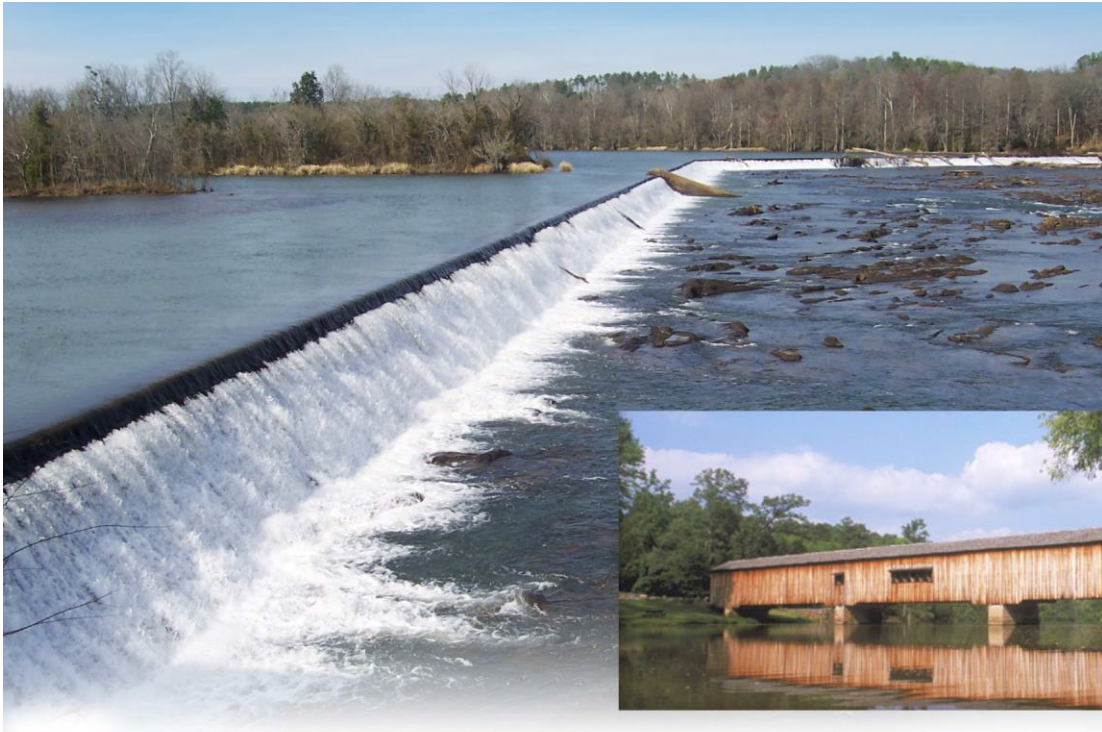
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We would also like to thank Jeff Larson and Jennifer Welte of Georgia EPD who spent countless hours supporting the Council.

# EXECUTIVE SUMMARY



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**The Savannah-Upper Ogeechee Water Planning Region** is one of ten such regions established by the Georgia General Assembly in 2008 as part of the State-wide Comprehensive Water Management Plan. The region's Water Planning Council (Council) consists of volunteer members who began working on the Regional Water Plan in March 2009 and completed those efforts in 2011. EPD adopted the initial Regional Water Plan in 2011. During the 5-year plan review and revision process (2016-17), the Council re-evaluated, and where appropriate, updated the Regional Water Plan. The plan describes water resources conditions, projected future demands, identified resource management issues, and recommended appropriate water management practices to be employed in the region through 2050.

Primary responsibility for implementing the Regional Water Plan is at the local level.



Other state and regional agencies also have implementation roles. The Regional Water Plan includes benchmarks selected to measure the plan's progress and identifies entities responsible for monitoring those milestones. Continued funding at both state and local levels is crucial to successful implementation.





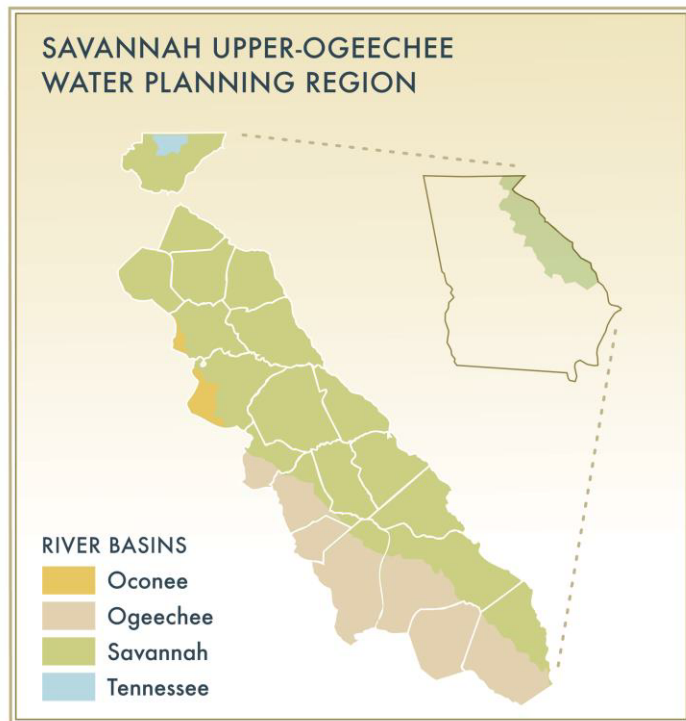
### Regional Overview

The Savannah-Upper Ogeechee Region includes 20 counties and 67 incorporated municipalities, with a current population of about 629,700 (2015 estimates). Slightly more than half of the region is covered by forest; only 8 percent of the region's land area is considered urban.

The Savannah River Basin includes three major lakes owned and operated by the U. S. Army of Corps of Engineers (USACE): Lake Hartwell, Lake Richard B. Russell, and Lake Thurmond. In addition to water supply, power generation, flood prevention, and drought management, the streams and lakes in the region support significant recreational uses and important biological resources.

The region covers portions of the Savannah, Ogeechee, Oconee and Tennessee River basins; the lower

portions of the Savannah, Ogeechee and Oconee basins lie within other regions, and the Savannah basin is shared with South Carolina. The region also includes various groundwater aquifer systems, particularly the Crystalline Rock aquifer, the Cretaceous aquifer and the Floridan aquifer systems. While much of the region's water comes from surface water and regulated reservoirs, portions of the region rely significantly on groundwater aquifers. In 2015, the Savannah-Upper Ogeechee Region withdrew approximately 316 million gallons per day (MGD) for water supply, with approximately 67 percent drawn from surface water. The region returned approximately 178 MGD of wastewater in 2015, with 52 percent from industrial and 48 percent from municipal sources. Currently, over 90 percent of the streams analyzed for dissolved oxygen levels have adequate capacity to assimilate pollutants.



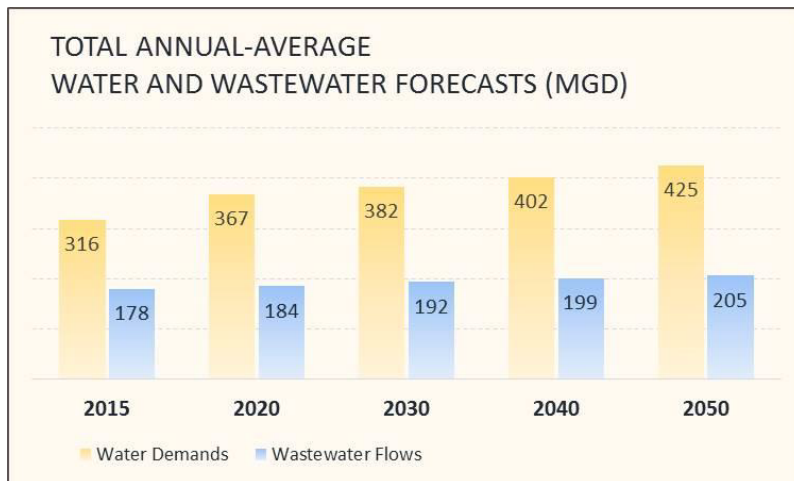
### Demand Forecasts and Water Resources Issues

With the region's population projected to grow to over 784,000 in 2050, the annual average water demand is projected to increase 34 percent from 2015 to 2050 (316 to 425 MGD). The region's wastewater generation will increase 15 percent from 2015 to 2050 (178 to 205 MGD) on an annual average daily basis. The Georgia Environmental Protection Division (EPD) conducted three Resource Assessments to



analyze resource conditions based on these projections. Available information regarding permitted facilities and land use on the South Carolina side of the Savannah River Basin was also incorporated.

The Surface Water Availability Resource Assessment (2017) indicates that the water supply needs in the Savannah River Basin can be met, assuming the USACE continues to operate its reservoirs using the current operation protocol; however, peak season agricultural irrigation may result in potential instream flow shortages in the Ogeechee Basin. The stream flow may fall below the flow thresholds analyzed in the resource assessment during summer low flow periods after meeting upstream irrigation needs.



The Groundwater Resource Assessment (2017) indicates that there will be adequate supplies to meet the region's future groundwater supply needs through 2050. The estimated sustainable yields from the Cretaceous aquifer and the portion of the Floridan aquifers that underlie the Savannah-Upper Ogeechee Region are significantly higher than the estimated demands from all planning regions relying on these aquifers.

EPD's Water Quality Resource Assessment (2017) predicted that some stream segments, including the Savannah Harbor, will have limited capacity to accept future wastewater discharges. Upgrade of existing wastewater treatment facilities or advanced treatment in new facilities will likely be required to improve the dissolved



oxygen levels in the streams. Dischargers along the Savannah River in both South Carolina and Georgia participated in a robust stakeholder process to determine appropriate discharge loadings in the basin with the ultimate goal of restoring water quality in the Savannah River and Harbor. In lieu of developing a TMDL document, a Category 5R process was initiated and a 5R plan developed for the Savannah River and Harbor as authorized by the



U.S. Environmental Protection Agency (USEPA) under the Clean Water Act. Stakeholders in the entire TMDL/5R process included USEPA, Georgia EPD, South Carolina Department of Health and Environmental Control (SCDHEC), and the Savannah River/Harbor Discharger Groups. The 5R plan was approved by USEPA and both Georgia EPD and SCDHEC are presently processing NPDES permit applications and reissuing permits for municipal and industrial facilities on the River/Harbor main stem and those facilities tributary to the main stem.

The Regional Water Plan's analysis shows that the rapidly-growing counties (especially Columbia County) will need additional water and wastewater infrastructure to meet growing demands in the next 35 years.

### Recommended Management Practices

To help address the region's water resources issues and comply with the Georgia Water Stewardship Act (SB 370) and EPD's rules for drought management and water supply efficiency, the Council recommends 15 priority water management practices. These priority practices include water conservation measures to further manage and reduce municipal, industrial, energy and agricultural demands in the entire region and monitoring of agricultural water use in the Upper Ogeechee River Basin. The Council suggests short-term and long-term actions for the recommended priority management practices.

To prevent potential shortages in meeting instream flow needs, the Council calls for more aggressive water conservation practices and development of drought management practices for the agricultural users/permittees in the Upper Ogeechee River Basin. The Council also recommends instream flow studies (to determine what flow levels are appropriate for protecting aquatic life) and additional streamflow monitoring in the Ogeechee River Basin (to confirm the frequency and magnitude of predicted instream flow shortages). Also, the Council's priority practices include development of local water and wastewater plans to identify local infrastructure needs and address watershed-related issues. The Council further supports State

implementation of the 5R plan for NPDES permitting to restore water quality in the Savannah River Basin and Harbor.



The Council also recommends 14 additional management practices to be considered by local governments and other responsible entities based on specific needs to be included in detailed local planning studies. These management practices promote proactive infrastructure planning and resource



management that, if implemented, will prevent or minimize local water resource shortages.

## Interstate Water Planning

The ongoing discussion between the states of Georgia and South Carolina is a defining issue of the Savannah River Basin. The topics under discussion and their successful resolution not only are critical to the appropriate use and protection of the Savannah River, but also will serve to inform future iterations of the Regional Water Plan. Discussion topics between the two states include (1) the appropriate distribution of biochemical oxygen demand loads identified through the Savannah River Basin and Harbor Category 5R process; (2) the saltwater intrusion issue on Hilton Head Island; (3) the continuation of the USACE Savannah River Basin Comprehensive Study (a cost-shared plan with the states); and (4) the planning necessary to ensure responsible and appropriate sharing of interstate water resources.

The Council recommends that future updates of the USACE Comprehensive Study emphasize the need for maintaining maximum storage in the reservoirs when possible, in light of the economic benefits the lakes bring to the region. The Comp plan is a cost share with Georgia EPD, SCDHEC and The Nature Conservancy. With respect to water sharing, the Council has incorporated a preliminary assessment of South Carolina's projected water use into its planning efforts. The Council recognizes that this is a first step in mutual water planning that will become more robust as the interstate water planning process continues.

## Conclusion

The Savannah-Upper Ogeechee Water Planning Council recognizes that the region's water resources are vitally important to the ecology of Georgia, the health and vitality of Georgia's citizens, and the state's economic well being. The Council has worked diligently on the critical resource issues associated with the Savannah-Upper Ogeechee Planning Region and has developed a set of management practices and benchmarks to help ensure appropriate water use from now until 2050.





## Executive Summary

REGIONAL WATER PLAN

The Council recommends that EPD continue to update and refine its water resources database and use this data in subsequent updates to the resource assessments. This information will help guide more localized planning and decision making, as well as strengthen the appropriate and scientifically sound application of management practices.

The Council looks forward to future regional planning that will incorporate results from the ongoing studies detailed in this Regional Water Plan. It is critical that local water planning continue in this region so that future iterations of this plan adequately incorporate the outcomes of any additional environmental discussions and studies.



# 1. INTRODUCTION



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## Section 1. Introduction

### 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.

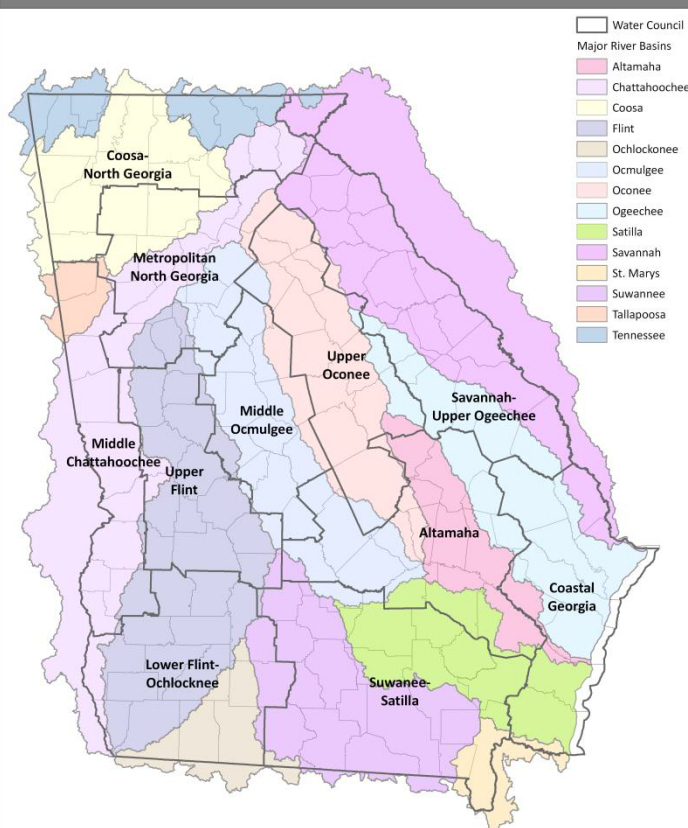
Georgia has abundant water resources, with fourteen major river systems (See Figure 1-1) and multiple groundwater aquifer systems. These waters are shared natural resources. Streams and rivers run through many political

jurisdictions. The Savannah River basin includes portions of South Carolina, and both the Savannah and Ogeechee basins flow downstream into the Coastal Georgia region. The rain that falls in one region of Georgia may replenish the aquifers used by communities many miles away. Although 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, their conditions, and their uses vary greatly across the state, selection and implementation of management strategies 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.

The Savannah-Upper Ogeechee Water Planning Region is one of eleven such regions established by the Georgia General Assembly. The region's Water Planning Council consists of volunteer members who began working on the original regional water plan in March 2009 and this update in 2016. The plan describes water resources conditions, projects future demands, identifies resource gaps and recommends appropriate water management practices to be employed in the region through 2050.

**Figure 1-1: Georgia Regional Water Planning Councils**



Source: Environmental Protection Division, 2009



# 1. Introduction

Therefore, the State Water Plan calls for the preparation of ten regional water development and conservation plans (Regional Water Plans). This Regional Water Plan prepared for the Savannah-Upper Ogeechee Water Planning Region by the Savannah-Upper Ogeechee Regional Water Planning Council describes the regionally appropriate water management practices to be employed in Georgia's Savannah-Upper Ogeechee Water Planning Region through 2050. During the 2016–2017 plan update process, the original 2011 Regional Water Plan for the Savannah-Upper Ogeechee Region was reviewed and updated based on updated regional water demand forecasts, updated resource assessment modeling, and the evaluation of future gaps in water availability and water quality. This updated plan also includes the revised management practices recommended by the Savannah-Upper Ogeechee Council to either address future water resource management needs or to refine or clarify management practices. 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 (e.g., changed circumstances for the region or updated technical work such as updated projections or forecasts).

## 1.2. State and Regional Water Planning Process

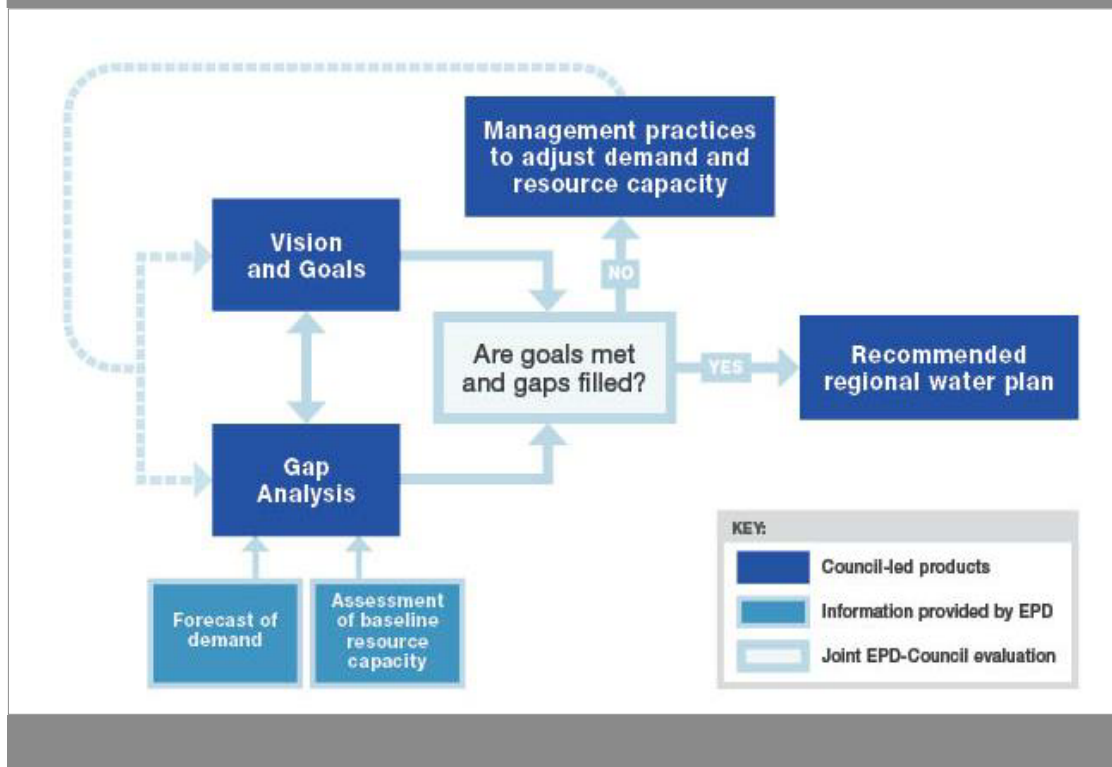
The State Water Plan calls for the preparation of Regional Water Plans designed to manage water resources in a sustainable manner through 2050. It establishes ten regional water planning councils and provides a framework for regional planning consistent with the policy statement that “Georgia manages water resources in a sustainable manner to support the state’s economy, to protect public health and natural systems, and to enhance the quality of life for all citizens.”

The original (2011) Regional Water Plan was prepared following the consensus-based planning process illustrated in Figure 1-2. As detailed in the Savannah-Upper Ogeechee Water Planning Council’s Memorandum of Understanding with the Georgia Environmental Protection Division (EPD) and Department of Community Affairs (DCA) as well as the Council’s Public Involvement Plan [see supplemental document *Technical Memorandum – Public Outreach and Involvement (May 2011)*], 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 original vision and goals, updates to the water and wastewater demands, updates to the resource assessments, and a re-evaluation of future gaps. Public/local government input and coordination with other regional water planning councils also informed the plan update.



To develop the 2011 Regional Water Plan, the Savannah-Upper Ogeechee Water Planning Council met regularly during the period of March 2009 to March 2011 to discuss water resource planning issues. The Council had three ongoing committees assisting with specific aspects of plan development. The Technical Committee consisted of five members with technical backgrounds in the water resource management. This committee was responsible for review of Resource Assessment data and had an advisory role in the selection of management practices. The Plan Review Committee consisted of four members who reviewed the draft plan sections in detail on behalf of the Council. The Interstate Coordination Committee consisted of one member who attended several meetings with Savannah River Basin Advisory Committee in South Carolina. Following each committee's initial review and feedback process, all major decisions and recommendations were brought to the full Council for discussion and approval. As part of this update, the Savannah-Upper Ogeechee Council met over a series of meetings in 2016 and 2017 to revise and update each of the sections of the plan, as appropriate.

**Figure 1-2: Planning Process**





### 1.3. The Savannah-Upper Ogeechee Regional Vision and Goals

The guiding policy from the 2004 Water Planning Act requires that Georgia manage its water resources in a sustainable manner to: 1) support the State's economy; 2) protect public health and natural systems; and 3) enhance the quality of life for all citizens. Following this principle, the Savannah-Upper Ogeechee Regional Water Planning Council adopted the vision and goals presented in the following subsections.

#### 1.3.1. Vision Statement

*The Savannah and Ogeechee Rivers along with the region's groundwater resources will provide high quality and quantity water supplies for balanced growth while protecting the natural and built environments. The Savannah-Upper Ogeechee Regional Water Planning Council, through collaboration with stakeholders, will formulate river basin policies based on current and developing technologies and conservation methods. Because of the results of our Council and other councils' efforts, Georgia will be recognized across the country as the leader in water resource management.*

#### 1.3.2. Goals

The Savannah-Upper Ogeechee Regional Water Planning Council adopted a list of goals reflecting the vision statement.

- Plan for sufficient water supplies to support planned economic development while providing residential, industrial, agricultural, recreational, and utility services in a sustainable manner. Request that the State consider and encourage future economic development in areas with adequate water resources.
- Provide support for state laws regulating interbasin transfers in Official Code of Georgia (OCGA) 12-5-584(f) and OCGA 12-5-31 and further described in EPD Rule 391-3-6-.07. Promote the development of a mandatory comprehensive evaluation process that protects donor basins from adverse impacts from proposed interbasin transfers between State Water Planning Districts.
- Work with EPD to establish ongoing relationships with South Carolina stakeholders and other Water Planning Councils to equitably address water sharing issues.
- Work to enhance the public's understanding of regional water issues and the need for support of new policies to protect future resources.
- Identify opportunities for water reuse and conservation in the region.



- Maintain and strive to improve the quality and quantity of the water of the region to protect species and habitat while balancing the needs of humans.
- Form a permanent Savannah and Ogeechee water planning organization as the conduit for bringing together all stakeholders and assisting the State with implementation of water resource goals in the entire basin. Grandfather one-third of the current Water Planning Council on the permanent organization.

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## 2. THE SAVANNAH-UPPER OGEECHEE WATER PLANNING REGION





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## 2. The Savannah-Upper Ogeechee Water Planning Region

### REGIONAL WATER PLAN



### Section 2. The Savannah-Upper Ogeechee Water Planning Region

The Savannah-Upper Ogeechee Water Planning Region (Figure 2-1) includes 20 counties and 67 incorporated municipalities. These local governments are responsible for land use and zoning decisions that may affect the management of water resources. Many local governments are also responsible for the planning, operations, and management of water and wastewater infrastructure.

This region shares portions of four river basins - Savannah, Ogeechee, Oconee, and Tennessee Rivers - with 20 counties and three states. While much of the region's water comes from surface water and regulated reservoirs, portions of the region rely on groundwater aquifers.

#### 2.1. History and Geography

The Savannah-Upper Ogeechee Water Planning Region is located in the eastern portion of the state and encompasses over 7,100 square miles. The region borders the Carolinas, as well as the Coosa-North Georgia, Metro North Georgia, Upper Oconee, Altamaha, and Coastal Georgia water planning regions. Spanning from Rabun County in the North Georgia Mountains down to Screven County near the Georgia coast, the region is diverse in geography and nature.

##### 2.1.1. Watersheds and Water Bodies

Portions of four river basins are within the region: Savannah, Ogeechee, Oconee, and Tennessee (Figure 2-1). The Tennessee River Basin drains north (ultimately to the Gulf of Mexico) and the remaining three basins drain to the Atlantic Ocean. Most of the region is in the Savannah and Ogeechee river basins which are shared with the Coastal Georgia water planning region and South Carolina.

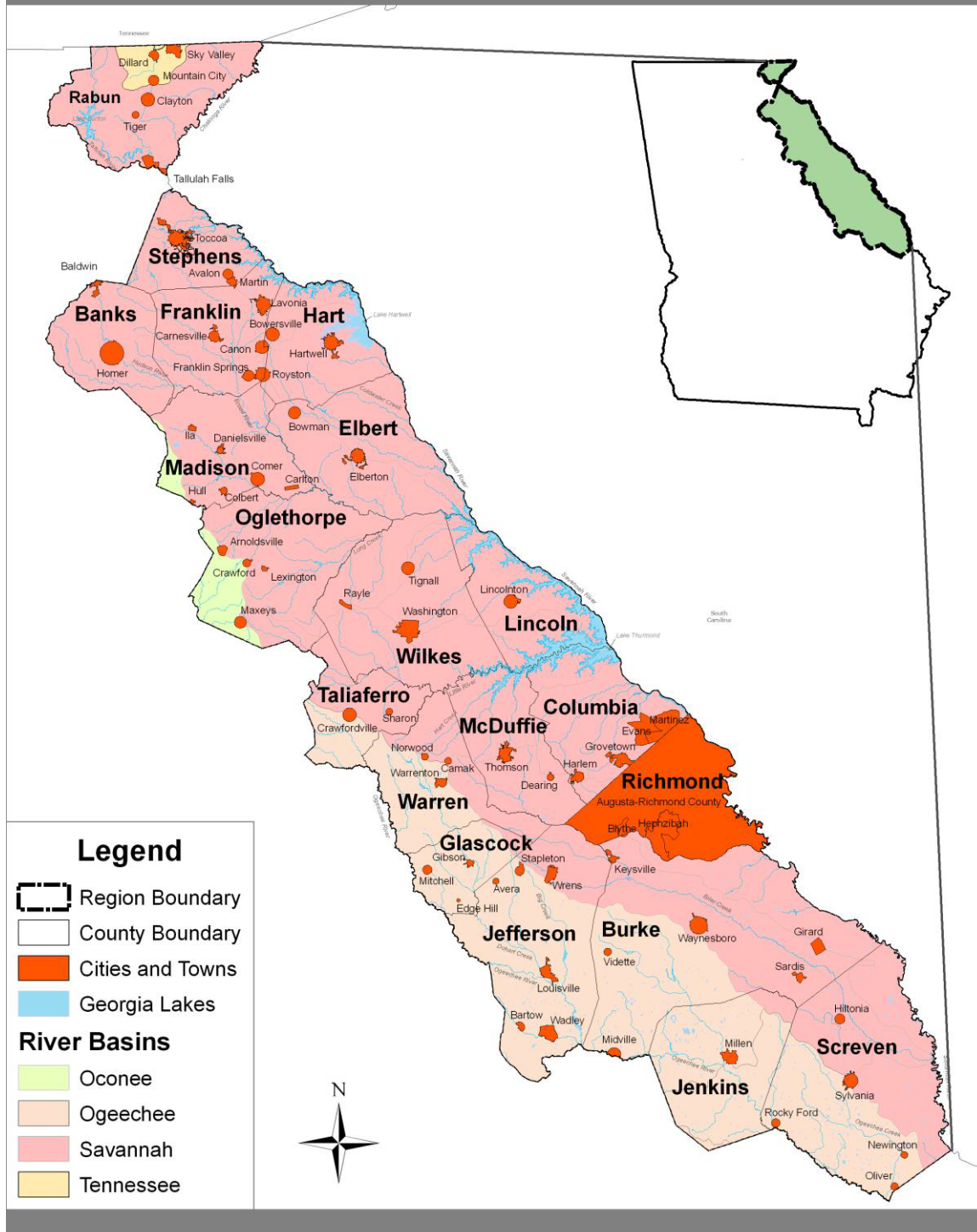
The Savannah River originates on the southeastern side of the Appalachian Mountains, just inside North Carolina, and forms most of the border between South Carolina and Georgia. The basin's northern portion is part of the Chattahoochee and Oconee National Forests. The Savannah River Basin also includes the Chattooga National Wild and Scenic River, Tallulah Gorge, six lakes operated by the Georgia Power Company, and three lakes owned and operated by the U.S. Army Corps of Engineers (USACE) - Lake Hartwell, Lake Richard B. Russell, and Lake Thurmond (also called Clarks Hill Lake). The Ogeechee River is one of Georgia's few free flowing rivers, and its basin is located entirely within state. There are no municipal water supply storage reservoirs or hydroelectric plants in the Ogeechee River Basin. The coastal estuaries, sounds, and Atlantic Intracoastal Waterway that are located just south of the region are significant to the basin.



## 2. The Savannah-Upper Ogeechee Water Planning Region

REGIONAL WATER PLAN

Figure 2-1: Savannah-Upper Ogeechee Water Planning Region



## 2. The Savannah-Upper Ogeechee Water Planning Region

### REGIONAL WATER PLAN



### 2.1.2. Physiography and Groundwater Resources

The Savannah-Upper Ogeechee Region is located in the Blue Ridge, Piedmont, and Coastal Plain physiographic provinces. The regional area north of the Fall Line is in the Blue Ridge and Piedmont provinces; the regional area south of the Fall Line is in the Coastal Plain province. Mountains with fast moving streams, rapids, and steep slopes – including the Appalachian and Blue Ridge mountains – dominate the Blue Ridge province. The Piedmont province is characterized by rolling hills, narrow valleys, and faster moving streams with occasional rapids and falls. The Coastal Plain province is characterized by slower, flatter streams with wide floodplain areas. The region receives between 40 to 80 inches of rain per year, typically with a wet spring and a dry season from mid-summer to late fall.

