LOWER SAVANNAH-SALKEHATCHIE RIVER BASIN PLAN 2025

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Name and Organization

Danny Black, Southern Carolina Regional Alliance
Taylor Brewer, Beaufort County Stormwater Manager
Kenneth Caldwell, Alliant Insurance Services/Tree Farmer
John Carman, City of Aiken Energy and Environmental Committee
Brian Chemsak, Beaufort Jasper Water and Sewer Authority
Austin Connelly, Farmers Grain & Supply Inc.
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** RBC member who participated during the process but was not an active member at the time this Plan was prepared*.

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The Lower Savannah-Salkehatchie RBC

Acronyms

Acronym

°F	degrees Fahrenheit
ACE	Ashepoo-Combahee-Edisto
AMI	advanced metering infrastructure
AMR	automated meter reading
ASR	Aquifer storage and recovery
AWWA	American Water Works Association
BEA	U.S. Bureau of Economic Analysis
BJWSA	Beaufort-Jasper Water and Sewer Authority
BMP	Best Management Practice
cfs	cubic feet per second
CMOR	Condition Monitoring Observer Report
CUA	Capacity Use Area
CWWMG	Catawba-Wateree Water Management Group
DCP	Drought Contingency Plan
DMA	Drought Management Area
DRC	Drought Response Committee
ECW&SA	Edgefield County Water & Sewer Authority
EDA	Economic Development Administration
EF	Enhanced Fujita
EIA	Energy Information Agency
EPA	Environmental Protection Agency
EQIP	Environmental Quality Incentives Program
FEMA	Federal Emergency Management Agency
FSA	Farm Service Agency
GAEPD	Georgia Environmental Protection Division
GC	golf course water user
GDP	gross domestic product
gpd	gallons per day
gpf	gallons per flush
gpm	gallons per minute
HMGP	Hazard Mitigation Grant Program
HUC	Hydrologic Unit Code
in.	inches
IR	agricultural (irrigation) water user
IRA	Inflation Reduction Act
IWNP	intelligent water and nutrient placement
LCOG	Lowcountry Council of Governments

LEED	Leadership in Energy and Environmental Design
LEPA	low elevation precision application
LESA	low elevation spray application
LRWS	Lowcountry Regional Water System
MCAS	Marine Corps Air Station
MESA	mid-elevation spray application
MGD	million gallons per day
MGM	million gallons per month
MIF	minimum instream flow
mph	miles per hour
MRLC	Multi-Resolution Land Characteristics Consortium
MSL	mean sea level
NASS	National Agricultural Statistics Service
NDMC	National Drought Mitigation Center
NLCD	National Land Cover Database
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NWS	National Weather Service
NRCS	Natural Resources Conservation Service
O&M	operations and maintenance
PPAC	Planning Process Advisory Committee
P&R	Permitted and Registered
PFAS	per- and polyfluoroalkyl substances
PSD	Public Service District
RBC	River Basin Council
RMA	Risk Management Agency
SC ORFA	South Carolina Office of Revenue and Fiscal Affairs
SCDA	South Carolina Department of Agriculture
SCDES	South Carolina Department of Environmental Services
SCDHEC	South Carolina Department of Health and Environmental Control
SCDNR	South Carolina Department of Natural Resources
SCFC	South Carolina Forestry Commission
SCNHP	South Carolina Natural Heritage Program
SCO	State Climatology Office
SEPA	Southeastern Power Administration
SMS	soil moisture sensor
SPI	Standard Precipitation Index
sq mi	square miles
SRS	Savannah River Site
SWAM	Simplified Water Allocation Model
TMDL	Total Maximum Daily Load
UIF	unimpaired flows
USACE	United States Army Corps of Engineers

USDA	U.S. Department of Agriculture
USDOE	U.S. Department of Energy
USFWS	U.S. Fish and Wildlife Service
USGA	U. S. Golf Association
USGS	United States Geological Survey
WBIC	weather-based irrigation controller
WS	water supply water user
WWQA	Watershed Water Quality Assessment

Chapter 1 Introduction

1.1 Background

The South Carolina Water Resources Planning and Coordination Act mandates that the South Carolina Department of Natural Resources (SCDNR) develop a comprehensive water resources policy for the state of South Carolina. SCDNR developed the first state water plan—the *South Carolina Water Plan*—in 1998. In 2004, the plan was updated following what is recognized as one of the worst multi-year droughts on record, which ended in 2002. One of the recommendations from the *South Carolina Water Plan, Second Edition* was forming advisory committees to develop comprehensive water resource plans for each of the state's four major river basins: Ashepoo-Combahee-Edisto (ACE), Pee Dee, Santee, and Savannah. In 2014, when the development of surface water quantity models to support the planning process began, SCDNR and the South Carolina Department of Health and Environmental Control (SCDHEC) decided to further subdivide the basins based on SCDHEC's delineations used for the Water Quality Assessments. The eight planning basins were the Broad, Catawba, Edisto, Pee Dee, Salkehatchie, Saluda, Santee, and Savannah. In 2022, SCDNR made two adjustments to the planning basins. In the Saluda basin, the drainage area just below the confluence of the Broad and Saluda Rivers, which is generally below the Fall Line, was added to the Santee basin. The Savannah basin was subdivided into two planning basins and the portion below Lake Thurmond was combined with the Salkehatchie basin to form the Lower Savannah-Salkehatchie basin, as shown in Figure 1-1. Throughout this River Basin Plan, the Lower Savannah-Salkehatchie River basin is often referred to as a single basin (for planning purposes), unless otherwise noted.

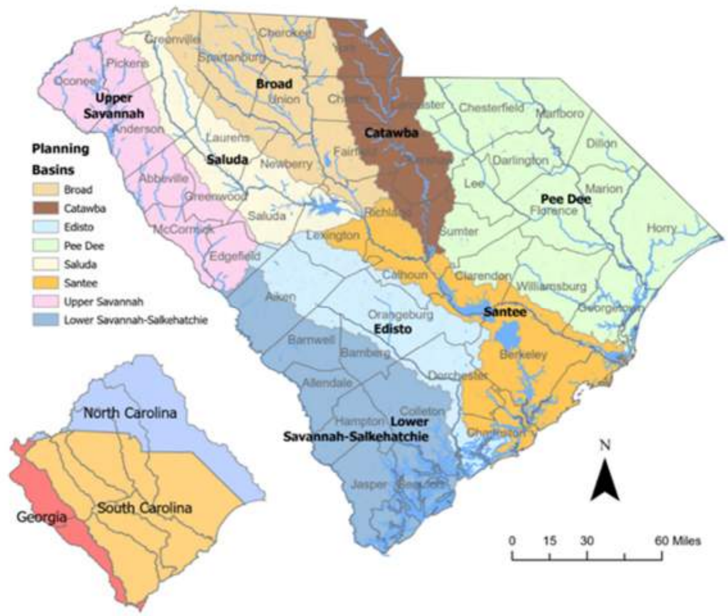


Figure 1-1. Planning basins of South Carolina.

Each of these water resource plans is called a River Basin Plan, which is defined in the *South Carolina State Water Planning Framework* (SCDNR 2019a; referred to hereafter as the Planning Framework) as "a collection of water management strategies supported by a summary of data and analyses designed to ensure the surface water and groundwater resources of a river basin will be available for all uses for years to come, even under drought conditions." The next update to the State Water Plan will build on the analyses and recommendations developed in the eight River Basin Plans.

River basins are seen as a natural planning unit for water resources since surface water in each basin is relatively isolated from water in other basins by natural boundaries. Each River Basin Plan will include data, analysis, and water management strategies to guide water resource development in the basin for a planning horizon of 50 years. Specifically, a River Basin Plan answers four questions:

1. What is the basin's current available water supply and demand?
2. What are the current permitted and registered water uses within the basin?
3. What will be the water demand in the basin throughout the planning horizon, and will the available water supply be adequate to meet that demand?
4. What water management strategies will be employed in the basin to ensure the available supply meets or exceeds the projected demand throughout the planning horizon?

In each river basin, a River Basin Council (RBC) is established and tasked with developing a plan that fairly and adequately addresses the needs and concerns of all water users following a cooperative, consensus-driven approach. The Lower Savannah-Salkehatchie River basin is the sixth of the eight river basins to begin and complete the process that culminated in developing this plan. River basin planning is expected to be an ongoing, long-term process, and this plan will be updated every 5 years.

1.2 Planning Process

The river basin planning process in South Carolina formally began with the development of the eight surface water quantity models starting in 2014 and the update of the Coastal Plain Groundwater Model in 2016. In March 2018, SCDNR convened the Planning Process Advisory Committee (PPAC). Over the next year and a half, SCDNR and the PPAC collaboratively developed the Planning Framework, which defines river basin planning as the collective effort of the numerous organizations and agencies performing various essential responsibilities, as described in the bullets that follow. A more complete description of the duties of each entity are provided in Chapter 3 of the Planning Framework.

- RBC: A group of approximately 25 members representing diverse stakeholder interests in the basin. Each RBC includes at least one representative from each of the eight broadly defined stakeholder interest categories shown in Figure 1-2. The RBC is responsible for developing and implementing the River Basin Plan; communicating with stakeholders; and identifying recommendations for policy, legislative, regulatory, or process changes.

- PPAC and WaterSC: The PPAC was a diverse group of water resource experts established to develop and help implement the Planning Framework for state and river basin water planning. The PPAC was dissolved in 2024 and the WaterSC Water Resources Working Group (WaterSC) was established by Executive Order 2024-22 to advise the South Carolina Department of Environmental Services (SCDES) on developing the new State Water Plan and facilitate additional collaboration with ongoing water planning efforts and existing initiatives.

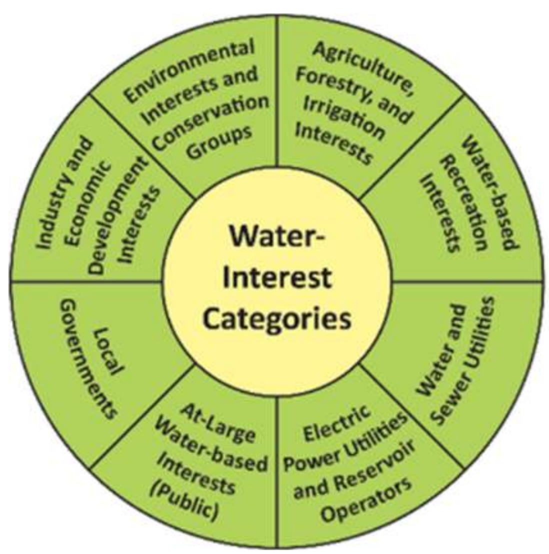


Figure 1-2. RBC water-interest categories.

- State and Federal Agencies:
  - SCDNR was the primary oversight agency for the river basin planning processes until July 1, 2024 when the Water Division of SCDNR moved to the newly formed SCDES. Key duties of SCDNR, which now fall to SCDES, include appointing members to the RBCs; educating RBC members on critical background information; providing RBCs and contractors with data, surface water models, and groundwater models; hiring contractors; and reviewing and approving the final River Basin Plans.
  - SCDES (formerly SCDHEC) is the regulatory agency that administers laws regarding water quality and use within the state and now oversees water planning activities. Key duties of SCDES include ensuring recommendations are consistent with existing laws and regulations, serving as an advisor for recommended changes to existing laws and regulations, directing the river basin planning effort, and developing the State Water Plan.
  - Other State Agencies: Representatives from other state agencies, such as the Department of Agriculture, Department of Commerce, Forestry Commission, Rural Infrastructure Authority, and the Energy Office, may be asked to attend RBC meetings in an advisory role.
  - Federal Agencies: Representatives from federal agencies, such as the U.S. Geological Survey (USGS), U.S. Army Corps of Engineers (USACE), and Southeastern Power Administration (SEPA), may be asked to attend RBC meetings as formal advisors. Representatives from other federal agencies may be asked to attend RBC meetings in an advisory role.
- Contractors: SCDES hired contractors to perform administrative, facilitative, technical, authorship, and public outreach functions. Specific roles included:
  - Coordinator: Performs administrative functions. Coordination of RBC meetings and other activities has been shared by representatives from CDM Smith and Clemson University, with assistance from SCDES (collectively, the Planning Team). The Planning Team met at least monthly in between RBC meetings.
  - Facilitator and Author: Guides RBC meetings in a neutral manner to encourage participation and provides River Basin Plan authorship services. CDM Smith served in these roles for the Lower Savannah-Salkehatchie RBC.
  - Public Outreach Coordinator: Engages stakeholders and the public in the planning process. Clemson University served in this role for the Lower Savannah-Salkehatchie RBC.
- Groundwater and Surface Water Technical Advisory Committees: SCDES-appointed groups with specific technical expertise intended to enhance the scientific and engineering aspects of the planning process.
- Subcommittees and Ad Hoc Groups: The Lower Savannah-Salkehatchie RBC elected not to form any subcommittees during the initial, 2-year process of developing this plan.
- The Public and Stakeholders: The public was invited to attend and provide comments at RBC meetings and designated public meetings. Additional detail on public participation is described in Chapter 1.4.

The creation of the Lower Savannah-Salkehatchie RBC began with two public meetings organized by SCDNR on August 24 and 29, 2023, in Walterboro and North Augusta, respectively. The goal of these meetings was to describe the need and process for river basin planning to stakeholders and solicit applications to join the Lower Savannah-Salkehatchie RBC. SCDNR accepted applications through September 2023 and selected RBC appointees in October 2023, based on their credentials, knowledge of their interest category, and their connection to the basin (i.e., RBC members must live, work, or represent a significant interest in the water resources of the basin). The diverse membership of the RBC is intended to allow for a variety of perspectives during development of the River Basin Plan. Table 1-1 lists the Lower Savannah-Salkehatchie RBC members (at the time the Final River Basin Plan was issued) and their affiliations, appointment dates, and term lengths. Term lengths are staggered to ensure continuity in the planning process. After serving an initial term, RBC members may be reappointed to serve additional terms subject to SCDNR approval, not to exceed three consecutive terms total.

Table 1-1. Lower Savannah-Salkehatchie RBC members and affiliations.

Name	Organization	Position	Interest Category	Appointment Date and Term Length (Years)
Danny Black	Southern Carolina Regional Alliance	President and CEO	Industry and Economic Development	November 2023 (4)
Taylor Brewer	Beaufort County Stormwater Manager	Stormwater Manager	Local Government	November 2023 (4)
Kenneth Caldwell	Alliant Insurance Services/Tree Farmer	Executive Vice President	Agriculture, Forestry, and Irrigation	November 2023 (2)
John Carman	City of Aiken Energy and Environmental Committee	Past Chair/Member	Local Governments	November 2023 (3)
Brian Chemsak	Beaufort Jasper Water and Sewer Authority (BJWSA)	Chief of Plant Operator	Water and Sewer Utilities	November 2023 (4)
Austin Connelly	Farmers Grain & Supply Inc.	Supervisor	Agriculture, Forestry, and Irrigation	November 2023 (4)
Leslie Dickerson	Savannah Riverkeeper	Board Member	Environmental	November 2023 (3)
Kari Foy	Lowcountry Regional Water System (LRWS)	Engineer	Water and Sewer Utilities	November 2023 (2)
Samuel Grubbs	Samuel L Grubbs Farm LLC	Owner	Agriculture, Forestry, and Irrigation	November 2023 (2)
Lawrence Hayden	Self Employed - Previously U.S. Department of Agriculture (USDA) Forest Service	Natural Resources Planner	Environmental	November 2023 (3)
Heyward Horton	SC Rural Water Association Colleton County Economic Alliance, Inc.	Executive Director	Industry and Economic Development	November 2023 (2)
Jeff Hynds	U.S. Department of Energy (USDOE) – Savannah River Field Office	Program Manager	Industry and Economic Development	November 2023 (4)
Courtney Kimmel	Port Royal Sound Foundation	Research Coordinator	Environmental	November 2023 (2)
Lynn McEwen	City of New Ellenton	Administrator	Water and Sewer Utilities	November 2023 (3)
Dean Moss	Retired	Former General Manager	At-Large	November 2023 (3)

Table 1-1. Lower Savannah-Salkehatchie RBC members and affiliations (Continued).

Name	Organization	Position	Interest Category	Appointment Date and Term Length (Years)
Pete Nardi	Hilton Head Public Service District (PSD)	General Manager	Water and Sewer Utilities	November 2023 (4)
Sara O'Connor	Coppage Law Firm/Seaside Sustainability	Paralegal	Environmental	November 2023 (4)
Brad O'Neal	Coosaw Farms	Chief Operating Officer	Agriculture, Forestry, and Irrigation	November 2023 (3)
Joseph Oswald III	JCO Farms & AIS LLC	Owner	Agriculture, Forestry, and Irrigation	November 2023 (2)
Tommy Paradise	City of North Augusta	Director of Planning and Development	Local Government	November 2023 (4)
Reid Pollard	Retired	Banker	Water-based recreational	November 2023 (3)
Brandon Stutts	Dominion Energy	Environmental Consultant	Electric Power Utilities	November 2023 (3)
Bill Wabbersen	Retired		Water-based recreational	November 2023 (3)
Will Williams	Western SC Economic Development Partnership	President/CEO	Industry and Economic Development	November 2023 (2)
Brad Young	Hilton Head National Golf Club	Golf Course Superintendent	Agriculture, Forestry, and Irrigation	November 2023 (4)

The Lower Savannah-Salkehatchie RBC began meeting in November 2023, and continued meeting monthly using a hybrid format that allowed for virtual participation when needed. Meetings were held in Blackville, Estill, Hampton, Hilton Head, and North Augusta.

The planning process was completed in four phases, as specified in the Planning Framework. During the mostly informational phase (Phase 1), RBC members heard presentations from subject matter experts representing SCDNR, SCDES, USGS, Clemson University, and CDM Smith. Presentation topics included water legislation and permitting; hydrology, monitoring, and low-flow characteristics; climatology; the South Carolina Drought Response Act; freshwater aquatic and marine resource management; and the relationships between streamflow and ecologic health.

Phase 2 of the planning process focused on assessing past, current, and future surface water availability. The RBC reviewed historical and current water use, and 50-year planning scenario results from the surface water quantity model (referred to as the Simplified Water Allocation Model or SWAM). Potential water shortages and issues were identified and discussed.

During Phase 3, water management strategies to address water availability issues were identified, evaluated, selected, and prioritized by the RBC based on their effectiveness, as determined by modeling and feasibility criteria such as cost, environmental impact, and socioeconomic impact.

Legislative, policy, technical, and planning process recommendations were considered during Phase 4 of the planning process, which culminated in developing this River Basin Plan.

Lower Savannah-Salkehatchie RBC members participated in two field trips to better understand the water resources of the basin, how water is withdrawn and used to support agriculture and public water supply needs, and its importance in energy production. In May 2024, the RBC visited Hilton Head Island to learn about Hilton Head PSD's aquifer storage and recovery (ASR) program, reverse osmosis treatment plant, and recycled water program. The RBC also toured the Waddell Mariculture Center in Bluffton. In April 2025, the RBC toured the USDOE's Savannah River Site (SRS). Photos from the field trips are shown in Figure 1-3.

Figure 1-3. RBC field trips.

1.3 Vision and Goals

At the first RBC meeting held on November 2, 2023, the Lower Savannah-Salkehatchie RBC identified and discussed their water resources issues and concerns. From that list they began to develop priorities for the managing the basin. Priorities that were developed through discussion included the following:

- Balancing water needs today and over the next 50 years to ensure the resource is always there to maintain the quality of life we have now for all water uses (environment, recreation, municipal, and industrial).
- Increasing awareness of water usage and availability within the basin through accurate reporting, stakeholder education, and public education.
- Promoting responsible development, conservation easements, open space, crop management, efficiency, and reducing water loss/waste.
- Balancing the priorities of the different subbasins within the larger Lower Savannah-Salkehatchie River basin.
- Recognizing that there is a lack of flow data in the Salkehatchie River basin, seeking opportunities to add additional monitoring stations or collect data to better characterize surface water flows in the basin.
- Recognizing that USACE release decisions in the Upper Savannah River basin affect flow in the Lower Savannah River, providing a voice for Lower Savannah River basin needs.
- Better understanding the impact of saltwater intrusion on the availability of usable water in the basin.

At a subsequent meeting, the RBC reviewed the issues, concerns, and priorities and developed a vision statement establishing the desired outcome of the planning process and actionable goals supporting their vision for the Lower Savannah-Salkehatchie River basin. The vision statement and goals are listed in Table 1-2.

Table 1-2. Lower Savannah-Salkehatchie RBC Vision Statement and Goals.

Vision Statement
Shared water resources are managed to sustainably meet the needs of all stakeholders in the Lower Savannah and Salkehatchie basins now and into the future.
Goals
1 Develop water use strategies, policies, and legislative recommendations so that the Lower Savannah and Salkehatchie River basins are resilient and: **a. Provide for an accurate accounting of current and future water availability.** **b. Promote stability of water allocations to support long-term planning.** **c. Promote balance between development, industry, and economic growth in areas with adequate water resources.** **d. Allow for growth.** **e. Prevent saltwater intrusion and loss of freshwater resources.** **f. Maintain adequate flows to support instream needs of aquatic organisms and recreation.**
2 Enhance collaboration between all stakeholders and water interest groups, including Georgia and the Upper Savannah RBC.
3 Educate and inform local governments on how land use decisions impact water availability.
4 Develop and implement an education and communication plan to promote the strategies, policies, and recommendations developed for the Lower Savannah-Salkehatchie River basin.

1.4 Public Participation

Public participation is a vital component of the river basin planning process. All RBC meetings are open to the public. To promote visibility and encourage participation, meeting notices are posted on the SCDES web page for the Lower Savannah-Salkehatchie River Basin and are distributed to an email list. Meeting agendas, minutes, summaries, presentations, and recordings are posted on the SCDES website and are available to the public.

In addition to the RBC meetings, dedicated public meetings were also held to distribute information and solicit feedback.

- The first two public meetings were held on August 24 and 29, 2023, in Walterboro and North Augusta, respectively. At these meetings, the public was informed of the basin planning process and the plan for public participation. RBC membership applications were solicited at this meeting.
- A third public meeting was held on July 22, 2025, at the Lake Warren State Park in Hampton. A summary of the plan was provided to attendees and a public comment period opened, which included a verbal comment period at the meeting followed by a 30-day written comment period. No written comments were received from the public during the 30-day comment period.

1.5 Previous Water Planning Efforts

1.5.1 Drought Planning

The South Carolina State Climatology Office (SCO) is responsible for drought planning in the state. The South Carolina Drought Response Act and supporting regulations establish the South Carolina Drought Response Committee (DRC) as the drought decision-making entity in the state. The DRC is composed of state agencies and local members representing various stakeholder interests. To help prevent overly broad response to drought, SCDNR split the state into four drought management areas (DMAs). The Lower Savannah and Salkehatchie River basins are largely within the West (Savannah Basin) DMA but has portions of its eastern area in the Southern (ACE Basin) DMA. The DRC monitors drought indicators, issues drought status updates, determines nonessential water use, and issues declarations for water curtailment as needed. In addition to establishing the DRC, the South Carolina Drought Response Act also requires all public water suppliers to develop and implement their own drought plans and ordinances. Drought management plans developed by the public water suppliers in the Lower Savannah and Salkehatchie River basins are further discussed in Chapter 8.

In the Savannah River basin, the USACE also has responsibility for drought planning, and has developed and implemented drought strategies and contingency plans over the years. In 1986, the Savannah District USACE developed a Short-Range Drought Water Management Strategy to address the water shortage conditions in the basin. The short-range strategy served as a prelude to the development of a long-term drought strategy, the Savannah River Basin Drought Contingency Plan (DCP) in March 1989. The DCP was developed to address the effects of the Savannah District water control management activities on the managed impoundments and the downstream portion of the river, and to assist Georgia and South Carolina in drought contingency planning in their water management responsibilities for the Savannah River Basin. That DCP was modified in 2006 by revising the management actions that would be taken at various lake levels. The intent of the updated DCP was to respond earlier in a drought to preserve additional water in the lakes, thereby delaying the time when the conservation pools would be depleted.

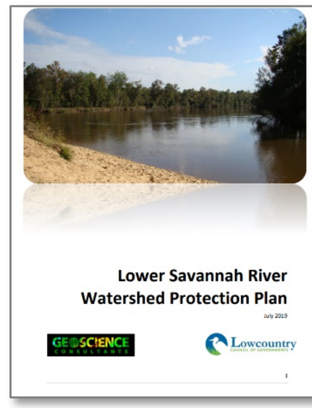
Water management during droughts has been a major issue and the USACE was requested to examine the DCP as part of the second interim of the Savannah River Basin Comprehensive Study. The draft of the study report tentatively recommended having no seasonal variation in drought trigger levels, raising the trigger levels by 3 to 6 feet, and further restricting the flow of water from Thurmond Dam earlier during drought; however, the recommendation was not implemented since the second interim Comprehensive Study ended prior to completion.

1.5.2 Watershed-Based Plans

Watershed-based plans have been developed for various watersheds throughout South Carolina to document sources of pollution and present a course of action to protect and improve water quality within a watershed. While this first iteration of the Lower Savannah-Salkehatchie River Basin Plan focuses on water quantity issues, previous planning efforts that addressed water quality are worth noting. Water quality considerations may be more fully developed in future updates to this River Basin Plan.

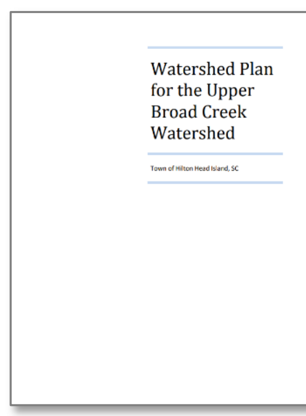
In 1992, SCDHEC initiated its Watershed Water Quality Management program to better coordinate river basin planning and water quality management. Watershed-based management allows SCDES to address congressional and legislative mandates and improve communication with stakeholders on existing and future water quality issues. In the entire Lower Savannah and Salkehatchie River basins, Watershed Water Quality Assessments (WWQAs) were completed in 1993, 1997, 2003, and 2010. The WWQAs of the Savannah River basin describe, at the watershed level, water-quality-related activities that may potentially have an adverse impact on water quality. As of 2016, the WWQAs have been replaced by the SC Watershed Atlas, which allows users to view watershed information and even add data, create layers from selected features, and export data for use outside of the application. Chapter 3 presents more information on current water quality impairments in the basins.

Lower Savannah River Watershed Protection Plan



In 2017, SCDES awarded the LCOG a grant to develop a watershed-based plan (LCOG, Geoscience Consultants LLC, and BMI Environmental Services LLC 2019). The overall goal of the Lower Savannah River Watershed Protection Plan was to evaluate water quality conditions and develop a plan to manage identified pollutants. The main concern for water quality in the watershed is impacts to surface water downstream of where BJWSA withdrawals and serves 150,000 residents as well as industrial and commercial customers. The water quality was assessed using spatial models due to a lack of water quality stationing data for the study area and looked at baseline conditions as well as potential climate change impacts such as increased precipitation and rainfall voracity. The study found that nutrients, total suspended solids, and sediment could have potential impacts to water quality in certain watersheds or could increase under potential climate change impacts. The primary non-point source input was found to be wastewater discharge from non-functioning septic systems. The plan highlights best management practices (BMPs) that could be implemented to address the identified water quality concerns.

Watershed Plan for the Upper Broad Creek Watershed, Town of Hilton Head Island, SC



In 2016, a watershed-based plan was developed by the Town of Hilton Head Island to address impairments caused by high bacteria levels measured the upper portions of the Broad Creek (Town of Hilton Head Island, SC and Woolpert Inc. 2016). The Upper Broad Creek Watershed is approximately 5,385 acres. The plan includes an implementation plan of 10 BMPs that were evaluated on their effectiveness of reducing nutrient and bacteria loading. The BMPs that were recommended include bioswales, bioretention cells, wet pond riser, Filtrexx check dams, and Filterra units. The plan recommends implementation of at least one BMP each year over the next several years. Best education practices are also included to engage stakeholders to assist with the structural measures to provide the long-term water quality benefits that the Town is aiming to achieve. The plan also outlines a monitoring strategy and evaluation criteria to determine if the implementation of the BMPs and the educational outreach have led to improvements of water quality.

1.6 Organization of this Plan

The Planning Framework outlines a standard format that all river basin plans are intended to follow, providing consistency in the organization and content. Consistency between river basin plans will facilitate the eventual update of the State Water Plan. Following the format outlined in the Planning

Framework, the Lower Savannah-Salkehatchie River Basin Plan is divided into 10 chapters, described as follows:

- **Chapter 1: Introduction** – Chapter 1 provides an overview of the river basin planning purpose and process. Background on the basin-specific history and vision for the future is presented. The planning process is described, including the appointment of RBC members and the roles of the RBC, technical advisory committees, subcommittees, ad hoc groups, state and federal agencies, and contractors.

- **Chapter 2: Description of the Basin** – Chapter 2 presents a physical and socioeconomic description of the basin. The physical description includes a discussion of the basin's land cover, geography, geology, climate, natural resources, and agricultural resources. The socioeconomic section describes the basin's population, demographics, land use, and economic activity, as these factors influence the use and development of water resources in the basin.

- **Chapter 3: Water Resources of the Basin** – Chapter 3 describes the surface and groundwater resources of the basin and the modeling tools used to evaluate their availability. Monitoring programs, current projects, issues of concern, and trends are noted.

- **Chapter 4: Current and Projected Water Demand** – Chapter 4 summarizes the current and projected water demands within the basin. Demands for public water supply, thermoelectric power, industry, agriculture, and other uses are presented along with their permitted and registered withdrawals. The chapter outlines the methodology used to develop demand projections and the results of those projections.

- **Chapter 5: Comparison of Water Resource Availability** – Chapter 5 describes the methodology and results of the basin's surface water availability analysis. This chapter presents planning scenarios that were developed, and the performance measures used to evaluate them. Any water shortages or reaches of interest identified through this analysis are described. The projected water shortages identified in this chapter serve as the basis for the water management strategies presented in Chapter 6.

- **Chapter 6: Water Management Strategies** – Chapter 6 presents the water management strategies developed to address potential water shortages, increase water availability, extend the water supply, and build resilience. For each water management strategy considered, Chapter 6 includes a description of the measure, results from a technical evaluation (as simulated in the surface water quantity model, if applicable), feasibility for implementation, and a cost-benefit analysis.

- **Chapter 7: Water Management Strategy Recommendations** – Chapter 7 presents the final recommendations for water management strategies based on the analysis and results presented in Chapter 6. The chapter discusses the selection, prioritization, and justification for each of the recommended strategies. Any remaining shortages or concerns are also discussed in this chapter.

- **Chapter 8: Drought Response** –The first part of the chapter discusses existing drought management plans, ordinances, and drought management advisory groups. The second part presents drought response initiatives and recommendations developed by the RBC.

- **Chapter 9: Policy, Legislative, Regulatory, Technical, and Planning Process Recommendations** – Chapter 9 presents overall recommendations intended to improve the planning process and/or the results of the planning process. Recommendations to address data gaps encountered during the planning process are presented along with recommendations for revisions to the state's water resources policies, legislation, and agency structure.

- **Chapter 10: River Basin Plan Implementation** – Chapter 10 presents a 5-year implementation plan and long-term planning objectives. The 5-year plan includes specific objectives, action items to reach those objectives, detailed budgets, and funding sources. The long-term planning objectives include other recommendations from the RBC that are less urgent than those in the implementation plan. There will be a chapter in future iterations of this plan that details progress made on planning objectives outlined in previous plan iterations.

Chapter 2
Description of the Basin

2.1 Physical Environment

2.1.1 Geography

The Lower Savannah River part of the Lower Savannah-Salkehatchie River basin (Figure 2-1) covers approximately 1,759 square miles (sq mi) in South Carolina and Georgia (SCDNR 2023a), and it is made up of the Calibogue-Wright River, Lower Savannah, and most of the Middle Savannah subbasins. The Lower Savannah River part of the basin extends for approximately 125 miles from the southern part of Edgefield County along the South Carolina-Georgia border to the coast in Jasper County's southernmost point, with the widest part being about 24 miles across. Parts of Aiken, Allendale, Barnwell, Beaufort, Edgefield, Hampton, and Jasper Counties are contained within the Lower Savannah River's subbasins. The Lower Savannah River is fed from the confluence of the Savannah River with Stevens Creek, which continues southeast to the Atlantic Ocean near the City of Savannah, Georgia. In addition, Horse Creek, Upper Three Runs Creek, and Lower Three Runs Creek drain the upper Coastal Plain region, while the New River drains the lower Coastal Plain.

The Salkehatchie River part of the Lower Savannah-Salkehatchie River basin (Figure 2-1) spans 2,725 sq mi in southeastern South Carolina, extending 95 miles from eastern Barnwell County to the coast of Beaufort and Colleton Counties (SCDNR 2023a). It is made up of the Salkehatchie, Broad-St. Helena, and St. Helena Island subbasins. At its widest, the Salkehatchie River part of the basin is approximately 46 miles (SCDHEC 2024a). Most of Colleton, Bamberg, Hampton, and Beaufort Counties, as well as parts of Jasper, Barnwell, Allendale, and Aiken Counties, are within these subbasins. The area is drained from the middle and lower Coastal Plain regions by three primary rivers: the Salkehatchie, Coosawhatchie, and Ashepoo Rivers. The Salkehatchie and Little Salkehatchie Rivers originate in the northern part of the basin and combine between Islandton and Early Branch to form the Combahee River. Originating in the southern part of the basin, the Coosawhatchie River discharges into the Broad River. The Ashepoo River originates in the eastern part of the basin and flows south to the coast. Within the coastal area of this basin are the most extensive estuarine water bodies in South Carolina, including St. Helena Sound and Port Royal Sound (SCDNR 2009).

Throughout this chapter, and in other parts of this plan, the Lower Savannah-Salkehatchie River basin is often referred to as a single basin (for planning purposes), unless otherwise noted. It is recognized that within the larger basin encompassing both the Lower Savannah and Salkehatchie River basins, there are smaller basins (as shown in Figure 2-1 and described above), which have their own unique physical, hydrologic, and other characteristics.

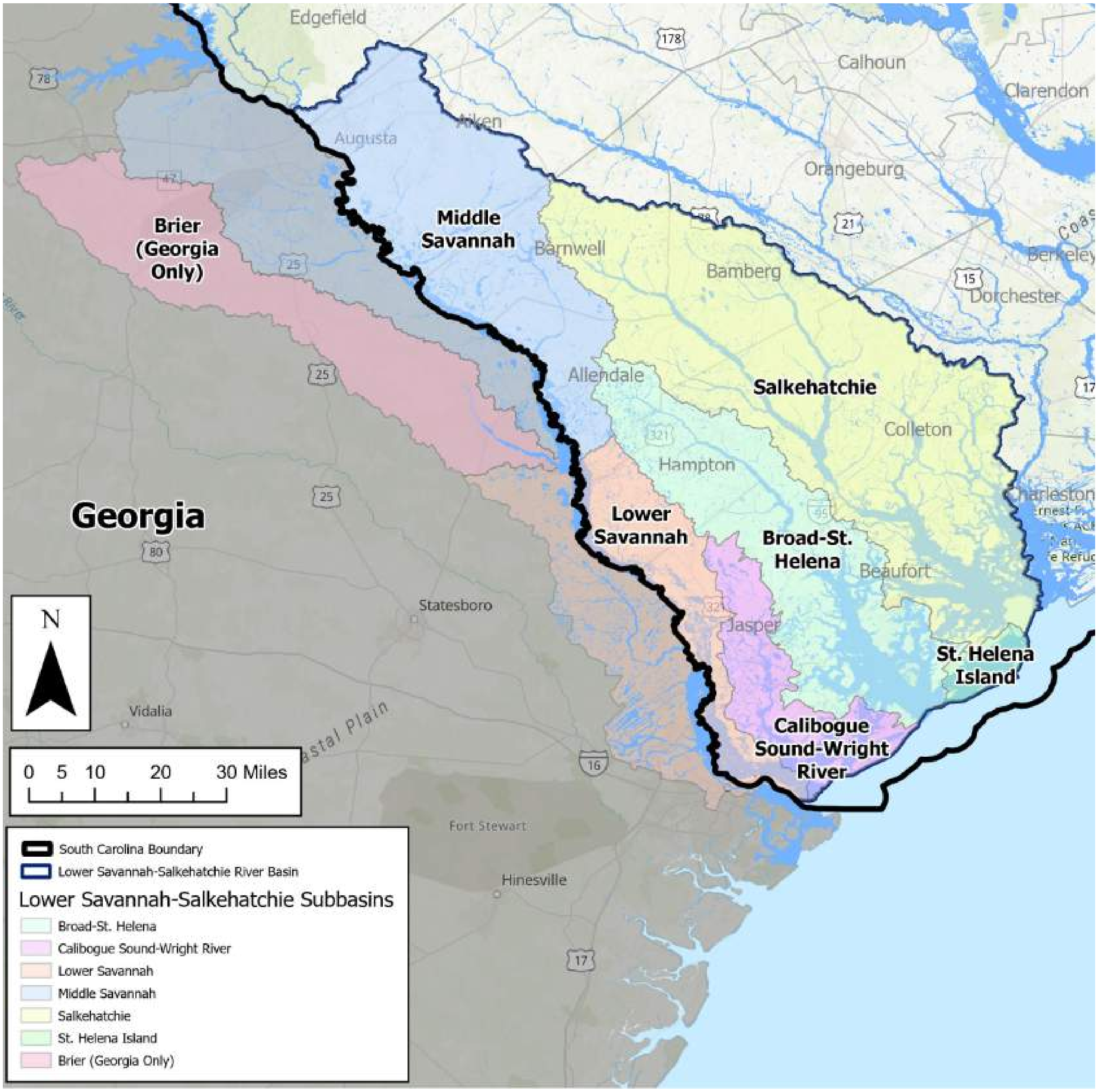


Figure 2-1. The Lower Savannah-Salkehatchie River basin and surrounding counties.

Table 2-1. Counties of the Lower Savannah-Salkehatchie River basin.

County	Percentage of County in Lower Savannah River Basin	Percentage of Lower Savannah River Basin in County*	Percentage of County in Salkehatchie River Basin	Percentage of Salkehatchie River Basin in County*
Aiken	49.92%	30.46%	0.06%	0.02%
Allendale	54.47%	12.65%	46.65%	6.66%
Bamberg	0%	0%	75.05%	10.32%
Barnwell	43.03%	13.42%	42.90%	8.23%
Beaufort	23.89%	7.98%	80.19%	16.45%
Colleton	0%	0%	83.10%	30.69%
Edgefield	3.56%	1.62%	0%	0%
Hampton	27.53%	8.77%	72.84%	14.26%
Jasper	63.01%	23.52%	37.79%	8.67%

*Column does not add to 100% because of rounding.

2.1.2 Land Cover

Land use and land cover in the Lower Savannah-Salkehatchie River basin primarily includes wetlands and forested areas, but also small- and moderate-sized urban areas (Figure 2-2) (Multi-Resolution Land Characteristics Consortium [MRLC] 2024a). The basin is predominantly rural. However, the basin contains the moderately-sized cities and towns of North Augusta, Hilton Head Island, Bluffton, and parts of Aiken, and numerous smaller cities and towns such as Beaufort, Barnwell, Walterboro, Hampton, Allendale, Bamberg, Denmark, Laurel Bay, and Hardeeville.

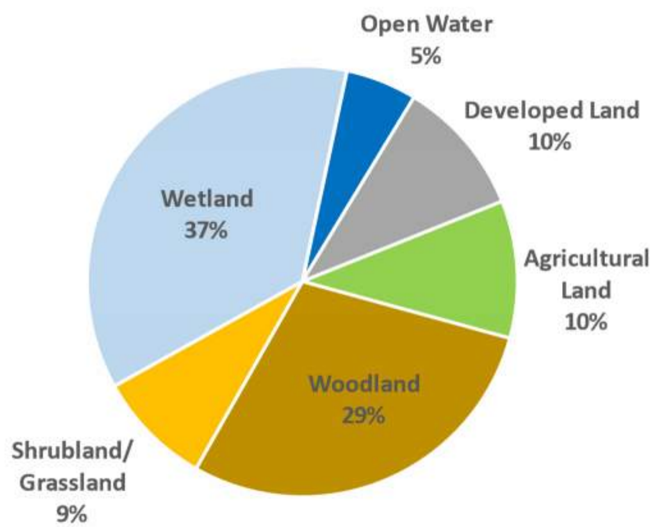


Figure 2-2. 2023 Lower Savannah-Salkehatchie River basin land cover (MRLC 2024a).

Table 2-2, derived from MRLC's National Land Cover Database (NLCD), provides a more detailed summary of land cover types in the basin, and it includes changes in land cover area from 2001 to 2023 (MRLC 2024a, 2024b). In that time, developed land increased by over 70 sq mi, while agricultural land (composed of hay/pasture and cultivated crops) collectively decreased by over 109 sq mi. Though hay/pastureland increased by 33 sq mi over this time, net agricultural losses were driven by a more than 142 sq mi loss in cultivated cropland. Woodland areas (represented by deciduous, evergreen, and mixed forests) likewise collectively decreased by almost 94 sq mi. Most of this decrease was due to 85 sq mi of loss of evergreen forest. A significant compositional change can also be seen in shrubland (represented by shrub and herbaceous grassland), as shrub land cover increased by 146 sq mi in the basin. Shrublands are often temporarily produced by silvicultural practices when standing timber is cleared and new trees are replanted or by fire. Its total amount may fluctuate depending on the yearly timber harvest and forest fire intensity (USGS 2020). There has been a loss of nearly 14 sq mi of wetlands in the basin, consisting of a 45 sq mi loss of woody wetlands, and a 31 sq mi gain in emergent herbaceous wetlands. Minor differences in open water are likely the product of the water level in the existing reservoirs at the time of the survey.

Table 2-2. Lower Savannah-Salkehatchie River basin land cover and trends (MRLC 2024a, 2024b).

NLCD Land Cover Class	2001 Area (sq mi)	2023 Area (sq mi)	Change from 2001-2023 (sq mi)	Percentage Change from 2001-2023	Percentage of Total Land (2023)
Open Water	248.3	247.5	-0.8	-0.3%	5.4%
Developed, Open Space	245.7	254.0	8.3	3.4%	5.5%
Developed, Low Intensity	113.1	153.4	40.3	35.7%	3.3%
Developed, Medium Intensity	22.4	41.0	18.6	83.1%	0.9%
Developed, High Intensity	6.1	9.1	3.0	49.4%	0.2%
Barren Land	13.3	15.6	2.3	17.1%	0.3%
Deciduous Forest	17.7	17.6	-0.1	-0.5%	0.4%
Evergreen Forest	1,381.6	1,296.7	-84.9	-6.1%	28.1%
Mixed Forest	32.6	24.1	-8.5	-26.1%	0.5%
Shrub/Scrub	123.4	213.0	89.6	72.6%	4.6%
Herbaceous	132.5	188.5	56.0	42.2%	4.1%
Hay/Pasture	59.5	92.2	32.7	55.0%	2.0%
Cultivated Crops	526.2	383.9	-142.3	-27.0%	8.3%
Woody Wetlands	1,357.3	1,312.2	-45.1	-3.3%	28.4%
Emergent Herbaceous Wetlands	337.7	368.9	31.2	9.2%	8.0%
Total Land Area	**4,617**	**4,617**	**0.0**	**-**	**100.0%**

2.1.3 Geology

South Carolina is divided into three major physiographic provinces based on geologic characteristics: the Blue Ridge, the Piedmont, and the Coastal Plain. Both the Lower Savannah River basin and the Salkehatchie River basin lie completely within the Coastal Plain (SCDNR 2009). The Coastal Plain contains six major aquifers composed of layers of clay, sand, and limestone. Approximately 4,000 feet thick near the coast, the Coastal Plain thins as it extends inward and crops out at the Fall Line, which divides the Coastal Plain and the Piedmont provinces. The Lower Savannah River basin extends from the Fall Line through the upper, middle, and lower Coastal Plain subregions to the coast along the South Carolina-Georgia border. Each subregion is successively lower, less dissected (i.e., less cut by erosion into hills and valleys), and younger toward the coast. The upper Coastal Plain extends from the Fall Line to the Orangeburg Scarp and has high relief and high drainage density compared to the lower regions. The middle Coastal Plain is a gently rolling to flat terrain that starts at the Orangeburg Scarp and continues to Surry Scarp. The lower Coastal Plain is the area to the east of the Surry Scarp extending to the shoreline (SCDNR 2009). The Salkehatchie River basin is bounded by the Lower Savannah River basin to the southwest and the Edisto River basin to the northeast. As a result, the geology of the Salkehatchie River basin mirrors those of the Lower Savannah and Edisto River basins. Figure 2-3 depicts a generalized geologic map of the Lower Savannah River basin and the Salkehatchie River basin.

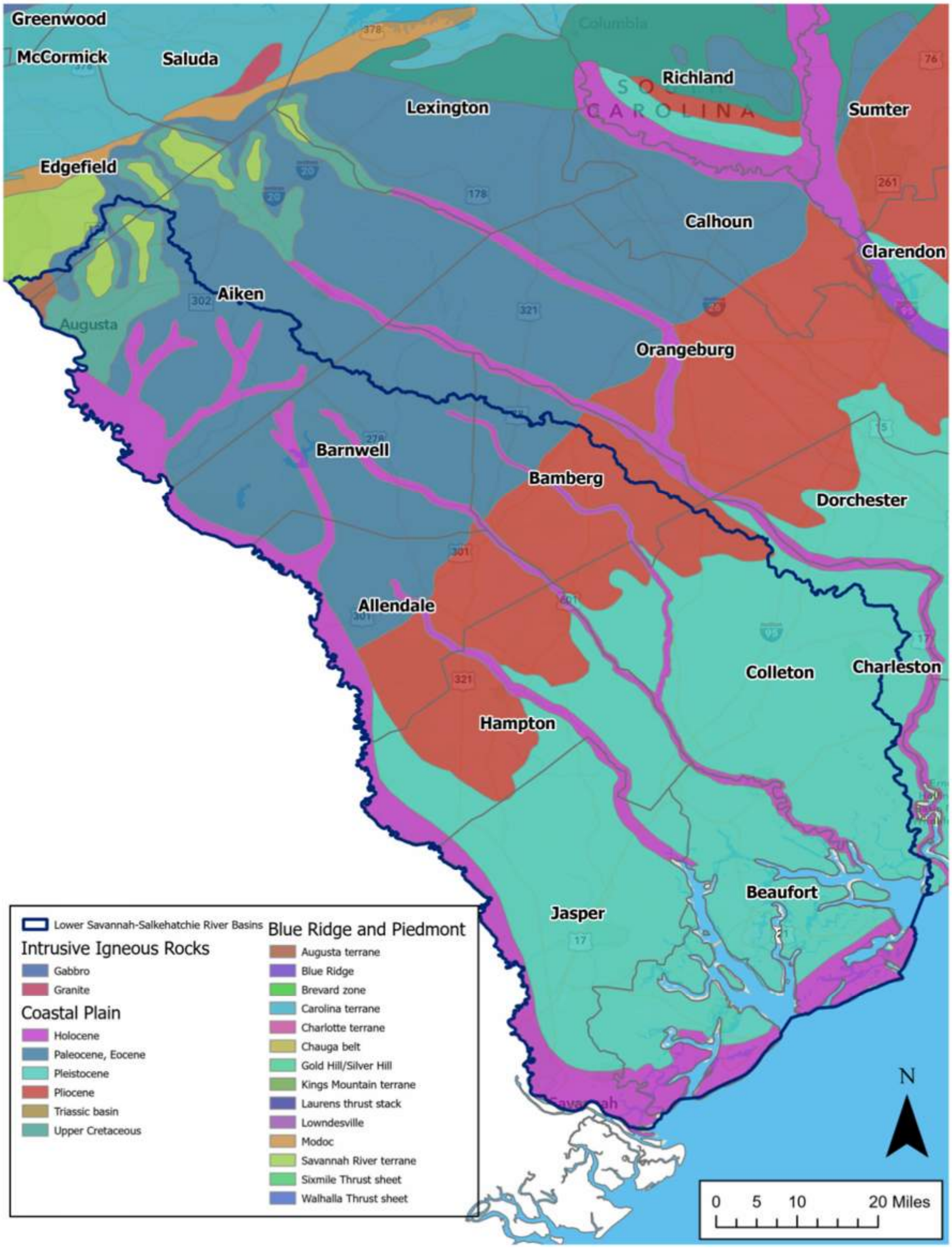


Figure 2-3. Generalized geological map of the Lower Savannah-Salkehatchie River basin (SCDNR 2023b).

2.2 Climate

2.2.1 General Climate

Much like the rest of the Carolinas, the South Carolina part of the combined Lower Savannah-Salkehatchie River basin's climate is described as humid subtropical, with hot summers and mild winters. Figure 2-4 shows the average annual temperature and the annual average precipitation for the Lower Savannah-Salkehatchie River basin, based on the current climate normals (1991 to 2020). The current climate normals maps for all of South Carolina for the parameters of temperature (average, maximum, and minimum) and precipitation at annual, seasonal, and monthly time steps are available on the South Carolina SCO "Climate" webpage, available at: https://www.dnr.sc.gov/climate/sco/ClimateData/cli_sc_climate.php (SCDNR SCO 2021).

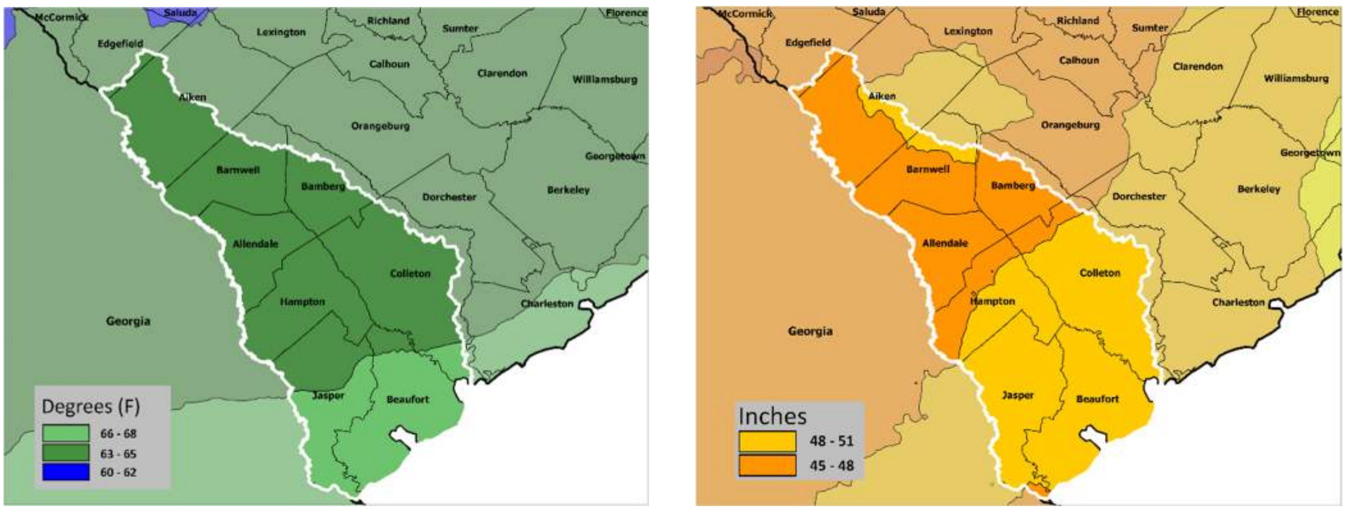


Figure 2-4. Normal annual average temperature and precipitation (1991–2020) for the Lower Savannah-Salkehatchie River basin.

The average annual temperature in the Lower Savannah-Salkehatchie River basin ranges from 63 to 68 degrees Fahrenheit (˚F), increasing from the upper to the lower basin. The annual average precipitation for the entire basin ranges from 45 to 51 inches (in.). Generally, the upper part of the basin receives less precipitation than the lower part.

Temperature and precipitation values are not constant throughout the basin and are not consistent for a given location throughout the year. Figures 2-5 and 2-6 show the monthly variation in temperature and precipitation at the meteorological stations "Blackville 3 W" in Barnwell County and "Beaufort MCAS (Marine Corps Air Station)" in Beaufort County. Unfortunately, this basin has fewer long-term, current, quality stations than other river basins in the state. The two stations referenced in this report were selected as they have the longest, continual data sets within the basin (Blackville 3 W: 1894 to the present; Anderson Regional Airport: 1958 to the present) because of their geographic distribution in the basin. Blackville 3 W is missing 11 years of temperature data (1960, 1982 to1984, 1994, 2000 to 2003, and 2020 to 2021) and 6 years of precipitation data (2000 to 2003 and 2020 to 2021). Beaufort MCAS is missing 8 years of temperature data (1999 to 2000, 2005 to 2006, 2008 to 2009, 2015, and 2021) and 12 years of precipitation data (1999 to 2000, 2005 to 2006, 2008, 2013 to 2015, and 2018 to 2021). The missing annual values are due to 1 or more months of missing data during each of those years, which affects the annual average for that specific year. The annual average values of temperature and precipitation for each station (Figures 2-7 through 2-10) may not match their locations on the basin climatology images of Figure 2-4 because of differences in the period of data records. The long-term station data ranges from 1958 to 2023, while the data used for Figure 2-4 is based on the current climate normals (1991 to 2020). While there are other stations in the basin, they were not considered because of the quality of data collection over time (e.g., less continuous data or a station no longer reporting).

For both Blackville 3 W and Beaufort MCAS, temperature oscillates throughout the year, with July generally being the warmest month for both stations (average monthly temperature of 80.5 and 79.6˚F, respectively) and January being the coldest month (average monthly temperature of 46.1 and 49.1˚F, respectively). When comparing the climographs for Blackville 3 W and Beaufort MCAS, the average monthly temperatures at Beaufort MCAS are 2 to 3.2˚F warmer than Blackville 3 W.

Precipitation also varies throughout the year for Blackville 3 W and Beaufort MCAS. The two stations have different wettest climatological months. Blackville 3 W's wettest month is June (average monthly precipitation of 5.35 in.), while Beaufort MCAS's wettest month is August (average monthly precipitation of 7.03 in.). However, both stations experience their driest climatological month in November. Blackville 3 W's average precipitation in November is 2.45 in., while Beaufort MCAS's average precipitation is 2.22 in. Generally, Blackville 3 W receives more rainfall between November and June than Beaufort MCAS, with a monthly precipitation difference between these stations of 0.1 to 1 in. However, between July and October, Beaufort MCAS receives higher monthly precipitation totals than Blackville 3 W, ranging between 0.3 and 2 in.

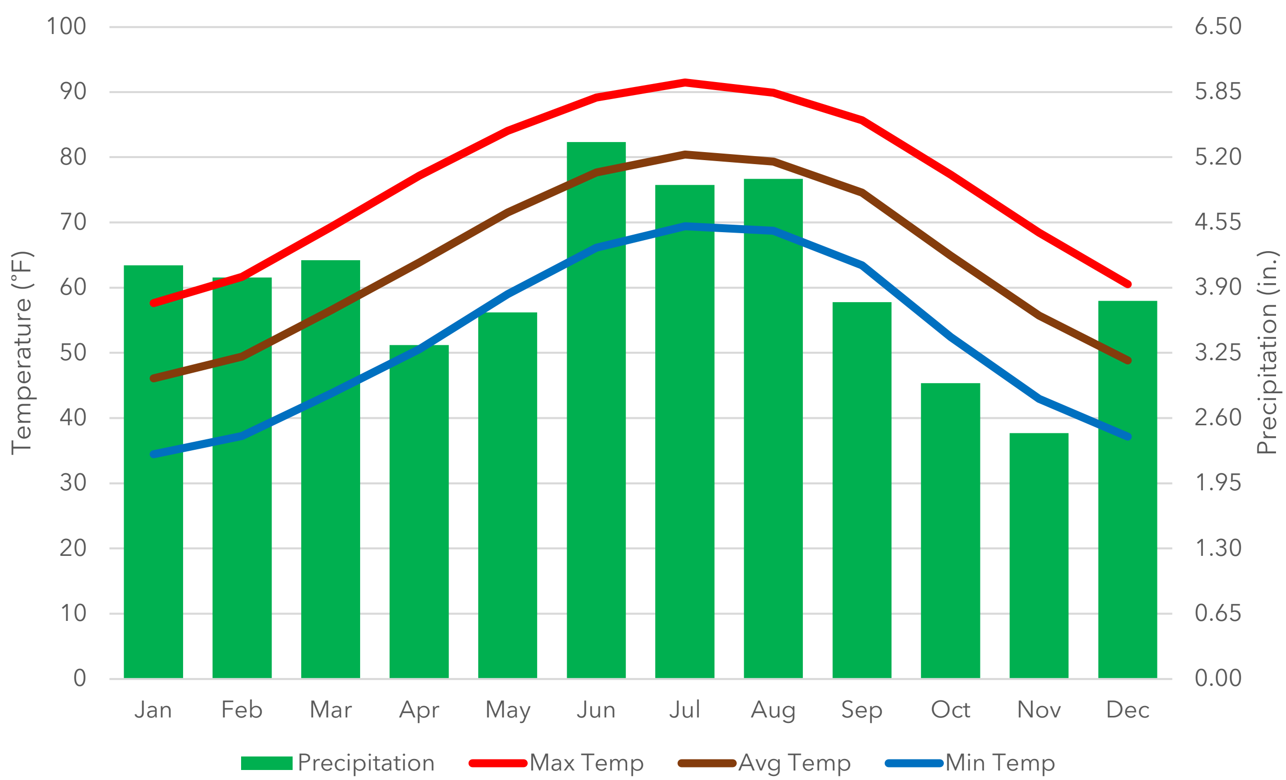


Figure 2-5. Blackville 3 W monthly climate averages from 1958–2023 (SCDNR SCO 2024a).

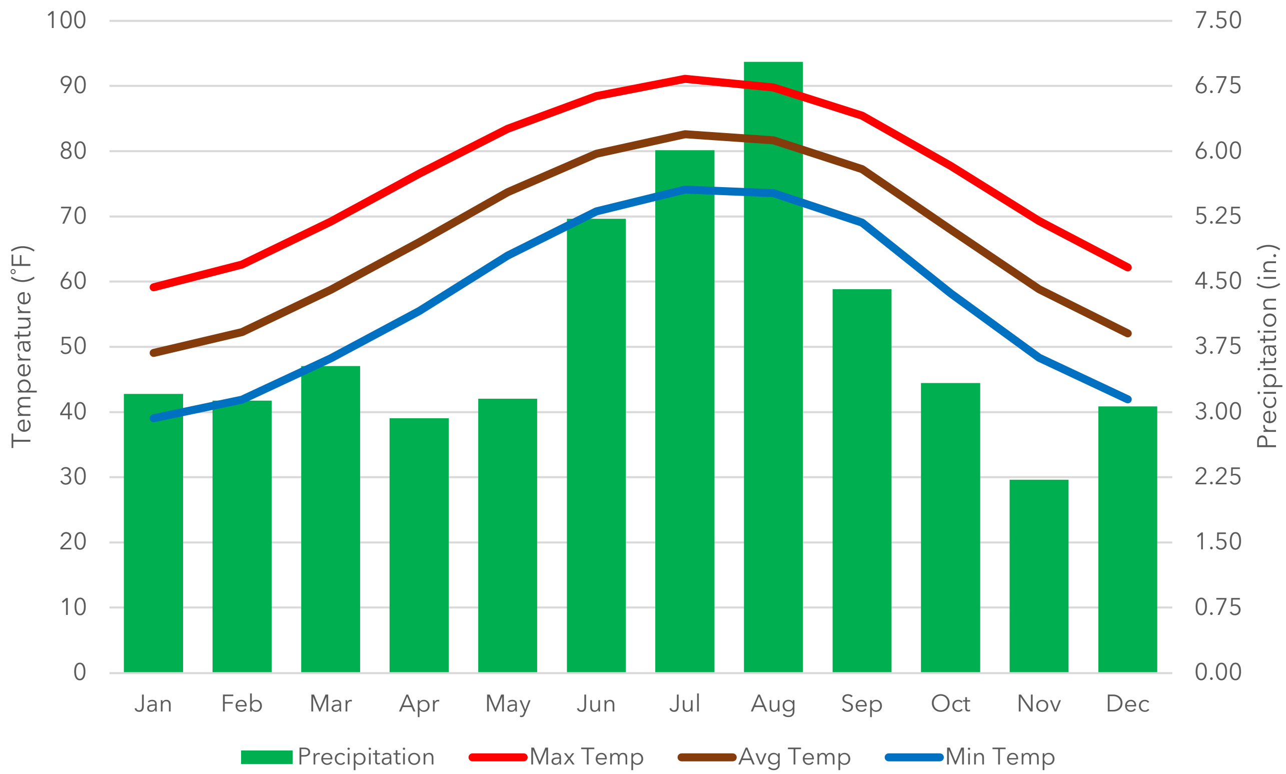


Figure 2-6. Beaufort MCAS monthly climate averages from 1949–2023 (SCDNR SCO 2024a).

Over time, the annual average temperature and precipitation for the Carolinas and the Lower Savannah-Salkehatchie River basin have varied (National Oceanic and Atmospheric Administration [NOAA] 2024a; SCNDR SCO 2024a). Figures 2-7 and 2-8 show the annual average temperature time series for Blackville 3 W and Beaufort MCAS, respectively. Both Figures 2-7 and 2-8 show years with annual average temperatures above and below the 1958 to 2023 average annual temperatures. Through this period, Blackville 3 W has an annual average temperature of 68.1˚F (Figure 2-7), and Beaufort MCAS has an annual average temperature of 66.6˚F (Figure 2-8). Table 2-3 shows the warmest and coldest 5 years for both stations. The two stations share 1990, 2017, and 2019 as three of their top five warmest years and share 1958 and 1976 as two of their top five coldest years. Blackville 3 W has had four of its five warmest years since 1990, while all of Beaufort MCAS's warmest years have occurred since 1990. Similarly, Blackville 3 W had four of its five coldest years before 1990, while Beaufort MCAS had all of its top five coldest years before 1990.

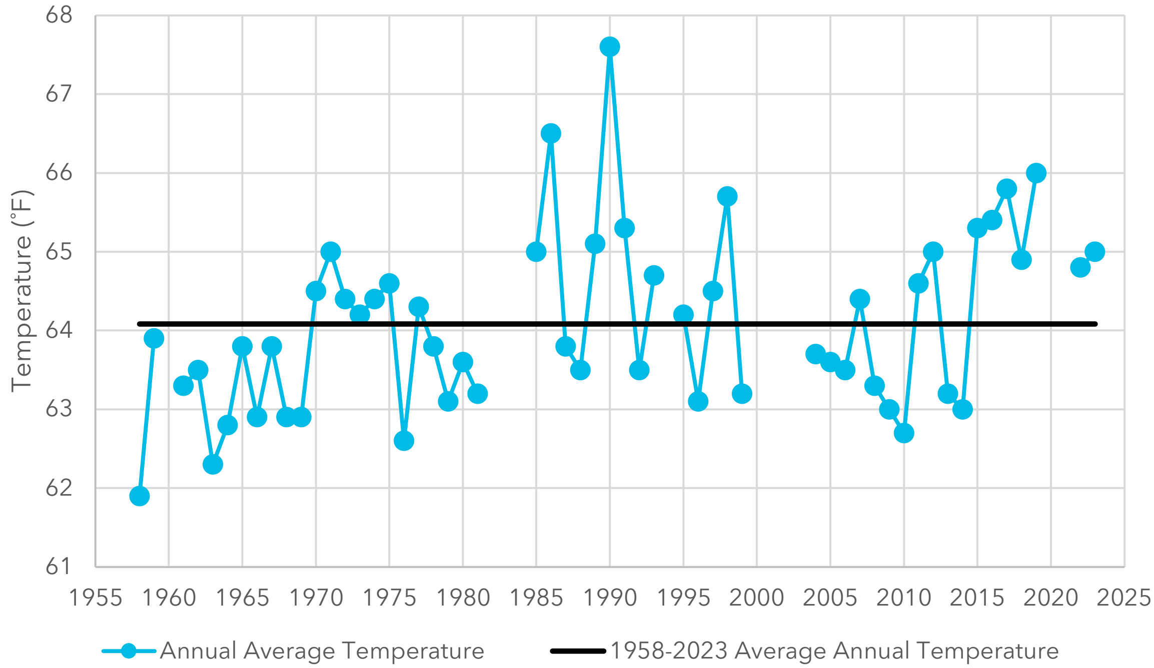


Figure 2-7. Annual average temperature for Blackville, 1958–2023 (SCNDR SCO 2024a).

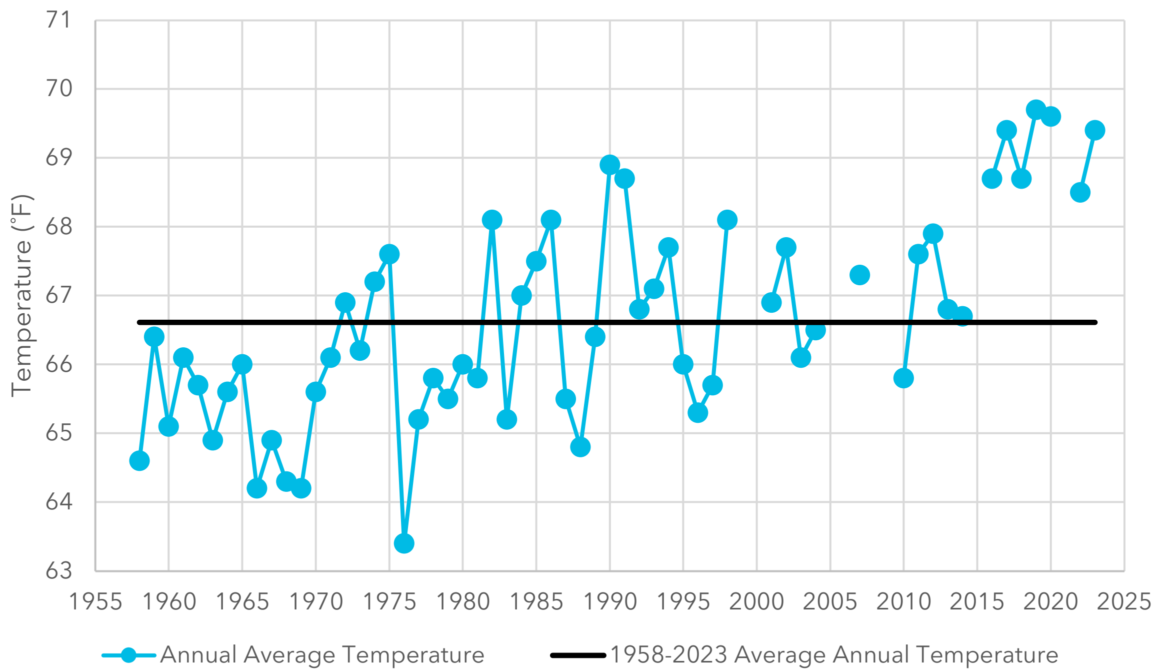


Figure 2-8. Annual average temperature for Beaufort MCAS Regional Airport,1949–2023 (SCNDR SCO 2024a).

Table 2-3. Five warmest and coldest years for Blackville 3 W and Beaufort MCAS from 1958-2023 (SCNDR SCO 2024a).

Year Rank	Warmest		Coldest	
	Blackville 3 W	Beaufort MCAS	Blackville 3 W	Beaufort MCAS
1	1990 (67.2°F)	2019 (69.7°F)	1958 (61.9°F)	1976 (63.4°F)
2	1986 (66.5°F)	2020 (69.6°F)	1963 (62.3°F)	1969 (64.2°F)
3	2019 (66.0°F)	2023 (69.4°F)	1976 (62.6°F)	1966 (64.2°F)
4	2017 (65.8°F)	2017 (69.4°F)	2010 (62.7°F)	1968 (64.3°F)
5	1998 (65.7°F)	1990 (68.9°F)	1964 (62.8°F)	1958 (64.6°F)

Figures 2-9 and 2-10 show the annual precipitation time series for Blackville 3 W and Beaufort MCAS, respectively, with some years of annual precipitation above and below the 1958 to 2023 average annual precipitation. Throughout this period, Blackville 3 W has an average annual precipitation of 47.48 in., and Beaufort MCAS has an average annual precipitation of 47.49 in. Table 2-4 shows the driest and wettest five years for both stations. Blackville 3 W and Beaufort MCAS share none of their top five driest years on record. Of the five wettest years on record for these two stations, they only share the wettest year on record (1964), which is also the wettest year on record for the state. The dissimilarities between these two stations for their wettest and driest years may be due to the differences in localized climatology (Blackville 3 W is inland, and Beaufort MCAS is coastal) and missing data noted earlier.

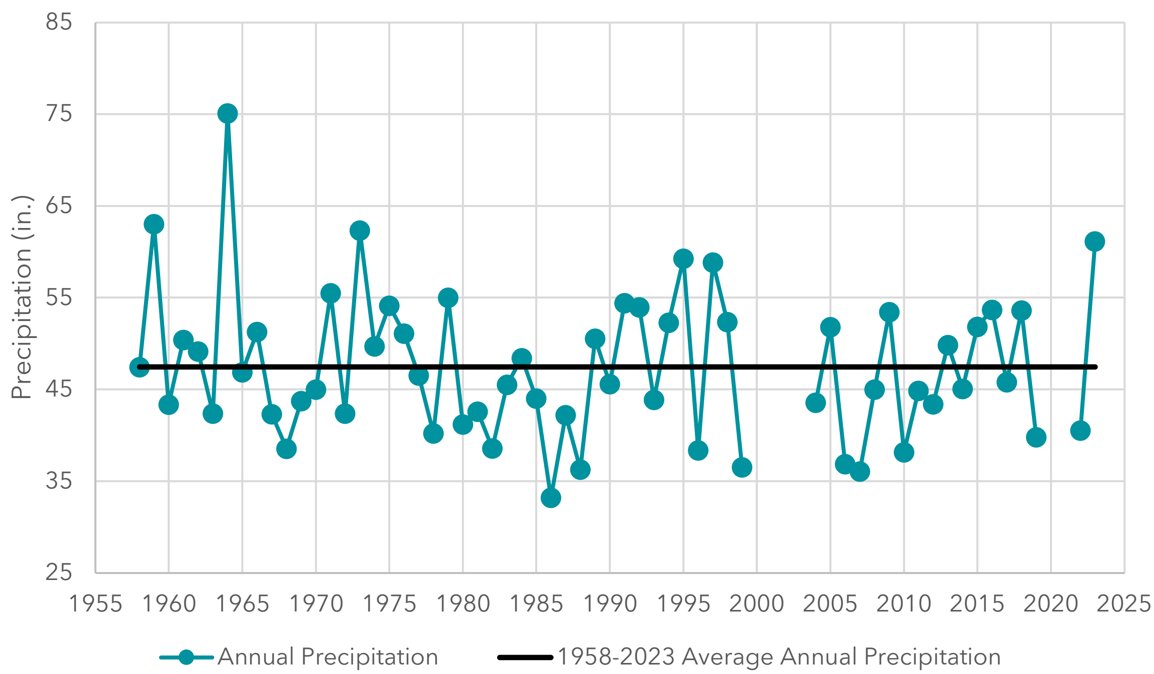


Figure 2-9. Annual precipitation for Blackville 3 W, 1949–2023 (SCNDR SCO 2024a).