The Savannah-Upper Ogeechee Water Planning Region includes portions of four aquifers, as shown in Figure 2-2:

- **Crystalline-Rock Aquifers** – located in the northern portion of the basin and generally do not provide significant amounts of groundwater
- **Cretaceous Aquifer System** – forms a narrow band through the middle of the state and consists mainly of sand and gravels
- **Gordon Aquifer System** – located in the southern portion of the basin
- **Floridan Aquifer** – extremely productive and underlie most of south Georgia

Wells from the major Coastal Plain aquifers south of the Fall Line (Cretaceous & Floridan) are generally very productive, with yields on the order of 1,000 gallons per minute (gpm). Wells that draw from the Crystalline-Rock Aquifers are typically less productive (less than 100 gpm).

### 2.1.3. Unique Physical Features

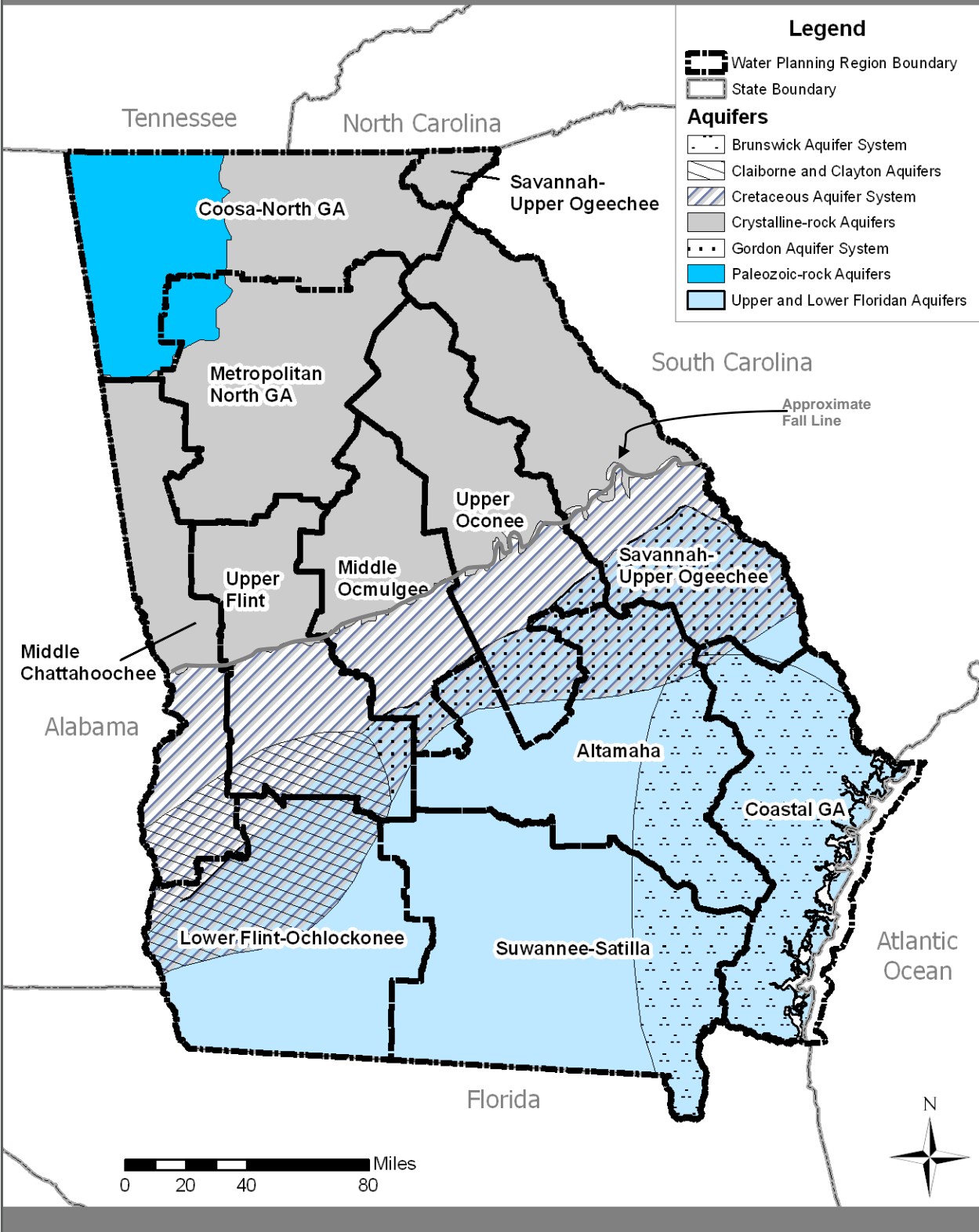
The geology is very different between the regional area in the Blue Ridge and Piedmont provinces and the regional area in the Coastal Plain. The Blue Ridge and Piedmont provinces are composed of crystalline igneous rocks (formed by the cooling of magma) and metamorphic rocks (caused by extremely high temperature and pressure). These areas include valuable deposits of slate and marble. The Coastal Plain province is composed of sands and clays generally underlain by limestone, including valuable deposits of kaolin. According to the United States Department of Agriculture (USDA) land use categories, the region crosses four Major Land Resource Areas (MLRAs): Blue Ridge, Southern Piedmont, Carolina and Georgia Sand Hills, and Southern Coastal Plain. The soil types are highly site-specific, but tend to transition from loamy in the Blue Ridge, to clayey in the Southern Piedmont, to sandy or sandy/loamy in the Sand Hills and Coastal Plain.



## 2. The Savannah-Upper Ogeechee Water Planning Region

REGIONAL WATER PLAN

Figure 2-2: Water Planning Regions with Aquifers



## 2. The Savannah-Upper Ogeechee Water Planning Region

### REGIONAL WATER PLAN



## 2.2. Characteristics of the Region

### 2.2.1. Population

In 2015, total population for the 20-county Savannah-Upper Ogeechee Water Planning Region was estimated at 629,734. Table 2-1 shows the breakdown of the population per county, highest to lowest. The two most populated counties, Richmond and Columbia, contain approximately 55 percent of the region's total population. Augusta-Richmond County is the largest population center in the region, with an estimated population of 203,625.

**Table 2-1 Savannah-Upper Ogeechee Region 2015 Population by County**

Richmond	203,625	Burke	23,006	Rabun	16,320	Jenkins	9,292
Columbia	142,402	Franklin	22,282	Jefferson	16,286	Lincoln	7,659
Madison	28,467	McDuffie	21,781	Oglethorpe	14,612	Warren	5,462
Stephens	25,794	Elbert	19,537	Screven	14,267	Glascok	3,139
Hart	25,628	Banks	18,586	Wilkes	9,906	Taliaferro	1,683

Source: Georgia Governor's Office of Planning and Budget, 2015.

### 2.2.2. Employment

Based on the Department of Labor and Census estimates, the region's employment is dominated by the government, health care services, manufacturing, retail, and construction sectors. U.S. Census data estimated the region's total employment has been growing from a low point in 2011 of 182,000 jobs to 199,000 jobs in 2016. Major government employers include Fort Gordon; the Savannah River Site; state universities and technical colleges; the Medical College of Georgia; local school systems; prison systems; and federal, state, and local governmental agencies.

Fort Gordon has over 23,000 employees, with an economic impact of approximately \$1.4 billion. The region has 18 higher learning institutions located within ten counties. Within the metropolitan area of Augusta, approximately 27,900 residents are employed by area hospitals, clinics, nursing homes, social service agencies, and the offices of doctors, dentists and other practitioners. Leisure and hospitality establishments are also major employment generators that include many cultural facilities and special events, such as the Masters Golf Tournament in the Augusta area. Plant Vogtle, a nuclear facility jointly owned by four utilities, employs approximately 800 people. Currently under development are plans to double the number of reactors at the plant which will result in increased employment opportunities. The region's manufacturing sector includes textiles and apparel; paper and allied products; chemicals; transportation equipment; stone, clay and glass products; food products; and furniture, lumber and wood products.





## 2. The Savannah-Upper Ogeechee Water Planning Region

REGIONAL WATER PLAN

### 2.2.3. Land Use

In 2008, approximately 53 percent of the land area of the Savannah-Upper Ogeechee Water Planning Region was covered by forested land (See Figure 2-3). Agriculture (23 percent land cover) is a significant land use activity, especially in the southern portion of the region, supporting a variety of animal operations and commodity production. In addition to forests and agriculture, wetlands consist of approximately 9 percent and urban area consists of approximately 8 percent of the land cover of the region. The majority of the urban area exists in Richmond and Columbia counties. There are a number of high priority streams, protected species, and significant recreational uses, which are described in Section 3 of the Plan.

### 2.3. Local Policy Context

Four Regional Commissions – Georgia Mountains, Northeast Georgia, Central Savannah River Area, and Coastal – work with the DCA to assist communities in the Savannah-Upper Ogeechee Water Planning Region with a variety of planning issues. The commissions review local comprehensive land use plans and can help make connections between growth and water planning. They assist local governments in securing funds for the water and wastewater infrastructure necessary for economic development, as well as provide planning support for compliance with environmental regulations, some of which pertain to water quality, such as watershed protection plans.

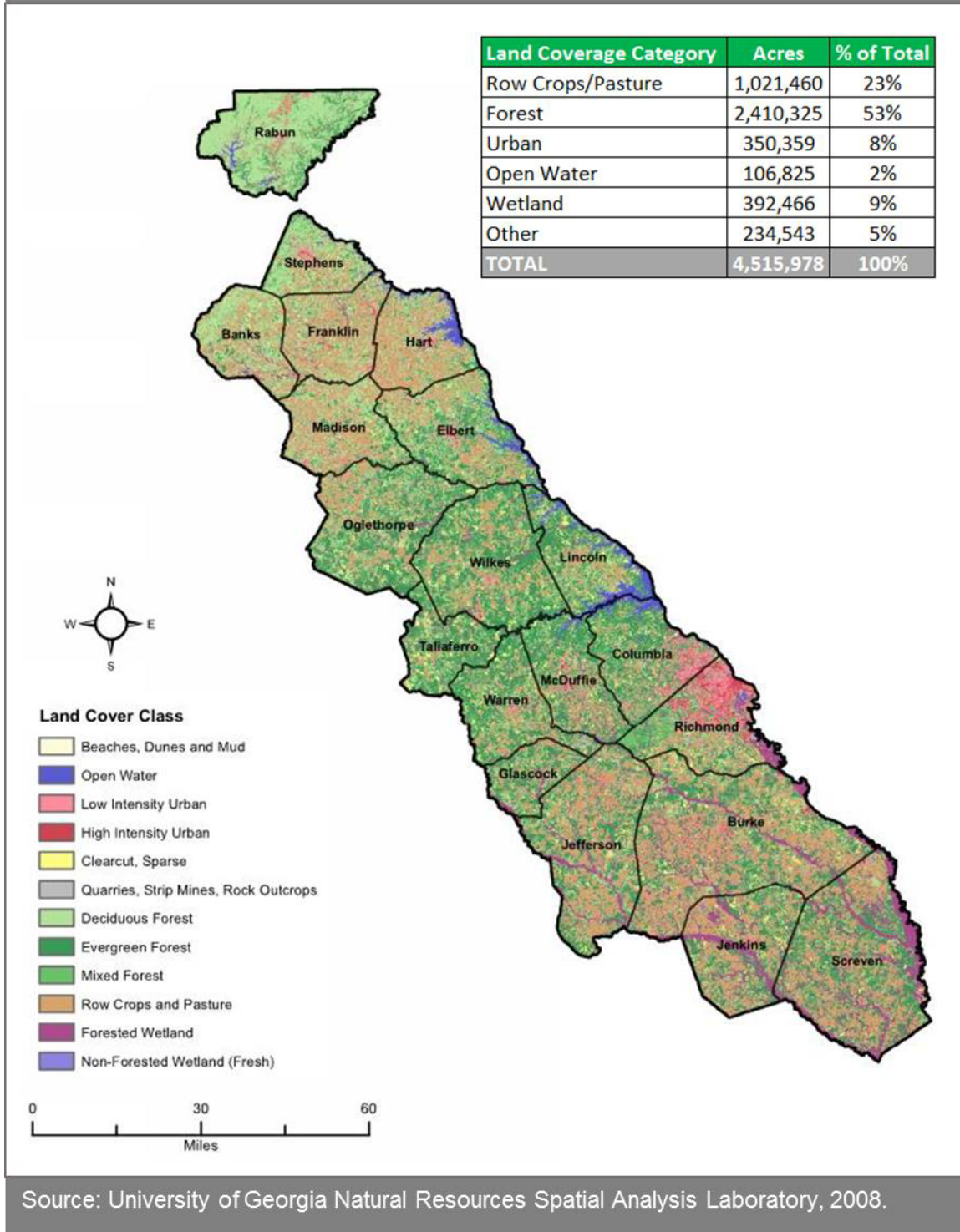


## 2. The Savannah-Upper Ogeechee Water Planning Region

### REGIONAL WATER PLAN



Figure 2-3: 2008 Land Cover in the Savannah-Upper Ogeechee Region



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### 3. WATER RESOURCES OF THE SAVANNAH-UPPER OGEECHEE WATER PLANNING REGION



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### 3. Water Resources of the Savannah-Upper Ogeechee Water Planning Region



## Section 3. Water Resources of the Savannah-Upper Ogeechee Water Planning Region

A summary of current surface water and groundwater use, results from the current conditions Resource Assessments developed by EPD and discussion of instream uses are provided in this section. This section's references to current conditions reflect the most recent data available at the time of the statistical development.

### 3.1 Major Water Use in the Region

Major water use and water returns are summarized for the Savannah-Upper Ogeechee region based on data compiled by USGS in the report 'Water Use in Georgia by County for 2010 and Water-Use Trends, 1985-2010'. In 2010, the region's daily water withdrawals averaged over 275 million gallons per day (MGD) on an annual average daily basis for municipal, industrial, energy and agricultural use. Seventy-eight percent was obtained from surface water supply sources and 22 percent from groundwater supply sources (Figure 3-1). Municipal use included residential, commercial, and industrial usage supplied by publicly owned water providers and estimated usage from self-suppliers. Industrial use included only industries that have State water withdrawal permits. Energy use included only water withdrawn by thermoelectric facilities and excluded withdrawals from hydroelectric facilities because the water used is not considered consumptive.

In 2010, the Savannah-Upper Ogeechee Region withdrew over 275 MGD for water supply (78 percent from surface water and 22 percent from groundwater sources). The region returned nearly 108 MGD of wastewater in 2010; 52 percent from industry and 48 percent from municipal sources. The region has abundant water supplies and over 90 percent of the streams analyzed were found to have adequate capacity to handle pollutants. In addition to water supply, power generation, flood prevention and drought management, many streams and lakes in the region support significant recreational uses.

#### 3.1.1. Surface and Groundwater Water Use

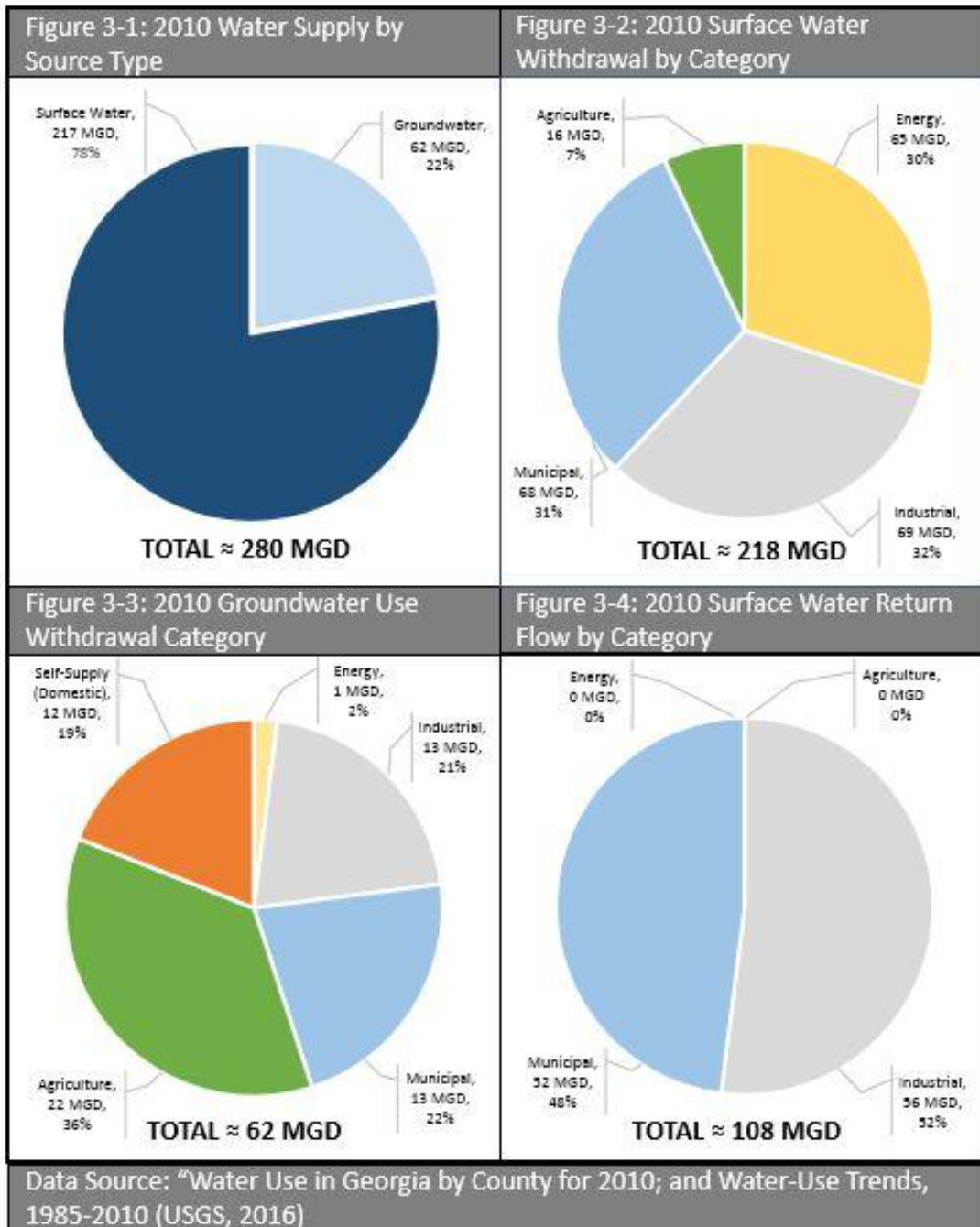
In 2010, approximately 218 MGD were withdrawn on an annual average daily basis from the region's surface water supply sources. Approximately 62 MGD were withdrawn from groundwater aquifers, primarily the Cretaceous Sand and Crystalline-Rock aquifers. Figures 3-2 and 3-3 present a breakdown of total surface water and groundwater use by category.

In 2010, the region generated approximately 108 MGD of wastewater on an annual average daily basis. The majority was treated in public wastewater facilities with permitted surface water discharge, and a small percentage was disposed of in land application systems (LAS). Figure 3-4 shows the surface water return flows by category.



### 3. Water Resources of the Savannah-Upper Ogeechee Water Planning Region

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### 3.2 Current Conditions Resource Assessments

As a major component of the State Water Plan, EPD developed three Resource Assessments: (1) surface water quality; (2) surface water availability; and (3) groundwater availability. The Resource Assessments estimated the capacity of our water resources to support Georgia communities in a sustainable fashion while



continuing to meet water management goals. The assessments were completed on a resource basis (river basins and aquifers). The results of the Baseline Resource Assessments evaluating current water use and discharge conditions are summarized here as they relate to the Savannah-Upper Ogeechee Water Planning Region. Future water supply and wastewater needs are discussed in Section 4; followed by Resource Assessments for future conditions in Section 5.

#### 3.2.1. Surface Water Quality (Assimilative Capacity)

Assimilative capacity refers to the natural ability of a water body to respond to pollutants without harming aquatic life or humans who come in contact with the water. A water body can be overloaded and violations of water quality standards may result. Water quality standards define the uses of a water body and set pollutant limits to protect those uses. The Assimilative Capacity Resource Assessment evaluated the capacity of surface waters to process pollutants without violating water quality standards. The Assimilative Capacity Resource Assessment results focus on dissolved oxygen (DO), nutrients (specifically nitrogen and phosphorus) and chlorophyll-a (a parameter that is closely tied to lake water quality). The current conditions assessment evaluated the impact of current wastewater and stormwater discharges with current withdrawals, land use, and meteorological conditions, with the Savannah River Basin assessment incorporating permitted facilities and land use for the South Carolina side of the basin. Limited or low assimilative capacity may indicate the need to upgrade treatment facilities, or to limit future wastewater discharge or stormwater pollutants to improve water quality in these streams.

Georgia's DO standards are based on stream-specific water use classifications. Most of the region's streams are designated as freshwater fishing, drinking water supplies or recreation. Assessment of the ability to assimilate oxygen-consuming wastes is important because aquatic life is dependent on the amount of residual DO available in the streams. The DO standards for these water use classifications require a daily average of 5 milligrams per litre (mg/L) and no less than 4 mg/L at all times.

Nutrients provide food for aquatic organisms. However, high nutrient concentrations can potentially encourage algal blooms, which may indirectly reduce fish population (and other aquatic life), cause unpleasant taste and odor in water supplies, and impact recreational use of water. The lakes in the region do not have specific standards for the nutrients nitrogen and phosphorus. EPD is currently evaluating Georgia's future nutrient standards.

Using planning level models, DO was modeled in the region's major river basins: the Savannah River (including the South Carolina portions of the basin), the Oconee (includes portions of Madison and Oglethorpe counties), the Ogeechee River, and the Little Tennessee River (includes portions of Rabun county).





### 3. Water Resources of the Savannah-Upper Ogeechee Water Planning Region

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Figure 3-5 and Table 3-1 show the results of the modeling. Additional site specific monitoring and study may be required to determine the actual conditions of these streams and whether upgrade of treatment facilities is needed to improve existing water quality in these streams.

<b>Table 3-1: Assimilative Capacity for DO in Savannah-Upper Ogeechee Planning Council (under current permit conditions)</b>							
<b>Basin</b>	<b>Available Assimilative Capacity (Total Mileage)</b>						<b>Total River Miles in the Council Area</b>
	<b>Very Good (<math>\geq 1.0</math> mg/L)</b>	<b>Good (0.5 to <math>&lt; 1.0</math> mg/L)</b>	<b>Moderate (0.2 to <math>&lt; 0.5</math> mg/L)</b>	<b>Limited (<math>&gt; 0.0</math> to <math>&lt; 0.2</math> mg/L)</b>	<b>None or Exceeded (<math>&lt; 0.0</math> mg/L)</b>	<b>Unmodeled</b>	
Oconee	13	2	0	0	0	0	15
Ogeechee	108	112	126	27	2	6	381
Savannah	338	26	13	2	48	0	427
Tennessee	2	1	0	0	0	1	4
Source: GIS Files from the Updated Water Quality Resource Assessment; EPD, January 2017							

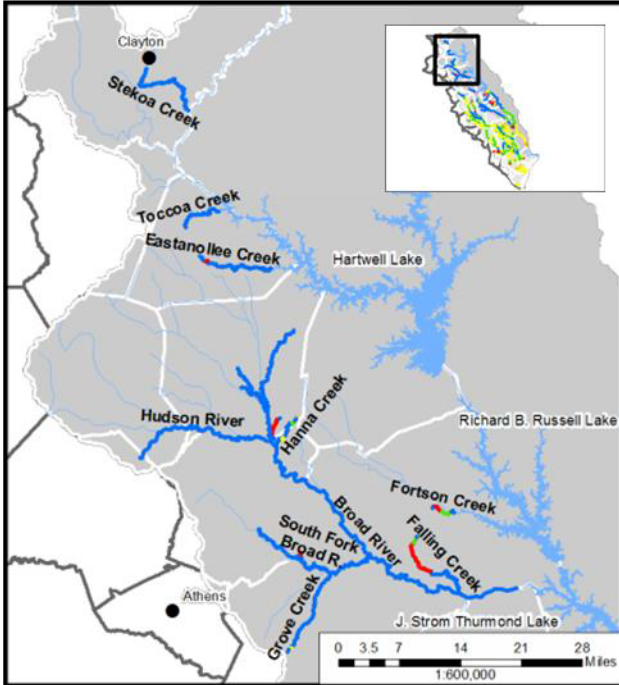
A watershed model based on current conditions was developed for the Savannah River Basin to estimate nutrient loadings. Although there are no existing nutrient standards in the Savannah-Upper Ogeechee Region, the results of the watershed model could be used to determine locations of high nutrient loading where Management Practices (MPs) would provide the most benefit. It is anticipated that nutrient standards may be developed for the lakes within this region following a public stakeholder process.

### 3. Water Resources of the Savannah-Upper Ogeechee Water Planning Region

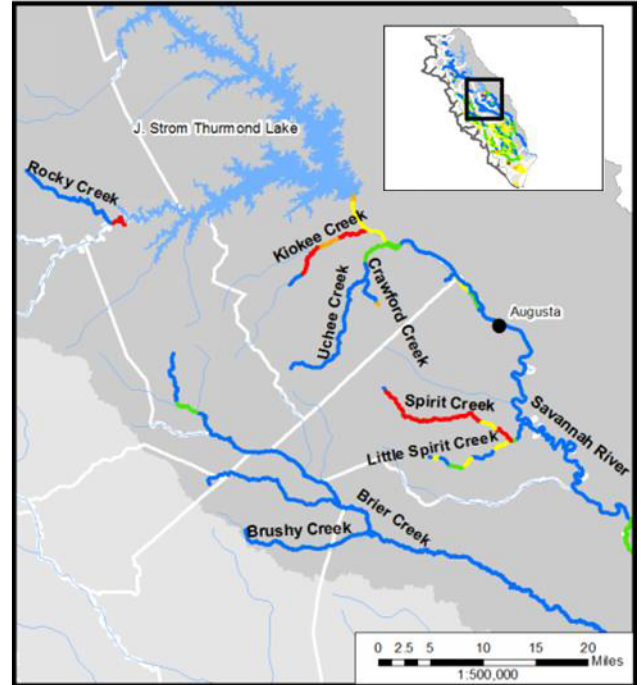


**Figure 3-5: Results of Assimilative Capacity Assessment – DO under Current Permit Conditions** Source: Synopsis Report: Current Assimilative Capacity Assessment Report (GAEPD, 2017).

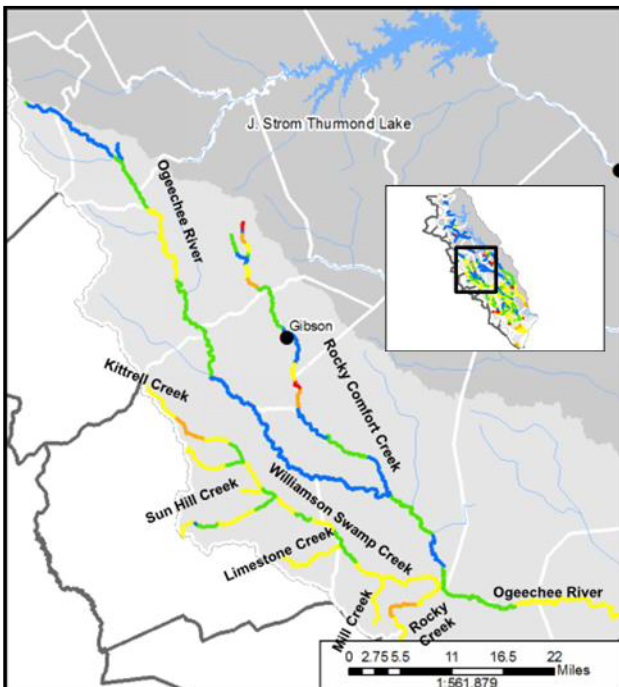
#### SAVANNAH BASIN



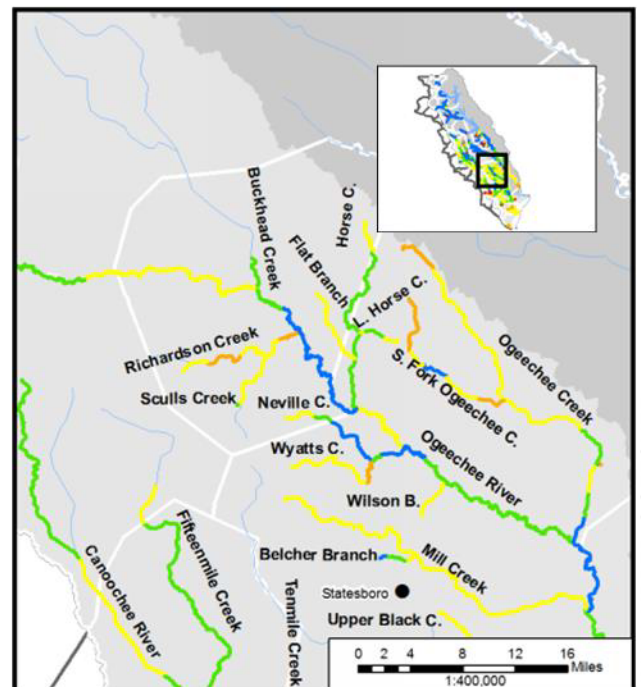
#### SAVANNAH BASIN



#### OGEECHEE BASIN



#### OGEECHEE BASIN



SAVANNAH-UPPER OGEECHEE



### 3. Water Resources of the Savannah-Upper Ogeechee Water Planning Region

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#### 3.2.2. Surface Water Availability

The Surface Water Availability Resource Assessment estimates the ability of surface water resources to meet current municipal, industrial, agricultural, and thermoelectric generation needs, as well as the needs of instream and downstream users. The assessment evaluated the impact of water consumption (withdrawals from a water body that are not returned to that water body) on stream flows at certain locations in each river basin. Modeled stream flows were compared with a flow regime based on low flow thresholds selected as indicators of the potential for water consumption to impact instream uses such as fishing, boating, and aquatic life habitat. For streams where federal requirements for reservoir releases are in place, low flow thresholds have been established through site-specific analysis. In other streams, a low flow threshold from state policy was used.

The modeled flow was compared with the flow regime; where the modeled stream flow was less than the flow regime, a potential “gap” was identified. The potential gaps were analyzed in terms of both magnitude (i.e., the amount by which the modeled stream flow fell below the flow regime) and duration (i.e., the number of days the stream flow fell below the flow regime).