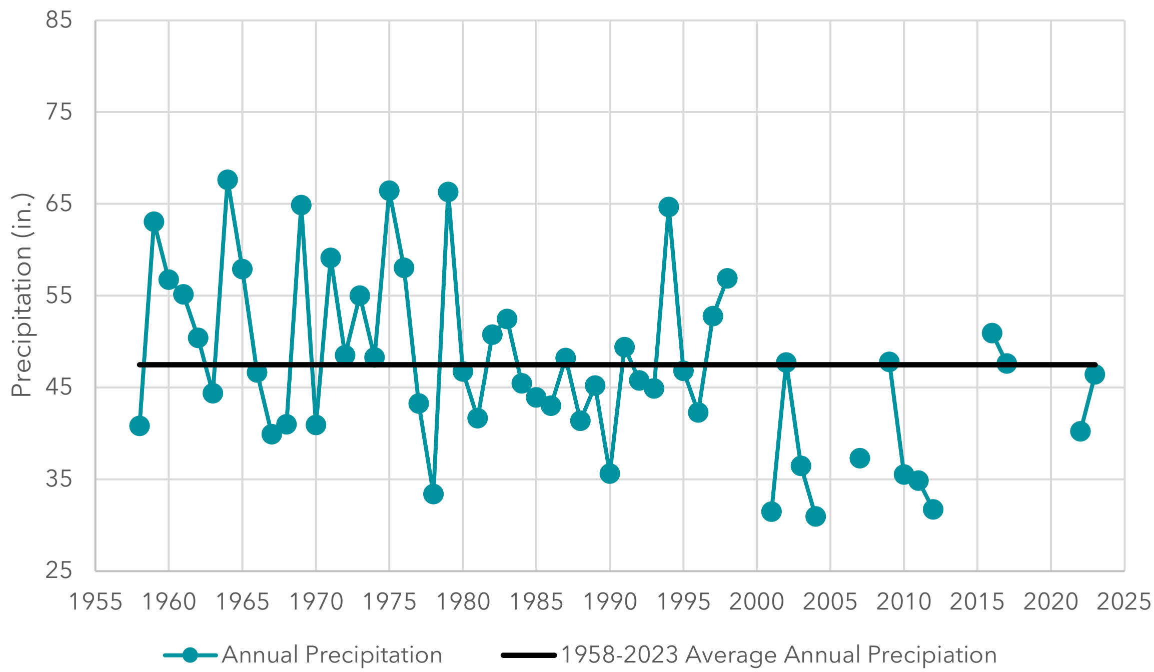


Figure 2-10. Annual precipitation for Beaufort MCAS, 1949–2023 (SCNDR SCO 2024a).

Table 2-4. Five wettest and driest years for Blackville 3 W and Beaufort MCAS from 1958–2023 (SCNDR SCO 2024a).

Year Rank	Driest		Wettest	
	Blackville 3 W	Beaufort MCAS	Blackville 3 W	Beaufort MCAS
1	1986 (33.21 in.)	2004 (30.95 in.)	1964 (75.10 in.)	1964 (67.79 in.)
2	2007 (36.10 in.)	2001 (31.48 in.)	1959 (63.02 in.)	2013 (66.59 in.)
3	1988 (36.30 in.)	2012 (31.70 in.)	1973 (62.34 in.)	2018 (62.74 in.)
4	1999 (36.55 in.)	1978 (33.38 in.)	1995 (59.28 in.)	1973 (61.91 in.)
5	2006 (36.88 in.)	2011 (34.84 in.)	1997 (58.85 in.)	1975 (61.40 in.)

2.2.2 Severe Weather

Severe weather, including thunderstorms, tornadoes, and tropical cyclones, can impact some or all parts of the Lower Savannah-Salkehatchie River basin.

Severe Thunderstorms and Tornadoes

There are between 54 and 72 thunderstorm days across the Lower Savannah-Salkehatchie River basin annually, with typically more thunderstorm days occurring in lower sections of the basin than the upper section (NOAA 2023a). Although the number of thunderstorm days varies across the basin, the potential impact from each storm is equal across the basin. While thunderstorms occur throughout the year, severe thunderstorms are more common during climatological spring (March, April, and May) and summer (June, July, and August). For a thunderstorm to be considered severe, it must produce wind gusts of at least 58 miles per hour (mph), hailstones of 1 in. in diameter or larger, or a tornado.

Most of South Carolina's tornadoes are short-lived and rated on the Enhanced Fujita (EF) Scale as EF-0 and EF-1 tornadoes, the lowest strengths, with winds between 65 and 110 mph. However, even a tornado with the lowest intensity rating is dangerous and poses a significant risk to lives and property. Table 2-5 shows the number of tornadoes by intensity ranking, confirmed within the basin between 1950 and 2023. The counts are based on instances where tornadoes formed within a basin or crossed into a basin (if it was formed outside the basin). Most of the basin's tornadoes were rated EF-0 and EF-1. (For reference, the EF Scale became operational in 2007, replacing the original Fujita Scale used since 1971; historical data are referenced to the EF Scale for simplicity). Since 1950, the basin has experienced 157 tornadoes, with 39 of them being of significant strength (EF-2 or higher). The strongest tornado affecting the basin was an EF-4 tornado in 2020 that moved through Hampton County. This tornado was part of the April 13, 2020, tornado outbreak, where 28 tornadoes affected the state (SCDNR SCO 2020). During this event, 10 of these tornadoes affected the Lower Savannah-Salkehatchie River basin, with 5 of these being of significant strength (four EF-3 and one EF-4). No part of the Lower Savannah-Salkehatchie basin or South Carolina has experienced an EF-5 tornado. SCDNR SCO collected tornado data from the NOAA National Centers for Environmental Information Storm Events Database (NOAA 2024b) and the National Weather Service (NWS) Greenville-Spartanburg's Historic Tornadoes in the Carolinas and Northeast Georgia database (NWS 2024).

Table 2-5. Count of tornadoes in the Lower Savannah-Salkehatchie River basin by intensity ranking 1950–2023 (SCDNR SCO 2024a).

EF Scale	Wind Speed	Count
EF-0	65–85 mph	60
EF-1	86–110 mph	63
EF-2	111–135 mph	19
EF-3	136–165 mph	10
EF-4	166–200 mph	1
EF-5	Over 200 mph	0
Total Number of Tornadoes in the Basin		141

Tropical Cyclones

South Carolina has an 86 percent chance of being impacted by a tropical cyclone (including tropical depressions, tropical storms, or hurricanes) yearly. Tropical cyclones can cause storm surge, damaging wind, precipitation-induced flooding (flash flooding and riverine flooding), and tornadoes. These impacts can occur near and far from the storm's center, as tropical cyclones have an average size of 300 miles in diameter. For example, tornadoes produced by tropical cyclones form in the outer rainbands, which can be hundreds of miles from the storm's center. In 2021, the center of Tropical Storm Elsa tracked into the basin through Allendale and Barnwell Counties and produced four tornadoes, two of which were EF-1 tornadoes in Beaufort County.

Since 1851, 77 tropical cyclones have tracked through the Lower Savannah-Salkehatchie River basin, meaning the storm's center crossed through part of the basin (SCDNR SCO 2024b). There were 41 unnamed storms (before 1951) and 36 named storms (the naming of tropical storms and hurricanes started in 1951). Of these 77 cyclones, 25 were of tropical depression strength (maximum wind of 38 mph or less), 40 were of tropical storm strength (maximum wind of 39 to 73 mph), and 12 were of hurricane strength (maximum wind of 74 mph or greater). Of the 12 hurricanes that have tracked through the basin, only 1 has tracked through the basin at major hurricane strength (Category 3 or greater, with winds 111 mph or greater). In 1959, Hurricane Gracie made landfall in St. Helena Island near Beaufort as a Category 4 hurricane (with landfall winds of 132 mph). The last tropical cyclone to track through the basin was Hurricane Idalia, which affected the basin at tropical storm strength (Figure 2-11). Because of the spatial extent of tropical cyclones, multiple storms of various strengths have affected the Lower Savannah-Salkehatchie River basin that did not track through the basin boundary.

Winter Storms

The Lower Savannah-Salkehatchie River basin has been impacted by multiple winter weather events, such as winter precipitation (snow, sleet, ice accumulation, and freezing rain accretion [accumulation]) and extreme cold. While the northern part of the basin typically averages about one winter precipitation event per season, it may be a few years between winter events in the Lowcountry. Most of the state averages 2 in. or less of snowfall each year.

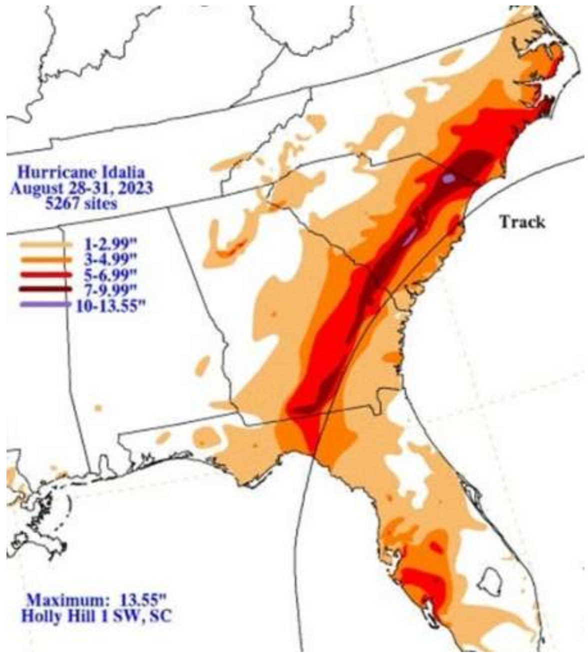


Figure 2-11. Track and Precipitation from Hurricane Idalia 2023.

Courtesy of NOAA's Weather Prediction Center.

The largest snowfall total in the Lower Savannah-Salkehatchie River basin was 22 in. at Bamberg in Bamberg County, occurring on February 9 to 11, 1973 (SCDNR SCO 2023a). The entire basin received snow from this event, with additional snowfall totals ranging from 2 in. at Hilton Head in Beaufort County to 17 in. in Barnwell County. While snow accumulations of this magnitude are rare in the basin, other snow events have affected parts of the entire basin. Another event in which most of the stations in the basin received snow was in December 1989, when totals ranged from 1.5 in. at the Hampton 1 S station (Hampton County) to 6.5 in. at the Beaufort MCAS station (Beaufort County). In January 2018, snow fell across parts of the basin, ranging from 1 in. at Hilton Head (Beaufort County) to 6.5 in. at Green Pond (Colleton County).

Winter weather events are usually high-impact situations in South Carolina because of their infrequent subseasonal, seasonal, and annual occurrence (SCDNR SCO 2023b). Winter precipitation mainly impacts travel and transportation; however, snow accumulations and ice accretions have caused impacts to trees, power lines, and built structures. It only takes 0.5 in. of ice accretion to cause these impacts. Since 1990, several freezing rain and ice events have caused over $100,000 in property damage to South Carolina. These eight events impacted the Lower Savannah-Salkehatchie basin. Impacts from these events are mainly from ice accretions over 0.5 in. The most common impacts were damage to powerlines (causing power outages), roofs, and trees. However, during some of these events, ice accretions on roads led to car accidents and fatalities. Table 2-6 lists the major ice storms in South Carolina since 1990.

Table 2-6. Winter storms that have caused significant ice accretion and damage in South Carolina since 1990.

Event Date	Estimated Damage in Dollars*
December 27–28, 1992	$500,000 to $5 million $500,000 to $5 million (crop)
March 13, 1993	$45 million $38 million (crop)
January 2-3, 1999	$1.45 million
December 4–5, 2002	$100 million
January 25–27, 2004	$54 million
January 29–30, 2010	$180,000
January 9–11, 2011	$716,000
February 12–13, 2014	$360 million (timber damage)

*Amounts refer to property damage unless otherwise stated.

One of South Carolina's worst ice storms occurred in February 2014 (Figure 2-12), with ice accretion totals of over 1 in. reported in Aiken, Barnwell, and Bamberg Counties (SCDNR SCO 2024a). The storm's effects were wide-ranging. Governor Nikki Haley declared a statewide state of emergency, as more than 364,000 homes lost power because of widespread tree and power line damage where icing occurred. Timber damage was estimated at $360 million by the South Carolina Forestry Commission (SCFC).

Extreme cold or freeze events can impact the basin, causing waterlines close to or above the ground to be more susceptible to freezing. Waterlines that freeze typically burst, which can cause water loss and flooding inside structures. Widespread cold events occurred in the basin in January 1985, January 1996, January 2003, and more recently in December 2022. During these events, minimum temperatures across the basin dropped well below freezing (32˚F), with some stations experiencing minimum temperatures below 20˚F (not accounting for wind chill). The most recent extreme cold event, December 23rd to 26th, 2022, caused many waterlines to freeze and burst as minimum temperatures in the basin ranged from 10 to 18˚F. With people traveling for the holidays, this was a significant issue in vacant homes and businesses. Beyond the internal water damage to homes and buildings, the amount of line breaks caused some water systems to experience a significant drop in water supplies. This extreme cold event highlights how other natural hazards besides drought can cause water supplies, infrastructure, and delivery issues.

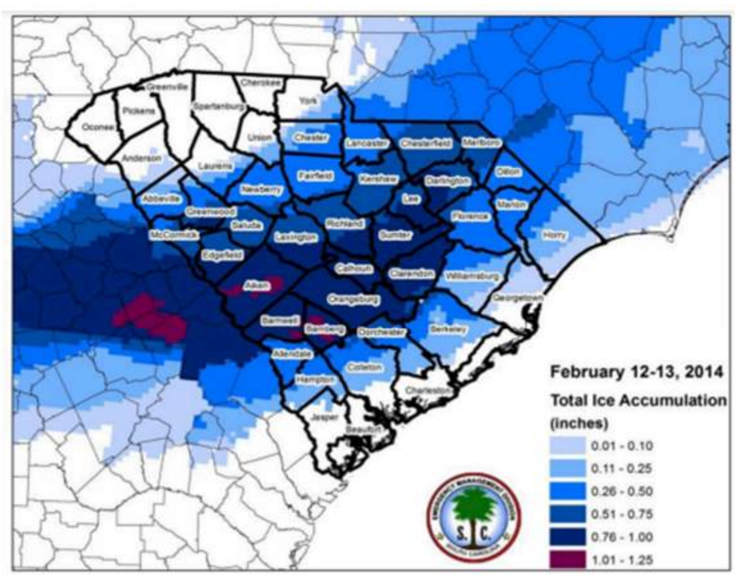


Figure 2-12. 2023 Map of ice storm from February

Courtesy of the South Carolina Emergency Management Division.

Flooding

The general definition of a flood is the temporary condition of a partial or complete inundation of typically dry land. There are three common types of flooding: fluvial, pluvial, and coastal. Fluvial flooding, or riverine flooding, is the flooding of typically dry areas caused by an increased water level of an established lake, river, or stream when the water overflows its banks. The damage from fluvial flooding can be widespread, extending miles away from the original body of water. This type of flooding is caused by excessive freshwater from a severe or prolonged rain event. Pluvial flooding occurs when rainfall events cause flooding in an area independent of an overflowing body of water. This can occur when drainage systems are overwhelmed, or as flash floods caused by heavy rainfall or from a sudden release of water upstream or uphill. Coastal flooding occurs when seawater inundates land; this can be caused by wind-driven storm surge or tsunamis. The discussion below focuses on pluvial flooding.

Before the completion of the Thurmond Dam (1946 to 1954), significant flooding occurred in the Lower Savannah River basin, including in August 1928 (Haiti hurricane), October 1929 (Bahamas hurricane), and August 1940 (Southeast/Charleston hurricane). In 1929, heavy prehurricane rainfall occurred from September 26 to 27, producing between 10 and 15 in. of rain across most of the Savannah River basin (Figure 2-13). The remnants of the Bahamas hurricane moved from the gulf northeastward over the southeastern United States at the beginning of October, bringing excessive rains across areas already impacted by heavy rains at the end of September. Damaging floods were reported on most streams and rivers, where previous high-water marks were exceeded twice in a week. The Savannah River at Augusta set a record crest of 45.1 feet, which is 13 feet above flood stage. According to USGS, the gage on the Savannah River near Clyo, Georgia, reported a height of 29.70 feet and a streamflow of 270,000 cubic feet per second (cfs), the highest flow on record for the gage. Since 1954, the highest streamflow at the Savannah River near the Clyo, Georgia, gage occurred on April 18, 1964, when the gage reported a flow of 83,800 cfs, which was affected by regulation or diversion (NOAA 2024c; SCDNR SCO 2023c).

Neither the Salkehatchie River near Miley nor the Coosawhatchie River near the Hampton stream gage stations have recorded major flooding. The peak gage height for the Salkehatchie River near Miley was 5.79 feet in 1992 (Figure 2-14), more than 3 feet below the flood stage of 9 feet. The threshold for major flooding on the Salkehatchie River near Miley is 14 feet. The Coosawhatchie River near Hampton's peak gage height was 9.85 feet in 2023 (Figure 2-15), more than 2 feet below the flood stage of 12 feet. The threshold for major flooding on the Coosawhatchie River near Hampton is 15 feet.

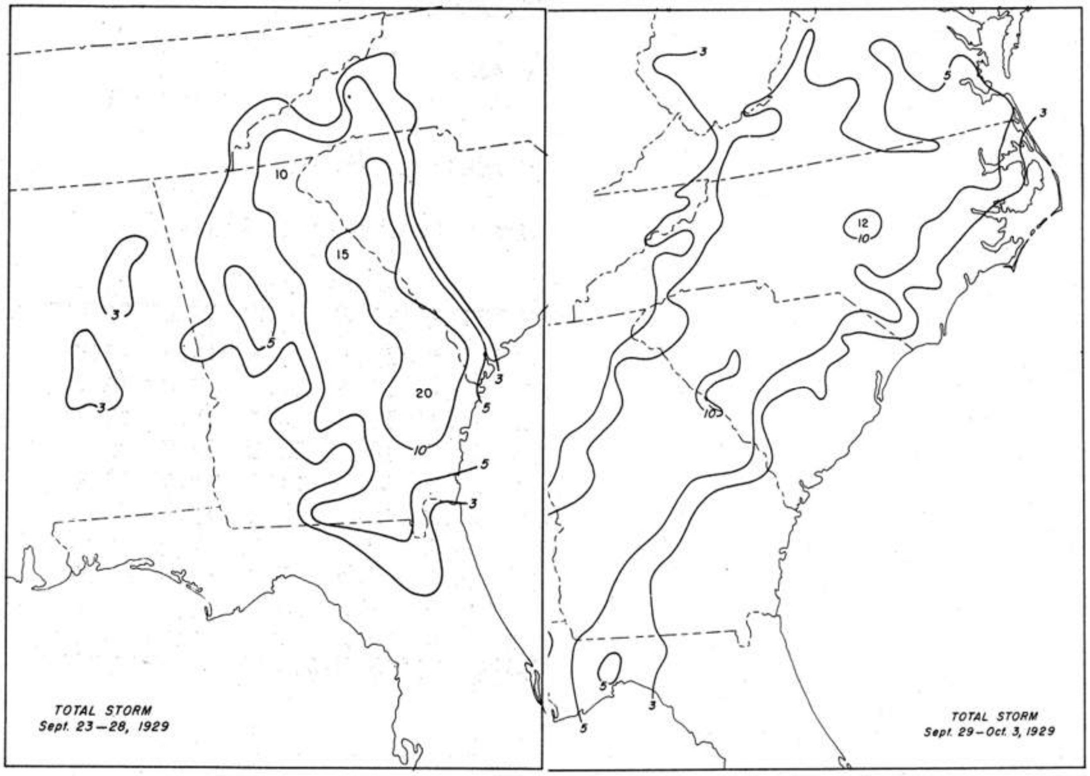


Figure 2-13. Precipitation totals from processor event and remnants from the 1929 Bahamas hurricane.

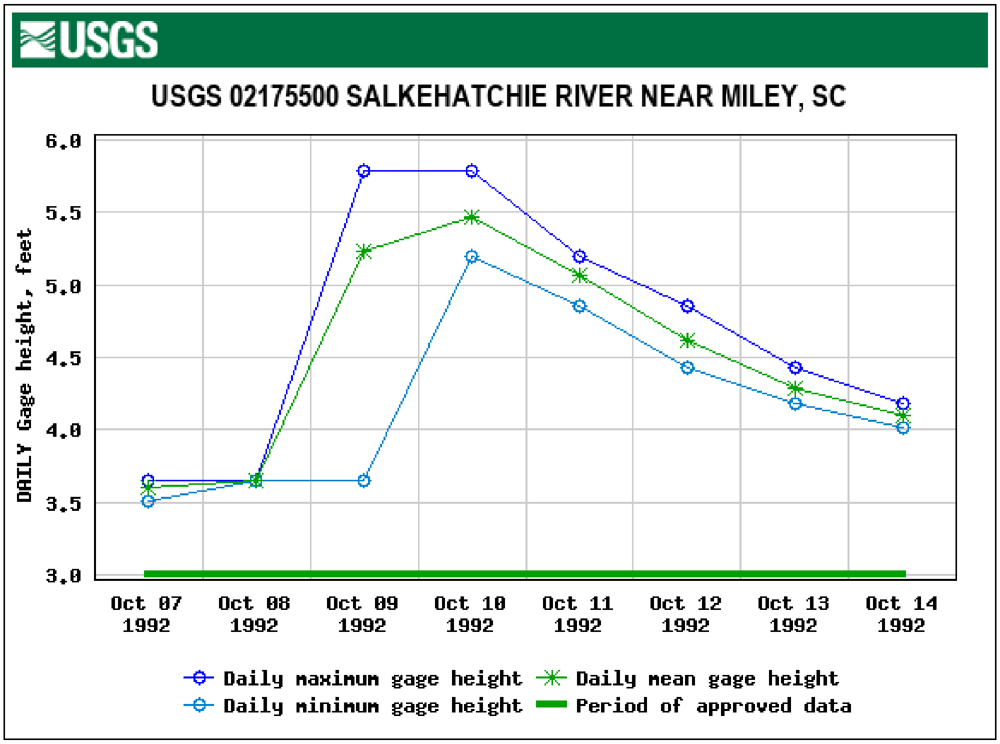


Figure 2-14. Salkehatchie River near Miley daily gage height between October 7–14, 1992 (USGS 2023a). (Period of approved data indicates data that has been approved by the USGS quality control system.)

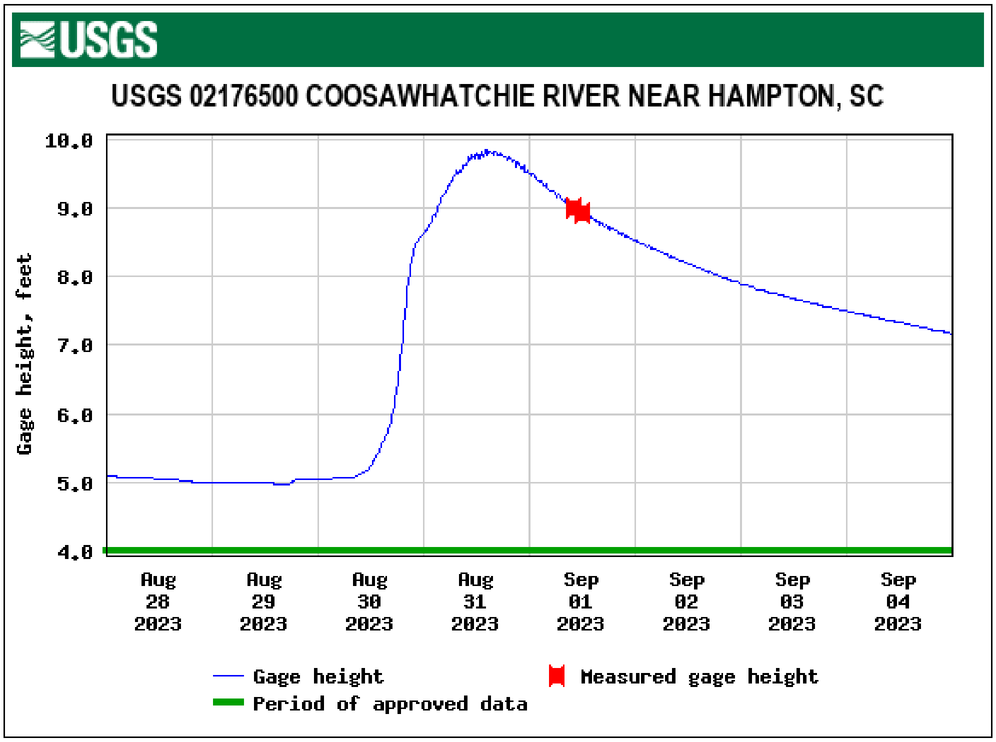


Figure 2-15. Coosawhatchie River near Hampton gage height between August 28–September 4, 2023 (USGS 2023a). (Period of approved data indicates data that has been approved by the USGS quality control system.)

2.2.3 Drought

Drought is a normal part of climate variability that occurs in every climate. Drought results from a lack of precipitation over an extended period, often resulting in a water shortage for some activity, sector, or the environment. In contrast to other environmental hazards, droughts develop slowly over weeks, months, or years. Three main categories physically define drought: meteorological, agricultural, and hydrological. These categories help determine the economic, ecological, and societal impacts of droughts in communities.

Figures 2-16 and 2-17 show the annual Standard Precipitation Index (SPI) value for the Bamberg and Savannah/Hilton Head International Airport (Georgia) stations from 1951 to 2023 (the latest SPI data available for these stations). The SPI is a drought index that compares accumulated rainfall over a given period (here, 12 months) to the historical average, where the index values are standard deviations from the mean. Any index value equal to or less than -1.0 is considered a drought. The lower the index value, the more severe the drought. The lowest SPI value was -2.48 for Bamberg in 1954 and -2.16 for Savannah/Hilton Head International Airport in 2001. This matches each station's driest year on record. In the last decade (2013 to 2022), both stations have had a mix of dry and wet years.

Annual SPI values do not show short-term conditions, such as monthly or seasonal conditions. During a year with a negative annual SPI value, there can be months or seasons with positive SPI values, and vice versa. While the annual SPI time series is provided here for reference, it is not the only method for looking at wet and dry periods over time. Furthermore, the SPI only accounts for precipitation accumulation and does not consider wetness or dryness in terms of evapotranspiration, soil moisture, streamflow, or groundwater.

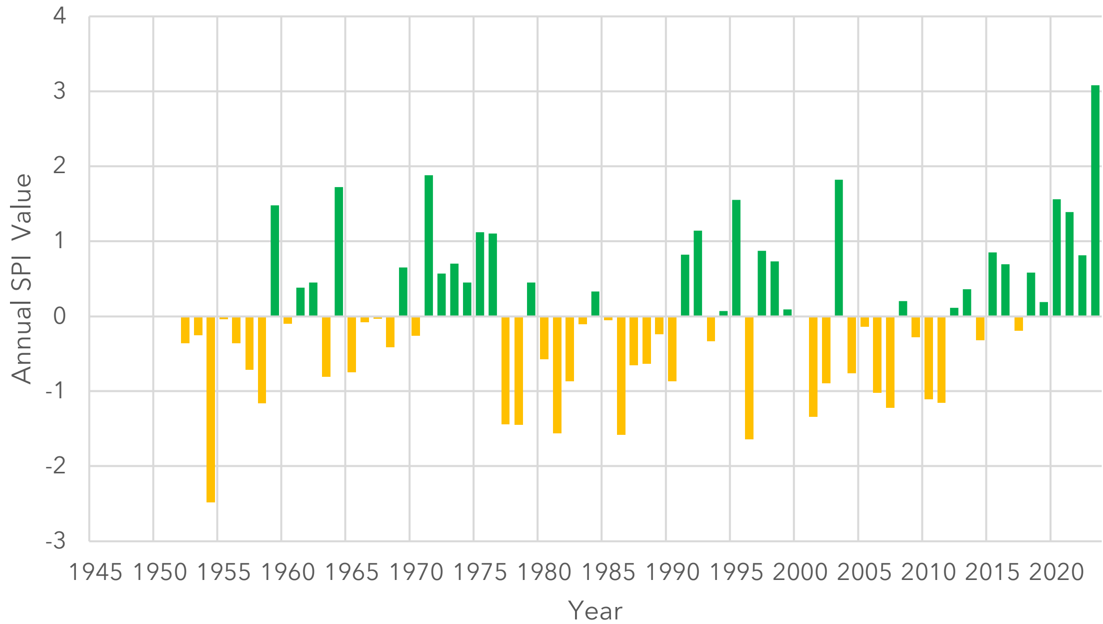


Figure 2-16. Annual SPI values for Bamberg, 1951–2022 (SCDNR SCO 2023d).

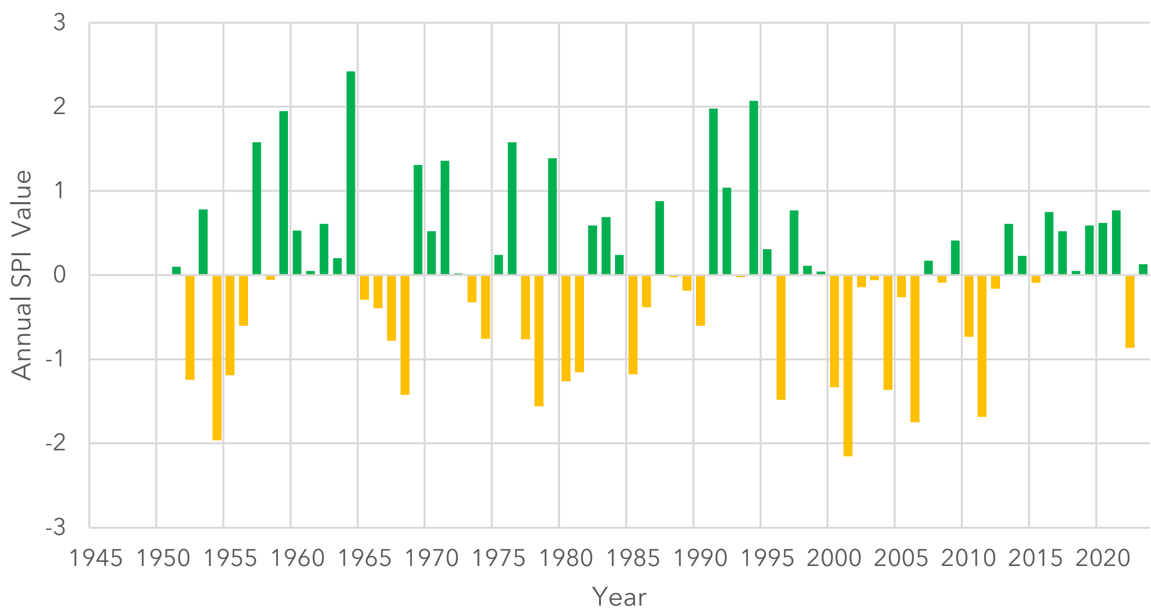


Figure 2-17. Annual SPI values for Savannah/Hilton Head International Airport, 1949–2022 (SCDNR SCO 2023d).

The impact of drought on streamflow in the basin was analyzed using two USGS streamflow gages at different locations in the basin. The Savannah River near Clyo, Georgia, gage is located on the Savannah River, along the border of Jasper County, South Carolina, and Effingham County, Georgia. The

Salkehatchie near Miley gage is situated near the borders of Allendale, Bamberg, Colleton, and Hampton Counties. These two gages were selected for their long-term, continuous data records. Other gages in the basin have shorter periods of record and/or less continuous data than the chosen locations. Table 2-7 shows the lowest monthly average flow, the year it occurred, and the long-term average monthly flow for each month at two stream gages. Table 2-7 also shows the year with the lowest annual average flow and the long-term average annual flow.

Table 2-7. Years of lowest monthly and annual average flow compared to the long-term average for the Savannah River near Clyo (Georgia) and Salkehatchie near Miley from 1952–2023.

Savannah River near Clyo, Georgia (02198500)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Year of Minimum Flow	2013	2012	2012	2012	2012	2008	2008	2008	2008	2008	2012	2012	2012
Lowest Average Flow (cfs)	4,684	5,238	5,694	4,949	4,685	4,786	4,336	4,418	4,417	4,605	4,298	4,507	4,962
Long-term Average Flow (cfs)	13,272	14,972	16,539	15,714	11,090	9,724	8,914	8,725	8,175	7,911	8,296	10,671	11,259
Salkehatchie near Miley (02175500)													
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Annual**
Year of Minimum Flow	2012	2012	2011	2012	2002	2011	2008	2002	1954	2007	2007	2011	2011
Lowest Average Flow (cfs)	138	131	177	89	48	23	43	34	44	44	57	135	121
Long-term Average Flow (cfs)	427	495	499	377	249	229	213	229	210	236	257	359	315

Figures 2-16, 2-17, and Table 2-7 show that drought is a normal part of climate and hydrology in the Lower Savannah-Salkehatchie River basin (as well as the rest of South Carolina). Because of the nature of drought, one indicator cannot fully encapsulate the intensity of drought regarding variation in impacts among sectors and locations within a river basin. While 1954 and 2001 were the driest years at the Bamberg and Savannah/Hilton Head International Airport stations (Figures 2-16 and 2-17), respectively, the Savannah River near Clyo, Georgia, experienced its lowest annual average flow in 2012, while the Salkehatchie River near Miley experienced its lowest annual average flow in 2011. Although dry climatological years affect flows, there is no perfect relationship between lack of rainfall and diminished streamflows.

Additionally, flows in the Lower Savannah River result from water released from Thurmond Dam and tributary inputs. Hence, the river's hydrologic regime can be altered by changing water releases (low flow protocols) from the dam. Because of the highly regulated flows on the Savannah River, drought impacts in the upper part of the watershed can have cascading effects within the entire basin.

Although South Carolina typically receives adequate precipitation, droughts can occur at any time of the year and last for several months to several years. Multiple factors such as temperature, evapotranspiration, and water demands must be considered when evaluating how drought periods will impact stream and river flows. Severe drought conditions can contribute to diminished water/air quality, increased risk to public health/safety, and reduced quality of life. Because drought causes a lack of expected water across multiple sectors at different time frames, it is essential to plan for drought so water demands can be adequately met and managed before and during a severe drought period.

The following paragraphs describe notable drought events in the past 30 years that have impacted the Lower Savannah-Salkehatchie River basin. Some of these droughts were statewide events, while others were more impactful to the region (SCDNR SCO 2023e).

1998 to 2002 Drought

The 1998 to 2002 drought was a statewide event, attributing to severe impacts across multiple sectors, including agriculture, recreation, forestry, and public water supply. Agricultural impacts included reduced crop yields or yield loss, the cost of digging new wells for irrigation, ponds going dry, and decreased pasture ability to feed livestock adequately. Low flows exposed hazards to boats and negatively affected businesses that rely on river recreation for income. Forestry dealt with cascading impacts from the drought. The potential for fire grew, leading to outdoor burn bans, while the reduced water availability stressed the trees. This stress allowed for increased susceptibility to the southern pine beetle, which caused billions of dollars in losses to the timber industry.

The summer and early fall of 2002 were hydrologically the most intense part of the 1998 to 2002 drought for the Lower Savannah-Salkehatchie River basin. From June 2002 to November 2002, the South Carolina DRC declared the entire basin was in severe to extreme drought, with the whole basin being in extreme drought from July 2002 to September 2002. Multiple water systems called for voluntary water use reductions, with some implementing mandatory water restrictions. Conditions improved by November 2002, and the entire state returned to typical conditions by spring 2003.

2007 to 2009 Drought

The 2007 to 2009 drought was a statewide event. However, the driest conditions were north of the Fall Line, particularly the Upper Savannah basin, impacting flows in the Lower Savannah basin. Over 2 years, impacts spanned multiple sectors, including agriculture, recreation, forestry, and public water supplies. Agricultural impacts included reductions in corn and soybean yields; however, hay production had the greatest losses, leading to decreased ability to feed livestock adequately (Carolinas Precipitation Patterns & Probabilities 2024).

The recreation industry experienced impacts from low flows that exposed hazards to boats and negatively affected businesses that rely on river recreation for income. Statewide, forestry also felt the effects of increased fires caused by low soil moisture content and tree stress from reduced water availability. Early in the drought, in July and August 2007, wildfire numbers were above normal, with 518 fires and 2,730 acres burned. By April 2008, wildfire numbers were above the annual average, with 2,800 fires and 17,000 acres burned (SCDNR SCO 2008a). By September 2008, the state had a 66 percent increase in the number of acres burned compared to the 5-year average (SCDNR SCO 2008b). The risk of wildfires waned in April 2009 because of improved conditions.

The intensity and duration of this drought impacted public water supplies as well. Through the summer and fall of 2007, the number of water systems that implemented water restrictions grew. By January 2008, 191 water systems across the state had some level of water conservation, with 146 systems implementing voluntary restrictions and 45 systems implementing mandatory restrictions (SCDNR SCO 2008c). Of the water systems within the basin discussed later in this plan (Chapter 8), 10 reported voluntary restrictions, and 2 reported mandatory restrictions. In July 2008, the governor, along with SCDNR, released a statement encouraging water conservation. While this message only encouraged water conservation, the governor has seldom needed to use executive authority in South Carolina to encourage water conservation, indicating how severe the situation had become in the upstate area. Although this statement was targeted for counties in severe and extreme drought status, specifically upstate, the message applied to everyone across the state on how to conserve residential water (SCDNR SCO 2008d). In June 2009, conditions returned to normal.

2010 to 2013 Drought

Similarly to the 2007 to 2009 drought, the 2010 to 2013 drought was a statewide event where the driest conditions affected the Upper Savannah River and Saluda River basins. Dry conditions affected the entire state in July 2010, and the DRC declared all 46 counties incipient drought status. However, conditions did not worsen until September 2011, when most of the state was placed in moderate drought status. By November 2011, the Upper Savannah River basin had entered severe drought because of continual dry conditions since the summer, which caused hydrologic conditions to decline (streamflows, reservoir levels, and groundwater). These drought conditions lingered through the winter and into the early spring of 2012. By April 2012, conditions started to deteriorate in the northern parts of the Lower Savannah-Salkehatchie River basin. From April 2012 until April 2013, parts of the basin remained in drought status, fluctuating between moderate and severe drought status. While the dry conditions impacted agriculture production and increased fire potential, the largest impacts were on water systems and water recreation. The drop in lake levels limited boat ramp access and exposed water hazards. Water systems that purchase water from the lakes needed to follow the water conservation practices from their suppliers, such as the USACE DCPs for Lake Hartwell, Lake Russell, and Lake Thurmond, meaning multiple water systems had enacted water conservation policies.

2015 to 2016 Drought

Throughout 2015, dry conditions affected the entire state, with most of the state being in moderate drought status in July. Below-normal rainfall through the spring and early summer led to below-normal streamflows, affected lake levels, particularly in the Catawba-Wateree basin, and caused agricultural impacts. Dry conditions remained through early fall; however, in October 2015, the South Carolina DRC removed all drought conditions (statewide) because of the extreme rainfall event in early October (SCDNR SCO 2023f).

By July 2016, dry conditions had returned, and the DRC placed 28 counties in incipient drought condition and 4 counties in moderate drought condition (all in the Upper Savannah basin, in Oconee, Pickens, Anderson, and Abbeville Counties). These four counties went from normal to moderate drought because of a lack of rainfall and high temperatures, leading to agricultural impacts, increased fire activity, and reduced streamflow. By October 2016, dry conditions intensified in the parts of the midlands and upstate, prompting the DRC to put most of the counties in moderate drought condition and declaring Oconee, Pickens, and Anderson to be in severe drought condition. Fires were more complex to respond to as they needed more resources and time for containment. Streamflows continued to stay below normal, leading reservoirs to fall below their target elevations. This caused water systems that purchased supplies from reservoirs to follow their suppliers' plans for water conservation. Simultaneously, the Coastal Plain, including much of the Lower Savannah-Salkehatchie River basin, was flooding because of heavy rains associated with Hurricane Matthew (SCDNR SCO 2024b). Upstate, the severity and duration of the dry conditions reduced agricultural yields by 50 to 70 percent. These drought conditions persisted and intensified through the end of 2016, and it was not until June 2017 that conditions across most of the state began to improve. The DRC moved counties in the Upper Savannah and the Lower Savannah-Salkehatchie River basin back to incipient and normal conditions.

2.3 Natural Resources

2.3.1 Soils, Minerals, and Vegetation

The Natural Resources Conservation Service (NRCS) divides South Carolina into six land resource areas based on soil conditions, climate, and land use, as shown in Figure 2-18. These areas generally follow the boundaries of the state physiographic provinces (see Section 2.1.3) but are defined based on soil characteristics and their supported land use types. Moving from its landward to seaward extents, the Lower Savannah-Salkehatchie River basin encompasses parts of the Carolina-Georgia Sandhills, Southern Coastal Plain, Atlantic Coast Flatwoods, and Tidewater land resource areas. The northernmost part of the Lower Savannah River basin also extends into the Southern Piedmont area. The land resource area descriptions below were originally presented in the South Carolina State Water Assessment (SCDNR 2009).

- The Southern Piedmont land resource area is a region of gentle to moderately steep slopes with broad to narrow ridge tops and narrow stream valleys. The area is covered with strongly acidic, firm clayey soils formed mainly from gneiss, schist, phyllite, and Carolina slate. The area is forested with mixed hardwoods and various pines. Cotton, corn, and soybeans are the major crops grown in the area.

- The Carolina-Georgia Sandhills land resource area consists of strongly sloping, sandy soils underlain by sandy and loamy sediments. With well-drained to excessively drained soils, the region supports cotton, corn, and soybean growth. Approximately two-thirds of the region is covered by forest types dominated by mixed pine and scrub oaks.

- The Southern Coastal Plain Land Resource Area is characterized by gently sloping terrain with increased dissection. The region is well suited for farming because of its loamy and clayey soils. The soils are mostly poorly drained except for the sandy slopes and ridges, which are excessively drained.

- The Atlantic Coast Flatwoods Land Resource Area and Tidewater Area are characterized as nearly level coastal plain with meandering streams in broad valleys. The region is two-thirds forested and supports truck crops (e.g., tomatoes, lettuce, melons, beets, broccoli, celery, radishes, onions, cabbage, and strawberries) and corn and soybean production. There are four general soil groups in the area:

  1. The wet lowlands consist of loamy and clayey soils underlain by clayey sediment and soft limestone.
  2. Broad ridges found in strips near the coast have wet, sandy soils.
  3. Floodplains of rivers have well-mixed soils underlain by clayey and loamy sediments.
  4. On the coast, salt marshes have clayey sediments and beaches have sandy sediments.

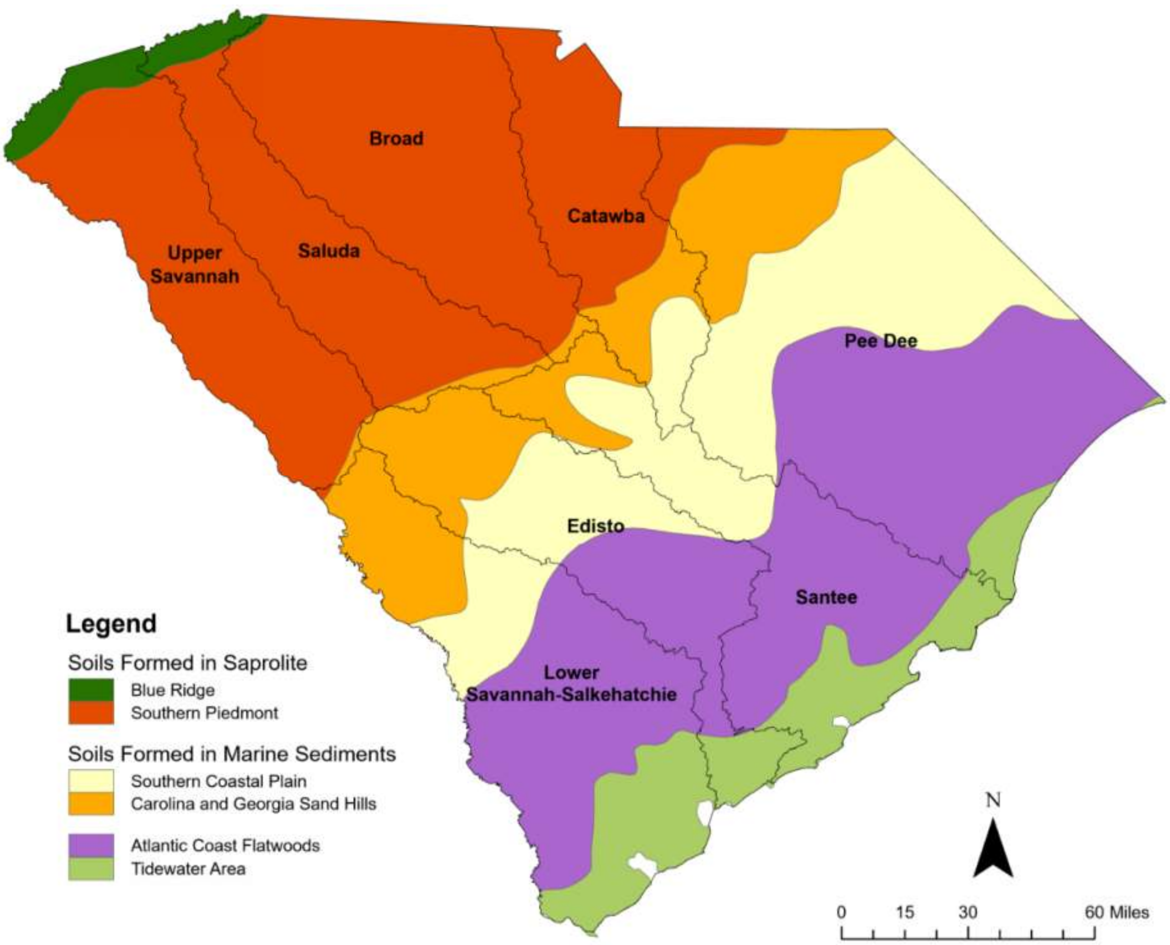


Figure 2-18. Generalized land resource and soils map of South Carolina.

There are currently 30 active mines within the Lower Savannah River basin: 23 in Aiken County, 1 in Beaufort County, and 6 in Jasper County. The most common mined material is sand (23), followed by clay (6) and granite (1) (SCDHEC 2024b). In the Salkehatchie River basin, there are currently 30 active mines: 9 in Colleton County, 6 in Beaufort County, 9 in Jasper County, 4 in Hampton County, 1 in Bamberg County, and 1 in Barnwell County. The mined material for all active mines in the Salkehatchie River basin is sand. According to the most recently published USGS Minerals Yearbook, South Carolina produced $1.15 billion in nonfuel minerals in 2019 (USGS 2022a). Because 30 of the state's 489 active mines, or approximately 6.1 percent, are in each of the Lower Savannah River basin and the Salkehatchie River basin, a rough percentage-based estimate of the annual value of minerals produced from each basin is $70.6 million (SCDHEC 2024b). Principal commodities in South Carolina include cement (masonry and Portland), clay (kaolin), sand and gravel (construction), and stone (crushed) (USGS 2022b).

2.3.2 Fish and Wildlife

The Lower Savannah-Salkehatchie River basin is home to an exceptionally diverse array of plants and animals, including 85 native species and 14 introduced species of freshwater fish (Thomason 2024). Some common sportfish of the two basins are the redbreast, bluegill, redear sunfish (shellcracker), and spotted sunfish (stumpknocker). On the other hand, some examples of non-game fish include the taillight shiner, the Savannah darter, and the dollar sunfish.

Additionally, the Savannah and Salkehatchie Rivers are an important habitat for diadromous fish or those that migrate from freshwater to saltwater (catadromous) and from saltwater to freshwater (anadromous) for the purpose of spawning. For example, striped bass and Atlantic sturgeon can be found in various reaches of the Savannah River depending on the season (Thomason 2024). Striped bass migrate from winter habitat in the lower river reaches near the ocean up through the landward freshwater reaches in the summer for spawning. The eggs require adequate flow in the river to prevent them from settling to the bottom of the river during their incubation period (SCDNR 2015).

The Upper and Lower Savannah River basins are home to a total of 118 native fish species, which is more than the total richness of some states (Marcy et al. 2005). Many amphibians and reptiles also live within the basins, including endangered salamanders and newts. Specifically, the Middle Savannah River subbasin is home to the robust redhorse (*Maxostoma robustum*), a fish once thought to be extinct but rediscovered in the 1980s (U.S. Fish and Wildlife Service [USFWS] 2011). Other species important to recreational and conservation efforts, such as the American shad and shortnose sturgeon, also spawn within the basin. In the Middle Savannah River subbasin, a further 15 fish species have been introduced. These include the common carp (*Cyprinus carpio*), yellow perch (*Perca flavescens*), and rainbow trout (*Oncorhynchus mykiss*), which were introduced for recreational fisheries purposes (Marcy et al. 2005).

Oysters are also a valuable commercial and recreational resource in South Carolina. Some of the highest mortality rates for oysters have been observed in the Calibogue Sound, which is in the Lower Savannah River basin, and may be attributed to the high rate of urbanization in the area. Conversely, the mortality rates of oysters have been among the lowest in the Port Royal Sound and lower St. Helena Sound, which are mostly contained in the Salkehatchie River basin, because of the limited freshwater flow into these sounds. Moreover, horseshoe crabs, white shrimp, and blue crabs can also be found in St. Helena Sound (Ballenger 2024).

Figure 2-19 displays a panel of some representative species within the Lower Savannah-Salkehatchie River basin.

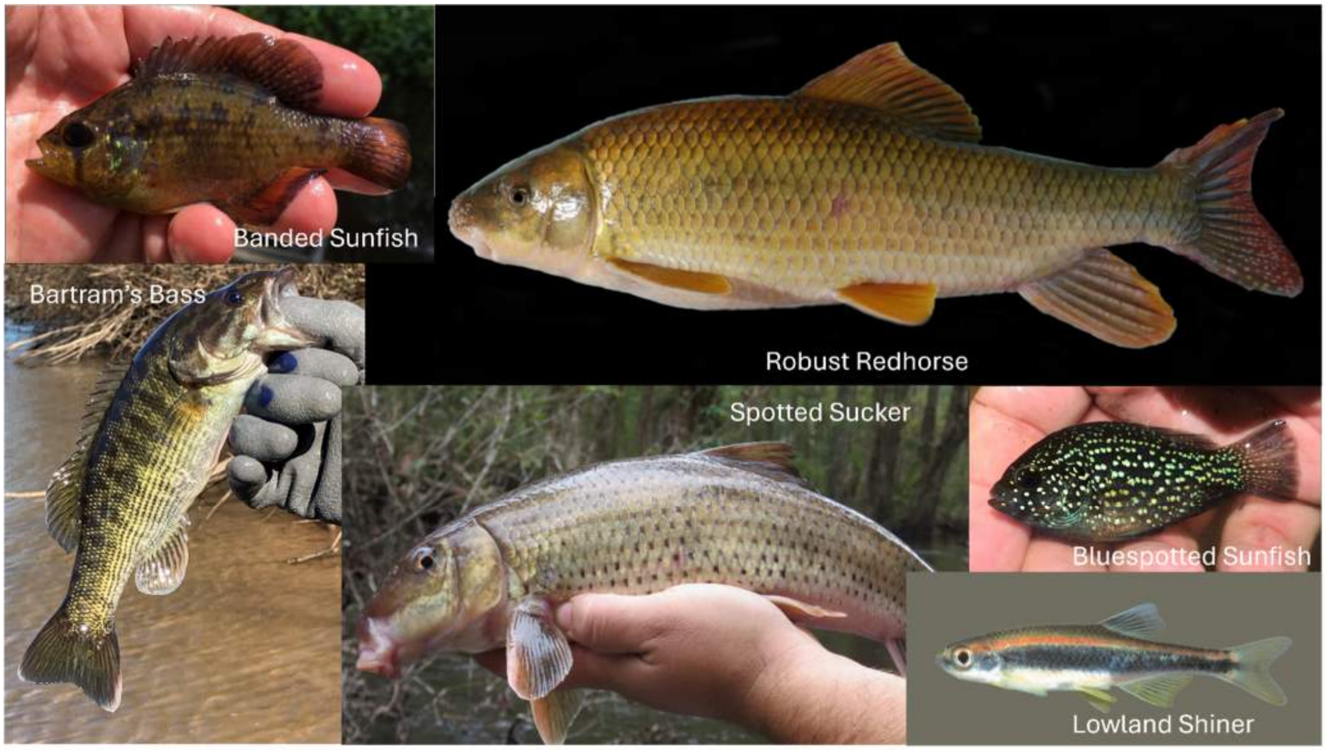


Figure 2-19. Representative fish species within the Lower Savannah-Salkehatchie River basin.

The Lower Savannah-Salkehatchie River basin provides habitat for numerous rare, threatened, and endangered species. In the basin, 12 federally endangered and 11 federally-threatened species are present, along with 6 state-listed endangered and 8 state-listed threatened species. A further 55 species in the combined Upper and Lower Savannah River basins are state-listed or of special concern (Georgia River Network 2018). The bald eagle, protected by the Bald and Golden Eagle Protection Act, has been noted in all but one of the counties in the Lower Savannah-Salkehatchie River basin. The tricolored bat, which as of 2023 has been placed on the proposed federally-endangered list, has likewise been noted in all but one of the nine counties. Other endangered species existing in at least eight of the nine counties in the basin include the Atlantic sturgeon, the Carolina gopher frog, Rafinesque's big-eared bat, and the red-cockaded woodpecker. Table 2-8 provides a list of all threatened and endangered species within the nine Lower Savannah-Salkehatchie River basin counties.

Table 2-8. Federal- and state-listed endangered and threatened species in Lower Savannah-Salkehatchie River basin counties (South Carolina Natural Heritage Program [SCNHP] 2024).

Federally Endangered	Federally Threatened	State Endangered	State Threatened
Atlantic Sturgeon	Atlantic Pigtoe	Brother Spike	Bald Eagle
Canby's Cowbane	Black Rail	Carolina Gopher Frog	Broad-striped Dwarf Siren
Carolina Heelsplitter	Florida Manatee	Gopher Tortoise	Broadtail Madtom
Chaffseed	Frosted Flatwoods Salamander	Rafinesque's Big-eared Bat	Common Ground Dove
Harperella	Green Sea Turtle	Swallow-tailed Kite	Least Tern
Kemp's Ridley Sea Turtle	Loggerhead Sea Turtle	Webster's Salamander	Southern Hog-nosed Snake
Leatherback Sea Turtle	Miccosukee Gooseberry		Spotted Turtle
Northern Long-eared Bat	Piping Plover		Wilson's Plover
Red-cockaded Woodpecker	Red Knot		
Relict Trillium	Smooth Purple Coneflower		
Shortnose Sturgeon	Wood Stork		
Southern Spicebush, Pondberry			

Despite its high diversity and importance for species conservation in the American southeast, the Savannah River is listed as one of the most polluted rivers in the United States, with several Section §303(d) impaired sites for issues pertaining to pH, zinc, mercury, and fecal coliform in the lower part of the river (SCDHEC 2022). The Salkehatchie River basin possesses an even greater number of impaired sites, which concentrate around the coastal area and pertain primarily to fecal coliform, mercury, turbidity, and copper (SCDHEC 2022).

2.3.3 Natural and Cultural Preserves

The Lower Savannah-Salkehatchie River basin is well-known for its natural and cultural resources. The South Carolina Heritage Trust program was founded in 1974 to protect critical natural habitats that monitored species depend on and significant cultural sites. There are 11 natural preserves designated by the South Carolina Heritage Trust program within the Lower Savannah-Salkehatchie River basin (SCDNR 2019b):

- Ditch Pond Heritage Preserve/Wildlife Management Area – The Ditch Pond Heritage Preserve covers 296 acres in Aiken and Barnwell Counties and sits on the border between the Salkehatchie and Edisto River basins between the towns of Windsor and Williston. The preserve preserves eight rare plant species, including blue maidencane, Robbin's spikerush, creeping St. John's wort, Piedmont water milfoil, awned meadow beauty, slender arrowhead, Florida bladderwort, and Piedmont bladderwort. This area also contains a Carolina bay approximately 25 acres in size and is owned/managed by SCDNR.

- Joiner Bank Seabird Sanctuary – The Joiner Bank Seabird Sanctuary is a 1-acre sand spit in Beaufort County and is located off the eastern coast of Hilton Head Island in the Lower Savannah River basin. As a sandbar that is submerged at high tide, the area serves as a place for seabirds and shorebirds to rest and feed, but it is not suitable for nesting.

- Henderson Heritage Preserve/Wildlife Management Area – The Henderson Heritage Preserve covers 417 acres in Aiken County and is in the northern part of the Lower Savannah River basin. The preserve seeks to protect multiple plant species, primarily the longleaf pine (*Pinus palustris*) but also the bog spicebush (*Lindera subcoriacea*), turkey oak (*Q. laevis*), trailing arbutus (*Epigea repens*), blueberry (*Vaccinium spp.*), and various wiregrass species. This area was donated to SCDNR in 1993.

- Cathedral Bay Heritage Preserve – The Cathedral Bay Heritage Preserve covers 58 acres in Bamberg County and is in the northern half of the Salkehatchie River basin at the junction between South Carolina Highway 64 and U.S. Highway 301. This preserve contains a Carolina bay, which is an elliptical-shaped basin and associated wetland that is common to the Atlantic Coastal Plain. Because of the presence of the bay, this preserve helps to collect rainwater runoff. Pond cypress trees are dominant in this area, with myrtle-leaf holly, wax myrtle, and buttonbush also present.

- Long Branch Bay Heritage Preserve – The Long Branch Bay Heritage Preserve covers 40 acres in Barnwell County and is located north of Route 278, just north of the Barnwell Regional Airport. This preserve contains a clay-based Carolina bay depression meadow with four specific plant species of interest: awned meadow beauty, Tracy's beakrush, slender arrowhead, and perennial goobergrass.

- Crosby Oxypolis Heritage Preserve – The Crosby Oxypolis Heritage Preserve covers 32 acres located in Colleton County, just west of the Town of Walterboro. Originally, this preserve was acquired to protect the Canby's dropwort (*Oxypolis canbyi*), also known as cowbane, which was considered to be a federally-endangered plant species. Canby's dropwort prefers wetland environments, including flooded bays or wet pine savannahs.

- St. Helena Sound Heritage Preserve – The St. Helena Sound Heritage Preserve (also named the Combahee Island Heritage Preserve) covers more than 10,000 acres across Colleton and Beaufort Counties, and includes Otter, Ashe, Beet, Big/Warren Complex, Buzzard, and North/South Williman Islands. Given the large area, many terrains, plants, and animals exist in this preserve. This is especially important because Otter Island is the only undeveloped part of the coastline for a long distance in either direction. Terrain varies between maritime forest, freshwater and brackish wetlands, open salt marsh, undisturbed dune fields, and shrub thicket. This preserve provides one of the most active spaces for loggerhead sea turtles to nest, as well as many other animals including the piping plover, peregrine falcon, wood stork, and southern bald eagle.

- Old Island Heritage Preserve/Wildlife Management Area – The Old Island Heritage Preserve covers 400 acres on the coastal side of Beaufort County, adjacent to Fripp Island and Hunting Island State Park. This reserve was acquired by South Carolina's chapter of The Nature Conservancy to protect seven habitat types and feeding areas for the wood stork (federally threatened) and the bald eagle (state threatened). Other birds that are often seen in this preserve include egrets, herons, terns, and red-winged blackbirds. Additionally, throughout the freshwater and saltwater wetlands, a variety of plant species can be found, including loblolly pine, cabbage palm, yaupon holly, and wax myrtle.

- Bay Point Shoal Seabird Sanctuary – Bay Point Shoal Seabird Sanctuary was once an island, but it now is connected to Bay Point Island in Beaufort County, just north of Hilton Head Island at the mouth of Port Royal Sound. Because of its susceptibility to flooding from high tides, this sanctuary is only available for seabirds and shorebirds to rest and feed, not to nest.

- Victoria Bluff Heritage Preserve/Wildlife Management Area – The Victoria Bluff Heritage Preserve covers 977 acres in Beaufort County, north of the Town of Bluffton. The preserve possesses 35 wet depressions, which operate as closed drainage systems and habitat for species like the pond spice (*Litsea glutinosa*). Other plant species in this preserve include the pine-saw palmetto, longleaf and slash pine, fetterbush, and galberry. Moreover, many birds frequent this area as well, including white-eyed vireos, summer tanagers, and yellow-rumped warblers.

- Tillman Sand Ridge Heritage Preserve/Wildlife Management Area – The Tillman Sand Ridge Heritage Preserve covers 953 acres in Jasper County on the South Carolina-Georgia border, between the towns of Clyo and Tarboro. SCDNR acquired the land for this preserve to protect the gopher tortoise, which is the most endangered reptile in South Carolina. Other common species in this preserve include the eastern diamondback rattlesnake, vireos, painted buntings, and the gopher frog. The terrain is primarily either xeric sand ridges and mixed bottomland hardwood-cypress swamp. Many plant species also grow in this area, such as the slash pine, bald cypress, tupelo gum, and water hickory.

Figure 2-20 shows representative plant species protected by South Carolina Heritage Trust preserves in the Lower Savannah-Salkehatchie River basin.

Figure 2-20. Representative species protected by South Carolina Heritage Trust preserves in the Lower Savannah-Salkehatchie River basin.

There are four state parks within the Lower Savannah-Salkehatchie River basin: Hunting Island State Park, Colleton State Park, Lake Warren State Park, and Barnwell State Park (South Carolina State Parks 2024). Additionally, there are seven cultural preserves in this river basin: Gopher Branch Heritage Preserve, Stoney Creek Battery Heritage Preserve, South Bluff Heritage Preserve, Fort Frederick Heritage Preserve, Daw's Island Heritage Preserve, Altamaha Heritage Preserve, and Green's Shell Enclosure Heritage Preserve.

Approximately 23 percent, or approximately 1,050 sq mi, of the Lower Savannah-Salkehatchie River basin is conserved land (The Nature Conservancy 2024). Land within the basin is primarily conserved through private and state government entities, as shown in Figure 2-21. Over 300 sq mi of land is conserved by the USDOE around the SRS (shown in the "Other Managed Land" category in Figure 2-21).

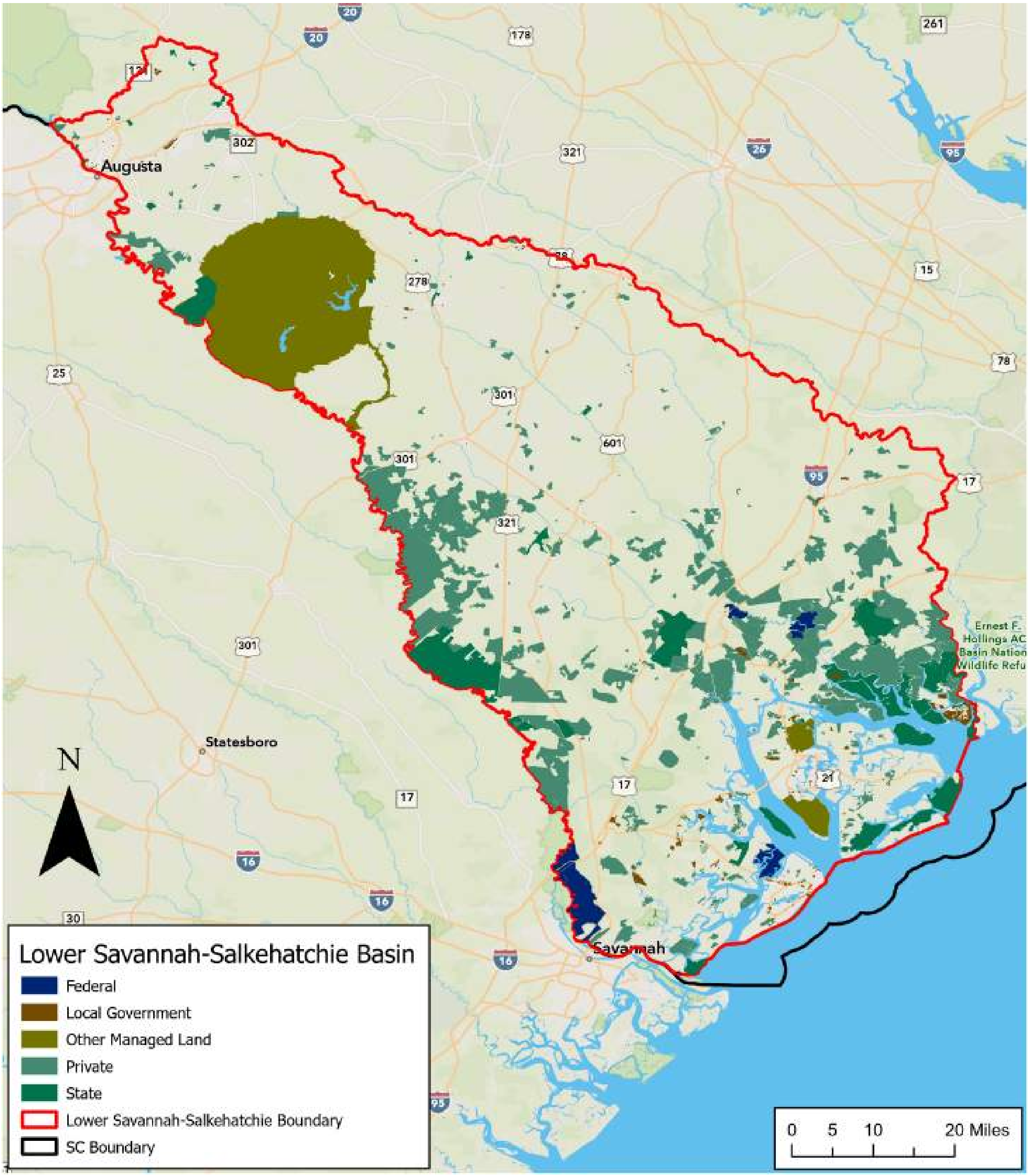


Figure 2-21. Conserved land within the Lower Savannah-Salkehatchie River basin.

2.4 Agricultural Resources

2.4.1 Agriculture and Livestock

Farming of agricultural crops is prevalent throughout the Lower Savannah-Salkehatchie River basin, while livestock farming is concentrated in the upper half of the basin. While agricultural land and forest have been gradually replaced with urban development, crop and pasturelands cover approximately 10 percent of the basin (MRLC 2024a, 2024b).

Total crop and livestock sales for the nine counties within the basin totaled $525 million according to the USDA Agricultural Census (USDA National Agricultural Statistics Service [NASS] 2022). Top agricultural products include cotton, corn, and hay. The USDA NRCS, which inventories land that can be used to produce the nation's food supply, has categorized 18.5 and 19.3 percent of the Lower Savannah River and Salkehatchie River basins, respectively, as prime farmland, and 28.6 and 45.3 percent of the Lower Savannah River and Salkehatchie River basins, respectively, are farmland of statewide importance, as shown in Table 2-9 (USDA NRCS 2017). Prime farmland is defined as land containing the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. Prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, and a water supply that is dependable and of adequate quality. It is also not excessively erodible or saturated with water for long periods and has slopes ranging from 0 to 6 percent. Farmland of statewide importance is land that nearly meets the requirements of prime farmland and can economically produce high-yield crops when treated and managed with acceptable farming methods. Both farmland types can be found throughout the basin, and Figure 2-22 depicts their distribution.

Table 2-9. Area of NRCS-categorized farmland in the Lower Savannah-Salkehatchie River basin.

Farmland Type	Lower Savannah		Salkehatchie	
	Area (sq mi)	Percent of Basin	Area (sq mi)	Percent of Basin
Prime Farmland	325	18.5%	551	19.3%
Farmland of Statewide Importance	503	28.6%	1,295	45.3%
Not Prime Farmland	930	52.9%	1,012	35.4%
Total	**1,758**	**100.0%**	**2,858**	**100.0%**

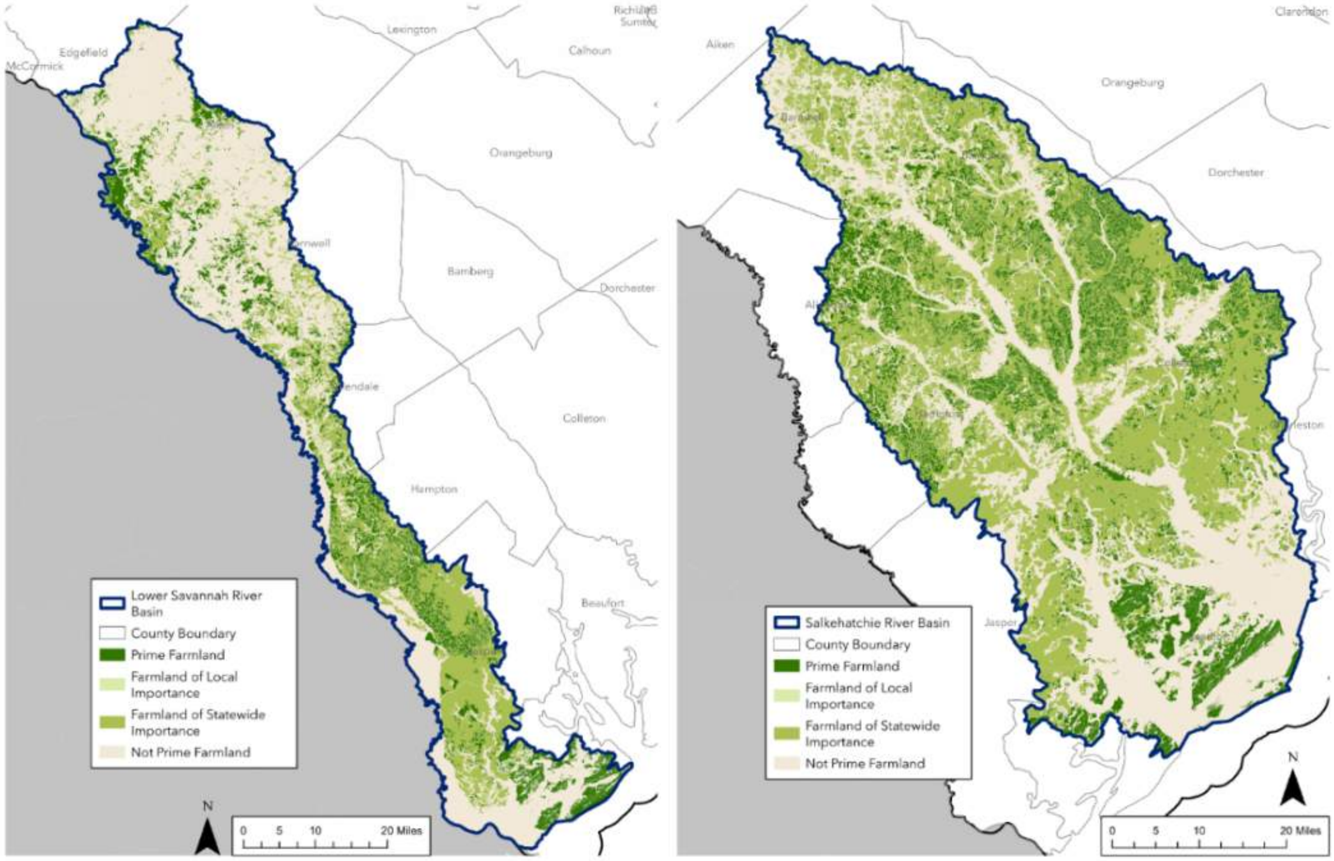


Figure 2-22. Location of NRCS-categorized farmland in the Lower Savannah River part of the basin (left) and the Salkehatchie River part of the basin (right).

Most agricultural output in the Lower Savannah River basin is distributed across the lower half of the basin, centered around Hampton, Jasper, and Beaufort Counties. Based on the locations of prime farmland within the basin (Figure 2-22), these counties are among those with the greatest proportion of choice agricultural land. In contrast, in the Salkehatchie River basin, the agricultural output is more evenly dispersed across the area of the basin, with especially high density in Colleton, Hampton, and Allendale Counties.

As of October 2023, there were 323 livestock operations in the Lower Savannah-Salkehatchie River basin, and Figure 2-23 displays their locations (SCDHEC 2023). Raising poultry and cattle each account for 47.7 percent of active operations, and raising swine makes up the remainder. Livestock operations dominate in the northern and western parts of the basin, where prime farmland that could be used otherwise to grow crops is scarce.