The Surface Water Availability Resource Assessment was conducted based on river basin boundaries rather than Water Planning Region boundaries. The upstream consumption and instream flow demands are summarized on a sub-basin level, each represented by a planning node. There are eight planning nodes designated within the Savannah-Ogeechee River Study Basin (Figure 3-6). Although only two nodes (Hartwell and Augusta) are located within the region, conditions at the Lake Keowee node (upstream of the region in South Carolina) and at the Clio, Savannah, Claxton, Eden and Kings Ferry nodes (downstream of the region in the Coastal Georgia Water Planning Region) also need to be assessed to evaluate the potential impacts of upstream users on downstream users. Current water withdrawals and returns were calculated for water users within each of these planning nodes and for both Georgia and South Carolina. The South Carolina water withdrawal and return data was developed in coordination with the South Carolina Department of Health & Environmental Control (SCDHEC) and based on historic data. In addition, there is one planning node (Little Tennessee) in the Little Tennessee Basin portion of the region located within Rabun County.

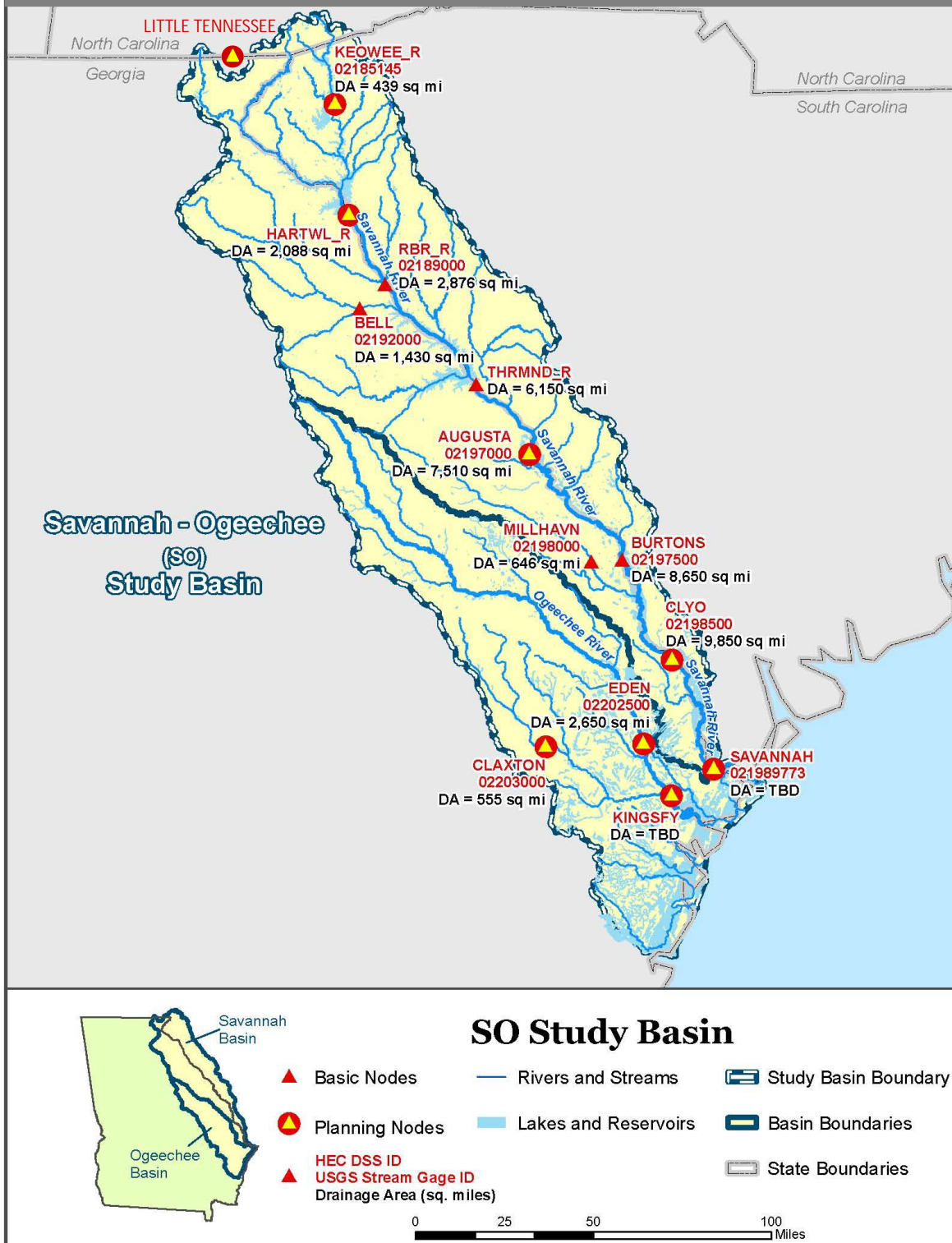
Modeling of current conditions indicates that there is sufficient surface water availability at the nodes located in the Savannah River Basin. However, the model estimates that current off-stream demands cannot be met without causing stream flows to fall below the flow regime during dry periods in the Ogeechee River Basin. Potential gaps in meeting the flow regime are predicted at the Claxton, Eden and Kings Ferry nodes. More detailed information about potential gaps at these nodes under future conditions is included in Section 5.

### 3. Water Resources of the Savannah-Upper Ogeechee Water Planning Region

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Figure 3-6: Savannah - Ogeechee Study Basin



Source: Georgia EPD, 2009.





### 3. Water Resources of the Savannah-Upper Ogeechee Water Planning Region

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#### 3.2.2. Groundwater Availability

The Groundwater Availability Resource Assessment evaluates the amount of water that can be withdrawn from specific areas of an aquifer without reaching specific thresholds of local or regional impacts. Indicators of impacts included declines in groundwater levels that may affect neighboring wells (drawdown) and reductions in the amount of groundwater that seeps into streams and thereby contributes to streamflows. The assessment estimates a range of yield that can be withdrawn from an aquifer before specific impacts become evident. The results reflect modeled aquifer responses to specific baseline conditions and specific pumping scenarios.

EPD prioritized the aquifers for modeling efforts based on the characteristics of the aquifer, evidence of negative effects, anticipated negative impacts, and other considerations. Three prioritized aquifer systems were evaluated in the Savannah-Upper Ogeechee Water Planning Region. The Crystalline-Rock Aquifer lies north of the Fall Line, which spans across Warren and Columbia counties, and is separated into the Blue Ridge and Piedmont provinces. Below the Fall Line exists the Floridan Aquifer in the eastern Coastal Plain of Georgia, which stretches southward beyond the planning region. Also below the Fall Line, between Augusta and Macon, is the Cretaceous Aquifer System, spanning counties within the central portions of planning region and across other planning regions. The Savannah-Upper Ogeechee Water Planning Region must coordinate usage with other water planning regions to ensure that the estimated range of yield for each groundwater source are considered in a regional fashion.

The baseline modeling results indicate that there are relatively large quantities of water sustainably available above existing withdrawal levels in the Floridan Aquifer and the Cretaceous Aquifer System, and smaller amounts available in the Crystalline-Rock Aquifer before reaching estimated ranges of yields.

### 3. Water Resources of the Savannah-Upper Ogeechee Water Planning Region



#### 3.3 Current Ecosystem Conditions and Instream Uses

The water resources of the region serve multiple purposes, including recreation and tourism, and support a great diversity of fish and wildlife. EPD has classified all of the streams in the region as fishing, except for the streams listed in Table 3-2.

**Table 3-2: Special Stream Classifications<sup>1</sup>**

Stream	Reach	Classification
Beaverdam Creek	Confluence with Little Beaverdam Creek to Carters Creek	Drinking Water
Beaverdam Creek (Lake Boline)	Headwaters to confluence with Little Beaverdam Creek (including Lake Boline)	Drinking Water
Black's Creek	Headwaters to confluence with Little Tennessee River	Drinking Water
Brier Creek	Walnut Branch to Fitz Creek	Drinking Water
Grove Creek	Headwaters to confluence with Hickory Level Creek	Drinking Water
Little Beaverdam Creek	Headwaters to confluence with Beaverdam Creek	Drinking Water
Mud Creek	Headwaters to confluence with Little Tennessee River	Drinking Water
North Fork Broad River	Confluence with Double Branch to confluence with Middle Fork Broad River	Drinking Water
Oconee River	Sinclair Dam to Fishing Creek	Drinking Water
Oconee River	Oochee Creek to Long Branch	Drinking Water
Ogeechee River	U.S. Hwy. 17 Bridge to Open Sea and littoral waters of Skidaway, Ossabaw, Sapelo, and St. Catherines Islands	Recreation
Rocky Comfort Creek	Headwaters to confluence with Whetstone Creek	Drinking Water
Sherrills Creek	Headwaters to confluence with South Fork Little River (including Sherrills Reservoir)	Drinking Water
Sweetwater Creek	Headwaters to confluence with Brier Creek (including Usry Lake)	Drinking Water

Source: EPD Rule 391-3-6-.03 Water Use Classifications and Water Quality Standards (2016)

1. All streams in the region are classified as "Fishing" except for the streams listed above.

##### 3.3.1. Monitored and Impaired Water

EPD assesses water bodies for compliance with water quality standards as required by the Clean Water Act and monitors streams throughout the state and publishes the results every other year. If an assessed water body is found not to meet standards,



### 3. Water Resources of the Savannah-Upper Ogeechee Water Planning Region

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it is considered “not supporting” its designated use and is included on a list of impaired waters, also known as the 303(d) list. Impairments can be based on various parameters such as DO, fecal coliform, copper, biota aquatic species), fish consumption guidance, pH, and toxicity. Impairments must be addressed through the development of a Total Maximum Daily Load (TMDL), which sets a pollutant budget and outlines strategies for corrective action. A TMDL is defined by the U.S. Environmental Protection Agency (USEPA) as a calculation of the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards, and an allocation of that amount to the pollutant's sources. Based on the assessment conducted in 2014, 326 miles of the streams evaluated in the region are supporting their designated use (54 reaches), 617 miles are not supporting their designated use (89 reaches), and 22 miles are pending assessment (4 reaches). There are 2 sounds impaired (totaling 56,548 acres). Figure 3-7 highlights the locations of the impaired stream segments in the region. A full list of impaired waters can be found on the EPD website <http://www.gaepd.org/Documents/305b.html>. This list is updated every two years by EPD.



### 3. Water Resources of the Savannah-Upper Ogeechee Water Planning Region



Figure 3-7: Savannah Upper Ogeechee Region Impaired Waters





### 3. Water Resources of the Savannah-Upper Ogeechee Water Planning Region

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Stakeholders including Georgia EPD, SCDHEC, USEPA, and the Savannah River/Harbor Discharger Group collaboratively developed an implementation plan to meet applicable water quality standards for the Savannah River Basin, including the Savannah Harbor. Following development of the plan, and reclassification of the Savannah Harbor to Category 5R on the 2014 305(b)/303(d) list, the USEPA withdrew the TMDL for the Savannah Harbor in favor of the alternative restoration approach outlined in the plan.

#### 3.3.2. Priority Conservation Areas

High priority waters for protecting aquatic biodiversity were identified as part of a larger effort by the Georgia Department of Natural Resources (DNR) to develop a comprehensive wildlife conservation strategy for Georgia. The streams included on the final priority list are those that have been identified as a high priority for restoration, preservation, or other conservation activity. Although the individual stream reaches were the basis for the selection process, a large portion of the region was identified as a high priority watershed. Protecting the entire watershed is the only way to protect these high priority waters. The high priority waters and watersheds for the Savannah-Upper Ogeechee Water Planning Region were identified in the Georgia DNR 2005 State Wildlife Action Plan and 2005 Comprehensive Wildlife Conservation Strategy. Table 3-3 demonstrates the high priority waters identified in 2005 Comprehensive Wildlife Conservation Strategy. The State Wildlife Action Plan was revised in 2015 and identified 56 additional priority watersheds which are shown in Figure 3-8 due to important coastal habitats, critical habitat or a recent occurrence species listed under the federal Endangered Species Act, migratory corridor, or ecological drainage units that were poorly represented in the dataset. Further information may be found at <http://www.georgiawildlife.com/node/1377>.

#### 3.3.3. Wildlife and Fisheries Resources

Currently, there are 18 federally listed species in the Savannah River Basin: five federally threatened and 13 federally endangered. In addition, there are 55 species that are either state-listed or of special concern: 20 threatened or endangered, ten considered rare, and four listed as unusual and deserving of special consideration. Water planning efforts must consider the protection of these species.

The DNR stocks trout in Rabun, Stephens, and Hart Counties and there are other stream segments in the basin designated as trout streams. Lake Burton, Hartwell, Richard B. Russell, and Thurmond also support popular sport fisheries. Some of the most sought after sport fish in the region include largemouth, striped, and redeye bass, bluegill, sunfish, crappie, catfish, and pickerel. The Richmond Hill State Fish Hatchery is downstream in the Ogeechee River basin. The Burton Trout Hatchery and the McDuffie Public Fishing Area are in the Savannah River basin. Striped bass stocks were declining in the mid-1980s and are now stocked from the Richmond Hill Hatchery. The endangered robust redhorse fish, once thought extinct, was found in the Savannah River shoals in 1997 and a recovery program is underway. Below Augusta, the Savannah River has a strong sport fishery. The Ogeechee River,

### 3. Water Resources of the Savannah-Upper Ogeechee Water Planning Region



stocked with striped bass from the Richmond Hill Hatchery, also provides excellent fishing opportunities.

The Savannah and Ogeechee Rivers also support dense populations of the most diverse native freshwater mussels in Georgia. Two particularly rare mussels in the region are the Atlantic pigtoe and the Savannah lilliput.

**Table 3-3: High-Priority Waters in the Savannah-Upper Ogeechee Region**

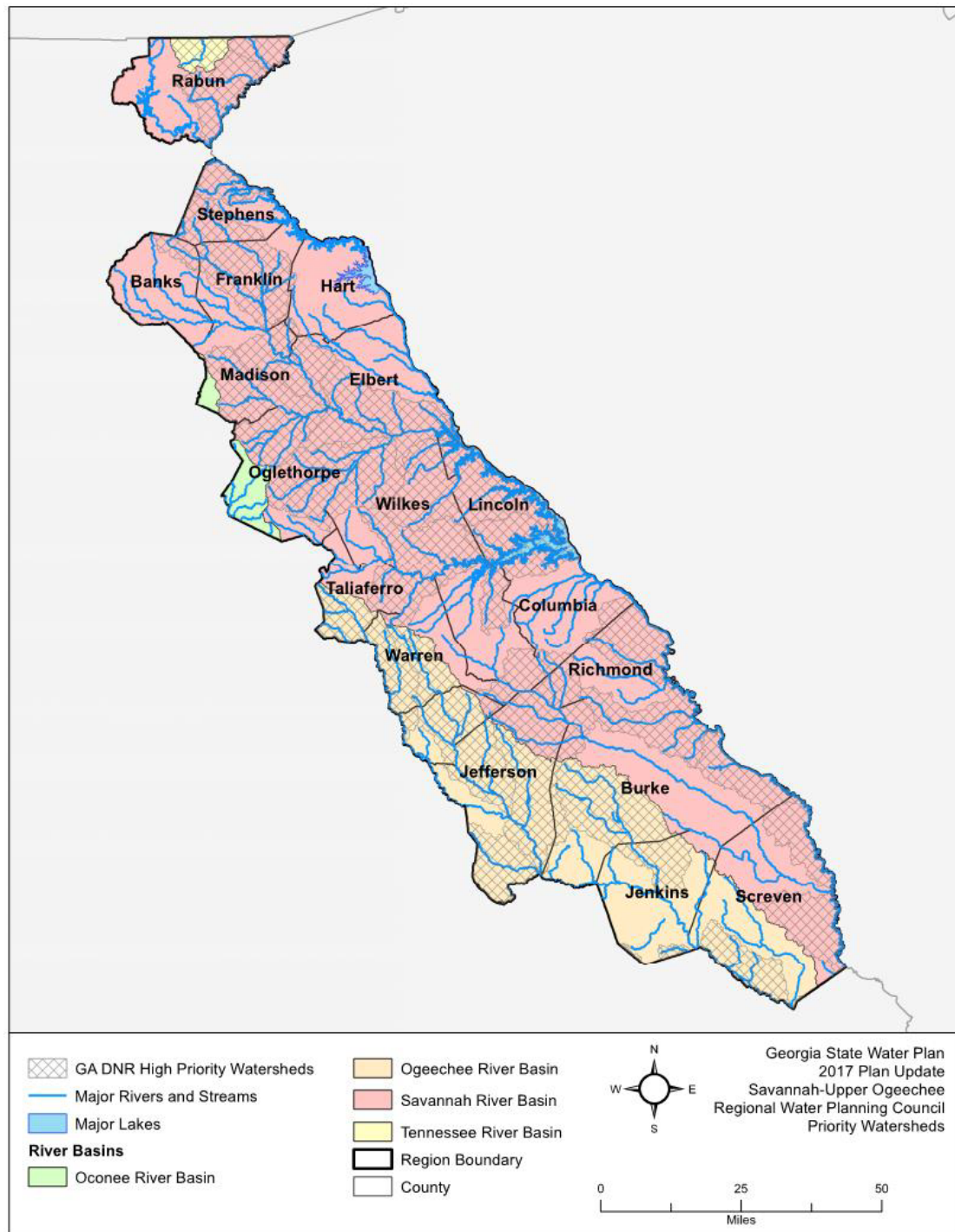
Savannah River Basin		
Classification	Stream Name	County
High Priority Species/ Aquatic Community Stream	Long Creek	Oglethorpe/Wilkes
	Broad River	Franklin/Madison/Elbert/Oglethorpe/Wilkes
	Savannah River	Columbia/Richmond/Burke/Screven/ Effingham/Chatham
	Brier Creek	Warren/McDuffie/Jefferson/Richmond/ Burke/Screven
	Brushy Creek	Jefferson/Burke
	Sandy Run Creek	Columbia/Richmond/Burke
	Reedy Creek	Jefferson/Glascock/Warren
	Boggy Gut Creek	McDuffie/Richmond/Jefferson
High Priority Aquatic Community Stream	McBean Creek	Burke
	Chattooga River	Rabun
	Moccasin Creek	Rabun
Ogeechee River Basin		
Classification	Stream Name	County
High Priority Species/ Aquatic Community Stream	Ogeechee River	Chatham/Bryan/Effingham/Bulloch/Screven
	Williamson Swamp	Washington/Jefferson
High Priority Aquatic Community Stream	Hannah Branch	Jefferson
Tennessee River Basin		
Classification	Stream Name	County
High Priority Species/ Aquatic Community Stream	Betty Creek	Rabun
Source: Georgia Comprehensive Wildlife Conservation Strategy (Georgia DNR, 2005).		



### 3. Water Resources of the Savannah-Upper Ogeechee Water Planning Region

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Figure 3-8: Savannah Upper Ogeechee Region Priority Watersheds



## 4. FORECASTING FUTURE WATER RESOURCE NEEDS



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### Section 4. Forecasting Future Water Resource Needs

Water demand and wastewater flow forecasts, along with Resource Assessments (Section 3), form the foundation for water planning in the Savannah-Upper Ogeechee Region and serve as the basis for the selection of water management practices (Section 6). This section presents the regional water and wastewater forecasts from 2015 through 2050 for four water use sectors: municipal, industrial, agricultural, and thermoelectric power generation. Detailed descriptions of the forecast generation methodology and data used are located in the supplemental document *Technical Memorandum: Savannah-Upper Ogeechee Water and Wastewater Forecasting (2017)*.

From 2015 to 2050, community growth in the region will increase population by 24.5 percent. Water demands will increase steadily from 316 MGD to 425 MGD. Concurrently, regional wastewater needs increase from 178 MGD to 205 MGD.

#### 4.1 Municipal Forecasts

Municipal water demand forecasts include water supplied to residences, commercial businesses, small industries, institutions, and military bases. The forecasts are closely tied to the population projections for the counties within the region (Table 4-1). The Governor's Office of Planning and Budget developed the state's population projections for the entire state, in accordance with state law. These projections were adopted by EPD for this planning period.

**Table 4-1: Population Projections by County**

County	2015	2020	2030	2040	2050	Difference (2015 - 2050)	% Increase (2015 - 2050)
Banks	18,586	18,983	19,427	19,383	19,129	543	2.9%
Burke	23,006	23,175	23,059	22,193	21,032	-1,974	-8.6%
Columbia	142,402	160,541	201,807	249,263	305,680	163,278	114.7%
Elbert	19,537	19,343	18,718	17,838	16,947	-2,589	-13.3%
Franklin	22,282	22,952	24,089	24,959	25,946	3,664	16.4%
Glascokk	3,139	3,239	3,442	3,541	3,605	466	14.8%
Hart	25,628	26,034	26,417	26,238	25,969	341	1.3%
Jefferson	16,286	16,190	15,785	14,964	14,139	-2,147	-13.2%
Jenkins	9,292	9,346	9,370	9,201	8,980	-312	-3.4%
Lincoln	7,659	7,401	6,672	5,739	4,857	-2,802	-36.6%
McDuffie	21,781	22,267	22,716	22,376	21,703	-78	-0.4%
Madison	28,467	29,441	30,884	31,448	31,648	3,181	11.2%
Oglethorpe	14,612	14,750	14,791	14,494	13,947	-665	-4.6%
Rabun	16,320	16,482	16,454	16,145	15,992	-328	-2.0%
Richmond	203,625	207,182	210,404	208,482	203,352	-272	-0.1%





## 4. Forecasting Future Water Resource Needs

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**Table 4-1: Population Projections by County**

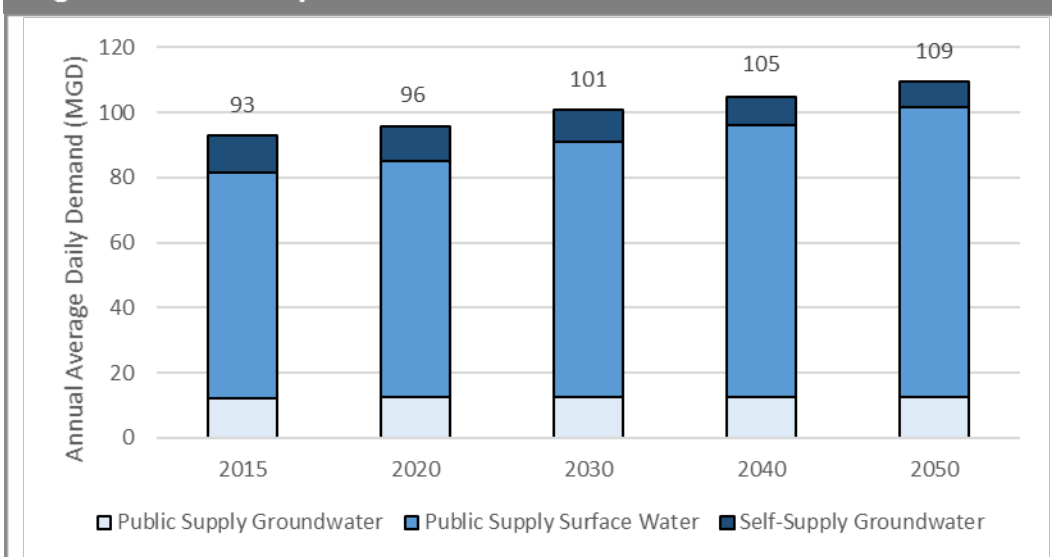
County	2015	2020	2030	2040	2050	Difference (2015 - 2050)	% Increase (2015 - 2050)
Screven	14,267	14,285	13,964	13,400	12,933	-1,334	-9.4%
Stephens	25,794	26,010	26,046	25,702	25,355	-439	-1.7%
Taliaferro	1,683	1,632	1,501	1,339	1,174	-510	-30.3%
Warren	5,462	5,230	4,784	4,329	3,925	-1,537	-28.1%
Wilkes	9,906	9,635	9,000	8,288	7,705	-2,202	-22.2%
<b>TOTAL</b>	<b>629,734</b>	<b>654,117</b>	<b>699,331</b>	<b>739,323</b>	<b>784,020</b>	<b>154,286</b>	<b>24.5%</b>

Source: Governor's Office of Planning and Budget, 2015.

### 4.1.1. Municipal Water Demand Forecasts

Municipal water demand forecasts (Figure 4-1) include demands for population that will be served by public water systems and by private wells (self supply). The projected demand for public water systems is further divided by the type of water supply source (groundwater or surface water).

**Figure 4-1: Municipal Water Forecast**



Source: Technical Memorandum: Savannah-Upper Ogeechee Water and Wastewater Forecasting (2017)

Note: Municipal water and wastewater includes residential, commercial, small industry and military institutions.

Municipal water demand forecasts were calculated by multiplying the per capita water use by the population served. Per capita water use differs for public water systems and self-supplied private wells; the demands are calculated separately and then added together.

## 4. Forecasting Future Water Resource Needs



Per-capita water use rates were initially developed in 2010 using reported withdrawal data from EPD (2005) and water use data from the USGS publication, *Water Use by County in Georgia 2005; and Water Use Trends, 1980-2005*. With feedback from counties, adjustments were made to subtract wholesale and industrial water uses where necessary. Large industrial users that were subtracted from municipal forecasting were forecast separately in the industrial forecast. Self-supplied water users were assumed to use a standard 75 gallons per capita per day (gpcd), unless feedback dictated otherwise.

To support this Plan update, EPD reviewed withdrawal data and the estimated population served reported by permitted municipal water systems from the years 2010 through 2014. Based on the trends observed from that data, an adjustment factor for each County was developed and applied to the gallons per capita per day values used in 2010 for public-supplied municipal demand. The self-supplied per capita values remained unchanged.

Adjustments to per capita water use rates were made to account for water savings as a result of changes in plumbing codes requiring high-efficiency plumbing fixtures. These adjustments were calculated based on U.S. Census housing information and an assumption of a two percent annual replacement rate of older fixtures to new high-efficiency plumbing fixtures throughout the planning period. Although the assumed plumbing improvements lowered future per capita water use rates, the total municipal water need increases from 93 MGD in 2015 to 109 MGD in 2050 as a result of population growth and increased urbanization.

### 4.1.2. Municipal Wastewater Flow Forecasts

The goal of the municipal wastewater flow forecasts is to estimate how much treated wastewater will be returned to waterways. These forecasts were based on estimated indoor water use; outdoor water use does not require wastewater treatment. Figure 4-2 shows the municipal wastewater flow forecasts by category. Wastewater may be treated by one of three disposal methods: 1) municipal wastewater treatment facilities to point source discharges, 2) municipal wastewater treatment facilities to land application systems (LAS), or 3) on-site sanitary sewage management systems (OSSMS). This study assumes that all privately-supplied population (on wells) uses OSSMS (septic systems) for wastewater management.

In 2010, to estimate indoor usage, water demands for each county were multiplied by estimated percentages of indoor water use that were developed by EPD. The percentage of publicly-supplied water customers who are on sewer and centralized treatment systems was estimated; the remaining users were assumed to be on septic systems. These percentages were calculated using reported EPD discharge data and feedback from counties and utilities.

For this Plan update, the percent of county total wastewater flow that is septic was retained, with the septic flow forecast adjusted based on the percent change in county population the prior (2010) and updated (2015) Office of Planning and Budget (OPB) population projections. Centralized wastewater flows from 2014, including



## 4. Forecasting Future Water Resource Needs

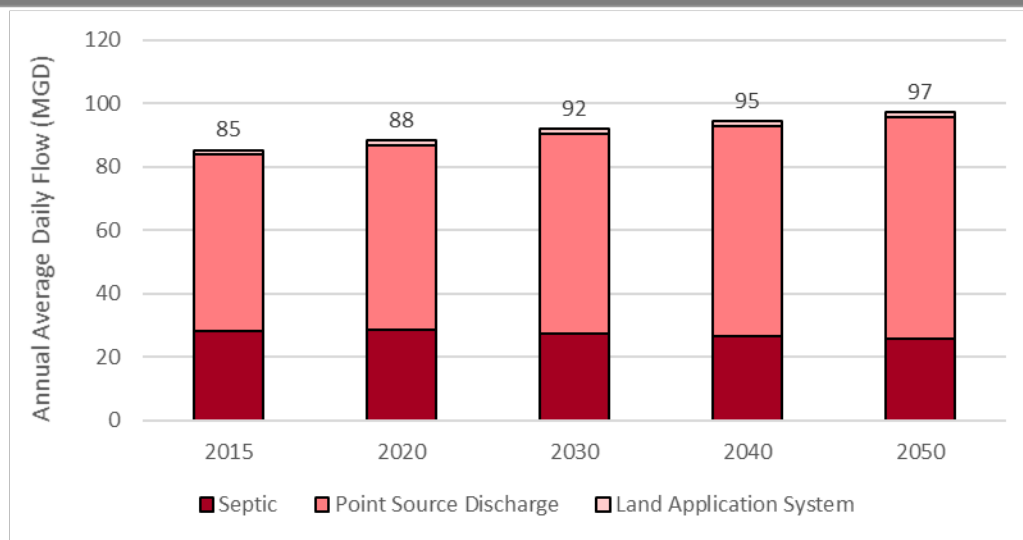
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point discharges and LAS, were analyzed. The sum of the 2014 point discharges per county was adjusted based on any adjustment in the ratio of septic/centralized treatment over time as well as the population projections. Similarly, the sum of 2014 land application system flows by county was adjusted based on the ratio of septic/centralized treatment over time and the population projections.

Septic systems account for approximately 33 percent of the 2015 wastewater generation in the Savannah-Upper Ogeechee Water Planning Region. Despite efforts to extend sewer service in some counties, the presence of septic systems will remain relatively steady for counties with lower population densities. The percentages of future wastewater flow that will be handled by centralized facilities (such as municipal treatment plant or LAS) versus septic systems are based on current County ratios; adjustments to the ratios were made based on feedback provided by local governments and utilities.

The total municipal wastewater flows are estimated to increase from 85 MGD in 2015 to 97 MGD in 2050.

**Figure 4-2: Municipal Wastewater Forecast**



Source: Technical Memorandum: Savannah-Upper Ogeechee Water and Wastewater Forecasting (2017)  
Note: Municipal water and wastewater includes residential, commercial, small industry and military institutions.

### 4.2 Industrial Forecasts

Industrial water demand and wastewater flow forecasts anticipate the future needs for industries expected to be the major water users through 2050. Industries require water for their production processes, sanitation, and cooling, as well as employee use and consumption. The industrial forecasts are based upon either the rate of

## 4. Forecasting Future Water Resource Needs



growth in employment for specific industrial sectors, the rate of growth in units of production for specific industrial sectors, or other credible and relevant information and data provided by specific industrial water users. Industrial water demand and wastewater generation forecasts in this section include both publicly-supplied and self-supplied industries. While many industries supply their own water and/or treat their own wastewater, some industries are supplied by public water systems and/or send their wastewater to a public treatment plant.

### 4.2.1. Employment Projections

The University of Georgia (UGA) produced industry-specific rates of employment growth for EPD, which were then used to estimate future water needs for specific industries within the Savannah-Upper Ogeechee Water Planning Region. General industrial employment shows an upward trend through the planning period.

### 4.2.2. Industrial Water Demand Forecasts

Industry-specific rates of employment growth for heavy water-using industry sectors (UGA, March 2010) were used to calculate future water needs for specific industries within the region. General industrial employment shows an upward trend through the planning period, but employment in some heavy water using industries, such as textile and apparel sectors, is expected to diminish over the planning period.

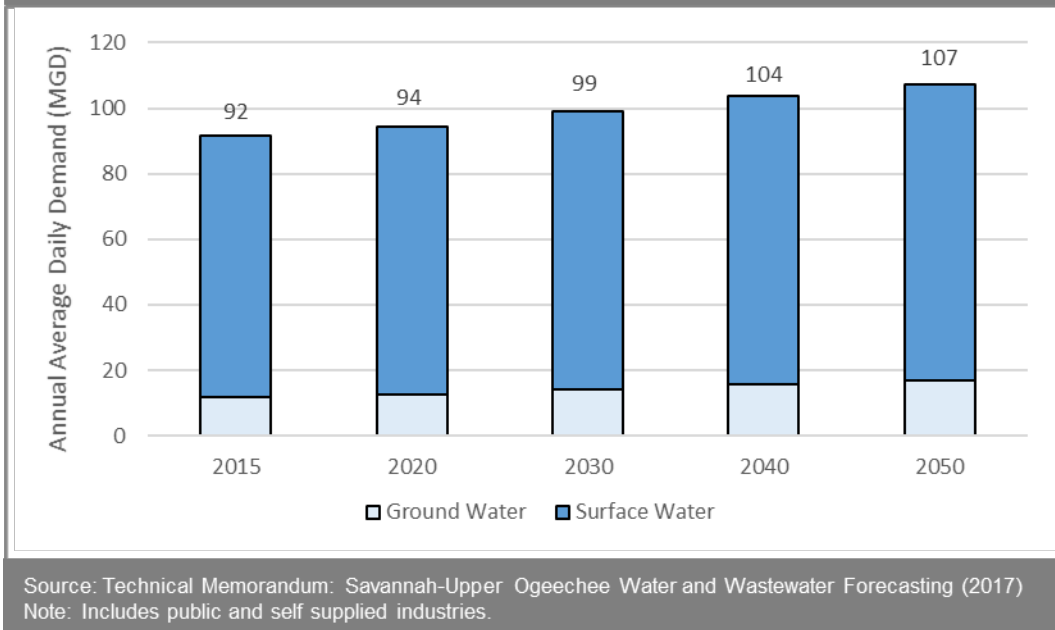
Industrial water demand forecasts were calculated using information and data specific to each major water-using industry. For industries where information was available on water use per unit of production, forecasts were based on production. For industries where product based forecasts were not possible, industry-specific workforce projections were assumed to reflect the anticipated growth in water use within the industry. A decrease in employment is projected for the textile and apparel industries. However, in calculating the forecasts, water demands for these industries were not reduced, based on the assumption that the withdrawal capacities may not correlate to employment or will be used by future industries recruited into the region. This industry-specific information and data, combined with the general upward trend in industrial employment, indicates a continual increase in industrial water demands through the planning period (Figure 4-3).



## 4. Forecasting Future Water Resource Needs

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**Figure 4-3: Industrial Water Forecast**



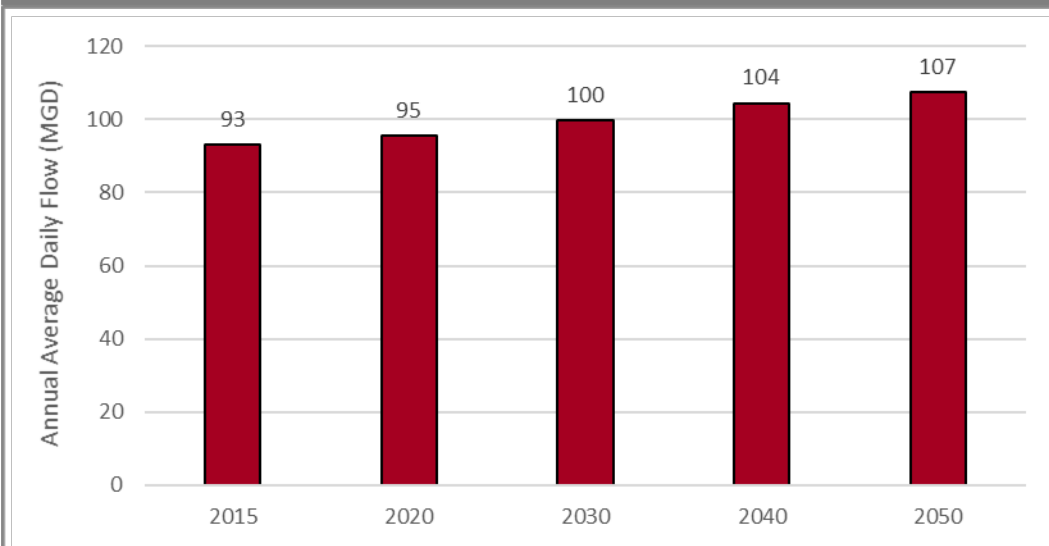
### 4.2.3. Industrial Wastewater Flow Forecasts

Industrial wastewater flow forecasts were estimated by multiplying the industrial water forecast by the ratio of wastewater generated to water used for each industrial sector. The wastewater return ratios were initially developed by EPD based on a state-wide analysis of multiple years of actual wastewater return and water withdrawal data (*Industrial Wastewater Return Ratios Memorandum, EPD, October 2009*); some ratios were adjusted later based on feedback provided by industry representatives. Figure 4-4 shows the industrial wastewater flow forecasts.

## 4. Forecasting Future Water Resource Needs



**Figure 4-4: Industrial Wastewater Forecast**



Source: Technical Memorandum: Savannah-Upper Ogeechee Water and Wastewater Forecasting (2017)  
Note: Includes public and self supplied industries. The projected wastewater quantity is higher than water demand because Georgia's stone and clay industry discharges more than it withdraws as using captured stormwater is a common practice by the industry.

### 4.3 Agricultural Forecasts

Agricultural water demand forecasts were originally developed, and recently updated, by the Georgia Water Planning & Policy Center at Albany State University (GWPPC), with support from UGA's College of Agricultural and Environmental Sciences. The projections cover row and orchard crops as well as most vegetable and specialty crops accounting for more than 95 percent of Georgia's irrigated land. Additionally, estimates of current use are made for animal agriculture, horticultural nurseries and greenhouses, as well as golf courses. Metered observations were utilized from the 2010-2013 growing seasons and then projected into the future demand years. The forecasts provide a range of irrigation water use under dry, medium, and wet climate conditions. Table 4-2 shows the dry year crop irrigation water demand for each county.

The bulk of agricultural water needs are located in the southern part of the region, in Burke, Jefferson, Jenkins, and Screven counties. While agricultural water needs are known to fluctuate substantially throughout the year, the annual averages are presented so that suitable comparisons may be made with other demand sectors. More description of the agricultural forecasts is provided in the supplemental document *Technical Memorandum: Savannah-Upper Ogeechee Water and Wastewater Forecasting (2017)*.



## 4. Forecasting Future Water Resource Needs

**Table 4-2: Agricultural Water Forecasts by County (in AAD-MGD)**

County	2015	2020	2030	2040	2050	% Increase (2015 to 2050)
Banks	0.003	0.003	0.004	0.005	0.005	77%
Burke	31.3	31.9	32.6	32.9	33.2	6%
Columbia	0.17	0.17	0.18	0.19	0.19	16%
Elbert	0.18	0.18	0.18	0.17	0.17	-7%
Franklin	0.09	0.09	0.08	0.08	0.08	-5%
Glascocock	0.14	0.14	0.14	0.14	0.13	-6%
Hart	0.82	0.84	0.85	0.85	0.85	4%
Jefferson	19.5	19.9	20.5	20.8	21.1	8%
Jenkins	9.3	9.6	10.0	10.3	10.6	14%
Lincoln	0	0	0	0	0	0%
Madison	0	0	0	0	0	0%
McDuffie	0.61	0.61	0.60	0.59	0.58	-5%
Oglethorpe	0.31	0.32	0.32	0.32	0.33	4%
Rabun	0	0	0	0	0	0%
Richmond	0.75	0.78	0.80	0.82	0.84	12%
Screven	23.6	24.3	25.5	26.5	27.4	16%
Stephens	0	0	0	0	0	0%
Taliaferro	0.006	0.006	0.006	0.006	0.006	0%
Warren	0.06	0.06	0.06	0.06	0.05	-7%
Wilkes	0	0	0	0	0	0%
<b>Total</b>	<b>86.9</b>	<b>88.9</b>	<b>91.8</b>	<b>93.7</b>	<b>95.6</b>	<b>10%</b>

Source: Technical Memorandum: Savannah-Upper Ogeechee Water and Wastewater Forecasting (2017)

### 4.4 Water for Thermoelectric Power Forecasts

Water requirements for thermoelectric power generation facilities are estimated based on future energy demands along with the water requirements and consumption rates in gallons per megawatt-hour (MWh) for different power generating configurations. EPD sought the input of an energy sector *ad hoc* group, which included representatives from the major electric utilities in the state, in preparing the energy sector water demand forecast. The methodology and results of the energy sector forecast are discussed in *Update of GA Energy Needs & Generating Facilities Memorandum* (2016).

The forecast analysis covers both water withdrawal requirements and water consumption associated with energy generation. Information related to water withdrawals is an important consideration in planning for the water needed for energy production. However, water consumption is the more important element when



## 4. Forecasting Future Water Resource Needs



assessing future resources because a large volume of water is typically returned to the environment following the energy production process.

The energy sector represents a significant portion of surface water demand in the Savannah-Upper Ogeechee Region. Plant Vogtle, located in Waynesboro in Burke County, is one of Georgia Power Company's two nuclear facilities and is the only major water user for thermoelectric power generation in the Savannah Upper-Ogeechee Water Planning Region. Its two existing units can generate 2,217 megawatts. Construction of two additional units (with additional capacity of 2,204 megawatts) is underway. In 2015, Plant Vogtle withdrew approximately 70 MGD (from the Savannah River) and returned 25 MGD on an annual average daily basis, effectively consuming 45 MGD of water. Based on the assumption that all four units will continue to be in operation through the year 2050, the region's total water withdrawal need for the energy sector is estimated to be 175 MGD in 2050; the respective consumption water need is estimated to be 114 MGD (Table 4-3).

**Table 4-3: Energy Sector Water Demand Forecast**

Demand Type	Savannah Upper Ogeechee Region (MGD-AAD)				
	2015	2020	2030	2040	2050
Withdrawals	70	138	140	155	175
Consumption	45	89	91	100	114
Source: Memorandum: Update of GA Energy Needs & Generating Facilities (2016).					
Note: Consumptive use consists of water lost through evaporation during the energy production process.					

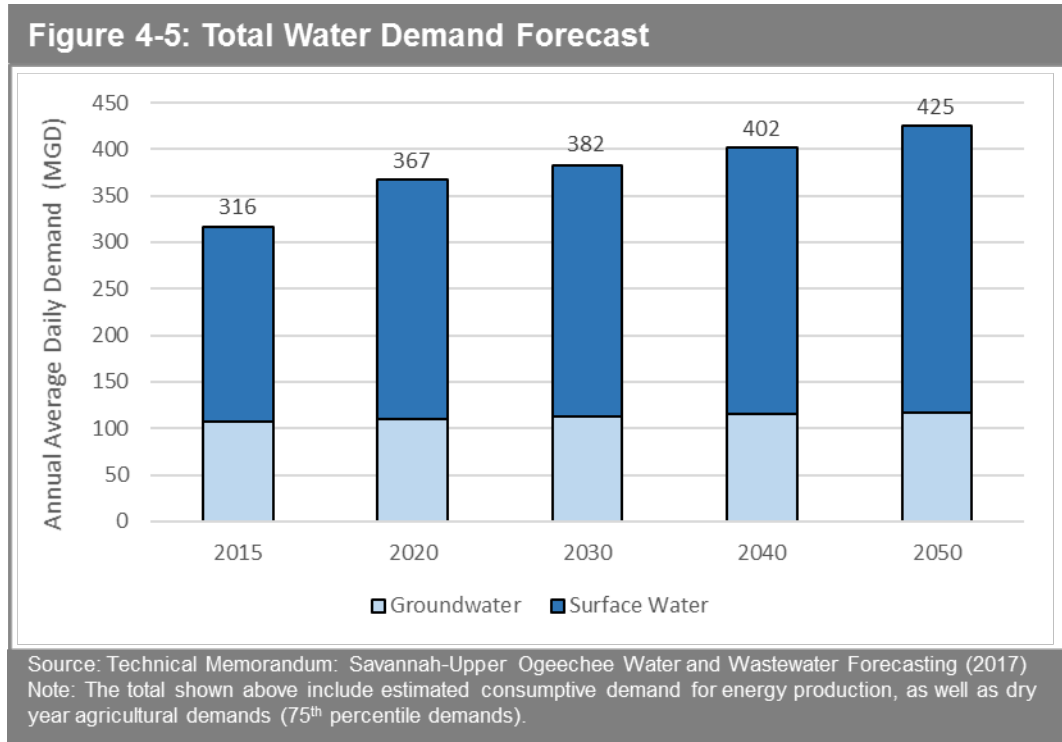


## 4. Forecasting Future Water Resource Needs

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### 4.5 Total Water Demand Forecasts

In total, the water needs of the region increase steadily through the planning period from approximately 316 MGD in 2015 to an estimated 425 MGD in 2050 (Figure 4-5).

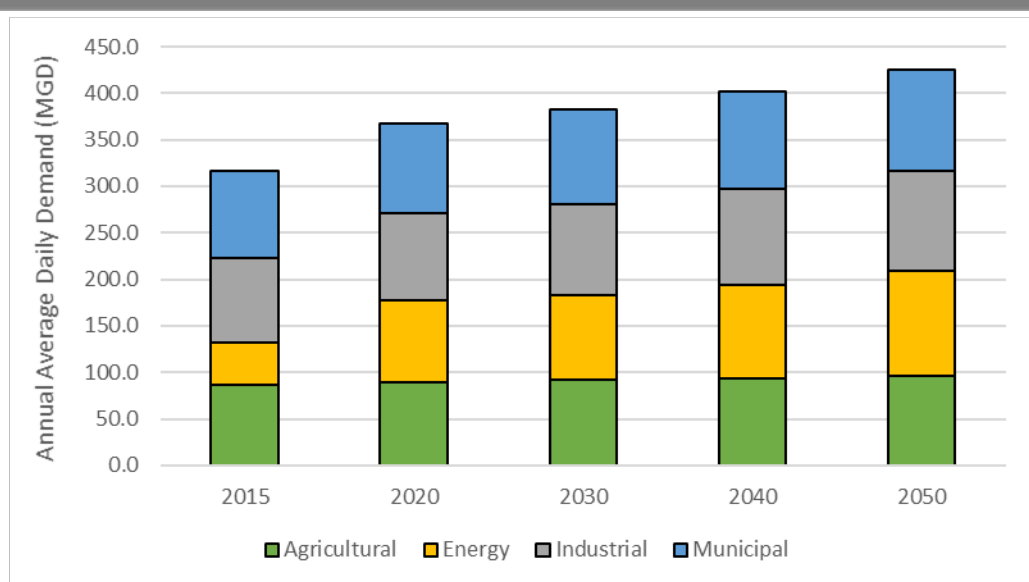


Municipal water demand is currently the greatest, followed closely by industrial and agricultural water demands (Figure 4-6). Municipal, industrial and agricultural water demands are projected to increase moderately by 2050, while energy sector water demands are projected to increase more dramatically.

## 4. Forecasting Future Water Resource Needs



Figure 4-6: Water Demand per Sector



Source: Technical Memorandum: Savannah-Upper Ogeechee Water and Wastewater Forecasting (2017)

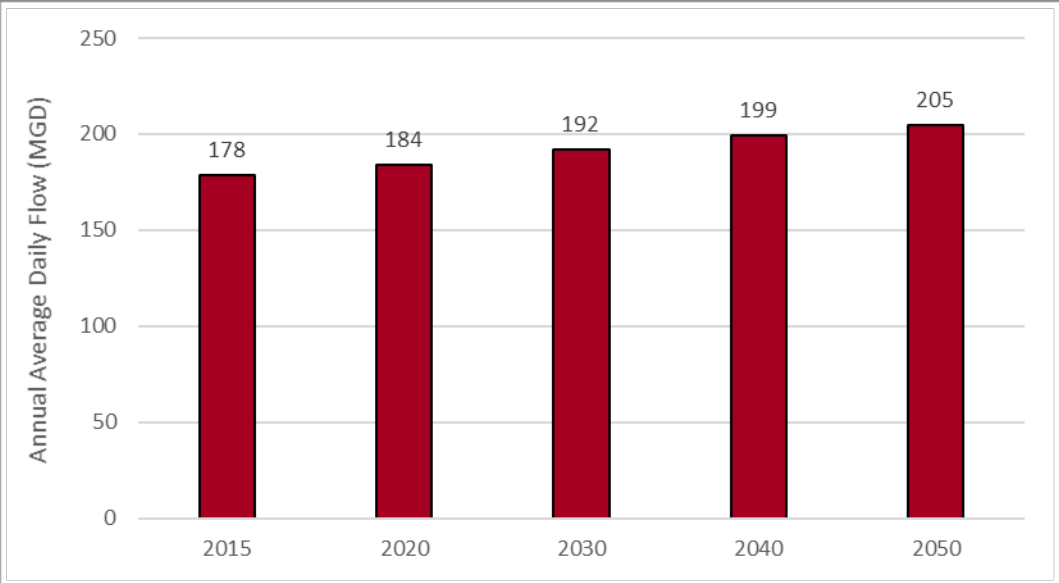
Note: The total shown above includes estimated consumptive demand for energy production as well as dry year agricultural demands (75th percentile demands).

The region's wastewater returns increase from approximately 178 MGD to 205 MGD in the same 35-year planning period (Figure 4-7). The region's wastewater returns are much lower than its withdrawals because of consumptive use for the energy production and negligible agricultural returns. Strategic planning for future wastewater management will be essential in protecting the region's surface water quality.



# 4. Forecasting Future Water Resource Needs

Figure 4-7: Total Wastewater Forecasts



Source: Technical Memorandum: Savannah-Upper Ogeechee Water and Wastewater Forecasting (2017)

## 5. COMPARISON OF WATER RESOURCE CAPACITIES AND FUTURE NEEDS



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## Section 5. Comparison of Water Resource Capacities and Future Needs

This Section summarizes the potential water resources management issues for the Savannah-Upper Ogeechee Water Planning Region. The potential gaps – areas where future demands exceed the estimated capacity of the resources – have been determined by expanding the Baseline Resource Assessments (Section 3) with the water demand and wastewater flow forecasts (Section 4). These gaps will be addressed through the selected management practices (Section 6).

### 5.1. Groundwater Availability Comparisons

The *Groundwater Availability Assessment Update* (2017) estimated the potential range of sustainable yield for each of the three prioritized aquifers in the region based on the models developed for the respective aquifers. The assessment results have been used to evaluate the potential for groundwater use to meet the projected 2050 demands across water planning regions. The assessment concluded that supplies from the Crystalline-Rock, Floridan and Cretaceous Aquifers are generally sufficient in meeting the forecasted groundwater demand from areas with access to these aquifers.

**Crystalline-Rock Aquifer** – Many communities in the upper portion of the region use groundwater from the Crystalline-Rock Aquifer to meet local needs or supplement their surface water supply sources including: Columbia, Franklin, Madison, Rabun, Stephens, and Taliaferro counties. In addition, groundwater is drawn from this aquifer for self-supply wells in the region. In most cases, multiple wells are required to meet existing needs due to the relatively low yields from individual wells (less than 100 gallons per minute). Some of the existing water suppliers are likely to continue to use groundwater to meet water supply needs. Site-specific studies may be required to determine the availability and sustainable yield in a localized area for future supplies. However, areas with higher increases in projected population density will likely need a combination of surface water and groundwater from the Crystalline-Rock Aquifer to meet future demands.

Assuming that the Crystalline-Rock Aquifer in the region exhibits similar characteristics to the portion of the aquifer in the adjacent Middle Oconee study

#### Summary

Over the planning period, potential surface water flow regime gaps (not meeting instream flow targets) are modeled to occur at the Eden planning node.

For modeled aquifers, no groundwater resource shortfalls are expected to occur over the planning horizon.

Assimilative capacity assessments indicate the need for advanced treatment in several streams, including continued efforts to implement the alternative restoration plan for the Savannah Harbor.





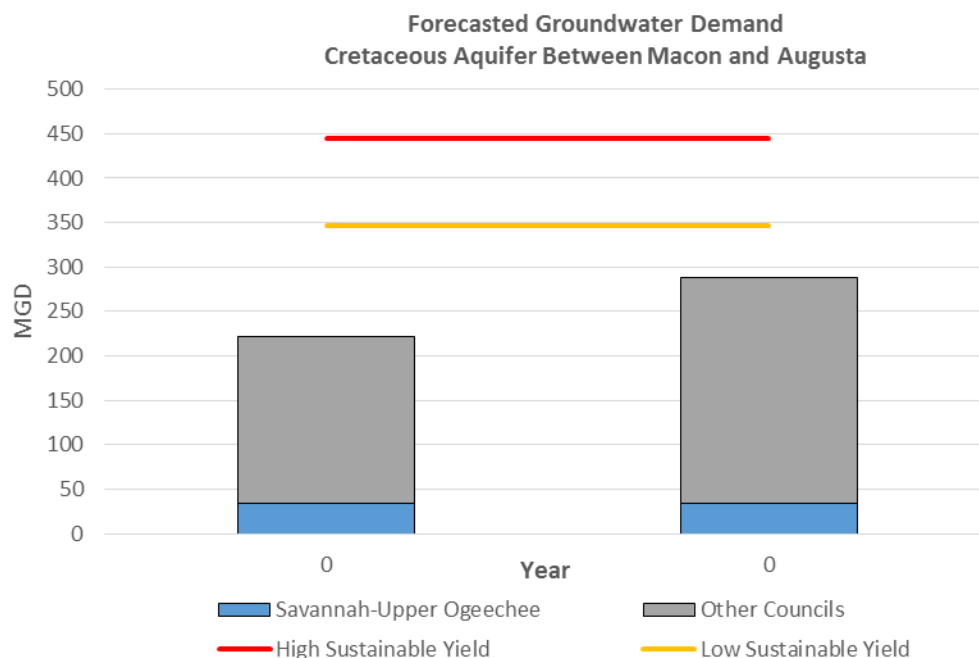
## 5. Comparison of Water Resource Capacities and Future Needs

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basin for which a water balance was generated, and using the low range of the area normalized sustainable yield (Piedmont - 0.01 MGD per square mile of area) for conservative planning, the sustainable yield available from the portion of the Crystalline-Rock Aquifer in the region is estimated to be approximately 40 MGD on an annual average daily basis. Based on this estimate, supplies from the Crystalline-Rock Aquifer will be sufficient for users in the region with total demands on the aquifer estimated as 9.6 MGD in 2015 increasing to 10.8 MGD in 2050.

**Cretaceous Aquifer** – The Cretaceous Aquifer is a significant water source in the Savannah Upper-Ogeechee Water Planning Region and in other water planning regions in Georgia. The sustainable yield for the prioritized aquifer units modeled is estimated to range from 347 to 445 MGD. Projections for water use from the multiple regions with access to this aquifer show that future demand within the modeled area is not projected to exceed the sustainable yield in future years (Figure 5-1). The demand estimates include 75<sup>th</sup> percentile agricultural demands representing dry year conditions. Because the Resource Assessment modeling is not specific to individual planning regions, site-specific studies would likely be required to determine the sustainable yield of this aquifer in any particular local area.

**Figure 5-1 Cretaceous Aquifer Demand vs. Estimated Yield**



Sources:  
Groundwater Availability Assessment (EPD, 2012).  
Technical Memorandum: Savannah-Upper Ogeechee Water and Wastewater Forecasting (2017).



**Floridan Aquifer** – The total estimated range of sustainable yield for the Floridan Aquifer in the South-Central Georgia and Eastern Coastal Plain modeled portions of the aquifer is higher than forecasted 2050 groundwater demands from regions with access to this aquifer. The projected water supply need from this aquifer for the Savannah-Upper Ogeechee Water Planning Region is approximately 59 MGD in 2050, mostly from the southern portion of the region (Burke, Glascock, Jefferson, Jenkins, Richmond, and Screven counties utilize this aquifer). The modeling results indicate that significant additional resources are available from the Floridan Aquifer.

### 5.2. Surface Water Availability Comparisons

The evaluation of surface water availability is based on the results of the *Surface Water Availability Resource Assessment* (2017) and the projected surface water demands in 2050, including estimated demands from South Carolina. For modeling purposes, the basin was divided into sub-basins with results summarized at individual planning nodes. The location of the planning nodes, local drainage areas (LDAs), and projected water availability gaps by planning node are summarized in Figure 5-2. The darker shading within the Savannah-Upper Ogeechee Region indicates the areas that drain to a planning node with potential surface water gaps.

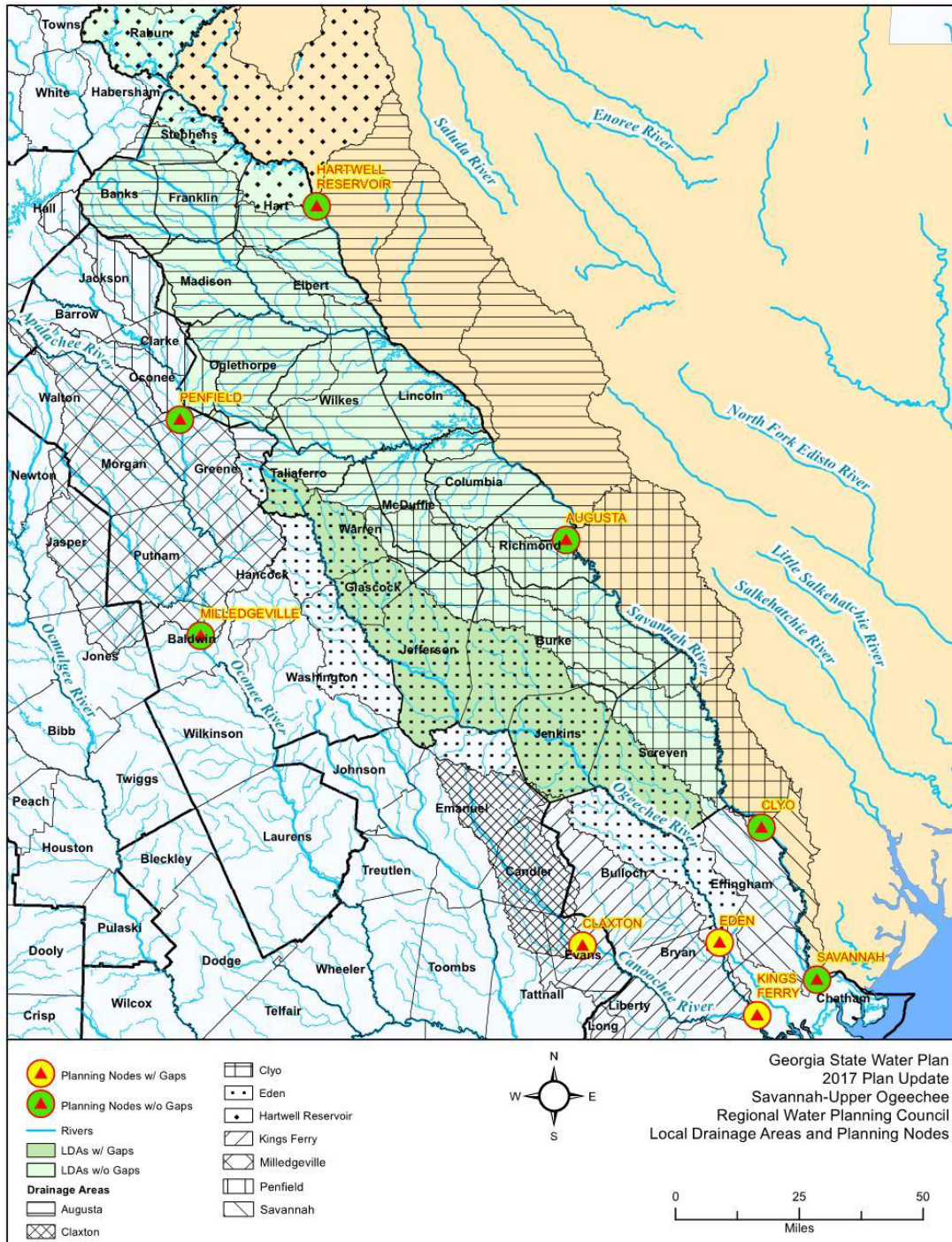
The surface water availability assessment modeling evaluated streamflows under future demand conditions and compared them to a low flow threshold. In the unregulated portions of the region (the Upper Ogeechee Basin), the low flow threshold is defined by the State's Interim Instream Flow Protection Policy, which calls for the protection of monthly 7Q10 or natural flow, whichever is lower. The 7Q10 flow is the lowest seven-day average flow with a frequency of occurring once in 10 years. A potential gap exists at a planning node when, after meeting upstream consumptive uses (withdrawal minus return), the modeled stream flows at the node do not meet the low flow threshold. The water supply and instream flow needs in the Savannah-Upper Ogeechee Water Planning Region can be met hydrologically at all major nodes evaluated, except at the Eden node. Potential surface water gaps also exist at the nearby nodes of Claxton and Kings Ferry on the Canoochee River, but only a very small portion of Jenkins County is within the drainage area for those nodes. For the Hartwell and Augusta nodes, the results were based on the existing operating protocol used by the USACE.



## 5. Comparison of Water Resource Capacities and Future Needs

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Figure 5-2: 2050 Surface Water Gap Summary



## 5. Comparison of Water Resource Capacities and Future Needs



While sufficient conservation storage is available for future water supply, this analysis did not include an evaluation of potential economic impact to communities surrounding the lakes. The Savannah-Upper Ogeechee Planning Council recognizes that impacts on local economies, and the state of Georgia as a whole, is an important aspect of the statewide water planning process. Through the update of the Savannah River Basin Comprehensive Study, the Council recommended that the USACE evaluate adaptive management strategies that could minimize the use of the available conservation storage. Currently the USACE is working with the States of South Carolina and Georgia to evaluate and model six alternatives within Phase II of the Comprehensive Study. The Comprehensive Study is a cost share with Georgia EPD, SDHEC and The Nature Conservancy. Table 5-1 presents a summary of the minimum reservoir levels predicted under current and 2050 demand conditions.