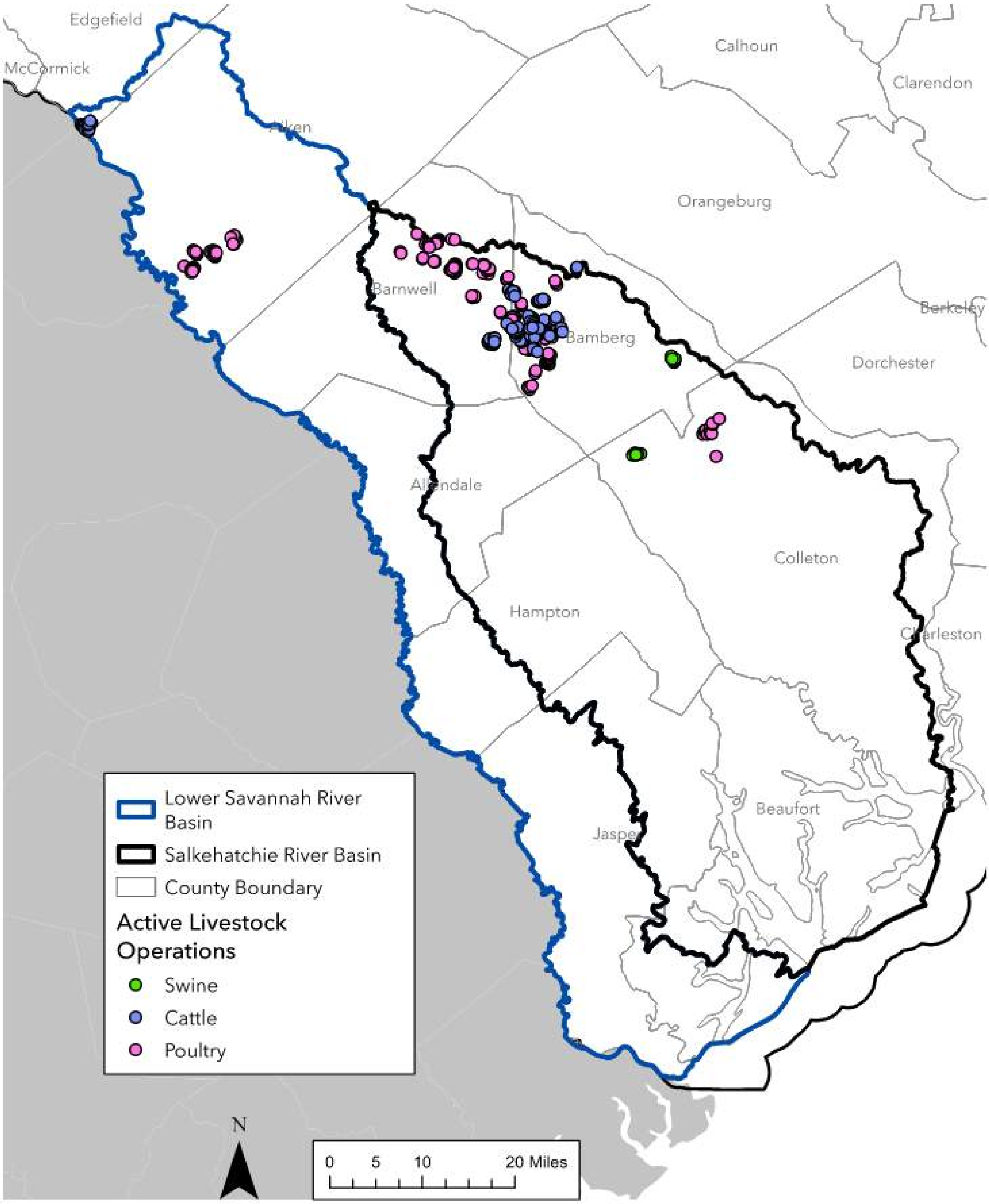


Figure 2-23. Active livestock operations in the Lower Savannah-Salkehatchie River basin.

Data from the Census of Agriculture, gathered by voluntary reporting, suggests that both the number of farm operations and irrigated acreage more than doubled in the Lower Savannah-Salkehatchie River basin during the 30 years between 1992 and 2022 (Figure 2-24). Most of this growth was between 2007 and 2022, when reported irrigated acreage within the basin increased by 54 percent. Increases in the number of irrigated farms were more modest, with only a 32 percent increase since 2007. Statewide, irrigated acreage has expanded more rapidly and since 2007 has increased by about 58 percent. The more modest increase seen within the Lower Savannah-Salkehatchie River basin may reflect an already high amount of irrigation in the area in past years. In 2002, the Lower Savannah River and Salkehatchie River basins possessed a reported total of 316 farms using irrigation and 23,040 total irrigated acres, or 16 and 24 percent of the statewide totals, respectively (USDA NASS 2022).

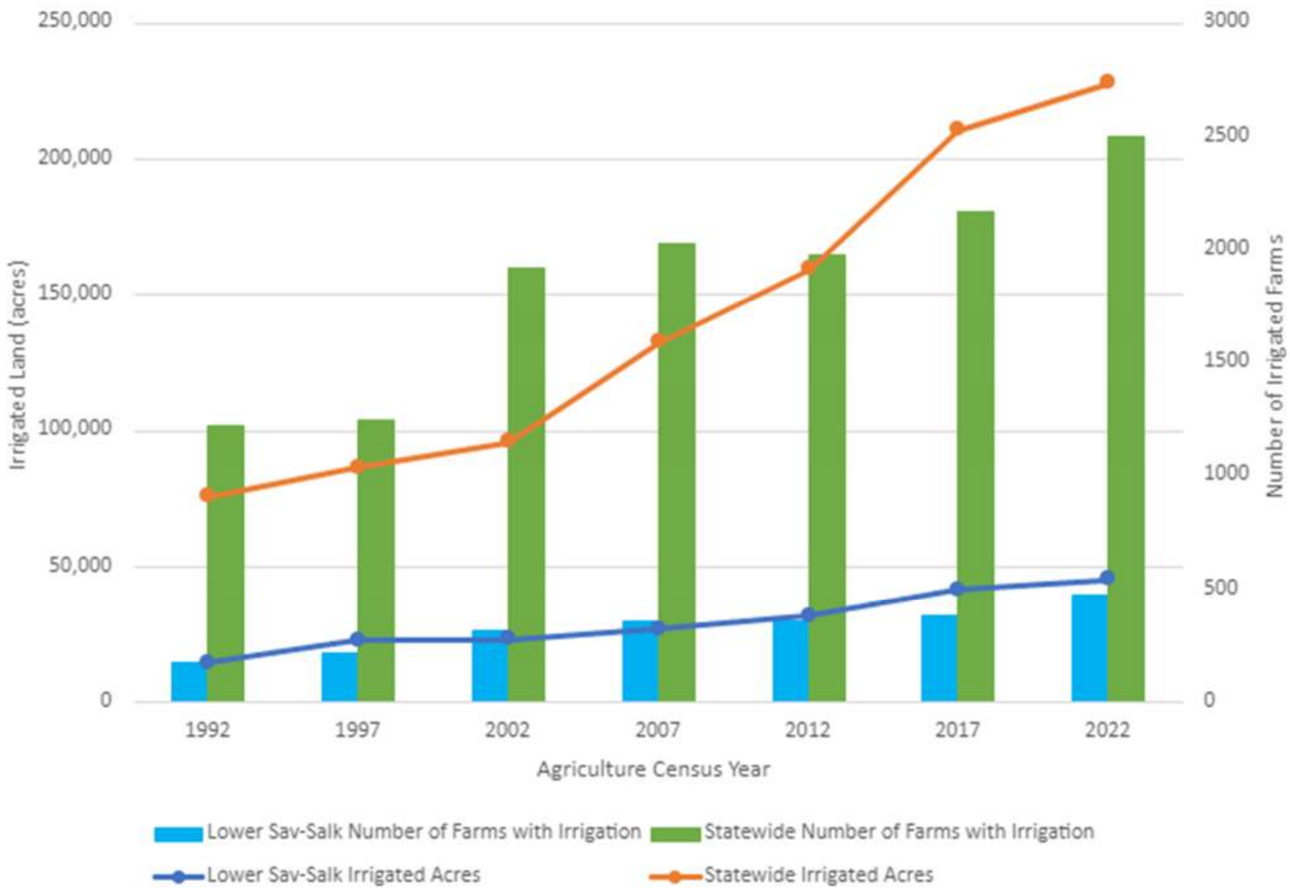


Figure 2-24. Number of farm operations and irrigated acreage for counties within the Lower Savannah-Salkehatchie River basin and statewide, 1992–2022 (USDA NASS 1997, 2007, 2017, 2022).

Table 2-10 and Table 2-11 provide additional 2022 Census of Agriculture data for the nine counties within the Lower Savannah-Salkehatchie River basin (USDA NASS 2022). Top commodities within the basin include cotton, corn, and hay. A column with basinwide totals is also included.

Table 2-10. Summary of 2022 Census of Agriculture for counties in the Lower Savannah-Salkehatchie River basin, cropland (USDA NASS 2022).

All Values in Acres	Total All Counties	Aiken	Allendale	Bamberg	Barnwell	Beaufort	Colleton	Edgefield	Hampton	Jasper
Farm Operations	814,044	138,479	66,335	102,313	62,381	36,074	167,546	68,671	96,359	75,886
Cropland	272,122	55,451	28,726	54,370	27,448	5,518	31,450	22,693	36,794	9,672
Harvested Cropland	191,134	36,955	21,034	41,744	19,330	2,839	16,427	14,948	32,215	5,642
Irrigated Land	41,553	8,476	5,888	9,373	4,894	2,007	2,385	-	8,530	D
Hay and Haylage Harvested	32,202	14,447	1,680	3,654	3,496	349	3,196	4,197	451	732
Soybeans Harvested	25,716	3,557	7,636	5,845	3,273	D	1,927	1,465	1,933	80
Corn (Grain) Harvested	35,216	4,057	5,840	8,776	2,651	1,031	4,626	593	6,674	968
Cotton Harvested	46,295	8,093	1,590	12,454	6,125	-	2,772	-	15,261	-
Vegetables Harvested	6,572	D	D	2,530	1,541	1,462	977	D	D	62
Wheat Harvested	6,089	539	2,058	2,630	452	-	D	410	D	D
Corn (Silage) Harvested	807	D	-	807	-	-	-	D	D	-
Orchards Harvested	9,573	2,120	D	139	39	D	142	7,104	29	D
Peanuts Harvested	16,795	1,125	2,079	3,746	1,551	-	2,151	-	6,143	D
Oats Harvested	2,107	850	D	610	D	-	387	-	260	D

D = Not shown to avoid disclosure of confidential information; estimates are included in higher-level totals.

Table 2-11. Summary of 2022 Census of Agriculture for counties in the Lower Savannah-Salkehatchie River basin, livestock (USDA NASS 2022).

	Total All Counties	Aiken	Allendale	Bamberg	Barnwell	Beaufort	Colleton	Edgefield	Hampton	Jasper
Cattle Operations	33,415	9,085	3,976	6,891	2,493	427	4,668	4,823	616	436
Cows/Beef Operations	11,400	5,462	2,220	1,605	D	D	2,113	D	D	D
Cows/Milk Operations	1,932	39	-	1,880	D	-	13	D	D	D
Hogs Operations	2,102	605	D	181	107	D	665	100	236	208
Sheep Operations	2,249	551	144	148	945	56	131	274	D	-
Chicken Layers (Egg) Operations	117,407	D	D	807	108,543	1,266	3,468	1,688	946	689
Chicken Broilers (Meat) Operations	27,738,396	19,429,023	-	2,566,500	1,505,630	123	D	4,237,120	D	D

D = Not shown to avoid disclosure of confidential information; estimates are included in higher-level totals.

The amount of water needed annually by the major row crops grown within the Lower Savannah-Salkehatchie River basin vary. Corn requires roughly 1 million gallons per acre over the course of a season, while cotton needs about 435,000 gallons per acre per season (Smith and Buckelew 2024). This usage data, when combined with the Farm Service Agency (FSA)-reported irrigated acres of each crop type, provide a picture of how crop irrigation influences water usage within the basin. For instance, the approximately 35,000 acres of corn within the basin use an estimated 35 billion gallons of water in a season. Likewise, 46,000 acres of cotton would consume upwards of 20 billion gallons of water in a season.

An agricultural water use survey conducted by Clemson University in 2018 found that fixed-rate center pivot irrigation is the most used irrigation technique in counties within the Lower Savannah-Salkehatchie River basin, followed by variable-rate center pivot and traveling gun irrigation (Sawyer et al. 2018). The water use survey represented a limited sample of statewide irrigation practices and was based on responses from 167 participants representing practices used on 75,000 acres of irrigated land in South Carolina. Statewide, most respondents noted groundwater as their main source of irrigation water (141), with other sources being lake/pond (29), river/stream (14), municipal (7), and recycled (2). Table 2-12 lists the irrigation techniques used by survey respondents who own farming operations in the Lower Savannah-Salkehatchie River basin.

Table 2-12. Irrigation techniques used in the Lower Savannah-Salkehatchie River basin (Sawyer et al. 2018).[1]

General	High Efficiency	Precision
Center Pivot–Fixed Rate	Drip–Surface	Center Pivot–Variable Rate
Traveling Gun	Drip–Subsurface	
Linear Move		

[1] Center Pivot–Fixed Rate with best nozzle technology (a high-efficiency type) may also be used; however, this category was not included in the survey.

2.4.2 Silviculture

While not as prominent as other industries, silviculture plays a significant role in the Lower Savannah-Salkehatchie River basin. Table 2-13 summarizes SCFC timber production values for 2021 (SCFC 2022). Harvested timber values are categorized as both “stumpage,” which is the value of standing trees on the stump, and “delivered,” which is the value of the logs when they are delivered to the mill. The latter considers all costs associated with cutting, preparing, and hauling timber to the plant.

Even though the Lower Savannah-Salkehatchie River basin contains relatively high proportions of wetlands and coastal areas, they are among the most forested river basins in South Carolina and one of the highest in terms of timber value. Four of its nine counties rank in the top 10 statewide in delivered value, and six counties rank in the top half.

In total, $194 million in timber value was generated in 2021 within the Lower Savannah-Salkehatchie River basin, roughly 17 percent of the statewide total. Because of the ease of access to the flat forested areas in this basin, the value of timber is higher. In general, the timber harvest decreases in value as one moves from the north to the south of the basin (Figure 2-25).

Table 2-13. Value of timber for counties in the Lower Savannah-Salkehatchie River basin and state total.

County	Acres of Forestland	Percent Forest	Harvest Timber Value (in Millions)		Delivered Value Rank
			Stumpage	Delivered	
Aiken	422,409	64%	$10.8	$21.9	13
Allendale	190,577	67%	$15.8	$27.7	9
Bamberg	198,136	86%	$5.8	$12.9	34
Barnwell	285,423	81%	$6.5	$13.7	31
Beaufort	127,642	32%	$2.5	$5.0	41
Colleton	493,480	74%	$18.0	$33.9	6
Edgefield	228,527	75%	$13.2	$26.5	10
Hampton	249,343	73%	$19.9	$35.8	4
Jasper	316,372	74%	$8.8	$16.7	22
Statewide	**12,849,182**	**66%**	**$573.7**	**$1,162.3**	**-**

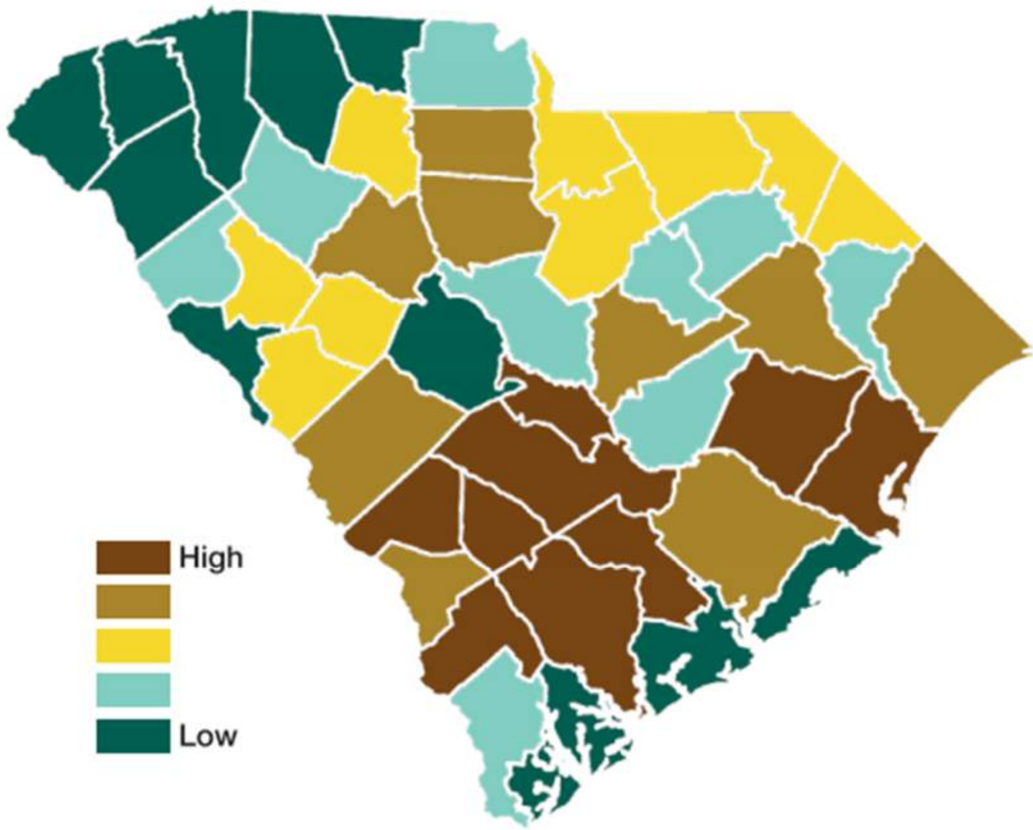


Figure 2-25. South Carolina delivered timber value rating by county (SCFC 2022).

2.4.3 Aquaculture

Limited data is available on aquaculture in the basin. However, the 2022 Census of Agriculture lists a handful of farms in the Lower Savannah-Salkehatchie River basin that possess reported aquaculture sales, shown in Table 2-14. Reported commercial aquaculture is concentrated in Beaufort, Colleton, and Hampton Counties, with Colleton representing the greatest number and diversity of commodities. Sales data has for the most part not been disclosed for these farms (USDA NASS 2022).

Table 2-14. Number of aquaculture farms in counties of the Lower Savannah-Salkehatchie River basin (USDA NASS 2022).

Aquaculture Type	Aiken	Allendale	Bamberg	Barnwell	Beaufort	Colleton	Edgefield	Hampton	Jasper
Catfish	-	-	-	-	-	1	-	-	-
Trout	-	-	-	-	-	1	-	-	-
Other Food Fish	-	-	-	-	-	3	-	-	-
Mollusks	-	-	-	-	4	3	-	-	-
Ornamental Fish	-	-	-	-	-	-	-	2	-
Sport or Game Fish	-	-	-	-	-	1	-	-	-

2.5 Socioeconomic Environment

2.5.1 Population and Demographics

The Lower Savannah-Salkehatchie River basin is overall the seventh most populous basin in South Carolina, possessing 8 percent of the state's population in 10 percent of its area. The estimated basin population as of the 2020 census was 448,000, which increased by approximately 9 percent since 2010. Figure 2-26 displays a population density map using data from the 2020 census (U.S. Census Bureau 2020). This map also contains parts of Georgia along the Savannah River.

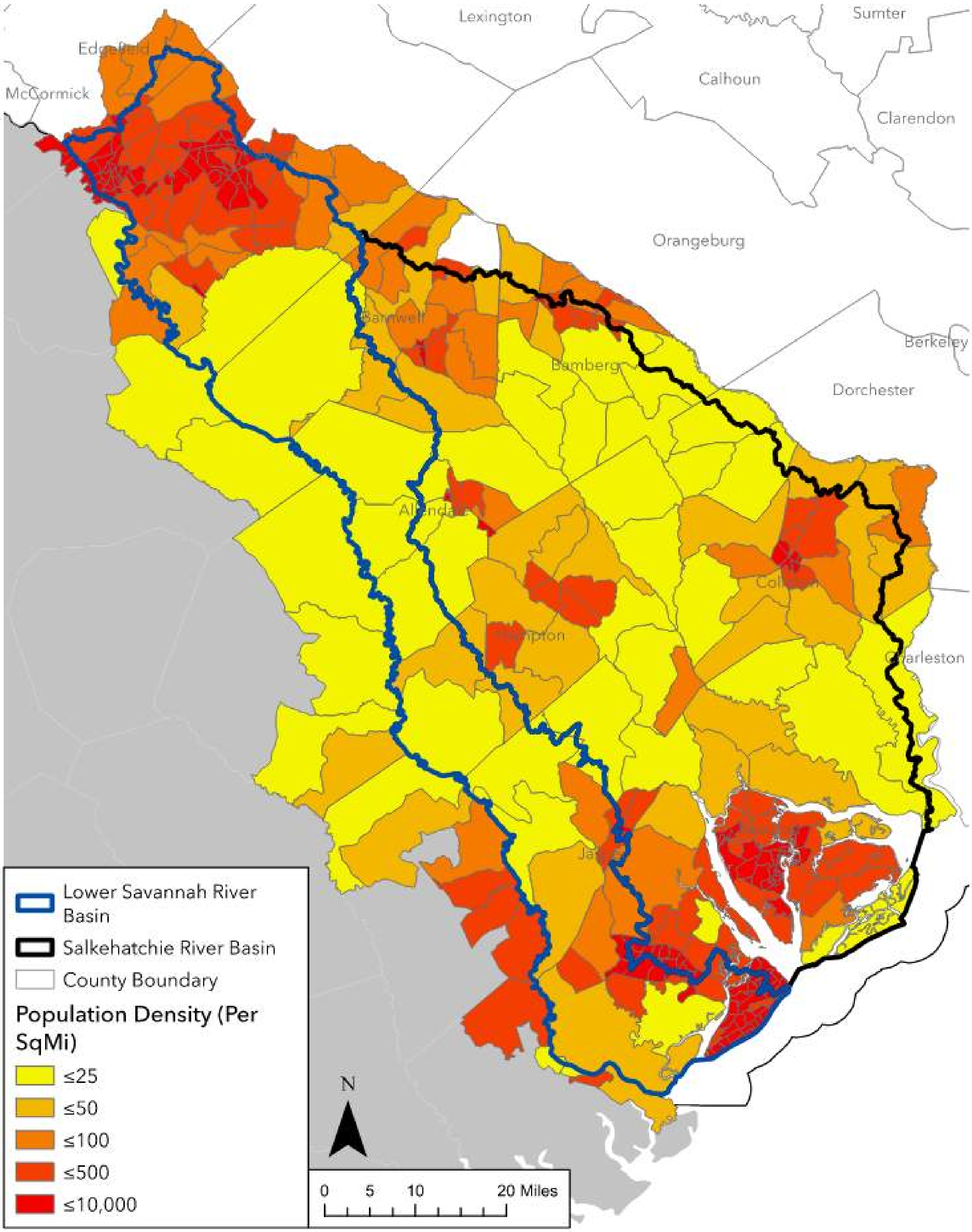


Figure 2-26. Population density of the Lower Savannah-Salkehatchie River basin by census block group (U.S. Census Bureau 2020).

The Lower Savannah-Salkehatchie River basin is predominantly rural in area, but also contains highly populated urban areas. Most major urban areas are found in Beaufort and Jasper Counties (around the city of Beaufort [approximately 14,000 residents] and the town of Bluffton [approximately 34,000 residents], respectively) along the southeast coast of South Carolina and in Aiken County (around the city of Augusta, Georgia) in the northern part of the river basin. The smaller urban and suburban parts of Barnwell (approximately 4,600 residents), Walterboro (approximately 5,500 residents), and Hampton (approximately 2,600 residents) make up the most significant population centers in the middle of the basin. Patterns of high and low population density within the South Carolina part of the basin are also reflected in its Georgia parts. In Georgia, the population is likewise highest in the basin's northern and southern swathes and least in its rural center (U.S. Census Bureau 2020).

Figure 2-27 displays population changes within the Lower Savannah-Salkehatchie River basin over the decade from 2010 through 2020 (U.S. Census Bureau 2020). In general, the population is growing rapidly in the coastal areas in Jasper and Beaufort Counties, with slight growth occurring in the suburban areas surrounding Augusta, Georgia, in Aiken County, South Carolina. On the other hand, areas in Bamberg and Barnwell Counties have seen a sharp decline, as residents move from rural areas to more metropolitan areas. Like patterns of population density across state borders (Table 2-15), patterns of population growth and loss are also similar across borders.

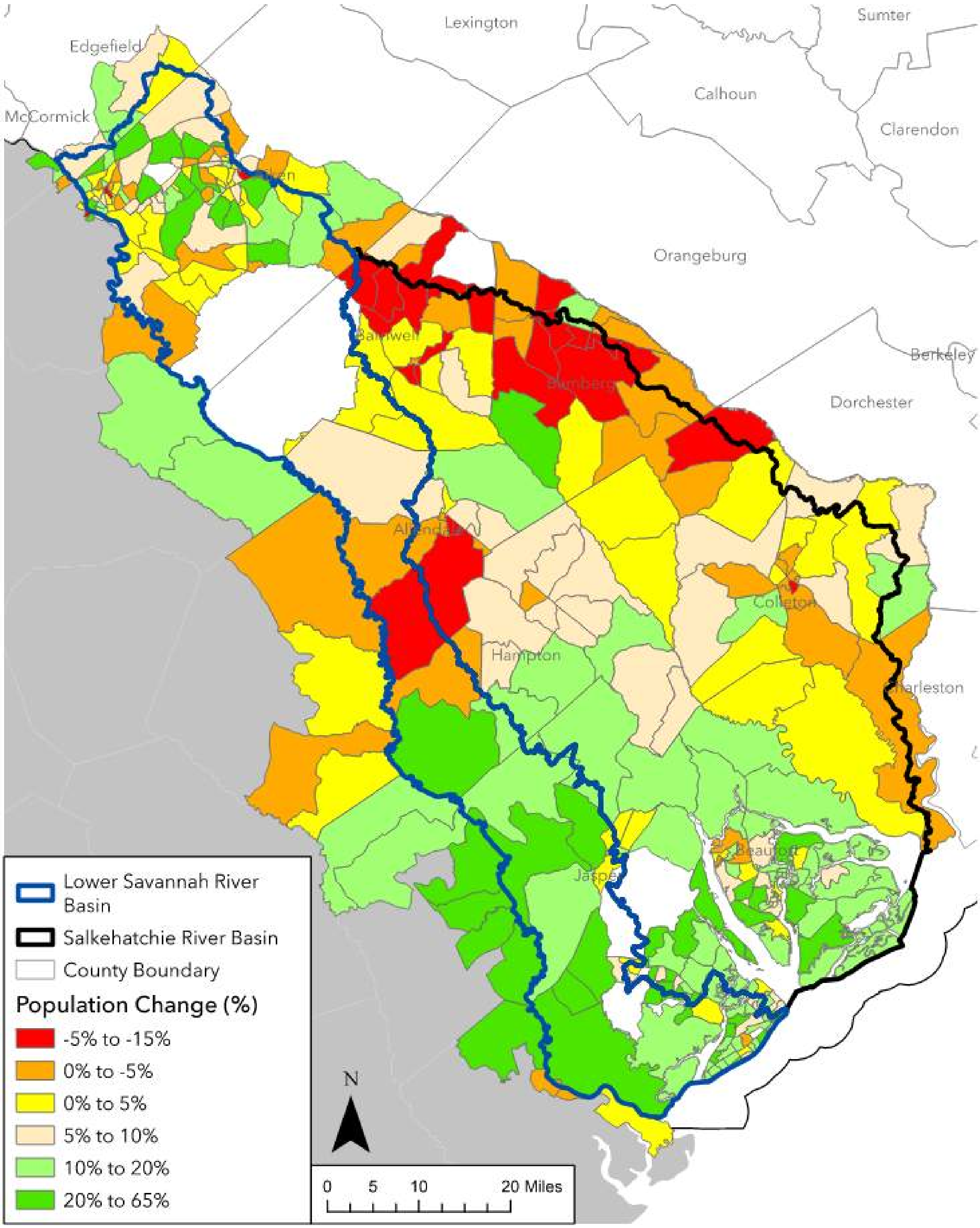


Figure 2-27. Change in the Lower Savannah-Salkehatchie River basin population from 2010–2020 by census block group (U.S. Census Bureau 2020).

Table 2-15. Estimated change in population from 2020–2035 by county (South Carolina Revenue and Fiscal Affairs Office 2021).

County	Estimated 2020 Population	Estimated 2035 Population	Percent Change
Aiken	171,320	180,550	5.4%
Allendale	8,515	6,160	-27.7%
Bamberg	13,780	10,425	-24.3%
Barnwell	20,655	17,250	-16.5%
Beaufort	195,910	248,860	27.0%
Colleton	37,570	36,285	-3.4%
Edgefield	27,150	27,425	1.0%
Hampton	18,900	15,545	-17.8%
Jasper	30,185	40,895	35.5%

When the population projections of each major county within the basin are averaged, the Lower Savannah-Salkehatchie River basin's population as a whole is projected to grow by 11.3 percent by 2035 (South Carolina Revenue and Fiscal Affairs Office 2021). This growth highlights how much the concentrated development in Beaufort and Jasper Counties outweigh the decline in more rural areas like Bamberg and Barnwell Counties.

The U.S. Bureau of Labor Statistics provided the 2021 per capita income of counties within the basin, presented in Table 2-16. The 2021 per capita income for the nine counties within the basin ranges from $37,761 (Barnwell County) to $55,522 (Aiken County). The average income across the basin is $44,802, which is below the statewide average of $55,295.

The counties of the Lower Savannah-Salkehatchie River basin predominantly fall at the extremes of per capita income rankings when compared to all 46 counties statewide, per data from 2021. Four out of nine counties are in the top 19, while three of the nine counties are in the bottom 11. The percentage of the population below the poverty line for the counties of the basin ranges from 11.3 percent (Beaufort County) to 35.4 percent (Allendale County), with a basinwide average of 20.9 percent. In total, an estimated 78,000 people in the basin live below the poverty line (South Carolina Revenue and Fiscal Affairs Office 2021).

Table 2-16. Per capita income for counties within the Lower Savannah-Salkehatchie River basin Counties (U.S. Bureau of Labor Statistics 2024).

County	2021 Per Capita Personal Income	Rank in State	Percent Change from 2020
Aiken	$55,522	4	2.66%
Allendale	$48,590	15	6.93%
Bamberg	$38,954	40	4.16%
Barnwell	$37,761	43	2.75%
Beaufort	$47,014	18	5.74%
Colleton	$40,056	38	5.65%
Edgefield	$45,359	25	8.73%
Hampton	$43,795	30	-2.42%
Jasper	$46,166	20	8.97%
Basin Average	$44,802	-	-
Statewide Average	$52,295	-	-

2.5.2 Economic Activity

The U.S. Bureau of Economic Analysis (BEA) tracks real gross domestic product (GDP) by county. Table 2-17 presents the 2022 GDP from the sum of all nine counties of the Lower Savannah-Salkehatchie River basin (U.S. BEA 2022). Data from the top three counties by GDP within the basin are individually included. Several industries, including agriculture and manufacturing, rely heavily on the water resources of the basin. The distribution of employment by industry sector for these counties is provided in Table 2-18 (U.S. BEA 2022).

Table 2-17. GDP of select counties in the Lower Savannah-Salkehatchie River basin in 2022 (in thousands of dollars).

Industry Type	Combined Counties	Beaufort	Aiken	Jasper
All industry total	24,798,970	10,820,373	8,563,162	1,676,533
Private industries	21,003,645	8,609,788	7,801,816	1,547,630
Agriculture, forestry, fishing, and hunting	219,456	7,716	24,492	11,000
Mining, quarrying, and oil and gas extraction	50,706	554	41,999	0
Utilities	596,677	35,936	177,931	313,911
Construction	1,870,281	691,363	768,131	245,044
Manufacturing	2,361,205	159,298	1,506,635	47,254
Durable goods manufacturing	1,041,855	76,889	597,482	21,068
Nondurable goods manufacturing	1,251,448	82,409	909,153	26,186
Wholesale trade	623,201	160,424	201,211	58,065
Retail trade	2,162,802	964,030	598,825	247,791
Transportation and warehousing	380,122	96,513	216,235	20,347
Information	290,772	128,324	124,573	3,551
Finance, insurance, real estate, rental, and leasing	4,768,444	3,001,587	1,128,850	291,376
Finance and insurance	652,452	416,395	148,011	16,161
Real estate and rental and leasing	4,156,588	2,585,192	980,839	275,215
Professional and business services	3,437,674	1,162,101	2,003,386	96,050
Professional, scientific, and technical services	1,483,390	749,673	631,353	39,772
Management of companies and enterprises	80,706	62,538	13,235	2,775
Administrative and support and waste management and remediation services	1,841,447	349,889	1,358,798	53,503
Educational services, health care, and social assistance	1,525,300	676,362	474,516	119,856
Educational services	125,807	67,588	18,362	15,357
Health care and social assistance	1,354,787	608,774	456,154	104,499
Arts, entertainment, recreation, accommodation, and food services	1,578,051	1,106,170	318,736	58,607
Arts, entertainment, and recreation	396,014	274,553	91,992	17,955
Accommodation and food services	1,154,467	831,617	226,744	40,652
Other services (except government and government enterprises)	783,803	419,409	216,295	34,778
Government and government enterprises	3,795,326	2,210,585	761,346	128,904

Table 2-18. Percent employment by industry sector of select counties in the Lower Savannah-Salkehatchie River basin in 2022.

Industry Sector	Lower Savannah-Salkehatchie River Basin Average Percent Employment
Agriculture, forestry, fishing and hunting	0.9%
Mining, quarrying, and oil and gas extraction	0.2%
Utilities	2.4%
Construction	7.5%
Manufacturing	9.5%
Wholesale trade	2.5%
Retail trade	8.7%
Transportation and warehousing	1.5%
Information	1.2%
Finance and insurance	2.6%
Real estate and rental and leasing	16.8%
Professional, scientific, and technical services	6.0%
Management of companies and enterprises	0.3%
Administrative and support and waste management and remediation services	7.4%
Educational services	0.5%
Health care and social assistance	5.5%
Arts, entertainment, and recreation	1.6%
Accommodation and food services	4.7%
Other services (except government and government enterprises)	3.2%
Government and government enterprises	15.3%

Chapter 3
Water Resources of the Lower Savannah-Salkehatchie Basin

3.1 Surface Water Resources

3.1.1 Major Rivers and Lakes

The Lower Savannah River basin, as defined for South Carolina's river basin planning process, extends 125 miles along the South Carolina-Georgia state line (SCDNR 2009). The lower part of the Savannah River runs from the confluence of the Upper Savannah River and Stevens Creek near the Fall Line to the Atlantic Ocean. The largest tributaries that drain to the lower Savannah River include Horse Creek, Upper Three Runs Creek, and Lower Three Runs Creek, all of which are in the upper Coastal Plain region. Smaller tributaries in the middle and lower Coastal Plain region are generally associated with swamplands.

To the northeast, the Salkehatchie River basin extends 95 miles inland from the Atlantic Ocean (SCDNR 2009). The major streams draining the Salkehatchie basin are the Salkehatchie, Coosawhatchie, and Ashepoo Rivers. The Salkehatchie River and the Little Salkehatchie River combine to form the tidally influenced Combahee River. The Coosawhatchie drains into the Broad River, a tidal saltwater river. Coastal water bodies in the basin include St. Helena Sound, Port Royal Sound, and numerous tidal creeks and rivers.

Savannah River flows have been regulated since 1951 through controlled releases from Lake Thurmond (SCDNR 2009). These releases and regulation at the Stevens Creek Dam result in flows in the Savannah River at Augusta nearly always being above 3,600 cfs. Flows are variable in the upper part of the Savannah River because of these releases, and more uniform downstream because of the tributary stream inflows and stabilization by the wetlands. Streamflow in the Salkehatchie River is relatively steady and well-sustained because of groundwater storage and water supplied from headwater streams in the upper Coastal Plain (SCDNR 2009). Coosawhatchie River flows are more variable, as it depends on rainfall and runoff from low lying, permeable terrain. Freshwater availability in the basin is limited, and the Coosawhatchie River and Great Swamp can run dry during the summer and fall.

Par Pond Lake is the only large lake in the Lower Savannah basin, located on Lower Three Runs Creek (SCDNR 2009). Par Pond has a surface area of 2,700 acres, and the next largest impoundment (Langley Pond) has a surface area of only 250 acres. Within the Salkehatchie basin, there are no major reservoirs. The largest lake in the basin is an unnamed pond with a surface area of 800 acres. The total surface area of lakes larger than 10 acres in the Salkehatchie is about 7,000 acres.

Figure 3-1 shows the location of the six major subbasins. Three subbasins (Middle Savannah, Lower Savannah, and Calibogue Sound-Wright River) lie within the larger Savannah River basin, while the remaining three subbasins (Salkehatchie, Broad-St. Helena, and St. Helena Island) make up the Salkehatchie part of the Lower Savannah-Salkehatchie River basin. Figure 3-1 also shows the major estuarine and riverine wetland types, small lakes, and ponds. Near the coast, estuarine and deepwater wetlands are present. These tidally influenced saltwater streams receive drainage from bordering salt marshes and tidal creeks. The Salkehatchie basin contains the most extensive estuarine water bodies in the state (SCDES 2023). Freshwater forested/shrub wetlands dominate in the Coastal Plain region.

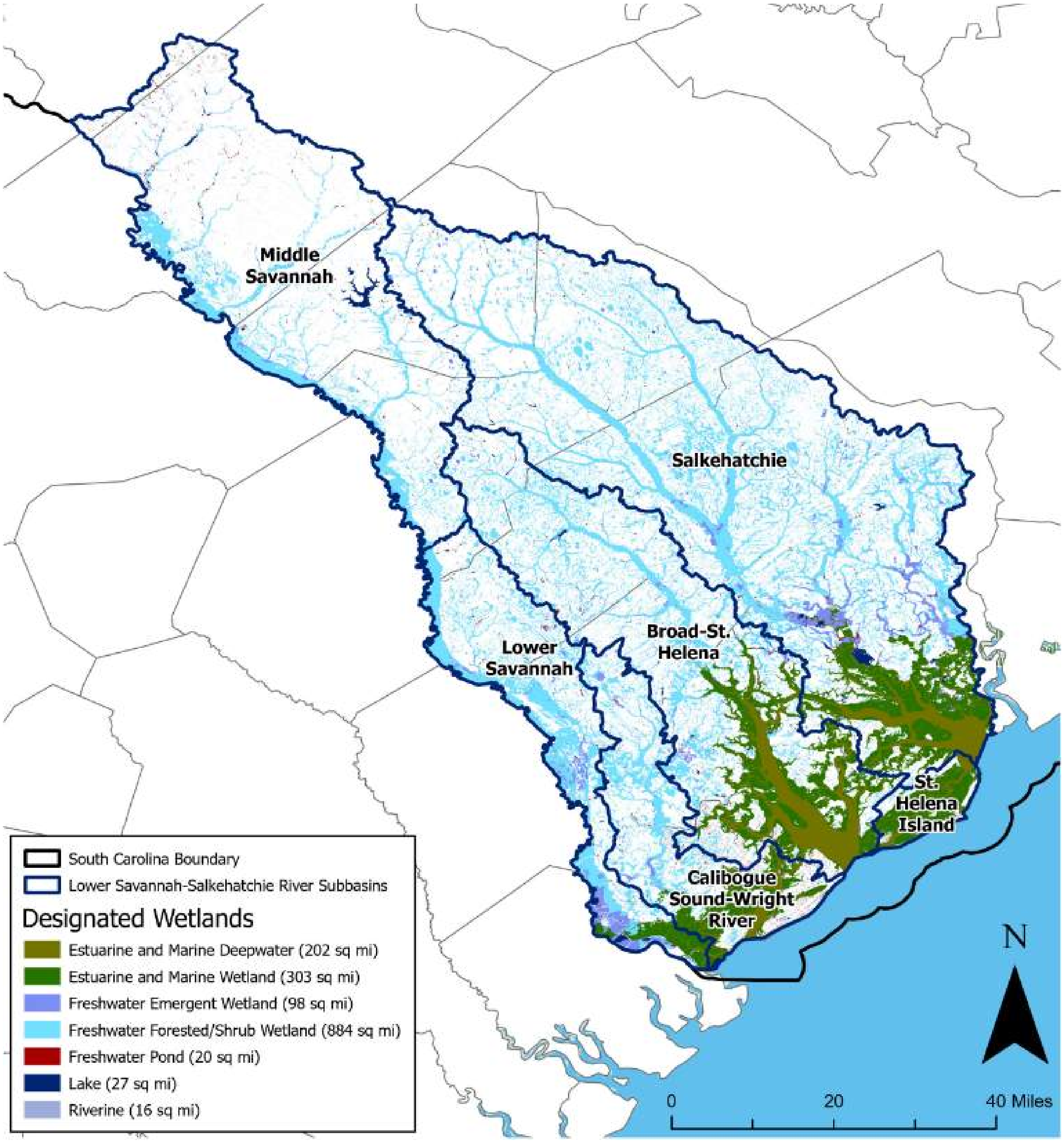


Figure 3-1. Wetland types of the Lower Savannah-Salkehatchie River basin (USFWS 2023).

3.1.2 Surface Water Monitoring

There are 32 active gaging stations operated by the USGS in the Lower Savannah-Salkehatchie River basin in South Carolina that report daily streamflow, stage, or lake elevation data. Eleven of the active stations' data sets include daily mean discharge (flow) data, while the remaining 21 active stations report daily mean stage, reservoir elevation, or tidal discharge data.

An additional 69 gaging stations are no longer active but previously collected daily streamflow or stage data. Many of the inactive stations were associated with the SRS, a 310 sq mi USDOE reservation. Table 3-1 lists the gaging stations in the basin and provides the first and last years in their periods of record, drainage areas, and select daily streamflow statistics through September 30, 2024 (where available and with USGS provisional data included). Stations are grouped by subbasin, as defined by the eight-digit hydrologic unit code (HUC). Gaging stations that do not record daily mean discharge data are included, but they do not have streamflow statistics. Figure 3-2 shows the locations of all the active and inactive gaging stations. The lowest recorded daily mean streamflow on the Savannah River within the Lower Savannah-Salkehatchie basin was 65 cfs, which was observed in 1989 near North Augusta, and the highest streamflow was 315,000 cfs recorded at Augusta in 1929. On the Salkehatchie River, the lowest recorded mean streamflow was 2.9 cfs in 2002, and the highest streamflow was 4,360 cfs in 2024, both recorded at the station near Miley.

Table 3-1. Streamflow characteristics at active[1] USGS gaging stations in the Lower Savannah-Salkehatchie River basin.

Map ID	Gaging Station Name	Station Number	Period of Record[2]	Drainage (sq mi)	Average Daily Flow (cfs)	90% Exceeds Flow (cfs)[3]	Minimum Daily Flow (cfs), (year)	Max Daily Flow (cfs), (year)
Middle Savannah River Subbasin–HUC 03060106								
1	Savannah River at Stevens Creek Dam near Morgana	02196483	1988–present	7,150	NA	NA	NA	NA
5	Augusta Canal near Augusta, Georgia (Upper)	02196485	1988–present	Not reported by USGS	2,508	1,720	188 (2024)	4,000 (2015)
8	Horse Creek at Clearwater	02196690	2004–present	155	182	106	44 (2013)	1,100 (2021)
9	Savannah River above New Sav. Lock and Dam	02196999	1989–present	7,508	NA	NA	NA	NA
10	Savannah River at Augusta	02197000	1883–present	7,330	9,478	3,960	1,040 (1927)	315,000 (1929)
11	Upper Three Runs near New Ellenton	02197300	1966–present	87	103	72	46 (2002)	509 (1992)
27	Savannah River near Waynesboro, Georgia	021973269	2004–present	8,300	7,063.4	4,390	3,450 (2012)	19,200 (2005)

Table 3-1. Streamflow characteristics at active[1] USGS gaging stations in the Lower Savannah-Salkehatchie River basin. (Continued)

Map ID	Gaging Station Name	Station Number	Period of Record[2]	Drainage (sq mi)	Average Daily Flow (cfs)	90% Exceeds Flow (cfs)[3]	Minimum Daily Flow (cfs), (year)	Max Daily Flow (cfs), (year)
Middle Savannah River Subbasin-HUC 03060106 (continued)								
59	Savannah River at Burtons Ferry Bridge near Millhaven, Georgia	02197500	1939-present	8,650	9,876	4,820	2,120 (1951)	138,000 (1940)
Lower Savannah River Subbasin-HUC 03060109								
61	Savannah River near Clyo, Georgia	02198500	1929-present	9,850	11,296	5,310	1,950 (1931)	203,000 (1929)
63	Savannah River above Hardeeville	02198760	1987-present	Not reported by USGS	NA	NA	NA	NA
64	Savannah River (I-95) near Port Wentworth, Georgia[4]	02198840	1987-present	Not reported by USGS	NA	NA	NA	NA
65	Savannah River at GA 25, at Port Wentworth, Georgia[4]	02198920	1987-present	Not reported by USGS	NA	NA	NA	NA
66	Middle River at GA 25 at Port Wentworth, Georgia[4]	02198950	2009-present	Not reported by USGS	NA	NA	NA	NA
67	Middle River at Fish Hole at Port Wentworth, Georgia[4]	02198955	2014-present	Not reported by USGS	NA	NA	NA	NA
68	Savannah River at Garden City, Georgia	021989715	2012-present	Not reported by USGS	NA	NA	NA	NA
70	Savannah River at USACE Dock, at Savannah, Georgia[4]	021989773	2007-present	Not reported by USGS	NA	NA	NA	NA
71	Little Back River above Lucknow Canal, near Limehouse	021989784	1990-present	Not reported by USGS	NA	NA	NA	NA
73	Little Back River at F&W Dock, near Limehouse	021989791	1989-present	Not reported by USGS	NA	NA	NA	NA
74	Little Back River at GA 25 at Port Wentworth, Georgia[4]	021989792	2009-present	Not reported by USGS	NA	NA	NA	NA

Table 3-1. Streamflow characteristics at active[1] USGS gaging stations in the Lower Savannah-Salkehatchie River basin. (Continued)

Map ID	Gaging Station Name	Station Number	Period of Record[2]	Drainage (sq mi)	Average Daily Flow (cfs)[3]	90% Exceeds Flow (cfs)	Minimum Daily Flow (cfs), (year)	Max Daily Flow (cfs), (year)
Lower Savannah River Subbasin-HUC 03060109 (continued)								
75	Savannah River at Elba Island, near Savannah, Georgia	0219897993	2013-present	Not reported by USGS	NA	NA	NA	NA
76	Savannah River at Fort Pulaski, Georgia[4]	02198980	1987-present	Not reported by USGS	NA	NA	NA	NA
Salkehatchie River Subbasin-HUC 03050207								
78	Ashepoo River at US17 near Greenpond[5]	02175148	2022-present	Not reported by USGS	89	-229	-737 (2022)	1,990 (2023)
79	Salkehatchie River at SC Hwy 64 near Barnwell	02175200	2020-present	65	NA	NA	NA	NA
81	Salkehatchie River Near Miley	02175500	1951-present	341	313	79	2.9 (2002)	4,360 (2024)
82	Little Salkehatchie River below Denmark	02175552	2020-present	42	NA	NA	NA	NA
83	Combahee River near Yemassee	02176000	1951-present	1,100	472	66	9.0 (1954)	5,070 (1955)
Broad-St. Helena Subbasin-HUC 03050208								
84	Coosawhatchie River near Hampton	02176500	1951-present	203	156	1.4	0 (numerous years[6])	6,590 (1969)
86	Coosawhatchie River at I95 near Ridgeland	021765182	2021-present	Not reported by USGS	NA	NA	NA	NA
87	Bees Creek at SC462 near Ridgeland, SC	021765184	2024-present	Not reported by USGS	NA	NA	NA	NA
88	Broad River near Beaufort	02176560	2000-present	Not reported by USGS	NA	NA	NA	NA
94	Beaufort River at Beaufort	02176603	1998-present	Not reported by USGS	NA	NA	NA	NA

Table 3-1. Streamflow characteristics at active[1] USGS gaging stations in the Lower Savannah-Salkehatchie River basin. (Continued)

Map ID	Gaging Station Name	Station Number	Period of Record[2]	Drainage (sq mi)	Average Daily Flow (cfs)[3]	90% Exceeds Flow (cfs)	Minimum Daily Flow (cfs), (year)	Max Daily Flow (cfs), (year)
Calibogue Sound-Wright River Subbasin-HUC 03060110								
101	New River at SC 46	0217689150	June 2024–present	173	NA	NA	NA	NA

[1] Only active gages are displayed in this table. Please see Appendix A for inactive gages.
[2] "Present" indicates that the gage was active at the end of water year 2024 (September 30, 2024).
[3] "90% exceeds flow" is the flow for which 90% of daily flows are higher and 10% are lower.
[4] These gages are influenced by tidal currents, and they report daily tidal high and low discharges instead of a daily mean discharge.
[5] The Ashepoo River at US17 near Greenpond gage is influenced by tidal fluctuations, resulting in negative daily mean discharge flows reported because of negative flows during flood tide.
[6] The Coosawhatchie River near Hampton gage recorded zero flow in each of the following years: 1951, 1954, 1956, 1957, 1968, 1980, 1981, 1986, 1988, 1990, 1993, 1995, 1998-2002, 2004 to 2012, 2014 to 2016, 2019, 2021, 2022, and 2024.

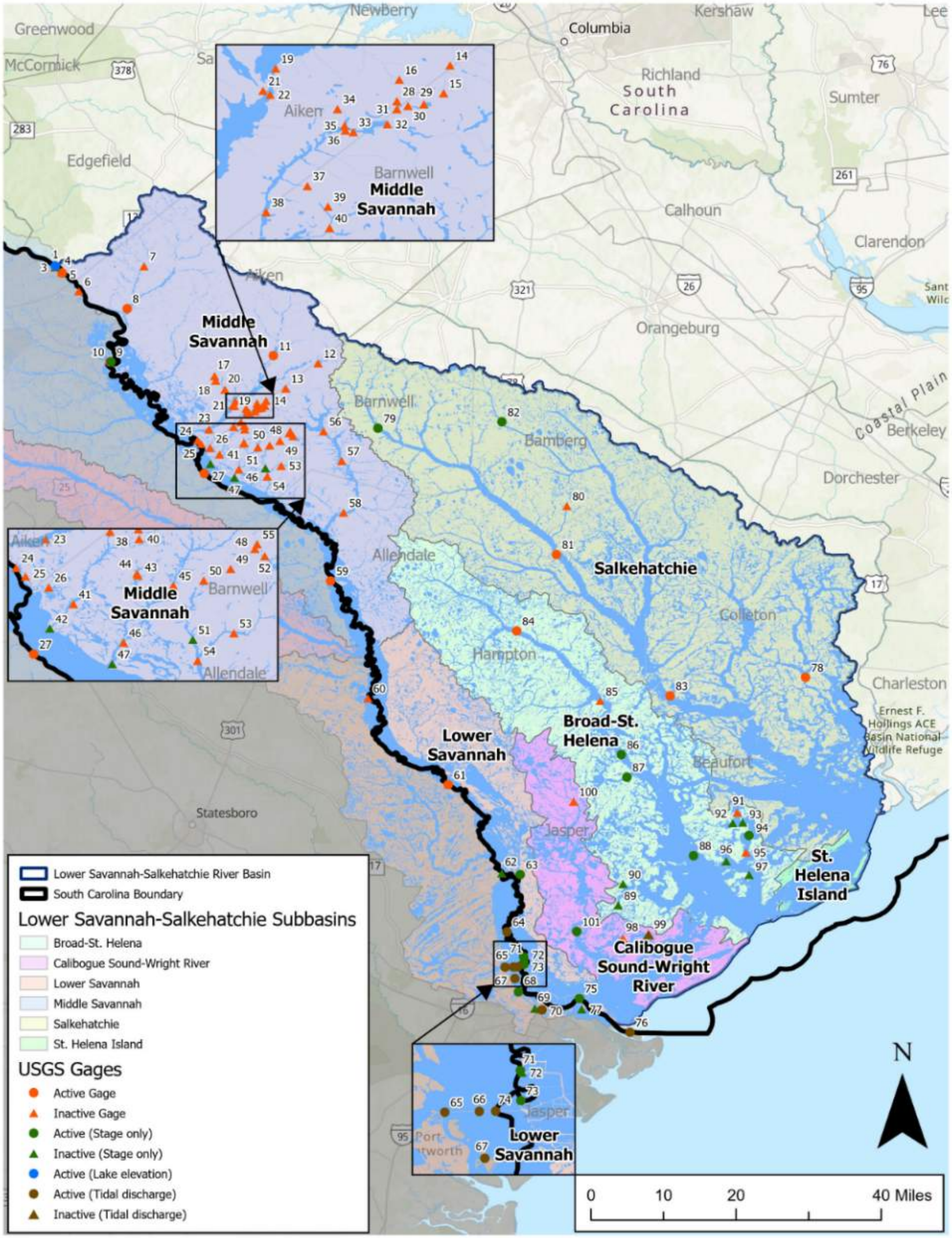


Figure 3-2. USGS streamflow gaging stations. (Both active (listed in Table 3-1) and inactive (listed in Appendix A) gages are displayed in this figure.)

Figure 3-3 shows duration hydrographs of streamflow statistics throughout the year at select gaging stations in the Lower Savannah-Salkehatchie basin. The flows on the Savannah River are influenced by controlled releases from upstream hydroelectric power facilities. Streamflow along the Lower Savannah River main stem is well-sustained because of upstream streamflow regulations. Median and average flows at the two lower gages, at Burtons Ferry Bridge near Millhaven and near Clyo, Georgia, are more uniform when compared to the flows at the Savannah River at Augusta station upstream. This is due to stabilizing effects from tributary streams as well as surrounding wetlands. The tributary gaging station on the Upper Three Runs Creek in Aiken County shows well-sustained base flows year-round, which is characteristic of the upper Coastal Plain province (SCDNR 2009).

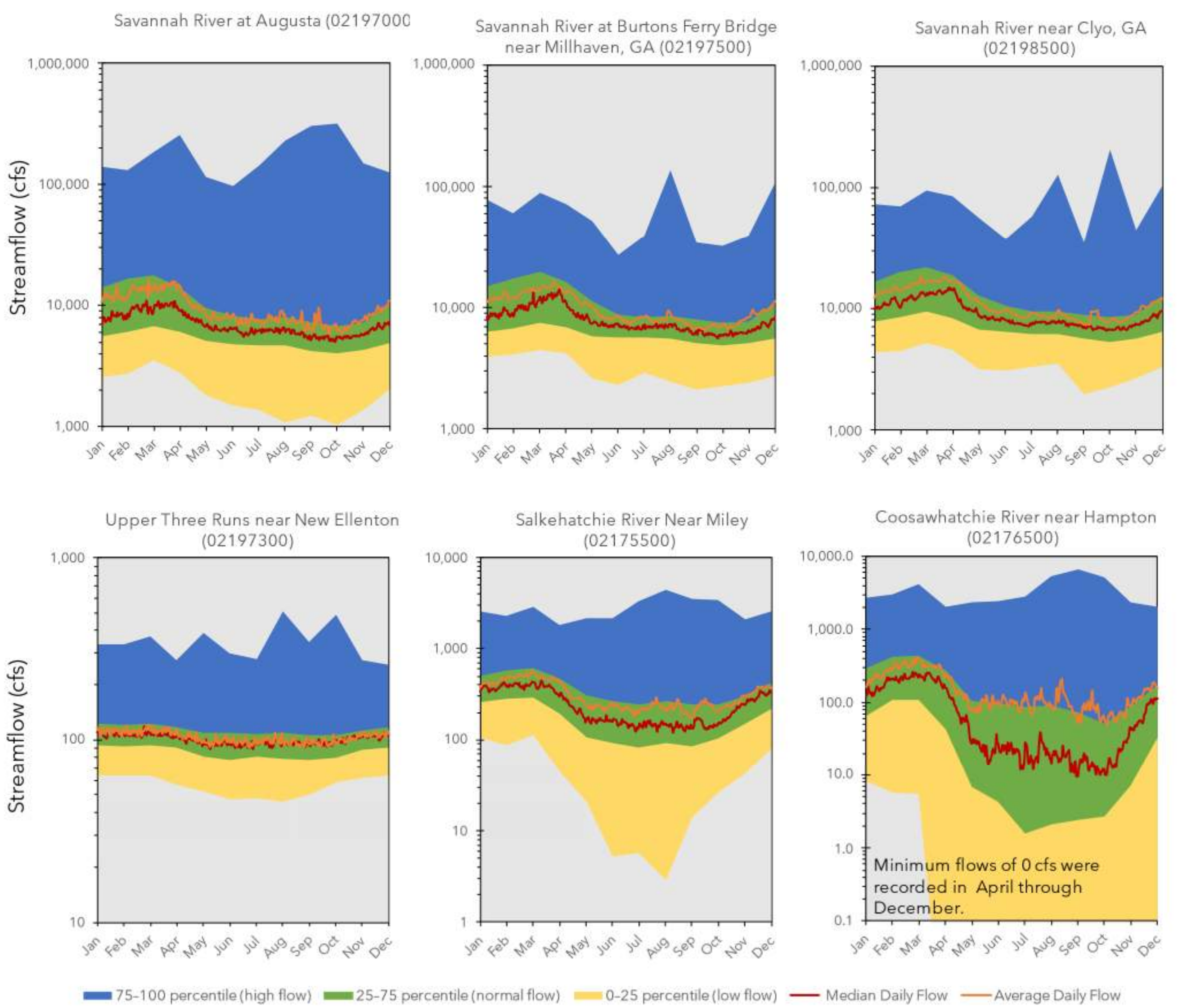


Figure 3-3. Duration hydrographs for select gaging stations in the Lower Savannah-Salkehatchie River basin.

Flows on the Coosawhatchie and Salkehatchie Rivers are lower and more variable than on the Lower Savannah River. Coosawhatchie River flows are particularly variable, with periods of no flow regularly recorded during summer and fall months. Flows in the middle and lower Coastal Plain regions are less reliable than streamflows in the upper part of the basin because of lower base flow (SCDNR 2009, SCDNR 2023c).

Figure 3-4 plots mean monthly flows at the Savannah River at Burtons Ferry Bridge near Millhaven, Georgia; Salkehatchie River near Miley; and Coosawhatchie River near the Hampton gaging stations over the previous 30 years (October 1994 through September 2024). Mean monthly flows at the Savannah River and Salkehatchie River stations exhibit similar patterns, with higher sustained flows at the Savannah River station because of releases from Stevens Creek Dam. Mean flows on the Coosawhatchie River are flashier with more frequent periods of low or no flow.

The fifth percentile of the mean monthly flows over the nearly 84-year period of record (October 1939 to September 1970, October 1982 to October 2003, and October 2004 to present) is 4,637 cfs at the Savannah River at Burtons Ferry Bridge near the Millhaven, Georgia, station. The fifth percentile of the mean monthly flows over the nearly 73-year period of record (February 1951 to present) is 79 cfs at the Salkehatchie River near Miley station. The graph uses the fifth percentile flows at the Salkehatchie River station to distinguish the periods of drought, most of which occurred between 2000 to 2002 and 2007 to 2012. While this station dropped below its historical fifth percentile flow several times over the last 30 years, the Savannah River station rarely did so. The fifth percentile of the mean monthly flows at the Coosawhatchie River near the Hampton station over the nearly 73-year period of record (February 1951 to present) is only 1 cfs. This is due to numerous periods of zero recorded flow in the stream. Months with zero recorded flow appear as a gap in the data in Figure 3-4 because of the figure's log axis. From the figure, these extremely low and no flow periods occurred with regularity and at a higher frequency than low flows on the Salkehatchie and Savannah Rivers.

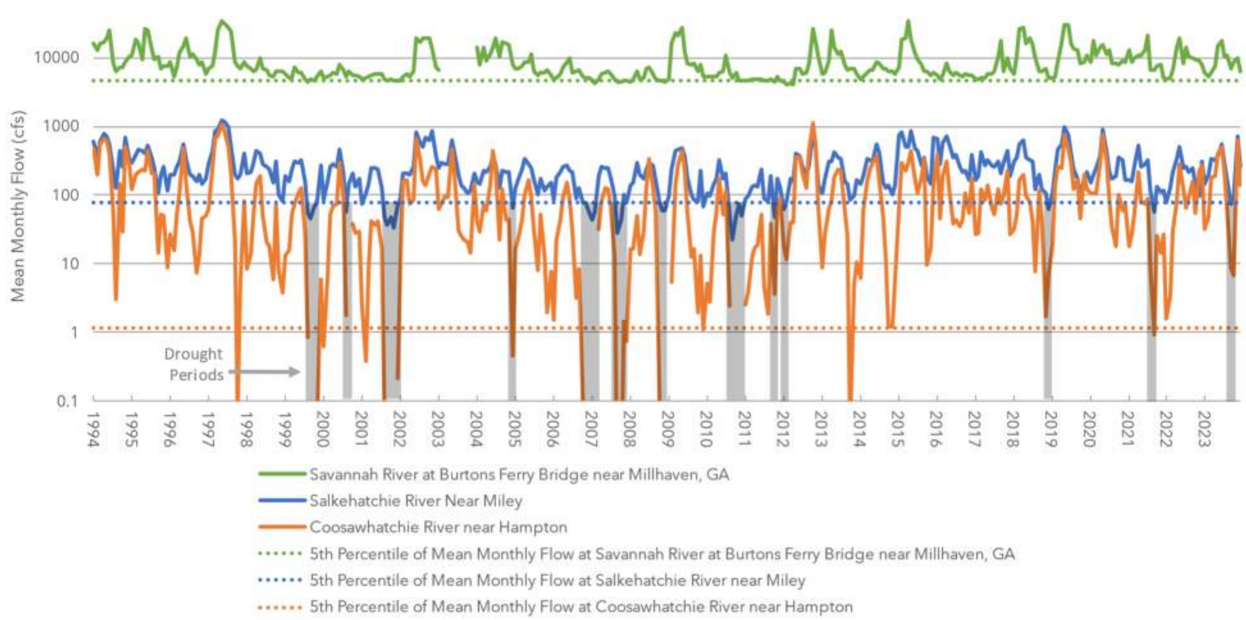


Figure 3-4. Mean monthly flows at gaging stations on the Savannah, Salkehatchie, and Coosawhatchie Rivers.

Apart from the USGS gaging stations that measure stage and flow, there are numerous sites throughout the basin where SCDES collects water quality data as part of their ongoing Ambient Surface Water Physical and Chemical Monitoring program to assess the water's suitability for aquatic life and recreational use. The program includes ongoing, fixed-location monitoring and statewide statistical survey monitoring. The fixed-location monitoring includes monthly collection and analysis of water from base sites in a uniform manner to provide solid baseline water quality data. The statistical survey sites are sampled once per month for one year and moved from year to year (SCDES 2025). SCDES does not measure flow at these sites.

3.1.3 Surface Water Development

The Lower Savannah-Salkehatchie River basin has been developed with numerous navigation projects and limited flood-control projects located solely in the Salkehatchie subbasin. Most development in the Lower Savannah subbasin has been for navigation projects, and there are no completed flood-control projects in this part of the basin. The largest lakes in this subbasin are Par Pond on Lower Three Runs Creek, which has a surface area of 2,700 acres and a volume of 54,000 acre-ft, and Langley Pond on Horse Creek, which has a surface area of 250 acres and a volume of 1,250 acre-ft (SCDNR 2009). The New Savannah Bluff Lock and Dam has not been used for commercial navigation since 1979, but its associated stable pool of water is a water source for North Augusta (SCDNR 2009).

There are no large reservoirs in the Salkehatchie part of the basin, where the largest lake is a pond near the Ashepoo River which has a surface area of 800 acres (SCDNR 2009). USACE navigation projects are concentrated near the coast and include channels through Port Royal Sound and the Beaufort River. They also maintain the Atlantic Intracoastal Waterway. The NRCS and Beaufort County have also implemented flood-control projects.

Additionally, regulated and unregulated small dams create small impoundments on the Lower Savannah River and Salkehatchie River tributaries. Dams that are less than 25 feet high or impound less than 50 acre-ft are generally exempt from regulation in South Carolina. There are 182 SCDES regulated dams in the Lower Savannah-Salkehatchie River basin, most of which are classified as low-hazard, Class 3 dams, as shown in Table 3-2. Most regulated dams, in particular those designated as high-hazard dams, are on the upper reaches of the basin, as shown in Figure 3-5.

Table 3-2. Regulated dams in the Lower Savannah-Salkehatchie River basin.

Dam Type	Number of Dams	Description
High Hazard, Class 1	56	Structure where failure will likely cause loss of life and/or serious damage to infrastructure
Significant Hazard, Class 2	10	Structure where failure will not likely cause loss of life but infrastructure may be damaged
Low Hazard, Class 3	116	Structure where failure may cause limited property damage
Total	**182**	

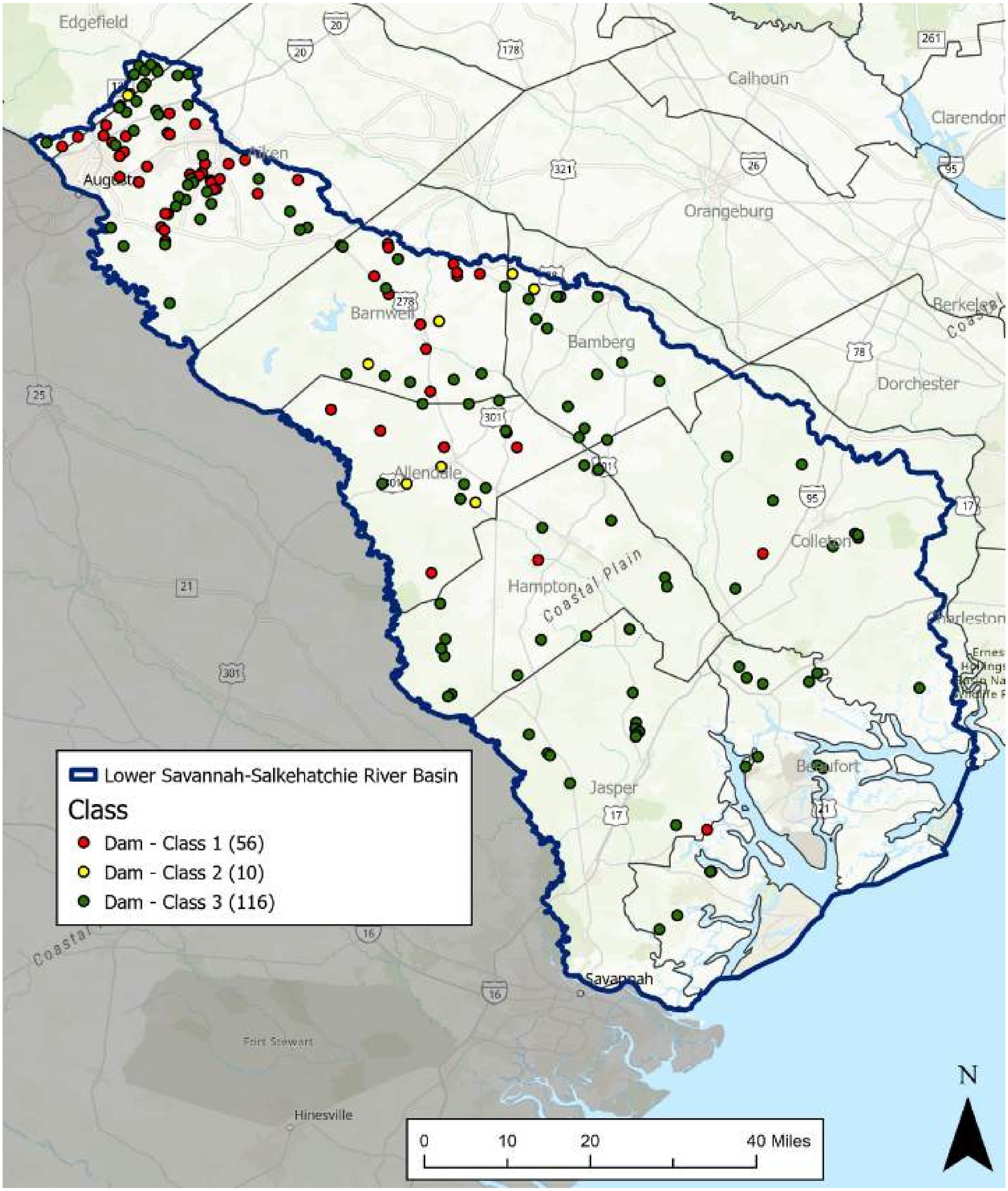


Figure 3-5. Regulated dams in the Lower Savannah-Salkehatchie River basin.

Approximately 68 percent of the total water withdrawals in the Lower Savannah-Salkehatchie basin in 2022 were surface water withdrawals (SCDNR 2023c). By far the greatest user of surface water that year was the thermoelectric power industry, which reported withdrawals totaling 58 percent of surface water withdrawals that year. Public water suppliers made up 25 percent of the surface water withdrawals, and industrial users accounted for 14 percent of the surface water withdrawals. Agricultural irrigation water users reported 2 percent of the surface water withdrawals, while golf course and aquaculture each accounted for approximately 1 percent of surface water usage.

3.1.4 Surface Water Quality Concerns

Except for water bodies near the coast, water bodies in the Lower Savannah River basin are designated as "freshwater" (Class FW) (SCDNR 2009), meaning they are suitable for aquatic life, primary- and secondary-contact recreation, drinking-water supply, fishing, and industrial and agricultural uses. Closer to the coast, streams are designated as "tidal saltwater" (Class SB) (SCDNR 2009), meaning they are suitable for primary- and secondary-contact recreation, crabbing, and fishing.

Water quality concerns have been associated with stream and river reaches in the basin that do not meet water quality standards and do not support designated uses. Water quality monitoring conducted by SCDHEC from 2002 to 2006 demonstrated that aquatic life uses were fully supported at 77 percent (149 out of 194 sites) (SCDHEC 2010a, 2010b). Approximately 56 percent (25 out of 45) of sites that were not fully supporting of aquatic life uses were impaired by zinc, copper, or nickel. Recreational use was fully supported at 83 percent (149 out of 179) of sampled sites. Sites not supportive of recreational use were all impaired by high levels of fecal coliform bacteria.

More recently, the 2022 Section §303(d) Clean Water Act list of impaired waters documented impairments at 177 sampling stations that impacted 97 different streams and lakes in the basin, including portions of the Ashepoo River, Combahee River, Coosaw River, Coosawhatchie River, Little Salkehatchie River, New River, Port Royal Sound, Saint Helena Sound, Salkehatchie River, and Savannah River (SCDHEC 2022). Table 3-3 provides a summary of the causes of impairments and the associated supported designated uses.

Table 3-3. 2022 Section §303(d) Lower Savannah-Salkehatchie River basin impairment summary.

Designated Use	Number of Stations with Impairments	Causes of Impairments (Number of Impairments)	Number of Stations with Impairments	Causes of Impairments (Number of Impairments)
	Lower Savannah Basin		Salkehatchie Basin	
Aquatic Life	20	Chromium (1) Dissolved Oxygen (3) Macroinvertebrate (2) pH (4) Turbidity (10) Zinc (3)	79	Ammonia Nitrogen (1) Chlorophyll A (7) Copper (4) Dissolved Oxygen (17) Macroinvertebrate (6) pH (1) Total Nitrogen (1) Total Phosphorus (3) Turbidity (44) Zinc (5)
Fish Consumption	14	Mercury (14)	11	Mercury (11)
Recreational Use	15	Escherichia coli (7) Enterococci (8)	38	Escherichia coli (19) Enterococci (22)
Shellfish	8	Fecal Coliform Bacteria (8)	14	Fecal Coliform Bacteria (14)

As of February 2025, fish-consumption advisories for mercury have been issued on the Salkehatchie, Little Salkehatchie, Combahee, Ashepoo, Coosawhatchie, and New Rivers, as well as on Horseshoe Creek, Chessey Creek, Cuckolds Creek, Lake George Warren, the entirety of the Lower Savannah River, and the Atlantic Ocean coast (SCDHEC 2025). A fish-consumption advisory for mercury and polychlorinated biphenyls has been issued for Langley Pond in Aiken County.

3.2 Surface Water Assessment Tools

3.2.1 SWAM Model

The SWAM model was used to assess current and future surface water availability and to evaluate the effectiveness of proposed water management strategies. From 2014 to 2017, all eight South Carolina surface water quantity models were built in the SWAM platform, including the Savannah and Salkehatchie basin models. The Savannah and Salkehatchie basin SWAM models were updated in 2024. Updates included extending the period of record to 2021, adding new permits and registrations, and removing inactive users. Both the Upper and Lower Savannah basins were included in the Savannah SWAM model. The modeling efforts and results presented here represent just the Lower Savannah part of the Savannah SWAM model.