**Table 5-1: Summary of Reservoir Storage Volumes**

Reservoir	Current Minimum Conservation Storage (AF)	Current Minimum Percent of Conservation Storage Remaining (%)	2050 Minimum Conservation Storage (AF)	2050 Minimum Percent of Conservation Storage Remaining (%)
Hartwell	730,964	52% (El. 646.1)	705,054	50% (El. 645.5)
Thurmond	252,671	24% (El. 317.3)	226,893	22% (El. 316.8)

Source: Surface Water Availability Resource Assessment (EPD, 2017).  
AF = acre-feet

The Surface Water Availability Resource Assessment predicted that the low flow threshold cannot be maintained at all times while meeting the forecasted 2050 demands at the Eden node. Table 5-2 provides a summary of the modeled potential surface water gaps at the Eden node.

**Table 5-2: Summary of Modeled Potential Surface Water Gaps at Eden Node**

Period	Length of Gap (% of time)	Average Gap	Long-term Average Flow	Maximum 1-Day Gap	Corresponding Flow Regime
Current	6	16 cfs (10 MGD)	2,207 cfs (1426 MGD)	35 cfs (23 MGD)	139 cfs (90 MGD)
2050	3	24 cfs (16 MGD)	2,213 cfs (1430 MGD)	47 cfs (30 MGD)	102 cfs (66 MGD)

Source: Surface Water Availability Resource Assessment (EPD, 2017).

When assessing this issue, the Savannah-Upper Ogeechee Council recognized that surface water gaps are driven by both net consumption (withdrawal minus returns) and year to year variations in river flows. In wet years, the region is likely to not experience any potential gaps to off-stream uses and instream needs. In dry years,





## 5. Comparison of Water Resource Capacities and Future Needs

the potential gaps are likely to be more severe. In order to better assess these potential gaps and to better understand the types of management practices that may be required, a more detailed quantification of the frequency and severity of potential gaps was completed.

The quantification and frequency of potential gaps is especially relevant when selecting water management practices. For example, if the preferred management practice is to replace surface water diversions with groundwater withdrawals, it is important to know how much flow should be generated and for what length of time. This process will in turn dictate the number and size of wells needed to generate the flow. If a reservoir is the preferred practice, then one needs to know the largest volume of storage that may be needed because stream flow needs can then be addressed by controlling the rate of flow released from the reservoir. In addition, since the largest potential gaps occur less frequently, there are important cost-benefit considerations associated with addressing the largest and more infrequent potential gaps. The quantification and frequency of the modeled gaps is provided in Table 5-3. It is important to note that the less severe and more frequent gaps (1 to 7 day and 8 to 14 day potential gaps events) are those that can most likely be addressed by management practices. The more infrequent and severe gaps are indicative of drought conditions and will most likely be addressed through drought management measures implemented by EPD and users in the region.

**Table 5-3: Characteristics of Modeled 2050 Potential Surface Water Gaps**

Gap Event Duration	Number of Gap Events (% of Total Gap Events) <sup>1</sup>		Total Gap Days (% of Total Days) <sup>2</sup>		Average Daily Flow Deficit per Event	Average Cumulative Flow Deficit per Event
Eden Node						
1-7 days	44	(61.1%)	178	(0.6%)	11 cfs (7 MGD)	52 cfsd (34 MG)
8-14 days	12	(16.7%)	114	(0.4%)	15 cfs (10 MGD)	150 cfsd (98 MG)
15-30 days	10	(13.9%)	222	(0.8%)	29 cfs (19 MGD)	633 cfsd (411 MG)
>30 days	6	(8.3%)	388	(1.4%)	28 cfs (18 MGD)	1,795 cfsd (1,167 MG)
Totals	72	(100.0%)	902	(3.3%)		

Source: Surface Water Availability Resource Assessment (EPD, 2017).

<sup>1</sup> The total number of modeled gap events is presented for each duration range, as well as the percentage in that duration range to the total number of all modeled gap events.

<sup>2</sup> The total number of days within the modeling period (1939-2013) in which a potential gap occurred is presented, as well as the percentage of that total to the total number of days analyzed in the modeling period.

## 5. Comparison of Water Resource Capacities and Future Needs



The projected changed use of surface water for the counties within the Savannah-Upper Ogeechee Region that have modeled potential current and future gaps are shown in Table 5-4. Since there are modeled current gaps at the referenced planning nodes, any development of additional surface water to meet projected needs will need to done in a manner that does not increase potential gaps.

**Table 5-4: 2050 Increased Annual Average Surface Water Demand within Potential Gap Areas**

County	Planning Node With Potential Gap	Change in Agricultural Demands by 2050 <sup>1</sup> (MGD)	Change in Agricultural Demand by 2050 <sup>1</sup> (cfs)
Burke	Eden	0.05	0.08
Glascocock	Eden	-0.004	-0.005
Jefferson	Eden	-0.04	-0.07
Jenkins	Eden	0.19	0.29
Screven	Eden	0.12	0.18
Taliaferro	Eden	0	0.0
Warren	Eden - Municipal	-0.06	-0.09
	Eden - Ag	-0.004	-0.006

<sup>1</sup>All surface water demands within drainage areas with potential gaps are agricultural except for the municipal demand noted in Warren county.



## 5. Comparison of Water Resource Capacities and Future Needs

In addition to the surface water availability resource assessment modeling, current permitted municipal surface water and groundwater withdrawals have been compared to the forecasted future demands (Table 5-5). This comparison indicates that Glascock, Madison, Oglethorpe, and Taliaferro counties may require additional water supply infrastructure above what is currently permitted. However, these counties show constant or even decreasing demand trends so the actual supply to meet demands may be coming from permits outside of the county boundaries.

**Table 5-5: Municipal Permitted Water vs. 2050 Forecasted Demand (MGD) <sup>1,2</sup>**

County	Current Permitted Water Withdrawals <sup>3</sup>	Projected 2015 Water Demand <sup>3</sup>	Projected 2050 Water Demand <sup>3</sup>	2050 Permitted Capacity Need <sup>4</sup>
Banks	1.0	0.8	0.8	-
Burke	4.9	1.1	0.9	-
Columbia	55.1	16.8	37.0	-
Elbert	5.4	1.0	0.9	-
Franklin	7.4	1.9	3.0	-
Glascock	0.0	0.09	0.09	0.09
Hart	3.8	1.6	2.9	-
Jefferson	3.1	1.4	1.2	-
Jenkins	1.0	0.8	0.7	-
Lincoln	0.9	0.4	0.2	-
Madison	0.6	2.5	2.6	2.0
McDuffie	4.6	1.5	2.5	-
Oglethorpe	0.25	1.3	1.13	0.88
Rabun	8.2	2.0	1.8	-
Richmond	85.6	43.3	41.2	-
Screven	1.3	0.9	0.8	-
Stephens	15	3.4	3.3	-
Taliaferro	0.0	0.05	0.03	0.03
Warren	0.8	0.2	0.2	-
Wilkes	3.8	0.8	0.6	-

<sup>1</sup> Municipal Water Demand includes industries that obtain their water from a municipal source.

<sup>2</sup> Includes both surface and groundwater.

<sup>3</sup> Surface water withdrawals are permitted as monthly values while groundwater withdrawals are permitted as both monthly and annual values. The annual values were used for groundwater permitted in this table.

<sup>4</sup> Analysis does not account for demands in one county that may be met by permits from another county.

Source: EPD Permit Data.





### 5.3. Surface Water Quality Comparisons (Assimilative Capacity)

This section summarizes the results of the *Water Quality (Assimilative Capacity) Resource Assessment* (2017) and the water quality gaps that the Savannah-Upper Ogeechee Water Planning Region may face, based on projected 2050 wastewater flows and assumptions. Analysis of the Savannah River Basin incorporated permitted facilities and land use information for the South Carolina side of the basin.

#### 5.3.1. Future Treatment Capacity Needs

Future treatment capacity needs were determined based on a comparison of forecasted 2050 wastewater flow and current permitted capacity in the region (Table 5-6). The permitted quantities are based on existing municipal facilities permitted under the National Pollutant Discharge Elimination System (NPDES) or State land application systems (LAS) permits.

Based on the forecast wastewater flow, Madison, and Oglethorpe counties may need additional permitted capacity for point source discharge. Burke and Stephens show minor potential gaps for LAS permitted capacity. It should be noted that the comparison in Table 5-6 was completed at the county level; additional localized shortages in treatment capacity may exist, and gaps in some counties may be met by systems in neighboring counties. Future expansion or new treatment facilities will be included in the consideration of management practices (Section 6). Additionally, some water utilities are investing in source water protection as a multi-tier approach to hedge against increasing future treatment capacity and costs.



## 5. Comparison of Water Resource Capacities and Future Needs

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**Table 5-6: 2050 Municipal Wastewater Forecast versus Existing Permitted Capacity (MGD)**

County	Point Source (PS)			Land Application Systems (LAS)		
	2050 Forecast <sup>1</sup>	Permitted Capacity	2050 Surplus or Gap (-) <sup>2</sup>	2050 Forecast <sup>1</sup>	Permitted Capacity	2050 Surplus or Gap (-) <sup>2</sup>
Banks	0.04	1.11	1.06	0.11	0.32	0.21
Burke	0.64	2.37	1.73	0.15	0	<b>-0.15</b>
Columbia <sup>3</sup>	19.50	21.65	2.15	0.49	0.58	0.09
Elbert	0.66	1.59	0.93	0	0	0
Franklin	0.62	1.50	0.87	0.06	0.08	0.02
Glascocock	0.02	0.21	0.19	0	0	0
Hart	0.20	0.50	0.30	0.72	1.75	1.03
Jefferson	1.77	3.85	2.07	0	0.05	0.05
Jenkins	0.33	0.95	0.62	0	0	0
Lincoln	0.09	0.52	0.43	0	0	0
Madison	0.93	0.17	<b>-0.76</b>	0.01	0.10	0.09
McDuffie	1.77	2.50	0.73	0.10	0.29	0.19
Oglethorpe	0.53	0.25	<b>-0.28</b>	0	0	0
Rabun	1.24	4.20	2.96	0.01	0.10	0.09
Richmond	38.10	48.43	10.32	0	0	0.0
Screven	0.60	1.57	0.97	0.001	0.044	0.043
Stephens	1.81	2.50	0.70	0.003	0	<b>-0.003</b>
Taliaferro	0.03	0.10	0.07	0	0	0.0
Warren	0.37	0.84	0.47	0.02	0.05	0.03
Wilkes	0.55	4.08	3.53	0	0	0.0
<b>Total</b>	<b>69.80</b>	<b>98.89</b>	<b>29.09</b>	<b>1.67</b>	<b>3.36</b>	<b>1.69</b>

<sup>1</sup> Includes industrial wastewater expected to be treated at municipal facilities.

<sup>2</sup> Analysis does not account for gaps in some counties that may be met by permitted systems in neighboring counties.



### 5.3.2. Assimilative Capacity Assessments

**Full permit scenario.** The 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 2014). The results of the DO modeling at current permitted conditions are presented in Figure 5-3 and Table 5-7 for the Savannah-Upper Ogeechee Region, which includes portions of the Oconee, Ogeechee, Savannah, and Tennessee 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 Savannah-Upper Ogeechee Planning Council that have exceeded their full assimilative capacity under the current conditions assessment include:

- Buck Creek, Chandlers Branch, Eastanollee Creek, Falling Creek, Fortson Creek, Franklin Springs, Kiokee Creek, Little River, Spirit Creek and an unnamed tributary to the South Fork Broad River in the Savannah River Basin; and
- Goldens Creek and Rock Comfort Creek in the Ogeechee Basin.

Stakeholders including Georgia EPD, SCDHEC, USEPA, and the Savannah River/Harbor Discharger Group collaboratively developed an implementation plan to meet applicable water quality standards for the Savannah River Basin, including the Savannah Harbor. Following development of the plan, and reclassification of the Savannah Harbor to Category 5R on the 2014 305(b)/303(d) list, the USEPA withdrew the TMDL for the Savannah Harbor in favor of the alternative restoration approach outlined in the plan.



## 5. Comparison of Water Resource Capacities and Future Needs

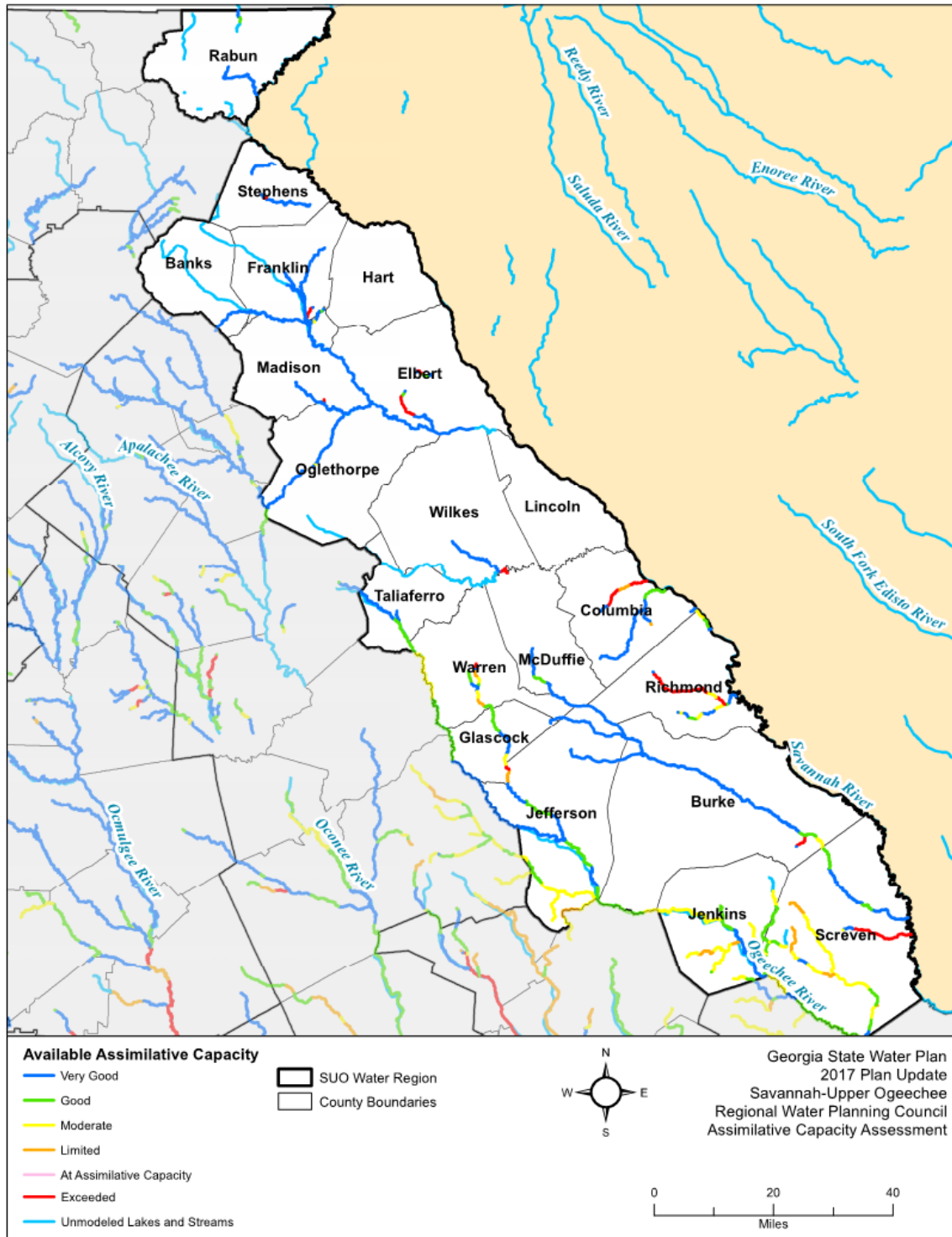
**Table 5-7: Permitted Assimilative Capacity for DO in Savannah-Upper Ogeechee Planning Council**

Basin	Available Assimilative Capacity (Total Mileage)						Total River Miles in the Council Area
	Very Good ( $\geq 1.0$ 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)	Unmodeled	
Oconee	13	2	0	0	0	0	15
Ogeechee	108	112	126	27	2	6	381
Savannah	338	26	13	2	48	0	427
Tennessee	2	1	0	0	0	1	4
Source: GIS Files from the Updated Permitted Water Quality Resource Assessment (EPD, January 2017).							

## 5. Comparison of Water Resource Capacities and Future Needs



Figure 5-3: Results of Assimilative Capacity Assessment – DO at Current Permit Conditions





## 5. Comparison of Water Resource Capacities and Future Needs

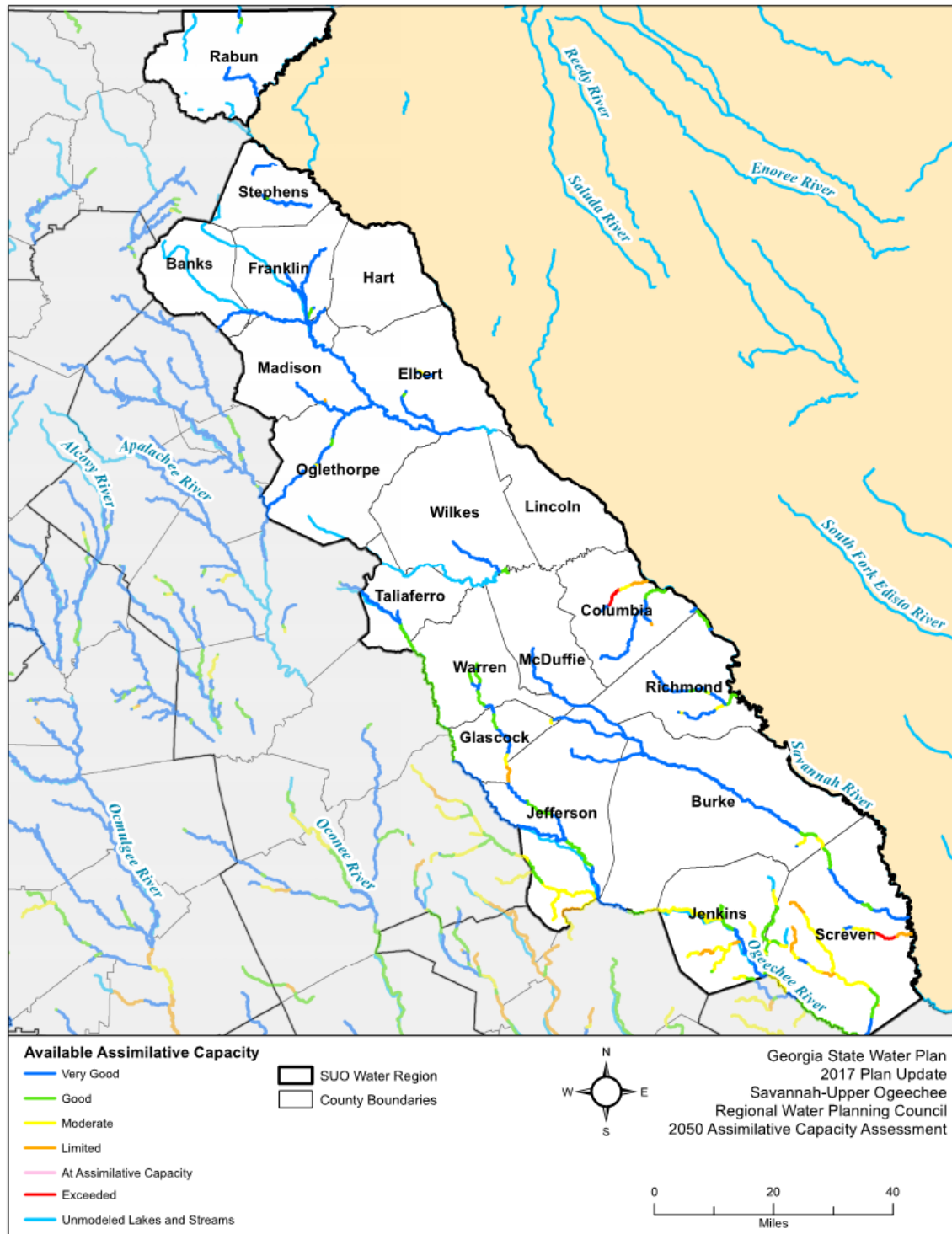
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**2050 Conditions Scenario.** Based on the results shown in Figure 5-3, EPD also conducted modeling under future conditions. In order to address areas of limited or no assimilative capacity for DO, EPD incorporated some assumptions regarding future (2050) 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. The resource assessment models developed for this planning process will continue to be used by EPD for future wasteload allocation and for assessing DO conditions in the streams. Assuming that 1) permit limits will be tightened in streams with potential DO violations, and 2) planned projects with alternative discharge locations will be constructed to handle future flows, EPD hopes to eliminate future DO violations in streams (red segments in Figure 5-3). Figure 5-4 shows the assimilative capacity at assumed future (2050) permitted flows and effluent limits.

## 5. Comparison of Water Resource Capacities and Future Needs



**Figure 5-4 Results of Assimilative Capacity Assessment – DO at Assumed Future (2050) Permitted Conditions**







## 5. Comparison of Water Resource Capacities and Future Needs

### 5.3.3. Watershed Models & Nutrient Assessments

Future assessments of nutrients (nitrogen and phosphorus) levels have been completed. Moderate increase of nutrient loadings are predicted in limited areas along both sides of the Savannah River. However, there are no existing nutrient standards in this basin to compare to at the time of this study. It is anticipated that nutrient standards will be developed in the future. Strategies for nutrient management (including MPs and source water protection) should be evaluated based on these standards and updated watershed modeling results in future plan updates. More detail regarding the nutrient model results is available in the *Water Quality (Assimilative Capacity) Resource Assessment* (2017). Nutrient and non-point source control management practices specific to land uses within the Savannah-Upper Ogeechee Region are discussed in Section 6.

### 5.3.4. Non-Point Source Pollution

Non-point source pollution accounts for the majority of surface water impairments in the region according to the 2014 303(d) list of Rivers, Streams, Lakes, and Reservoirs published by EPD (see discussion in Section 3). 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 in order to appropriately address them with management practices.

## 5.4. Summary of Potential Water Resources Issues

The region is fortunate to have abundant water supply sources. Future water availability issues include:

- The Surface Water Availability Resource Assessment predicted that the low flow threshold cannot be maintained at all times while meeting the forecasted 2050 demands at the Eden node in the Ogeechee Basin.
- At the regional level, for modeled aquifers, no groundwater resource shortfalls are expected to occur in the Savannah-Upper Ogeechee Region over the planning horizon.
- Additional permitted water withdrawals and treatment capacity may be needed in some counties to meet demands.

Major future water quality issues for the Savannah-Upper Ogeechee Region include:

- Additional wastewater treatment capacity may be needed, especially in fast growing areas.
- Additional wastewater planning and monitoring is needed to address limited assimilative capacity in several stream segments.
- Significant organic load reductions will be required for the Savannah River and Harbor for both Georgia and South Carolina discharges.

## 5. Comparison of Water Resource Capacities and Future Needs



Table 5-8 summarizes the potential water resource gaps and permitted capacity needs in the Savannah-Upper Ogeechee Region by County. Section 6 discusses the management practices appropriate to address these potential water resources issues.

**Table 5-8: Summary of Potential Gaps or Shortages by County**

County	Surface Water Flow Regime Gap	Municipal Water Permitted Capacity Need	Municipal Wastewater Permitted Capacity Need	Water Quality - Assimilative Capacity Gap
Source	Figure 5-2	Table 5-5	Table 5-6	Figure 5-3
Banks				
Burke	Yes		Yes	Yes
Columbia				Yes
Elbert				Yes
Franklin				Yes
Glascocock	Yes	Yes		Yes
Hart				
Jefferson	Yes			Yes
Jenkins	Yes			
Lincoln				
McDuffie				Yes
Madison		Yes	Yes	Yes
Oglethorpe		Yes	Yes	
Rabun				
Richmond				Yes
Screven	Yes			Yes
Stephens			Yes	Yes
Taliaferro	Yes	Yes		
Warren	Yes			Yes
Wilkes				Yes

**Notes:**

- 1) "Yes" indicates a predicted gap in the indicated county (for surface water, "yes" indicates part or all of the indicated county lies in the area contributing to a gap)
- 2) Permitted capacity need is based on the comparison of permitted municipal capacity versus 2050 forecasted demand.

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## 6. ADDRESSING WATER NEEDS AND REGIONAL GOALS



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### Section 6. Addressing Water Needs and Regional Goals

This Section presents Savannah-Upper Ogeechee Water Planning Council's water management practices selected to address resource shortfalls or gaps identified and described in Section 5, and to meet the Council's Vision and Goals as described in Section 1.

The Savannah-Upper Ogeechee Water Planning Council selected 15 priority and 14 additional management practices that will assist with maintaining adequate supply, preventing surface water instream flow shortage at the Eden Planning Node (Upper Ogeechee Basin), improving water quality, infrastructure planning, and proactive management of water resources in the region.

#### 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 gaps, and demonstrates the need for regional and resource specific water management practices. In the cases where shortfalls or gaps appear to be unlikely based on this comparison, the management practices described in this section have also been selected to meet those needs specified by the Council (e.g. facility or infrastructure needs and practices, programmatic practices, etc.) that are aligned with the Region's vision and goals. In selecting these practices, the Council considered the critical factors described below:

- Practices identified in existing plans, including the following two major regional studies:
  - Stakeholders including Georgia EPD, SCDHEC, USEPA, and the Savannah River/Harbor Discharger Group collaboratively developed an implementation plan to meet applicable water quality standards for the Savannah River Basin, including the Savannah Harbor. Following development of the Plan, and reclassification of the Savannah Harbor to Category 5R on the 2014 305(b)/303(d) list, the USEPA withdrew the TMDL for the Savannah Harbor in favor of the alternative restoration approach outlined in the plan.
  - *Savannah River Basin Drought Contingency Plan (USACE, 2012)*;
- The Region's vision and goals; and
- Coordination with local governments and water providers as well as neighboring Councils who share these water resources.

Coordination with the USACE, SCDHEC, and the South Carolina Savannah River Basin Advisory Council remains ongoing with a positive interchange of information.

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. When possible, successful management practices already



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planned for and/or in use in the Region formed the basis for the water management practices selected by the Council. The supplemental document *Existing Plans for Savannah-Upper Ogeechee Water Planning Region (May 2011)* includes detailed tables that list local water and wastewater related plans and comprehensive plans that were considered for this planning process. This document is available on the Council's website.

### 6.2 Selected Water Management Practices for the Savannah-Upper Ogeechee Region

This section briefly discusses the management practices selection process and presents the selected water management practices. The supplemental document *Technical Memorandum - Management Practices Selection (May 2011)* guided the original decision-making process for selecting management practices and can be found on the Council's website. For the 5-year update, the Council reviewed and updated the prior management practices based on the updated comparison of Resource Assessments and forecasted needs.

#### 6.2.1 Management Practice Selection Process

The needs and interests of the stakeholders in the region are diverse. One of the Council's major concerns is that the recommended management practices not dictate what each stakeholder group or entity should do. Rather, they are presented as a menu for selection by entities within the Savannah-Upper Ogeechee Region based on local needs and conditions. Each entity may conduct detailed planning or feasibility studies that evaluate its individual issues and resources to determine appropriate management practices.

For this update, demand management (conservation) practices have been adjusted based on the Water Stewardship Act, SB 370, and the 2015 EPD drought management and water efficiency rules. The Council reviewed the 2011 plan's list of water quantity and quality management practices as well as the added conservation practices. The Council also incorporated demand management (conservation) practices listed in *Detailed Guidance for Evaluating Practices to Manage Demands (September 21, 2010, EPD)*. The Council's Technical Committee reviewed and revised management practices for full Council approval. The management practices were then revised based on input received from the Technical Committee, other Council members and stakeholders.

The Council prioritized the recommended management practices so that stakeholders can focus their efforts on issues most important to their respective communities. The recommended management practices are divided into two groups:

- **Priority Management Practices** are selected to address water resource gaps and existing regulations (including demand management practices



## 6. Addressing Water Needs and Regional Goals



listed in the Water Stewardship Act, SB370) and the 2015 EPD drought management and water efficiency rules).

- **Additional Management Practices** can be selected by local entities to address specific concerns based on the results of detailed local planning.

The Council recognizes that although regions were established for planning purposes, plans and management practices must consider the entirety of the watershed, whether it is the Savannah River or the Ogeechee River. Although the resource assessment and forecasting analyses are generally conducted at the watershed level, some of the information contained in this plan has been filtered to reflect data specific to the Savannah-Upper Ogeechee Water Planning Region. However, in the Council's deliberations, the entirety of the watersheds concerned have been considered.

### 6.2.2 Priority Management Practices

Table 6-1A presents the recommended priority management practices for the Savannah-Upper Ogeechee Region. The table also identified regional goals and the type of gap addressed by these selected practices. The fifteen (15) priority management practices are grouped by type of practices, as follows:

- Four demand management practices,
- Five supply management practices,
- Four water quality management practices, and
- Two education initiatives.

The State Water Plan (Section 7, Policy 3) states that *“water conservation will be a priority water quantity management practice implemented to help meet water needs in all areas of the state and will be practiced by all water user sectors.”* In *Detailed Guidance for Evaluating Practices to Manage Demands* (September 21, 2010, EPD), demand management (or conservation) practices were divided into four tiers, as follows:

- **Tier One** includes basic water conservation activities and practices that are currently required by statute (SB370 – Water Stewardship Act) or under the water supply efficiency or drought management rules adopted by the DNR Board in 2015.
- **Tier Two** includes basic water conservation activities and practices that may be addressed in the water supply efficiency, drought management, or other rules, but are not required of all permit applicants.
- **Tier Three** includes basic water conservation activities and practices that will not be addressed in current or upcoming amended rules.



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- **Tier Four** includes “beyond basic” water conservation practices to be considered if a gap exists between current or future water supplies and demands for the region.

**Table 6-1A: Priority Water Management Practices Selected for the Savannah-Upper Ogeechee Planning Region**

Action(s) Needed	Applicable Area	Description/Definition of Action
<b>Water Demand Management Practices</b> Goals Addressed: 1 (economy and sustainability), 5 (water reuse/conservation), 6 (balance human needs v. habitat needs), 7 (regional planning) Gap Addressed: Potential Minimum Instream Flow Shortage in Ogeechee Basin (WD3 & WD4)		
WD1 - Implement Tier 1 Water Conservation Practices Required by SB370 or the EPD rules for water efficiency and drought management	ALL	<p>Tier 1 water conservation practices include those required by statute (SB370 – Water Stewardship Act) or under the drought management and water efficiency rules adopted by the DNR Board in 2015. Current State rules and regulations address the following water conservation practices:</p> <ul style="list-style-type: none"> <li>• Water loss auditing requirements for public water systems (serving more than 3,300 individuals), according to IWA/AWWA Water Audit Method<sup>[1]</sup> (Ga. Comp. R. &amp; Regs R. 391-3-33, OCGA §12-5-4.1)</li> <li>• Demonstration of progress towards improving water supply efficiency by public water systems (Ga. Comp. R. &amp; Regs R. 391-3-33)</li> <li>• Submittal of drought contingency plans by water withdrawal permittees (Ga. Comp. R. &amp; Regs R. 391-3-6-.07(4) and 391-3-2-.04(11))</li> <li>• Building code standards for high efficiency plumbing fixtures in new construction after July 1, 2012 (OCGA 8-2-3)</li> <li>• Installation of submeters in multiunit residential buildings and certain retail and light industrial buildings granted a permit for construction after July 1, 2012 (OCGA 12-5-180.1)</li> </ul>

<sup>[1]</sup> American Water Works Association/International Water Association, IWA/AWWA Water Audit Method, Manual 36, 2009, <http://www.awwa.org/resources-tools/water-knowledge/water-loss-control.aspx>

## 6. Addressing Water Needs and Regional Goals



**Table 6-1A: Priority Water Management Practices Selected for the Savannah-Upper Ogeechee Planning Region**

Action(s) Needed	Applicable Area	Description/Definition of Action
		<ul style="list-style-type: none"> <li>• Even-odd watering restrictions for non-irrigation outdoor water uses during Drought Response Level 2 and 3 (Ga. Comp. R. &amp; Regs R. 391-3-30)</li> <li>• Agricultural withdrawal permittees to comply with SB370 requirements regarding classification of existing agricultural water permits by status (active, inactive and unused permits)</li> </ul>
<b>WD2 – Evaluate/Encourage Tier 2 (Non-Farm) Water Conservation Practices</b>	ALL	<p>The Council supports and encourages the adoption of voluntary water conservation measures and recommends using existing incentive programs to support implementation of such management practices. Some recommended management practices for municipal and industrial permittees may include the following:</p> <ul style="list-style-type: none"> <li>• Conservation-oriented rate structures for residential and/or commercial water customers</li> <li>• Adoption of a beneficial meter calibration, repair and replacement program</li> <li>• Studying feasibility of reuse</li> <li>• Exploring use of grey water</li> <li>• Adoption of replacement or retrofit programs for plumbing fixtures (e.g., toilet rebates)</li> <li>• Offering facility-specific water use audits</li> <li>• Considering rain or moisture sensor shut-off devices for irrigation systems</li> </ul>



## 6. Addressing Water Needs and Regional Goals

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**Table 6-1A: Priority Water Management Practices Selected for the Savannah-Upper Ogeechee Planning Region**

Action(s) Needed	Applicable Area	Description/Definition of Action
WD3 – Evaluate/Encourage Tier 3 and Tier 4 Agricultural Water Conservation Practices	Ogeechee River Basin	<p>Review and implement applicable agricultural water efficiency and demand management practices that are “beyond basic” to reduce surface water demand and in the Ogeechee River Basin. Some recommended management practices for agricultural permittees may include</p> <ul style="list-style-type: none"> <li>• Using rain sensors on irrigation systems</li> <li>• Irrigating during time of day with low evaporation rate</li> </ul> <p><i>Note for WD1 to WD3: The full list of specific conservation goals and tiered conservation practices recommended by the Savannah-Upper Ogeechee Council can be found in Technical Memorandum – Demand Management Practices (August 2011), available on the Council's website.</i></p>
WD4 – Monitor Agricultural Use	ALL	<ul style="list-style-type: none"> <li>• Complete installation of irrigation meters on all major agricultural withdrawal permittees</li> <li>• Ensure appropriate procedures for reading and maintaining irrigation meters, including a meter calibration and replacement program and provisions for self-reporting</li> <li>• Use monitored data during critical period to improve calibration of existing Resource Assessment model</li> <li>• Review current agricultural withdrawal permits for potential modifications to protect minimum instream flows</li> <li>• Monitor agricultural withdrawals from the Ogeechee River on a continuous basis to prevent development of a potential future supply gap</li> <li>• Evaluate future withdrawal permit request from the Ogeechee River against monitored usage before issuing future permits</li> </ul>

## 6. Addressing Water Needs and Regional Goals



**Table 6-1A: Priority Water Management Practices Selected for the Savannah-Upper Ogeechee Planning Region**

Action(s) Needed	Applicable Area	Description/Definition of Action
<b>Water Supply Management Practices</b> Goals Addressed: 1 (economy and sustainability), 6 (balance human needs v. habitat needs), 7 (regional planning) Gap Addressed: Potential Minimum Instream Flow Shortage in Ogeechee Basin (WS2, WS3, WS4, WS5), Water Infrastructure Need (WS1)		
WS1- Evaluate/Update Local Water Master Plans	ALL	Local entities to re-evaluate every five years based on system demand or other growth factors, to ensure consistency with Regional Water Plan recommendations, as follows: <ul style="list-style-type: none"> <li>• Update population and water demand projections with local details; compare to Regional Water Plan forecast trend and assumptions</li> <li>• Adequacy of water supply sources</li> <li>• Need for additional water supply/ alternatives supply source analysis</li> <li>• Water use efficiency</li> <li>• Treatment and distribution system needs and options</li> <li>• Review and update capital improvements</li> <li>• Review and update funding requirements</li> <li>• Recommended planning horizon: 20 years</li> </ul>
WS2 – Monitor Streamflow to Confirm the Frequency and Magnitude of the Predicted Gap	Ogeechee River Basin	Develop streamflow monitoring program to confirm the frequency, duration and magnitude of the predicted gap at existing planning nodes, plus a new node located in the Savannah-Upper Ogeechee Region (Upper Ogeechee)
WS3 – Conduct Instream Flow Studies	Ogeechee River Basin	Conduct instream flow studies at various segments of the basin to determine required instream flow values to be compared to values used in the Resource Assessment Model
WS4 - Increase Groundwater Supplies	Ogeechee River Basin	<ul style="list-style-type: none"> <li>• Use feasibility study<sup>1</sup> involving the Eden Node to evaluate replacement of surface water withdrawals with groundwater withdrawals.</li> <li>• Encourage groundwater for agricultural use in the future.</li> </ul>

<sup>1</sup>J. Kennedy, Synopsis Report, Groundwater Availability Assessment Updates (EPD, March 2017)



## 6. Addressing Water Needs and Regional Goals

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**Table 6-1A: Priority Water Management Practices Selected for the Savannah-Upper Ogeechee Planning Region**

Action(s) Needed	Applicable Area	Description/Definition of Action
<b>WS5 – Decrease Surface Water Use during Low Flow Periods</b>	Ogeechee River Basin	Develop drought management plan to decrease surface water withdrawals for agricultural use during low flow periods
<b>Water Quality Management Practices</b> Gap Addressed: 1 (economy and sustainability), 6 (balance human needs v. habitat needs), 7 (regional planning) Gap Addressed: Wastewater Infrastructure Need (WQ1, WQ2, WQ3)		
<b>WQ1 - Evaluate/ Update Local Wastewater Master Plans</b>	ALL	Local entities to re-evaluate every five years based on wastewater treatment demand or other growth factors to ensure consistency with Regional Water Plan recommendations, as follows: <ul style="list-style-type: none"> <li>• Update population and wastewater flow projections with local details; compare to Regional Water Plan forecast trend and assumptions</li> <li>• Evaluate future wastewater treatment, collection and disposal needs and options</li> <li>• As needed, apply for new or updated existing waste load allocations to ensure compliance with water quality standards</li> <li>• Evaluate septic disposal options for lower density areas without centralized treatment services</li> <li>• Evaluate/update source water protection measures</li> <li>• Review and update capital improvements</li> <li>• Review and update funding requirements</li> <li>• Recommended planning horizon: 20 years</li> </ul>
<b>WQ2 - Upgrade Existing Wastewater Treatment Facilities</b>	ALL	As identified by local wastewater master plans or evaluations, increase treatment capacity or improve level of treatment as necessary to meet future capacity needs and/or water quality standards.
<b>WQ3 - Construct New Advanced Wastewater Treatment Facilities</b>	ALL	As identified by local wastewater master plans or evaluations, provide advanced treatment as necessary to meet future capacity needs and water quality standards.

## 6. Addressing Water Needs and Regional Goals



**Table 6-1A: Priority Water Management Practices Selected for the Savannah-Upper Ogeechee Planning Region**

Action(s) Needed	Applicable Area	Description/Definition of Action
WQ4 – Support Forestry Commission Water Quality Program	ALL	Support Georgia Forestry Commission's (GFC) water quality program consisting of MP development, education/ outreach, implementation/ compliance monitoring, and a complaint resolution process
<b>Educational Initiatives</b>		
<b>Goals Addressed:</b> : 3 (stakeholder relationships), 4 (education), 5 (water reuse/conservation)		
ED1 - Develop Regional or Customize State or Other Available Educational Program and Materials for Localized Implementation	ALL	<p>Modify existing state education materials to address regional and local issues and distribute to local governments, land managers, and water utilities for use or further customization. Materials can cover the following topics depending on local needs:</p> <ul style="list-style-type: none"> <li>• Water conservation and efficiency for municipal /commercial / industrial / agricultural users</li> <li>• Outdoor watering and gardening best management practices for residential users</li> <li>• Water conservation/efficiency for landscape and irrigation professionals</li> <li>• Water conservation/efficiency certification program for professional landscaping and irrigation</li> <li>• Best management practices for agriculture, silvaculture, and other land management practices</li> <li>• Pet waste impacts on water quality and proper disposal</li> <li>• Stormwater management</li> <li>• Current water issues awareness, including awareness of drought conditions</li> <li>• Septic tank (OSSMS) installation/maintenance</li> <li>• Protection of sensitive lands</li> </ul>





## 6. Addressing Water Needs and Regional Goals

REGIONAL WATER PLAN

**Table 6-1A: Priority Water Management Practices Selected for the Savannah-Upper Ogeechee Planning Region**

Action(s) Needed	Applicable Area	Description/Definition of Action
<b>ED2 - Promote Coordinated Environmental Planning</b>	ALL	Incorporate regional water planning goals and management practices into local comprehensive planning of land use, transportation, and water resources
<b>Eden Node</b> includes Burke, Glascock, Jenkins, Jefferson, Screven, Taliaferro, and Warren counties WD – Water Demand Management WS – Water Supply Management WQ – Water Quality Management ED – Education Initiatives Source: Technical Memorandum - Management Practices Selection (May 2011)		

One of the Council's goals is to identify opportunities for conservation in the region. The Council supports the implementation of the required Tier 1 demand management practices and encourages each water user or permittee to evaluate Tier 2 practices and implement practices as required by current or upcoming regulations or permit conditions. The recommended Tier 1 and Tier 2 conservation practices are applicable to the entire region. Water users in the Ogeechee watersheds are encouraged to evaluate and implement applicable Tier 3 and Tier 4 conservation practices to address the potential shortage in meeting instream uses. The Council encourages water users/permittees to evaluate the cost and operational implications of these practices, and to implement them when they are beneficial to their operation. The full list of specific Tier 1 and Tier 2 conservation goals and demand management practices recommended by the Savannah-Upper Ogeechee Council can be found in the supplemental document *Technical Memorandum – Demand Management Practices (August 2011)*, which can be found at the Council's website.

Development or update of local water and wastewater master plans is recommended to identify specific local needs and issues not examined in detail in this high-level regional plan. The regional plans evaluated information on a regional and county basis, and the number of entities providing water, wastewater and stormwater services to customers within a county varies greatly. The Council stressed the importance in providing flexibility for entities within the region to conduct their own planning activities to address specific community issues following Regional Water Plan recommendations.

To address the projected 2050 wastewater flows, new wastewater treatment facilities will need to be constructed and some of the existing facilities will need to be expanded and/or upgraded. The water quality management practices identified have been selected to prevent water quality (assimilative capacity) degradation, assuming

## 6. Addressing Water Needs and Regional Goals



that future facilities and/or facility expansions (as identified in local master plans) will be designed to meet existing and future water quality standards.

### 6.2.3 Additional Recommended Management Practices

Table 6-1B presents additional management practices that can be selected by local entities to address their specific concerns, based on the results of the detailed local master plans. The 14 management practices also are grouped by type of practices, including:

- Two demand management practices,
- Two supply management practices, and
- Ten water quality management practices: Five addresses wastewater management and infrastructure planning, and the other five focus on non-point source pollution reduction and stormwater management.



## 6. Addressing Water Needs and Regional Goals

REGIONAL WATER PLAN

**Table 6-1B: Additional Recommended Management Practices For Water Resource Management (*Select based on needs identified in local master plans*)**

Action(s) Needed	Issues to be Addressed	Description/Definition of Action
<b>Water Demand Management Practices</b> <b>Goals Addressed:</b> 1 (economy and sustainability), 5 (water reuse/conservation)		
<b>WD5 - Promote Full-Cost System Accounting/ Encourage Conservation-Oriented Rate Structure</b>	<p>Better planning and management</p> <p>Meeting water/ wastewater systems long-term needs for maintenance, repair, rehabilitation, as well as new or replacement assets</p>	<p>Utilities or local governments are encouraged to evaluate accounting and management practices to ensure that all costs of operating and maintaining the systems, as well as costs of rehabilitating and providing all needed capital assets, are understood and are reflected in accounting practices and in the schedule of rates and charges. Evaluation steps can include:</p> <ul style="list-style-type: none"> <li>• Based on master planning, develop comprehensive lists of long-term system needs</li> <li>• Evaluate internal accounting procedures and practices to reflect all direct and indirect costs</li> <li>• Create a financial planning model and conduct a revenue analysis to determine the ability of the system to meet the full costs of providing services</li> <li>• Investigate irrigation meter pricing, conservation- oriented pricing or other appropriate strategies for the locale</li> <li>• Evaluate billing system functionality and determine the ability to implement alternative rate structures</li> <li>• Conduct rate studies and update pricing and fee schedules as appropriate<sup>2</sup></li> <li>• Implement procedures to verify revenue sufficiency and to support and track the expenditure of funds to meet the long-term needs of the systems</li> </ul>

<sup>2</sup> The University of North Carolina (UNC) Environmental Finance Center regularly reviews water and wastewater rate structures for utilities in Georgia. UNC's Environmental Finance Center has other tools available such as a rate analysis model to help utilities set rate structure based on expenses and revenue. (See <http://www.efc.sog.unc.edu/project/georgia-water-and-wastewater-rates-and-rate-structures>).

## 6. Addressing Water Needs and Regional Goals



**Table 6-1B: Additional Recommended Management Practices For Water Resource Management (Select based on needs identified in local master plans)**

Action(s) Needed	Issues to be Addressed	Description/Definition of Action
<b>WD6 - Evaluate/Encourage Tier 3 Water Conservation Practices</b>	<p>Additional Demand Management to extend life of existing water supply source and to delay capital expenditure for new supply sources</p> <p>(More applicable to counties in Table 5-5 with projected infrastructure needs)</p>	<ul style="list-style-type: none"> <li>Local governments or utilities are encouraged to evaluate applicability of Tier 3 Practices for 1) Agricultural Water Use; 2) Electric Generation; 3) Golf Courses; 4) Water-Using Industries and Commercial Businesses; 5) Heavy Landscape Water Use; 6) Urban and Suburban Areas; and 7) State Agency Facilities. Implement where necessary based on local conditions.</li> <li>A trigger approach can be considered, such as reaching 85 to 90 percent of treatment capacity. Local utilities are encouraged to evaluate this approach based on local conditions and comfort level for operation.</li> </ul>
<b>Water Supply Management Practices</b> <b>Goals Addressed:</b> 1 (economy and sustainability), 5 (water reuse/conservation), 6 (balance human needs v. habitat needs)		
<b>WS7 - Maximize or Increase Existing Surface Water Reservoir Storage</b>	<p>Local water supply needs as indicated in Table 5-5 (as an option for counties with projected infrastructure needs)</p>	<ul style="list-style-type: none"> <li>As part of master planning process, evaluate expansion of existing reservoirs by increasing the height of existing dams or dredging to provide additional storage. This option can be used for all entities with existing reservoir storage to extend and maximize the life of the supply source.</li> <li>Evaluate potential for Natural Resources Conservation Service impoundments (if any within the service areas) to serve as water supply sources</li> </ul>
<b>WS8 - Promote and Evaluate Beneficial Reuse</b>	<p>Local water supply needs</p> <p>Decrease demand for groundwater and surface water sources</p>	<p>Evaluate the following to decrease overall system water demand:</p> <ul style="list-style-type: none"> <li>Indirect potable reuse: return highly treated wastewater to water supply reservoirs</li> <li>Non-potable reuse: irrigation with highly treated effluent in areas such as golf courses, parks and residences</li> </ul>



## 6. Addressing Water Needs and Regional Goals

REGIONAL WATER PLAN

**Table 6-1B: Additional Recommended Management Practices For Water Resource Management (*Select based on needs identified in local master plans*)**

Action(s) Needed	Issues to be Addressed	Description/Definition of Action
<b>Water Quality Management Practices</b> <b>Goals Addressed:</b> 1 (economy and sustainability), 5 (water reuse/conservation), 6 (balance human needs v. habitat needs)		
WQ5 - Decrease Use of Land Application Systems (LAS) in Urban Areas	Reduction of consumptive loss and improved pollution control	<ul style="list-style-type: none"> <li>• Increase returns to surface waters</li> <li>• Counties with aging LAS may consider discontinuing the practice after 25-30 years of use of the facilities or when it is appropriate to switch to point discharge</li> </ul>
WQ6 - Decrease Use of On-Site Sewage Management Systems (OSSMS)/ Septic in Urban Areas	Reduction of consumptive loss and improved pollution control	<ul style="list-style-type: none"> <li>• Increase returns to surface water in urban areas</li> <li>• Prevent long-term water quality problems caused by failing OSSMS</li> <li>• As part of local wastewater master plans, evaluate providing centralized wastewater collection and treatment services where density requires</li> <li>• Identify areas where centralized sewer would benefit water quality (e.g., areas around lakes or smaller lots that would not support septic systems)</li> </ul>
WQ7 - Evaluate Restoration of Natural and/or Construction of Treatment Wetlands in Non-Urban/Low-Density Areas	Improved source water protection, discharge quality and enhanced pollution control	<ul style="list-style-type: none"> <li>• Provide increased protection for source water</li> <li>• Provide polishing treatment</li> <li>• Promote beneficial reuse, wildlife habitat and public use benefits</li> <li>• Promote re-establishing wetlands in forested areas</li> </ul>
WQ8 - Develop/Implement Wastewater Collection System Asset Management Programs	Better planning and management of municipally owned facilities	<ul style="list-style-type: none"> <li>• Develop/Update GIS database</li> <li>• Develop/Implement Sanitary Sewer Overflow (SSO) Prevention and Response Plan</li> <li>• Develop/Conduct system maintenance and update schedule</li> <li>• Consider establishing Capacity Management, Operations and Maintenance (CMOM) programs</li> </ul>

## 6. Addressing Water Needs and Regional Goals



**Table 6-1B: Additional Recommended Management Practices For Water Resource Management** *(Select based on needs identified in local master plans)*

Action(s) Needed	Issues to be Addressed	Description/Definition of Action
<b>WQ9 - Customize State and Other Available Education Materials and Programs and Support Maintenance for Homeowners with OSSMSs (Septic)</b>	<ul style="list-style-type: none"> <li>• Reduction of non-point source pollution</li> <li>• Prevention/reduction of septic tank failures</li> </ul>	<p>Customize and use state and other available educational materials and programs to emphasize</p> <ul style="list-style-type: none"> <li>• Proper maintenance of on-site systems</li> <li>• Regular inspection</li> <li>• Pumping/disposal of waste</li> </ul>
<b>WQ10 - Update/Implement Water Supply Watershed Protection Plan Measures</b>	<ul style="list-style-type: none"> <li>• Water quality protection of source water</li> <li>• Reduction of non-point source pollution</li> </ul>	<p>Update/Implement watershed protection plan elements for water supply watersheds:</p> <ul style="list-style-type: none"> <li>• Reservoir buffers</li> <li>• Lot size requirements</li> <li>• Septic setbacks</li> <li>• Reservoir use restrictions</li> </ul>
<b>WQ11 - Customize State and Other Available Materials and Programs for Stormwater Public Education and Outreach</b>	Reduction of non-point source pollution	<p>Customize and use state and other available education and outreach materials and programs for reduction of non-point source pollution for the following audiences:</p> <ul style="list-style-type: none"> <li>• Residential and commercial developments</li> <li>• Industries</li> <li>• Agricultural community</li> <li>• Forestry professionals</li> </ul>
<b>WQ12 - Develop/Update Local Stormwater Master Plan</b>	<p>Reduction of non-point source pollution</p> <p>Reduction of potential assimilative capacity gaps</p>	<ul style="list-style-type: none"> <li>• Prepare or update a local stormwater master plan to identify potential runoff/ water quality issues and develop long-term capital improvement programs to better manage drainage systems, floodplains and implement other water quality enhancement programs</li> <li>• Recommended interval: every 5-10 years</li> </ul>
<b>WQ13 - Establish a Stormwater Utility</b>	Reduction of non-point source pollution	Local governments (serving > 10,000 people) may consider establishing a stormwater utility (or other mechanism) to increase funding for stormwater management programs.



**Table 6-1B: Additional Recommended Management Practices For Water Resource Management *(Select based on needs identified in local master plans)***

Action(s) Needed	Issues to be Addressed	Description/Definition of Action
WQ14 - Evaluate Water Quality Trading	Improved assimilative capacity	<ul style="list-style-type: none"><li>• Water quality trading is a market based approach that can complement water-quality regulation.</li><li>• It allows facilities to buy pollutant reduction credits from other facilities in the same watershed (or non-point sources like agriculture)</li><li>• Non-point source pollutant reductions are frequently less expensive than treatment-plant upgrades. Trading programs can cost-effectively improve water quality.</li></ul>
WD – Water Demand Management WS – Water Supply Management WQ – Water Quality Management Source: Technical Memorandum - Management Practices Selection (May 2011)		

6.2.4 Other Regional Efforts

In addition to the Management Practices identified above, another project with significant potential benefits to the region is the Phinizy Center for Water Sciences’ efforts to restore oxbows along the Savannah River. Historically, these oxbows were cut off in order to straighten the channel for navigation. The work entails a feasibility study of approximately 22 oxbows in order to determine their restoration potential. If restored, these oxbows have the potential to enhance fish and wildlife habitat and improve water quality/assimilative capacity. The USACE has developed a draft project management plan to scope the work and estimate costs.



## 7. IMPLEMENTING WATER MANAGEMENT PRACTICES



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## 7. Implementing Water Management Practices



### Section 7. Implementing Water Management Practices

This section presents the Savannah-Upper Ogeechee Council's roadmap for the implementation of the water management practices identified in Section 6. As the State Water Plan provides, this plan will be primarily implemented by the various water users in the region. This section describes the suggested roles and responsibilities of the implementing parties as well as the fiscal implications of the practices.

Primary responsibility for implementing the regional plan will be at the local level; however, State agencies are requested to assist with implementation. The Council suggested short-term and long-term actions for the recommended priority management practices. Implementation schedules for additional management practices are to be determined by local governments, utilities and permit holders based on needs identified in detailed local master plans.

#### 7.1. Implementation Schedule and Roles of Responsible Parties

The implementation schedule and roles of responsible parties for priority management practices (management practices selected to address Resource Assessment gaps or existing regulations) are detailed in Table 7-1. The timeframe for implementation has only been identified for the priority management practices detailed in Table 6-1A. Anticipated timeframes for implementation actions are defined as short-term (next 5 years) and long-term (5 years and beyond).

The Council recommends that timeframes for implementing other recommended management practices (Table 6-1B) be determined by affected water users/entities, based on the type of projects selected to address specific needs and following detailed analysis conducted by local entities. Implementation of infrastructure projects, such as construction of a new reservoir or expansion of a wastewater treatment facility, often require much longer times and cannot be easily compared to implementation of ongoing programmatic measures, such as stormwater or water conservation education programs. The Council's recommended management practices, if implemented, will work toward preventing or closing potential future gaps and meeting regional goals. The Council advocates that the recommended management practices be reviewed and updated as necessary in subsequent 5-year plan updates, based on newly available data, information, and implementation results.



## 7. Implementing Water Management Practices

REGIONAL WATER PLAN

**Table 7-1: Implementation Schedule  
Priority Water Management Practices to Address Resource Assessment Gaps or  
Existing Regulations**

Action(s) Needed	Permit Category of Responsible Parties	Short-term Actions (Next 5 Years)	Long-term Actions (5 years and beyond)	Responsible or Potentially Affected Parties
<b>Water Demand Management Practices</b>				
WD1 - Implement Tier 1 Water Conservation Practices Required by SB370 or the EPD rules for water efficiency and drought management	<u>Municipal / Industrial Water Withdrawals</u>	<u>Municipal/ Industrial Withdrawal Permittees:</u> <ul style="list-style-type: none"> <li>Comply with SB370 (Water Stewardship Act)</li> <li>Based on water loss audits and water loss detection programs, target areas in need of improvement and implement water loss reduction measures</li> <li>Update and continue public education and awareness programs about outdoor watering restrictions</li> </ul>	<p>Conduct surveys (based on annual progress reports) to gauge effectiveness</p> <p>Revise public education and awareness program if necessary to improve effectiveness</p>	<u>Short-term Actions:</u> <ul style="list-style-type: none"> <li>Municipal / Industrial Water Withdrawal Permittees</li> <li>Agricultural Withdrawal Permittees</li> </ul>
	<u>Agricultural Surface Water Withdrawal</u>	<u>Agricultural Withdrawal Permittees:</u> <p>Comply with SB370 (Water Stewardship Act) requirements regarding classification of existing agricultural water permits by status (active, inactive and unused permits)</p>		<u>Long-term Actions:</u> <ul style="list-style-type: none"> <li>Municipal / Industrial Survey: EPD working with Council and Regional Commissions or DCA</li> <li>Agricultural Survey: EPD working with Georgia Soil and Water Conservation Commission (GSWCC), and County Extension Services</li> <li>Public Education: Local governments or utilities</li> </ul>

## 7. Implementing Water Management Practices



**Table 7-1: Implementation Schedule  
Priority Water Management Practices to Address Resource Assessment Gaps or  
Existing Regulations**

Action(s) Needed	Permit Category of Responsible Parties	Short-term Actions (Next 5 Years)	Long-term Actions (5 years and beyond)	Responsible or Potentially Affected Parties
<b>WD2 – Evaluate/ Encourage Tier 2 (Non-Farm) Water Conservation Practices</b>	Municipal / Industrial Water Withdrawals	Draft/update water conservation plans to include additional, cost-effective water savings measures	<ul style="list-style-type: none"> <li>Conduct surveys to gauge effectiveness</li> <li>Continue implementation and revise program, if necessary.</li> </ul>	DNR Board, EPD, and Municipal / Industrial Water Withdrawal Permittees (including thermoelectric power production)
<b>WD3 – Evaluate/ Encourage Tier 3 &amp; Tier 4 Agricultural Water Conservation Practices</b>	Agricultural Withdrawal	<ul style="list-style-type: none"> <li>Evaluate and identify preferred conservation options based on irrigation conditions</li> <li>Evaluate potential inclusion of permit conditions (EPD)</li> <li>Update list of existing and potential incentive programs, with help from Georgia Soil and Water Conservation Commission and Farm Bureau</li> <li>Work with GSWCC and County Extension Services for outreach and education</li> </ul>	<ul style="list-style-type: none"> <li>Continue implementation of selected practices</li> <li>Revise outreach and education based on results</li> </ul>	<ul style="list-style-type: none"> <li>Agricultural permittees with help from GSWCC, County Extension Services, and Georgia Farm Bureau</li> <li>EPD</li> </ul>
<b>WD4 – Monitor Agricultural Use in the Ogeechee River</b>	Agricultural Withdrawal	<ul style="list-style-type: none"> <li>Update list of current permittees with and without water use meters</li> <li>Install meters for major users that do not have metering systems</li> <li>Develop water use monitoring and reporting structure and database</li> <li>Develop meter calibration and replacement program</li> </ul>	<ul style="list-style-type: none"> <li>Continue water use monitoring and meter calibration program</li> <li>Update demand forecasts and Resource Assessment models based on monitored use</li> </ul>	<ul style="list-style-type: none"> <li>Agricultural permittees</li> <li>EPD, County Extension Services, and Georgia Farm Bureau</li> </ul>



## 7. Implementing Water Management Practices

REGIONAL WATER PLAN

**Table 7-1: Implementation Schedule  
Priority Water Management Practices to Address Resource Assessment Gaps or  
Existing Regulations**

Action(s) Needed	Permit Category of Responsible Parties	Short-term Actions (Next 5 Years)	Long-term Actions (5 years and beyond)	Responsible or Potentially Affected Parties
<b>Water Supply Management Practices</b>				
<b>WS1- Develop/Update Local Water Master Plans</b>	Municipal Water Withdrawals	<ul style="list-style-type: none"> <li>Update master plans with latest population and demand forecasts for local service areas; identify system needs and options</li> <li>Integrate Regional Water Plan recommendations into master plans</li> <li>Conduct alternatives analysis; identify and prioritize projects (including new, replacement repair and rehabilitation projects) to address long-term needs</li> </ul>	Implement priority projects and update master plan every 5 years based on growth	Local governments / utilities
<b>WS2 – Monitor Streamflow to Confirm the Frequency and Magnitude of the Predicted Gap</b>	EPD and USGS to coordinate	<ul style="list-style-type: none"> <li>Secure funding for additional flow monitoring</li> <li>Determine location(s) for monitoring in the Ogeechee Basin</li> <li>Install flow monitoring stations and begin monitoring daily flows and low flows; compare monitored flow conditions to model predictions</li> </ul>	<ul style="list-style-type: none"> <li>Continue low flow monitoring and comparison of observed low flow conditions to model predictions</li> <li>Update Resource Assessment models based on observed low flows and revised water use and projections</li> </ul>	<ul style="list-style-type: none"> <li>EPD (coordination and Resource Assessment)</li> <li>USGS (flow monitoring and record keeping)</li> <li>GEFA (funding)</li> </ul>

## 7. Implementing Water Management Practices



**Table 7-1: Implementation Schedule  
Priority Water Management Practices to Address Resource Assessment Gaps or  
Existing Regulations**