SWAM uses a framework composed of a network of river reaches, impoundments, withdrawals, and returns, in which water is routed hydrologically between nodes. The model focuses principally on main stem rivers, along with primary and secondary tributaries. The model often does not include smaller-order tributaries whose flows are aggregated into flow estimates for primary and secondary tributaries. The model simulates basin hydrology at a daily or monthly interval.

Inputs to the model include the following:

- Calculated and estimated unimpaired flows for the headwaters of the main stem and tributary included in the model. Unimpaired flows were calculated by mathematically removing historical influence of storage, withdrawals, and return flows from measured flow at USGS streamflow gaging stations. This allows the model to simulate either historical or hypothetical water use patterns for evaluating future conditions. Many of the unimpaired flow records were synthesized using standard statistical techniques where measured data were not explicitly available for river reaches or time periods.
- Reach Gain/Loss Factors: These are calibrated values used to increase flow as it moves downstream based on additional drainage area or decrease flow for losing river reaches.
- Locations of all withdrawals, return flows, and interbasin transfers. These values are discussed below as user-adjusted variables.
- Reservoir characteristics, such as capacity, bathymetry, constraints, and flexible operating rules.
- USGS daily flow records, which are embedded in the model for comparative purposes. Simulation results can be compared with historical records.

Model variables, which can be modified by users to explore future conditions, include the following:

- Withdrawal targets (municipal, industrial, thermoelectric, agricultural, golf courses, hatcheries)
- Consumptive use, wastewater discharge, and other return flows (which can be estimated automatically)
- Interbasin transfers
- Reservoir operating rules and storage characteristics, if applicable
- Environmental flow targets

Using this information, the SWAM model calculates available water (physically available based on simulated flows, and legally available based on permit conditions and other uses), withdrawals, storage, consumption, and return flows at user-defined nodes. The flow from the main river stem, as well as major branches and tributaries, are discretely quantified. Figure 3-6 shows the Salkehatchie River basin SWAM model framework. Figure 3-7 shows the Savannah River basin SWAM model framework.

The model can be used to simulate current and future demands based on defined scenarios and identify potential shortages in water availability when compared to demands for withdrawals or instream flow targets. Section 4 discusses in further detail the scenarios that were evaluated specifically for the Lower Savannah-Salkehatchie River basin.

As with all eight of the SWAM models for South Carolina, the Savannah and Salkehatchie models were calibrated and then tested to demonstrate reasonable ability to recreate historical hydrology and operational conditions. Historical water uses were added into the models to alter the estimated unimpaired flows, and simulated versus gaged flows were compared at key locations throughout the subbasins. Figure 3-8 shows an example verification test result. The *South Carolina Surface Water*

Quantity Models: Savannah Basin Model report (CDM Smith 2017a) and the *South Carolina Surface Water Quantity Models: Salkehatchie Basin Model* report (CDM Smith 2017b) discuss full verification results and methods.

While the SWAM model can quantify water balance calculations for free-flowing streams and reservoirs based on several inputs, it does have limitations. The model is not capable of performing rainfall-runoff or hydraulic routing calculations and cannot be used (by itself) to calculate natural flow in tidally influenced reaches. Groundwater and its impacts are not explicitly modeled by the SWAM model; however, groundwater inputs and losses to streams and rivers are implicitly accounted for through incorporation of gage records and model calibration and verification. SWAM also cannot model water quality metrics. Future climate scenarios can be explored with SWAM by adjusting the tributary input flows.

The model, as well as its user guide and the full report on the Savannah Basin Model and the Salkehatchie Basin Model development and calibration are publicly available for download at SCDES's website. At the time of this writing, the models and associated documentation can be found at: https://www.des.sc.gov/programs/bureau-water/hydrology/surface-water-program/surface-water-models.

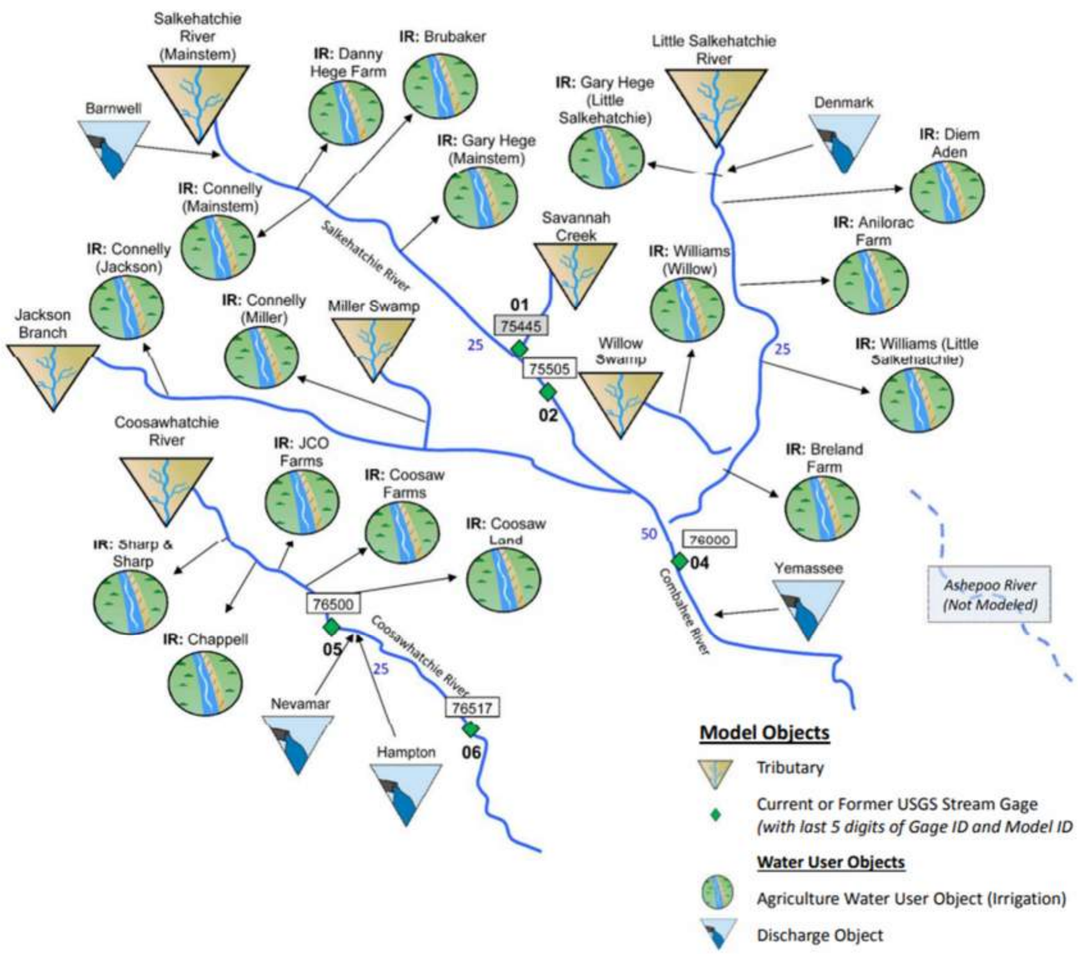
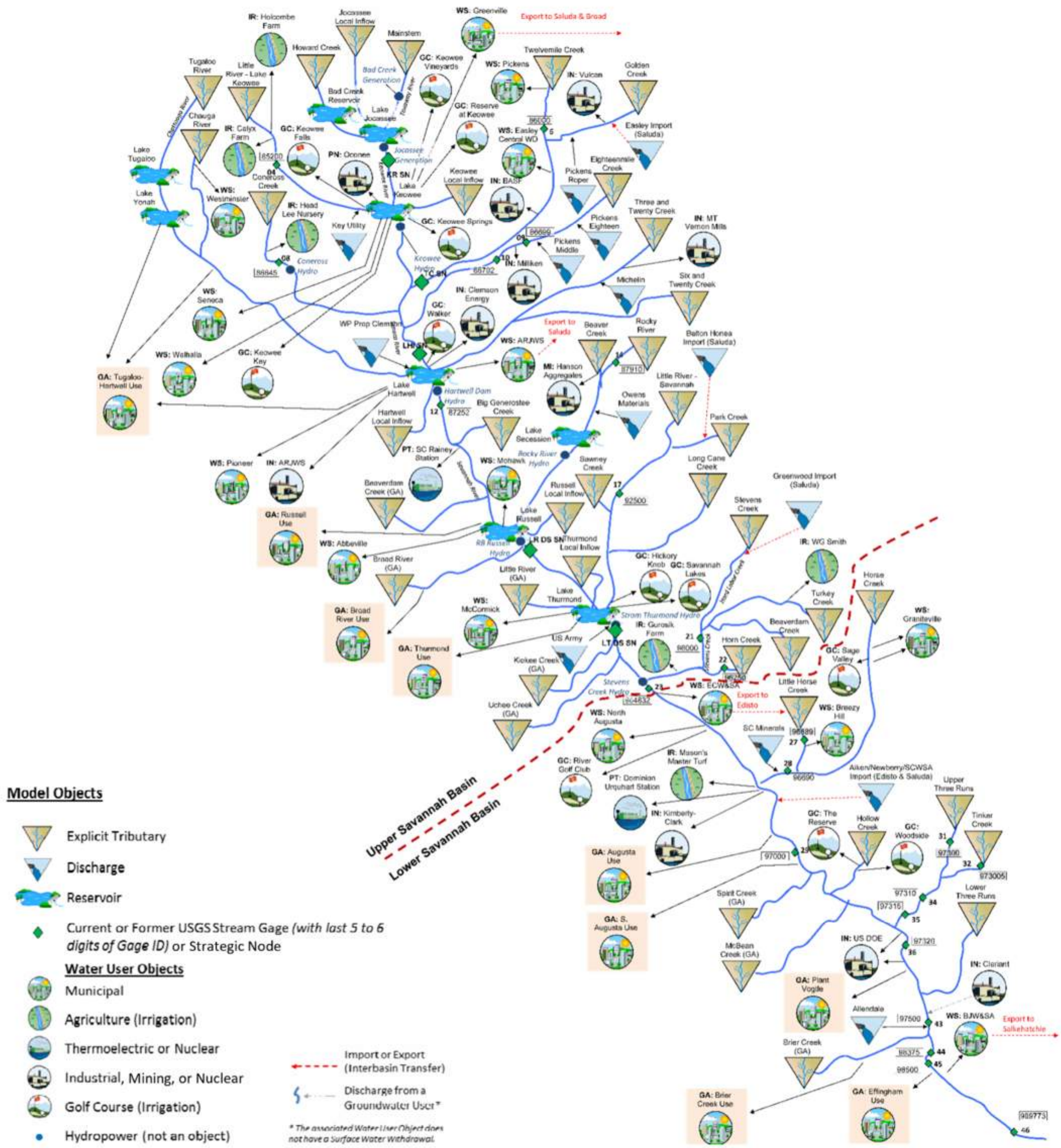


Figure 3-6. SWAM Model interface for the Salkehatchie River basin.



Note: Water users shaded in light orange represent Georgia water users.

Figure 3-7. SWAM Model interface for the Savannah River basin.

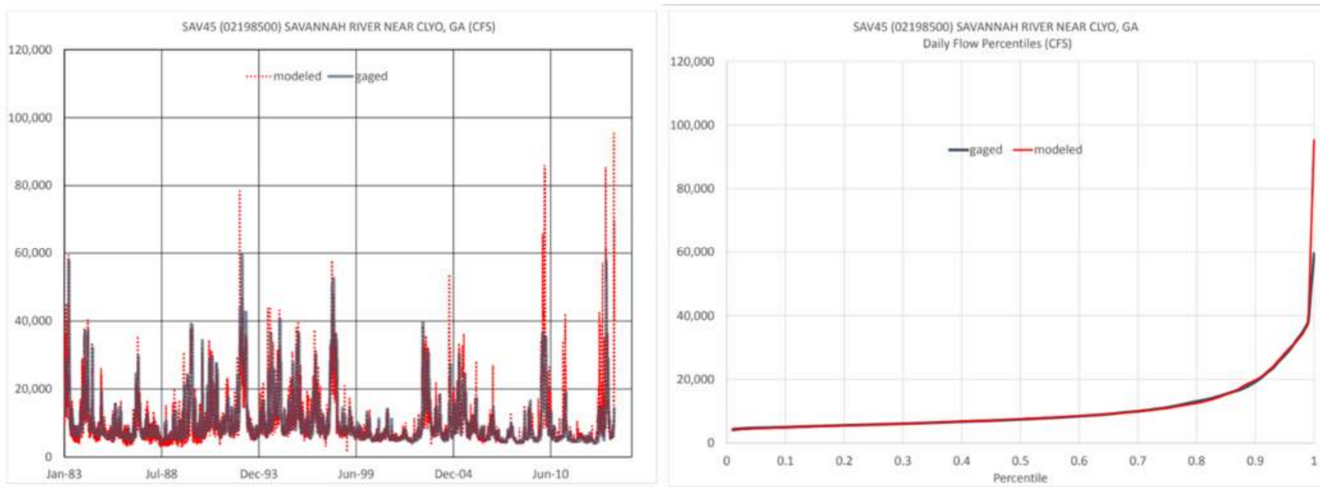


Figure 3-8. Representative Savannah River basin SWAM model verification graphs (CDM Smith 2017a).

3.2.2 Other Surface Water Analyses

While the SWAM models focus on the hydrology of larger main stem rivers and primary tributaries in the Lower Savannah-Salkehatchie River basin and other South Carolina basins, other work has focused on the hydrology and flow characteristics in smaller headwater streams, specifically those that are classified as wadable. As part of an effort to formulate relationships between hydrologic metrics (flow patterns, statistics, and variability in these streams for both pulses and long-term averages) with ecological suitability metrics, daily rainfall-runoff modeling of small headwater streams throughout the state was accomplished with the WaterFALL model (Watershed Flow ALLocation model), as described in Eddy et al. (2022) and Bower et al. (2022). As discussed in Bower et al. (2022), biological response metrics were developed and combined with the hydrologic metrics from WaterFALL to identify statistically significant correlations between flow characteristics and ecological suitability for fish and macroinvertebrates. The results are intended to help guide scientific decisions on maintaining natural hydrologic variations while also supporting consumptive water withdrawals. As a component in the analysis, the WaterFALL hydrologic modeling results augment the SWAM modeling results by providing similar hydrologic understanding of the smaller headwater streams not simulated explicitly or individually in SWAM. Chapter 5 further discusses the use of ecological flow metrics as performance measures in the Lower Savannah-Salkehatchie RBC planning process.

3.3 Groundwater Resources

3.3.1 Groundwater Aquifers

The Lower Savannah-Salkehatchie River basin is underlain by the Coastal Plain aquifer system, a wedge of layered aquifers and confining units that begins at the Fall Line and thickens toward the coast, as shown in Figure 3-9. Aquifers in the Coastal Plain are composed of permeable sand or limestone units separated by less permeable confining clay units laid on crystalline bedrock at the base. The Coastal Plain aquifer system's sediments range from 0 feet at land surface at the Fall Line to a depth of 3,833 feet at the coast. The lowermost aquifers in the basin are the Gramling and Charleston aquifers, which are overlain by the McQueen Branch, Crouch Branch, Gordon, Middle and Upper Floridan, and surficial aquifers. Figure 3-9 shows a schematic illustration of the aquifers underlying the Lower Savannah-Salkehatchie basin, and Figure 3-10 shows the regional extents of these aquifers.

An older version of South Carolina hydrostratigraphic nomenclature referred to the Upper and Middle Floridan aquifers as the Floridan aquifer system, the Gordon aquifer as the Tertiary sand aquifer, the Crouch Branch aquifer as the Black Creek aquifer, the McQueen Branch and Charleston aquifers as the Middendorf aquifer, and the Gramling aquifer as the Cape Fear aquifer (SCDNR 1995; USGS 2010). This alternative naming convention may be used in some publications, particularly those before 2010.

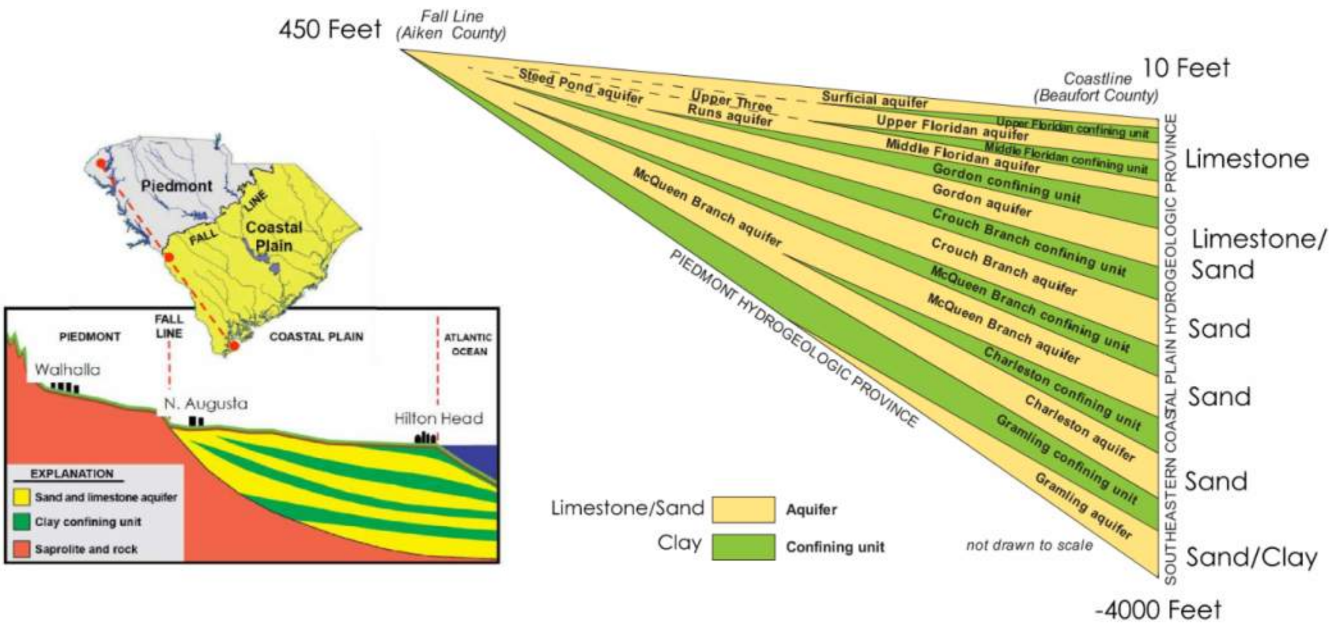


Figure 3-9. Coastal Plain aquifer system schematic cross sections (SCDNR 2023d).

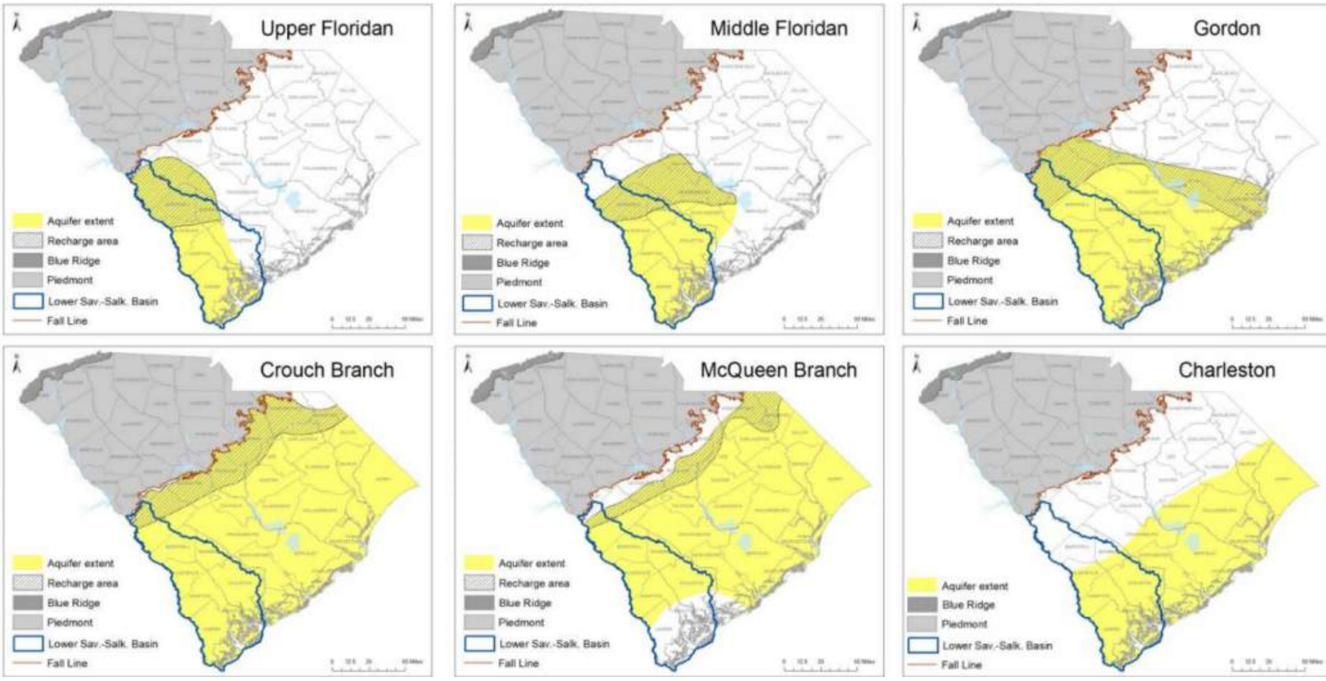


Figure 3-10. Aquifers underlying the Lower Savannah-Salkehatchie River basin (SCDNR 2023d).

Surficial Aquifer

The surficial aquifer, which occurs throughout the Coastal Plain, consists of the uppermost layer of permeable sediments that lie on the shallowest impermeable confining layer. It is shallow, unconfined, and hydraulically connected to surface water, and is often referred to as the water table aquifer. The surficial aquifer is composed of quartz, sand, and clay, with sediments becoming more fine-grained near the coast, and its thickness is generally less than 100 feet. Groundwater flow routes generally follow surface topography. Due to its unconfined nature and connection with surface water, groundwater levels in the surficial aquifer show more seasonal fluctuation and have more limited available drawdowns compared to those of the deeper confined aquifers. Surficial aquifer wells, which are typically 25 to 60 feet deep and generally yield less than 75 gallons per minute (gpm), are typically used for domestic and light commercial purposes (SCDNR 2009). Near the coast, where water in the Floridan aquifer is brackish, the surficial aquifer is used for domestic water supplies. Ponds that are hydraulically connected to the surficial aquifer may also be used as water supply for golf courses or agricultural irrigation.

Floridan Aquifer

The Floridan aquifer system is one of the most productive aquifer systems in the United States and has substantial volume pumped from it in southern South Carolina and coastal Georgia. The Floridan aquifer system is the primary groundwater source in all but the upper part of the Lower Savannah-Salkehatchie basin (SCDNR 2009).

In the lower half of the basin, the Floridan aquifer consists of two distinct aquifers, the Upper Floridan aquifer and the Middle Floridan aquifer, separated by the Middle Floridan confining unit. Although near the coast the confining unit is more than 200 feet thick, the two aquifers have generally similar water levels, suggesting both aquifers are hydraulically connected. In the upper part of the basin (Aiken and

Barnwell Counties), the confining unit separating the Upper and Middle Floridan aquifers is nonexistent, and the two aquifers become one, known as the Upper Three Runs aquifer. Closer to the Fall Line, in Aiken County, the confining unit between the Upper Three Runs aquifer and the underlying Gordon aquifer pinches out, and the combined aquifer in that area is referred to as the Steed Pond aquifer. In the lower half of the basin, the Upper and Middle Floridan aquifers consist primarily of limestone, while in the upper half of the basin, the aquifers consist primarily of unconsolidated sand and clay.

As the shallowest of the major aquifers in the basin, the top of the Floridan aquifer usually occurs within 50 to 100 feet of land surface, while the base of the aquifer is at its deepest in southern Beaufort County, where it occurs at about 600 feet. The limestone of the Floridan aquifer is more transmissive than other sand aquifers in South Carolina, allowing for well yields that can exceed 2,000 gpm.

In the Lower Savannah-Salkehatchie planning basin, recharge of the Floridan aquifer occurs in southern Aiken County, throughout most of Barnwell County, and in northern Bamberg County, where the aquifer is open to the atmosphere and is under water table conditions. Southeast of the recharge areas, the aquifer is overlain by clay and marl beds that confine the aquifer and create artesian conditions. Less interaction between groundwater and surface water is thought to occur in those areas.

Gordon Aquifer

The Gordon aquifer, which is composed of sand, clay, and clayey limestone, underlies the Floridan system across most of the basin (Figure 3-9) and is an important source of water for domestic supply, public supply, irrigation, and industry. The top of the Gordon aquifer occurs near land surface in Aiken County and slopes down to a depth of more than 1,600 feet in southern Beaufort County, and it thickens from less than 100 feet in Aiken County to about 300 feet near the coast. Well yields are typically less than 600 gpm (SCDNR 2009).

In this planning basin, recharge for the Gordon aquifer occurs primarily in Aiken County, where the aquifer is under water table conditions and discharges groundwater to local streams and other surface water bodies. Southeast of recharge area, the aquifer is overlain by confining clay beds, creating artesian conditions and hydraulically separating the aquifer from the overlying Floridan aquifer. Less interaction between groundwater and surface water is thought to occur in those areas.

Crouch Branch Aquifer

The Crouch Branch aquifer is an important source of water for public suppliers, industry, and agriculture, particularly in the upper half of the basin. The Crouch Branch aquifer underlies the Gordon aquifer (Figure 3-9) and consists largely of unconsolidated quartz sand and clay throughout the basin. It occurs at or near the surface in the northern parts of Aiken County and reaches depths of over 1,500 feet in coastal areas. Aquifer thickness ranges from 0 feet near the Fall Line to about 300 feet lower in the basin. Crouch Branch wells in Allendale, Barnwell, Colleton, and Hampton Counties are known to yield more than 1,000 gpm (SCDNR 2009).

In this planning basin, recharge of the Crouch Branch aquifer occurs in Aiken County, where the aquifer is under water table conditions. The Crouch Branch confining unit, which normally separates the Gordon and Crouch Branch aquifers, is generally thin and discontinuous in the recharge areas, and the Crouch Branch is often in direct contact with the overlying Gordon aquifer. Precipitation moves downward through the Gordon aquifer and recharges the underlying Crouch Branch aquifer. In low-lying areas of

Aiken County, the Gordon aquifer is eroded and the Crouch Branch is directly recharged by precipitation. Southeast of the recharge areas, starting in northern Barnwell County, the aquifer is overlain by continuous clay beds that confine the aquifer and create artesian conditions. Less interaction between groundwater and surface occurs in those areas.

McQueen Branch and Charleston Aquifers

The McQueen Branch aquifer, which is the primary water supply aquifer in Aiken and Barnwell Counties, underlies the Crouch Branch aquifer throughout the basin (Figure 3-9) and consists largely of unconsolidated quartz, sand, and clay. The aquifer occurs at or near the surface in the northern parts of Aiken County and reaches depths of almost 1,500 feet in southern Hampton County, where the aquifer reaches a thickness of about 300 feet. McQueen Branch wells in the central part of the basin can produce more than 2,000 gpm (SCDNR 2009). In Jasper, Beaufort, and southern Colleton Counties, the sands of the McQueen Branch aquifer become so fine that they yield so little water that the unit is no longer defined as a viable aquifer in this area. In these coastal areas, the McQueen Branch aquifer is generally not used for water supply because of its depth, its relatively poor ability to yield water, and more readily available water in shallower aquifers.

In this planning basin, recharge of the McQueen Branch aquifer occurs in Aiken County where confining units are thin and discontinuous. In this area, the aquifer is thought to be under water table conditions. Because the McQueen Branch confining unit, which normally separates the Crouch Branch and McQueen Branch aquifers, and the Crouch Branch confining unit are generally both thin and discontinuous in these areas, the McQueen Branch is hydraulically connected with both the Gordon and Crouch Branch aquifers. Precipitation moves downward through the Gordon and Crouch Branch aquifers and recharges the underlying McQueen Branch. In low-lying areas of Aiken County, the Gordon and Crouch Branch aquifers are eroded, and the McQueen Branch is directly recharged by precipitation. Southeast of the recharge areas, starting in northern Barnwell County, the aquifer is overlain by continuous clay beds that confine the aquifer, hydraulically isolate the aquifer from the overlying aquifers, and create artesian conditions. Less interaction between groundwater and surface water occurs in those areas.

The Charleston aquifer underlies the McQueen Branch aquifer in the lower half of the basin. The Charleston aquifer is used for public supply, industry, and golf course irrigation around the central coastal portion of the state. Its use is limited to one user in eastern Colleton County in the Lower Savannah-Salkehatchie basin due to the availability of shallower productive aquifers. In the upper half of the basin, the confining unit above the Charleston aquifer thins away to nothing, and the Charleston aquifer becomes part of the McQueen Branch aquifer. The depth of the Charleston aquifer ranges from almost 1,500 feet in central Allendale County, where it first occurs, to as deep as 2,500 feet at Hilton Head Island, where the aquifer is about 150 feet thick. Because the Charleston aquifer is never near land surface, its recharge occurs primarily by movement of water from the McQueen Branch aquifer.

Gramling Aquifer

The Gramling aquifer underlies the Charleston aquifer (Figure 3-9) and is the basal aquifer of the South Carolina Coastal Plain. It is composed of quartz sand, clayey sand, silt, and clay, and much like the Charleston aquifer, the Gramling aquifer only occurs in the lower half of the Coastal Plain. Depths to the top of the Gramling range from about 1,500 feet in Allendale County to more than 2,700 feet in southern Beaufort County, where its thickness exceeds 1,000 feet (SCDNR 2009). Primarily because of its depth, few wells in the basin use this aquifer. Recharge of the Gramling aquifer occurs solely by leakage from overlying aquifers.

3.3.2 Groundwater Monitoring

Groundwater monitoring wells are used to identify short- and long-term trends in groundwater levels and aquifer storage and to monitor drought conditions by providing continuous, long-term records of groundwater levels at specific sites. Most of the actively monitored wells have water level records dating to the 1990s, with one dating as far back as 1955.

Groundwater monitoring is performed by SCDES and the USGS. Statewide, the groundwater monitoring network operated by SCDES has more than 180 wells as of 2024, the majority of which are in the Coastal Plain (SCDES 2024a). Most SCDES wells are equipped with automatic data recorders that measure and record water levels every hour, while others are measured manually four to six times per year. The USGS also maintains a groundwater-level monitoring network of 21 wells in South Carolina. The Lower Savannah-Salkehatchie basin currently contains a total of 75 active monitoring wells, monitored by USGS and SCDES (SCDES 2024b). The locations of the SCDES wells monitoring groundwater levels in each aquifer are shown in Chapter 5 (Figure 5-12).

SCDES routinely measures water levels in other non-network wells to develop potentiometric maps for the major Coastal Plain aquifers. A potentiometric map is a contour map that illustrates the elevation to which groundwater will rise in a well open to a particular aquifer. Unlike monitoring wells, which provide continuous records of changing aquifer conditions at specific locations, potentiometric maps provide “snapshots” of aquifer conditions over the full extent of the aquifer at one moment in time. Areas of relatively significant groundwater level declines are indicated on potentiometric maps by relatively lower potentiometric elevations, often seen as concentric loops of contours lines known as a cone of depression. Typically, SCDES produces new potentiometric maps for the Floridan, Gordon, Crouch Branch, and McQueen Branch/Charleston aquifers every three years.

Examples of monitoring well hydrographs and potentiometric maps that can be created using monitoring well data are shown in Figure 3-11 and Figure 3-12, respectively. More detailed descriptions of monitoring well data and potentiometric maps are included in Chapter 5.

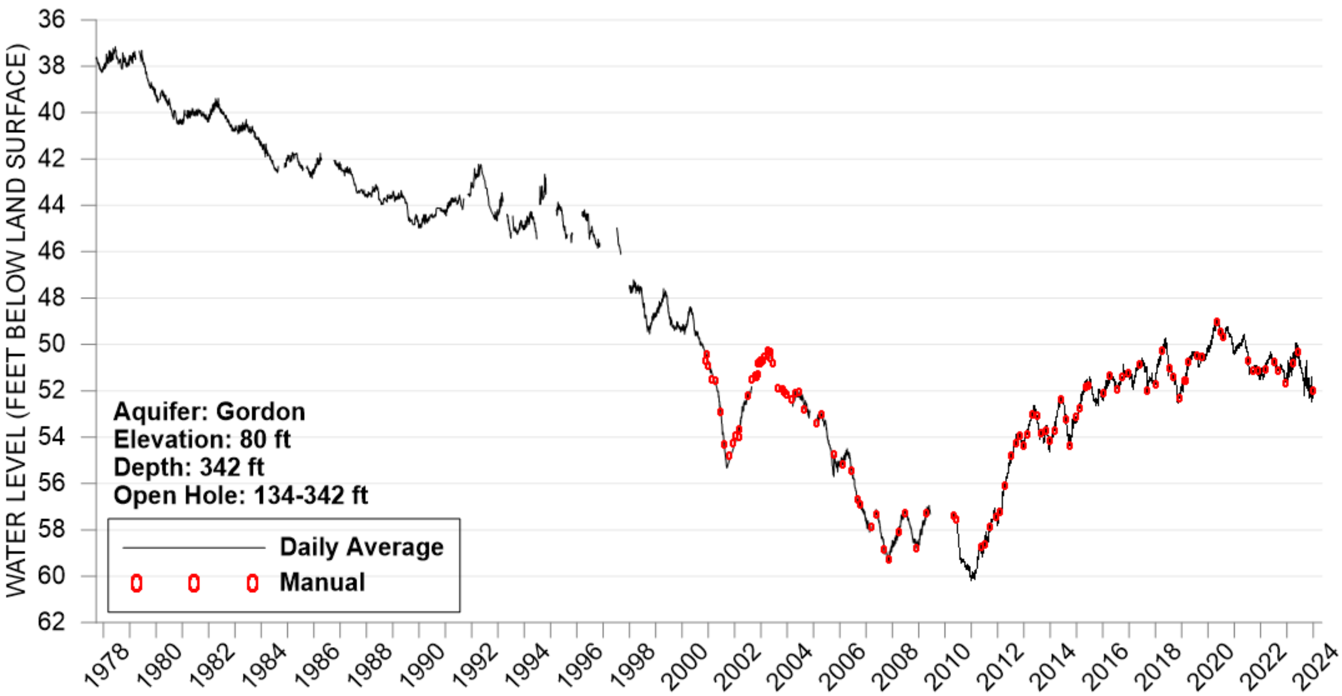


Figure 3-11. Example monitoring well hydrograph showing groundwater level trends in the Gordon aquifer in Colleton County.

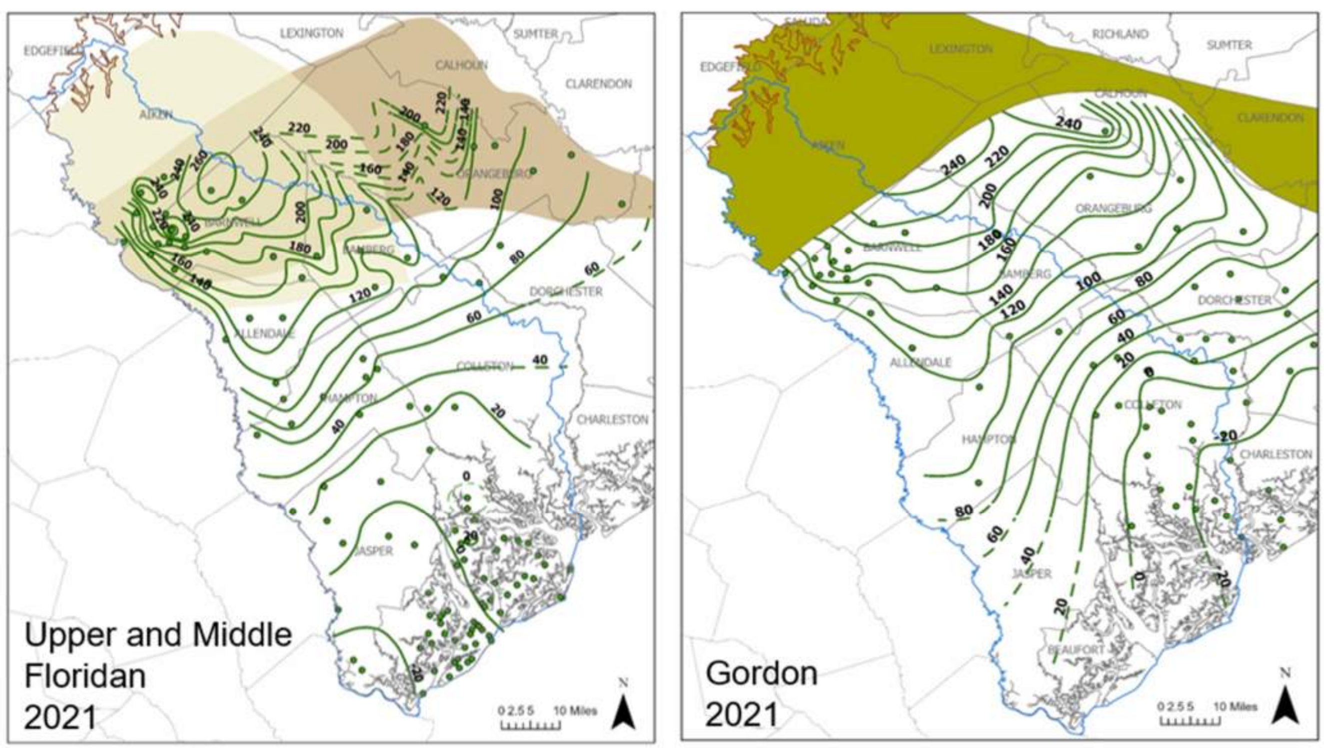


Figure 3-12. Examples of recent potentiometric surface maps of the Floridan and Gordon aquifers in and adjacent to the Lower Savannah-Salkehatchie basin.

3.3.3 Groundwater Development

Groundwater supplies have been developed in the Lower Savannah-Salkehatchie River basin to serve municipalities, agriculture, industry, and golf courses. In 2023, the average withdrawal of groundwater for all uses was approximately 72 million gallons per day (MGD), or 26.6 billion gallons for the year (SCDES 2024b). This does not include relatively minor withdrawals from domestic and other wells which are below the reporting limit of 3 million gallons per month (MGM). Public water supply and agriculture are by far the two largest groundwater users in the basin, with public supply withdrawals of 35 MGD (or 12.8 billion gallons for the year) and agricultural withdrawals of 30 MGD (11.0 billion gallons for the year) in 2023. Industrial use was 4 MGD and golf course use was 3 MGD.

Many small towns and communities in the Lower Savannah-Salkehatchie River basin are solely dependent on groundwater supplies, as are some larger municipalities such as Walterboro and Barnwell. Most larger water providers, for example the City of Aiken and BJWSA, use groundwater but also have access to surface water supplies.

Near the coast, some municipal water providers have implemented ASR programs to store treated water in aquifers when water demand is low and extract the stored water when demand is high. BJWSA injects and stores approximately 300 million gallons of surface water from the Savannah River into the Middle Floridan aquifer each year (Chemask 2025). Hilton Head PSD extracts brackish water from the Middle Floridan aquifer, removes the salt using reverse osmosis, and returns it to the same aquifer for storage, storing about 260 million gallons each year (Nardi 2025).

3.3.4 Capacity Use Areas

Groundwater in South Carolina is regulated by SCDES in areas designated as Capacity Use Areas (CUAs). Under South Carolina's Groundwater Use and Reporting Act (Chapter 5, Section 49-5-60), a CUA is designated where excessive groundwater withdrawals present potential adverse effects to natural resources, public health, safety, or economic welfare. SCDES then coordinates with affected governing bodies and groundwater withdrawers to develop a groundwater management plan for the CUA.

The basin includes parts of two CUAs: the Western CUA in the upper part of the basin and the Lowcountry CUA in the lower part of the basin. See Chapter 1, Figure 1-4 for a map of the CUAs.

The Western CUA, consisting of Aiken, Allendale, Bamberg, Barnwell, Calhoun, Lexington, and Orangeburg Counties, was designated on November 8, 2018. Although there are no major cones of depression in this area, groundwater monitoring wells illustrate long-term water level declines of up to 15 feet in the Floridan/Gordon, Crouch Branch, and McQueen Branch aquifers (Foxworth and Hughes 2019).

The Lowcountry CUA, consisting of Beaufort, Colleton, Hampton, and Jasper Counties, was designated on July 24, 1981. This CUA was established due to concerns about saltwater intrusion from water level declines observed in the Upper Floridan aquifer near Savannah, Georgia and at Hilton Head Island (Berezowska and Monroe 2017). Much of the updip area of the Upper Floridan aquifer is unaffected by this pumping, and groundwater levels are close to predevelopment conditions (USGS 2010). Regulatory groundwater permit limits enacted on Upper Floridan aquifer withdrawals at Hilton Head combined with alternative surface water sources and groundwater from deeper aquifers have caused a leveling off over time of the Upper Floridan aquifer at Hilton Head.

3.3.5 Groundwater Concerns

In the Lower Savannah-Salkehatchie basin, groundwater levels have declined since predevelopment but are generally stable (SCDNR 2017). A significant concern in the basin is the cone of depression in the Upper Floridan aquifer under Savannah, Georgia. While the cone itself is centered outside of the state, it has created a potentiometric low that extends into South Carolina, causing groundwater declines as well as altering flow paths. In some locations near the coast, groundwater levels have declined to at or below sea level, resulting in saltwater intrusion.

To manage this cone of depression, the permitting agencies of South Carolina and Georgia have reduced pumping in the Savannah/Hilton Head area since the late 1990s (Berezowska and Monroe 2017). In addition, the Lowcountry CUA groundwater management plan includes the protection of groundwater quality from saltwater intrusion as one of its goals.

In discussions at the February 6, 2025 RBC meeting, attendees noted groundwater concerns and challenges, including:

- Saltwater intrusion on Hilton Head Island
- Possible connection between septic tank inundation and groundwater
- Potential for subsidence in Upper Floridan aquifer due to new withdrawals

3.4 Groundwater Assessment Tools

The primary tools used by the RBC to evaluate current and future groundwater conditions and available supplies for this Lower Savannah-Salkehatchie River Basin Plan are groundwater monitoring data and information, potentiometric maps, and current and projected groundwater use data as described in Section 3.3 above.

Groundwater flow models can be useful tools for simulating current and future groundwater levels, predicting changes in aquifer storage and groundwater flow direction, and evaluating the effectiveness and impacts of various groundwater management strategies. The RBC intended to use a groundwater flow model developed by the USGS to estimate future groundwater conditions resulting from various water use scenarios and to quantify the impacts of proposed groundwater management recommendations. Unfortunately, the development of the groundwater model was delayed to the extent that it was not available for use during this phase of the water planning process. Once completed, the groundwater model can be used by the Lower Savannah-Salkehatchie RBC to evaluate groundwater supply issues and potential management strategies and include those findings in later versions of the water plan.

Chapter 4
Current and Projected Water Demand

This chapter summarizes current and projected water demands over the 50-year planning horizon from 2020 to 2070 in the Lower Savannah and Salkehatchie River basins. Demand projections are based on historical demands and published projection datasets for variables that influence water demand including population, economic development, and irrigated acreage. A statistical model was built to project demands for each major water use category using the current demands and driver variables. Consistent with the Planning Framework, two demand projections were developed: a Moderate Demand Scenario using median rates of water use and moderate growth, and a High Demand Scenario using high rates of water use and high growth. A third scenario, the High Growth Scenario, was developed as a supplemental analysis for groundwater demands to represent high growth rates with more modest estimates of high water use. The demand projections were used to assess future water availability as summarized in Chapters 5 and 6.

4.1 Current Water Demand

Current water demands reflect withdrawal data as reported to SCDES that were available at the time of the analysis. Current surface water demands are based on data available through 2019 and were developed to reflect average withdrawals over the last 10 years (in most cases). Current groundwater demands are based on withdrawals reported for 2014 to 2021 and were developed to reflect average withdrawals over that 8-year period. Some users near the coast were excluded from surface water analysis because they withdraw from tidally influenced sections of the basin's rivers that were not included in the surface water modeling completed for this plan. Withdrawals for these users are not included in this chapter.

The withdrawals used for this demand characterization were reported to SCDES by permitted and registered water users in the Lower Savannah and Salkehatchie River basins as required by state regulation. All users withdrawing more than 3 million gallons of surface water or groundwater in any month must either obtain a permit or register their use and report withdrawals to SCDES annually. Users withdrawing less than this threshold are not required to report their withdrawals; however, they may choose to report voluntarily. For surface water withdrawals over the threshold, agricultural water users must register their use while all other users must permit their use in accordance with SCDES's Regulation 61-119, Surface Water Withdrawal, Permitting, Use and Reporting. For groundwater withdrawals over the threshold, users withdrawing within a CUA must permit their use, while those withdrawing outside of a CUA must only register their use. All of the Lower Savannah-Salkehatchie River Basin is in a CUA, therefore, all groundwater users over the 3 MGM threshold are permitted.

The total current withdrawal from permitted and registered South Carolina users in the Lower Savannah and Salkehatchie River basins is 246.4 MGD. Current withdrawals in the Lower Savannah River basin total approximately 203.9 MGD on average, with 167.6 MGD from surface water and 36.2 MGD from groundwater. Of the 167.6 MGD of surface water withdrawal, only 20 percent (34.1 MGD) of the water is consumptively used and 80 percent (133.5 MGD) is returned to streams and rivers after use. Consumptive use was not calculated for groundwater users. Due to the type and age of collection systems, discharge data suggests there may be substantial inflow and infiltration which hinders the calculation of consumptive use. Current Salkehatchie River basin withdrawals total approximately 42.5 MGD on average, with 2.8 MGD from surface water and 39.8 MGD from groundwater. 100 percent of the surface water withdrawals in the Salkehatchie River basin are used for agriculture and are assumed to be consumptive. Consumptive use was not calculated for groundwater users.

Current water use for the Lower Savannah River basin is summarized in Table 4-1. The largest water use category is thermoelectric (50.5 percent of the total basin use). Dominion Urquhart Station is the only user in this category, withdrawing 103.1 MGD; however, only 2.5 percent of total withdrawal is consumed, and 97.5 percent is returned downstream. The next largest use categories are public supply, with 71.9 MGD of withdrawals (35.3 percent of basin withdrawals), manufacturing, with 22.4 MGD of withdrawals (11.0 percent), agriculture, with 5.3 MGD of withdrawals (2.6 percent), and golf course irrigation, with 1.3 MGD of withdrawals (0.6 percent). Figure 4-1 illustrates the distribution of water use by sector for all sectors in the Lower Savannah River basin.

Current water use for the Salkehatchie is summarized in Table 4-2. Agriculture has the largest withdrawal with 31.5 MGD (74.2 percent of basin withdrawals). Public supply and golf course irrigation have the next largest withdrawals with 7.8 MGD (18.4 percent) and 2.3 MGD (5.5 percent) of withdrawals, respectively. Minimal water withdrawals are associated with aquaculture (1.0 percent), thermoelectric (0.9 percent), and manufacturing (0.2 percent). Figure 4-1 illustrates distribution for all sectors in the Salkehatchie River basin.

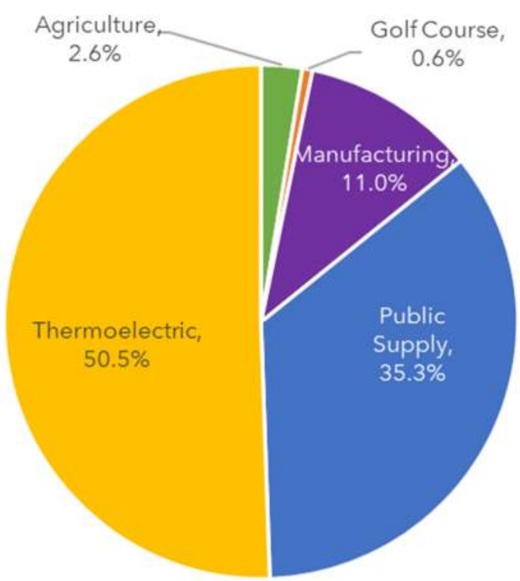
Appendix B includes a table of all water users along with the user's source (surface water or groundwater), withdrawals, and discharges. For surface water modeling purposes, consumptive use percentages (i.e., the amount of water withdrawn that is not returned to surface water or groundwater) for each water user were calculated by comparing withdrawal and discharge amounts as reported to SCDES. For groundwater users, this calculation of consumptive use was not possible for all users. Consumptive use is noted in Appendix B as 100 percent for groundwater users. This is reasonable for agricultural users and users that may return withdrawals to the groundwater system through septic tanks. For groundwater users with National Pollutant Discharge Elimination System (NPDES) discharge permits that discharge to these basins, the discharges are listed separately in the table in Appendix B.

Table 4-1. Current water demand in the Lower Savannah River basin.

Water Use Category	Groundwater (MGD)	Surface Water (MGD)	Total (MGD)
Thermoelectric	-	103.1	103.1
Public Supply	26.6	45.2	71.9
Manufacturing	3.6	18.7	22.4
Golf Course	0.7	0.6	1.3
Agriculture	5.3	-	5.3
Total	**36.2**	**167.6**	**203.9**

Table 4-2. Current water demand in the Salkehatchie River basin.

Water Use Category	Groundwater (MGD)	Surface Water (MGD)	Total (MGD)
Thermoelectric	0.4	-	0.4
Public Supply	7.8	-	7.8
Manufacturing	0.1	-	0.1
Golf Course	2.3	-	2.3
Agriculture	28.8	2.8	31.5
Aquaculture	0.4	-	0.4
Total	**39.8**	**2.8**	**42.5**



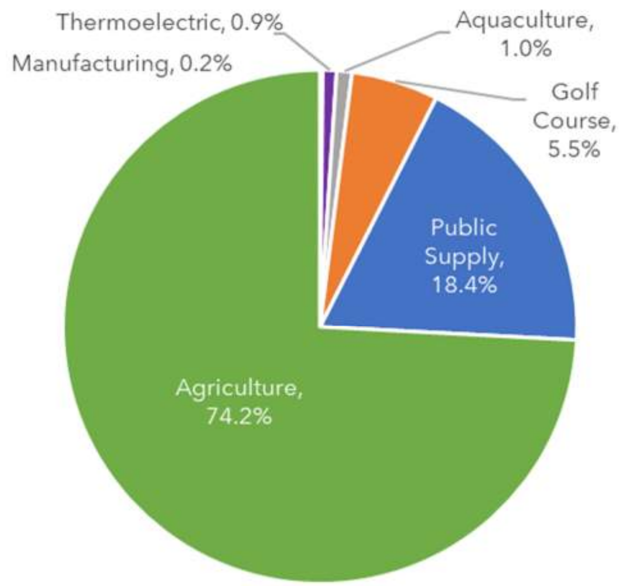


Figure 4-1. Current water use category percentages of total demand for Lower Savannah (left) and Salkehatchie (right).

To evaluate surface water availability in the Lower Savannah River basin, it was necessary to include withdrawals and discharges in the Lower Savannah River basin for Georgia users. The withdrawal and return data used for the demands calculations were obtained from Georgia Environmental Protection Division's (GAEPD) Consumptive Use Database. Facilities that withdraw or discharge in Georgia are required to report relevant data to GAEPD on a monthly basis. Current Georgia demands are summarized in Table 4-3. Total surface water demand for the Lower Savannah basin is 338.7 MGD with 167.6 MGD withdrawal for South Carolina users and 171.1 MGD withdrawal for Georgia users.

Table 4-3. Georgia surface water demands in the Lower Savannah River basin.

Water User Group[1]	Withdrawal (MGD)	Consumptive Use (MGD)	Return (MGD)
Augusta	56.6	8.8	47.8
South Augusta	47.5	3.4	44.1
Plant Vogtle	43.4	43.4	-
Briar Creek	3.5	0.9	2.6
Effingham	20.1	6.7	13.4
Total	**171.1**	**63.2**	**107.9**

[1] Georgia-side water users were aggregated into groups based on their general location within the basin.

Georgia Regional Water Plans summarize current and projected groundwater use in Georgia at the county level. Six of these counties border South Carolina and overlap the Lower Savannah River basin boundary: Burke, Chatham, Columbia, Effingham, Richmond, and Screven. Current groundwater withdrawal from all six counties is 136.0 MGD with 37.7 MGD from Burke, 44.6 MGD from Chatham, 3.4 MGD from Columbia, 13.0 MGD from Effingham, 8.5 MGD from Richmond, and 28.8 MGD from Screven. Groundwater withdrawals from these six counties are for municipal, industrial, energy, and agriculture use (CDM Smith 2024a, 2024b, 2024c).

4.2 Permitted and Registered Water Use

As of September 2024, 1,506.9 MGD has been permitted or registered in the Lower Savannah River basin. Of this total,1,420.8 MGD of surface water has been permitted, 0.0002 MGD of surface water has been registered, 86.0 MGD of groundwater has been permitted, and 0.05 MGD of groundwater has been registered. Currently, 13.5 percent (203.9 MGD) of the total permitted and registered amount is withdrawn. Groundwater registrations in the Lower Savannah River basin consist of all users below the 3 MGM permitting threshold that voluntarily choose to report their use to SCDES. Groundwater registrations do not include a withdrawal limit; the values discussed in this chapter reflect the current use of these registered users.

For the Salkehatchie River basin, 118.5 MGD has been permitted or registered. This total includes 47.6 MGD of agricultural surface water registrations, 70.8 MGD of groundwater permits, and 0.1 MGD of groundwater registrations. There are no surface water permits in the Salkehatchie River basin. Currently, 35.9 percent (42.5 MGD) of the total permitted and registered surface water amount is withdrawn. As with the Lower Savannah River Basin, the groundwater registrations in the Salkehatchie River basin consist of all users below the 3 MGM permitting threshold that voluntarily choose to report their use to SCDES.

Figure 4-2 shows the location of all permitted and registered surface water intakes and groundwater wells in the basin. Table 4-4 summarizes permitted and registered surface water and groundwater withdrawals by water use category for the Lower Savannah River basin, and Table 4-5 summarizes permitted and registered surface water and groundwater by water use category for the Salkehatchie River basin. Appendix B includes a table of all permitted or registered withdrawals for each user.

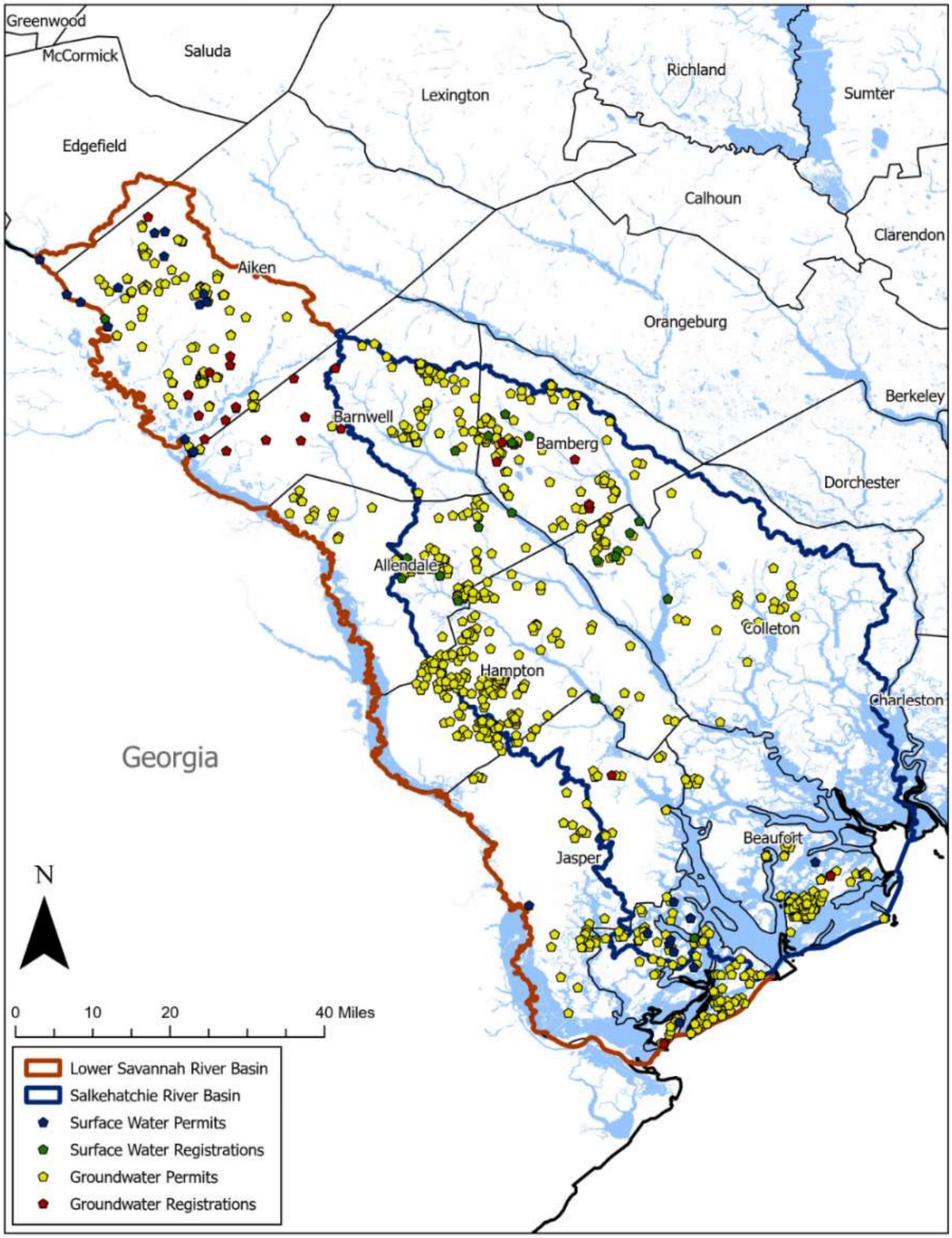


Figure 4-2. Locations of permitted and registered water intakes and groundwater wells in the Lower Savannah and Salkehatchie River basins.

Table 4-4. Permitted and registered surface water totals by category in the Lower Savannah River basin.

Water Use Category	Surface Water (MGD)			Groundwater (MGD)			Total (MGD)		
	Permitted	Registered	Total	Permitted	Registered[1]	Total	Permitted	Registered	Total
Thermoelectric	217.1	-	217.1	-	-	-	217.1	-	217.1
Public Supply	309.3	-	309.2	69.2	0.005	69.2	378.4	0.005	378.4
Manufacturing	881.3	-	881.3	6.0	0.03	6.0	887.3	0.03	887.3
Golf Course	13.2	-	13.2	1.8	0.02	1.8	14.9	0.02	14.9
Agriculture	-	0.0002	0.0002	9.1	-	9.1	9.1	0.0002	9.1
Total	**1,420.8**	**0.0002**	**1,420.8**	**86.0**	**0.05**	**86.1**	**1,506.8**	**0.05**	**1,506.9**

Water Use Category	Percentage of Total Permitted and Registered Surface Water Currently in Use	Percentage of Total Permitted and Registered Groundwater Currently in Use	Percentage of Total Permitted and Registered Water Currently in Use
Thermoelectric	47.5%	-	47.5%
Public Supply	14.6%	38.5%	19.0%
Manufacturing	2.1%	60.8%	2.5%
Golf Course	4.7%	38.9%	8.8%
Agriculture	-	57.9%	57.9%
Total	**11.8%**	**42.1%**	**13.5%**

[1]Groundwater registrations do not include limits and were assumed to be equal to current use.

Table 4-5. Permitted and registered surface water totals by category in the Salkehatchie River basin.

Water Use Category	Surface Water (MGD)			Groundwater (MGD)			Total (MGD)		
	Permitted	Registered	Total	Permitted	Registered[1]	Total	Permitted	Registered	Total
Thermoelectric	-	-	-	0.5	-	0.5	0.5	-	0.5
Public Supply	-	-	-	13.4	0.1	13.5	13.4	0.1	13.5
Manufacturing	-	-	-	0.6	-	0.6	0.6	-	0.6
Golf Course	-	-	-	4.5	-	4.5	4.5	-	4.5
Agriculture	-	47.6	47.6	51.2	0.04	51.2	51.5	47.6	98.8
Aquaculture	-	-	-	0.6	-	0.6	0.6	-	0.6
Total	**-**	**47.6**	**47.6**	**70.8**	**0.1**	**70.9**	**70.9**	**47.7**	**118.5**

Water Use Category	Percentage of Total Permitted and Registered Surface Water Currently in Use	Percentage of Total Permitted and Registered Groundwater Currently in Use	Percentage of Total Permitted and Registered Water Currently in Use
Thermoelectric	-	79.6%	79.6%
Public Supply	-	58.0%	58.0%
Manufacturing	-	11.5%	11.5%
Golf Course	-	51.6%	51.6%
Agriculture	5.8%	56.2%	31.9%
Aquaculture	-	66.1%	66.1%
Total	**5.8%**	**56.1%**	**35.9%**

[1]Groundwater registrations do not include limits and were assumed to be equal to current use.

4.3 Projection Methodology

The methodology to calculate demand projections followed the guidance in *Projection Methods for Off-Stream Water Demand in South Carolina* (SCDNR 2019c). SCDNR developed this document over several years in collaboration with the South Carolina Water Resources Center at Clemson University and the USACE, with additional input from stakeholders including:

- South Carolina Water Works Association Water Utility Council
- South Carolina Farm Bureau Water Committee
- South Carolina Chamber of Commerce Environmental Committee
- South Carolina Water Quality Association
- PPAC

Following the guidance in the statewide projections report, SCDES developed demands for the Lower Savannah River and Salkehatchie River basins with only minor deviations from the framework, as presented in this section. Demands were projected to increase for the public water supply, manufacturing, and agriculture sectors. Nearly all water used for hydroelectric power generation is returned directly to the river and was assumed to remain constant. Demands for golf courses and aquaculture were also assumed to remain stable over the planning horizon.

For the three water use categories with projected increases in demands, the projection methodology varies by water use category. Each water use category has an associated driver variable that influences demand growth, as shown in Table 4-6. Projections for these driver variables come from a variety of published sources. Published values were extrapolated to 2070 to match the planning horizon of the River Basin Plan.

Two demand projections were developed for surface water: (1) the Moderate Water Demand Scenario (Moderate Demand Scenario) and (2) the High Water Demand Scenario (High Demand Scenario). The Moderate Demand Scenario was originally referred to as the Business-as-Usual Scenario in the Planning Framework. The Moderate Demand Scenario is based on median rates of water use in recent reporting and moderate growth projections, while the High Demand Scenario is based on the maximum monthly rates of water use in recent reporting and high-growth projections. While it is unlikely that the conditions of the High Demand Scenario would occur for an extended time or universally across the basin, the scenario is useful for establishing an upper bound for the projected demand. For groundwater users, a third scenario called the High Growth Scenario was also developed to represent a potentially more realistic scenario of high demands where high growth projections are paired with median rates of water use. SCDES determined this High Growth Scenario could be valuable for analysis of the impacts to groundwater since groundwater recharge may occur very slowly for some aquifers, and extended high rates of withdrawal may result in unrealistic drawdown impacts. The subchapters present additional details on the calculation of demand for each water use category.

Table 4-6. Driver variables for each water use category.

Water Use Category	Driver Variable	Driver Variable Data Source	Moderate Demand Scenario	High Demand Scenario and High Growth Scenario
Public Supply	Population	South Carolina Office of Revenue and Fiscal Affairs (SC ORFA)	SC ORFA projection to 2035; extend straight-line growth or assume constant population if the population projection is negative	Project using statewide or countywide growth rate, increased by 10%
Manufacturing	Economic production	Subsector growth rates from the U.S. Energy Information Agency (EIA)	Manufacturing subsector growth with the minimum adjusted to 0%	Manufacturing subsector growth with the minimum adjusted to 2.1%[1]
Agriculture	Irrigated acreage	National-scale studies: Brown et al. 2013 and Crane-Droesch et al. 2019	Assume irrigated acreage increases with an annual growth rate of 0.65%	Assume irrigated acreage increases with an annual growth rate of 0.73%
Thermoelectric	NA	NA	Assumed constant	Assumed constant
Golf Course	NA	NA	Assumed constant	Assumed constant
Aquaculture	NA	NA	Assumed Constant	Assumed constant

NA – not applicable

[1] 2.1% is the total overall EIA economic growth projection increased by 10% (1.9% + 10% x 1.9% = 2.1%)

4.3.1 Public Supply Demand Projections Methodology

Public supply is the second largest water use sector in the Lower Savannah River basin and in the Salkehatchie River basin. Demand projections for public supply were developed based on county-level population and water use projections. Population projections for the Moderate Demand Scenario were obtained from SC ORFA. These projections, which end in 2035, were extended to 2070. For the Moderate Demand Scenario, projections are extended linearly. If SC ORFA projections indicate a decline in population, then the extension to 2070 is flatlined at 2035 levels. For the High Demand and High Growth Scenarios, populations are projected to grow exponentially. If SC ORFA projected growth, then the exponential growth rate was increased by 10 percent. If the SC ORFA projection for a county was less than the state average, then the high-scenario population projection is set at the state average plus 10 percent. The High Demand Scenario pairs high projected growth with maximum monthly rates of use while the High Growth Scenario pairs high projected growth with median monthly rates of use. As shown in Figure 4-3, some counties are projected to experience population declines while others may experience substantial growth in both the Moderate and High Demand Scenarios (population projections for the High Demand and the High Growth Scenarios are the same and are shown with a single line on Figure 4-3). Approximately 69 percent of public supply water use in the Lower Savannah River basin is from surface water, while 100 percent of the public supply use in the Salkehatchie River basin is from groundwater.

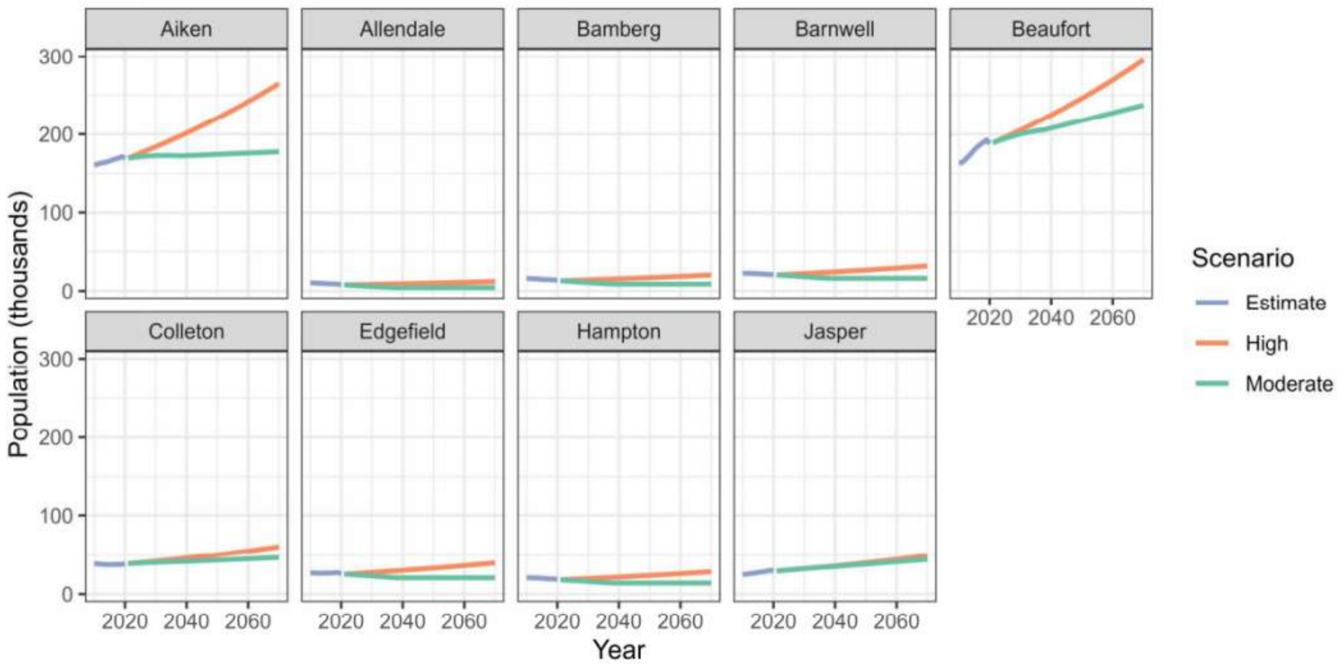


Figure 4-3. Population projections for counties withdrawing water from the Lower Savannah and Salkehatchie River basins (Sangha 2024).

4.3.2 Manufacturing Demand Projections Methodology

Water is used for manufacturing in the Lower Savannah-Salkehatchie River basin for producing products such as paper, chemical, plastics and rubber, and wood products. Manufacturing demand projections were based on projected subsector growth rates from EIA, which ranged from 0.1 to 2.1 percent for the sectors present in the Lower Savannah-Salkehatchie River basin (EIA 2023). The Moderate Demand Scenario used EIA projected growth rates, while the High Demand and High Growth Scenarios increased growth rates 10 percent over their projected values. The High Demand Scenario pairs high projected growth with maximum monthly rates of use while the High Growth Scenario pairs high projected growth with median monthly rates of use. The majority of manufacturing use in the Lower Savannah River basin is from surface water while 100 percent of the manufacturing use in the Salkehatchie River basin is from groundwater.

4.3.3 Agriculture Demand Projections Methodology

Water demand projections for agriculture were developed using existing unit use rates and projections of increases in irrigated area. Moderate Demand Scenario projections were based on regional projections of irrigation in the southeast growing 0.65 percent per year (Brown et al. 2013). For the High Demand and High Growth Scenarios, the growth rate was increased to 0.73 percent per year, based on projections of climate change impacts on agricultural irrigation (Crane-Droesch et al. 2019). The High Demand Scenario pairs high projected growth with maximum monthly rates of use while the High Growth Scenario pairs high projected growth with median monthly rates of use.

For input to the SWAM model, projected growth of irrigation water use was assigned to subbasin outlets in the model. This method represents a relatively robust assumption that irrigation will expand somewhere in each subbasin where irrigation currently occurs but might underrepresent expansion of irrigation withdrawals on small tributaries within each subbasin.

4.3.4 Other Demand Projections Methodology

Other water withdrawals in the Lower Savannah and Salkehatchie River basins support thermoelectric energy production, golf course irrigation, and aquaculture. Water use for thermoelectric energy production was held constant as there are not public plans for expansion in the future. Water use for golf courses and aquaculture is low, and was held constant into the future. For the Moderate Demand and High Growth Scenarios, demands for these use categories were held constant based on median rates of recent historic use. For the High Demand Scenario, demands for these use categories were held constant based on maximum rates of recent historic use. This approach means that while demands for these use categories are held constant within a scenario, the demands differ between scenarios.

4.3.5 Georgia Demand Projections Methodology

Future withdrawals from the Lower Savannah River basin for Georgia were also considered. For surface water withdrawals, the 2020 to 2060 growth projections for Georgia-side water users (CDM Smith 2024a, 2024b, 2024c) were used to estimate the surface water demand growth through 2070. For the purpose of South Carolina Lower Savannah River basin demand forecasting, Georgia-side water demands were grouped into nine consolidated users based on geography and/or source water. Growth factors were calculated for each consolidated water user group based on the percent growth by sector and the current withdrawal amounts reported for individual water users within that group. Future 2070 demands for the nine consolidated Georgia water users were calculated by multiplying the monthly current demands by the growth factors.

For groundwater withdrawals, Georgia groundwater demand projections through 2060 were taken from the Georgia Regional Water Plans (CDM Smith 2024a, 2024b, 2024c). Since no groundwater model was used as part of this River Basin Plan, the projections were summarized as is and were not extended to 2070. Groundwater demands were presented at a county level.

4.4 Projected Water Demand

For the Lower Savannah River basin, from 2025 to 2070, total withdrawals are projected to increase by 10 percent from 190.2 MGD to 208.7 MGD under the Moderate Demand Scenario and by 28 percent from 282.3 MGD to 360.1 MGD under the High Demand Scenario. The Moderate and High Demand Scenarios have different starting points from one another and differ from the current use because the Moderate Demand Scenario is based on each user's median recent use, the High Demand Scenario is based on each user's maximum recent use, and the Current Use Scenario is based on each user's average recent use. Total water demand is expected to reach 14 to 24 percent of currently permitted and registered total water withdrawals by 2070 for the Moderate and High Demand Scenarios, respectively. The additional High Growth Scenario, developed for groundwater only, projects groundwater use to increase 52 percent over this time period, a similar percent increase to the groundwater demand growth in the High Demand Scenario since they both use high growth projections, but to a lower final 2070 demand due to the use of median individual users' use rates compared to maximum use rates.

Table 4-7 shows and Figure 4-4 summarizes projected surface water and groundwater demands over the planning horizon for the Lower Savannah River basin. The figures include stacked area graphs, with total demand shown as thick black lines and shaded areas showing which portion of total demand comes from groundwater or surface water. For example, in 2025, the Moderate Demand Scenario total demand is 190.2 MGD. Of that, 35.8 MGD is from groundwater and 154.5 MGD is from surface water. Figure 4-5 shows the groundwater projections (Moderate, High Growth, and High Demand) over the planning horizon. No stacked area graph of surface water and groundwater is shown for the High Growth Scenario since this scenario was only developed for groundwater. Figure 4-6 shows the total projected withdrawals categorized by water user category.

Table 4-7. Lower Savannah River basin projected surface water and groundwater demands.

Year	Moderate Demand Scenario (MGD)			High Demand Scenario (MGD)			High Growth Scenario (MGD)
	SW	GW	Total	SW	GW	Total	GW
2025	154.5	35.8	190.2	232.4	49.9	282.3	36.3
2030	155.9	36.6	192.5	236.8	52.1	288.9	37.9
2035	157.1	37.2	194.3	241.5	54.4	295.9	39.7
2040	157.9	37.8	195.7	246.2	56.9	303.1	41.6
2050	160.9	39.2	200.1	257.7	62.1	319.8	45.5
2060	163.5	40.8	204.3	270.2	68.2	338.4	50.1
2070	166.4	42.3	208.7	285.5	74.7	360.1	55.1
% Increase 2025-2070	**8%**	**18%**	**10%**	**23%**	**50%**	**28%**	**52%**

Note: Surface water abbreviated to SW and groundwater abbreviated to GW to accommodate table size.

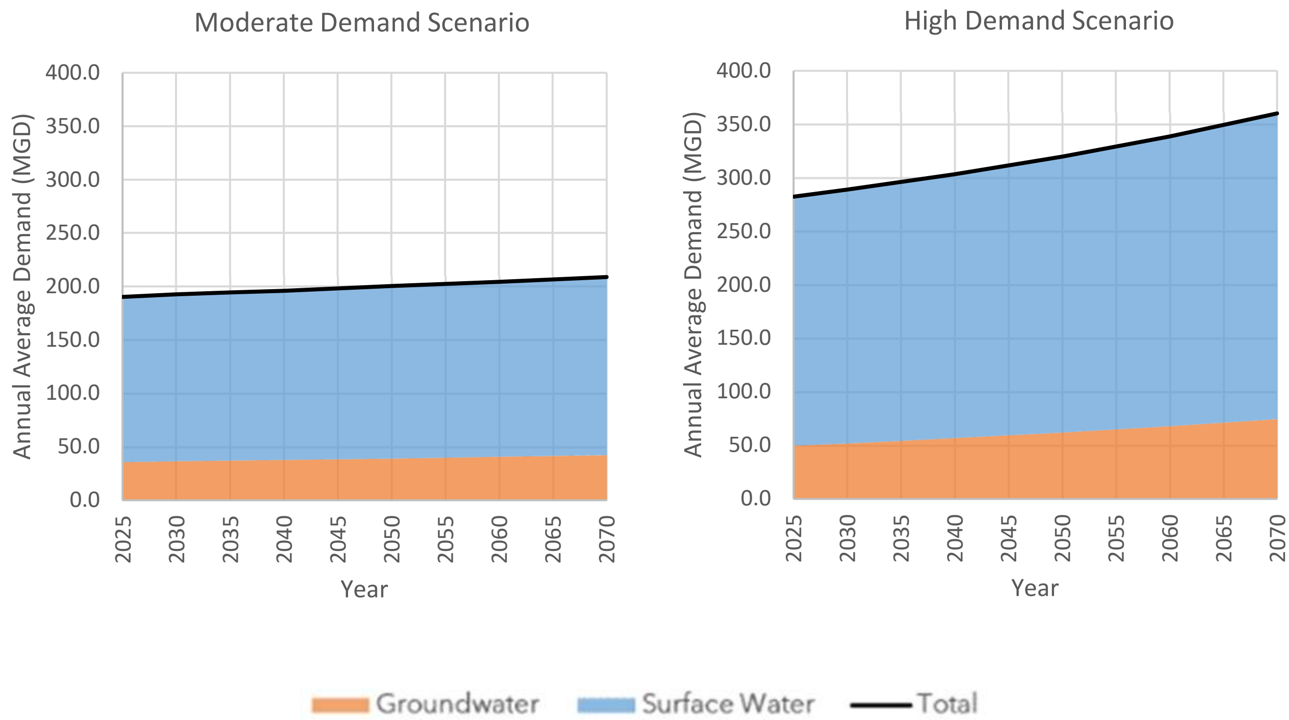


Figure 4-4. Lower Savannah River basin demand projections by water source.

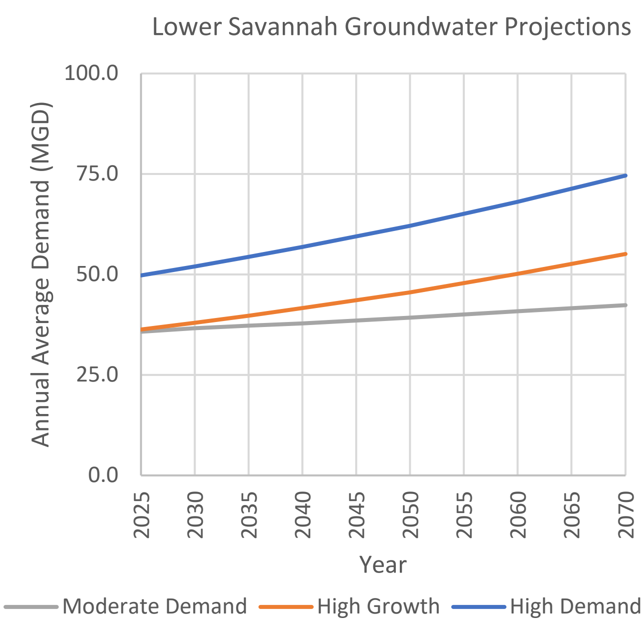


Figure 4-5. Lower Savannah River basin groundwater demand projections.

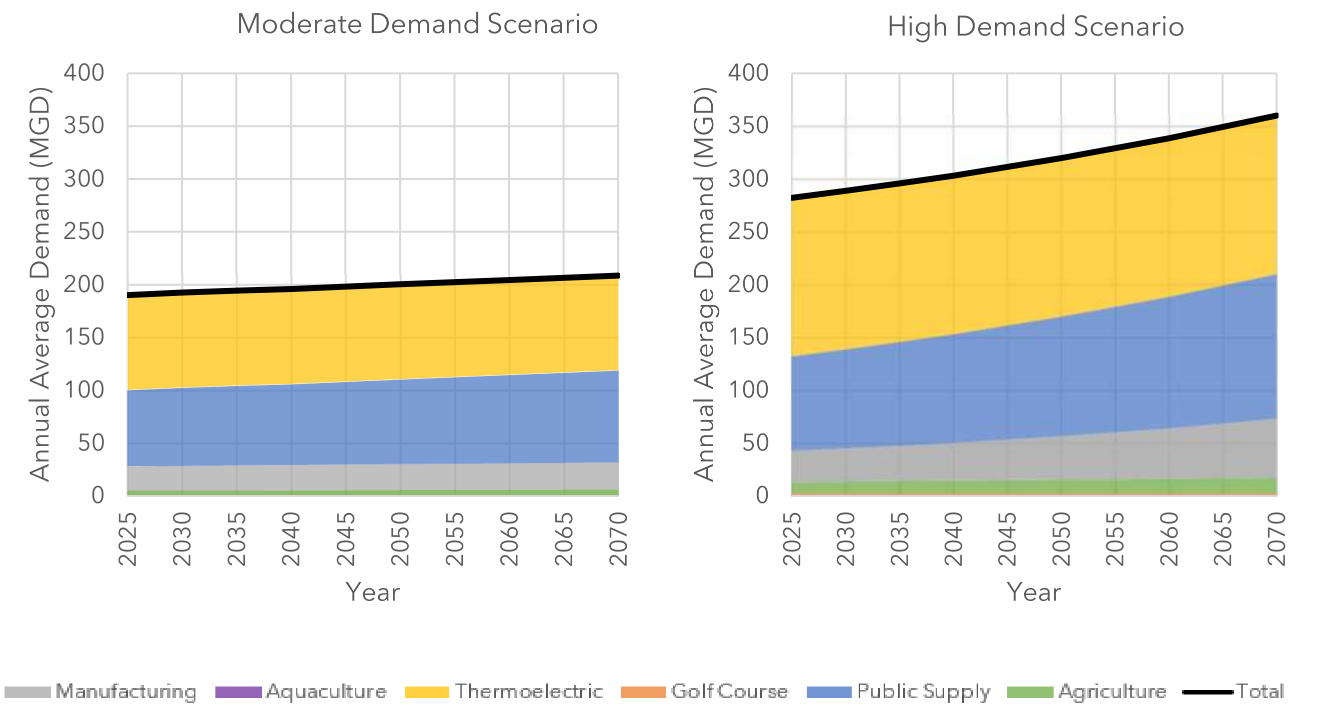


Figure 4-6. Lower Savannah River basin demand projections by water use category. (Golf course demands make up less than 1 percent of the total 2070 demands and may be too small to be seen on this chart.)

For the Salkehatchie River basin, from 2025 to 2070, total withdrawals are projected to increase by 24 percent from 42.0 MGD to 52.0 MGD under the Moderate Demand Scenario and by 36 percent from 72.9 MGD to 99.4 MGD under the High Demand Scenario. Total water demand is expected to reach 44 to 84 percent of currently permitted and registered water withdrawals by 2070 for the Moderate and High Demand Scenarios, respectively. The additional High Growth Scenario, developed for groundwater only, projects groundwater use to increase 38 percent over this time period, similar to the growth in the High Demand Scenario, but to a lower 2070 demand due to the use of median use rates compared to maximum use rates.

Table 4-8 shows and Figure 4-7 summarizes projected surface water and groundwater demands over the planning horizon for the Salkehatchie River basin. Figure 4-8 shows the groundwater projections (Moderate, High Growth, and High Demand) over the planning horizon. Figure 4-9 shows the total projected withdrawals categorized by water user category.

Table 4-8. Salkehatchie River basin projected surface water and groundwater demands.

Year	Moderate Demand Scenario (MGD)			High Demand Scenario (MGD)			High Growth Scenario (MGD)
	SW	GW	Total	SW	GW	Total	GW
2025	2.8	39.2	42.0	3.8	69.1	72.9	39.8
2030	2.9	39.8	42.7	4.0	71.4	75.4	41.2
2035	3.0	40.5	43.4	4.1	73.9	78.0	42.7
2040	3.0	41.3	44.4	4.2	76.5	80.7	44.3
2050	3.2	43.5	46.8	4.6	81.9	86.4	47.5
2060	3.4	45.9	49.3	4.9	87.8	92.7	51.1
2070	3.6	48.4	52.0	5.3	94.1	99.4	54.9
% Increase 2025-2070	**26%**	**23%**	**24%**	**37%**	**36%**	**36%**	**38%**

Note: Surface water abbreviated to SW and groundwater abbreviated to GW to accommodate table size.

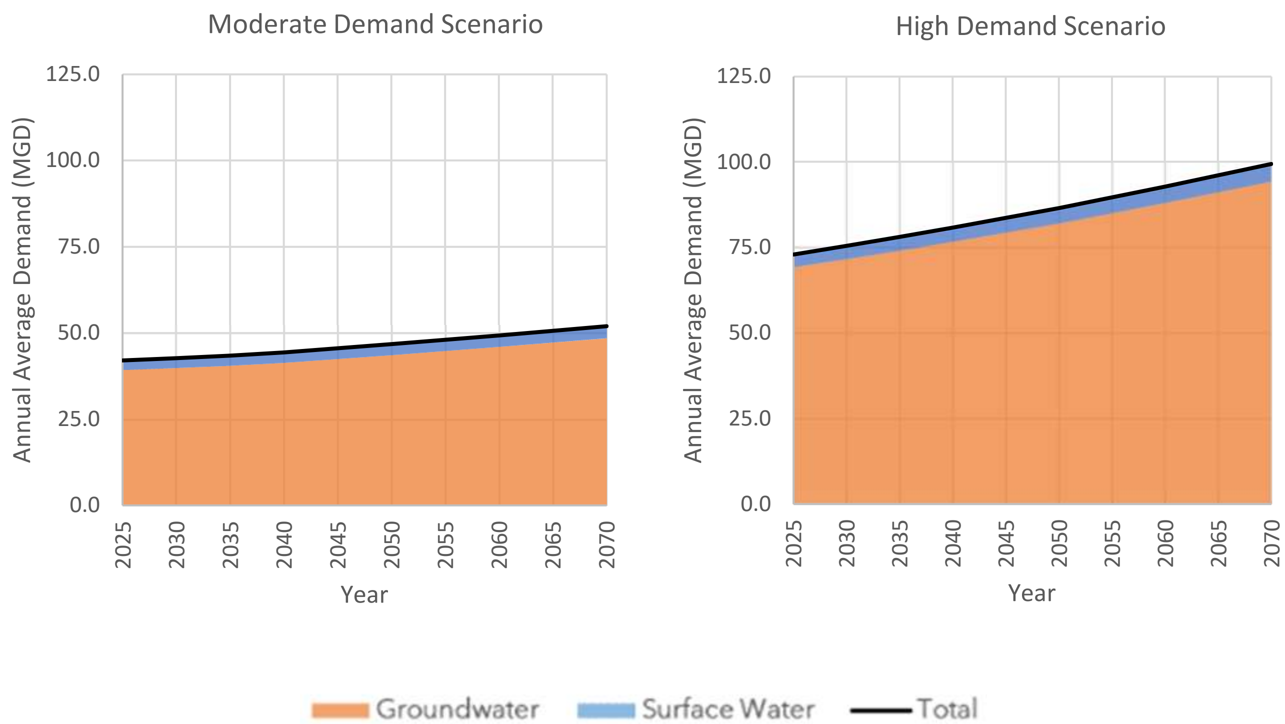


Figure 4-7. Salkehatchie River basin demand projections by water source.

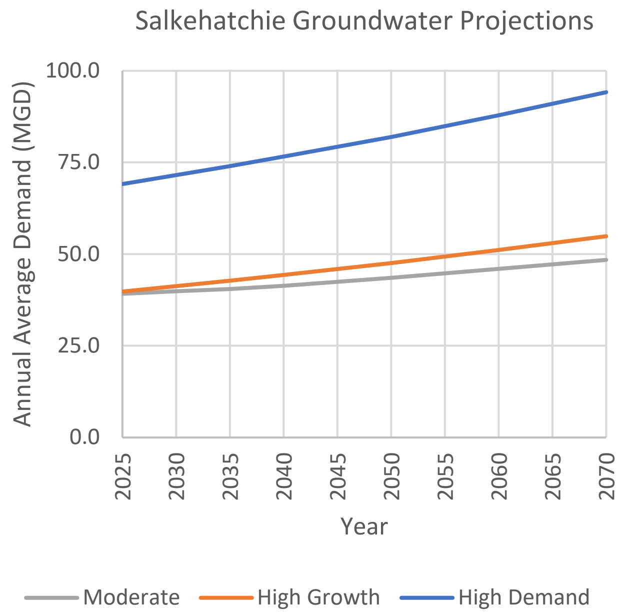


Figure 4-8. Salkehatchie River basin groundwater demand projections.

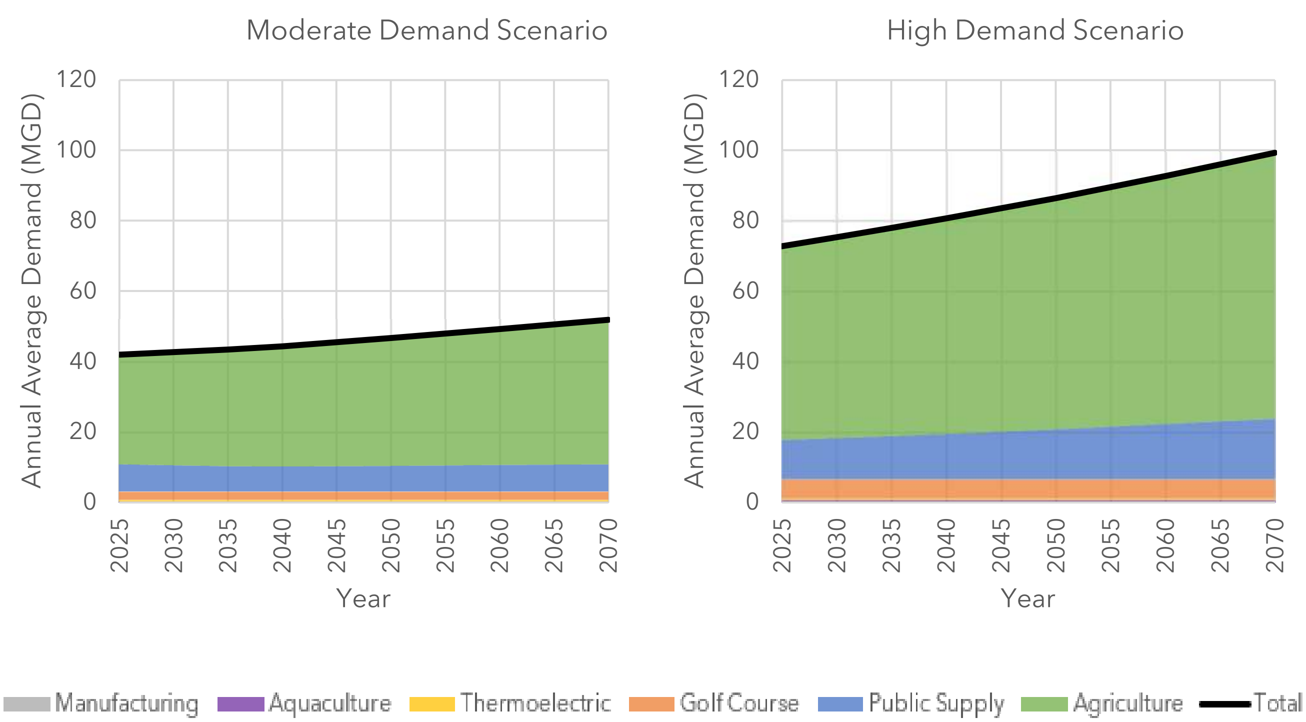


Figure 4-9. Salkehatchie River basin demand projections by water use category. (Golf course demands make up less than 1 percent of the total 2070 demands and may be too small to be seen on this chart.)

4.4.1 Public Supply Demand Projections

Most of the water demand growth in both the Lower Savannah and Salkehatchie River basins is expected to come from increasing demand for public water supply. Table 4-9 presents projected population increases for counties that are located in the Lower Savannah and/or Salkehatchie River basins.

Table 4-9. Projected population increases (in thousands) (provided by SCDES).

Scenario	County	2025	2030	2035	2040	2050	2060	2070
Moderate Demand Scenario	Aiken	171.5	172.7	172.8	172.6	174.3	175.9	177.6
	Allendale	6.8	5.7	4.9	4.4	4.4	4.4	4.4
	Bamberg	11.9	10.7	9.4	8.7	8.7	8.7	8.7
	Barnwell	19.4	18.2	16.9	16.1	16.1	16.1	16.1
	Beaufort	194.4	200.3	204.4	207.8	217.6	227.5	237.3
	Colleton	39.6	40.4	41.1	41.8	43.4	45	46.7
	Edgefield	24.4	23.1	21.7	20.8	20.8	20.8	20.8
	Hampton	17.2	16	14.8	14.1	14.1	14.1	14.1
	Jasper	30.8	32.6	34	35.2	38.2	41.3	44.3
High Demand and High Growth Scenarios	Aiken	175.8	184	192.6	201.5	220.8	241.8	264.9
	Allendale	8	8.4	8.8	9.2	10.1	11	12.1
	Bamberg	13.5	14.1	14.7	15.4	16.9	18.5	20.3
	Barnwell	21.1	22.1	23.1	24.2	26.5	29	31.8
	Beaufort	196.1	205.2	214.7	224.7	246.2	269.6	295.4
	Colleton	40.2	42.1	44	46.1	50.5	55.3	60.5
	Edgefield	26.4	27.6	28.9	30.2	33.1	36.3	39.7
	Hampton	18.9	19.8	20.7	21.7	23.8	26	28.5
	Jasper	30.7	32.3	34.1	35.9	39.9	44.3	49.1

4.4.1.1 Lower Savannah Projections

In the Moderate Demand Scenario for the Lower Savannah River Basin, public supply demands are projected to increase 20 percent between 2025 and 2070 (72.3 to 86.9 MGD). In the High Demand Scenario, public supply demands are projected to increase by 53 percent (89.3 to 136.6 MGD). Groundwater for the High Growth scenario is projected to increase 50 percent (27.6 to 41.5 MGD) for public supply demands. Most of the public supply demand increase will be met by surface water, which will serve over 63 percent of demand for both the High Demand and Moderate Demand. Projected 2070 public supply withdrawals for the Moderate and High Demand Scenarios are approximately 23 and 36 percent of the total permitted and registered amount for public supplies, respectively. Figure 4-10 shows and Table 4-10 summarizes public supply demand projections by water source for the Lower Savannah. Figure 4-11 shows the comparison of the three different groundwater projections for public supply.

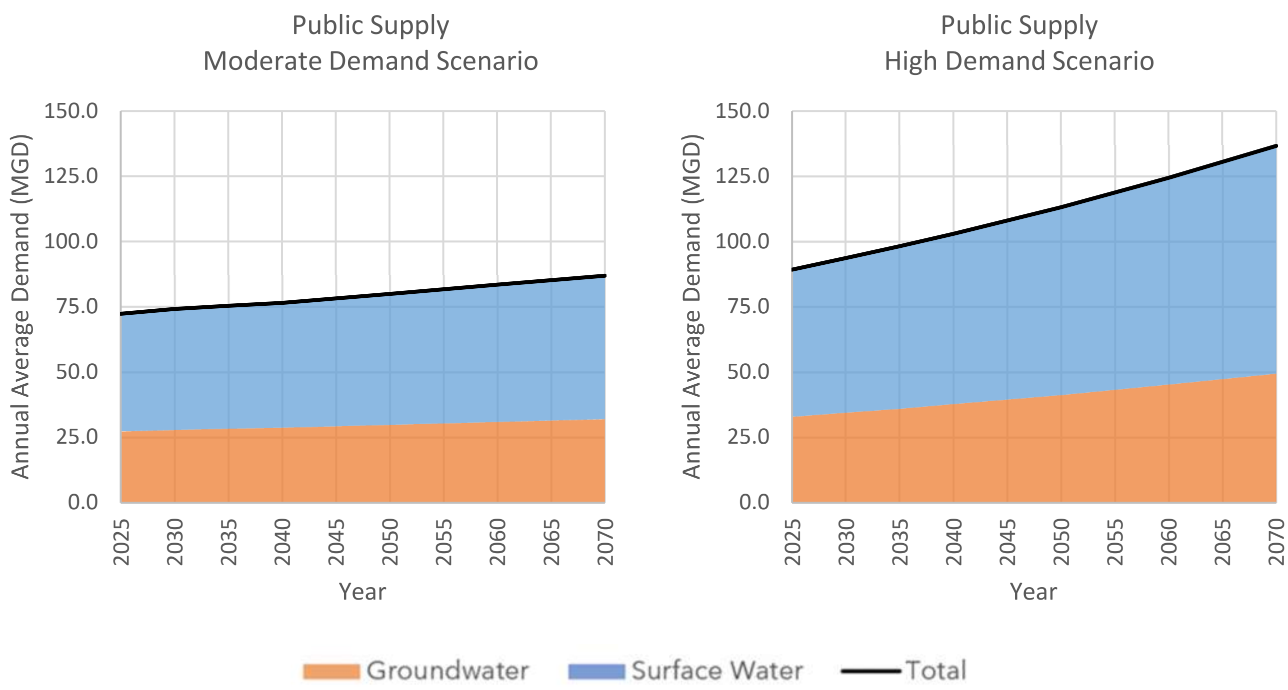


Figure 4-10. Lower Savannah River basin projected public supply water demands.

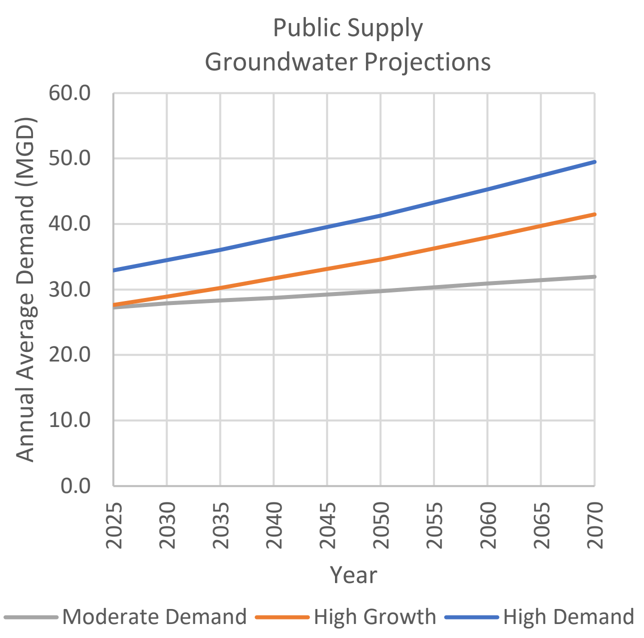


Figure 4-11. Lower Savannah River basin groundwater public supply demand projections.

Table 4-10. Lower Savannah River basin projected public supply water demands.

Year	Moderate Demand Scenario (MGD)			High Demand Scenario (MGD)			High Growth Scenario (MGD)
	SW	GW	Total	SW	GW	Total	GW
2025	45.1	27.3	72.3	56.4	32.9	89.3	27.6
2030	46.2	27.9	74.1	59.2	34.5	93.6	28.9
2035	47.0	28.3	75.3	62.1	36.0	98.1	30.2
2040	47.7	28.7	76.4	65.2	37.8	103.0	31.7
2050	50.1	29.8	79.9	71.8	41.3	113.1	34.6
2060	52.5	30.9	83.4	79.1	45.3	124.4	38.0
2070	54.9	32.0	86.9	87.2	49.5	136.7	41.5
Percent Increase 2025-2070	**22%**	**17%**	**20%**	**55%**	**50%**	**53%**	**50%**

Note: Surface water abbreviated to SW and groundwater abbreviated to GW to accommodate table size.

4.4.1.2 Salkehatchie Projections

In the Moderate Demand Scenario for the Salkehatchie River Basin, public supply demands are projected to initially decrease with decreasing population, then rise, returning to approximately starting 2025 demands. In the High Demand Scenario, public supply demands are projected to increase by 54 percent (11.2 to 17.3 MGD). In the High Growth scenario, public supply groundwater demands are projected to increase 54 percent (8.4 to 12.9 MGD). All of the public supply comes from groundwater in the Salkehatchie River basin. Projected 2070 public supply withdrawals for the Moderate and High Demand Scenarios are approximately 59 and 130 percent of the total permitted and registered amount for public supplies, respectively. Figure 4-12 shows and Table 4-11 summarizes public supply demand projections by water source for the Salkehatchie River basin. Figure 4-13 shows the comparison of the three different groundwater projections for public supply.

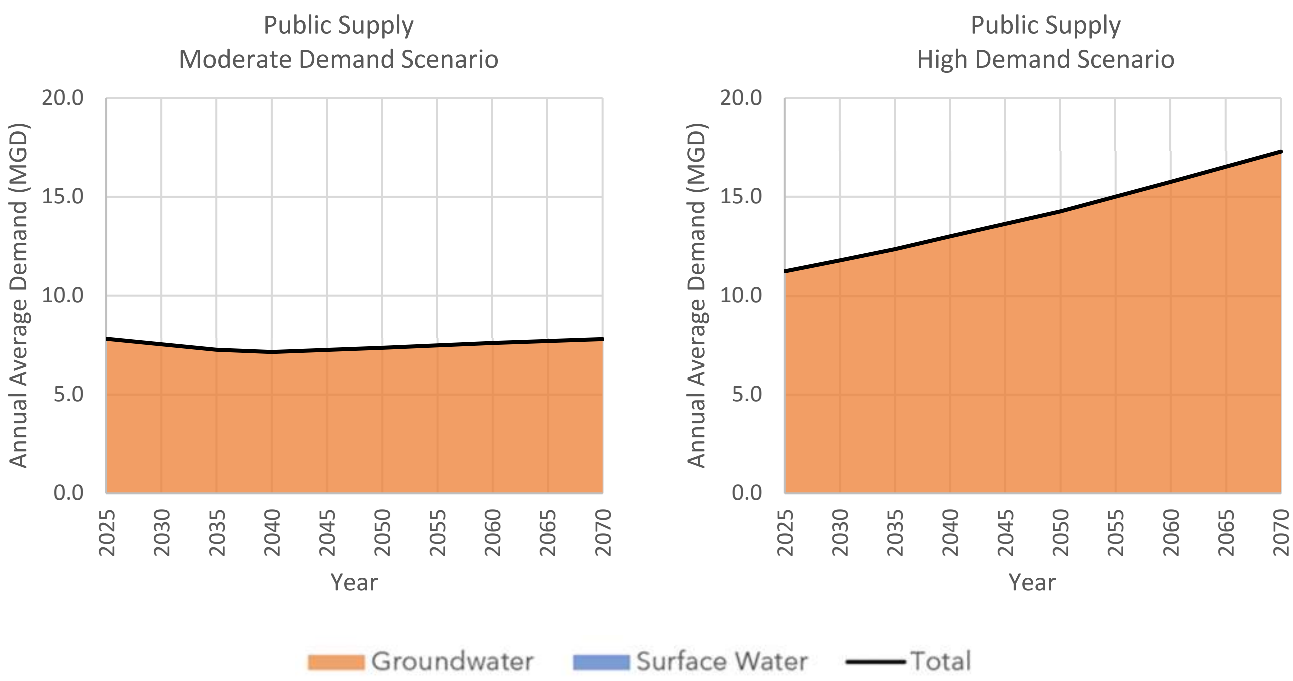


Figure 4-12. Salkehatchie River basin projected public supply water demands.

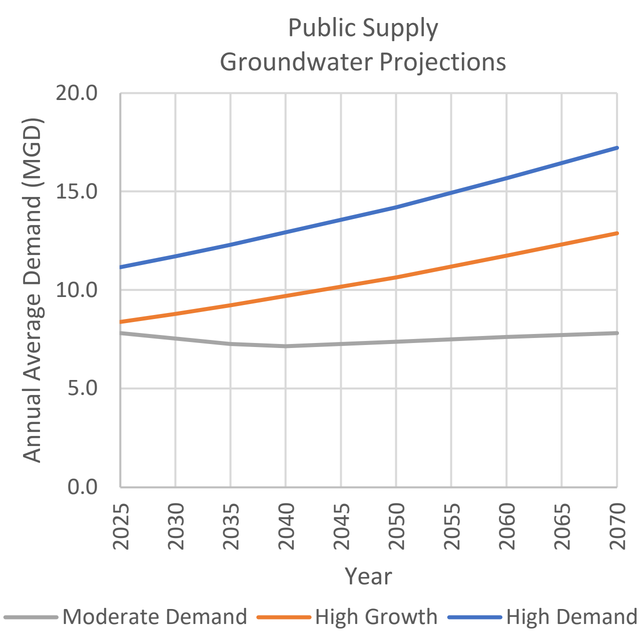


Figure 4-13. Salkehatchie River basin groundwater public supply demand projections.

Table 4-11. Salkehatchie River basin projected public supply water demands (Groundwater only).

Year	Moderate Demand Scenario (MGD)	High Growth Scenario (MGD)	High Demand Scenario (MGD)
2025	7.8	8.4	11.2
2030	7.5	8.8	11.7
2035	7.3	9.2	12.3
2040	7.1	9.7	12.9
2050	7.4	10.6	14.2
2060	7.6	11.7	15.7
2070	7.8	12.9	17.2
Percent Increase 2025-2070	**0%**	**54%**	**54%**

4.4.2 Manufacturing Demand Projections

4.4.2.1 Lower Savannah Projections

In the Lower Savannah River basin, manufacturing demands are projected to increase 11 percent between 2025 and 2070 (22.9 to 25.5 MGD) in the Moderate Demand Scenario. In the High Demand Scenario, manufacturing demands are projected to increase 90 percent between 2025 and 2070 (29.5 to 55.9 MGD). In the High Growth Scenario, manufacturing demands are projected to increase 84 percent between 2025 and 2070 (4.1 MGD to 7.5 MGD). Projected 2070 manufacturing withdrawals for the Moderate and High Demand Scenarios are approximately 3 and 6 percent of currently permitted and registered manufacturing withdrawals, respectively. Figure 4-14 shows and Table 4-12 summarizes manufacturing demand projections. Figure 4-15 shows the comparison of the three different groundwater projections for manufacturing.

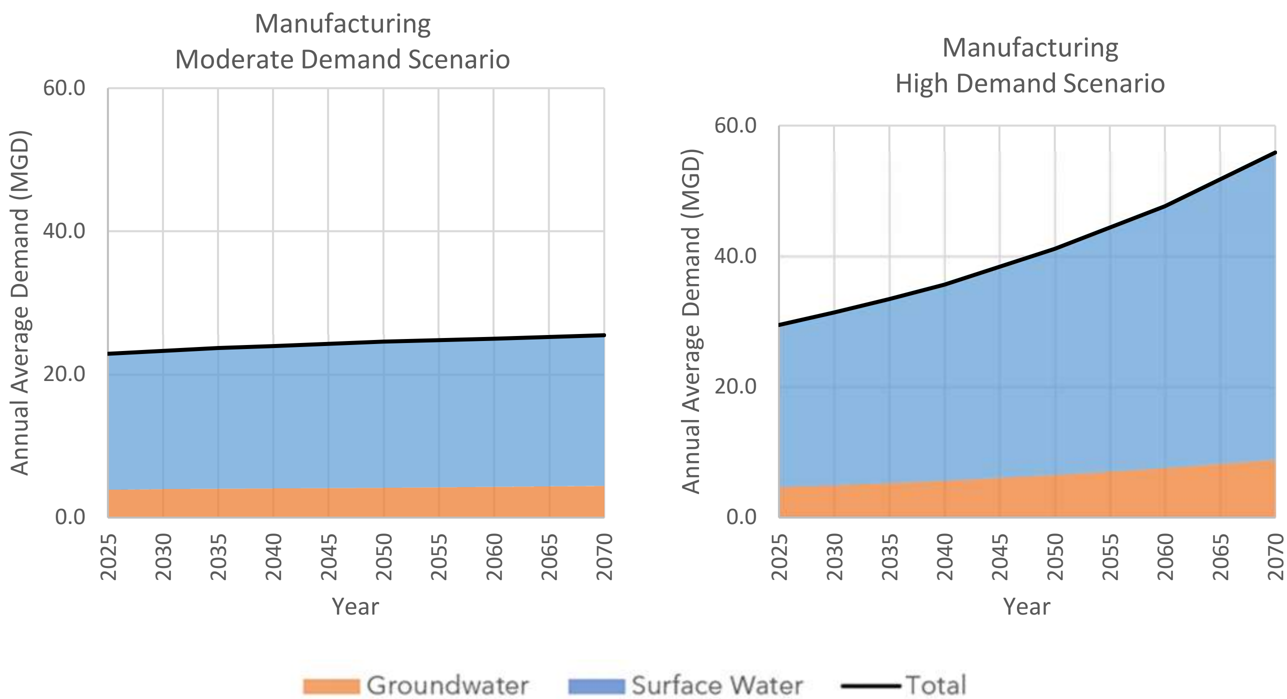


Figure 4-14. Lower Savannah River basin projected manufacturing water demands.

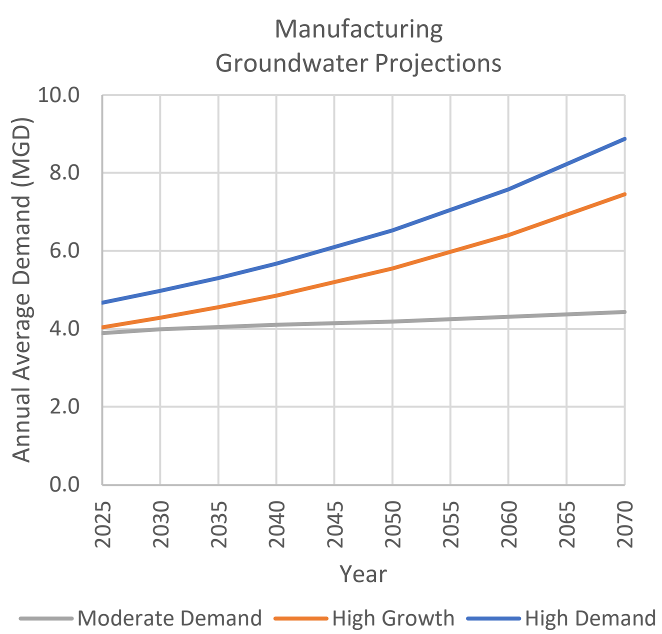


Figure 4-15. Lower Savannah River basin groundwater manufacturing demand projections.

Table 4-12. Lower Savannah River basin projected manufacturing water demands.

Year	Moderate Demand Scenario (MGD)			High Demand Scenario (MGD)			High Growth Scenario (MGD)
	SW	GW	Total	SW	GW	Total	GW
2025	19.0	3.9	22.9	24.8	4.7	29.5	4.1
2030	19.3	4.0	23.3	26.4	5.0	31.4	4.3
2035	19.6	4.0	23.7	28.1	5.3	33.4	4.6
2040	19.8	4.1	23.9	30.0	5.7	35.6	4.9
2050	20.4	4.2	24.6	34.6	6.5	41.1	5.6
2060	20.6	4.3	25.0	40.1	7.6	47.6	6.4
2070	21.0	4.4	25.5	47.0	8.9	55.9	7.5
Percent Increase 2025-2070	**11%**	**14%**	**11%**	**89%**	**90%**	**90%**	**84%**

Note: Surface water abbreviated to SW and groundwater abbreviated to GW to accommodate table size.

4.4.2.2 Salkehatchie Projections

There is no projected manufacturing demand in the Salkehatchie River basin. The manufacturing user in this basin shown in Chapter 4.1 for current demands has had zero water use since 2015 and is not anticipated to have withdrawal in the future.

4.4.3 Agriculture Demand Projections

4.4.3.1 Lower Savannah Projections

In the Lower Savannah River basin, agriculture demands are projected to increase 34 percent between 2025 and 2070 (4.0 to 5.3 MGD) in the Moderate Demand Scenario. In the High Demand Scenario, agriculture demands are projected to increase 39 percent between 2025 and 2070 (10.5 to 14.5 MGD). In the High Growth Scenario, agricultural demands are projected to increase 39 percent between 2025 and 2070 (4.0 to 5.5 MGD). All projected agricultural demands in the Lower Savannah River basin are from groundwater. Projected 2070 agriculture withdrawals for the Moderate and High Demand Scenarios are approximately 18 and 50 percent of currently permitted and registered agriculture withdrawals, respectively. Figure 4-16 shows and Table 4-13 summarizes agriculture demand projections. Figure 4-17 shows the comparison of the three different groundwater projections for public supply.

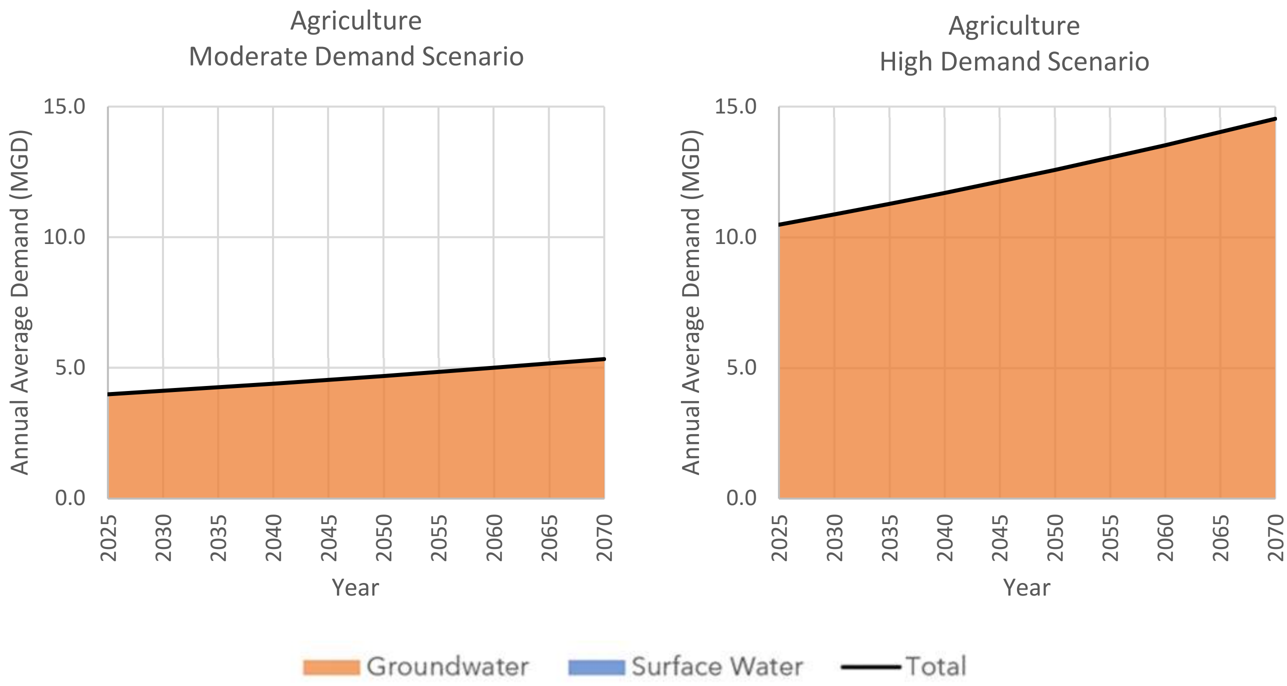


Figure 4-16. Lower Savannah River basin projected agriculture water demands.

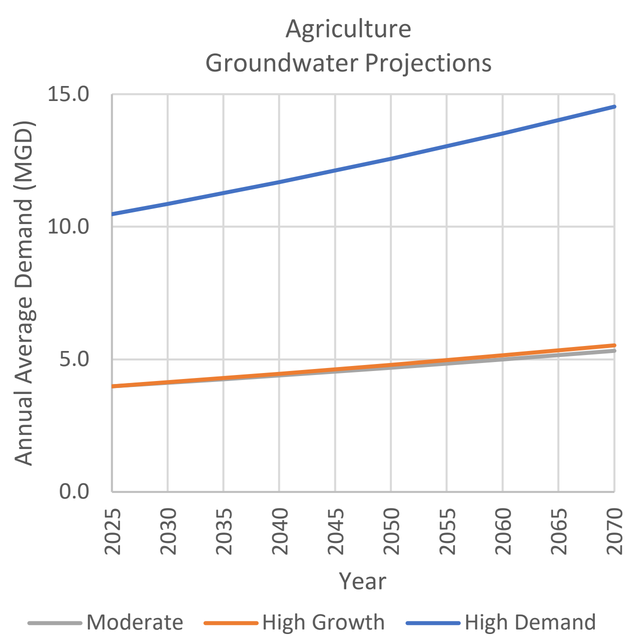


Figure 4-17. Lower Savannah River basin groundwater agriculture demand projections.

Table 4-13. Lower Savannah River basin projected agriculture water demands.

Year	Moderate Demand Scenario (MGD)	High Growth Scenario (MGD)	High Demand Scenario (MGD)
2025	4.0	4.0	10.5
2030	4.1	4.1	10.9
2035	4.3	4.3	11.3
2040	4.4	4.5	11.7
2050	4.7	4.8	12.6
2060	5.0	5.2	13.5
2070	5.3	5.5	14.5
Percent Increase 2025-2070	**34%**	**39%**	**39%**

4.4.3.2 Salkehatchie Projections

In the Salkehatchie River basin, agriculture demands are projected to increase 32 percent between 2025 and 2070 (31.1 to 41.0 MGD) in the Moderate Demand Scenario. In the High Demand Scenario, agriculture demands are projected to increase 37 percent between 2025 and 2070 (55.1 to 75.5 MGD). In the High Growth Scenario, agricultural demands are projected to increase 37 percent between 2025 and 2070 (28.3 to 38.8 MGD). Projected 2070 agriculture withdrawals for the Moderate and High Demand Scenarios are approximately 41 and 76 percent of currently permitted and registered agriculture withdrawals, respectively. Figure 4-18 shows and Table 4-14 summarizes agriculture demand projections. Figure 4-19 shows the comparison of the three different groundwater projections for public supply.

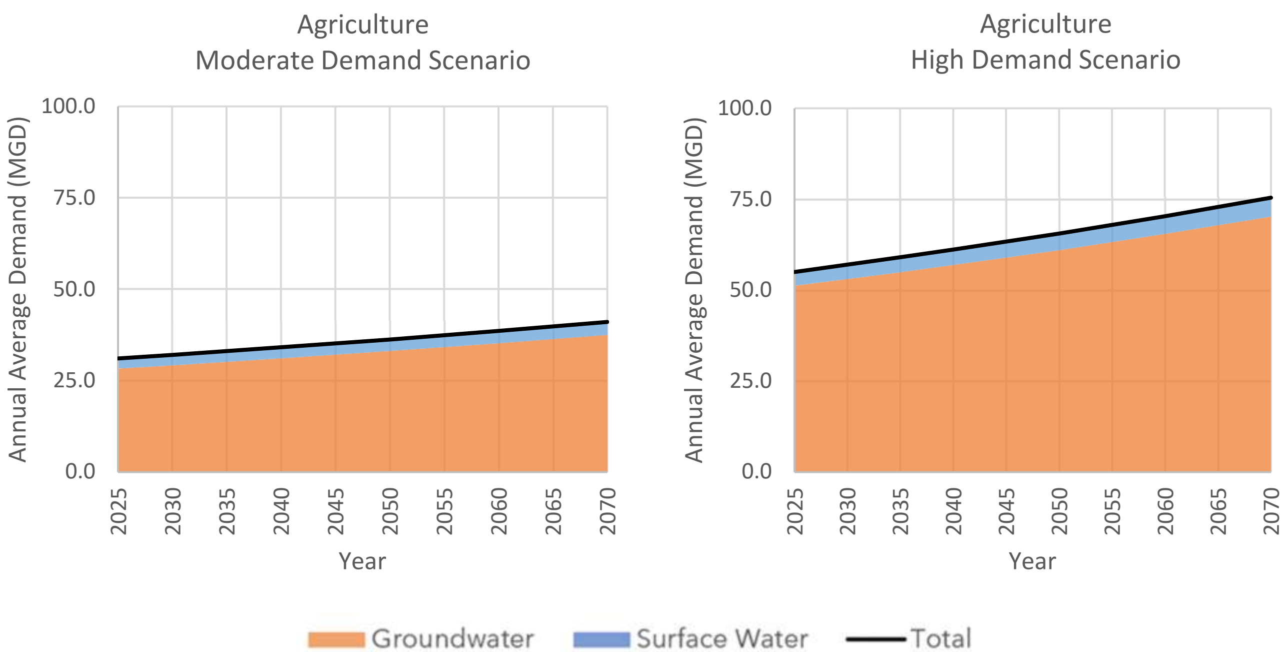


Figure 4-18. Salkehatchie River basin projected agriculture water demands.

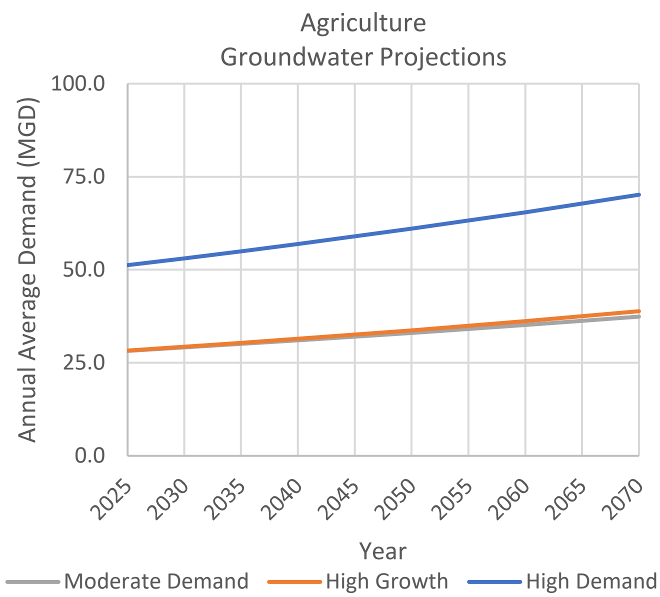


Figure 4-19. Salkehatchie River basin groundwater agriculture demand projections.

Table 4-14. Salkehatchie River basin projected agriculture water demands.

Year	Moderate Demand Scenario (MGD)			High Demand Scenario (MGD)			High Growth Scenario (MGD)
	SW	GW	Total	SW	GW	Total	GW
2025	2.8	28.2	31.1	3.8	51.2	55.1	28.3
2030	2.9	29.1	32.0	4.0	53.0	57.0	29.3
2035	3.0	30.1	33.0	4.1	54.9	59.0	30.3
2040	3.1	31.0	34.1	4.3	56.9	61.1	31.4
2050	3.2	33.0	36.2	4.6	61.0	65.6	33.7
2060	3.4	35.2	38.6	4.9	65.5	70.4	36.2
2070	3.57	37.5	41.0	5.3	70.2	75.5	38.8
Percent Increase 2025-2070	**26%**	**33%**	**32%**	**37%**	**37%**	**38%**	**37%**

Note: Surface water abbreviated to SW and groundwater abbreviated to GW to accommodate table size.

4.4.4 Georgia Demands

Surface water demands for Georgia water users from the Lower Savannah River basin are projected to increase 26 percent from 174 MGD to 219 MGD between 2020 to 2070. This growth is summarized in Figure 4-20 and Table 4-15.

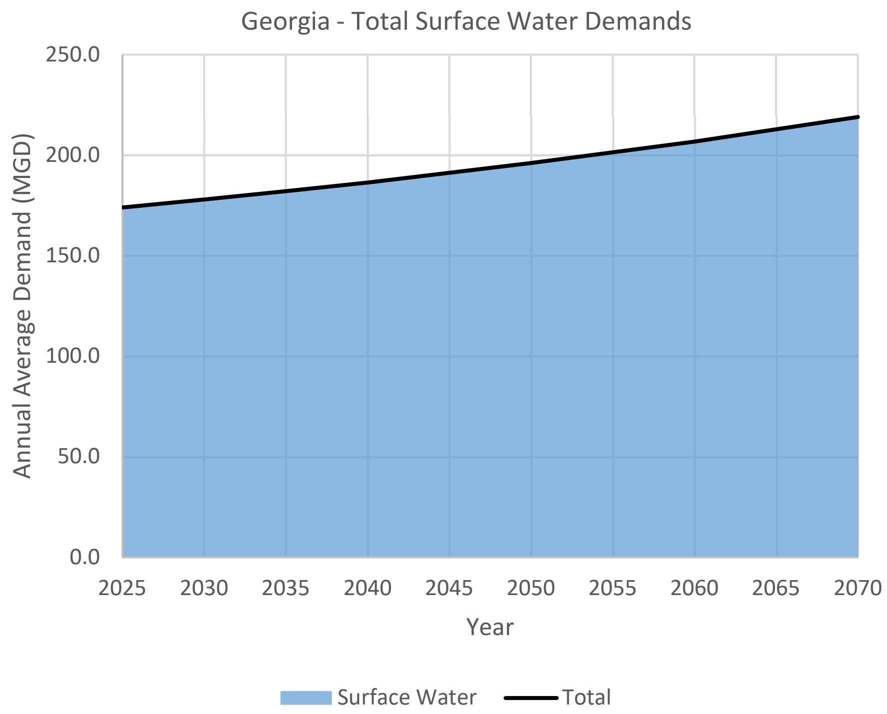


Figure 4-20. Projected Georgia surface water demands.

Table 4-15. Projected Georgia surface water demands.

Year	Georgia Demands (MGD)
2025	174.0
2030	177.9
2035	182.0
2040	186.4
2050	195.9
2060	206.7
2070	219.0
% Increase 2025-2070	**26%**

There are six Georgia counties that overlap with the Lower Savannah-Salkehatchie basin. The projections for each county from 2020 to 2060 are shown in Table 4-16 below. For the six counties, groundwater use is projected to increase 12 percent from 2020 to 2060 (136.0 MGD to 152.0 MGD). These projections were not extended to 2070 as part of this plan since no groundwater modeling was performed.

Table 4-16. Projected Georgia groundwater demands.

Year	Chatham (MGD)	Effingham (MGD)	Screven (MGD)	Burke (MGD)	Richmond (MGD)	Columbia (MGD)	Total (MGD)
2020	44.6	13.0	28.8	37.7	8.5	3.4	136.0
2030	43.9	14.3	30.5	40.4	8.6	3.0	140.7
2040	44.3	14.9	32.5	41.6	8.4	2.6	144.4
2050	44.6	14.8	30.3	41.2	8.1	2.3	141.3
2060	45.0	15.0	37.4	44.5	8.2	1.9	152.0
% Increase 2025-2060	**1%**	**16%**	**30%**	**18%**	**-4%**	**-42%**	**12%**

4.4.5 Other Demand Projections

Other demands were held constant into the future. For the Moderate Demand Scenario, demands were held constant based on median rates of recent historic use. For the High Demand Scenario, demands were held constant based on maximum rates of recent historic use. Golf course demands across the planning horizon for the Lower Savannah River basin were held at 1.1 MGD in the Moderate Demand Scenario and 2.9 MGD in the High Demand Scenario. For the Salkehatchie River basin, golf course demands across the planning horizon were held at 2.4 MGD in the Moderate Demand Scenario and 5.4 MGD in the High Demand Scenario where 100 percent of the withdrawals is from groundwater.

Thermoelectric demands in the Lower Savannah River basin were held constant at 89.9 MGD in the Moderate Demand Scenario and at 150.1 MGD in the High Demand Scenario. In the Salkehatchie River basin, thermoelectric demands were held constant at 0.4 MGD in the Moderate Demand Scenario and at 0.5 MGD in the High Demand Scenario.

Aquaculture demands, present only in the Salkehatchie River basin, were held at 0.3 MGD in the Moderate Demand Scenario and 0.7 MGD in the High Demand Scenario.

Chapter 5
Comparison of Water Resource Availability and Water Demand

This chapter describes the methods used to assess surface water availability in the Lower Savannah-Salkehatchie River basin. Surface water quantity models were used to evaluate water availability using current and projected water demands. Water availability was also assessed assuming surface water withdrawals at permitted and registered amounts. The results of these assessments are presented and compared, and potential water shortages and concerns are identified. No calibrated groundwater model was available for the Lower Savannah-Salkehatchie basin during this initial planning period; however, groundwater resources were evaluated by considering historical trends in aquifer levels and accounting for past, present, and projected future groundwater pumping.

Key observations and conclusions in this chapter include:

- **Surface Water** – Surface water availability modeling suggests a low risk of water supply shortages under the Current Scenario, and shortages are localized to agricultural water users whose withdrawals are mostly located either on or adjacent to impoundments that are not included in the models. The surface water resources of the planning basin are overallocated based on existing permitted and registered withdrawals amounts, meaning shortages exist in specific locations if all water users withdraw their allowable amounts simultaneously – a highly unlikely scenario. For a future demand scenario representing aggressive growth through 2070 (the High Demand Scenario), one municipal water user in the Lower Savannah River basin and multiple agricultural water users in the Salkehatchie River basin are projected to experience shortages. The results of an ecological flow assessment performed at a location on Horse Creek, a tributary to the Savannah River, show a low risk to ecological integrity for the future demand scenarios, and a moderate risk to fish species richness if all upstream water users withdraw their permitted and registered amounts simultaneously.

- **Groundwater** – Groundwater levels are relatively stable basin-wide across all aquifers; however, additional monitoring wells are needed to understand how future pumping may impact aquifer levels in the middle of the basin. The greatest concern to groundwater resources exists in the Upper Floridan aquifer, which has been impacted by a large cone of depression at Savannah, Georgia and by saltwater intrusion at Hilton Head Island. Even if all groundwater withdrawals were stopped in this coastal area, the saltwater plumes moving inland across Hilton Head Island would continue to exist well into the future. Since public water supply demand is expected to increase in Beaufort and Jasper Counties over the next several decades, the additional demand for water should be met with more surface water use in addition to increased groundwater use from deeper aquifers.

5.1 Methodology

5.1.1 Surface Water

Following are several key terms of the surface water modeling, introduced in the Planning Framework, used throughout this chapter.

- **Physically Available Surface Water Supply** – The maximum amount of water that occurs 100 percent of the time at a location on a surface water body with no defined Surface Water Conditions applied on the surface water body.

- **Reach of Interest** – A stream reach defined by the RBC that experiences undesired impacts, environmental or otherwise, determined from current or future water demand scenarios or proposed water management strategies. Such reaches may or may not have identified Surface Water Shortages. The Lower Savannah-Salkehatchie RBC did not identify any Reaches of Interest.

- **Reservoir Safe Yield** – The Surface Water Supply for a reservoir or system of reservoirs over the simulated hydrologic period of record. The Lower Savannah-Salkehatchie River basin does not contain any large reservoirs, so safe yield analyses were not performed for this basin.

- **Strategic Node** – A location on a surface water body or aquifer designated to evaluate the cumulative impacts of water management strategies for a given model scenario. Strategic nodes serve as primary points of interest from which to evaluate a model scenario's performance measures. The RBC selected 6 Strategic Nodes in the Lower Savannah portion of the basin and 6 Strategic Nodes in the Salkehatchie portion of the basin.

- **Surface Water Condition** – A limitation, defined by the RBC, on the amount of water that can be withdrawn from a surface water source and that can be applied to evaluate Surface Water Supply for planning purposes. The Lower Savannah-Salkehatchie RBC did not establish a Surface Water Condition for any location in the basin. Therefore, all model results shown here assume no minimum instream flow requirements, or zero flow as the boundary for water availability for withdrawal. This assumption does not consider biological, chemical, or physical conditions needed to maintain stream integrity or take into account the needs of downstream users.

- **Surface Water Shortage** – A situation in which water demand exceeds the Surface Water Supply for any water user in the basin.

- **Surface Water Supply** – The maximum amount of water available for withdrawal 100 percent of the time at a location on a surface water body without violating any applied Surface Water Conditions on the surface water source and considering upstream demands.

Surface water planning scenarios were constructed and simulated using the previously developed Savannah River basin (which contains the Lower Savannah basin) and Salkehatchie River basin surface water quantity models (CDM Smith 2017a, 2017b). The Savannah River basin model includes the Middle and Lower Savannah River subbasins, and the Salkehatchie River basin model includes the Salkehatchie, Broad-St. Helena, St. Helena Island, and Calibogue Sound-Wright River subbasins; these subbasins are shown on Figure 2-1. These models were developed with CDM Smith's SWAM software. This Microsoft

Excel-based model simulates river basin hydrology, water availability, and water use across a network over an extended timeseries.

SWAM provides efficient planning-level analyses of Surface Water Supply systems. Simulations begin with naturally occurring headwater flow into the river reaches, estimated based on available records. The model then calculates physically available and permitted or allowable (not limited for use by a regulatory constraint) water flow, diversions, storage, consumption, and return flows at user-defined nodes in a networked river system. A range of water user types can be represented in the model, including municipal water suppliers, agricultural irrigators, and industrial water users, with time-variable demands either prescribed by the user or, in some cases, calculated internally. Multiple layers of complexity are available in SWAM to allow for easy development of a range of systems. As an example, SWAM's reservoir object can include basic hydrology-dependent calculations including storage as a function of inflow, outflow, and evaporation. It can also include operational rules of varying complexity such as prescribed monthly releases, a set of prioritized monthly releases or storage targets, or a set of conditional release rules (dependent on hydrology). Municipal water conservation programs can similarly be simulated with sets of rules of varying complexity. The model user chooses the appropriate level of complexity given the modeling objectives and data availability.

The Savannah River basin SWAM model simulates 82 years of variable historic hydrology (October 1939 through December 2021), while the Salkehatchie River basin SWAM model simulates nearly 71 years of variable historic hydrology (February 1951 through December 2021). Both simulate on either a monthly or daily user-specified calculation timestep (the surface water scenarios presented in this chapter represent monthly analyses, unless noted otherwise). The models are designed for three primary purposes:

- Accounting of current and past basin inflows, outflows, and consumptive uses
- Simulating streamflow and lake storage across a range of observed historical climate and hydrologic conditions, given current water use and operations
- Simulating future "what if" scenarios associated with changes in basin water use, management, and/or operations.

The Savannah River basin model extends from the upstream headwaters to Savannah, Georgia. The portion of the Savannah River basin model that represents the Lower Savannah basin includes five municipal, four golf course, two industrial, one agricultural (irrigation), and one thermoelectric surface water users. There are five additional water user objects that represent consolidated water withdrawals from Georgia water users. The Salkehatchie River basin model includes the Salkehatchie River and its tributaries from its headwaters to the ocean, plus the Coosawhatchie River. The Salkehatchie River basin model includes 15 agricultural (irrigation) surface water users. For both models, all water users with permitted withdrawals greater than 0.1 MGD are represented, either explicitly or implicitly. In the model version that represents current conditions, monthly water use is set equal to the average of a recent 10-year period (2012 through 2021) of reported use, with several exceptions. Exceptions include new surface water users and surface water users with recent demands that are significantly different from demands in the early part of the 10-year period. Model users also can adjust water use patterns to explore future water management scenarios, as discussed in this chapter.

A total of 10 "tributary objects" (rivers and streams) are represented discretely in the Lower Savannah portion of the model, including the mainstem Savannah River. A total of seven "tributary objects" are represented discretely in the Salkehatchie River basin model, including the Salkehatchie River mainstem. Boundary condition (headwater) flows for each tributary object are prescribed in the model based on external analyses (CDM Smith 2017a, 2017b), which estimated naturally occurring historical flows "unimpaired" by human uses. Historical, current, and/or future uses then can be simulated against the same natural hydrology of the basin. Hydrologic flow gains (or losses) for each tributary are simulated in SWAM using lumped gain (or loss) factors, which are set based on a model calibration exercise, using gaged flow data, and/or guided by changes in reach drainage area. SWAM implicitly accounts for interaction between groundwater and surface water through the assignment of the gain/loss factors.

The Savannah and Salkehatchie River basin SWAM models were used to simulate current and potential future scenarios to evaluate surface water availability. Section 5.3 provides detailed descriptions of the surface water scenarios and their results.

5.1.2 Groundwater

No calibrated groundwater model was available for the Lower Savannah-Salkehatchie River basin during the planning period, but this did not eliminate groundwater management from the topics of discussion. Therefore, the RBC assessed groundwater availability generally based on a review of potentiometric maps, groundwater monitoring well data, groundwater development in the basin, groundwater concerns, and groundwater withdrawals by various water users and industries. Chapter 3.3 discusses potentiometric maps, monitoring data, development in the basin, and groundwater concerns. Chapter 4 discusses groundwater withdrawals and future demand projections.

5.2 Performance Measures

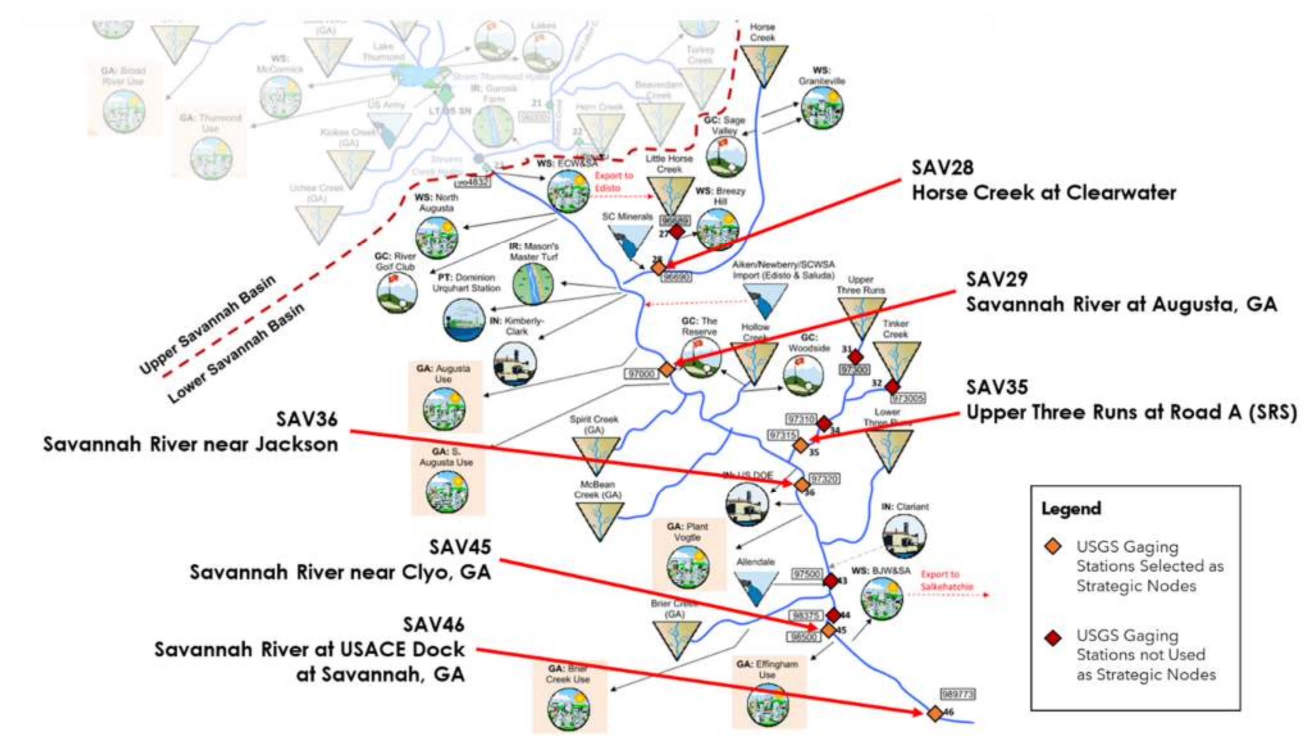
Performance measures were developed as a means for comparing water resource impacts (negative and positive) of each scenario. A performance measure is a quantitative measure of change in a user-defined condition from an established baseline, which is used to assess the performance of a proposed water management strategy or combination of strategies. Performance measures establish an objective approach for comparing scenarios. Performance measures were selected in collaboration with the RBC as outlined below.

5.2.1 Hydrologic-based Performance Measures

Table 5-1 presents the hydrologic surface water performance measures used to evaluate and compare simulation results. For each simulated scenario, performance measures were calculated as a post-processing step in the modeling. All measures, or metrics, were calculated for the entire simulation period. Changes in performance measures between scenarios were particularly useful for the planning process. The first set of performance metrics were calculated for model output nodes that were identified by the RBC as Strategic Nodes. These Strategic Nodes are distributed throughout the river basin. Within the Lower Savannah River portion of the basin, Strategic Nodes are defined at six of the USGS streamflow gaging stations in the basin. In the Salkehatchie River basin, Strategic Nodes are defined at four of the USGS streamflow gaging stations and on the Jackson Branch and Little Salkehatchie River tributaries. Figures 5-1 and 5-2 show all Strategic Node locations.

Table 5-1. Surface water performance measures.

Strategic Node Metrics (generated for each Strategic Node)
Mean flow (cfs)
Median flow (cfs)
25th percentile flow (cfs)
10th percentile flow (cfs)
5th percentile flow (cfs)
Comparison to minimum instream flows (MIFs)
Basinwide Metrics (generated in aggregate for the entire modeled river basin)
Total basin annual mean shortage (MGD) - Sum of the average shortage for all users over the simulation period
Maximum water user shortage (MGD) - Maximum monthly shortage experienced by any single user over the simulation period
Total basin annual mean shortage (% of demand) - Sum of the average shortage for all users over the simulation period divided by the sum of the average demand for all users over the simulation period
Average frequency of shortage (%) - Average frequency of shortage of all users who experience a shortage, where each user's frequency of shortage is calculated as the number of months with a shortage divided by the total months in the simulation (for a monthly timestep simulation)



Note: Water users shaded in light orange represent Georgia water users.

Figure 5-1. Strategic node locations in the Lower Savannah River basin.

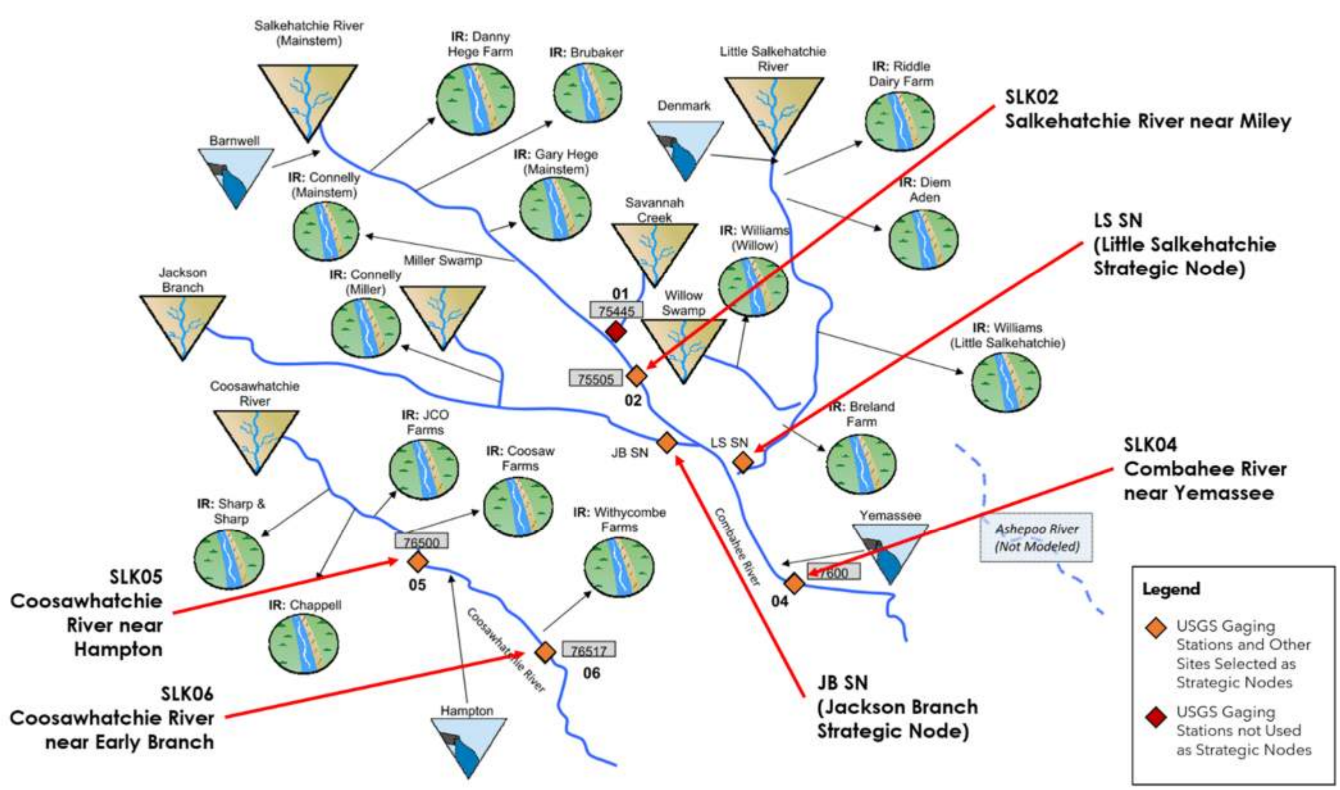


Figure 5-2. Strategic node locations in the Salkehatchie River basin.