Action(s) Needed	Permit Category of Responsible Parties	Short-term Actions (Next 5 Years)	Long-term Actions (5 years and beyond)	Responsible or Potentially Affected Parties
<b>WS3 – Conduct Instream Flow Studies</b>	EPD, WRD and USGS to coordinate	<ul style="list-style-type: none"> <li>Secure funding for an initial “pilot-scale” study in the Ogeechee Basin</li> <li>Determine scope and locations to conduct instream flow study (suggest one location each in the Upper and Lower Ogeechee Basins).</li> <li>Begin and complete the “pilot” study in the basin.</li> </ul>	Expand study locations as necessary; modify scope and content of studies from lessons learned from the pilot study	<ul style="list-style-type: none"> <li>• EPD</li> <li>• WRD</li> <li>• USGS</li> <li>• GEFA</li> </ul>
<b>WS4 - Increase Groundwater Supplies</b>	Agricultural Withdrawal	<ul style="list-style-type: none"> <li>Initiate strategic planning that includes identifying site-specific needs for groundwater wells over the next 40 years</li> <li>Identify a primary agency to lead outreach program and to develop an incentive program to reduce reliance on surface water for irrigation during summer low flow periods</li> <li>Begin permitting process for new wells</li> <li>Construct new wells as needed and as funding allows</li> <li>Develop outreach program to explain the need to increase groundwater use during summer low flow periods</li> </ul>	<ul style="list-style-type: none"> <li>Continue permitting process for new wells</li> <li>Construct as needed and as funding allows</li> <li>Revise strategic plan every 5 years in conjunction with Regional Water Plan update</li> </ul>	<ul style="list-style-type: none"> <li>• EPD (planning)</li> <li>• GSWCC, County Extension Services or Georgia Farm Bureau</li> <li>• Agricultural permittee (Installation of wells)</li> </ul>





## 7. Implementing Water Management Practices

REGIONAL WATER PLAN

**Table 7-1: Implementation Schedule  
Priority Water Management Practices to Address Resource Assessment Gaps or  
Existing Regulations**

Action(s) Needed	Permit Category of Responsible Parties	Short-term Actions (Next 5 Years)	Long-term Actions (5 years and beyond)	Responsible or Potentially Affected Parties
<b>WS5 – Decrease Surface Water Use during Low Flow Periods</b>	Agricultural Withdrawal	<ul style="list-style-type: none"> <li>Identify funding sources and a lead agency (such as GSWCC or County Extension Services) to help develop drought management plans for agricultural permittees</li> <li>Review current agricultural withdrawal permits for potential modifications to protect minimum instream flows during low flow and drought conditions</li> <li>Develop drought management plan and implement instream flow protection measures</li> <li>Incorporate drought management into new agricultural withdrawal permits</li> </ul>	<ul style="list-style-type: none"> <li>Continue to work with agricultural withdrawal permittees and EPD to develop permit modifications</li> <li>Update Resource Assessment models based on monitored use and instream flow protection measures</li> </ul>	<ul style="list-style-type: none"> <li>EPD</li> <li>GSWCC, county Extension Services or Georgia Farm Bureau</li> <li>Agricultural permittees</li> </ul>
<b>Water Quality Management Practices</b>				
<b>WQ1 - Develop/ Update Local Wastewater Master Plans</b>	Municipal NPDES Permits	<ul style="list-style-type: none"> <li>Update master plans with latest population and demand forecasts for local service areas; identify system needs and options; evaluate future service area strategies</li> <li>Integrate Regional Water Plan recommendations into master plans</li> <li>Conduct alternatives analysis; identify and prioritize projects (including new, replacement, repair and rehabilitation projects) to address long-term needs</li> <li>Implement priority projects as appropriate</li> </ul>	Implement priority projects and update master plan every 5 years based on growth	Local governments / utilities

## 7. Implementing Water Management Practices



**Table 7-1: Implementation Schedule  
Priority Water Management Practices to Address Resource Assessment Gaps or  
Existing Regulations**

Action(s) Needed	Permit Category of Responsible Parties	Short-term Actions (Next 5 Years)	Long-term Actions (5 years and beyond)	Responsible or Potentially Affected Parties
<b>WQ2 - Upgrade Existing Wastewater Treatment Facilities</b>	Municipal & Industrial NPDES Permits	<ul style="list-style-type: none"> <li>Based on wastewater master planning and Regional Water Plan recommendations, evaluate options for upgrades</li> <li>Request new or revised waste load allocation for the selected local option</li> <li>Apply for revised permit based on selected option</li> <li>Begin preliminary design</li> </ul>	<ul style="list-style-type: none"> <li>Facility Design and Construction</li> <li>Include results of implementation in 5-year Regional Water Plan update</li> </ul>	Local governments; municipal/ industrial NPDES discharge permittees
<b>WQ3 - Construct New Advanced Wastewater Treatment Facilities</b>	Municipal & Industrial NPDES Permits	<ul style="list-style-type: none"> <li>Based on wastewater master planning and Regional Water Plan recommendations, evaluate treatment options</li> <li>Request new or revised waste load allocation for the selected option</li> <li>Apply for revised permit based on selected option</li> <li>Begin preliminary design</li> </ul>	<ul style="list-style-type: none"> <li>Facility Design and Construction</li> <li>Include results of implementation in 5-year Regional Water Plan update</li> </ul>	Local governments; municipal/ industrial NPDES discharge permittees
<b>WQ4 – Support Forestry Commission Water Quality Program</b>	Stormwater (NPDES Discharges)	<ul style="list-style-type: none"> <li>Implementation of MPs identified in Georgia's Best Management Practices for Forestry handbook</li> <li>Annual monitoring of BMPs</li> </ul>	<ul style="list-style-type: none"> <li>Conduct survey to gauge effectiveness</li> <li>Update BMPs as needed</li> </ul>	Georgia Forestry Commission, UGA



## 7. Implementing Water Management Practices

REGIONAL WATER PLAN

**Table 7-1: Implementation Schedule  
Priority Water Management Practices to Address Resource Assessment Gaps or  
Existing Regulations**

Action(s) Needed	Permit Category of Responsible Parties	Short-term Actions (Next 5 Years)	Long-term Actions (5 years and beyond)	Responsible or Potentially Affected Parties
<b>Educational Initiatives</b>				
<b>ED1 - Develop Regional or Customize State or Other Available Educational Program and Materials for Localized Implementation</b>	All Water Withdrawal and NPDES Permits	<ul style="list-style-type: none"> <li>• Coordinate with DCA, Regional Commissions and other Councils to establish and implement regional education programs.</li> <li>• Update inventory of existing education materials from AWWA, GAWP and established water districts (in State or out of State)</li> <li>• Develop educational materials and public awareness programs tailored to Region's needs and issues</li> <li>• Develop additional outreach and promotional materials for economic development, focusing on the abundant water resources of the region</li> <li>• Local entities to customize materials as needed and implement educational and outreach programs</li> </ul>	<ul style="list-style-type: none"> <li>• Conduct survey to gauge effectiveness</li> <li>• Revise programs as needed</li> </ul>	<p><u>Short-term Actions:</u> EPD and Council work with Regional Commissions, DCA with support from Association of County Commissioner of Georgia (ACCG), Georgia Municipal Association (GMA), Georgia Rural Water Association, Georgia Association of Water Professionals (GAWP), and local governments</p> <p><u>Long-term Actions:</u> All of the above; survey lead - Regional Commissions or DCA</p>

## 7. Implementing Water Management Practices



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**Table 7-1: Implementation Schedule  
Priority Water Management Practices to Address Resource Assessment Gaps or  
Existing Regulations**

Action(s) Needed	Permit Category of Responsible Parties	Short-term Actions (Next 5 Years)	Long-term Actions (5 years and beyond)	Responsible or Potentially Affected Parties
<b>ED2 - Promote Coordinated Environmental Planning</b>	All Water Withdrawal and NPDES Permits	<p>Coordinate with DCA regarding potential revisions to Chapter 110-12-1, Standards and Procedures for Local Comprehensive Planning and Part V Environmental Planning Criteria to facilitate incorporation of Regional Water Plan in the Comprehensive Planning process</p> <p>Implement revised Part V Environmental Planning Criteria (Chapter 391-3-16) of Georgia Planning Act of 1989 for the protection of</p> <ul style="list-style-type: none"> <li>• Water supply watersheds</li> <li>• Groundwater recharge areas</li> <li>• Wetlands</li> <li>• River corridors</li> <li>• Mountains</li> </ul>	<ul style="list-style-type: none"> <li>• Continue integration of Regional Water Plan and Comprehensive Planning Process</li> <li>• Implement recommendations as appropriate</li> </ul>	<p><u>Short-term Actions:</u></p> <ul style="list-style-type: none"> <li>• Council and EPD work with Regional Commissions, and DCA</li> <li>• Local governments / Utilities</li> </ul> <p><u>Long-term Actions:</u> Local governments / Utilities</p>
<p>WD – Water Demand Management            WS – Water Supply Management            WQ – Water Quality Management            ED – Education Initiatives            Source: Technical Memorandum - Management Practices Selection (May 2011)</p>				



### 7.2. Fiscal Implications of Selected Water Management Practices

The following sub-sections discuss planning-level cost estimates and potential funding sources and options. Successful implementation of the Regional Water Plan hinges on the ability of the State and local governments to fund the needed implementation actions.

#### 7.2.1. Planning Level Cost Estimates

Table 7-2 describes the fiscal implications of the priority management practices. Cost estimates for implementation are included to the extent possible, based on possible implementation unit (per capita, per study, per MGD of plant capacity, etc.). The table is designed so that local governments/jurisdictions or other permit holders and water users can estimate budget requirements for the implementation of the recommended management practices.

The planning level cost information shown in Table 7-2 is based upon cost guidance prepared by EPD in April 2011 (“EPD Supplemental Guidance”). Neither the guidance nor the cost estimates shown in the following tables have 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.

#### 7.2.2. Funding Sources and Options

The ability of the responsible parties to successfully implement the management practices identified in this plan depends on the availability of funding. It is essential that a funding mechanism be identified, both at the State and local level to support the long-term implementation of the Regional Water Plan. Affected parties in the region will be responsible for determining the best combination of funding sources/options for implementing applicable management practices.

For local governments/utilities, water and sewer rates can be designed to provide a steady revenue stream to support implementation of certain actions. Other potential sources of funding for local governments and utilities can include general funds raised through property taxes or service fees, bonds, loans (such as loans from the Georgia Environmental Finance Authority), and grants. One existing program worth mentioning is DCA’s “WaterFirst”. WaterFirst communities receive discounts on interest rates for loans. The program is a voluntary partnership between local governments, State agencies, and other organizations working together to increase the quality of life in communities through the wise management and protection of water resources. It promotes a proactive approach to water resources that makes the connection between land use and water quality and quantity, which is consistent with the Council’s goal. Details of this program can be found on the DCA website.<sup>1</sup>

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<sup>1</sup> [http://www.dca.state.ga.us/development/EnvironmentalManagement/programs/water\\_first.asp](http://www.dca.state.ga.us/development/EnvironmentalManagement/programs/water_first.asp)

## 7. Implementing Water Management Practices



For agricultural (farmers) or industrial (industries or businesses) permit holders, the sources of funding include investment by the individual or business, grants, and/or incentive programs.

**Table 7-2: Cost Estimates for Implementation Responsibilities  
(associated with Priority Water Management Practices in Tables 6-1 and 7-1)**

Management Practice	Capital/ Programmatic Cost Range	Funding Sources and Options	Notes and Sources for Costs
WD1 - Implement Tier 1 Water Conservation Practices Required by SB370 or the EPD rules for water efficiency and drought management	Cost varies based on practices	Water/wastewater system revenues; State and local government incentive programs	EPD Supplemental Guidance <sup>1</sup> for various demand management practices
WD2 - Evaluate/ Encourage Tier 2 (Non-Farm) Water Conservation Practices	Cost varies based on practices	Water/wastewater system revenues; State and local government incentive programs	EPD Supplemental Guidance <sup>1</sup> for various demand management practices
WD3 -Evaluate/ Encourage Tier 3 and Tier 4 Agricultural Water Conservation Practices	Cost varies based on practices	State incentive programs	EPD Supplemental Guidance <sup>1</sup>
WD4 - Monitor Agricultural Use	\$2,500 - \$5,000 per user monitored	Local governments; State incentive programs (potential)	EPD Supplemental Guidance <sup>1</sup> page 6
	\$8,000 - \$16,000 per year for data keeping and coordination		
WS1 - Evaluate/ Update Local Water Master Plans	\$30,000 - \$300,000 per plan, depending on size of the system and scope of study	Water/wastewater system revenues; State incentive programs (potential)	Water system modeling, if desired, may add to overall cost of master plan <sup>2</sup>
WS2 - Monitor Streamflow to Confirm the Frequency and Magnitude of the Predicted Gap	\$30,000 to \$60,000 / new gage station installation; \$15,000 annual maintenance	State and USGS	EPD Supplemental Guidance <sup>1</sup> page 6; Cost for Resource Assessment is not included
WS3 - Conduct Instream Flow Studies	\$4,000 - \$20,000 biological monitoring per site	State; State or Federal grant	EPD Supplemental Guidance <sup>1</sup> page 6  Colorado Water Supply Reserve Account Annual Report 2009
	\$70,000 - \$200,000 per study - cost varies based on scope		



## 7. Implementing Water Management Practices

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**Table 7-2: Cost Estimates for Implementation Responsibilities  
(associated with Priority Water Management Practices in Tables 6-1 and 7-1)**

Management Practice	Capital/ Programmatic Cost Range	Funding Sources and Options	Notes and Sources for Costs
WS4 - Increase Groundwater Supplies	\$30,000 - \$300,000/MG; cost varies based on location	State incentive programs, private investment	EPD Supplemental Guidance <sup>1</sup>
WS5 – Decrease Surface Water Use during Low Flow Periods	\$1,000 - \$5,000/MG	State incentive programs	EPD Supplemental Guidance <sup>1</sup> Cost range is for conservation practices only
WQ1 – Evaluate/ Update Local Wastewater Master Plans	\$30,000 - \$250,000 per plan depending on size of the system and scope of study	Water/wastewater system revenues; State incentive programs (potential)	Sewer system modeling, if desired, may significantly increase overall cost of master plan <sup>2</sup>
WQ2 - Upgrade Existing Wastewater Treatment Facilities	\$4 - \$10 Million per MGD	Local governments / utilities, State (GEFA)	EPD Supplemental Guidance <sup>1</sup>
WQ3 - Construct Advanced Wastewater Treatment Facilities	\$7 - \$11 Million per MGD	Local governments / utilities, State (GEFA)	EPD Supplemental Guidance <sup>1</sup>
WQ4 – Support Forestry Commission Water Quality Program	Cost varies based on practices	State/federal funds	GA Forestry Commission's Water Quality Program
ED1 - Develop Regional or Customize State or Other Available Educational Program and Materials for Localized Implementation	\$0.10 - \$2.25 per capita	State, local governments/utilities	EPD Supplemental Guidance <sup>1</sup>
ED2 - Promote Coordinated Environmental Planning	\$0.10 - \$0.50 per capita	State, local governments/utility fees	EPD Supplemental Guidance <sup>1</sup>
WD – Water Demand Management WS – Water Supply Management WQ – Water Quality Management ED – Education Initiatives Sources: 1. Supplemental Guidance for Regional Planning Contractors: Water Management Practice Cost Comparison (EPD, 2010); 2. Jacobs, various recent projects			





### 7.3. Alignment with Other Plans

This update of the Regional Water Plan builds upon the knowledge base of previous planning efforts by the Council as well as State and local governments and utilities. Existing water- and wastewater-related plans and information sources are listed in the supplemental document *Existing Plans for Savannah-Upper Ogeechee Water Planning Region (May 2011)*, which can be found on the Council's website.

Where appropriate, local planned projects and successful management practices were considered in the development of this plan. No known major conflicts between this regional plan and other plans have been identified. The Council encourages continuing alignment with all local and regional efforts (including those for adjacent watersheds and states) for future updates of regional plans. Coordinated environmental planning is recognized as a priority management practice, so that recommendations in the Regional Water Plan can be incorporated in other major regional or local planning, such as comprehensive land use plans, transportation plans, or local master plans.

Some differences exist in planning timing or cycle; for example, local comprehensive plans are typically prepared for a 20-year planning horizon; complete or partial update of the comprehensive plan can be prepared every 5 years. Water and wastewater master plans and capital improvement plans are typically conducted for a 20- to 30-year planning horizon. This Regional Water Plan has a 35-year planning horizon to allow major water supply needs and their long-term impacts on water resources to be evaluated. The differences in planning horizons indicate that the projects identified in local plans may not completely address the resource gaps identified in this Regional Water Plan. However, the potential trends and issues identified by this plan can be used to guide decision making by both local governments and state agencies to avert potential negative impacts on water resources in the region.

The Council also recognizes that specific funding needs to be set aside for continuation of regional water planning, implementation, and Council activities. Without available funding, the future role of the Council is unknown. The implementation of Regional Water Plans largely depends on the availability of funding.



## 7. Implementing Water Management Practices

REGIONAL WATER PLAN

### 7.4. Recommendations to the State

The Savannah-Upper Ogeechee Council recommends the following actions by the EPD to support implementation of the Regional Water Plan (Table 7-3). These recommendations include additional funding, data collection, policy, coordination and public education and outreach necessary for improving future regional water planning efforts.

**Table 7-3: Recommendations to the State**

<b>Funding</b>	<ul style="list-style-type: none"><li>• Identify long-term funding options and a coordinating agency(s) to assist responsible parties with Regional Water Plan implementation.</li><li>• Coordinate with EPD and develop additional funding to further implement and improve the agricultural metering program.</li><li>• Recommend State and Federal funding to support further optimization studies for the USACE lakes to include: minimum release flows and pool elevation modifications (Savannah River Basin Comprehensive Study Phase II)</li><li>• Identify funding or support for developing Stormwater Utilities for small water utilities that lack necessary resources to implement on their own.</li></ul>
<b>Additional Data (Surface Water)</b>	<ul style="list-style-type: none"><li>• Engage USACE regarding a feasibility study to evaluate the costs/benefits of raising lake levels to preserve storage for water supply and provide flows for drought relief downstream.</li><li>• Further develop agricultural use metering program and monitor withdrawal from the nursery and agricultural industries in the region by reading meters, collecting and compiling that data on a regular basis, with consideration given to the implementing of a self-reporting practice.</li><li>• Evaluate instream flow and unimpaired flow assumptions in the Surface Water Availability Resource Assessment. Consider pilot site-specific instream flow studies in the Ogeechee Basin (at locations predicted to have instream flow shortage). In combination with a low flow monitoring program and an agricultural use metering program, confirm the magnitude and frequency of predicted gaps.</li><li>• Consider adding an additional planning node(s) in the Upper Ogeechee Basin for further refinement of the Surface Water Availability Resource Assessment model.</li><li>• Update Surface Water Availability and Surface Water Quality Resource Assessment models based on the results of the studies for future Regional Water Plan update.</li><li>• Provide and present future updated information by watershed, rather than by Council boundaries.</li></ul>

## 7. Implementing Water Management Practices



**Table 7-3: Recommendations to the State**

<b>Additional Data (Water Quality)</b>	Continue monitoring on segments of streams predicted to exceed DO assimilative capacity; monitor rate of DO depletion and evaluate possible causes before determining actions to correct the potential impairment.
<b>Technical Support (Water Quality)</b>	Support and facilitate ongoing implementation of the Savannah Harbor 5R plan approved by USEPA. EPD's assistance in coordinating, facilitating, and providing technical support during implementation of the 5R Plan is needed to improve dissolved oxygen conditions in the lower Savannah River.
<b>Policy</b>	<ul style="list-style-type: none"> <li>• Continue to study and evaluate current instream flow policy.</li> <li>• Encourage State funding for minimum instream flow and unimpaired flow research.</li> <li>• Request EPD assistance in streamlining the reservoir permitting process.</li> <li>• Maintain the existing ban of interbasin transfers that was incorporated in the 2001 statute creating the Metropolitan North Georgia Water Planning District and expressly prohibiting the interbasin transfer of water into the 15 county metropolitan Atlanta area. Therefore, any transfer of Tennessee or Savannah River Basin water to the Metro region has been and is currently prohibited by law.</li> <li>• Consider designating the Southeast Georgia Experiment Station at Midville as an irrigation research center similar to the Stripling Center in Camilla to provide modelling data that is more specific to the region.</li> </ul>
<b>Coordination</b>	<ul style="list-style-type: none"> <li>• Continue to coordinate with SCDHEC and SCDNR on Savannah River water resources.</li> <li>• Coordinate with USGS regarding its 5-year water use data collection efforts so these data can be aligned with other EPD data reporting efforts and used for future regional planning purposes.</li> <li>• Use UGA Extension as the preferred channel to disseminate information to the Agricultural Community due to its reputation and capability.</li> </ul>
<b>Public Education and Outreach</b>	Develop regional education materials for use and customization by local entities that can be tailored for specific audiences (i.e., community vs. industrial vs. agricultural organizations).

The Council specifically requests that EPD, working in conjunction with the USACE and through the Savannah River Basin Comprehensive Study update process, evaluate adaptive management techniques and potential revisions to operating protocols that would minimize the use of the available conservation storage.



## 7. Implementing Water Management Practices

REGIONAL WATER PLAN

Currently, the USACE is working with the States of Georgia and South Carolina to secure funding for the next phase of Comprehensive Study update. Topics to be investigated with the Comprehensive Study update are recommended to include:

1. Management of the Savannah River Basin in a more adaptive manner by releasing less water from the Thurmond dam if adequate river flows are occurring downstream. Generally speaking, it is in the best interest of all stakeholders within the Savannah River Basin to keep the lakes as full as practical and as long as practical, so that stored water is available to release in times of lower rainfall.
2. Evaluate potential revisions to the rule curves for Lakes Thurmond and Hartwell. Evaluate whether the winter pool elevations could be beneficially raised.
3. Manage the USACE lakes more closely to the existing rule curves. Evaluate the operational scenario where (a) downstream flow releases are reduced as soon as the lakes drop below the rule curves for Lakes Hartwell and Thurmond, and (b) reduce the range of lake level drop between trigger levels.
4. Consider further economic impact studies and protection of "the economic well being" of the communities that have developed both around the USACE projects and downstream in the basin as one of the goals of those projects.
5. Continue to evaluate the current minimum flow release below the Thurmond dam.
6. Continue to evaluate the ecological impacts of any modifications to the management operations strategy.

## 8. MONITORING AND REPORTING PROGRESS



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## Section 8. Monitoring and Reporting Progress

This section presents benchmarks for evaluating the implementation of this Regional Water Plan and discusses future plan update requirements and amendment processes.

### 8.1 Benchmarks

The benchmarks prepared by the Savannah-Upper Ogeechee Council and listed in Table 8-1 below will be used to assess the effectiveness of this plan's implementation and identify periodic revisions. As detailed below, the Council selected both qualitative and quantitative benchmarks that will be used to assess whether the water management practices are closing gaps over time and allowing the water planning region to meet its vision and goals.

The Savannah-Upper Ogeechee Council selected benchmarks to assess the effectiveness of this Regional Water Plan. Progress toward implementation will be based on benchmarks designed for demand management, water supply, water quality management practices, and educational initiatives. Measurement tools include annual, biennial, and other surveys on a 5-year basis prior to each Regional Water Plan Update. EPD is assumed to be the lead party responsible to administer these surveys with help from partnering agencies and local governments.

The selected water management practices recommended by the Savannah-Upper Ogeechee Council will be primarily implemented 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. The Council recommends specific benchmarks for all of the recommended priority management practices. Measurement of these benchmarks is primarily conducted by surveys at various frequencies, and some of the data can be gathered from reports already required by permit conditions. For additional voluntary management practices, the Council recommends a survey prior to the 5-year plan update process. EPD is assumed to be the lead responsible party to administer surveys with help from partnering agencies or local governments. These benchmarks should be revisited during the 5-year plan update process and revised as necessary, depending on implementation of management practices and other available information.

### 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 five years and in accordance with 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 five years since EPD's adoption of the most recently updated plan. The recommended benchmarks serve to guide EPD in the review of the Regional Water Plan.





## 8. Monitoring and Reporting Progress

REGIONAL WATER PLAN

**Table 8-1: Benchmarks for Priority Management Practices**

Management Practices	Benchmarks	Measurement Tools	Time Period
<b>Water Demand Management Practices</b>			
<b>WD1 - Implement Tier 1 Water Conservation Practices Required by SB370 or the EPD rules for water efficiency and drought management</b>	<p>Maintenance or reduction of residential per capita water use</p> <p>Demonstrable progress toward improving water supply efficiency</p>	<p>Municipal water withdrawal permittee tools:</p> <ul style="list-style-type: none"> <li>• Calculation of residential per capita demand (gpcd) via annual water conservation progress report with help from Regional Commissions and DCA</li> <li>• Qualified annual water loss audits</li> </ul>	Annual
<b>WD2 – Evaluate/ Encourage Tier 2 (Non-Farm) Water Conservation Practices</b>	Implementation of recommended water conservation practices for municipal and industrial permittees, including thermoelectric power generation	Survey based on annual water conservation progress report	Annual
<b>WD3 – Evaluate/ Encourage Tier 3 &amp; Tier 4 Agricultural Water Conservation Practices</b>	Implementation of recommended water conservation practices	Survey with help from GSWCC, County Extension offices and Georgia Farm Bureau	Every 5 years*
<b>WD4 – Monitor Agricultural Use</b>	Establishment of water withdrawal monitoring network/database	<ul style="list-style-type: none"> <li>• Number/location of new meters installed</li> <li>• Total number of agricultural irrigation meters</li> <li>• Number of meters calibrated or replaced</li> <li>• Number of self-reported meter readings and if/how many of those readings were audited</li> <li>• Revised Resource Assessment (model re-calibration based on newly available data)</li> </ul>	Every 5 years*
<b>Water Supply Management Practices</b>			
<b>WS1- Evaluate/ Update Local Water Master Plans</b>	Number of local water master plans initiated/ completed	Survey	Every 5 years*

## 8. Monitoring and Reporting Progress

**Table 8-1: Benchmarks for Priority Management Practices**

Management Practices	Benchmarks	Measurement Tools	Time Period
<b>WS2 – Monitor Streamflow to Confirm the Frequency and Magnitude of the Predicted Gap</b>	Establishment of flow monitoring network/database in the Ogeechee River Basin	<ul style="list-style-type: none"> <li>• Number/location of new flow monitoring stations</li> <li>• Comparison of monitored low flow to actual or estimated agricultural use</li> <li>• Revised Resource Assessment (model re-calibration based on newly available data)</li> </ul>	Every 5 years*
<b>WS3 – Conduct Instream Flow Studies</b>	Number of instream flow studies conducted	Streams with site-specific instream flow requirement based on the studies	Every 5 years*
<b>WS4 - Increase Groundwater Supplies from Floridan Aquifer</b>	Reduction of future water quantity gap in the Ogeechee Basin (Eden Node )	<ul style="list-style-type: none"> <li>• % of groundwater used for irrigation during low flow seasons</li> <li>• Revised Resource Assessment (model re-calibration based on newly available data)</li> </ul>	Every 5 years*
<b>WS5 – Decrease Surface Water Use during Low Flow Periods</b>	Reduction of future water quantity gap in the Ogeechee Basin (Eden Node )	<ul style="list-style-type: none"> <li>• % of surface water used for irrigation during droughts and low flow seasons</li> <li>• Revised Resource Assessment (model re-calibration based on newly available data)</li> </ul>	Every 5 years*
<b>Water Quality Management Practices</b>			
<b>WQ1 - Evaluate/ Update Local Wastewater Master Plans</b>	Number of local wastewater master plans initiated/ completed	Survey	Every 5 years*
<b>WQ2 - Upgrade Existing Wastewater Treatment Facilities</b>	Meeting treatment capacity needs and compliance with water quality standards	Quantities of additional permitted treatment capacities or upgrades	Every 5 years*
<b>WQ3 - Construct New Advanced Wastewater Treatment Facilities</b>			



## 8. Monitoring and Reporting Progress

REGIONAL WATER PLAN

**Table 8-1: Benchmarks for Priority Management Practices**

Management Practices	Benchmarks	Measurement Tools	Time Period
<b>WQ4 - Support Forestry Commission Water Quality Program</b>	Ongoing improvement of data points	MP compliance surveys	Every 2 years
<b>Educational Initiatives</b>			
<b>ED1 - Develop or Customize State or Other Available Educational Program and Materials for Localized Implementation</b>	Number/type of local educational and outreach programs developed based on regional materials	Survey based on annual water conservation progress report; and surveys (for other educational programs) with help from Regional Commissions and DCA	Every 5 years*
<b>ED2 - Promote Coordinated Environmental Planning</b>	Incorporation of Regional Water Plan via Comprehensive Planning and Service Delivery Strategy processes	Survey with help from Regional Commissions and DCA	Every 5 years*
<p>* prior to next 5-year Regional Plan update</p> <p>WD – Water Demand Management</p> <p>WS – Water Supply Management</p> <p>WQ – Water Quality Management</p> <p>ED – Education Initiatives</p> <p>Note: For all measurement tools listed above, EPD is assumed to be the lead party responsible to administer survey with help from partnering agencies or local governments</p> <p>Source: Technical Memorandum - Management Practices Selection (May 2011)</p>			



### 8.3 Plan Amendments

The Council wishes to provide flexibility for plan amendments to adapt to changing circumstances. This Regional Water Plan will be amended, at a minimum, on a 5-year basis, or as required as additional needs arise. Examples of a major triggering event could include the following:

- Proposal (or expansion) of a major water-using industry or development, including energy generation or military facilities, that would be expected to significantly change the water demand or discharge conditions of the region;
- Closure of major existing water use facilities that would significantly change the water demand or discharge conditions of the region;
- Major change in regulatory requirements, such as nutrient loading or instream flow requirements based on site-specific studies;
- Major changes in operation protocols of USACE lakes;
- Any discussion regarding interbasin transfers into or out of the region;
- New information that results in gaps in resource availability.

The Council intends to form a permanent Savannah and Ogeechee water planning organization as the conduit for bringing together all stakeholders and assisting the State with implementation of water resource goals in the entire basin. The Council recommends that one third of the current Council members be grandfathered into the permanent organization for continuity. The discussions on this new organization are in the very initial stage. The Council recommends that any plan amendments be reviewed and approved by EPD until a future organization is formed. Any meetings conducted to review and approve future plan amendments should invite stakeholders and allow for general public input.