5.2.2 Biological Response Metrics

As referenced in Chapter 3.2.2 and discussed in Bower et al. (2022) and The Nature Conservancy et al. (2025), biological response metrics were developed and combined with hydrologic metrics to identify statistically significant correlations between flow characteristics and ecological suitability for fish and macroinvertebrates. Select flow-ecology metrics (hydrologic metrics found to be most correlated to biological diversity) were used as performance measures to help guide RBC discussions and recommendations for the Lower Savannah-Salkehatchie River basin. This section provides discussion of the relevant, selected biological response metrics and related hydrologic metrics (sometimes referred to as the “flow-ecology metrics”), and Chapter 5.3.7 presents their values and interpretation in the context of the Lower Savannah-Salkehatchie River basin.

The biological metric was based on flow-ecology relationships calculated using data from streams and small rivers with watershed areas less than or equal to 232 sq mi. Results are broadly applicable across the basin, because streams of this size comprise 87 percent of all surface water in South Carolina. However, the results should not be extrapolated to large rivers or reservoirs. All strategic nodes in the Salkehatchie River basin were on rivers greater than 232 sq mi and could not be used to inform flow management. The Strategic Node on the Upper Three Runs tributary in the Lower Savannah basin was not used for this analysis due to high increases in mean daily flow for the Permitted and Registered Surface Water Use Scenario (P&R Scenario). The one selected biological metric was calculated at the remaining tributary Strategic Node location shown in Figure 5-1 (Horse Creek at Clearwater). This represents a general, but limited, assessment of how aquatic life could be impacted by changes in flow based on SWAM scenarios. Results should not be considered as necessarily uniform throughout each basin. Local conditions may vary along the length of streams.

Of the 14 biological response metrics identified in Bower et al. (2022), the following biological response metric was used in the Lower Savanah-Salkehatchie River basin because of the relevance and strong connection to hydrologic statistics that could be readily extracted from the SWAM model (description from The Nature Conservancy et al. 2025):

- **Species richness:** number of species found at a given site

Hydrologic statistics that correlated well to this biological metric included two metrics that could be easily extracted from SWAM model results (The Nature Conservancy et al. 2025). These flow metrics, intended to support flow-ecology relationships, expand on the hydrologic metrics discussed in Chapter 5.2.1, which were used specifically for hydrologic comparisons. The two flow metrics are:

- **Mean daily flow** is the mean (average) daily flow of the stream in cfs over the period of record
- **Duration of low flow** is the average pulse duration for each year for flow events below a threshold equal to the 25th percentile value for the entire flow record. The metric is the median of the yearly average durations (number of days).

Mapped together, these hydrologic metrics were used to estimate changes in the biological response metric, which characterizes the ecological integrity of the basin. Table 5-2 helps illustrate the flow-ecology relationships for the Southeastern Plains Stable Base Flow (SE3) stream type, which is the stream class corresponding to the one selected Strategic Node (The Nature Conservancy et al. 2025); however, this table is not exhaustive. Chapter 5.3.7 presents and provides discussion of the application of the biological response metrics for the Lower Savannah-Salkehatchie River basin.

Table 5-2. Relationship of hydrologic and biological response metrics.

Hydrologic Metric (Output from SWAM Scenarios)	Biological Response Metrics with High Conditional Importance (Bower et al. 2022)	Type of Evaluation
Mean Daily Flow	Species Richness	Ecological Integrity
Duration of Low Flow	Species Richness	Ecological Integrity

5.3 Scenario Descriptions and Surface Water Simulation Results

Four scenarios were initially used to evaluate surface water availability and to identify any anticipated Surface Water Shortages: the Current Surface Water Use Scenario (Current Scenario); P&R Scenario; the Moderate Water Demand Scenario (Moderate Scenario); and the High Water Demand Scenario (High Demand Scenario). The Moderate Scenario was originally referred to as the Business-as-Usual Scenario in the Planning Framework. The RBC requested a fifth scenario, the Unimpaired Flow Scenario (UIF Scenario), and a model simulation was completed. The UIF Scenario removes all surface water withdrawals and discharges and simulates conditions before any surface water development.

These five scenarios were simulated over the approximately 82-year period (based on hydrology data spanning October 1939 through December 2021) and approximately 71-year period (based on hydrology data spanning February 1951 through December 2021) of variable climate and hydrology data for the Savannah and Salkehatchie basins, respectively. All simulation results, except where noted, are based on model simulations using a monthly timestep. Summaries of the model results are presented in this chapter, with results presented separately for the Lower Savannah and Salkehatchie River basins which were modeled separately. Lower Savannah River basin results incorporate changes to demands based on identical model scenarios in the Upper Savannah River basin, as this impacts flows entering the Lower Savannah River basin mainstem.

5.3.1 Current Surface Water Use Scenario

The Current Scenario represents current operations, infrastructure, and water use in the Lower Savannah-Salkehatchie River basin. Water demands were generally set based on reported water usage in the 10-year period spanning 2012 to 2021, with several minor exceptions. This simulation provides information on the potential for Surface Water Shortages that could immediately result under a repeat of historic drought conditions in the basin and highlights the need for short-term planning initiatives, including the development of strategies to mitigate shortages and/or increase Surface Water Supply.

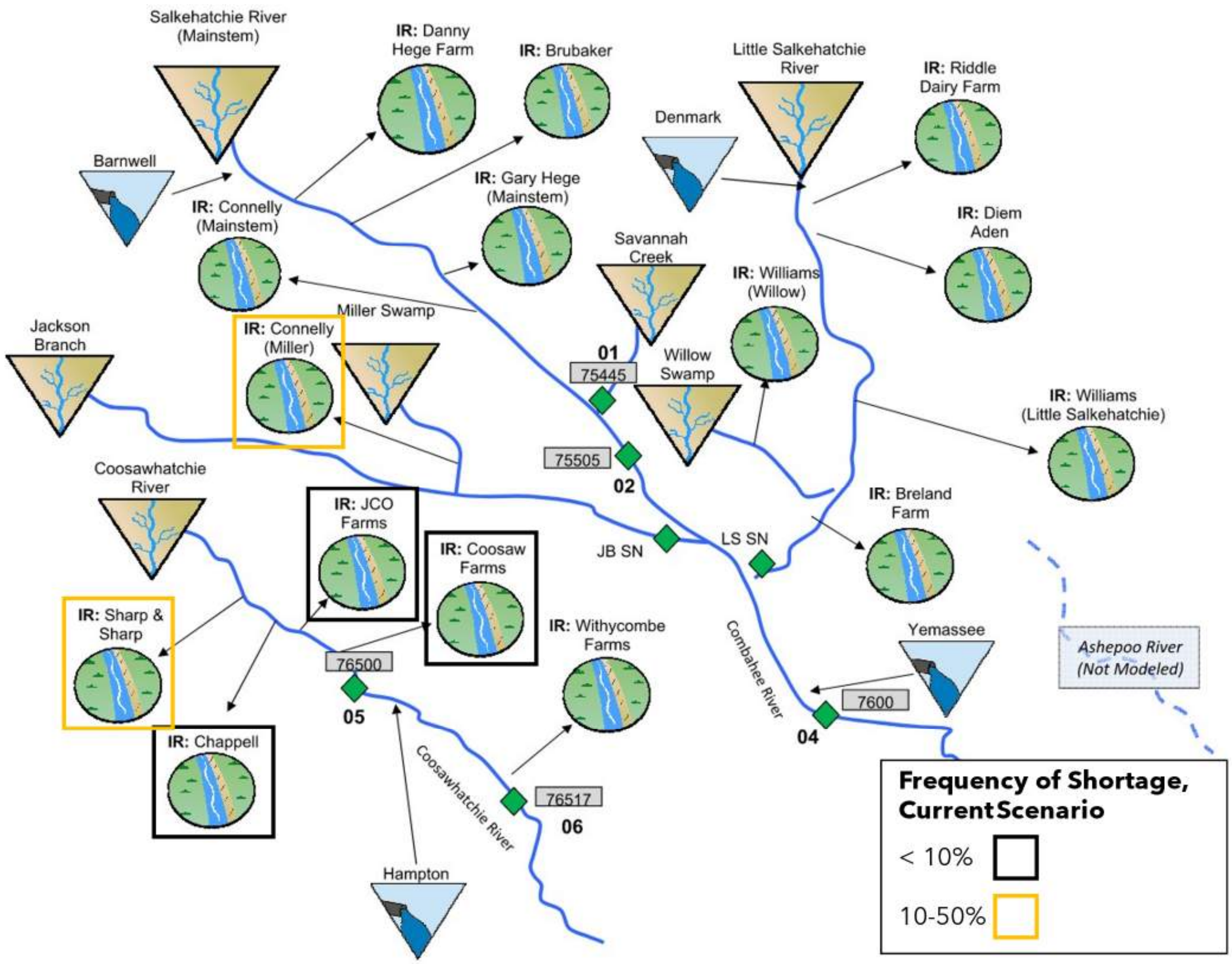
Tables 5-3 through 5-7 summarize simulation results (using a monthly timestep) for the Current Scenario assuming zero minimum instream flow requirements. There are no simulated shortages in the Lower Savannah basin under the Current Scenario. Table 5-3 lists the surface water users with one or more months of a simulated Surface Water Shortage in the Salkehatchie basin. Simulated shortages occur for 5 of 15 users in the Salkehatchie basin. Figure 5-3 shows the locations of these water users on the SWAM model framework. Also shown are the average annual demand for each water user experiencing a shortage; the minimum physically available (monthly average) flow at the point of withdrawal; the maximum (monthly average) shortage; and the frequency of shortage. All five users experiencing shortages with shortages are agricultural water users. These withdrawals are mostly located either on or adjacent to impoundments that are not included in the model. The impoundments may provide enough water to prevent the projected physical shortages at times when Miller Swamp and the Coosawhatchie River are simulated to have very low flow.

Tables 5-4 and 5-5 present the mean flow, median flow, and Surface Water Supply at each Strategic Node within the two basins. Also presented are the 25th, 10th, and 5th percentile flows, which are useful in characterizing low flows. Tables 5-6 and 5-7 present the basinwide performance metrics.

Table 5-3. Identified Surface Water Shortages in the Salkehatchie River basin, Current Scenario.

Water User Name	Source Water	Average Annual Demand (MGD)	Minimum Physically Available Flow (MGD)	Maximum Shortage (MGD)	Frequency of Shortage
IR: Connelly (Miller)	Miller Swamp	0.32	0.003	1.59	11.3%
IR: Chappell	Coosawhatchie River	0.02	0.00	0.05	6.5%
IR: Sharp & Sharp	Coosawhatchie River	0.87	0.00	2.20	13.0%
IR: JCO Farms	Coosawhatchie River	0.03	0.00	0.07	7.2%
IR: Coosaw Farms	Coosawhatchie River	0.19	0.00	0.50	5.9%

IR = agricultural (irrigation) water user



Note: There are no simulated shortages in the Lower Savannah basin under the Current Scenario.

Figure 5-3. Water users with Surface Water Shortages and frequency of shortages in the Salkehatchie River basin, Current Scenario.

Table 5-4. Surface water model simulation results at Strategic Nodes in the Lower Savannah River basin, Current Scenario.

Strategic Node	Mean Flow (cfs)	Median Flow (cfs)	Surface Water Supply (cfs)	Percentile Flows (cfs)		
				25th	10th	5th
SAV29 Savannah River at Augusta, GA	8,967	6,516	3,307	4,815	4,420	4,126
SAV36 Savannah River near Jackson	9,773	7,287	3,776	5,370	4,921	4,580
SAV45 Savannah River near Clyo, GA	11,483	8,813	4,424	6,326	5,659	5,233
SAV46 Savannah River at USACE Dock at Savannah, GA	11,831	9,107	4,477	6,523	5,799	5,354
SAV35 Upper Three Runs at Road A (SRS)	223	214	102	177	146	133
SAV28 Horse Creek at Clearwater	186	176	45	140	114	99

Table 5-5. Surface water model simulation results at Strategic Nodes in the Salkehatchie River basin, Current Scenario.

Strategic Node	Mean Flow (cfs)	Median Flow (cfs)	Surface Water Supply (cfs)	Percentile Flows (cfs)		
				25th	10th	5th
SLK02 Salkehatchie River near Miley	317	253	23	157	98	76
SLK04 Combahee River near Yemassee	670	490	37	287	173	131
Jackson Branch Strategic Node	74	45	0	23	11	7
Little Salkehatchie Strategic Node	170	104	3	54	26	19
SLK05 Coosawhatchie River near Hampton	157	82	0	22	5	3
SLK06 Coosawhatchie River near Early Branch	309	162	1	45	13	7

Table 5-6. Basinwide surface water model simulation results in the Lower Savannah River basin, Current Scenario.

Performance Measure	Result
GA-Side and SC-Side Water Users	
Total basin annual mean shortage (MGD)	0
Total basin annual mean demand (MGD)	338.39
Maximum water user shortage (MGD)	0
Total basin annual mean shortage (% of demand)	0%
Percentage of water users experiencing shortage	0%
Average frequency of shortage (%)	0%
SC Water Users Only (Not Including GA-Side Water Users)	
Total basin annual mean shortage (MGD)	0
Total basin annual mean demand (MGD)	167.34
Maximum water user shortage (MGD)	0
Total basin annual mean shortage (% of demand)	0%
Percentage of water users experiencing shortage	0%
Average frequency of shortage (%)	0%

Table 5-7. Basinwide surface water model simulation results in the Salkehatchie River basin, Current Scenario.

Performance Measure	Result
Total basin annual mean shortage (MGD)	0.21
Total basin annual mean demand (MGD)	2.75
Maximum water user shortage (MGD)	2.20
Total basin annual mean shortage (% of demand)	7.6%
Percentage of water users experiencing shortage	33.3%
Average frequency of shortage (%)	2.9%

5.3.2 Permitted and Registered Surface Water Use Scenario

In the P&R Scenario, modeled demands were set to permitted or registered values for all water users. In other words, this simulation asked, "What if all water users used the full volume of water allocated through permits and registrations?" This scenario, plausible on paper but highly unlikely to occur, provides information to determine whether surface water is currently over-allocated in the basin.

Tables 5-8 through 5-15 summarize the simulation results for the P&R Scenario (monthly timestep) assuming zero minimum instream flow requirements. In this scenario, river flows are predicted to decrease, compared to the Current Scenario, throughout the basin, resulting in Surface Water Shortages for several surface water users. In the Lower Savannah basin, these water users include one golf course and two public water suppliers; these users are all permitted to withdrawal amounts much larger than their current average annual demands. In the Salkehatchie basin, the five agricultural water users who experienced shortages in the Current Scenario also experience shortages under the P&R Scenario, plus an additional five agricultural water users. Tables 5-8 and 5-9 list the surface water users with one or more months of a simulated Surface Water Shortage in the two basins. Figures 5-4 and 5-5 show locations of these water users on the SWAM model framework. Also shown are the average annual demand for each water user experiencing a shortage, the minimum physically available (monthly average) flow at the point of withdrawal, the maximum (monthly average) shortage, and the frequency of shortage.

Table 5-8. Identified Surface Water Shortages in the Lower Savannah River basin, P&R Scenario.

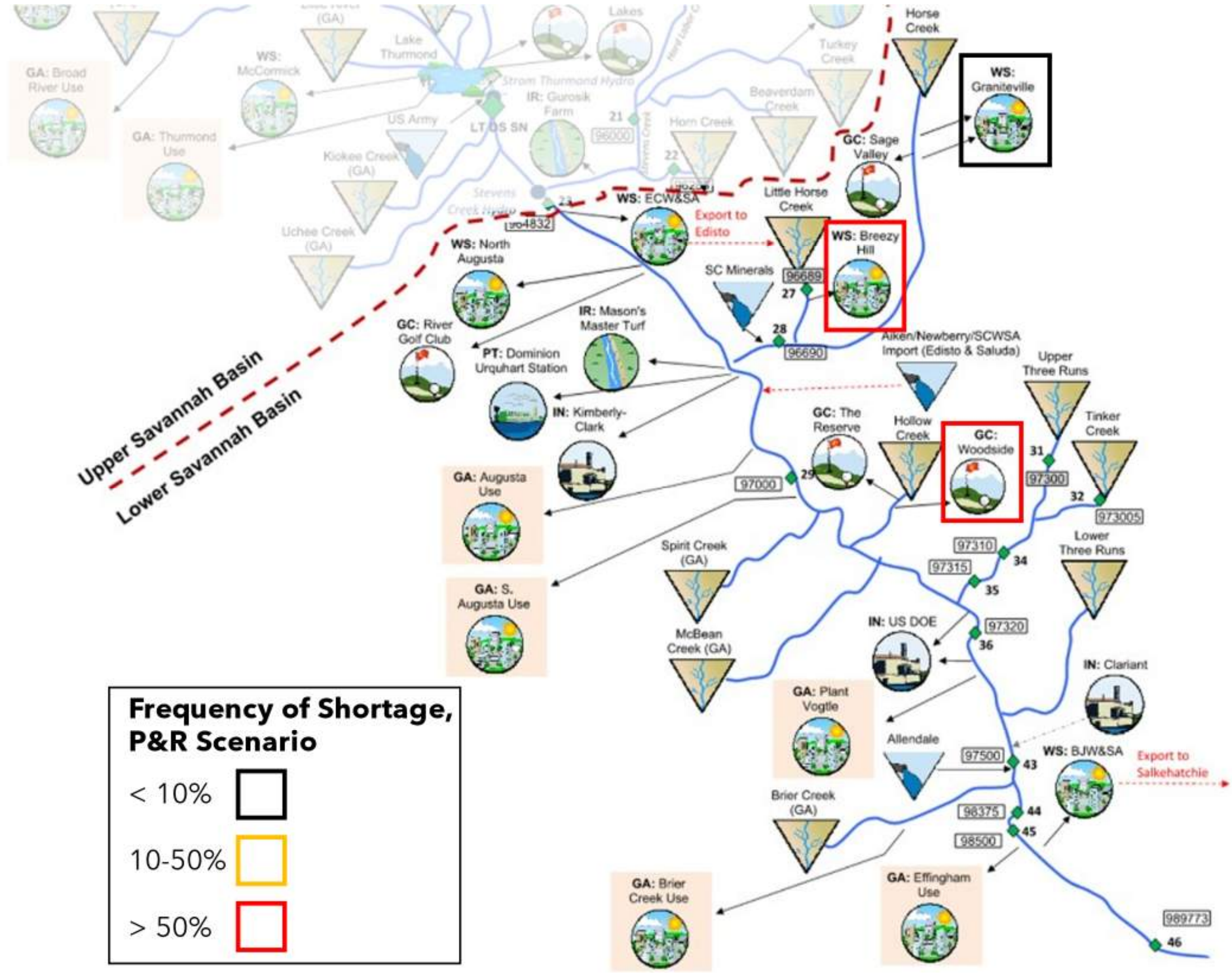
Water User Name	Source Water	Average Allowable Use (MGD)[1]	Minimum Physically Available Flow (MGD)	Maximum Shortage (MGD)	Frequency of Shortage
GC: Woodside	Hollow Creek	6.17 (0.16)	2.72	3.44	78.7%
WS: Breezy Hill	Little Horse Creek	55.08 (1.22)	3.80	50.79	99.6%
WS: Graniteville	Horse Creek	24.40 (8.17)	9.12	13.56	4.9%

WS = water supply water user; GC = golf course water user
[1] The current use average annual demand is provided in parentheses.

Table 5-9. Identified Surface Water Shortages in the Salkehatchie River basin, P&R Scenario.

Water User Name	Source Water	Average Allowable Use (MGD)[1]	Minimum Physically Available Flow (MGD)	Maximum Shortage (MGD)	Frequency of Shortage
IR: Connelly (Miller)	Miller Swamp	3.52 (0.32)	0.003	3.54	68.4%
IR: Williams (Willow)	Willow Swamp	3.55 (0.02)	0.29	3.31	20.0%
IR: Riddle Dairy Farm	Little Salkehatchie River	0.75 (0.37)	0.74	0.01	0.1%
IR: Diem Aden	Little Salkehatchie River	0.56 (0.06)	0.14	0.42	0.5%
IR: Williams (Little Salkehatchie)	Little Salkehatchie River	0.99 (0.00)	0.95	0.05	0.1%
IR: Chappell	Coosawhatchie River	1.34 (0.02)	0.00	1.42	36.7%
IR: Sharp & Sharp	Coosawhatchie River	6.71 (0.87)	0.00	6.80	44.8%
IR: JCO Farms	Coosawhatchie River	20.25 (0.03)	0.00	21.84	72.7%
IR: Coosaw Farms	Coosawhatchie River	0.90 (0.19)	0.00	0.92	16.9%
IR: Withycombe Farm	Coosawhatchie River	1.32 (0.00)	0.66	0.64	1.1%

IR = agricultural (irrigation) water user
[1] The current use average annual demand is provided in parentheses.



Note: Water users shaded in light orange represent Georgia water users.

Figure 5-4. Water users with Surface Water Shortages and frequency of shortages in the Lower Savannah River basin, P&R Scenario.

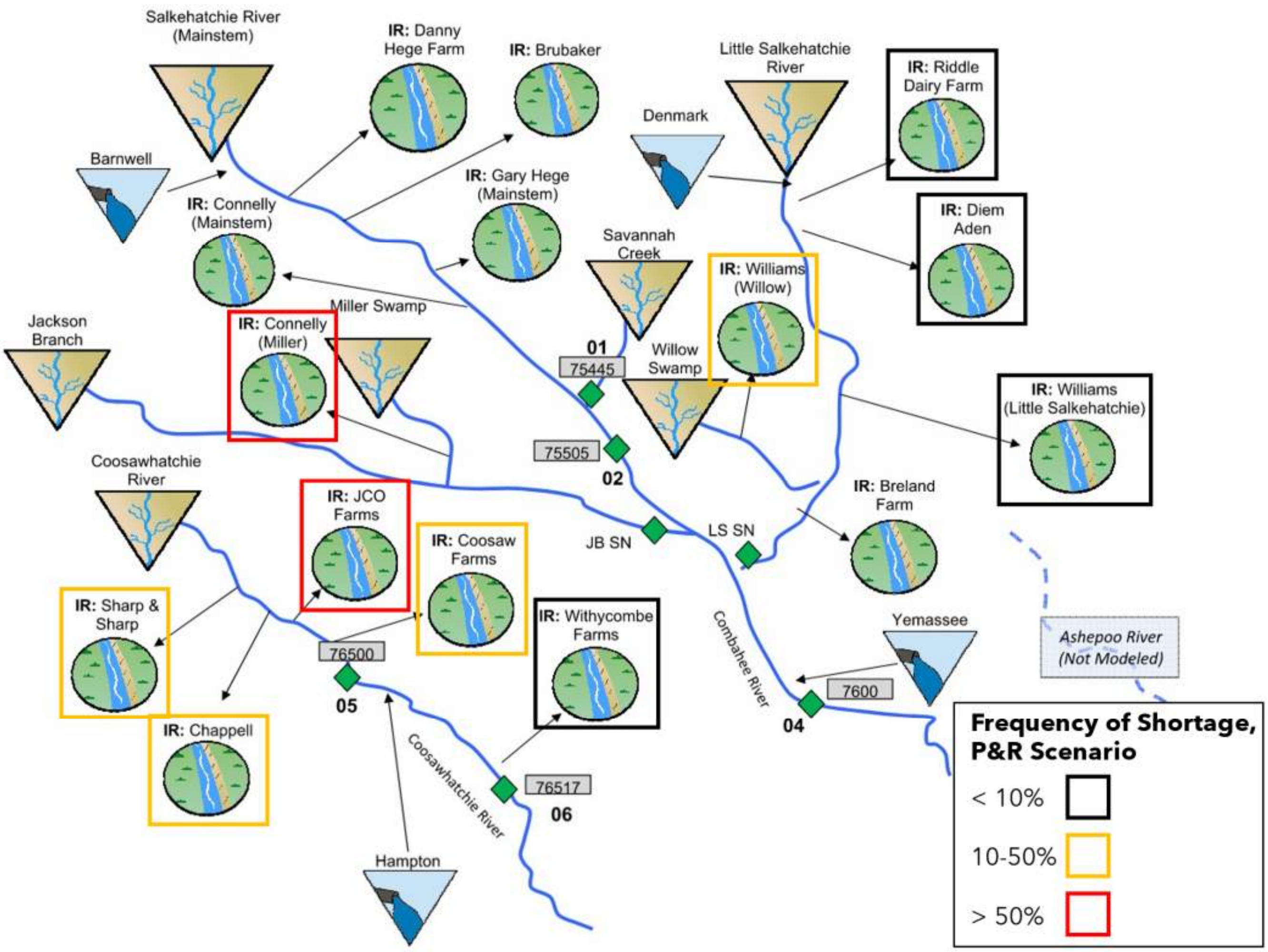


Figure 5-5. Water users with Surface Water Shortages and frequency of shortages in the Salkehatchie River basin, P&R Scenario.

Tables 5-10 and 5-11 present the mean flow, median flow, and Surface Water Supply at each Strategic Node. Also presented are the 25th, 10th, and 5th percentile flows, which are useful in characterizing low flows. Tables 5-12 and 5-13 show the percentage decrease in P&R Scenario flow statistics compared to the Current Scenario. Along the Lower Savannah River mainstem, modeled reductions are most pronounced during median flow periods, while modeled reductions are most pronounced during low-flow conditions in the Salkehatchie basin. On the Upper Three Runs tributary to the Savannah River (SAV35), flows are greatly increased under the P&R Scenario due to the USDOE industrial wastewater discharge upstream. Mean flows at the most downstream site on the Lower Savannah River mainstem (SAV46, Savannah River at USACE Dock at Savannah, GA) are predicted to decrease by approximately 7 percent, and median flows by approximately 11 percent, if all upstream users withdrew water from the system at their permitted or registered amount. In the Salkehatchie River basin, mean and median flows at the most downstream site on the Combahee River (SLK04, Combahee River near Yemassee) are predicted to decrease by approximately 3 and 5 percent, respectively. Mean and median flows at the most downstream site on the Coosawhatchie River (SLK06, Coosawhatchie River near Early Branch) are predicted to decrease by approximately 8 and 11 percent, respectively.

Table 5-10. Surface water model simulation results at Strategic Nodes in the Lower Savannah River basin, P&R Scenario.

Strategic Node	Mean Flow (cfs)	Median Flow (cfs)	Surface Water Supply (cfs)	Percentile Flows (cfs)		
				25th	10th	5th
SAV29 Savannah River at Augusta, GA	8,521	5,657	3,240	4,701	4,278	3,931
SAV36 Savannah River near Jackson	9,621	6,732	3,981	5,548	5,064	4,687
SAV45 Savannah River near Clyo, GA	10,939	7,939	4,172	6,094	5,431	5,009
SAV46 Savannah River at USACE Dock at Savannah, GA	11,049	8,085	3,989	6,037	5,330	4,860
SAV35 Upper Three Runs at Road A (SRS)	528	519	404	479	450	436
SAV28 Horse Creek at Clearwater	119	114	29	84	64	53

Table 5-11. Surface water model simulation results at Strategic Nodes in the Salkehatchie River basin, P&R Scenario.

Strategic Node	Mean Flow (cfs)	Median Flow (cfs)	Surface Water Supply (cfs)	Percentile Flows (cfs)		
				25th	10th	5th
SLK02 Salkehatchie River near Miley	306	242	15	149	89	68
SLK04 Combahee River near Yemassee	649	467	27	268	157	117
Jackson Branch Strategic Node	72	42	0	22	10	7
Little Salkehatchie Strategic Node	162	96	1	46	20	14
SLK05 Coosawhatchie River near Hampton	136	65	0	18	5	2
SLK06 Coosawhatchie River near Early Branch	285	143	0	40	10	5

Table 5-12. Percent change in P&R Scenario flows at Strategic Nodes relative to Current Scenario flows in the Lower Savannah River basin.

Strategic Node	Mean Flow (cfs)	Median Flow (cfs)	Surface Water Supply (cfs)	Percentile Flows (cfs)		
				25th	10th	5th
SAV29 Savannah River at Augusta, GA	-5.0%	-13.2%	-2.0%	-2.4%	-3.2%	-4.7%
SAV36 Savannah River near Jackson	-1.6%	-7.6%	5.4%	3.3%	2.9%	2.3%
SAV45 Savannah River near Clyo, GA	-4.7%	-9.9%	-5.7%	-3.7%	-4.0%	-4.3%
SAV46 Savannah River at USACE Dock at Savannah, GA	-6.6%	-11.2%	-10.9%	-7.5%	-8.1%	-9.2%
SAV35 Upper Three Runs at Road A (SRS)[1]	137.4%	142.4%	295.4%	170.3%	208.4%	228.2%
SAV28 Horse Creek at Clearwater	-35.8%	-35.5%	-36.6%	-39.7%	-43.9%	-46.2%

[1] At SAV35, flows are greatly increased under the P&R Scenario due to the USDOE industrial wastewater discharge upstream.

Table 5-13. Percent change in P&R Scenario flows at Strategic Nodes relative to Current Scenario flows in the Salkehatchie River basin.

Strategic Node	Mean Flow (cfs)	Median Flow (cfs)	Surface Water Supply (cfs)	Percentile Flows (cfs)		
				25th	10th	5th
SLK02 Salkehatchie River near Miley	-3.3%	-4.3%	-32.8%	-5.2%	-9.6%	-11.5%
SLK04 Combahee River near Yemassee	-3.2%	-4.7%	-26.0%	-6.5%	-9.7%	-10.7%
Jackson Branch Strategic Node	-4.0%	-5.9%	0.0%	-5.9%	-4.8%	-5.0%
Little Salkehatchie Strategic Node	-4.7%	-7.6%	-69.5%	-15.5%	-22.4%	-26.1%
SLK05 Coosawhatchie River near Hampton	-13.5%	-20.9%	*NA*	-19.5%	-13.7%	-12.2%
SLK06 Coosawhatchie River near Early Branch	-7.5%	-11.4%	-100.0%	-12.3%	-24.9%	-33.1%

The impact of full allocation withdrawals on downstream water users is evident in the predicted increase in mean annual water shortage and the increase in the number and frequency of water users experiencing a shortage during the simulation period, as shown in Tables 5-14 and 5-15. As explained in Chapter 4, the fully permitted and registered withdrawal rates greatly exceed current use rates. Despite the low likelihood of the P&R Scenario, results demonstrate that the surface water resources of the basin are overallocated based on existing permit and registration amounts. During implementation of the 2011 Surface Water Withdrawal, Permitting Use, and Reporting Act, permit amounts for pre-existing surface water users were based on intake capacities rather than safe yield calculations. The intake capacities allow for withdrawal of more water than may be available under certain drought conditions, as demonstrated by the results of the P&R Scenario.

Table 5-14. Basinwide surface water model simulation results in the Lower Savannah River basin, P&R Scenario.

Performance Measure	Result
GA-Side and SC-Side Water Users	
Total basin annual mean shortage (MGD)	30.77
Total basin annual mean demand (MGD)	1,877.43
Maximum water user shortage (MGD)	50.79
Total basin annual mean shortage (% of demand)	1.6%
Percentage of water users experiencing shortage	16.7%
Average frequency of shortage (%)	10.2%
SC Water Users Only (Not Including GA-Side Water Users)	
Total basin annual mean shortage (MGD)	30.77
Total basin annual mean demand (MGD)	1,416.29
Maximum water user shortage (MGD)	50.79
Total basin annual mean shortage (% of demand)	2.2%
Percentage of water users experiencing shortage	23.1%
Average frequency of shortage (%)	14.1%

Table 5-15. Basinwide surface water model simulation results in the Salkehatchie River basin, P&R Scenario.

Performance Measure	Result
Total basin annual mean shortage (MGD)	16.17
Total basin annual mean demand (MGD)	47.58
Maximum water user shortage (MGD)	21.84
Total basin annual mean shortage (% of demand)	34.0%
Percentage of water users experiencing shortage	66.7%
Average frequency of shortage (%)	17.4%

5.3.3 Moderate Water Demand Projection Scenario

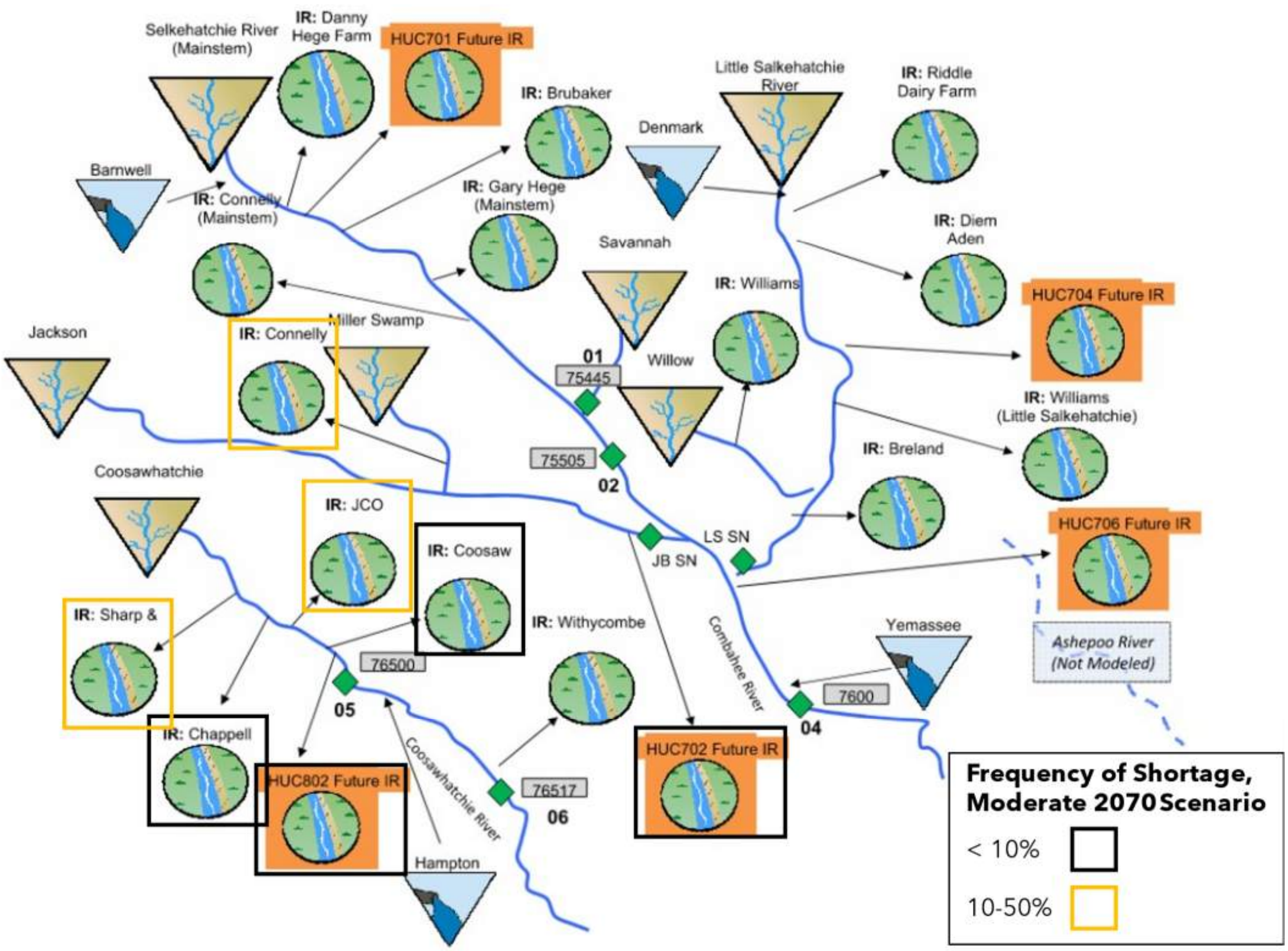
For the Moderate Scenario, modeled demands were set to projected future levels based on an assumption of moderate population and economic growth, as described in Chapter 4.3. The year 2070 planning horizon was targeted using the demand projections developed by SCDES and presented in Chapter 4.4. Future municipal water demands above current demands from Greenville were assumed to be met by Lake Keowee in the Upper Savannah River basin, which influences the mainstem headwater inflow in the Lower Savannah River. Existing agricultural users' current demands were kept constant. Additional future agricultural irrigation demands were represented in the SWAM model by new simulated water users located at the outlet of select watersheds where growth in agricultural irrigation was projected to occur; additional "watershed-level" agricultural demands were applied only in the Upper Savannah River basin (impacting the headwater flow into the Lower Savannah River) and the Salkehatchie River basin.

Tables 5-16 through 5-22 summarize the Moderate Scenario (monthly timestep) simulation results for the 2070 planning horizon assuming zero minimum instream flow requirements. No water users have calculated water shortages in the Lower Savannah basin under the Moderate 2070 Scenario. In the Salkehatchie basin, the five agricultural water users with shortages in the Current Scenario have shortages, plus shortages are calculated for two of the five "watershed-level" water users used for simulating future agricultural irrigation demands. Figure 5-6 shows the locations of these water users on the SWAM model framework. Given current climate conditions and existing basin management and regulatory structure, basin surface water supplies are predicted to be adequate to meet increased demands resulting from moderate economic and population growth, recalling that agricultural uses are typically supplemented with small off-stream impoundments that can provide buffers against short-term low-streamflow conditions. However, there is no requirement that agricultural users use the water in their impoundments first before making additional withdrawals.

Table 5-16. Identified Surface Water Shortages in the Salkehatchie River basin, Moderate 2070 Scenario.

Water User Name	Source Water	Average Annual Demand (MGD)	Minimum Physically Available Flow (MGD)	Maximum Shortage (MGD)	Frequency of Shortage
IR: Connelly (Miller)	Miller Swamp	0.33	0.003	1.72	12.1%
HUC702 Future IR	Jackson Branch	0.12	0.03	0.42	0.1%
IR: Chappell	Coosawhatchie River	0.02	0.00	0.05	6.5%
IR: Sharp & Sharp	Coosawhatchie River	0.87	0.00	2.20	13.0%
IR: JCO Farms	Coosawhatchie River	0.05	0.00	0.12	13.3%
IR: Coosaw Farms	Coosawhatchie River	0.21	0.00	0.67	6.3%
HUC802 Future IR	Coosawhatchie River	0.29	0.00	0.87	1.6%

IR = agricultural (irrigation) water user



Note: Water users shaded in dark orange represent additional future agricultural irrigation demands from new simulated water users located within watersheds where growth in agricultural irrigation was projected to occur.

Figure 5-6. Water users with Surface Water Shortages and frequency of shortages in the Salkehatchie River basin, Moderate 2070 Scenario.

In the Moderate Scenario, flows are predicted to decrease modestly in the Lower Savannah basin, compared to the Current Scenario. At some locations in the Salkehatchie basin, flows are predicted to decrease more substantially, depending on location, compared to the Current Scenario. These modeled reductions are most pronounced during low-flow periods. Mean and median flows at the most downstream site on the Lower Savannah River mainstem (SAV46, Savannah River at USACE Dock at Savannah, GA) are predicted to decrease 1 and 3 percent, respectively, by 2070 if population and economic growth is moderate and climate change impacts are negligible. In the Salkehatchie River basin, mean and median flows at the most downstream site on the Combahee River (SLK04, Combahee River near Yemassee) are predicted to decrease by 0.1 percent or less. Mean and median flows at the most downstream site on the Coosawhatchie River (SLK06, Coosawhatchie River near Early Branch) are predicted to decrease by 0.2 percent or less.

Table 5-17. Surface water model simulation results at Strategic Nodes in the Lower Savannah River basin, Moderate 2070 Scenario.

Strategic Node	Mean Flow (cfs)	Median Flow (cfs)	Surface Water Supply (cfs)	Percentile Flows (cfs)		
				25th	10th	5th
SAV29 Savannah River at Augusta, GA	8,880	6,324	3,309	4,804	4,397	4,114
SAV36 Savannah River near Jackson	9,685	7,075	3,777	5,360	4,893	4,548
SAV45 Savannah River near Clyo, GA	11,332	8,572	4,361	6,254	5,576	5,154
SAV46 Savannah River at USACE Dock at Savannah, GA	11,667	8,862	4,400	6,431	5,691	5,261
SAV35 Upper Three Runs at Road A (SRS)	222	214	102	177	146	133
SAV28 Horse Creek at Clearwater	183	174	42	138	111	97

Table 5-18. Surface water model simulation results at Strategic Nodes in the Salkehatchie River basin, Moderate 2070 Scenario.

Strategic Node	Mean Flow (cfs)	Median Flow (cfs)	Surface Water Supply (cfs)	Percentile Flows (cfs)		
				25th	10th	5th
SLK02 Salkehatchie River near Miley	316	253	22	156	98	76
SLK04 Combahee River near Yemassee	669	490	34	286	171	131
Jackson Branch Strategic Node	74	45	0	23	10	7
Little Salkehatchie Strategic Node	170	104	3	54	26	18
SLK05 Coosawhatchie River near Hampton	156	81	0	21	4	2
SLK06 Coosawhatchie River near Early Branch	308	162	1	45	12	6

Table 5-19. Percent change in Moderate 2070 Scenario flows at Strategic Nodes relative to Current Scenario flows in the Lower Savannah River basin.

Strategic Node	Mean Flow (cfs)	Median Flow (cfs)	Surface Water Supply (cfs)	Percentile Flows (cfs)		
				25th	10th	5th
SAV29 Savannah River at Augusta, GA	-1.0%	-2.9%	0.0%	-0.2%	-0.5%	-0.3%
SAV36 Savannah River near Jackson	-0.9%	-2.9%	0.0%	-0.2%	-0.6%	-0.7%
SAV45 Savannah River near Clyo, GA	-1.3%	-2.7%	-1.4%	-1.1%	-1.5%	-1.5%
SAV46 Savannah River at USACE Dock at Savannah, GA	-1.4%	-2.7%	-1.7%	-1.4%	-1.9%	-1.7%
SAV35 Upper Three Runs at Road A (SRS)	0.0%	0.0%	-0.1%	0.0%	0.0%	0.0%
SAV28 Horse Creek at Clearwater	-1.3%	-1.5%	-5.9%	-1.6%	-2.2%	-2.1%

Table 5-20. Percent change in Moderate 2070 Scenario flows at Strategic Nodes relative to Current Scenario flows in the Salkehatchie River basin.

Strategic Node	Mean Flow (cfs)	Median Flow (cfs)	Surface Water Supply (cfs)	Percentile Flows (cfs)		
				25th	10th	5th
SLK02 Salkehatchie River near Miley	-0.1%	0.0%	-2.1%	-0.3%	-0.4%	-0.8%
SLK04 Combahee River near Yemassee	-0.1%	0.0%	-6.6%	-0.4%	-1.2%	-0.6%
Jackson Branch Strategic Node	-0.3%	0.0%	-99.8%	-0.8%	-2.4%	-3.9%
Little Salkehatchie Strategic Node	-0.1%	-0.4%	-14.9%	-0.4%	-1.3%	-2.1%
SLK05 Coosawhatchie River near Hampton	-0.3%	-2.1%	*NA*	-4.2%	-15.2%	-36.5%
SLK06 Coosawhatchie River near Early Branch	-0.2%	0.0%	0.0%	-0.4%	-6.0%	-12.6%

Table 5-21. Basinwide surface water model simulation results in the Lower Savannah River basin, Moderate 2070 Scenario.

Performance Measure	Result
GA-Side and SC-Side Water Users	
Total basin annual mean shortage (MGD)	0
Total basin annual mean demand (MGD)[1]	384.94
Maximum water user shortage (MGD)	0
Total basin annual mean shortage (% of demand)	0%
Percentage of water users experiencing shortage	0%
Average frequency of shortage (%)	0%
SC Water Users Only (Not Including GA-Side Water Users)	
Total basin annual mean shortage (MGD)	0
Total basin annual mean demand (MGD)[1]	166.05
Maximum water user shortage (MGD)	0
Total basin annual mean shortage (% of demand)	0%
Percentage of water users experiencing shortage	0%
Average frequency of shortage (%)	0%

[1] For water users in South Carolina, the projected Moderate and High Demand Scenarios have different starting points from one another and differ from the Current Use Scenario because the Moderate Demand Scenario is based on each user's median recent use, the High Demand Scenario is based on each user's maximum recent use, and the Current Use Scenario is based on each user's average recent use.

Table 5-22. Basinwide surface water model simulation results in the Salkehatchie River basin, Moderate 2070 Scenario.

Performance Measure	Result
Total basin annual mean shortage (MGD)	0.23
Total basin annual mean demand (MGD)[1]	3.58
Maximum water user shortage (MGD)	2.20
Total basin annual mean shortage (% of demand)	6.5%
Percentage of water users experiencing shortage	35.0%
Average frequency of shortage (%)	2.6%

[1] The projected Moderate and High Demand Scenarios have different starting points from one another and differ from the Current Use Scenario because the Moderate Demand Scenario is based on each user's median recent use, the High Demand Scenario is based on each user's maximum recent use, and the Current Use Scenario is based on each user's average recent use.

5.3.4 High Water Demand Projection Scenario

For the High Demand Scenario, modeled demands are set to the 90th percentile of variability in reported withdrawals for each user, and the projections are based on aggressive growth within the range of uncertainty of the referenced driver variable projections, as described in Chapter 4. Like the Moderate Scenario, a year 2070 planning horizon was targeted using the demand projections developed by SCDES. This set of scenarios represents the combined impacts of all sectors experiencing high growth and all water users experiencing conditions of high water demand. These assumptions are intended to represent an unlikely maximum for total water demand; it is very unlikely these demands would occur month after month and year after year for all water users. The purpose of this scenario is to provide the RBC with information on which to base conservative management strategies. Other methods and assumptions used in constructing the High Demand Scenario were the same as for the Moderate Scenario.

Tables 5-23 through 5-30 summarize the High Demand Scenario (monthly timestep) simulation results for the 2070 planning horizon assuming zero minimum instream flow requirements. Figures 5-7 and 5-8 show the locations of these water users on the SWAM model framework. In the Lower Savannah basin, one municipal water user experiences shortages under the High Demand 2070 Scenario. All of the Salkehatchie basin agricultural water users with shortages in the Moderate 2070 Scenario exhibit equal or slightly greater shortages under the High Demand 2070 Scenario. Two additional agricultural water users and one additional "watershed-based" water user (representing additional future demand) also experience shortages under this scenario.

Table 5-23. Identified Surface Water Shortages in the Lower Savannah River basin, High Demand 2070 Scenario.

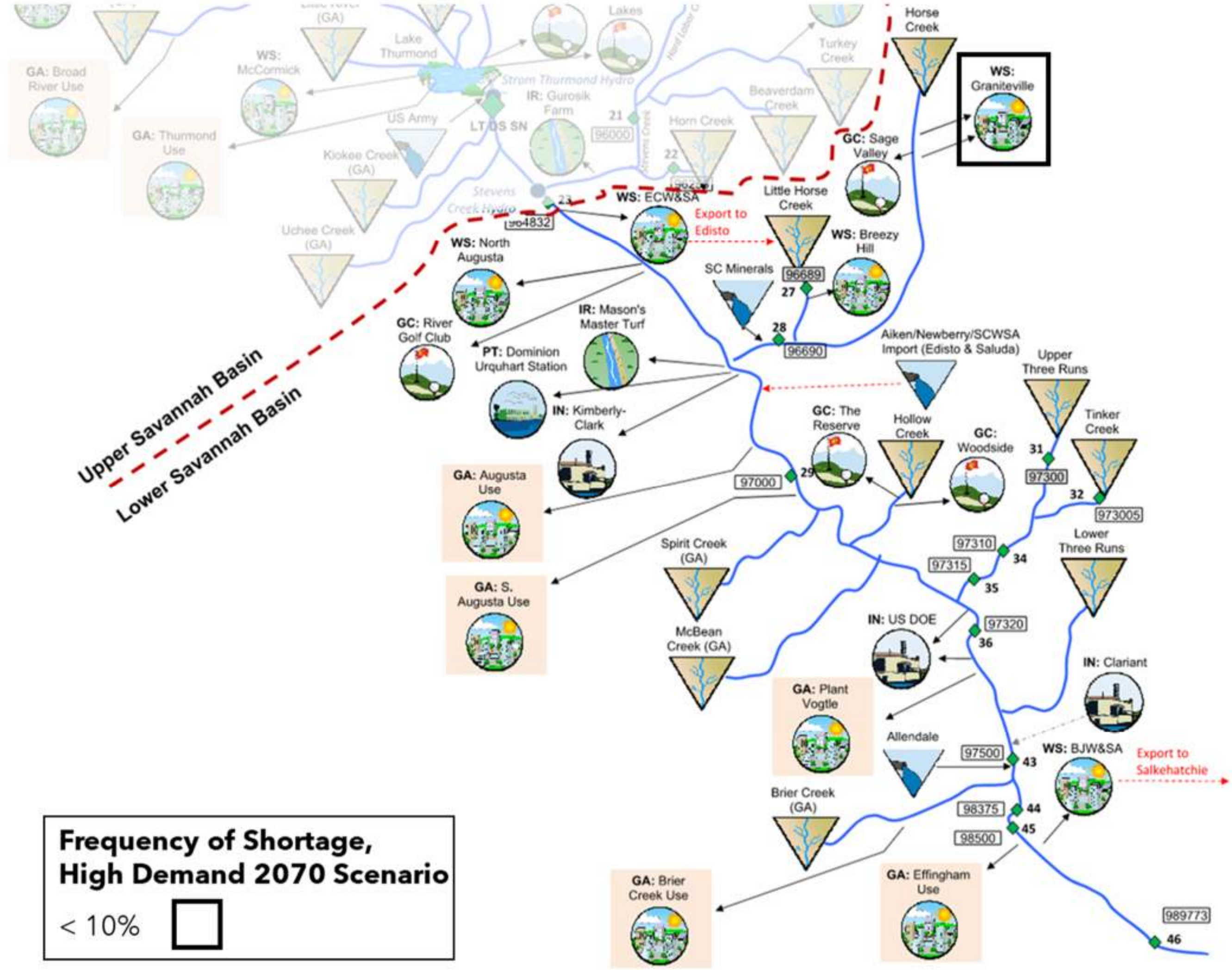
Water User Name	Source Water	Average Annual Demand (MGD)	Minimum Physically Available Flow (MGD)	Maximum Shortage (MGD)	Frequency of Shortage
WS: Graniteville	Horse Creek	19.51	9.12	3.25	0.6%

WS = water supply water user

Table 5-24. Identified Surface Water Shortages in the Salkehatchie River basin, High Demand 2070 Scenario.

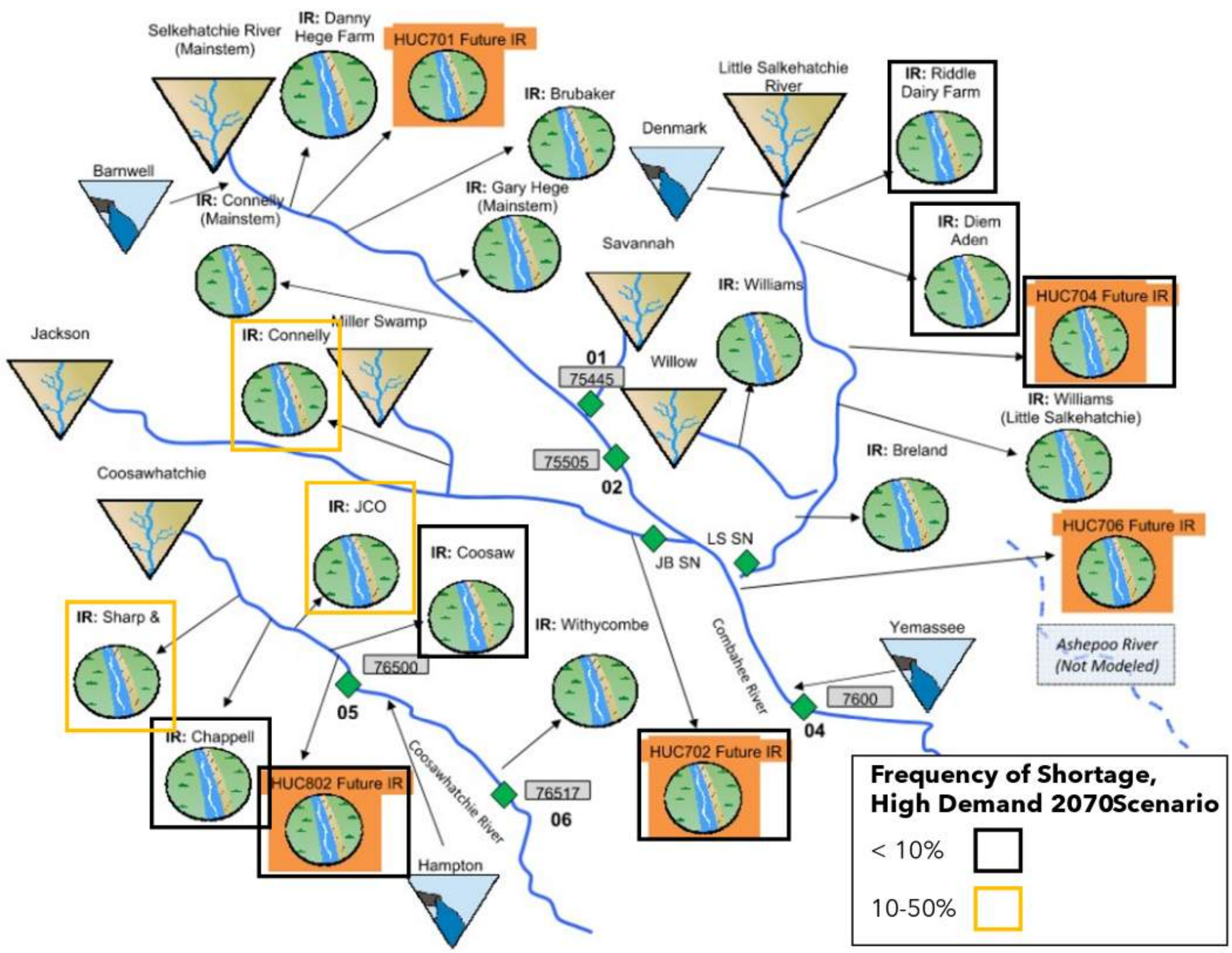
Water User Name	Source Water	Average Annual Demand (MGD)	Minimum Physically Available Flow (MGD)	Maximum Shortage (MGD)	Frequency of Shortage
IR: Connelly (Miller)	Miller Swamp	0.66	0.003	2.99	19.7%
HUC702 Future IR	Jackson Branch	0.28	0.03	1.00	0.2%
IR: Riddle Dairy Farm	Little Salkehatchie River	0.54	0.74	0.01	0.1%
IR: Diem Aden	Little Salkehatchie River	0.17	0.14	0.21	0.2%
HUC704 Future IR	Little Salkehatchie River	0.29	0.36	0.09	0.1%
IR: Chappell	Coosawhatchie River	0.02	0.00	0.05	6.5%
IR: Sharp & Sharp	Coosawhatchie River	0.87	0.00	2.20	13.0%
IR: JCO Farms	Coosawhatchie River	0.06	0.00	0.14	13.4%
IR: Coosaw Farms	Coosawhatchie River	0.29	0.00	0.74	8.0%
HUC802 Future IR	Coosawhatchie River	0.45	0.00	1.22	2.1%

IR = agricultural (irrigation) water user



Note: Water users shaded in light orange represent Georgia water users.

Figure 5-7. Water users with Surface Water Shortages and frequency of shortages in the Lower Savannah River basin, High Demand 2070 Scenario.



Note: Water users shaded in dark orange represent additional future agricultural irrigation demands from new simulated water users located within watersheds where growth in agricultural irrigation was projected to occur.

Figure 5-8. Water users with Surface Water Shortages and frequency of shortages in the Salkehatchie River basin, High Demand 2070 Scenario.

In the High Demand Scenario, river flows are predicted to decrease modestly in the Lower Savannah basin, compared to the Current Scenario. At most locations in the Salkehatchie basin, flows are predicted to decrease even more substantially than calculated under the Moderate Demand Scenario, compared to the Current Scenario. Again, these modeled reductions are most pronounced during low-flow periods. Mean and median flows at the most downstream site on the Lower Savannah River mainstem (SAV46, Savannah River at USACE Dock at Savannah, GA) are predicted to decrease 2 and 4 percent, respectively, by 2070 if population and economic growth is moderate and climate change impacts are negligible. In the Salkehatchie River basin, mean and median flows at the most downstream site on the Combahee River (SLK04, Combahee River near Yemassee) are predicted to decrease by 0.4 percent. Mean and median flows at the most downstream site on the Coosawhatchie River (SLK06, Coosawhatchie River near Early Branch) are predicted to decrease by 0.3 percent or less.

Table 5-25. Surface water model simulation results at Strategic Nodes in the Lower Savannah River basin, High Demand 2070 Scenario.

Strategic Node	Mean Flow (cfs)	Median Flow (cfs)	Surface Water Supply (cfs)	Percentile Flows (cfs)		
				25th	10th	5th
SAV29 Savannah River at Augusta, GA	8,797	6,173	3,296	4,783	4,373	4,078
SAV36 Savannah River near Jackson	9,602	6,930	3,764	5,332	4,879	4,509
SAV45 Savannah River near Clyo, GA	11,248	8,458	4,348	6,229	5,556	5,138
SAV46 Savannah River at USACE Dock at Savannah, GA	11,567	8,751	4,373	6,384	5,665	5,214
SAV35 Upper Three Runs at Road A (SRS)	223	214	102	178	146	133
SAV28 Horse Creek at Clearwater	169	159	31	123	97	82

Table 5-26. Surface water model simulation results at Strategic Nodes in the Salkehatchie River basin, High Demand 2070 Scenario.

Strategic Node	Mean Flow (cfs)	Median Flow (cfs)	Surface Water Supply (cfs)	Percentile Flows (cfs)		
				25th	10th	5th
SLK02 Salkehatchie River near Miley	316	252	21	156	97	75
SLK04 Combahee River near Yemassee	667	488	32	283	169	128
Jackson Branch Strategic Node	74	44	0	22	10	7
Little Salkehatchie Strategic Node	170	103	2	53	25	18
SLK05 Coosawhatchie River near Hampton	156	80	0	21	4	1
SLK06 Coosawhatchie River near Early Branch	308	162	1	45	12	6

Table 5-27. Percent change in High Demand 2070 Scenario flows at Strategic Nodes relative to Current Scenario flows in the Lower Savannah River basin.

Strategic Node	Mean Flow (cfs)	Median Flow (cfs)	Surface Water Supply (cfs)	Percentile Flows (cfs)		
				25th	10th	5th
SAV29 Savannah River at Augusta, GA	-1.9%	-5.3%	-0.3%	-0.7%	-1.0%	-1.2%
SAV36 Savannah River near Jackson	-1.7%	-4.9%	-0.3%	-0.7%	-0.9%	-1.6%
SAV45 Savannah River near Clyo, GA	-2.0%	-4.0%	-1.7%	-1.5%	-1.8%	-1.8%
SAV46 Savannah River at USACE Dock at Savannah, GA	-2.2%	-3.9%	-2.3%	-2.1%	-2.3%	-2.6%
SAV35 Upper Three Runs at Road A (SRS)[1]	0.1%	0.1%	0.1%	0.2%	0.1%	0.1%
SAV28 Horse Creek at Clearwater	-9.2%	-9.9%	-30.7%	-11.9%	-14.7%	-17.4%

[1] At SAV35, flows increase slightly under the High Demand 2070 Scenario due to the USDOE industrial wastewater discharge upstream.

Table 5-28. Percent change in High Demand 2070 Scenario flows at Strategic Nodes relative to Current Scenario flows in the Salkehatchie River basin.

Strategic Node	Mean Flow (cfs)	Median Flow (cfs)	Surface Water Supply (cfs)	Percentile Flows (cfs)		
				25th	10th	5th
SLK02 Salkehatchie River near Miley	-0.3%	-0.2%	-6.8%	-0.7%	-1.0%	-2.0%
SLK04 Combahee River near Yemassee	-0.4%	-0.4%	-12.7%	-1.3%	-2.5%	-2.8%
Jackson Branch Strategic Node	-0.9%	-0.9%	-99.8%	-3.0%	-7.5%	-11.7%
Little Salkehatchie Strategic Node	-0.5%	-1.0%	-22.8%	-1.6%	-4.0%	-5.1%
SLK05 Coosawhatchie River near Hampton	-0.5%	-2.2%	*NA*	-6.0%	-24.7%	-50.2%
SLK06 Coosawhatchie River near Early Branch	-0.3%	0.0%	0.0%	-0.6%	-9.9%	-18.8%

Table 5-29. Basinwide surface water model simulation results in the Lower Savannah River basin, High Demand 2070 Scenario.

Performance Measure	Result
GA-Side and SC-Side Water Users	
Total basin annual mean shortage (MGD)	0.01
Total basin annual mean demand (MGD)[1]	503.95
Maximum water user shortage (MGD)	3.25
Total basin annual mean shortage (% of demand)	0.001%
Percentage of water users experiencing shortage	5.6%
Average frequency of shortage (%)	0.03%
SC Water Users Only (Not Including GA-Side Water Users)	
Total basin annual mean shortage (MGD)	0.01
Total basin annual mean demand (MGD)[1]	285.05
Maximum water user shortage (MGD)	3.25
Total basin annual mean shortage (% of demand)	0.003%
Percentage of water users experiencing shortage	7.7%
Average frequency of shortage (%)	0.05%

[1] For water users in South Carolina, the projected Moderate and High Demand Scenarios have different starting points from one another and differ from the Current Use Scenario because the Moderate Demand Scenario is based on each user's median recent use, the High Demand Scenario is based on each user's maximum recent use, and the Current Use Scenario is based on each user's average recent use.

Table 5-30. Basinwide surface water model simulation results in the Salkehatchie River basin, High Demand 2070 Scenario.

Performance Measure	Result
Total basin annual mean shortage (MGD)	0.42
Total basin annual mean demand (MGD)[1]	5.26
Maximum water user shortage (MGD)	2.99
Total basin annual mean shortage (% of demand)	8.0%
Percentage of water users experiencing shortage	50.0%
Average frequency of shortage (%)	3.2%

[1] The projected Moderate and High Demand Scenarios have different starting points from one another and differ from the Current Use Scenario because the Moderate Demand Scenario is based on each user's median recent use, the High Demand Scenario is based on each user's maximum recent use, and the Current Use Scenario is based on each user's average recent use.

The High Demand Scenario for the 2070 planning horizon was also modeled using a daily timestep. Tables 5-31 through 5-34 summarize the results. Mean and median modeled flows are lower for all Strategic Nodes for the daily simulation compared to the monthly timestep simulation. With the exception of the Strategic Nodes on the Coosawhatchie River (SLK05 and SLK06), modeled minimum flows (Surface Water Supply) are lower for the daily timestep model compared to the monthly timestep. On the Coosawhatchie River, minimum flows are not sensitive to timestep. A greater range of flow variability is simulated with the higher resolution daily model, compared to the monthly model. Because of the higher temporal resolution, the daily model captures a basinwide maximum daily water user shortage that is higher than that quantified by the monthly timestep model (Tables 5-35 and 5-36).

Table 5-31. Daily timestep surface water model simulation results at Strategic Nodes in the Lower Savannah River basin, High Demand 2070 Scenario.

Strategic Node	Mean Flow (cfs)	Median Flow (cfs)	Surface Water Supply (cfs)	Percentile Flows (cfs)		
				25th	10th	5th
SAV29 Savannah River at Augusta, GA	8,788	5,068	3,188	4,732	4,341	4,028
SAV36 Savannah River near Jackson	9,592	5,828	3,524	5,264	4,825	4,464
SAV45 Savannah River near Clyo, GA	11,234	7,280	3,865	6,072	5,423	5,009
SAV46 Savannah River at USACE Dock at Savannah, GA	11,553	7,555	3,872	6,204	5,497	5,064
SAV35 Upper Three Runs at Road A (SRS)	223	208	84	169	139	124
SAV28 Horse Creek at Clearwater	169	151	10	115	87	70

Table 5-32. Daily timestep surface water model simulation results at Strategic Nodes in the Salkehatchie River basin, High Demand 2070 Scenario.

Strategic Node	Mean Flow (cfs)	Median Flow (cfs)	Surface Water Supply (cfs)	Percentile Flows (cfs)		
				25th	10th	5th
SLK02 Salkehatchie River near Miley	315	231	1	127	75	52
SLK04 Combahee River near Yemassee	665	438	2	230	126	85
Jackson Branch Strategic Node	73	38	0	16	7	4
Little Salkehatchie Strategic Node	168	88	0	38	16	9
SLK05 Coosawhatchie River near Hampton	155	56	0	10	1	0
SLK06 Coosawhatchie River near Early Branch	306	112	1	23	6	3

Table 5-33. Percent change in High Demand 2070 Scenario daily flows at Strategic Nodes relative to High Demand 2070 Scenario monthly flows in the Lower Savannah River basin.

Strategic Node	Mean Flow (cfs)	Median Flow (cfs)	Surface Water Supply (cfs)	Percentile Flows (cfs)		
				25th	10th	5th
SAV29 Savannah River at Augusta, GA	-0.1%	-17.9%	-3.3%	-1.1%	-0.7%	-1.2%
SAV36 Savannah River near Jackson	-0.1%	-15.9%	-6.4%	-1.3%	-1.1%	-1.0%
SAV45 Savannah River near Clyo, GA	-0.1%	-13.9%	-11.1%	-2.5%	-2.4%	-2.5%
SAV46 Savannah River at USACE Dock at Savannah, GA	-0.1%	-13.7%	-11.5%	-2.8%	-3.0%	-2.9%
SAV35 Upper Three Runs at Road A (SRS)	-0.1%	-2.8%	-18.3%	-4.8%	-4.9%	-6.6%
SAV28 Horse Creek at Clearwater	-0.1%	-5.1%	-67.4%	-7.1%	-10.8%	-14.4%

Table 5-34. Percent change in High Demand 2070 Scenario daily flows at Strategic Nodes relative to High Demand 2070 Scenario monthly flows in the Salkehatchie River basin.

Strategic Node	Mean Flow (cfs)	Median Flow (cfs)	Surface Water Supply (cfs)	Percentile Flows (cfs)		
				25th	10th	5th
SLK02 Salkehatchie River near Miley	-0.3%	-8.4%	-94.7%	-18.5%	-22.9%	-30.1%
SLK04 Combahee River near Yemassee	-0.4%	-10.3%	-93.0%	-18.8%	-25.3%	-33.2%
Jackson Branch Strategic Node	-0.6%	-14.2%	-100.0%	-29.0%	-33.9%	-44.6%
Little Salkehatchie Strategic Node	-0.6%	-14.4%	-97.0%	-28.0%	-35.2%	-47.7%
SLK05 Coosawhatchie River near Hampton	-0.4%	-30.4%	*NA*	-53.3%	-64.4%	-82.0%
SLK06 Coosawhatchie River near Early Branch	-0.4%	-30.5%	0.0%	-49.0%	-48.6%	-44.6%

Table 5-35. Basinwide surface water model daily simulation results in the Lower Savannah River basin, High Demand 2070 Scenario.

Performance Measure	Result
GA-Side and SC-Side Water Users	
Total basin annual mean shortage (MGD)	0.04
Total basin annual mean demand (MGD)	504.46
Maximum water user shortage (MGD)	13.94
Total basin annual mean shortage (% of demand)	0.01%
Percentage of water users experiencing shortage	5.6%
Average frequency of shortage (%)	0.1%
SC Water Users Only (Not Including GA-Side Water Users)	
Total basin annual mean shortage (MGD)	0.04
Total basin annual mean demand (MGD)	285.52
Maximum water user shortage (MGD)	13.94
Total basin annual mean shortage (% of demand)	0.01%
Percentage of water users experiencing shortage	7.7%
Average frequency of shortage (%)	0.1%

[1] For water users in South Carolina, the projected Moderate and High Demand Scenarios have different starting points from one another and differ from the Current Use Scenario because the Moderate Demand Scenario is based on each user's median recent use, the High Demand Scenario is based on each user's maximum recent use, and the Current Use Scenario is based on each user's average recent use.

Table 5-36. Basinwide surface water model daily simulation results in the Salkehatchie River basin, High Demand 2070 Scenario.

Performance Measure	Result
Total basin annual mean shortage (MGD)	0.60
Total basin annual mean demand (MGD)	5.28
Maximum water user shortage (MGD)	3.05
Total basin annual mean shortage (% of demand)	11.4%
Percentage of water users experiencing shortage	50.0%
Average frequency of shortage (%)	4.7%

[1] The projected Moderate and High Demand Scenarios have different starting points from one another and differ from the Current Use Scenario because the Moderate Demand Scenario is based on each user's median recent use, the High Demand Scenario is based on each user's maximum recent use, and the Current Use Scenario is based on each user's average recent use.

5.3.5 Unimpaired Flow Scenario

At the request of the RBC, the SWAM model was used to simulate the UIF Scenario throughout the Lower Savannah-Salkehatchie River basin. For this simulation, all water demands and discharges in the model were set to zero. Simulation results represent river hydrologic conditions without the impact of reservoirs (including removal of those in the Upper Savannah River basin), surface water users, dischargers, or water imports, as modeled. In other words, results represent "naturalized" surface water conditions in the basin.

Tables 5-37 through 5-40 summarize UIF Scenario monthly simulation results in the Lower Savannah and Salkehatchie basins. Simulated mean UIFs are generally higher than simulated Current Scenario flows, as expected. This reflects the removal of consumptive water use for the UIF Scenario simulation; however, at the Strategic Node on Upper Three Runs on the Savannah River Site (SAV35), Current Use Scenario mean flows are approximately greater than UIF Scenario mean flows because of the USDOE industrial wastewater discharge upstream. At most Strategic Nodes in the Lower Savannah basin, the Current Use Scenario minimum flows are greater than UIF Scenario flows due to upstream discharges originating from outside of the basin. An exception to this is the Strategic Node on Horse Creek at Clearwater (SAV28), where the Current Use Scenario minimum flow is less than the UIF Scenario minimum flow.

In the Salkehatchie basin, mean flows in the Current Use Scenario are generally less than the UIF Scenario by 1 percent at most. At the Strategic Node on the Salkehatchie River (SLK02), Current Use Scenario mean flows are marginally higher than the UIF Scenario mean flows because of upstream wastewater discharges. At most Strategic Nodes in the Salkehatchie basin, Current Use Scenario minimum flows are less than UIF Scenario minimum flows, which is a contrast from the Lower Savannah basin.

Table 5-37. Surface water model simulation results at Strategic Nodes in the Lower Savannah River basin, UIF Scenario.

Strategic Node	Mean Flow (cfs)	Median Flow (cfs)	Surface Water Supply (cfs)	Percentile Flows (cfs)		
				25th	10th	5th
SAV29 Savannah River at Augusta, GA	9,835	8,108	1,158	5,174	3,545	2,918
SAV36 Savannah River near Jackson	10,643	8,889	1,461	5,744	4,098	3,370
SAV45 Savannah River near Clyo, GA	12,420	10,467	1,836	6,798	4,862	4,062
SAV46 Savannah River at USACE Dock at Savannah, GA	12,814	10,836	1,895	7,046	5,034	4,203
SAV35 Upper Three Runs at Road A (SRS)	219	211	99	174	142	129
SAV28 Horse Creek at Clearwater	199	189	57	153	126	113

Table 5-38. Surface water model simulation results at Strategic Nodes in the Salkehatchie River basin, UIF Scenario.

Strategic Node	Mean Flow (cfs)	Median Flow (cfs)	Surface Water Supply (cfs)	Percentile Flows (cfs)		
				25th	10th	5th
SLK02 Salkehatchie River near Miley	316	252	26	159	99	78
SLK04 Combahee River near Yemassee	670	489	40	287	173	133
Jackson Branch Strategic Node	75	45	0	23	11	8
Little Salkehatchie Strategic Node	170	105	4	54	27	19
SLK05 Coosawhatchie River near Hampton	158	83	0	24	7	3
SLK06 Coosawhatchie River near Early Branch	309	162	0	47	13	7

Table 5-39. Percent change in UIF Scenario flows at Strategic Nodes relative to Current Scenario flows in the Lower Savannah River basin.

Strategic Node	Mean Flow (cfs)	Median Flow (cfs)	Surface Water Supply (cfs)	Percentile Flows (cfs)		
				25th	10th	5th
SAV29 Savannah River at Augusta, GA	9.7%	24.4%	-65.0%	7.5%	-19.8%	-29.3%
SAV36 Savannah River near Jackson	8.9%	22.0%	-61.3%	7.0%	-16.7%	-26.4%
SAV45 Savannah River near Clyo, GA	8.2%	18.8%	-58.5%	7.5%	-14.1%	-22.4%
SAV46 Savannah River at USACE Dock at Savannah, GA	8.3%	19.0%	-57.7%	8.0%	-13.2%	-21.5%
SAV35 Upper Three Runs at Road A (SRS)[1]	-1.6%	-1.7%	-3.7%	-2.1%	-2.5%	-2.8%
SAV28 Horse Creek at Clearwater	6.9%	7.4%	27.1%	9.4%	10.8%	13.6%

[1] At SAV35, flows decrease slightly under the UIF Scenario due to the removal of the USDOE industrial wastewater discharge upstream.

Table 5-40. Percent change in UIF Scenario flows at Strategic Nodes relative to Current Scenario flows in the Salkehatchie River basin.

Strategic Node	Mean Flow (cfs)	Median Flow (cfs)	Surface Water Supply (cfs)	Percentile Flows (cfs)		
				25th	10th	5th
SLK02 Salkehatchie River near Miley	-0.1%	-0.3%	12.5%	1.3%	0.5%	1.6%
SLK04 Combahee River near Yemassee	0.0%	-0.1%	9.4%	0.2%	-0.1%	1.1%
Jackson Branch Strategic Node	0.5%	1.4%	7.8%	1.4%	2.6%	2.3%
Little Salkehatchie Strategic Node	0.0%	0.5%	25.2%	0.4%	1.6%	2.8%
SLK05 Coosawhatchie River near Hampton	1.0%	1.2%	*NA*	8.8%	24.8%	27.0%
SLK06 Coosawhatchie River near Early Branch	0.1%	0.3%	-100.0%	3.2%	-2.2%	-5.7%

5.3.6 Comparison to Minimum Instream Flows

At the request of the RBC, model-simulated flows for the UIF, Current Use, 2070 Moderate, 2070 High Demand, and P&R Scenarios were compared to the calculated MIF at a subset of the Strategic Nodes. As defined in R.61-119, Surface Water Withdrawal, Permitting, Use and Reporting regulations, the MIF is the "*flow that provides an adequate supply of water at the surface water withdrawal point to maintain the biological, chemical, and physical integrity of the stream taking into account the needs of downstream users, recreation, and navigation*" (SCDHEC 2012). Under SCDNR's 2009 Minimum Instream Flow Policy, the MIF for the Piedmont region is set at 40 percent of the mean annual daily flow for the months of January, February, March, and April; 30 percent of the mean annual daily flow for the months of May, June, and December; and 20 percent of the mean annual daily flow for the months of July through

November for surface water withdrawers. Table 5-41 shows the calculated MIFs at a subset of Strategic Nodes. The MIF regulation applies to new surface water permits only. In the Lower Savannah River basin, all permitted surface water users are "grandfathered" and are not subject to the MIFs. There are no permitted surface water users in the Salkehatchie River basins, only registered surface water users. Grandfathered water users are those that had surface water withdrawals before January 1, 2011.

For these comparisons, modeled flows from daily timestep simulations were used. Table 5-42 presents and compares the percentage of days for all scenarios when flows are simulated to drop below the calculated MIF at the selected Strategic Nodes. The gages were selected primarily because of their locations in the basin and/or length of periods of record. The calculated MIF, which comes from measured flow at each USGS gaging station, is based on a shorter period that coincides with the gaging station's period of record (Table 5-41).

Table 5-41. Calculated MIF at select Strategic Nodes.

Gage Name	Gage ID	Period of Record	Mean Annual Daily Flow[1] (cfs)	MIF (cfs)		
				Jan-Apr	May, Jun, and Dec	Jul-Nov
Lower Savannah River Basin						
Savannah River above Augusta Canal near Bonair, Georgia	021964832	2010–2017	6,720	2,688	2,016	1,344
Horse Creek at Clearwater	02196690	2005–2024	182	73	54	36
Salkehatchie River Basin						
Salkehatchie River near Miley	02175500	1951–2024	313	125	94	63
Combahee River near Yemassee	02176000	1951–1957	472	189	141	94
Coosawhatchie River near Hampton	02176500	1951–2024	156	62	47	31
Percent of mean annual daily flow for calculating MIF ->				**40%**	**30%**	**20%**

[1] Mean annual daily flow was calculated using streamflow data through the end of water year 2024 (September 30, 2024).

Table 5-42. Percent of days below MIF at select Strategic Nodes.

Strategic Node	Scenario	Percentage of days below MIF[1]											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lower Savannah River Basin													
Savannah River above Augusta Canal near Bonair, Georgia	UIF	0.7	0.0	0.0	0.0	0.0	2.8	1.6	3.1	4.1	4.4	1.5	0.5
	Current Use	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2070 Moderate	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2070 High Demand	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	P&R	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Horse Creek at Clearwater	UIF	0.4	0.1	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0
	Current Use	0.5	0.1	0.0	0.0	0.3	1.6	0.4	0.0	0.0	0.0	0.0	0.0
	2070 Moderate	0.5	0.1	0.0	0.0	0.3	1.7	0.5	0.1	0.0	0.0	0.0	0.0
	2070 High Demand	0.9	0.2	0.2	0.5	1.9	3.0	2.1	1.3	1.3	0.0	0.0	0.0
	P&R	4.2	3.9	2.3	7.3	8.7	11.7	4.9	5.1	4.3	2.9	0.9	2.0
Salkehatchie River Basin													
Salkehatchie River near Miley	UIF	1.5	1.1	0.5	8.1	20.9	25.3	17.2	14.5	15.5	9.0	2.1	0.7
	Current Use	1.3	1.0	0.4	8.0	21.1	26.0	18.2	14.6	15.4	8.5	2.0	0.7
	2070 Moderate	1.3	1.0	0.4	8.1	21.3	26.0	18.5	14.8	15.5	8.5	2.0	0.7
	2070 High Demand	1.3	1.0	0.4	8.1	21.6	26.5	18.7	15.6	16.0	9.2	2.0	0.7
	P&R	2.0	1.3	0.9	10.8	24.5	28.5	21.8	18.5	20.2	12.5	3.4	1.2
Combahee River near Yemassee	UIF	0.3	0.7	0.0	4.5	16.1	21.1	14.6	11.5	13.3	7.0	1.7	0.6
	Current Use	0.3	0.7	0.0	4.3	16.3	21.9	15.6	11.6	13.2	6.4	1.7	0.6
	2070 Moderate	0.3	0.7	0.0	4.3	16.5	22.6	16.3	12.1	13.3	6.4	1.7	0.6
	2070 High Demand	0.3	0.7	0.0	4.5	16.9	23.1	17.0	12.6	14.0	7.0	1.7	0.6
	P&R	1.1	0.9	0.2	6.3	19.6	24.5	18.0	15.7	16.9	10.2	2.4	0.7
Coosawhatchie River near Hampton	UIF	23.5	12.6	13.9	33.9	57.2	61.7	57.1	56.0	60.7	67.2	54.9	36.1
	Current Use	23.5	12.6	14.1	34.2	58.8	63.0	59.6	57.9	61.5	67.4	55.0	36.1
	2070 Moderate	23.5	12.6	14.1	34.4	59.0	63.5	60.2	58.8	61.9	67.4	55.0	36.1
	2070 High Demand	23.5	12.6	14.3	34.7	59.3	63.8	60.2	59.1	62.1	67.8	55.0	36.1
	P&R	30.7	17.2	18.4	39.9	63.3	66.2	61.6	61.0	65.2	71.4	60.8	43.7

[1] There were 25,890 days in the Salkehatchie River model simulation period and 30,043 days in the Savannah River model simulation period.

From Table 5-42, results of the comparison to MIFs suggests the following:

- Under UIF conditions, flows drop below MIFs at all selected sites. This suggests that low-flow conditions below MIFs at these locations occur naturally.
- At most of the selected sites, there is a modest increase in the percentage of days when flows are below MIFs moving from the Current Use to the 2070 Moderate, 2070 High Demand, and P&R Scenarios. This is because of the higher surface water withdrawals simulated in those scenarios. The exception to this is the Savannah River site near the top of the basin, which does not drop below MIFs for any of the demand scenarios other than the UIF Scenario. This is a result of flow equalization provided by the highly-controlled Savannah River reservoir system upstream, which has minimum release requirements.
- At the site on the Coosawhatchie River, flows drop below MIFs a substantial amount of the time during all months. Flows drop below MIFs at this location at the lowest frequency in February and at the highest frequency in October. Under the UIF Scenario, flows are below the October MIF as much as 67 percent of the time during October.
- At the selected sites in the Salkehatchie River basin and on the Horse Creek tributary (in the Savannah River basin), there is a relatively large increase in the percentage of days when P&R Scenario flows are below MIFs, compared to the other scenarios. This is due to permit and registration amounts being substantially greater than the Current Use and future demand projections.
- Flows are maintained above the MIFs the greatest percentage of the time during the winter months (generally December through March).

5.3.7 Extended Drought Scenario Analysis

One of the uncertainties in the planning process identified by the RBC is future climate conditions. The RBC recognizes that climate conditions may be different in the future than the modeled period, and conditions in the upstream Upper Savannah basin have potential to impact water availability in the Lower Savannah River. Given the uncertainty about future climate conditions and to further evaluate water supply resiliency, the SWAM model was used to test additional, hypothetical hydrologic conditions using the 2070 High Demand Scenario water demands in the Savannah basin. Following are the three extended drought scenarios tested:

- **Scenario 1** – A repeating 5-year drought constructed by splicing together the five driest water years in the baseline simulation period (2001, 2008, 1981, 1988, and 2017), with respect to mainstem total annual flow.

- **Scenario 2** – A repeating single-year drought corresponding to the second driest water year (2008) and identified as the critical single-year drought with respect to Lake Thurmond water supply availability during critical summer months.

- **Scenario 3** – A repeating synthetic drought year constructed by splicing together the 12 driest calendar month flows in the baseline simulation period.

These three scenarios were compared against the baseline hydrology over the 10-year period of 2000 to 2009, which captures the 2002 and 2007 to 2008 drought periods. The results reflect the simulated balance between projected (2070) water demands and a low-flow supply condition based on historical observed surface flows. While the sequences of monthly flows and reservoir evaporation rates are synthetic, the magnitudes of the values are grounded in the historical baseline. No attempts have been made in the modeling to directly incorporate future hydrologic nonstationarity as projected by, for example, global climate models. Further, the modeling approach applied neglects any potential changes in groundwater/surface water interactions that could result from reduced recharge and depleted alluvial groundwater storage.

Results show that water user shortages in the Upper Savannah basin, as compared to baseline hydrology, for the constructed extended drought scenarios, range from 2.4 MGD under Scenario 1 to 68.8 MGD under Scenario 2 (including both Georgia- and South Carolina-side water users). Under Scenario 1, shortages occur for Lake Russell and Lake Thurmond water users. Under Scenarios 2 and 3, shortages also occur for Lake Hartwell water users.

The reduction in water availability in, and releases from, Lake Thurmond under these extended drought scenarios would impact the flow entering the Lower Savannah River. During drought conditions, the USACE operates the Savannah River reservoirs (including Lake Thurmond) in a predefined manner. First, they sacrifice the volume of water in Lake Russell in order to maintain supplies in Lake Hartwell and Lake Thurmond. If drought conditions worsen, the volume of water in Lake Thurmond would be sacrificed next, while continuing to provide a minimum release from Lake Thurmond of 3,600 cfs (measured at Augusta). After the depletion of supply in Lake Thurmond, then the USACE would lower Lake Hartwell’s pool below the bottom of its conservation zone. Figure 5-9 demonstrates how Lake Thurmond releases under the 2070 High Demand Scenario would be impacted by the three extended drought scenarios. Under extended 10-year drought Scenarios 1 and 2, Lake Hartwell releases drop slightly below 3,600 cfs for very brief periods. In Scenario 3, the most extreme extended drought condition tested, the 3,600 cfs minimum release is no longer able to be met after approximately 30 months, and late summer releases drop below 1,000 cfs. In years 3 through 10, there is only a short period of time where the minimum 3,600 cfs release to the Lower Savannah River basin would be met. While Scenario 3 represents a rather unlikely drought condition, since it relies on repeating the driest monthly flows observed over the period of record for 10 years consecutively, it demonstrates that under extreme drought conditions, flows coming from the Upper Savannah River basin could be significantly reduced. The USACE’s goal under emergency drought operations is to provide a continuous water supply to the greatest population for as long as possible. If conditions dictate, the USACE would work with their Emergency Management Team to establish alternate sources of water.

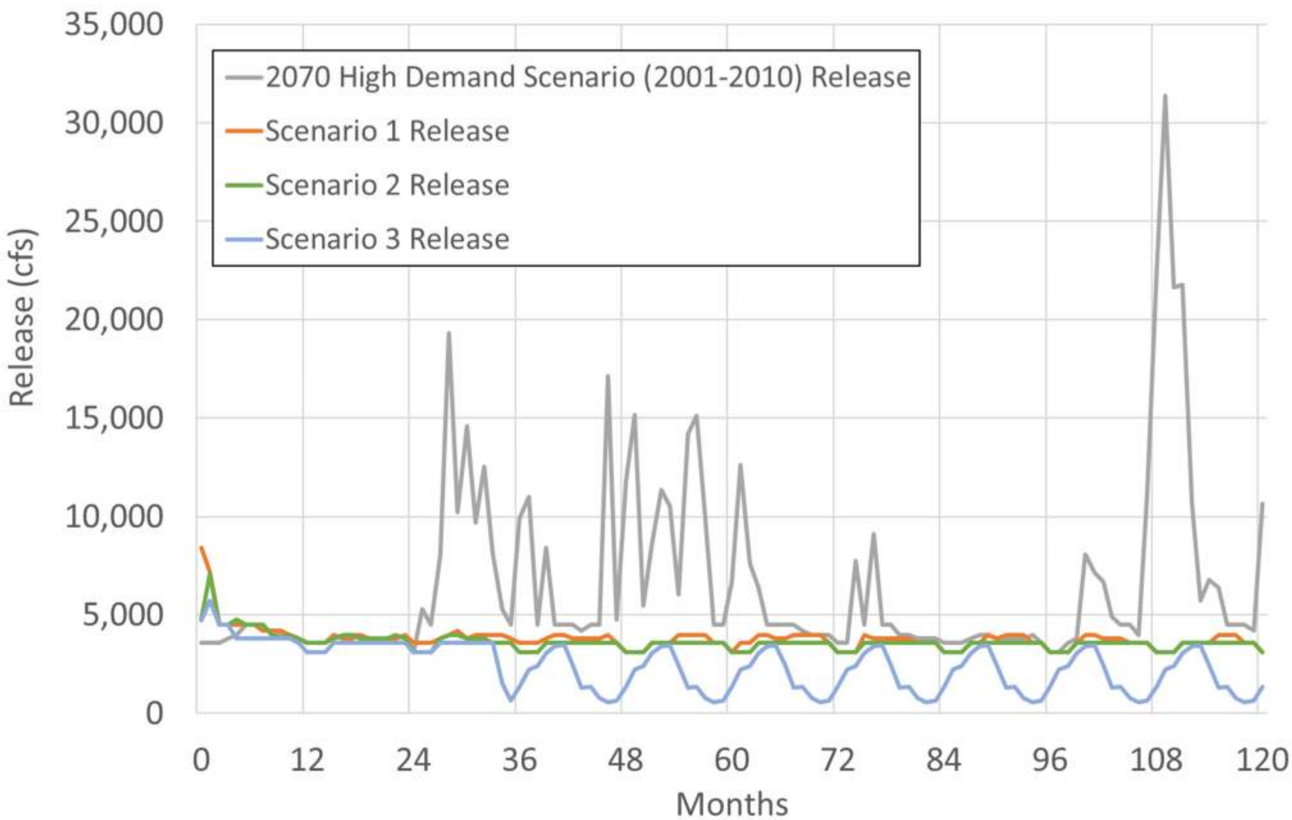


Figure 5-9. Extended drought scenario release results for Lake Thurmond in the Upper Savannah River basin.

In general, the simulations performed here highlight significant water supply vulnerabilities if historical observed drought conditions were to occur in the future with greater frequency and/or duration. While modified reservoir storage operations (i.e., holding back water) could mitigate some of the quantified shortages, this would come at a cost of severely reduced flows in the Lower Savannah River. Acceptable instream and environmental flow levels are a key driver of the vulnerability of water supplies to potential future extreme drought conditions.

5.3.8 Application of Biological Response Metrics

One biological response metric developed by Bower et al. (2022) was correlated to model-simulated flows from the various planning scenarios to assess the potential for ecological risk, as described in The Nature Conservancy et al. (2025) report provided in Appendix C. Results of this assessment are not presented in their entirety, but rather illustrated by example (as discussed in Chapter 5.2.2).

The consistent methodology used is discussed in Bower et al. (2022) and summarized in this plan in Chapter 5.2.2. Fundamentally, the two selected hydrologic metrics (mean daily flow and duration of low flow) are compared to current conditions and expressed as a percentage change relative to future demand scenarios. This percentage change is converted into a percentage change in the biological response metric using the predeveloped correlation relationships between these factors and plotted on a risk scale. Correlation does not imply causation. Table 5-43 and Figure 5-10 illustrate how the process works.

Table 5-43. Example of calculating changes in the biological metrics at the Horse Creek at Clearwater Strategic Node.[1]

Demand Scenario	Current Scenario Flow (cfs)	Projected Demand Scenario Flow (cfs)	Percentage Change in Flow Metric	Biometric	Percentage Change in Biometric	95% Confidence Interval[2]
UIF	185.67	198.50	7%	Richness	5%	-15% to 25%
Moderate 2070		183.17	-1%	Richness	-1%	-21% to 19%
High Demand 2070		168.68	-9%	Richness	-7%	-27% to 13%
P&R		120.46	-35%	Richness	-27%	-47% to -7%

[1]This table is one example, extracted from the analysis at the Horse Creek at Clearwater Strategic Node, and looks at the single hydrologic metric of mean daily flow (MA1) and its correlation with the single biological metric of species richness for fish taxa.
[2] Ninety-five percent confidence interval for the percentage change in biometric estimates.

Once the changes in flow-ecology relationships are quantified via machine learning techniques, they are converted into a risk chart. The three risk categories, high, medium, and low, are determined by sudden and significant changes in biological health, driven by the change in the hydrologic metric, as shown in Figure 5-10.

Biological response metrics were applied at the Strategic Nodes at Horse Creek at Clearwater. Figure 5-11 presents representative results for the two hydrologic metrics and the biological response metric at this location.

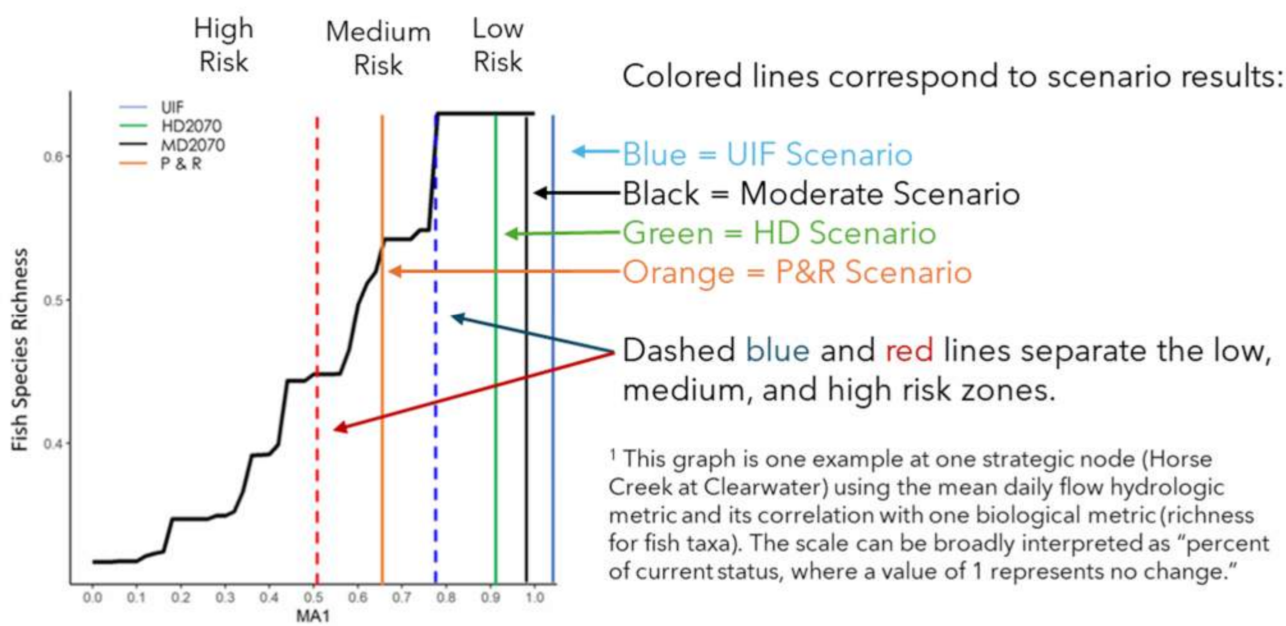
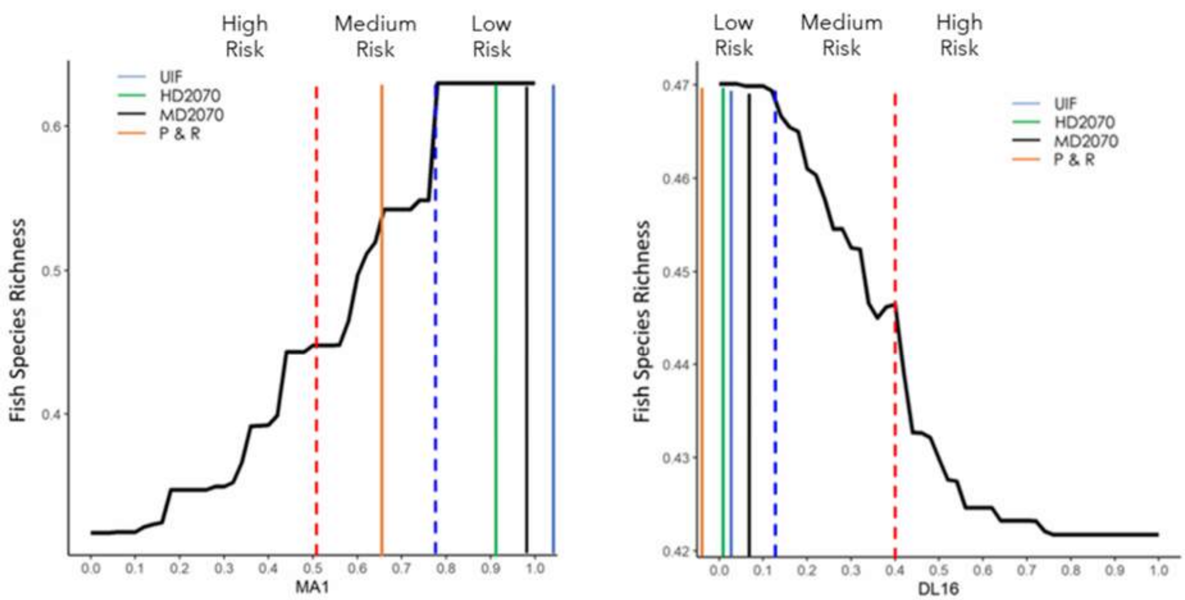


Figure 5-10. Example of the conversion of changes in biological metrics into risk (The Nature Conservancy et al. 2025).



(A) Mean Daily Flow (MA1) as an indicator of Fish Richness
SAV28 (Horse Creek at Clearwater)

(B) Duration of Low Flow (DL16) as an indicator of Fish Richness
SAV28 (Horse Creek at Clearwater)

Figure 5-11. Selected biological risk level results for one biological metrics and at one Strategic Node location (The Nature Conservancy et al. 2025).

As illustrated in Figure 5-9, SWAM model–simulated flow metrics for the UIF, Moderate Demand 2070, and High Demand 2070 Scenarios generally result in low risk for ecological integrity (The Nature Conservancy et al. 2025). A large change in mean daily flow for the P&R Scenario is predicted to substantially reduce the number of fish species at the one Strategic Node analyzed. The 35 percent change in mean daily flow was predicted to substantially reduce the number of fish species by 27 percent. The linear relationships predicted losses in the number of species to be between 1 percent and 7 percent for the Moderate and High Demand 2070 Scenarios. The unimpaired SWAM scenario predicted a 7 percent increase in mean daily flow at the location.

For the duration in low flow metric, the Moderate Demand 2070 Scenario predicted a 6 percent increase, decreasing the number of fish species by 4 percent. The UIF and High Demand 2070 Scenarios predicted low changes in duration in low flow between less than 1 percent and 3 percent, and low losses in the number of fish species ranging between less than 1 percent and 2 percent. A decrease of 6 percent for the duration of low flow metric for the P&R Scenario results in a predicted increase in the number of fish species by 5 percent.

In general, the P&R future management scenario in this study suggests a moderate ecological risk to fish species on the wadable tributaries of the Lower Savannah-Salkehatchie River basin. For proper context, the following are some important limitations of the work:

- Biological response metrics and associated risks were only calculated at one select node, based on its location on a primary tributary. There may be other locations in the river network that are more susceptible to flow changes or where flow changes may be higher percentages when compared against current conditions. This could lead to more significant impacts to associated ecological integrity and tolerance in these unexamined locations.

- Macroinvertebrates are considered better indicators of water quality than fish because they are more sensitive to changes in environmental conditions, have shorter life cycles, and are often more readily affected by pollution, making them a more reliable gauge of a water body's overall health compared to fish populations. Moreover, macroinvertebrates are used in SCDES ambient monitoring to determine support of aquatic life and water quality impairment. Finally, fish data were limited and significantly limited the number of sites available for analysis.

- Nonwadeable streams were not assessed for biological response sensitivities to flow changes caused by the various demand scenarios.

- Processing biological samples from wadeable sampling locations and hydrologic records throughout the Lower Savannah-Salkehatchie River basin via machine learning techniques derived the relationships between hydrologic metrics and biological responses. Wadable access, while more limited downstream and in larger tributaries, is common throughout the basin.

- The assessment was limited to the hydrologic and biological response metrics selected by the principal investigators, and for which biologically meaningful correlation had been established. This limited the use of these metrics to two hydrologic metrics and one biological metric. The findings do not rule out potential risks for ecological integrity or tolerance related to other flow metrics or other forms of flow changes.

- No assessment was performed for wadeable streams of the Lower Savannah-Salkehatchie River basin in the Piedmont or Middle Atlantic ecoregions.

- Because the SWAM model focuses principally on primary and secondary tributaries, the study did not examine impacts on smaller headwater streams, which may be more vulnerable to flow management changes but also less likely to be affected by large-scale changes in their flow regimes. Since the SWAM model includes all streams where significant flow management occurs (i.e., permitted and registered withdrawals and major discharges), the likelihood of significant flow alteration on nonmodeled streams is low.

- The demand scenarios are based solely on potential future changes on withdrawals and do not consider other human impacts that affect instream flow. Increased development of the landscape from forest or agricultural land cover to suburban/urban development will continue to degrade the flow regime, which will exacerbate the effects of water withdrawals on the ecological integrity of streams and rivers in the basin. As such, the estimates of potential biodiversity loss are likely underestimated. Additionally, the flow metrics used to estimate flow-ecology relationships were estimated based on precipitation, temperature, land cover, etc., within a recent period of record. Future changes in these factors will affect the shape and magnitude of flow-ecology relationships. Accordingly, incorporating future climate and land use projections would likely alter our estimates of the impact of future water withdrawals on aquatic biodiversity.

5.4 Groundwater Conditions

5.4.1 Evaluating Groundwater Conditions

Groundwater conditions in the Lower Savannah-Salkehatchie River basin were evaluated using available groundwater-level data, potentiometric aquifer surface contour maps, and current and historical groundwater usage. The impact of future water demand on aquifer conditions and groundwater availability in the basin were estimated based on current groundwater trends and assumptions about where increased pumping would occur. See Chapter 3, Section 3.3.1 for a full description of the major aquifers, Section 3.3.2 for a brief description of SCDES's groundwater monitoring and potentiometric mapping programs, and Chapter 4 for details about both current and potential future water use in the basin.

SCDES, with the assistance of the USGS, maintains a network of groundwater monitoring wells completed in each of the major aquifers present in the Lower Savannah-Salkehatchie basin. Most of the wells in this network are equipped with automated water level data recorders that record groundwater levels every hour; water levels in those wells not equipped with data recorders are measured manually several times each year. Wells in this monitoring network are referred to as trend network wells, as they provide information about short- and long-term trends in groundwater levels and, thus, changes in aquifer storage at specific sites. The majority of actively monitored wells in this basin have water level records dating to the 1990s with one dating as far back as 1955. Figure 5-12 shows the locations of these monitoring wells in and near the Lower Savannah-Salkehatchie basin.

Changes in groundwater levels over time correspond to changes in groundwater storage; declining water levels indicate the amount of water stored in an aquifer is decreasing, which occurs when the volume of water pumped from an aquifer exceeds the volume of water recharging into it. The severity of an observed groundwater level decline is dependent on several factors, including the magnitude of the decline, the groundwater level relative to the top of the aquifer, and the depths of the pump intakes in the wells withdrawing water.

While monitoring wells provide long-term, continuous records of aquifer conditions at specific points, potentiometric maps provide "snapshots" of aquifer conditions over the full extent of the aquifer at one moment in time. A potentiometric map is a contour map that illustrates the elevation to which groundwater will rise in wells open to a particular aquifer and is made using water level measurements from numerous wells located throughout an aquifer's extent, all measured at nearly the same time. Because the number of monitoring network wells is inadequate to create potentiometric maps, water levels of additional, non-network "synoptic" wells are used to fill spatial data gaps for these maps. Typically, SCDES produces new potentiometric maps for the Floridan, Gordon, Crouch Branch, and McQueen Branch aquifers every three years. Figure 5-13 shows recent potentiometric surface maps of the major aquifers present in the basin.

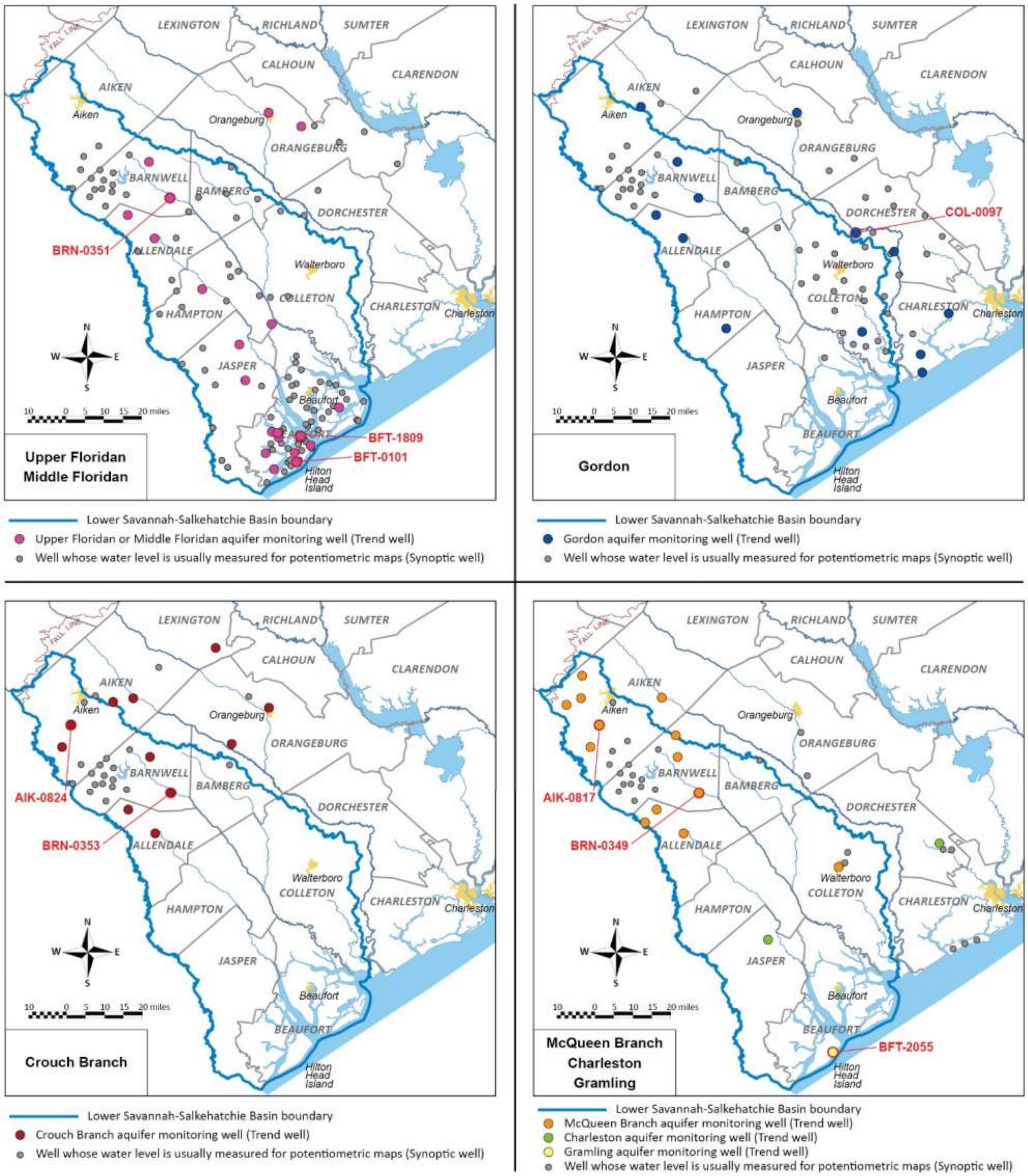


Figure 5-12. Maps showing the locations of wells used by SCDES for water-level measurements in the Lower Savannah-Salkehatchie basin, by aquifer.

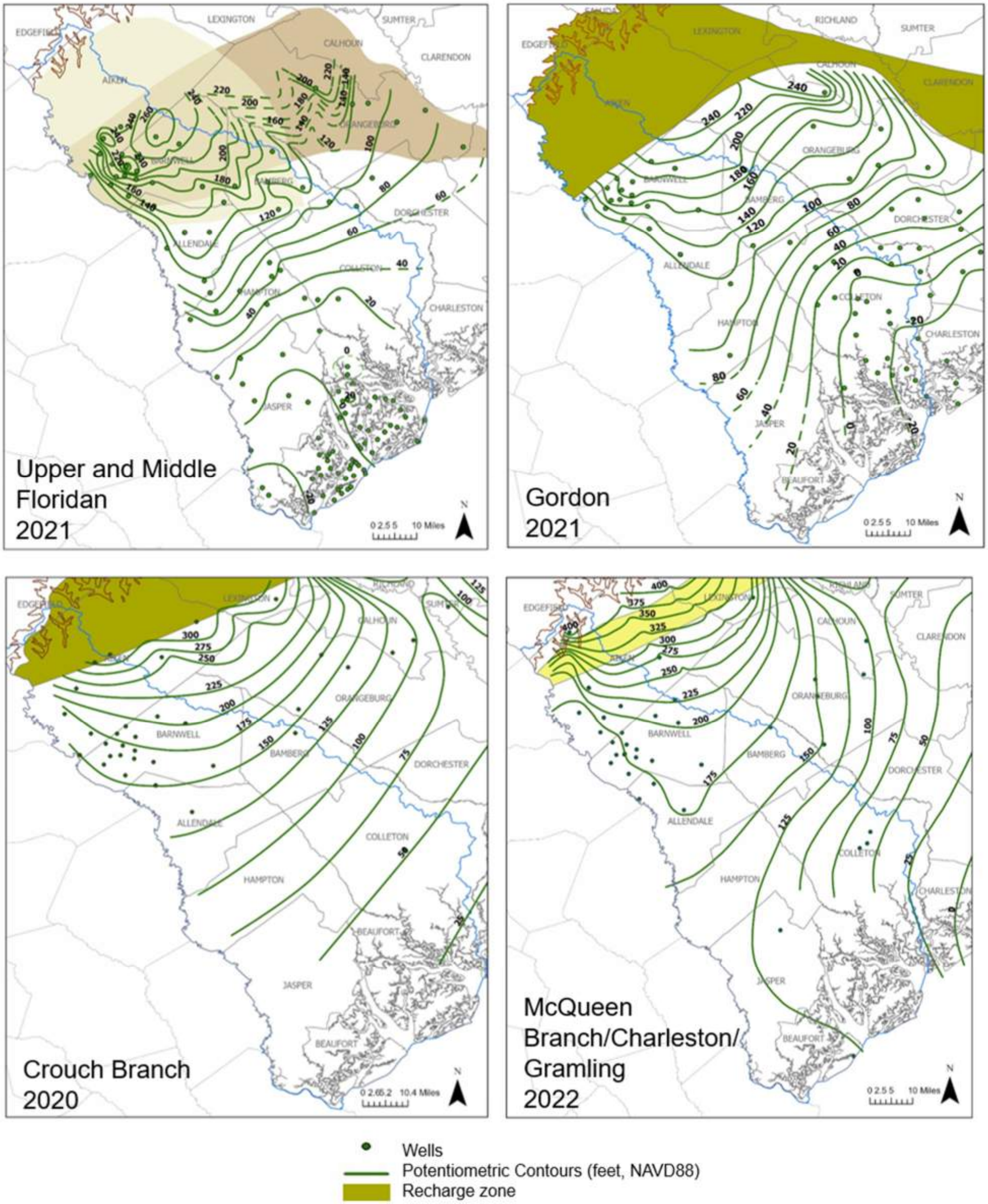


Figure 5-13. Recent potentiometric surface maps of the aquifers in the Lower Savannah-Salkehatchie River basin (SCDES 2024b).

Unlike continuous groundwater level data, which show changes in groundwater conditions over time at specific sites, potentiometric maps show aquifer conditions for only the time when the water level data were collected, but these maps show conditions throughout an entire aquifer.

Areas of relatively significant groundwater level declines are indicated on potentiometric maps by locally lower potentiometric elevations, usually centered near the pumping causing the decline. These potentiometric lows, known as cones of depression, are often seen on potentiometric maps as concentric loops of contour lines, and changes in the magnitude or areal extent of a cone of depression can be seen on successive potentiometric maps. Potentiometric maps also indicate the direction of groundwater flow within an aquifer, as groundwater flows from areas of higher pressure to areas of lower pressure.

Groundwater demand and groundwater availability occur basin-wide, but different aquifers are primarily used in different regions. In the upper half of the basin (Aiken, Barnwell, Allendale, and Bamberg Counties), most production wells are completed in the Crouch Branch or McQueen Branch aquifers. In the lower basin (Hampton, Jasper, and Beaufort Counties), the Upper and Middle Floridan aquifers are primarily used. Use of the very deep Charleston and Gramling aquifers, which exist only in the lower part of the basin, is very limited; there is only one Gramling aquifer production well in the basin, located on Hilton Head Island.

5.4.2 Current Aquifer Conditions

Water level data from a selection of monitoring wells are presented here to illustrate groundwater conditions and significant trends observed in the aquifers of the Lower Savannah-Salkehatchie basin, and to evaluate if there are potential concerns regarding groundwater availability in the basin for the duration of the 50-year planning horizon.

A well cluster site in western Aiken County having limited influence from nearby pumping is useful for examining the relationship between precipitation, recharge, and groundwater levels in the Crouch Branch (AIK-0824) and McQueen Branch (AIK-0817) aquifers in the upper part of the basin. Figure 5-14 shows groundwater levels in these wells along with precipitation trends recorded at nearby Augusta Bush Field Airport (NOAA 2024a). The figure illustrates how lower-than-average precipitation from 2007 to 2012 correlates with declining groundwater levels over this same period. Similarly, the normal to above average precipitation since 2017 corresponds to an increase in groundwater levels. However, the range in water levels in both aquifers over the 31-year period of record is about 10 feet, and more recently, in the last decade, the range is less than 5 feet.

Public water supply is the largest sector of groundwater use in Aiken County, with an average use of 12 MGD in 2023. Projected population increases in Aiken County suggest that water demand could increase by 8 percent (13 MGD) to as much as 83 percent (22 MGD) in the Moderate Demand and High Demand Scenarios, respectively. The Crouch Branch and the McQueen Branch are the primary aquifers used to meet the current demand. Some systems, such as the City of Aiken, also use surface water to supplement their supplies. Recent potentiometric maps for the Crouch Branch (2020) and McQueen Branch (2022) aquifers (Figure 5-14) indicate the aquifers in this area have had only minor declines (in the range of 20 to 25 feet) from pre-development water levels, despite many decades of groundwater development. This suggests a high likelihood that groundwater resources will remain sustainable in the upper Lower Savannah-Salkehatchie basin over the planning horizon.

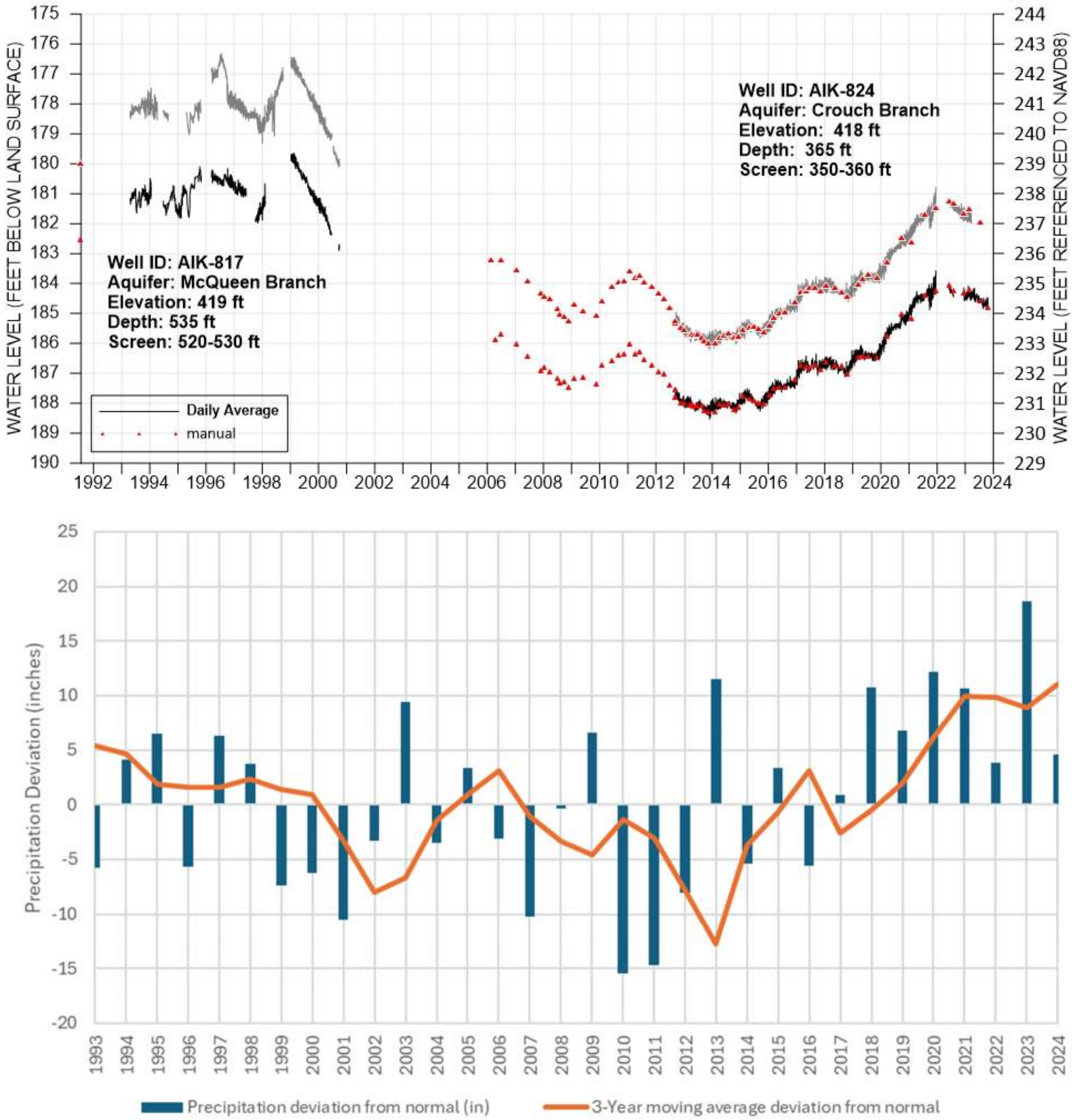


Figure 5-14. Groundwater levels in the Crouch Branch and McQueen Branch aquifers (top graph) and precipitation deviation from normal (bottom graph) in Aiken County.

In southern Barnwell County, a cluster of monitoring wells demonstrates how water levels in different aquifers and at different depths vary over time. Figure 5-15 shows, from greatest to shallowest depth, the BRN-0349 (McQueen Branch), BRN-0353 (Crouch Branch), and BRN-0351 (Upper Floridan) wells (SCDES 2024c). Since the 1990s, groundwater levels in the three aquifers have been generally dropping, despite the recovery of the Upper Floridan aquifer (BRN-0351) between 2013 and 2017, which was likely caused by large rainfall events in those years that contributed significant amounts of water to that aquifer's nearby unconfined recharge area. The slow decline in water levels in the McQueen Branch and Crouch Branch wells is a typical response to pumping in confined aquifers not near their recharge zones. Water levels are slower to respond and respond with less magnitude to changes in precipitation. Seasonal groundwater fluctuations caused by pumping are evident in the two lower aquifers at this location (McQueen Branch and Crouch Branch), and these fluctuations have been more pronounced since 2013 likely due to the expansion of agricultural irrigation in the surrounding area.

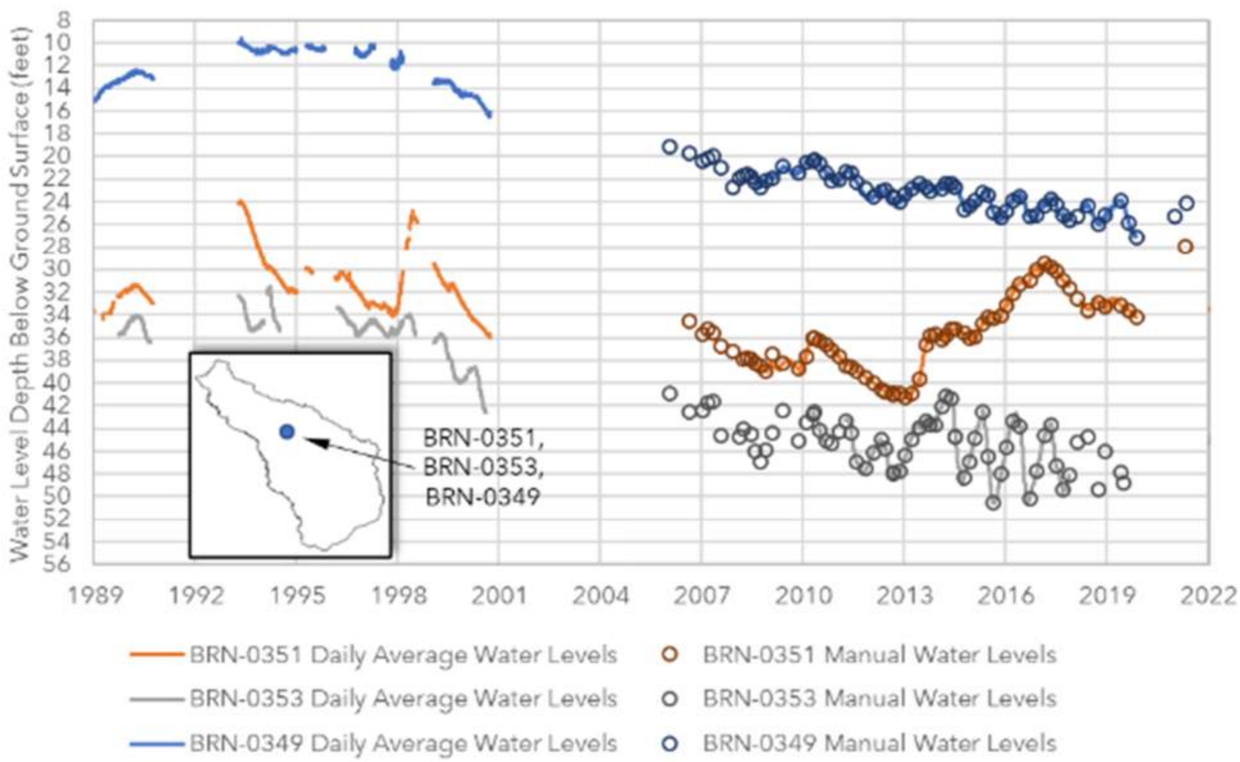


Figure 5-15. Groundwater levels in McQueen Branch, Crouch Branch, and Upper Floridan aquifers in Barnwell County.

The majority of permitted agricultural irrigation wells in the Lower Savannah-Salkehatchie River basin are located within Allendale, Bamberg, and Barnwell Counties, in the middle portion of the basin, and agricultural demand from groundwater sources is projected to continue or increase over the planning horizon (see Chapter 4). Agricultural water use is seasonal, however, which allows the aquifers to recover during the non-irrigation season and during wet years. In addition, because there are several hundred feet of available drawdown for the McQueen Branch and Crouch Branch aquifers in this area, the declining water levels occurring in these aquifers in the central part of the basin are not a cause for concern at this time or in the near future. In the central Lower Savannah-Salkehatchie basin, the McQueen Branch and Crouch Branch aquifers should remain a sustainable groundwater resource over the planning horizon.

A well in eastern Colleton County (COL-0097) provides background information regarding the Gordon aquifer by illustrating the influence of pumping and climate patterns. Figure 5-16 shows a pattern observed in many of SCDES Gordon aquifer monitoring wells located in the down-dip portion of the aquifer. Water levels declined at a rate of 1.5 feet per year between 1978 and 2011 due to groundwater pumping in Walterboro and elsewhere in Colleton County. A rebound of approximately 10 feet began in 2012 due to pumping reductions and coincides with a pattern of wetter than normal weather; small irrigators who also use the Gordon aquifer may have needed to irrigate less. Walterboro also uses the Crouch Branch and Charleston aquifers as additional water supply so the pressure on the Gordon aquifer is reduced. Compared to predevelopment levels, water levels in coastal counties have declined between 25 and 50 feet. The zero-elevation contour line is located near Walterboro (Figure 5-13).

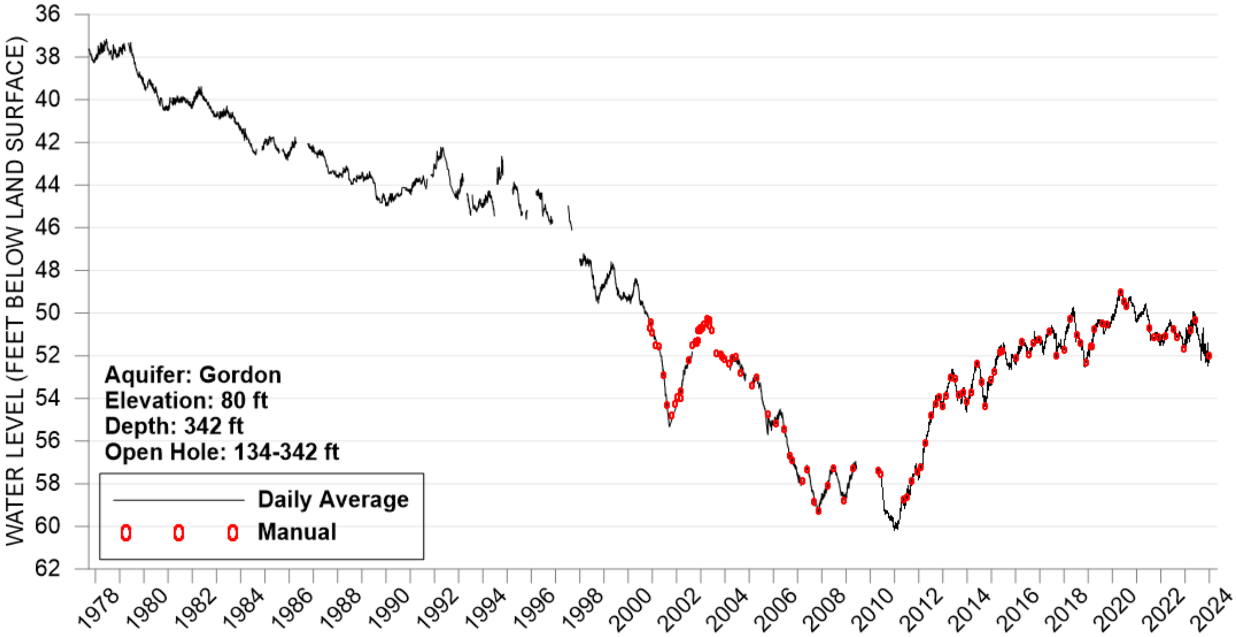


Figure 5-16. Groundwater level in the Gordon aquifer well COL-0097 in Colleton County.

In the lower part of the basin, in Beaufort, Jasper, and southern Hampton Counties, the Upper Floridan and Middle Floridan are the most used aquifers. Unlike the McQueen Branch and Crouch Branch aquifers in the upper basin, however, years of groundwater withdrawals from the Upper Floridan aquifer have significantly impacted groundwater availability in this area.

Water levels measured in the Upper Floridan monitoring well BFT-0101 (Figure 5-17), on Hilton Head Island in southern Beaufort County, show the effect of increasing pumping and subsequent groundwater management on water levels in the Upper Floridan aquifer since the late 1950s. Between 1950 and the 1990s, groundwater withdrawals on Hilton Head increased from approximately 8 MGD to14.5 MGD, and water levels in the aquifer dropped by more than 10 feet between 1960 and 1990. While the magnitude of that decline is not particularly large, it was enough to lower water levels in the aquifer at Hilton Head to below sea level, allowing saltwater to move into the aquifer from offshore (see Section 5.4.3, Savannah Cone of Depression). In the mid-1980s, the range of seasonal variation increased from about 4 feet to 8 feet, due to additional demand. In 1997, concern regarding large withdrawals and saltwater intrusion on the Island led to a regulatory limit on Upper Floridan withdrawals on Hilton Head Island of 9.7 MGD, and in 1999, Hilton Head Public Water District began supplementing its supply with water from the Savannah River. Since that time, water levels have remained relatively stable with a seasonal variation of approximately 8 feet.

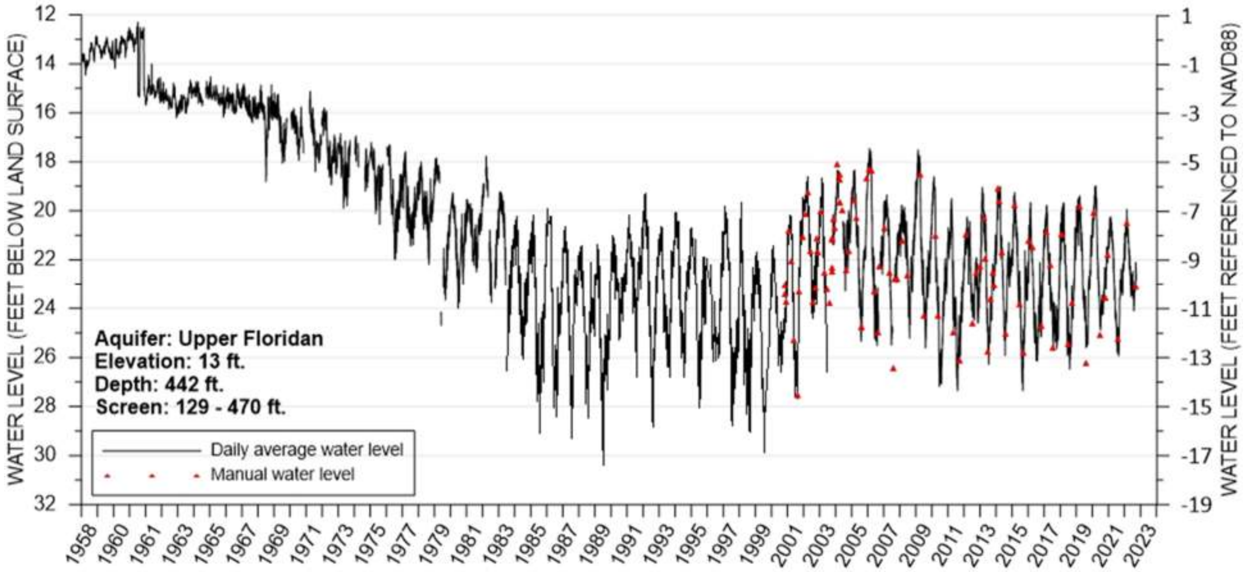


Figure 5-17. Groundwater level in the Upper Floridan aquifer well BFT-0101 in Beaufort County.

Water levels measured in the Middle Floridan monitoring well BFT-1809 (Figure 5-18) on Hilton Head Island in southern Beaufort County show the impact of increased seasonal pumping on groundwater levels in that aquifer. The seasonal drawdown and subsequent recovery fluctuations have increased over time, from approximately 3 feet in the 1990s to approximately 7 feet in recent years. The pattern of increased seasonal drawdown and recovery is concurrent with the Hilton Head PSD beginning to use the Middle Floridan aquifer as the source for its reverse osmosis plant in 2009. Although the magnitude of the seasonal drawdowns has increased, water levels still recover to pre-drawdown levels when pumping ceases.

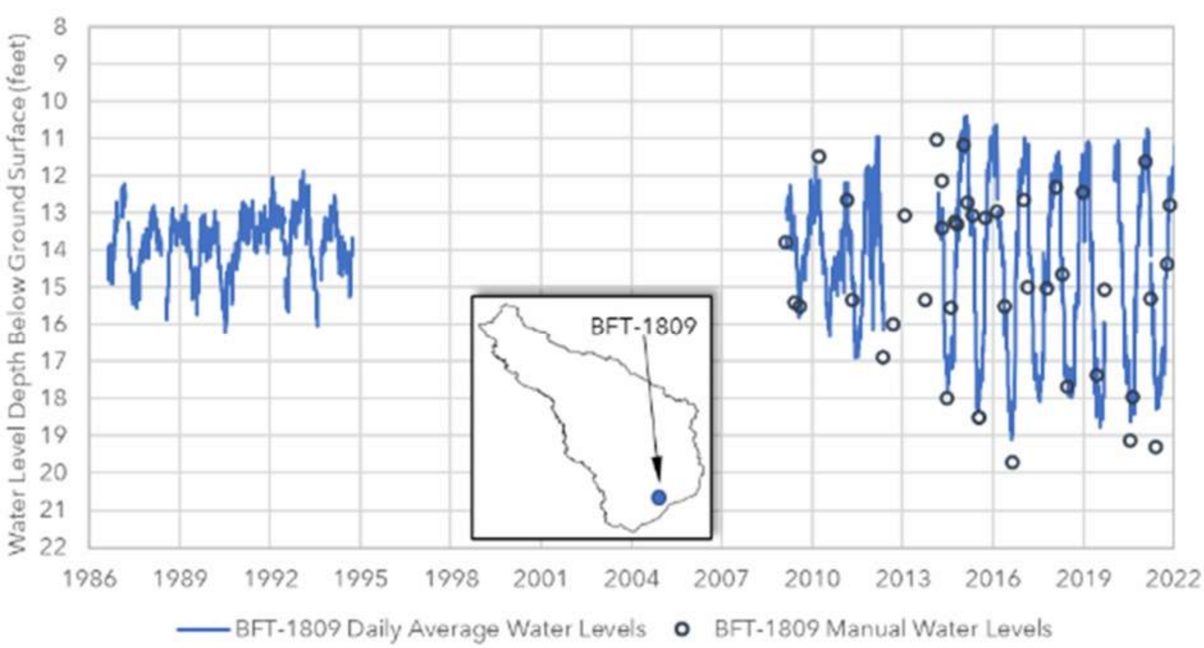


Figure 5-18. Groundwater levels in the Middle Floridan aquifer well BFT-1809 in Beaufort County.

The annually stable water levels in both the Upper and Middle Floridan aquifers at Hilton Head Island in recent years suggest that the current rates of withdrawal from these aquifers in southern Beaufort County are sustainable, but only if the current withdrawal rates are maintained. Increased future water demands should be met with other water sources, such as surface water or perhaps the deeper Charleston or Gramling aquifers. These are strategies identified in the *Initial Groundwater Management Plan for the Lowcountry Capacity Use Area*, which includes Beaufort County (Berezowska and Monroe 2017).

A Gramling aquifer well in Beaufort County, BFT-2055, shows a 30-foot decline in water levels in response to pumping (Figure 5-19). A nearby water supply production well withdrew water at an increasing rate between 2002 (1.5 MGD) and 2009 (2.6 MGD). Pumping rates were reduced to an average of 1.3 MGD, which caused water levels to level off. The deep Gramling aquifer is infrequently tapped due to the presence of adequately productive aquifers at shallower depths. Due to its deep depth and degree of confinement, water flows from this aquifer approximately 130 feet above land surface. It is estimated that water levels prior to development in this aquifer were approximately 156 feet above land surface as compared to potentiometric maps made of this aquifer (Figure 5-13).

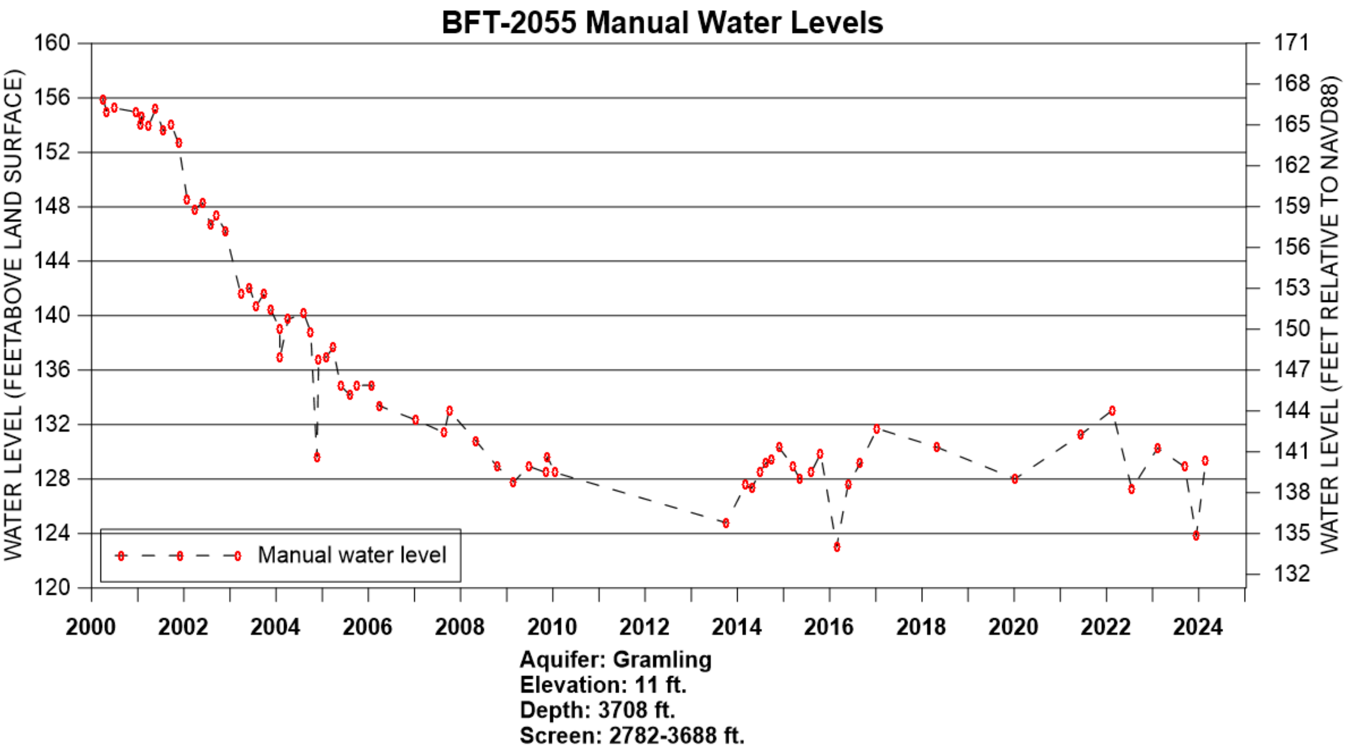


Figure 5-19. Groundwater level in the Gramling aquifer in Beaufort County.

5.4.3 Savannah Cone of Depression

The greatest groundwater concern in the Lower Savannah-Salkehatchie River basin exists in the Upper Floridan aquifer in southern Beaufort County, where historical groundwater gradients have reversed, and saltwater has intruded into the aquifer in response to pumping at Savannah, Georgia and Hilton Head Island. Ongoing saltwater intrusion has caused Hilton Head PSD to abandon or discontinue use of more than 10 of its Upper Floridan public supply wells on the island.

In the 1880s, prior to groundwater development, water levels in the Upper Floridan aquifer were near or above land surface, and groundwater flowed generally toward the southeast and discharged into the ocean. The 1930s marked the beginning of groundwater development of the Upper Floridan aquifer at Savannah, Georgia, and Hilton Head began developing the aquifer in 1950. A USGS Water Supply Paper (Counts and Donsky 1963) found that, in 1957, due to increases of pumping up to 62 MGD the center of the pumping cone at Savannah was 120 feet below sea level, and water levels had dropped 10 feet from predevelopment levels at Hilton Head. In Jasper and Beaufort Counties, the historic groundwater gradient reversed from southeast to southwest towards the pumping center and saltwater began to migrate downward through the thin or absent Upper Floridan confining units into the Upper Floridan aquifer water supply. At this time, saltwater was observed in the Upper Floridan aquifer near Parris Island but not yet at Hilton Head.

In response to concerns about how to control saltwater intrusion and manage large groundwater withdrawals on Hilton Head Island, the South Carolina Water Resources Commission conducted an aquifer assessment in 1976 which became the basis for the creation of the Lowcountry Capacity Use Area in 1981. Hayes (1979) estimated the withdrawals from the aquifer in Savannah, Georgia and Hilton Head were 75 MGD and 8 MGD respectively. Potentiometric maps created during the study indicated water levels on Hilton Head had lowered by 10 to 30 feet across the island. The study concluded that where the Upper Floridan confining layer was absent, freshwater head was the primary controlling factor for saltwater intrusion.

Groundwater withdrawals continued to increase through the 1980s. In 1990, withdrawals reached 88 MGD at Savannah and 14.5 MGD at Hilton Head Island. A potentiometric map created in 1998 showed that the cone of depression at Savannah was 90 feet below mean sea level (125 feet below predevelopment levels); by 2000, the cone had deepened to 120 feet below mean sea level (155 feet below predevelopment). Pumping reductions in 2007 to approximately 69 MGD (permit limit is currently 47.7 MGD) at Savannah and the enforcement of a 9.7 MGD permit limit for Hilton Head Island in 1997 allowed the cone of depression to rebound by 50 feet to its current level of approximately 70 feet below mean sea level (105 feet below predevelopment). Potentiometric water levels on Hilton Head Island have remained relatively unchanged since 1998.

Groundwater withdrawals in both the Savannah and Hilton Head areas have contributed toward the inland movement of saltwater plumes. The Coastal Georgia Regional Water Plan describes the results of model simulations performed to determine the sustainable yield of the Floridan aquifer in these areas, which is defined as the limit of withdrawal that would not cause southwestward movement of the saltwater plume. Results indicated that any withdrawal above 1.7 MGD in the Hilton Head area and above 10.3 MGD in the Savannah area causes movement of saltwater. The report further states that even if all groundwater withdrawals were eliminated, the plumes would continue to exist well into the future (Georgia Water Planning 2023).

5.4.4 Public Water Supply in Beaufort and Jasper Counties

The population in Beaufort and Jasper Counties is expected to grow over the next decade (see Table 2-15), and supply side and demand side water management strategies are needed to meet the growing demand. Permit limit regulations enforced on the Upper Floridan aquifer in South Carolina have allowed water levels to stabilize. Therefore, additional demand must be met using a variety of other source waters.

Currently, public water supply demand in these counties is met through the conjunctive use of groundwater from multiple aquifers along with surface water from the Savannah River. The average 5-year public water supply demand for Beaufort and Jasper Counties was 46 MGD, of which 62 percent (28.3 MGD) is supplied by the BJWSA Savannah River intake and 38 percent is supplied by a combination of the Upper Floridan (9.9 MGD), Middle Floridan (6.7 MGD), and Gramling (1.1 MGD) aquifers.

Three main public water utilities serve customers on Hilton Head Island. Hilton Head PSD operates a small number of Upper Floridan aquifer wells and a reverse osmosis drinking water treatment plant supplied by three Middle Floridan aquifer wells. The plant produces 4 MGD and satisfies 60 percent of the current demand for Hilton Head PSD customers. Hilton Head PSD also operates an ASR well where it stores treated surface water purchased wholesale from BJWSA to be used during periods of high demand.

South Island PSD provides approximately 6 MGD through a combination of Upper Floridan aquifer wells (4.4 MGD), Middle Floridan ASR wells (0.9 MGD), and deep wells completed in the Charleston/Gramling aquifers (1.1 MGD). A smaller utility, Broad Creek PSD, operates three Upper Floridan aquifer wells in the middle of the Island (1.6 MGD).

The projected increase in population in Beaufort County suggests that public water supply demand could increase by 31 percent (19.9 MGD) to as much as 80 percent (27.3 MGD) in the Moderate Demand and High Demand Scenarios, respectively, through the year 2070. In Jasper County, the demand could increase by 50 percent (1.2 MGD) to as much as 125 percent (1.8 MGD) in those same scenarios. Meeting future water demand in these counties will likely require supply side management strategies such as the use of additional surface water from the Savannah River and the expansion of reverse osmosis treatment plant capacities. Additional wells drilled into the Middle Floridan, Charleston, or Gramling aquifers could also support the growing water supply demand.

5.5 Summary of Water Availability Assessments

The application of the surface model using current and projected rates of water withdrawals resulted in the identification of several key observations and conclusions regarding the availability of surface water resources in the Lower Savannah-Salkehatchie River basin. Several observations and conclusions were also identified for groundwater resources. Although lacking a model to simulate current and future groundwater demand scenarios, the approach of using current and historical water level and water use trends resulted in the identification of areas where water management strategies have been successfully employed through regulatory action that has maintained the current supply. Areas were also identified that are lacking information for a thorough assessment. The approach for evaluating groundwater resources was developed to be data-ready when the groundwater model becomes available.

The key conclusions from water availability assessments, presented below, led to the RBC identifying and evaluating a suite of water management strategies to protect surface water supply and maintain adequate river flows, especially during low flow conditions, as well as address potential groundwater issues. The evaluation and selection of water management strategies is presented in Chapter 6 – Water Management Strategies.

5.5.1 Key Surface Water Observations and Conclusions

Application of the surface water model using current and projected rates of water withdrawals resulted in the identification of several key observations and conclusions regarding the availability of water resources in the Lower Savannah-Salkehatchie River basin. The following are specific observations and conclusions relative to each planning scenario.