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APPENDIX A:  
TABLE OUTLINING UPDATES  
AND REVISIONS



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## Appendix A: Table Outlining Updates and Revisions

### REGIONAL WATER PLAN



Section	Location	Change	Description
ES	Regional Overview	<ul style="list-style-type: none"> <li>Updated current population</li> <li>Clarified that lower portions of the Savannah, Ogeechee and Oconee basins lie within other water planning regions</li> <li>Clarified that the Savannah River basin is shared with South Carolina</li> <li>Updated water and wastewater use values</li> <li>Updated surface water quality impairment discussion</li> </ul>	<ul style="list-style-type: none"> <li>Population information was updated based on the most recent statewide population projections (Governor's Office of Planning and Budget, 2015).</li> <li>Clarifications regarding Savannah basin and SUO RWP Council boundaries.</li> <li>Updated water use information to the most recent information compiled by USGS (2016 USGS Publication).</li> <li>Updated return flow information from the Technical Memorandum: Savannah-Upper Ogeechee Water and Wastewater Forecasting (2017).</li> <li>Updated discussion of water quality impairments based on results from Surface Water Quality (Assimilative Capacity) Resource Assessment (EPD, March 2017).</li> </ul>
ES	Demand Forecasts and Water Resources Issues	<ul style="list-style-type: none"> <li>Updated population projections, surface water availability, and assimilative capacity</li> <li>Replaced discussion of TMDL management plan with discussion of the stakeholder Category 5R plan for restoring water quality to the Savannah River and Harbor</li> </ul>	<ul style="list-style-type: none"> <li>Population information was updated based on the most recent statewide population projections (Governor's Office of Planning and Budget, 2015).</li> <li>Updated surface water availability and assimilative capacity from the Technical Memorandum: Savannah-Upper Ogeechee Water and Wastewater Forecasting (2017).</li> <li>Updated text to describe the current status of the Savannah River and Harbor Category 5R Watershed Restoration Plan.</li> </ul>
ES	Figure: Total Annual-Average Water and Wastewater Forecasts (MGD)	<ul style="list-style-type: none"> <li>Updated water and wastewater forecasts</li> </ul>	<ul style="list-style-type: none"> <li>Updated water and wastewater forecasts from the Technical Memorandum: Savannah-Upper Ogeechee Water and Wastewater Forecasting (2017).</li> </ul>
ES	Recommended Management Practices	<ul style="list-style-type: none"> <li>Added text regarding drought management and water supply efficiency rules</li> </ul>	<ul style="list-style-type: none"> <li>Text was updated to reflect recent EPD rules.</li> </ul>



## Appendix A: Table Outlining Updates and Revisions

REGIONAL WATER PLAN

Section	Location	Change	Description
ES	Interstate Water Planning	<ul style="list-style-type: none"> <li>Replaced text regarding TMDL development with text regarding the Category 5R process for restoring water quality to the Savannah River and Harbor</li> </ul>	<ul style="list-style-type: none"> <li>Updated text to describe the current status of the Savannah River and Harbor Category 5R Watershed Restoration Plan that replaces EPA's TMDL Plan.</li> </ul>
1	box summary, Section 1.1	<ul style="list-style-type: none"> <li>Minor text revision</li> </ul>	<ul style="list-style-type: none"> <li>Text was revised to reflect the purpose of this document as an update to the Plan completed in 2011.</li> </ul>
1	Section 1.1	<ul style="list-style-type: none"> <li>Clarified that the Savannah River basin is shared with South Carolina</li> <li>Minor text addition</li> </ul>	<ul style="list-style-type: none"> <li>Clarification regarding Savannah basin boundary made.</li> <li>Text was added to describe the planning update process.</li> </ul>
1	Section 1.2	<ul style="list-style-type: none"> <li>Minor text revisions and addition</li> </ul>	<ul style="list-style-type: none"> <li>Text was added to describe the planning update process.</li> </ul>
2	Section 2.1.2.	<ul style="list-style-type: none"> <li>Minor text revision</li> </ul>	<ul style="list-style-type: none"> <li>Reference to the "Upper Floridan" aquifer was updated to read "Floridan," to ensure consistency with terminology used by EPD in the 2013 Announcement regarding Future Withdrawals from the Floridan Aquifer and in other documents.</li> </ul>
2	Section 2.2.1., including Table 2-1	<ul style="list-style-type: none"> <li>Updated current population in text and table</li> </ul>	<ul style="list-style-type: none"> <li>Population information was updated based on the most recent statewide population projections (Governor's Office of Planning and Budget, 2015).</li> </ul>
2	Section 2.2.2.	<ul style="list-style-type: none"> <li>Updated employment growth</li> </ul>	<ul style="list-style-type: none"> <li>Employment growth was updated based on the most recent, readily available information (U.S. Census Bureau, 2016).</li> </ul>
2	Section 2.2.3.	<ul style="list-style-type: none"> <li>Updated land cover data</li> </ul>	<ul style="list-style-type: none"> <li>Updated land-cover distribution based on most recent, readily available information (University of Georgia Natural Resources Spatial Analysis Laboratory, 2008).</li> </ul>
3	Sections 3.1 and 3.1.1., including Figures 3-1 — 3-4	<ul style="list-style-type: none"> <li>Minor text deletion</li> <li>Clarified that lower portions of the Savannah, Ogeechee and Oconee basins lie within other water planning regions</li> <li>Clarified that the Savannah River basin is shared with South Carolina</li> <li>Updated water use text and figures</li> </ul>	<ul style="list-style-type: none"> <li>Removed text related to outdated references</li> <li>Clarifications regarding Savannah basin and Savannah-Upper Ogeechee RWP Council boundaries.</li> <li>Updated water use information to the most recent information compiled by USGS (2016 USGS Publication).</li> </ul>

## Appendix A: Table Outlining Updates and Revisions

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Section	Location	Change	Description
3	Section 3.2.1., including Table 3-1 and Figure 3-5	<ul style="list-style-type: none"> <li>Updated assimilative capacity text, table, and figure</li> <li>Clarified that the Savannah River basin is shared with South Carolina</li> </ul>	<ul style="list-style-type: none"> <li>Updated assimilative capacity information based on results from Surface Water Quality (Assimilative Capacity) Resource Assessment (EPD, March 2017).</li> <li>Updated description of the Surface Water Quality Resource Assessment to more accurately describe the nature of the analysis</li> <li>Clarification regarding the Savannah basin boundary made.</li> </ul>
3	Section 3.2.2., including Figure 3-6	<ul style="list-style-type: none"> <li>Updated surface water availability text and figure</li> </ul>	<ul style="list-style-type: none"> <li>Updated surface water availability information based on results from Surface Water Availability Resource Assessment (EPD, March 2017).</li> <li>Updated description of the Surface Water Availability Resource Assessment to more accurately describe the nature of the analysis.</li> </ul>
3	Section 3.2.3.	<ul style="list-style-type: none"> <li>Updated groundwater availability text</li> <li>Minor text revision</li> </ul>	<ul style="list-style-type: none"> <li>Updated description of the Groundwater Availability Resource Assessment to more accurately describe the nature of the analysis.</li> <li>Reference to the "Upper Floridan" aquifer was updated to read "Floridan," to ensure consistency with terminology used by EPD in the 2013 Announcement regarding Future Withdrawals from the Floridan Aquifer and in other documents.</li> </ul>
3	Section 3.3, including Table 3-2 and Figure 3-7	<ul style="list-style-type: none"> <li>Updated table, text, and figure</li> <li>Replaced text regarding TMDL development with text regarding the Category 5R process for restoring water quality to the Savannah River and Harbor</li> </ul>	<ul style="list-style-type: none"> <li>Table, text, and figure updated based on the most recent, readily available information (2016 Water Use Classifications and Water Quality Standards and the 2014 303(d) list).</li> <li>Figure has been updated to show the types of impairments.</li> <li>Updated text to describe the current status of the Savannah River and Harbor Category 5R Watershed Restoration Plan.</li> </ul>



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Section	Location	Change	Description
3	Section 3.3.2	<ul style="list-style-type: none"> <li>Updated text and added references</li> </ul>	<ul style="list-style-type: none"> <li>Text updated to clarify basis of selection for high priority water and watersheds (Georgia State Wildlife Action Plan (DNR, 2005); Georgia Comprehensive Wildlife Conservation Strategy (DNR, 2005)).</li> </ul>
4	Box Summary, Section 4	<ul style="list-style-type: none"> <li>Minor text revision</li> </ul>	<ul style="list-style-type: none"> <li>Text revised to reflect updated forecasts</li> </ul>
4	Section 4	<ul style="list-style-type: none"> <li>Minor text revision</li> </ul>	<ul style="list-style-type: none"> <li>Reference updated for forecasting information (Technical Memorandum: Savannah-Upper Ogeechee Water and Wastewater Forecasting (2017)).</li> </ul>
4	Section 4.1	<ul style="list-style-type: none"> <li>Updated text</li> </ul>	<ul style="list-style-type: none"> <li>Text added to describe updated methodology used during the Plan update.</li> </ul>
4	Table 4-1	<ul style="list-style-type: none"> <li>Updated population projections</li> </ul>	<ul style="list-style-type: none"> <li>Population projections were updated based on the most recent statewide population projections (Governor's Office of Planning and Budget, 2015).</li> </ul>
4	Section 4.1.1., including Figure 4-1	<ul style="list-style-type: none"> <li>Updated text and figure</li> </ul>	<ul style="list-style-type: none"> <li>Text added to describe updated methodology used during the Plan update.</li> <li>Figure based on updated water demand forecasts from the Technical Memorandum: Savannah-Upper Ogeechee Water and Wastewater Forecasting (2017).</li> </ul>
4	Section 4.1.2., including Figure 4-2	<ul style="list-style-type: none"> <li>Updated text and figure</li> </ul>	<ul style="list-style-type: none"> <li>Text added to describe updated methodology used during the Plan update.</li> <li>A contribution for I/I was not explicitly added under the revised methodology, but instead, forecasts were based on the reported discharges. Thus, the paragraph describing I/I flows was removed.</li> <li>Figure based on updated wastewater flow forecasts from the Technical Memorandum: Savannah-Upper Ogeechee Water and Wastewater Forecasting (2017).</li> </ul>

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Section	Location	Change	Description
4	Figure 4-3	<ul style="list-style-type: none"> <li>Updated figure</li> </ul>	<ul style="list-style-type: none"> <li>Figure was updated to include 2015 data and include groundwater and surface water contributions.</li> </ul>
4	Figure 4-4	<ul style="list-style-type: none"> <li>Updated figure</li> </ul>	<ul style="list-style-type: none"> <li>Figure was updated to include 2015 data.</li> </ul>
4	Section 4.3, including Table 4-2	<ul style="list-style-type: none"> <li>Updated text and table</li> </ul>	<ul style="list-style-type: none"> <li>Text and table were updated to reflect the methodology and data used for forecasting agricultural demands (Technical Memorandum: Savannah-Upper Ogeechee Water and Wastewater Forecasting (2017)).</li> </ul>
4	Section 4.4, including Table 4-3	<ul style="list-style-type: none"> <li>Updated text and table</li> </ul>	<ul style="list-style-type: none"> <li>Text and table were updated to reflect the methodology and data used for forecasting energy demands (Technical Memorandum: Savannah-Upper Ogeechee Water and Wastewater Forecasting (2017)).</li> <li>Note: There is no longer a regional portion of unassigned energy sector withdrawals because at the state level, unassigned withdrawals have decreased significantly.</li> </ul>
4	Section 4.5, including Figures 4-5, 4-6, and 4-7	<ul style="list-style-type: none"> <li>Updated text and figure</li> </ul>	<ul style="list-style-type: none"> <li>Text and figures were updated to reflect the methodology and data used for total water demands (Technical Memorandum: Savannah-Upper Ogeechee Water and Wastewater Forecasting (2017)).</li> <li>Figure 4-6 was converted from a pie chart to a bar chart and updated with revised water demand totals per sector.</li> <li>Former Figure 4-8 was deleted because the pie chart was redundant with updated Figure 4-7 (bar chart).</li> </ul>
5	Box Summary, Section 5	<ul style="list-style-type: none"> <li>Minor text revision</li> </ul>	<ul style="list-style-type: none"> <li>Text revised to reflect updated resource assessments.</li> </ul>



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Section	Location	Change	Description
5	Section 5.1, including Figure 5-1	<ul style="list-style-type: none"> <li>Text and figure updates</li> </ul>	<ul style="list-style-type: none"> <li>Text was updated based on the latest demands per aquifer.</li> <li>The counties with demands assigned to the Floridan aquifer were also updated based on the latest data from the agricultural and other sector forecasts.</li> <li>Figure 5-1 revised based on updated demand forecast information.</li> <li>Figure 5-1 modified and simplified to show 2015 and 2050 demands; 75th percentile agricultural demands; and separate demands for the Savannah-Upper Ogeechee RWP Council area compared to other Council areas.</li> </ul>
5	Section 5.2, including Figure 5-2 and Tables 5-1 and 5-2	<ul style="list-style-type: none"> <li>Text and figure updates</li> </ul>	<ul style="list-style-type: none"> <li>Text was updated based on the latest resource assessments, which no longer show potential gaps at the Little Tennessee node.</li> <li>Text was updated to emphasize that the drainage areas encompassing potential gaps at the Claxton and Kings Ferry nodes overlap a very small portion of Jenkins County.</li> <li>Figure 5-2 revised based on updated resource assessment information.</li> <li>Table 5-1 revised based on updated resource assessment information; elevation values added.</li> <li>Table 5-2 revised based on updated resource assessment information.</li> </ul>
5	Table 5-3 (Former)	<ul style="list-style-type: none"> <li>Table and related text deleted</li> </ul>	<ul style="list-style-type: none"> <li>Table 5-3 (former) and related text were removed based on updated resource assessments, as there is no longer a modeled gap at the Little Tennessee node.</li> </ul>

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Section	Location	Change	Description
5	Table 5-3 (New)	<ul style="list-style-type: none"> <li>Table and related text added</li> </ul>	<ul style="list-style-type: none"> <li>Table 5-3 (new) and related text were added based on updated resource assessment information, and in order to provide information regarding the frequency and duration of potential gaps. This information was used in determining the most relevant management practices for addressing the potential gaps.</li> </ul>
5	Table 5-4 (New)	<ul style="list-style-type: none"> <li>Table and related text added</li> </ul>	<ul style="list-style-type: none"> <li>Table 5-4 (new) and related text were added based on updated resource assessment information in order to show how surface water demand is forecasted to grow or decline in potential gap areas.</li> </ul>
5	Table 5-5 (Formerly Table 5-4)	<ul style="list-style-type: none"> <li>Table and related text updated</li> </ul>	<ul style="list-style-type: none"> <li>Table 5.5 updated with the latest permitted water withdrawal values and the updated demand forecasts. There are now fewer counties with a projected need for additional future permitted water withdrawal capacity, most likely due to lower demand estimates based on the most recent statewide population projections (Governor's Office of Planning and Budget, 2015).</li> </ul>
5	Section 5.3	<ul style="list-style-type: none"> <li>Text added</li> </ul>	<ul style="list-style-type: none"> <li>Text added to clarify that South Carolina data was incorporated in updated resource assessments.</li> </ul>
5	Section 5.3.1.	<ul style="list-style-type: none"> <li>Text added</li> </ul>	<ul style="list-style-type: none"> <li>Text regarding utility investment in source water protection added.</li> </ul>
5	Table 5-6 (Formerly Table 5-5)	<ul style="list-style-type: none"> <li>Table and related text updated</li> </ul>	<ul style="list-style-type: none"> <li>Table updated with the latest permitted discharge flow values and the updated wastewater flow forecasts.</li> <li>Table updated to distinguish between point source discharges and land application systems.</li> </ul>
5	Table 5-7 (New)	<ul style="list-style-type: none"> <li>Table added</li> </ul>	<ul style="list-style-type: none"> <li>Table added to summarize the updated assimilative capacity results under current permitted conditions.</li> </ul>
5	Section 5.3.4. (New)	<ul style="list-style-type: none"> <li>Section added</li> </ul>	<ul style="list-style-type: none"> <li>Section added for consistency with other regional planning councils to discuss non-point source pollution.</li> </ul>





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Section	Location	Change	Description
5	Figures 5-3 and 5-4	<ul style="list-style-type: none"> <li>Figures and related text updated</li> </ul>	<ul style="list-style-type: none"> <li>Figures and text were updated based on the latest resource assessments.</li> <li>Figure format was modified to depict assimilative capacity across the whole WPC region.</li> </ul>
5	Section 5-4, including Table 5-8 (Formerly Table 5-6)	<ul style="list-style-type: none"> <li>Table and text updated</li> </ul>	<ul style="list-style-type: none"> <li>Table and text were revised to reflect the updated resource assessment information.</li> </ul>
6	Box Summary	<ul style="list-style-type: none"> <li>Minor text revision</li> </ul>	<ul style="list-style-type: none"> <li>Text was updated to reflect current number of management practices (MPs).</li> </ul>
6	Section 6.1	<ul style="list-style-type: none"> <li>Replaced text regarding TMDL development with text regarding the Category 5R process for restoring water quality to the Savannah River and Harbor</li> <li>Other minor text revisions</li> </ul>	<ul style="list-style-type: none"> <li>Updated text to describe the current status of the Savannah River and Harbor Category 5R Watershed Restoration Plan.</li> <li>Updated year for reference to Savannah River Basin Drought Contingency Plan.</li> </ul>
6	Section 6.2	<ul style="list-style-type: none"> <li>Minor text revisions and additions</li> </ul>	<ul style="list-style-type: none"> <li>Text was added to describe the plan update process.</li> </ul>
6	Section 6.2.1	<ul style="list-style-type: none"> <li>Minor text revisions and additions</li> <li>Added text regarding drought management and water supply efficiency rules</li> <li>Text added concerning challenge of planning and managing across watershed boundaries</li> </ul>	<ul style="list-style-type: none"> <li>Text was added to describe the plan update process.</li> <li>Text was updated to reflect recent EPD rules.</li> <li>Text regarding watershed planning considerations added.</li> </ul>
6	Section 6.2.2	<ul style="list-style-type: none"> <li>Minor text revisions and additions</li> <li>Added text regarding drought management and water supply efficiency rules</li> </ul>	<ul style="list-style-type: none"> <li>Text was updated to reflect current number of MPs</li> <li>Text was updated to reflect recent EPD rules.</li> </ul>
6	Table 6-1A, WD1	<ul style="list-style-type: none"> <li>Revised/updated</li> </ul>	<ul style="list-style-type: none"> <li>Updated MPs incorporate recent EPD rules for water supply efficiency and drought management.</li> </ul>
6	Table 6-1A, WD2	<ul style="list-style-type: none"> <li>Revised</li> </ul>	<ul style="list-style-type: none"> <li>Itemized select MPs contained within the Technical Memorandum - Management Practices Selection (May 2011)</li> </ul>
6	Table 6-1A, WD3	<ul style="list-style-type: none"> <li>Revised</li> </ul>	<ul style="list-style-type: none"> <li>Itemized select MPs contained within the Technical Memorandum - Management Practices Selection (May 2011)</li> </ul>

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Section	Location	Change	Description
6	Table 6-1A, WD4	<ul style="list-style-type: none"> <li>Revised</li> </ul>	<ul style="list-style-type: none"> <li>Name of MP revised to reflect the purpose of this document as an update to the Plan completed in 2011</li> <li>Additional MPs to address need to ensure metering accuracy, reading, and reporting</li> <li>Broadened MPs to cover the entire Water Planning Council area.</li> </ul>
6	Table 6-1A, WS1	<ul style="list-style-type: none"> <li>Minor revision</li> </ul>	<ul style="list-style-type: none"> <li>Name of MP revised to reflect shift from developing master plans to evaluating them.</li> </ul>
6	Table 6-1A, WS4	<ul style="list-style-type: none"> <li>Minor revision</li> </ul>	<ul style="list-style-type: none"> <li>Added a citation for specific feasibility study.</li> </ul>
6	Table 6-1A, WS6	<ul style="list-style-type: none"> <li>Deleted</li> </ul>	<ul style="list-style-type: none"> <li>MP was deleted because updated resource assessment information shows there is no longer a potential gap at the Little Tennessee Node.</li> </ul>
6	Table 6-1A, WQ1	<ul style="list-style-type: none"> <li>Revised</li> </ul>	<ul style="list-style-type: none"> <li>Name of MP revised to reflect shift from developing master plans to evaluating them</li> <li>Source water protection MP added</li> </ul>
6	Table 6-1A, WQ4	<ul style="list-style-type: none"> <li>Deleted and Replaced</li> </ul>	<ul style="list-style-type: none"> <li>Former MP regarding development of a TMDL management plan was deleted because the TMDL has been replaced by an EPA-approved stakeholder Category 5R plan.</li> <li>New MP added regarding support for the Forestry Commission Water Quality Program as a means of improving forestry practices that may have beneficial impacts on water quality.</li> </ul>
6	Table 6-1A, ED1	<ul style="list-style-type: none"> <li>Revised</li> </ul>	<ul style="list-style-type: none"> <li>Name of MP and description updated to indicate option of customizing existing materials.</li> <li>Added education/outreach items concerning MPs for outdoor watering/gardening, irrigation, land management, pet waste, and drought.</li> </ul>



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Section	Location	Change	Description
6	Table 6-1A (footnote), Text immediately following Table 6-1A	<ul style="list-style-type: none"> <li>Deleted reference to Little Tennessee Node from footnote and adjacent text</li> </ul>	<ul style="list-style-type: none"> <li>Updated resource assessment information shows there is no longer a potential gap at the Little Tennessee Node, so there is no longer a corresponding MP.</li> </ul>
6	Table 6-1B, WD5	<ul style="list-style-type: none"> <li>Minor revision</li> </ul>	<ul style="list-style-type: none"> <li>Added reference for the UNC Environmental Finance Center rate structure survey &amp; analysis model</li> </ul>
6	Table 6-1B, WD6	<ul style="list-style-type: none"> <li>Minor revision</li> </ul>	<ul style="list-style-type: none"> <li>Reference to upcoming amended rules deleted, because EPD finalized both the water supply efficiency and drought management rules in 2015.</li> </ul>
6	Table 6-1B, WQ7	<ul style="list-style-type: none"> <li>Revised</li> </ul>	<ul style="list-style-type: none"> <li>Text revised to add natural wetland restoration and source water protection benefits of wetlands.</li> </ul>
6	Table 6-1B, WQ8	<ul style="list-style-type: none"> <li>Minor revision</li> </ul>	<ul style="list-style-type: none"> <li>Name of MP and description revised to emphasize implementation.</li> </ul>
6	Table 6-1B, WQ9	<ul style="list-style-type: none"> <li>Minor revision</li> </ul>	<ul style="list-style-type: none"> <li>Name of MP and description updated to indicate option of customizing existing materials.</li> </ul>
6	Table 6-1B, WQ10	<ul style="list-style-type: none"> <li>Minor revision</li> </ul>	<ul style="list-style-type: none"> <li>Name of MP and description revised to emphasize updates and implementation.</li> </ul>
6	Table 6-1B, WQ11	<ul style="list-style-type: none"> <li>Minor revision</li> </ul>	<ul style="list-style-type: none"> <li>Name of MP and description updated to indicate option of customizing existing materials.</li> <li>Addition of forestry professionals as a target audience.</li> </ul>
6	Section 6.2.4.	<ul style="list-style-type: none"> <li>Revised</li> </ul>	<ul style="list-style-type: none"> <li>Deleted paragraph on projected savings from high efficiency plumbing fixtures</li> <li>Inserted paragraph on "Other Regional Efforts" describing feasibility study of Oxbow restoration and its potential water quality and fish/wildlife benefits.</li> </ul>
7	Section 7.1	<ul style="list-style-type: none"> <li>Minor text revision</li> </ul>	<ul style="list-style-type: none"> <li>Text was revised to reflect the updated timeframe for plan implementation.</li> </ul>
7	Table 7-1 (all)	<ul style="list-style-type: none"> <li>Reformatted</li> </ul>	<ul style="list-style-type: none"> <li>Deleted column labelled "Initial Implementation Step(s) 2011-2012," and appropriate initial action items were shifted into the "Short-Term Actions" column.</li> </ul>

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Section	Location	Change	Description
7	Table 7-1, WD1	<ul style="list-style-type: none"> <li>Revised</li> </ul>	<ul style="list-style-type: none"> <li>Name of MP and text updated to incorporate recent EPD rules for water supply efficiency and drought management.</li> </ul>
7	Table 7-1, WD2	<ul style="list-style-type: none"> <li>Revised</li> </ul>	<ul style="list-style-type: none"> <li>Updated to reflect changes in Table 6-1A, WD2</li> </ul>
	Table 7-1, WD4	<ul style="list-style-type: none"> <li>Revised</li> </ul>	<ul style="list-style-type: none"> <li>Updated to reflect changes in Table 6-1A, WD4</li> <li>Responsible party for monitoring agricultural irrigation meters changed from GSWCC to EPD.</li> </ul>
7	Table 7-1, WS6	<ul style="list-style-type: none"> <li>Deleted</li> </ul>	<ul style="list-style-type: none"> <li>MP was deleted because updated resource assessment information shows there is no longer a potential gap at the Little Tennessee Node.</li> </ul>
7	Table 7-1, WQ4	<ul style="list-style-type: none"> <li>Revised</li> </ul>	<ul style="list-style-type: none"> <li>Name of MP regarding development of a TMDL management plan was replaced with MP for supporting Forestry Commission Water Quality Program, per update in Table 6-1A.</li> </ul>
7	Table 7-1, ED1	<ul style="list-style-type: none"> <li>Minor revision</li> </ul>	<ul style="list-style-type: none"> <li>Name of MP and description updated to indicate option of customizing existing materials</li> </ul>
7	Section 7.2.1	<ul style="list-style-type: none"> <li>Text added</li> </ul>	<ul style="list-style-type: none"> <li>Text clarifies that cost information in Table 7-2 has not been updated since 2011 and should only be used as a general guide.</li> </ul>
	Table 7-2, WD1	<ul style="list-style-type: none"> <li>Minor revision</li> </ul>	<ul style="list-style-type: none"> <li>Name of MP updated to incorporate recent EPD rules for water supply efficiency and drought management.</li> </ul>
7	Table 7-2, WQ4	<ul style="list-style-type: none"> <li>Revised</li> </ul>	<ul style="list-style-type: none"> <li>Name of MP regarding development of a TMDL management plan was replaced with MP for supporting Forestry Commission Water Quality Program, per update in Table 6-1A.</li> </ul>
7	Table 7-2, ED1	<ul style="list-style-type: none"> <li>Minor revision</li> </ul>	<ul style="list-style-type: none"> <li>Name of MP and description updated to indicate option of customizing existing materials</li> </ul>
7	Section 7.3	<ul style="list-style-type: none"> <li>Text added</li> </ul>	<ul style="list-style-type: none"> <li>Text added to emphasize importance of aligning efforts with those occurring in adjacent watersheds and states.</li> </ul>



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Section	Location	Change	Description
7	Table 7-3, Funding	<ul style="list-style-type: none"> <li>Recommendation added</li> </ul>	<ul style="list-style-type: none"> <li>Recommendation added for state funding to support smaller local governments in need of a stormwater utility.</li> </ul>
7	Table 7-3, Additional Data (Surface Water)	<ul style="list-style-type: none"> <li>Recommendation added</li> </ul>	<ul style="list-style-type: none"> <li>Recommendation added for state to engage Corps in a feasibility study of increasing lake levels for water supply/drought relief benefits.</li> </ul>
7	Table 7-3, Additional Data (Surface Water)	<ul style="list-style-type: none"> <li>Recommendation updated</li> </ul>	<ul style="list-style-type: none"> <li>Recommendation updated to reflect MP WD4.</li> </ul>
7	Table 7-3, Additional Data (Surface Water)	<ul style="list-style-type: none"> <li>Recommendation added</li> </ul>	<ul style="list-style-type: none"> <li>Recommendation added requesting state provide data along watershed rather than Council boundaries.</li> </ul>
7	Table 7-3, Technical Support (Water Quality) new	<ul style="list-style-type: none"> <li>Recommendation added</li> </ul>	<ul style="list-style-type: none"> <li>Recommendation regarding the Category 5R plan for restoring water quality in the Savannah River Basin &amp; Harbor added.</li> </ul>
7	Table 7-3, Policy	<ul style="list-style-type: none"> <li>Recommendation added</li> </ul>	<ul style="list-style-type: none"> <li>Recommendation regarding maintenance of the current prohibition against interbasin transfers into the Metropolitan North Georgia Water Planning District regional planning area added.</li> </ul>
7	Table 7-3, Policy	<ul style="list-style-type: none"> <li>Recommendation added</li> </ul>	<ul style="list-style-type: none"> <li>Recommendation to designate Southeast GA Experiment Station at Midville as an irrigation research center to provide modeling data more specific to the region added.</li> </ul>
7	Table 7-3, Coordination	<ul style="list-style-type: none"> <li>Recommendation added</li> </ul>	<ul style="list-style-type: none"> <li>Recommendation to use UGA Extension to disseminate information to agriculture community added.</li> </ul>
7	Table 7-3, Public Education and Outreach	<ul style="list-style-type: none"> <li>Recommendation revised</li> </ul>	<ul style="list-style-type: none"> <li>Recommendation revised to include option of tailoring existing materials to different audiences.</li> </ul>
7	Section 7.4	<ul style="list-style-type: none"> <li>Text deleted</li> </ul>	<ul style="list-style-type: none"> <li>Former item 6, regarding Savannah River DO TMDL, has been deleted as no longer applicable.</li> </ul>

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Section	Location	Change	Description
8	Section 8.2	<ul style="list-style-type: none"> <li>Minor text revisions</li> </ul>	<ul style="list-style-type: none"> <li>Text revised to reflect plan has been updated.</li> </ul>
8	Table 8-1, WD1	<ul style="list-style-type: none"> <li>Text updated</li> </ul>	<ul style="list-style-type: none"> <li>Text updated to reflect MP updates based on recent EPD rules for water supply efficiency and drought management.</li> </ul>
8	Table 8-1, WD4	<ul style="list-style-type: none"> <li>Text revised</li> </ul>	<ul style="list-style-type: none"> <li>Text added to include calibration and self-reporting options for evaluating meter accuracy/ reporting data.</li> </ul>
8	Table 8-1, WS6	<ul style="list-style-type: none"> <li>MP deleted</li> </ul>	<ul style="list-style-type: none"> <li>Text was deleted to reflect MP was deleted based on updated resource assessment information showing there is no longer a potential gap at the Little Tennessee node.</li> </ul>
8	Table 8-1, WQ4	<ul style="list-style-type: none"> <li>MP deleted and replaced</li> </ul>	<ul style="list-style-type: none"> <li>MP regarding development of a TMDL management plan was replaced with MP for supporting Forestry Commission Water Quality Program, per update in Table 6-1A.</li> </ul>
8	Table 8-1, ED1	<ul style="list-style-type: none"> <li>Minor text revisions</li> </ul>	<ul style="list-style-type: none"> <li>MP name updated to indicate option of customizing existing materials.</li> </ul>
8	Table 8-1, footnotes	<ul style="list-style-type: none"> <li>Minor text revisions</li> </ul>	<ul style="list-style-type: none"> <li>Text revised to reflect plan has been updated.</li> </ul>
8	Section 8.3	<ul style="list-style-type: none"> <li>Text revision</li> </ul>	<ul style="list-style-type: none"> <li>Text regarding interbasin transfers revised.</li> </ul>

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