- Surface water availability modeling suggests a low risk of water supply shortages under the Current Scenario assuming no minimum instream flow requirements. Water supply shortages were identified using current, monthly average demands when considering the approximately 82-year period of record covering hydrologic conditions observed from 1939 through 2021 in the Savannah basin and approximately 71-year period or record covering hydrologic conditions observed from 1951 through 2021 in the Salkehatchie basin. Shortages are projected for five agricultural water users on tributary streams and the Coosawhatchie River. These withdrawals are mostly located either on or adjacent to impoundments that are not included in the model, which may provide enough water to prevent the projected physical shortages at times when low flows are simulated.
- The P&R Scenario asked, “What if all water users used the full volume of water allocated through permits and registrations?” The results, which include projected shortages for 10 agricultural operations, two public water suppliers, and one golf course, demonstrate that the surface water resources of the basin are overallocated based on existing permits and registrations without considering any requirements for minimum instream flows. The public water suppliers and golf course with shortages are all permitted to withdraw amounts much larger than their current average annual demands. Projected mean, median, and low flows at Strategic Nodes in the Salkehatchie basin and on the Lower Savannah River mainstem suggest that flows are generally lower for the P&R Scenario than for the same performance measures for the Current Scenario. At the Strategic Node on the Savannah River Site (SAV35, Upper Three Runs at Road A), projected flows are considerably greater for the P&R Scenario because of the USDOE industrial wastewater discharge upstream. Mean flows at the most downstream site on the Lower Savannah River mainstem (SAV46, Savannah River at USACE Dock at Savannah, Georgia) are predicted to decrease by approximately 7 percent, and median flows by approximately 11 percent, if all upstream users withdraw water from the system at their permitted or registered amount.
- For the Moderate Demand Scenario, modeled demands were set to projected future levels based on an assumption of moderate population and economic growth. Given current climate conditions and existing basin management and regulatory structure, basin surface water supplies are predicted to be adequate to meet increased demands, resulting from moderate economic and population growth, without considering any requirements for minimum instream flows. Shortages are projected for five existing agricultural water users plus two “watershed-level” future water users, all in the Salkehatchie basin. Agricultural uses are typically supplemented with small mpoundments (i.e., farm ponds) that can provide buffers against short-term low-streamflow conditions. River flows are predicted to decrease modestly in the Lower Savannah basin and more substantially at some locations in the Salkehatchie basin. Mean and median flows at the most downstream site on the Lower Savannah River mainstem (SAV46, Savannah River at USACE Dock at Savannah, Georgia) are predicted to decrease 1 and 3 percent, respectively, by 2070 if population and economic growth is moderate and climate change impacts are negligible.

- For the High Demand Scenario, modeled demands are set to the 90th percentile of variability in reported withdrawals for each user, and the projections are based on aggressive growth assumptions. This scenario represents an unlikely maximum for total water demand because it is very unlikely these demands would occur month after month and year after year for all water users; however, this scenario provides the RBC with information on which to base conservative management strategies. In the Lower Savannah basin, one municipal water user experiences shortages under the High Demand 2070 Scenario. All the Salkehatchie basin agricultural water users with shortages in the Moderate 2070 Scenario exhibit equal or slightly greater shortages under the High Demand 2070 Scenario, and two additional agricultural water users and one additional "watershed-based" water user (representing additional future demand) also experience shortages. Agricultural withdrawals are often located either on or adjacent to impoundments that are not included in the model. These impoundments may provide enough water to prevent the projected physical shortages at times when source water bodies are simulated to have very low flow. River flows are predicted to decrease modestly in the Lower Savannah basin and more substantially at most locations in the Salkehatchie basin. Modeled reductions are most pronounced during low-flow periods. Mean and median flows at the most downstream site on the Lower Savannah River mainstem (SAV46, Savannah River at USACE Dock at Savannah, Georgia) are predicted to decrease 2 and 4 percent, respectively, by 2070 if population and economic growth is moderate and climate change impacts are negligible. Results do not consider requirements for maintaining minimum instream flows.
- The SWAM model was also used to simulate hydrologic conditions without the impact of surface water users, discharges, or water imports. Predicted river flows for the UIF Scenario are generally higher than simulated Current Scenario flows, as expected; however, at the Strategic Node on Upper Three Runs on the Savannah River Site (SAV35), Current Use Scenario mean flows are approximately 2 percent greater than UIF Scenario mean flows because of the USDOE industrial wastewater discharge upstream. At most Strategic Nodes in the Lower Savannah basin, the Current Use Scenario minimum flows are greater than UIF Scenario flows because of upstream discharges originating from outside of the basin. An exception to this is the Strategic Node on Horse Creek at Clearwater (SAV28), where the Current Use Scenario minimum flow is less than the UIF Scenario minimum flow. At most Strategic Nodes in the Salkehatchie basin, Current Use Scenario minimum flows are less than UIF Scenario minimum flows, which is a contrast from the Lower Savannah basin.
- SWAM model–simulated flow metrics for the Moderate Demand 2070 and High Demand 2070 Scenarios result in low risk for ecological integrity (The Nature Conservancy et al. 2025). On Horse Creek, the mean daily flow metric for the P&R Scenario results in a moderate risk in terms of fish species richness because of streamflow reductions. Changes in mean daily flow for the P&R Scenario are predicted to substantially reduce the number of fish species, with the Horse Creek Strategic Node predicted to lose 27 percent of fish species. Low-risk outcomes in terms of duration of low flow were identified for all scenarios assessed at the Horse Creek location.

Results and conclusions are based on modeling that assumed historical climate patterns. In subsequent phases of river basin planning, the RBC may decide to evaluate potential impacts to Surface Water Supply availability resulting from changing climate conditions such as increasing temperatures and more variable precipitation.

5.5.2 Key Groundwater Observations and Conclusions

Groundwater levels are relatively stable basin-wide across all aquifers in response to groundwater development, and for a majority of the basin, there has been no significant long-term decline in aquifer levels. The greatest concern in the Lower Savannah-Salkehatchie River basin exists in the Upper Floridan aquifer, which has been impacted by a large cone of depression at Savannah, Georgia and by saltwater intrusion at Hilton Head Island.

The aquifers that underly the basin are capable of transmitting large volumes of groundwater to support projected water demand over the planning horizon, but, in the absence of testing the demand scenarios with a calibrated groundwater model, this evaluation is a best guess. The updated Coastal Plain groundwater model is needed to make better estimates of potential groundwater declines related to future projected use.

Specific observations and conclusions relative to the groundwater assessment are presented below.

- In the upper part of the basin, the Crouch Branch and McQueen Branch aquifers have experienced minimal declines from predevelopment levels despite decades of groundwater pumping. This demonstrates a pattern of consistent and sufficient recharge to both aquifers. It is likely that no groundwater supply shortages will occur under modeled projected use scenarios.
- Agricultural irrigation is common in the basin, especially in Allendale, Bamberg, and Barnwell Counties in the middle of the basin. Irrigation in this area is projected to continue or increase over the planning horizon. There are too few trend and synoptic monitoring wells in the Crouch Branch and McQueen Branch aquifers to adequately evaluate groundwater trends in this area. Additional monitoring wells are needed to understand how future pumping may impact aquifer levels in the area.
- Long-term pumping of the Upper Floridan aquifer has reversed natural groundwater gradients and allowed saltwater to intrude into the aquifer beneath Hilton Head Island. Pumping reductions at Savannah, Georgia and Hilton Head have stabilized both the cone of depression at Savannah and groundwater levels on Hilton Head, but saltwater plumes are still moving inland across Hilton Head Island. Even if all groundwater withdrawals were stopped, the plumes would continue to exist well into the future.
- Public water supply demand is expected to increase in Beaufort and Jasper Counties over the next several decades, and supply side and demand side water management strategies will be needed to meet the growing demand. Withdrawal limits enforced on the Upper Floridan aquifer in South Carolina have allowed water levels in that aquifer to stabilize and should be continued; additional demand must therefore be met with more surface water use, expanded ASR programs, and the increased use of groundwater from deeper aquifers.
- Groundwater levels should be monitored routinely, particularly in the lower Coastal Plain and coastal counties. In addition to the measurement of static water levels, water levels in actively-pumping wells should also occasionally be measured.

Chapter 6
Water Management Strategies

This chapter summarizes the evaluation of potential water management strategies identified by the Lower Savannah-Salkehatchie RBC. The Planning Framework identifies a two-step process to evaluate water management strategies. As a first step, the Planning Framework states that the proposed management strategies are to be simulated using the available models to assess each strategy's effectiveness in eliminating or reducing identified shortages, or in increasing surface water or groundwater supply. For strategies deemed effective, a second step addresses each strategy's feasibility for implementation. The Planning Framework identifies multiple considerations for determining feasibility, including potential costs and benefits, consistency with state regulations, reliability, environmental and socioeconomic impacts, and potential interstate or interbasin impacts.

6.1 Surface Water Management Strategies

Under the Planning Framework, a surface water management strategy is any water management strategy proposed to eliminate a surface water shortage, reduce a surface water shortage, or generally increase surface water supply to reduce the probability of future shortages. Strategies include demand-side management strategies that reduce supply gaps by reducing demands, and supply-side strategies that reduce supply gaps by directly increasing supply.

6.1.1 Overview of Strategies

The Lower Savannah-Salkehatchie RBC identified a portfolio of demand-side strategies consisting of municipal water conservation and efficiency practices and irrigation (agricultural and golf courses) water efficiency practices, as listed in Tables 6-1 and 6-2, respectively. While the demand-side strategies were identified for surface water withdrawers, they also apply to the basin's limited groundwater withdrawers. The RBC did not identify any strategies that increase the amount of surface water available for withdrawal (supply-side strategies) because no significant Surface Water Shortages were identified under the 2070 High Demand Scenario. Existing supply-side strategies, such as conjunctive use of both surface water and groundwater, interbasin transfers, and use of small impoundments to provide storage during low flow periods are already effectively used in the Lower Savannah and Salkehatchie River basins.

Table 6-1. Municipal water conservation and efficiency practices[1].

Municipal Practices	
Development, Update, and Implementation of Drought Management Plans	Time-of-Day Watering Limits
Public Education of Water Conservation	Car Wash Recycling Ordinances
Conservation Pricing Structures/Drought Surcharge	Toilet Rebate Program
Residential Water Audits	Water Waste Ordinances
Landscape Irrigation Programs and Codes	Building Code Requirements (Water Efficiency Standards for New Construction)
Leak Detection and Water Loss Control Programs	Recycled Water Programs Using Utility-Provided Reclaimed Water for Irrigation and Other Uses

[1] Here, and throughout Chapter 6, "municipal" includes local governments, special purpose districts, authorities, and other organizations that provide water to the public.

Table 6-2. Irrigation (agricultural and golf courses) water efficiency practices.

Agricultural Practices	
Water Audits and Nozzle Retrofits	Irrigation Equipment Changes
Irrigation Scheduling and Smart Irrigation	Future Technologies
Soil Management and Cover Cropping	Wetting Agents to Reduce Water Use at Golf Courses
Crop Variety, Crop Types, and Crop Conversions	Recycled Water Programs, Including Use of Utility-Provided Reclaimed Water for Irrigation

The RBC additionally outlined water conservation approaches for manufacturing (industrial) and energy water users. In the Lower Savannah-Salkehatchie River basin, these water users include Kimberly-Clark, USDOE's SRS, Archroma Martin (formerly Clariant), and Dominion's Urquhart Thermoelectric Station. The identified strategies are water audits, rebates on energy-efficient appliances, water recycling programs, water-saving equipment and efficient water systems, water-saving fixtures and toilets, and educating employees about water conservation. Several of these approaches overlap those listed for municipal users, described in Section 6.1.2.

These strategies do not represent an exhaustive list of possible strategies that water users in the Lower Savannah-Salkehatchie River basin could implement. Similarly, not all strategies will be applicable to all users in the basin. The most appropriate strategies for a water withdrawer will depend on their location, end use, water source, financial resources, and other constraints or opportunities.

The sections that follow detail the surface water management strategies reviewed and discussed by the RBC. Technical evaluation of their potential effectiveness, and assessment of their feasibility are also presented.

6.1.2 Municipal Water Efficiency and Conservation Demand-Side Strategies

This subchapter describes the municipal water efficiency practices that were considered for inclusion as part of a toolbox of strategies. These demand-side strategies also apply to groundwater users.

Development, Update, and Implementation of Drought Management Plans

This strategy is already ongoing in the basin because public suppliers were required to develop drought management plans as part of the state's Drought Response Act of 2000. Each drought management plan has a set of measurable triggers indicating when conditions enter one of three phases of drought, and the corresponding response actions to reduce demand by a target percentage. Chapter 8 describes the drought management plans in the Lower Savannah-Salkehatchie River basin. Under this strategy, public suppliers would continue to implement their drought management plans during drought conditions and update their plans to reflect any changes to the system. The Lower Savannah-Salkehatchie RBC recognizes the importance of the drought management plans for reducing demand and conserving water during critical low-flow periods.

Public Education of Water Conservation

This strategy would involve expanding existing public education programs or developing new programs as needed. Water conservation education could occur through public schools, civic associations, or other community groups. Water utilities and local governments could create informational handouts and/or include additional water conservation information on water utility bills. For this strategy to remain effective, public outreach would need to continue on a regular basis to maintain public engagement and motivation. The RBC discussed the possibility of larger water utilities sharing staffing or other conservation resources with smaller utilities.

In the Lower Savannah River basin, organizations such as the Clemson Cooperative Extension Service could offer programs that help educate the public about water conservation. One potential action to support this strategy is for the Lower Savannah-Salkehatchie RBC to coordinate with groups like Clemson, that have existing education and outreach efforts.

The Lower Savannah-Salkehatchie RBC could also look to the 2014 Water Use Efficiency Plan developed by the Catawba-Wateree Water Management Group (CWWMG) for an example of a basinwide approach to reduce demand. The 2014 Plan includes measures such as a public information campaign, education and outreach, and landscape water management and demonstration gardens. The Lower Savannah-Salkehatchie RBC may request that members of the CWWMG provide an update on actions and results since the 2014 Plan to guide Lower Savannah-Salkehatchie RBC actions.

Conservation Pricing Structures/Drought Surcharges

Conservation pricing structures increase the unit cost of water as consumption increases. Utilities may have pricing structures that use a flat rate, rates that vary with consumption, or some combination of the two. Conservation pricing sets higher unit-use rates for customers whose usage exceeds set thresholds. This strategy assumes that consumers will curtail their personal use to avoid paying higher prices. The extent of demand reduction depends on the magnitude of the price increase and the local price elasticity of demand for water usage.

In the Lower Savannah-Salkehatchie River basin, several utilities, including the City of North Augusta and the City of Aiken, have drought surcharges that may be implemented during severe and/or extreme drought phases. These surcharges are like conservation pricing structures, because the intent is to discourage customers to from using more water. If implemented during an extreme drought, the City of North Augusta charges the regular water rate for the first 225 gallons per equivalent residential unit (an equivalency unit defined to be equal to one single- family residence) per day, two times the regular water rate for up to 300 gallons used, and three times the regular rate for more than 300 gallons used. The City of Aiken limits households to 40 cubic feet per household per day during extreme drought periods, and may levy a surcharge of up to $25.00 per 100 cubic feet for domestic use above this limit or a similar surcharge for other water users if the City of Aiken Utilities Division deems that adequate conservation measured have not been implemented. These pricing structures/surcharges primarily discourage landscape irrigation, filling of swimming pools, and other uses of water beyond what's normally required for human health purposes.

Residential Water Audits

Residential water audits allow homeowners to better understand their personal water use and identify methods to reduce water use. Homeowners can perform these audits themselves using residential water audit guides, or water utilities may provide free residential water audits to their customers. Residential water audits involve checking indoor uses (e.g., toilets, faucets, showerheads) and outdoor uses (e.g., lawn sprinklers). Based on the results of the audit, homeowners may invest in low-flow systems, repair leaks, and/or adjust personal water use behaviors.

Landscape Irrigation Programs and Codes

Landscape irrigation programs or water-efficient landscaping regulations can encourage or require homeowners to adopt water-efficient landscaping practices. Such practices seek to retain the natural hydrological role of the landscape, promote infiltration into groundwater, preserve existing natural vegetation, and conserve water. Water-efficient landscaping may include incorporating native or low-water-use plants into landscape design (City of Commerce, CA 2021).

Local governments can require use of these water efficiency measures through municipal codes or encourage their use through incentives or educational programs. Potential practices include:

- Smart Irrigation Controller Rebate – Utilities may offer rebates to homeowners who replace their existing irrigation controllers with smart irrigation controllers that adjust irrigation according to soil moisture levels. Smart irrigation controllers incorporate soil moisture sensors (SMSs) and/or precipitation and/or evapotranspiration sensors (called weather-based irrigation controllers [WBICs]). Controllers can be WaterSense-certified by meeting U.S. Environmental Protection Agency (EPA) criteria.

- Turf Replacement Rebate – Utilities may offer rebates to homeowners or businesses who replace irrigable turf grass with landscaping that requires minimal or no supplemental irrigation.

- Developer Turf Ordinance – Ordinances can be set that require new developments to have reduced irrigable turf grass area. Such development may be required to have low flow or microirrigation in plant beds, spray or rotor heads in separate zones for turf grass, or smart irrigation controllers to manage remaining turf areas.

- Education Programs – Programs could be offered for homeowners to learn about water-efficient landscaping practices. Some examples of landscape irrigation improvements include:
  - Verifying the best irrigation schedule for the climate and soil conditions
  - Verifying the recommended nozzle pressure in sprinklers
  - Adjusting sprinkler locations to ensure water falls on lawns and/or gardens (not on sidewalks or other impervious surfaces)
  - Using a water meter to measure the water used in landscape irrigation

The need for landscape irrigation programs and codes can potentially be reduced with effective conservation pricing structures.

Leak Detection and Water Loss Control Programs

A water loss control program identifies and quantifies water uses and losses from a water system through a water audit. Once identified, sources of water loss can be reduced or eliminated through leak detection, pipe repairs or replacement, and/or changes to standard program operations or maintenance protocols. Following these interventions, the water loss program can evaluate the success of the updates and adjust strategies as needed.

Automated meter reading (AMR) and advanced metering infrastructure (AMI) are technologies that can assist with leak detection. AMR technology allows water utilities to automatically collect water use data from water meters, either by walking or driving by the property. AMI systems automatically transmit water usage data directly to the utility without requiring an employee to travel to the property. AMI systems collect data in real time. Both technologies reduce the staff time required to read meters and allow utilities to more frequently analyze actual consumption (as opposed to predicting usage based on less frequent manual meter readings). Higher-than-expected readings can be flagged as potential leaks. Because of their ability to collect data more frequently, AMI systems may detect consumption anomalies sooner than AMR systems. AMI systems allow for earlier detection of smaller leaks so repairs can be made before a major pipe breaks. However, AMI systems are more expensive to install than AMR systems and therefore may not be economical for smaller utilities. Hybrid systems on the market allow for future migration from AMR to AMI.

An example of a basinwide water audit and water loss control program is that of CWWMG, which is undertaking a significant water audit project to identify real (leaks) and apparent (meter inaccuracy) water losses throughout the basin. This project identified 17 billion gallons of nonrevenue water that could be managed, thereby increasing utility revenue by $16.8 million (CWWMG 2023). Subsequent phases involve conducting economic analyses and identifying water loss goals for each CWWMG member and the entire group. A similar effort could be pursued within the Lower Savannah-Salkehatchie River basin.

Georgia is one of the few states that have implemented statewide water loss control requirements. In 2010, the Georgia Water Stewardship Act was enacted. The Act set water loss control requirements that apply to public water systems serving populations over 3,300, which include:

- Completing an annual water loss audit using American Water Works Association (AWWA) M36 Methodology

- Developing and implementing a water loss control program
- Developing individual goals to set measures of water supply efficiency
- Demonstrating progress toward improving water supply efficiency

Time-of-Day Watering Limits

A time-of-day watering limit prohibits outdoor watering during the hottest part of the day, usually 10:00 a.m. to 6:00 p.m. This practice reduces water loss from evaporation.

Car Wash Recycling Ordinances

In-bay automatic car wash systems use approximately 35 gallons of water per vehicle. Touch-free car wash systems, which rely solely on chemicals and high-pressure spray rather than on the gentle friction of a soft-touch wash, use approximately 70 gallons of water per vehicle. Assuming one bay and 100 customers per day, these two common types of systems use between 3,500 and 7,000 gallons of water per day. To reduce water usage, car wash recycling ordinances require all new car washes to be constructed to include recycled water systems. Recycled water systems allow for water used in washing or rinsing to be captured and reused. Ordinances can set a percentage of recycled water to total water used. Typical ordinances require at least 50 percent use of recycled water.

Toilet Rebate Program

Residents can be incentivized to replace household appliances and fixtures with low-flow alternatives that meet standards and requirements such as those from the Leadership in Energy and Environmental Design (LEED) or U.S. EPA's WaterSense programs. For example, toilet rebate programs offer rebates for applicants who replace old, inefficient toilets with water-efficient ones. If a toilet being replaced uses 3.5 gallons per flush (gpf) and the replacement toilet uses 1.28 gpf, there will be a savings of 2.22 gpf per rebate. Assuming a use rate of five flushes per day per person (DeOreo et al. 2016) and an average of 2.5 persons per household results in savings of 27.8 gallons per household per day for each rebate.

Water Waste Ordinances

Local governments can establish a water waste ordinance to prohibit the watering of impervious surfaces, such as sidewalks or driveways, and/or prohibit runoff from private properties onto public streets.

Building Code Requirements (Water Efficiency Standards for New Construction)

Local ordinances can require that renovations and new construction meet established water efficiency metrics. These ordinances may either be set by the local government or rely on existing water efficiency certification programs such as LEED or U.S. EPA's WaterSense. These programs have set water efficiency requirements for all household fixtures, such as a maximum rating of 2.5 gpm flow rate for showers and maximum rating of 1.6 gpf for toilets (Mullen 2022).

Recycled Water Programs Using Utility-Provided Reclaimed Water for Irrigation and Other Uses

Recycled water programs reuse highly treated wastewater for other beneficial purposes, reducing demands on surface water and groundwater. Water can be reclaimed from a variety of sources then treated and reused for beneficial purposes such as irrigation of crops, golf courses, and landscapes; industrial processes including cooling water; cooling associated with thermoelectric plants; and environmental restoration. The quality of reclaimed water would need to be matched with water quality requirements of the end use, and emerging contaminants of concern (e.g., per- and polyfluoroalkyl substances [PFAS] and microplastics) would need to be considered.

The national WateReuse Association defines terminology around water reuse in the following way. **Recycled water** generally refers to treated domestic wastewater that is used more than once before it passes back into the water cycle. The terms "reused" and "recycled" are often used interchangeably depending on where you are geographically. **Reclaimed water** is not reused or recycled until it is put to some purpose. It can be reclaimed and be usable for a purpose, but not recycled until somebody uses it. This River Basin Plan uses both terms, recycled water and reclaimed water, depending on the context and in accordance with these definitions. The difference in terminology is shown in Figure 6-1, where treated wastewater effluent that undergoes further, advanced treatment becomes reclaimed water, and when that reclaimed water is put to use it becomes recycled water.

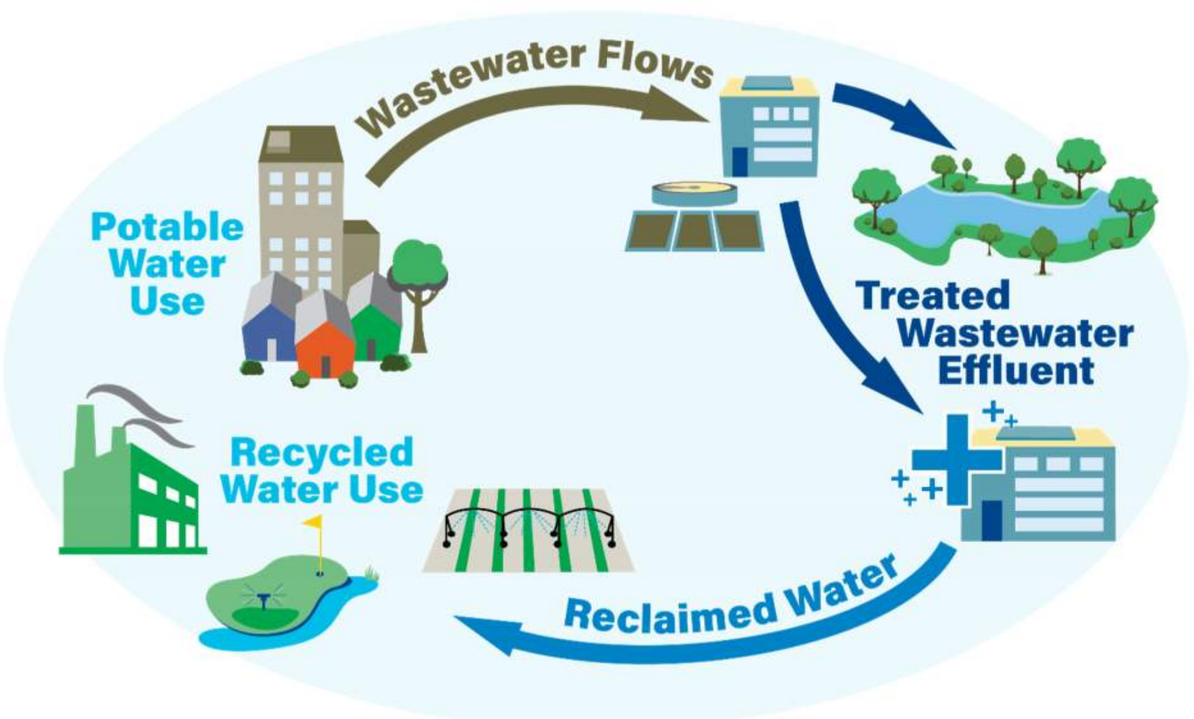


Figure 6-1. Recycled water cycle and definitions.

6.1.3 Agriculture Water Efficiency Demand-Side Strategies

This section provides a more detailed description of the agricultural water efficiency practices considered as part of the toolbox of strategies. These demand-side strategies also apply to groundwater users.

Water Audits and Nozzle Retrofits

Water audits monitor water use in an agricultural irrigation system to identify potential opportunities for water efficiency improvements. Water audits consider water entering the system, water uses, water costs, and existing water efficiency measures. Water audits gather information on the size, shape, and topography of the agricultural field, depth to groundwater, vulnerability to flooding, pumping equipment, irrigation equipment, and past and present crop use and water use (Texas Water Development Board 2013).

Across South Carolina, Clemson University Cooperative Extension Service specialists and researchers have held meetings to talk with farmers about center pivot irrigation and discuss the Clemson Center Pivot Irrigation Test Program, a type of water audit offered by the Clemson Extension Water Resources, Agronomic Crops, and Horticulture Teams. These audits measure irrigation uniformity—the consistency of irrigation depth across the irrigated area. Without irrigation uniformity, some crops may experience overirrigation and some may experience underirrigation, leading to wasted water and lost profit. The Center Pivot Irrigation Test Program can provide growers with a map of irrigation depths, observed issues such as leaks and clogs, estimated costs of over- or underwatering, estimated costs for nozzle retrofits, and design versus observed flow rates and system pressure (Clemson Cooperative Extension 2022a). After the audit, a report is provided that includes an estimated cost of under- or overirrigation based on crop type. The cost of suboptimal irrigation is compared to the estimated cost of a sprinkler retrofit.

The South Carolina Mobile Irrigation Laboratory pilot project is another example water audit program. This project was the result of a partnership with South Carolina Department of Agriculture (SCDA) and Aiken Soil and Water Conservation District. Pilot project audits identified areas of over- and underwatering, suggested energy savings opportunities, and recommended upgrades or operational changes (SCDNR 2019d). The project provided no-cost water and energy audits of 24 agricultural center pivot irrigation systems throughout South Carolina over 3 years (SCDNR 2020).

Irrigation Scheduling and Smart Irrigation

Irrigation scheduling refers to the process of scheduling when and how much to irrigate crops based on the needs of the crops and the climatic/meteorological conditions. It ensures that crops are receiving the correct amount of water at the right time. The three main types of irrigation scheduling methods are soil water measurement, plant stress sensing, and weather-based methods. To measure soil water, farmers can use SMSs at varying depths. SMSs are of two types: those that measure volumetric water content and those that measure soil tension (University of Minnesota Extension 2024). Water application can be controlled and limited by identifying precise periods when irrigation is needed by using soil moisture measurements and other factors such as soil temperature, crop growth stage, localized evapotranspiration, and even weather forecasts. For weather-based methods, farmers can research regional crop evapotranspiration reports to develop an irrigation schedule. Additionally, farmers can use thermal sensors to detect plant stress (Freese and Nichols, Inc. 2020). The use of thermal and/or moisture sensors to automatically schedule irrigation is referred to as smart irrigation. Advanced irrigation scheduling and use of sensors and smart irrigation technology may reduce water use by 15 percent on average (Smart Irrigation 2019).

A Clemson University study on intelligent water and nutrient placement (IWNP) combines smart watering strategies with smart fertilizer applications. IWNP uses smart sensing with model-based decision support systems to determine the irrigation water and nutrient application required by crops at a given time (Clemson College of Agriculture, Forestry and Life Sciences 2021). The IWNP systems are installed on existing overhead irrigation systems as a retrofit. Clemson seeks to develop the IWNP system, then develop a training program to teach farmers how to use the system.

Feedback from the Lower Savannah-Salkehatchie RBC on this strategy was that irrigation scheduling can be a useful tool, but it needs to be conducted correctly to be effective. This strategy can be used in both agricultural and municipal settings (although the specific approaches and technologies may be different).

Soil Management and Cover Cropping

Soil management includes land management strategies such as conservation tillage, furrow diking, and the use of cover crops in crop rotations. The USDA defines conservation tillage as "any tillage or planting system that covers 30 percent or more of the soil surface with crop residue, after planting, to reduce soil erosion by water" (USDA 2000). Conservation tillage can conserve soil moisture, increase water use efficiency, and decrease costs for machinery, labor, and fuel. Types of conservation tillage include:

- No Till – Soil is left undisturbed from harvest to planting except for nutrient injection. Planting is done in narrow seedbeds and a press wheel may be used to provide firm soil–seed contact (Janssen and Hill 1994).
- Strip Till – This practice involves tilling only the seed row prior to planting, disturbing less than one-third of the row width (Conservation Technology Information Center 1999).
- Ridge Till – This practice involves planting into a seedbed prepared on ridges using sweeps, disk openers, coulters, or row cleaners. Residue is left on the surface between ridges to reduce soil loss (Janssen and Hill 1994).
- Mulch Till – This practice uses chisel flows, field cultivators, disks, sweeps, or blades to till soil in such a way that it does not invert the soil but leaves it rough and cloddy (Janssen and Hill 1994).
- Furrow Diking – The practice of creating small dams or catchments between crop rows to slow or prevent rainfall runoff and increase infiltration. Increased water capture reduces the supplemental irrigation needed, resulting in direct water savings.
- Cover Crops – This practice involves planting cover crops, such as cereal grains or legumes, following the harvest of summer crops. Cover crops use nutrients not used by previous crops, and protect against nutrient runoff and soil erosion. Cover crops can increase infiltration and the water-holding capacity of the soil, which may indirectly result in water savings because applied water is used more efficiently.

Crop Variety, Crop Type, and Crop Conversion

Changing crop types from those requiring relatively large amounts of water to those requiring less water can save significant amounts of irrigation water. Exact savings vary by crop, but could potentially be on the order of 15.8 acre-inches per acre (Freese and Nichols, Inc. 2020). Switching the variety of a particular crop may also be a water conservation strategy. For example, switching from full/mid-season corn to short-season corn could result in a savings of 3.7 acre-inches per acre. However, such a change could also result in substantial yield loss, making it an unviable option for some growers (Freese and Nichols, Inc. 2020).

In South Carolina, transitioning away from corn and small grains, such as wheat, rye, oats, and barley, and increasing cotton crops can reduce water use. However, because the choice of crops is market-driven and certain machinery, infrastructure, and skills are specific to different crops, changing crop type may not be economical for growers, especially in the Lower Savannah-Salkehatchie River basin. Conversion programs that offer growers incentives may be necessary.

Irrigation Equipment Changes

Changing from low-efficiency to higher-efficiency irrigation equipment can reduce water use but requires significant financial investment. Irrigation methodologies may include mid-elevation, low-elevation, low-elevation precision application, or drip/trickle irrigation. These methodologies have application efficiencies of 78, 88, 95, and 97 percent, respectively (Amosson et al. 2011).

Future Technologies

There are several emerging technologies to improve irrigation efficiency and water conservation that are under development or in the early stages of being adopted on a larger scale. An example of a future technology, as discussed herein, is smart irrigation systems that rely on soil moisture levels, weather conditions, and crop water needs in real time. High-efficiency irrigation control systems use weather data to adjust irrigation schedules automatically (HydroPoint 2012). Precision agriculture methods use Global Positioning System and satellite imagery to apply water, fertilizers, and pesticides more accurately. As new technologies are developed and commercialized, agricultural water users in the basin should consider how they might apply these technologies to conserve water.

Wetting Agents to Reduce Water Use at Golf Courses

Adding wetting agents can reduce the surface tension of water, allowing irrigation water to penetrate deeper into the root zone. Also known as soil surfactants, wetting agents can be applied for a number of different reasons including preventing localized dry spots, improving moisture uniformity, increasing water infiltration to the root zone, and improving moisture retention.

Recycled Water Programs, Including Use of Utility-Provided Reclaimed Water for Irrigation

Recycled water programs, described above under Municipal Water Efficiency and Conservation Demand Side Strategies, can be used for irrigation of certain food crops depending on the water quality requirements of the crop, non-food crops including turfgrass, garden crops, and animal feed. Sources of water suitable for recycling in agricultural applications may include reclaimed water from municipal wastewater plants, agricultural processing plants, and runoff from fields after irrigation (tailwater). Water quality would need to be considered, especially for application to food crops. Utility-provided reclaimed water is already used for irrigation of golf courses in the basin and it may be an option for some agricultural operations, but the RBC recognizes that there are limitations, and it should not be considered a universal recommendation for agricultural irrigation.

6.1.4 Supply-Side Strategies

The Lower Savannah-Salkehatchie RBC did not identify any strategies that increase the amount of surface water available for withdrawal (supply-side strategies) since no significant water shortages were identified under the 2070 High Demand Scenario.

6.1.5 Technical Evaluation of Strategies

None of the surface water management strategies in the Lower Savannah-Salkehatchie River basin were evaluated using the SWAM surface water model. This was largely because the strategies could not be related to triggers that can be integrated into the model (i.e., streamflows or reservoir water levels). While some of the municipal drought management plans in the basin do have reservoir water level triggers, these were not tested using the model because of (1) the lack of water shortages related to reservoir storage throughout the basin in the 2070 High Demand Scenario and (2) the triggers would not become activated very often during the simulation and, therefore, would have a minimal impact on supply.

6.1.6 Feasibility of Surface Water Management Strategies

The Lower Savannah-Salkehatchie RBC assessed the feasibility of the strategies described in Section 6.1.2 considering consistency with regulations, reliability of water source, environmental impacts, socioeconomic impacts, potential interstate or interbasin impacts, and water quality impacts. Table 6-6 presents this assessment. Irrigation (agricultural and golf course) practices are presented first, followed by municipal practices.

Color coding was used to identify the expected effect of the strategy within each category. Expected effects range from moderate to high adverse effects to moderate to high positive effects. The assignment of effects, whether adverse, neutral, or positive, was largely subjective and based on professional judgment and feedback from the RBC. The color coding used for the expected effects listed in Table 6-6 are shown below.

Color Coding for Assigning Expected Effects in Table 6-3.

Potential Moderate/High Adverse Effect	Potential Low Adverse Effect	Likely Neutral Effect (either no effect, or offsetting effects)	Potential Low Positive Effect	Potential Moderate/High Positive Effect

Table 6-3. Water management strategy feasibility assessment.

Water Management Strategy	Strategy Type	Consistency with Regulations	Reliability of Water Source	Environmental Impacts and Benefits[1]	Socioeconomic Effects	Potential Interstate or Interbasin Effects	Other Water Quality Considerations
Demand-Side Irrigation (Agricultural and Golf Course) Practices							
Water Audits and Nozzle Retrofits	Demand-side – Agriculture/ Irrigation	Consistent	Strategy reduces demand and extends supply, increasing water source reliability for other demands.	**Impacts:** None anticipated. **Benefits:** Prevention of overwatering may limit runoff, erosion, and sedimentation.	No to low anticipated effects – Financial gains from reduced delivery and pumping costs likely outweigh costs of audit and nozzle retrofits.	No anticipated effects	See Environmental Benefits.
Irrigation Scheduling and Smart Irrigation	Demand-side – Agriculture/ Irrigation	Consistent	Strategy reduces demand and extends supply, increasing water source reliability for other demands.	**Impacts:** None anticipated. **Benefits**: May reduce overfertilization and prevention of overwatering may limit runoff, erosion, and sedimentation.	Low to moderate effects – Initial costs of advanced technology may be partially offset by savings from reduced water and nutrient use.	No anticipated effects	See Environmental Benefits.
Soil Management and Cover Cropping	Demand-side – Agriculture/ Irrigation	Consistent	Strategy reduces demand and extends supply, increasing water source reliability for other demands.	**Impacts:** Low anticipated impacts – Increase in herbicides may be required. **Benefits:** May improve soil quality and reduce runoff.	Low to moderate effects – Initial costs of new equipment plus training and operations and maintenance (O&M) costs. Costs may be partially offset by reduction in soil, water, and nutrient loss.	No anticipated effects	No to low anticipated impacts – Conservation tillage may increase potential leaching of nitrogen or pesticide to groundwater. See also Environmental Benefits.
Crop Variety, Crop Type, and Crop Conversions	Demand-side – Agriculture/ Irrigation	Consistent	Strategy reduces demand and extends supply, increasing water source reliability for other demands.	**Impacts:** Low anticipated impacts – Variation in chemical application for different crops must be considered.	Medium to high anticipated effects – Potential profit loss from switching to lower demand crop or from a full season to short-season crop.	No anticipated effects	No anticipated impacts.

Table 6-3 (continued). Water management strategy feasibility assessment.

Water Management Strategy	Strategy Type	Consistency with Regulations	Reliability of Water Source	Environmental Impacts and Benefits[1]	Socioeconomic Effects	Potential Interstate or Interbasin Effects	Other Water Quality Considerations
Demand-Side Irrigation (Agricultural and Golf Course) Practices							
Irrigation Equipment Changes, including Drip/Trickle Irrigation	Demand-side – Agriculture/ Irrigation	Consistent	Strategy reduces demand and extends supply, increasing water source reliability for other demands.	**Impacts:** Low anticipated impacts – Changing equipment may disturb environmentally sensitive areas.	Low anticipated effects – Initial costs of equipment changes may be partially offset by water use savings. Investments in drip/trickle irrigation may not be economical for low value crops.	No anticipated effects	No anticipated impacts.
Future Technologies	Demand-side – Agriculture/ Irrigation	Consistent	Strategy reduces demand and extends supply, increasing water source reliability for other demands.	**Impacts:** None anticipated. **Benefits**: May reduce overfertilization and overwatering; may limit runoff, erosion, and sedimentation.	Low to moderate effects – Initial costs of advanced technology may be partially offset by savings from reduced water and nutrient use.	No anticipated effects	See Environmental Benefits.
Wetting Agents to Reduce Water Use at Golf Courses	Demand-side – Agriculture/ Irrigation	Consistent	Strategy reduces demand and extends supply, increasing water source reliability for other demands	**Impacts:** None assuming bio-degradable and use of environmentally friendly surfactants. **Benefits**: Prevention of overwatering may limit runoff, erosion, and sedimentation	Low to no effects – Effective use of wetting agents can result in water and energy savings, reducing overall cost.	No anticipated effects	Low to none assuming bio-degradable and environmentally friendly surfactants are used
Recycled Water Programs, Including Use of Utility-Provided Reclaimed Water for Irrigation	Demand-side – Agriculture/ Irrigation	Consistent (assuming approved uses)	Strategy reduces demand and extends supply, increasing water source reliability for other demands	**Impacts:** Potential accumulation of metals and salts in soil, depending on source. **Benefits**: May reduce need for fertilizers and conserves freshwater resources	Low to no effects – Effective use of recycled water can result in water and energy savings, reducing overall cost.	No anticipated effects	Monitoring is needed to ensure no long-term impacts to soil and crop health from potential contaminants, salinity, and pathogens.

Table 6-3 (continued). Water management strategy feasibility assessment.

Water Management Strategy	Strategy Type	Consistency with Regulations	Reliability of Water Source	Environmental Impacts and Benefits[1]	Socioeconomic Effects	Potential Interstate or Interbasin Effects	Other Water Quality Considerations
Demand-Side Municipal Practices							
Development, Update, and Implementation of Drought Management Plans	Demand-side – Municipal	Consistent	Strategy reduces demand and extends supply, increasing water source reliability during droughts.	**Impacts:** None anticipated.	Low anticipated effects – Effects to utility revenue if demand reductions are substantial. Positive effect to residential users from reduced water bills (if billed at unit rates).	No anticipated effects	No anticipated impacts.
Public Education of Water Conservation	Demand-side – Municipal	Consistent	Strategy reduces demand and extends supply, increasing water source reliability for other demands.	**Impacts:** None anticipated.	Low to no anticipated effects – Effects to utility revenue if demand reductions are substantial. Positive effects to residential users from reduced water bills (if billed at unit rate).	No anticipated effects	No anticipated impacts.
Conservation Pricing Structures	Demand-side – Municipal	Consistent	Strategy reduces demand and extends supply, increasing water source reliability for other demands.	**Impacts:** None anticipated.	Moderate anticipated effects – Customers who cannot reduce water use may face economic hardship. Reduced billing revenue for utilities may cause financing issues or lead to further rate increases.	No anticipated effects	No anticipated impacts.

Table 6-3 (continued). Water management strategy feasibility assessment.

Water Management Strategy	Strategy Type	Consistency with Regulations	Reliability of Water Source	Environmental Impacts and Benefits[1]	Socioeconomic Effects	Potential Interstate or Interbasin Effects	Other Water Quality Considerations
Demand-Side Municipal Practices							
Residential Water Audits	Demand-side – Municipal	Consistent	Strategy reduces demand and extends supply, increasing water source reliability for other demands.	**Impacts:** None anticipated.	No to low anticipated effects – Revenue effects to utility from reduced demand may be offset by lower delivery costs. Effects to homeowners from repairs may be offset by reduced water bills (if billed at unit rate). The need to hire implementation and compliance staff would contribute to rate increase.	No anticipated effects	No anticipated impacts.
Leak Detection and Water Loss Control	Demand-side – Municipal	Consistent	Strategy reduces demand and extends supply, increasing water source reliability for other demands.	**Impacts**: None anticipated.	Cost of program implementation could result in rate increase, no impact, or potential rate decrease, depending on circumstances.	No anticipated effects	No anticipated impacts.
Time-of-Day Watering Limit	Demand-side – Municipal	Consistent	Strategy reduces demand and extends supply, increasing water source reliability for other demands.	**Impacts**: None anticipated.	The need to hire implementation and compliance staff would contribute to rate increase.	No anticipated effects	No anticipated impacts.

Table 6-3 (continued). Water management strategy feasibility assessment.

Water Management Strategy	Strategy Type	Consistency with Regulations	Reliability of Water Source	Environmental Impacts and Benefits[1]	Socioeconomic Effects	Potential Interstate or Interbasin Effects	Other Water Quality Considerations
Demand-Side Municipal Practices							
Landscape Irrigation Program and Codes	Demand-side – Municipal	Consistent	Strategy reduces demand and extends supply, increasing water source reliability for other demands.	**Impacts:** None anticipated. **Benefits:** Water quality of receiving waters may be improved by reducing runoff from landscaping.	Low anticipated effects – Mandates to meet standards may cause financial hardship for homeowners. No anticipated effects to homeowners from educational programs. The need to hire implementation and compliance staff would contribute to rate increase.	No anticipated effects	See Environmental Benefits.
Car Wash Recycling Ordinances	Demand-side – Municipal	Consistent	Strategy reduces demand and extends supply, increasing water source reliability for other demands	**Impacts:** Low anticipated impacts – renovation or construction may impact sensitive areas **Benefits:** Positive environmental benefit of reduced pollutant runoff	Low anticipated effects – Financial burden to developer or owner of car wash for construction/ renovation. The need to hire implementation and compliance staff would contribute to rate increase.	No anticipated effects	See Environmental Benefits

Table 6-3 (continued). Water management strategy feasibility assessment.

Water Management Strategy	Strategy Type	Consistency with Regulations	Reliability of Water Source	Environmental Impacts and Benefits[1]	Socioeconomic Effects	Potential Interstate or Interbasin Effects	Other Water Quality Considerations
Demand-Side Municipal Practices							
Toilet Rebate Program	Demand-side – Municipal	Consistent	Strategy reduces demand and extends supply, increasing water source reliability for other demands	**Impacts:** Low anticipated impacts – Minor additional waste from discarded inefficient toilets, fixtures, and appliances.	Low anticipated Effects – Positive benefit for homeowners from upgrading appliances for lower cost and reduced water billings (if billed at unit rate). Adverse effect due to need to hire implementation and compliance staff which would contribute to rate increase.	No anticipated effects	No anticipated impacts
Water Waste Ordinances	Demand-side – Municipal	Consistent	Strategy reduces demand and extends supply, increasing water source reliability for other demands	**Impacts:** Low anticipated impacts **Benefits:** Water quality of receiving waters may be improved by reducing runoff from landscaping	Low anticipated effects – Homeowners and business owners may face economic hardship from required modifications to irrigation system. The need to hire implementation and compliance staff would contribute to rate increase.	No anticipated effects	See Environmental Benefits
Building Code Requirements (Water Efficiency Standards for New Construction)	Demand-side – Municipal	Consistent	Strategy reduces demand and extends supply, increasing water source reliability for other demands	**Impacts:** None anticipated	Low anticipated effects – Efficiency standards may make renovations or construction more expensive and limit access to renovate or build. The need to hire implementation and compliance staff would contribute to rate increase.	No anticipated effects	No anticipated impacts

Table 6-3 (continued). Water management strategy feasibility assessment.

Water Management Strategy	Strategy Type	Consistency with Regulations	Reliability of Water Source	Environmental Impacts and Benefits[1]	Socioeconomic Effects	Potential Interstate or Interbasin Effects	Other Water Quality Considerations
Demand-Side Municipal Practices							
Recycled Water Programs Using of Utility-Provided Reclaimed Water for Irrigation and Other Uses	Demand-side – Municipal	SCDES regulates reclaimed wastewater systems for irrigation use with public contact; there are no laws or regulations pertaining to indirect potable reuse or direct potable reuse	Strategy reduces demand and extends supply, increasing water source reliability for other demands	**Impacts:** Low to moderate anticipated impacts: Depending on the extent of reclaim demand, reduced discharge from wastewater treatment facilities may reduce low flow levels **Benefits:** Depending on the extent of reclaim demand, reduced discharge from wastewater treatment facilities may result in improved receiving water quality	Moderate anticipated effects – Higher initial water bills to finance a recycled water program may be offset by long-term savings from postponing the need for new supplies and raw water treatment facilities. The need to hire operations staff could contribute to rate increase.	No anticipated effects	See Environmental Benefits Need to match end use with quality of reclaimed water. Consider emerging contaminants of concern (e.g., PFAS and microplastics)

[1]For the purposes of this comparison, “impacts” can be understood as potentially adverse consequences, while “benefits” are potential advantageous consequences.

6.1.7 Cost-Benefit Analysis

Cost and benefit information for each strategy, in terms of potential cost or water savings, is discussed in this section. These are generalized values from literature or other locations and should be considered for planning-level assessment only, to help screen and understand the alternatives. Implementation planning would require more specific analysis.

The information provided in this chapter is not intended to rule any alternative into or out of a recommended River Basin Plan for the Lower Savannah-Salkehatchie River basin. Rather, the information is for comparison purposes, so that the potential benefits, risks, and impacts of the alternatives can be better understood and decision-makers can make more informed decisions about priorities.

Demand-Side Municipal Strategies

Public Education of Water Conservation

Building water conservation awareness will not only save water but will reduce operational and production costs. Savings are estimated at 5,000 gallons per household per year for 30 percent of households targeted. Public education and outreach costs more per person in smaller communities than in larger ones ($2.75 per person per year for communities less than 20,000 and $1.80 per person per year for communities with more than 20,000) (Freese and Nichols, Inc. 2020).

Conservation Pricing Structures/Drought Surcharge

Implementing conservation pricing rate structures that discourage the inefficient use or waste of water is a cost-effective option for utilities because there are no direct costs to them to achieve a reduction in demand. However, reduction in billing revenue associated with decreased customer usage must be considered. On average, in the United States, a 10 percent increase in the marginal price of water in the urban residential sector can be expected to diminish demand by about 3 to 4 percent in the short run (Olmstead and Stavins 2009). An example application in the Texas Panhandle assumed 10 percent of households would respond and change their water consumption behavior, resulting in 6,000 gallons saved per household per year (Freese and Nichols, Inc. 2020).

Residential Water Audits

Residential water audits may result in implementing various strategies, retrofits, and other measures that may save up to 20 to 30 gallons of water per day per household. Costs include costs for water audits (if applicable) and for replacing or repairing household water systems.

Landscape Irrigation Programs and Codes

If water efficiency measures are required, costs would be associated with enforcement. If not required, costs would be associated with incentives or education programs. If programs include rebate offerings, the cost of the rebate itself and costs for administering the program must be considered. Smart irrigation controllers with an U.S. EPA WaterSense certification are commercially available for between $120 and $280. These costs assume there is already a compatible irrigation system in place. Costs to the homeowner would be greater if irrigation system installation or renovation is required. Irrigation with a smart irrigation meter rather than a standard irrigation meter may result in a water use efficiency reduction of 30 percent. An example of a turf replacement rebate is from California's Metropolitan Water District, which offers a $2 per square foot rebate for up to 5,000 square feet. The cost to the utility or municipality would be dependent on the rebate rate and percent uptake by customers.

Leak Detection and Water Loss Control Programs

U.S. EPA estimates that the average water loss in water systems is 16 percent, with up to 75 percent of the water loss potentially recoverable through a water loss control program (U.S. EPA 2013). Since 2010, Georgia's public water systems have reported, on average, between 13.5 and 17.4 percent water loss; however, 43 of 263 systems reported over 30 percent average annual water loss since 2010. Costs for a water loss control program would include the time spent conducting the water audit and costs for needed repairs, which would be system-dependent. However, water audits generally have been proven to be cost-effective. The AWWA M36 Manual of Water Audits and Loss Control Programs includes an example of a utility with a $79,000 water audit cost, which, in 2022 dollars, translates to a unit cost of $310 per water main mile (AWWA 2016).

AMI and AMR technologies greatly reduce the labor required for water meter reading. Davie County Public Utilities, a water system in North Carolina, required 50 days (with frequent misreads) to manually read all 11,000 service connections in their network. After using AMR technology, they reduced their meter reading rate to 3,000 meters in 2 days, with nearly 100 percent accuracy (Atkinson 2016). In Michigan, the Oakland County Water Resources Commission achieved a 99 percent read success rate and reduced their meter reading staff by half after implementing an AMR system (Atkinson 2016).

A cost-benefit analysis for Washington Suburban Sanitary Commission Water concluded that an AMI system would pay for itself in 11 years, and savings would exceed $286 million over a 20-year period (Arcadis 2020). The project cost was estimated to total $208 million dollars, with the primary cost driver of replacing 492,000 meters. The analysis estimated that 29 of the existing 37 meter reader employee positions would be eliminated, and the utility would have a revenue gain of more than $580 million over 20 years because of improved meter accuracy. The improved domestic leak detection would save customers approximately $56 million over 20 years. Intangible benefits include safer working environments for utility employees from reducing meter reading field activities, water and energy conservation by customers, identification of meter tampering and potential water theft, and benefits from more frequent billing cycles.

Another example is Red Star Water District, a small water system in Leedey, Oklahoma. The district conducted a water loss audit and found real losses of 28.9 million gallons per year, valued at $71,962 and representing 25.2 percent of the total water supplied to the system. After identifying 29 leaks, the district adopted an aggressive program of leak repair and was able to repair all leaks, saving the system 26 million gallons of water per year at a value of $71,000 annually (Oklahoma Department of Environmental Quality 2021).

Time-of-Day Watering Limits

Setting a time-of-day watering limit may save up to 1,000 gallons of water per household per year, depending on the amount of irrigated landscape. Costs are associated with enforcement and can vary depending on the size of the utility, but these costs are expected to be low. Utilities may benefit from reduced water use and a reduction in peak demands if a time-of-day water limit restricts usage before typical morning peak demands.

Car Wash Recycling Ordinances

Costs of this practice are associated with purchase and installation of a recycled water system by the car wash owner or developer. The initial cost for a water recycling system can range between $20,000 and $40,000 (in 2022 dollars) depending on the car wash size and requirements (Taylor 2013). Operating costs would be higher than a nonrecycled wash water system because of increased energy usage, replacement of filters and membranes, and other factors. Depending on whether the water was obtained from a public water system or (private) well, there would be a reduction in raw water costs since water demand would be reduced. Ordinances can set a percentage of recycled water to total water used. Typical ordinances require at least 50 percent use of recycled water.

Toilet Rebate Program

Rebate programs to encourage use of low flow fixtures, toilets, and appliances have been used to lower residential water demand. The costs to the utility or local government are based on the rebate amount per fixture, toilet, or appliance, plus any program management costs. Reduced total water use in the community results in lower operating costs for the utility but may also result in lower billing revenue depending on the fee structure used.

Toilets made prior to 1980 typically used 5.0 to 7.0 or high gpf and toilets made from the early 1980s to 1992 typically used 3.5 gpf or more. The current federal standard is 1.6 gpf.

An example of an existing rebate requires customers to purchase a toilet using 1.1 gpf or less to receive a $75 rebate (Metropolitan North Georgia Water Planning District 2022). Metro Atlanta utilities have proven toilet rebate programs can be successful by replacing more than 150,000 toilets with low flow models between 2008 and 2019. Assuming an average water savings of just 2.4 gpf, this equates to a savings of 360,000 gpf. Since the average household flushed about 5 times per day, the combined water savings of these 150,000 low flow toilet replacements is a staggering 657 million gallons over the span of one year.

Water Waste Ordinances

Costs of this practice would be related to enforcement of the ordinance. Estimates range from $2,500 (communities less than 20,000 people) to $10,000 (communities with more than 20,000 people). Savings are estimated at 3,000 gallons per year per household (Freese and Nichols, Inc. 2020).

Building Code Requirements (Water Efficiency Standards for New Construction)

High efficiency toilets can save more than $100 per family per year (Mullen 2022). U.S. EPA estimates that fixtures meeting the WaterSense requirements can save approximately 700 gallons of water per year per household (U.S. EPA 2021). The costs associated with implementing local ordinances outlining water efficiency standards is low. There are numerous examples that can be used to guide ordinance development and implementation.

Recycled Water Programs Using Utility-Provided Reclaimed Water for Irrigation and Other Uses

Benefits include increased water supply, increased reliability, and reduced effluent disposal. Initial costs may be substantial and include construction/retrofit costs to wastewater facilities for full reuse capabilities and construction of distribution lines to end users. Benefits may result by lowering demand on highly treated potable water, thereby extending the source of supply and delaying the need for future upgrades to treatment processes or procuring additional water sources. The overall cost-benefit is dependent on the system, the end user, the cost of treatment, and many other factors. Utilities and others that have implemented recycled water programs have typically done so after careful analysis and planning to demonstrate the long-term financial viability of a recycled water program.

Demand-Side Irrigation (Agricultural and Golf Course) Strategies

Water Audits and Nozzle Retrofits

The cost of a Clemson Center Pivot Irrigation Test Program audit is $125.00 per pivot. Costs of other water audits vary significantly depending on whether they are conducted internally, by a consultant, or by a government entity. While the process of conducting a water audit does not alone provide benefits, if improvements such as nozzle retrofits are made, benefits can include increased water efficiency and energy savings. An approximately 15 percent reduction in water use could be expected from nozzle retrofits made following a center pivot sprinkler audit (Walther, pers. comm. 2021).

A sample audit report provided by Clemson Cooperative Extension estimates the cost of a retrofit sprinkler package at $5 per foot of pivot length (Clemson Cooperative Extension 2022b). In this example, the total cost to retrofit is estimated at $2,982. Using an assumed crop value, irrigation need, and cost of under- or overirrigation, the estimated suboptimal irrigation cost is $4.39 per acre. With an irrigated area of 37.4 acres, this is an estimated loss of $164. Over the estimated 23.6-year lifespan of the retrofit, this equates to $3,875 in savings compared to the total cost of $3,107 ($2,982 cost of the retrofit plus the $125 cost of the initial audit).

Irrigation Scheduling and Smart Irrigation

According to the 2021 Texas Panhandle Water Plan, the cost of a typical smart irrigation system ranges from $6.50 to $12.00 per acre and benefits amount to approximately 10 percent of the water used on each crop seasonally (Freese and Nichols, Inc. 2020). Other studies suggest that irrigation scheduling may reduce water use by 15 percent on average (Smart Irrigation 2019). The overall cost savings is hard to quantify, given the variability in irrigation rates, the cost of pumping, the potential increase in crop yield that results from optimizing irrigation, and other factors. A simple example assuming a center pivot irrigated area of 81 acres, a cost of $648 for a smart irrigation system ($8 per acre), and an annual cost of $1,374 ($16.96 per acre) for energy associated with pumping (North Carolina State University 2007), suggests that if a smart irrigation system is able to reduce water use by 15 percent, then the $648 capital cost of the system will be recovered in just over 3 years.

Soil Management

The 2021 Texas Panhandle Water Plan assumed a 1.75 acre-inches per acre of water savings from soil management strategies (Freese and Nichols, Inc. 2020). While conservation tillage may result in savings from reduced machine, fuel, and labor costs, depending on the conservation type implemented, it also has initial costs to transition from conventional to conservation tillage, including the purchase of new equipment and any chemical control costs (herbicides or pesticides). For example, ridge tilling requires specially designed equipment such as a ridge cultivator or ridge planter.

Implementing furrow diking can range from less than $2,000 to several thousand dollars. Per crop per season per acre estimates range from $5 to $30. The Texas Water Development Board estimates water savings of 3 inches per season (0.2 acre-feet per acre), but savings will vary by field and season. Using the irrigation of corn with a 113-day growing season as an example, a reduction in 3 inches per season would be expected to lower the seasonal irrigation need from 9.9 inches to 6.9 inches, assuming average seasonal precipitation of 16 inches, and an average seasonal corn crop watering need of 25.9 inches. The reduction of 3 inches would save approximately $10 per acre in irrigation system operating cost.

Crop Variety, Crop Type, and Crop Conversion

The cost of implementation and the actual reduction in irrigation water used will depend on numerous local factors including market pricing, cost of seed, cost of harvesting, and the value of crops.

If farmers are encouraged to switch from long-season varieties to short-season varieties, they may experience loss in yield and therefore revenue. However, they will see savings from reduced seed, pumping, fertilizer, harvest, and water use costs.

Irrigation Equipment Changes

Irrigation equipment changes may focus on lowering the elevation of nozzles on center pivot systems. Total replacement of a system (assumed 125-acre, 30-inch spacing) with a new 60-inch spacing system is estimated at $151.20 an acre, including labor and new hoses, heads, and weights. Conversion instead of full replacement of the same system is estimated at $44 per acre. Costs assume that the system is converting from low elevation spray application (LESA) or mid-elevation spray application (MESA) systems to low elevation precision application (LEPA) systems (Freese and Nichols, Inc. 2020). This transfer in irrigation practice may result in a 7 to 17 percent increase in irrigation efficiency and, consequently, decreased water usage. In most cases, irrigation equipment changes will be a combination of replacement and conversion.

Drip irrigation systems can cost between $500-$1,200 per acre (Simonne et al. 2024). Drip irrigation can improve the efficiency of both water and fertilizer applications, lowering the cost associated with pumping water and lowering fertilizer cost. Nutrient applications may also be better timed to meet plant needs. Drip systems can also be easily automated, lowering labor costs. One Texas cotton grower reported increasing their yield to 3 bales of cotton per acre using 16 inches of drip system water, compared to only 2.25 bales of cotton per acre using 16 inches of water from a center pivot system (Toro 2010). A Kansas corn grower who installed a drip system on 4,000 acres experienced a combined savings considering fuel, labor, chemical/fungicide, fertilizer, and cultivation of $160.05 per acre, compared to flood irrigation. At an initial capital cost of $1,200 per acre, the payback period for the drip system was 3.6 years (Toro 2007).

Wetting Agents to Reduce Water Use

Effective wetting agent programs can yield overall water savings. One study resulted in an approximately 20 percent savings the first season of application, and an average annual savings of $12,500 to $15,000 (U.S. Golf Association [USGA] 2024). Turfgrass loss during the summer was reduced to a level that allowed for the elimination of annual fairway overseeding, saving an additional $15,000 per year. The combined savings of water and seed completely offset the cost of the wetting agent program.

Irrigation Recycled Water Programs, Including Use of Utility-Provided Reclaimed Water for Irrigation

Benefits include increased water supply, increased reliability, and potentially lower costs. Initial costs may be substantial and include construction/retrofit costs to wastewater facilities for full reuse capabilities and construction of distribution lines to end users. If runoff from fields or crop beds after irrigation is collected and recycled, costs may be relatively low and are associated with collection (ditches and pipes), pumping facilities, and maintenance. Benefits may result by lowering demand on the original source of water, thereby extending the source of supply and delaying the need for procuring additional water sources. The overall cost-benefit is dependent on the system, the end user, the cost of treatment, and many other factors. Farmers and others that have implemented recycled water programs for agriculture have typically done so after careful analysis and planning to demonstrate the long-term financial viability of a recycled water program.

6.2 Groundwater Management Strategies

Under the Framework, a groundwater water management strategy is any water management strategy proposed to address a Groundwater Area of Concern or groundwater shortage. Strategies may include demand-side management strategies that reduce supply gaps by reducing demands, and supply-side strategies that increase or augment supply. Examples of demand-side strategies include municipal and agriculture conservation and water use efficiency measures. Examples of supply-side strategies include ASR, relocating pumping from one aquifer to another, and conjunctive use of both surface and groundwater.

In the Lower Savannah River basin, just over 15 percent of current demands are met by groundwater. In the Salkehatchie River basin, about 94 percent of current demands are met by groundwater. In both basins combined, groundwater demands are projected to increase by approximately 50 percent over the planning horizon under the High Demand Scenario. The Lower Savannah-Salkehatchie RBC focused the evaluation and selection of water management strategies on surface water management strategies; however, the demand-side strategies described in the previous section for surface water withdrawers also apply to the basin's groundwater withdrawers. Should utilities begin to rely more on groundwater as a water source or for developing redundancy, additional analysis may be needed.

Chapter 7
Water Management Strategy Recommendations

The Lower Savannah-Salkehatchie RBC considered a wide variety of water management strategies for implementation in the Lower Savannah River and Salkehatchie River basins (collectively referred to as the Lower Savannah-Salkehatchie River basin). As water management strategies were identified and discussed, the RBC recognized that significant surface water shortages or ecological risk due to low surface water flows are not projected to occur over the approximately 50-year planning horizon. As such, the RBC focused their efforts on the demand-side strategies. While demand-side strategies are not likely to be needed for the purpose of reducing or eliminating projected shortages, they may have other benefits including reducing the cost of water production and use, building resilience, mitigating potential localized shortages that are difficult to capture in the modeling, and sustaining and extending surface water supplies if unforeseen conditions occur such as changes in climate patterns, higher than expected growth, or higher than expected water use.

The water management strategy recommendations presented in this chapter align with the RBC vision and goal statements for the basin. By assessing and recommending a portfolio of demand-side strategies, the stakeholders comprising the RBC are recommending actions that help achieve the RBC's vision statement: "***Shared water resources are managed to sustainably meet the needs of all stakeholders in the Lower Savannah and Salkehatchie basins now and into the future."*** The selection and recommendation of the demand-side strategies also support the RBC-identified goal to:

Develop water use strategies, policies, and legislative recommendations so that the Lower Savannah and Salkehatchie River basins are resilient and:

- ***Provide for an accurate accounting of current and future water availability.***
- ***Promote stability of water allocations to support long-term planning.***
- ***Promote balance between development, industry, and economic growth in areas with adequate water resources.***
- ***Allow for growth.***
- ***Prevent saltwater intrusion and loss of freshwater resources.***
- ***Maintain adequate flows to support instream needs of aquatic organisms and recreation***

7.1 Selection, Prioritization, and Justification for each Recommended Water Management Strategy

Demand-side strategies recommended by the Lower Savannah-Salkehatchie RBC to conserve surface water resources, enhance instream flows, and increase water supply availability are identified and discussed below.

Municipal Demand-side Strategies: The recommended municipal demand-side water management strategies are summarized in Table 7-1. The RBC did not prioritize the remaining strategies because of the significance of individual utility circumstances (e.g., current operations and programs, utility size, financial means) in determining which is the most desirable strategy to pursue. The strategies represent a "toolbox" of potential approaches to reduce water demands. Utility managers may find the descriptions and feasibility assessment presented in Chapter 6 helpful for determining which strategies to pursue.

Table 7-1. Municipal demand-side water management strategies.

Water Management Strategy	Prioritization
Public Education of Water Conservation	Toolbox of strategies. Applicability and priority vary by utility (see discussion below)
Conservation Pricing Structures	
Leak Detection and Water Loss Control Programs	
Water Waste Ordinance	
Advanced Metering Infrastructure (AMI) and Automated Meter Reading (AMR)	
Landscape Irrigation Program and Codes/Time-of-Day Watering Limit	
Recycled Water Programs Using Utility-Provided Reclaimed Water for Irrigation and Other Uses	

As part of their discussions, the RBC identified several considerations related to these municipal demand-side water management strategies:

- Recycled water programs using utility-provided reclaimed water was identified as a promising strategy especially in the coastal portions of the basin where the ability to permit new wastewater discharges can be challenging. Recycled water programs reduce the amount of wastewater discharged to coastal water bodies. BJWSA and Hilton Head PSD are two coastal water utilities that have successfully implemented recycled water programs and continue to look for opportunities to expand them.
- As part of a leak detection and water loss control program, water providers could also consider district metering to measure flow at strategic locations in the system and perform a mass balance to locate areas with potential water loss. Water providers may also have programs to estimate non-revenue water, or water the utility is producing but not collecting revenue for such as municipal uses like firefighting and hydrant flushing.

- Water waste ordinances may only be needed under extreme circumstances (severe or extreme drought) and as a supplement to other demand-side strategies.
- Drought surcharges (discussed in Chapter 8) or increasing block rate structures should be considered to disincentivize high water use, especially during droughts.
- Landscape irrigation programs and codes such as time-of-day watering limits can be difficult or prohibitively costly to enforce. Additionally, some residents may irrigate with well water, making it difficult to know who is subject to restrictions. Some water providers in the basin have these programs in place but do not enforce them. The RBC discussed that these recommendations may be less relevant to small utilities but decided to keep in the toolbox of strategies, noting that it may still be beneficial for water suppliers that could enforce them.

Agricultural Demand-side Strategies: The RBC-recommended agricultural water management strategies are summarized in Table 7-2. RBC members representing the agriculture, forestry, and irrigation water interest category noted that most of the strategies listed are already used by most farmers, to varying extents, and are considered best management practices. However, commodity markets and input prices severely limit the ability to implementation many of these strategies without proper support in funding.

The RBC chose not to prioritize strategies to recognize that the most appropriate strategy for a given agricultural operation will depend on the size of the operation, crops grown, current irrigation practices, and financial resources of the owner/farmer. Several RBC members stressed that without soil management and cover cropping, a farmer will not reap the maximum benefit out of the other practices, which suggests soil management might be prioritized above other strategies. Collecting and reusing runoff from fields and crop beds was also identified as a useful strategy by one RBC member. The descriptions and feasibility assessment presented in Chapter 6 may be helpful to owners/farmers for determining which strategies to pursue.

Table 7-2. Agricultural water management strategy prioritization.

Water Management Strategy	Prioritization
Water Audits and Nozzle Retrofits	Toolbox of strategies. Priority varies by operation.
Irrigation Scheduling and Smart Irrigation	
Soil Management and Cover Cropping[1]	
Crop Variety, Crop Type, and Crop Conversion[2]	
Irrigation Equipment Changes	
Future Technologies	
Wetting Agents (golf courses)	
Recycled Water Programs, Including Use of Utility-Provided Reclaimed Water for Irrigation	

[1] *Soil management and cover cropping could be considered a higher priority strategy for many growers because it may increase the benefit of other strategies.*

[2] *Not all agriculture, forestry, and irrigation water interest category representatives on the RBC support this strategy. Crop types cannot be easily changed without major expenditures on equipment. Furthermore, the type of crop grown is often market driven.*

Industrial and Energy Sector Demand-side Strategies: The RBC identified and discussed water conservation approaches for manufacturing (industrial) and energy water users. In the Lower Savannah-Salkehatchie River basin, these water users include Kimberly-Clark, USDOE, Savannah River Nuclear Solutions, Savannah River Remediation, Bridgestone Americas, Inc., SRS, Archroma Martin, Resort Services Inc., and Recycled Group of South Carolina, LLC. The strategies identified by the RBC are water audits, rebates on energy-efficient appliances, water recycling, water saving equipment and efficient water systems, water-saving fixtures and toilets, and educating employees about water conservation. Water audits could involve adding meters throughout the system and pressure transducers to identify leaks where and when they occur. As with municipal strategies, these represent a “toolbox” of potential approaches to reduce water demands for the industrial and energy sectors.

Supply-side Strategies: The RBC identified supply-side strategies that are already implemented in the basin and discussed which of these should be recommended for expansion. Strategies currently implemented in the basin include onsite retention of stormwater via impoundments for irrigation; conjunctive use of surface water and groundwater; interconnections and regionalization of public water supply systems; interbasin transfers (e.g., from the Lower Savannah River basin to the Salkehatchie River basin); and ASR. Although recycled water programs are considered demand-side strategies since they lower demands on existing sources, they could also be considered supply-side strategies since they provide new sources of supply. The RBC recognized that recycled water programs already exist in the basin and noted that the use of reclaimed water for new golf courses, agriculture, construction, and industry could potentially be expanded. The value of ASR varies based on the characteristics of the aquifer being utilized. The RBC noted a study on the potential for ASR throughout the basin could be beneficial to encouraging this strategy. The RBC discussed the value of interconnections for emergency use as well as redundancy. In parts of the basin, opportunity for interconnections may be limited by the distance between systems and financial constraints of building extensive pipelines.

Another strategy discussed by the RBC for future consideration is the creation of a groundwater barrier via injection of reclaimed water to help prevent saltwater intrusion. This would help protect the integrity of coastal groundwater as a potable water source.

7.2 Remaining Shortages

The surface water modeling described in Chapter 5 did not indicate any significant projected shortages that may need to be addressed using surface water management strategies. In the Lower Savannah River basin, the Current Use and Moderate Demand planning scenarios resulted in no shortages and the High Demand planning scenario resulted in shortage for one municipal user less than one percent of the time; however, several small, upstream impoundments which provide storage were not included in the model. The small impoundments may provide enough storage to eliminate the infrequent, simulated shortages.

In the Salkehatchie River basin, the Current, Moderate, and High Demand planning scenarios resulted in simulated shortages for several agricultural users; however, these uses are typically supplemented with small impoundments that can provide buffers against short-term low-streamflow conditions. The small impoundments are not reflected in the model and as such, the model likely overestimates the frequency and duration of shortages for these users. Ecological risk at a single location assessed in the Lower Savannah River basin (Horse Creek at Clearwater) was low under all planning scenarios, except for the P&R Scenario which results in moderate risk for species richness due to streamflow reductions.

The recommended demand-side management strategies presented in this chapter will provide basin-wide benefit by increasing water supply and helping to maintain instream flows that support a healthy and diverse aquatic ecosystem. Implementation of these strategies also serves to protect against future climate conditions such as more frequent or severe droughts and water demands that exceed current projections.

7.3 Remaining Issues Regarding Designated Reaches of Interest or Groundwater Areas of Concern

The evaluation presented in Chapters 5 and 6 enabled the RBC to identify any Reaches of Interest or Groundwater Areas of Concern. Reaches of Interest are defined in the Framework as "specific stream reaches that may have no identified Surface Water Shortage but experience undesired impacts, environmental or otherwise, determined from current or future water-demand scenarios or proposed water management strategies" (SCDNR 2019a). The RBC did not identify any Reaches of Interest.

A Groundwater Area of Concern is defined in the Framework as "an area in the Coastal Plain, designated by a River Basin Council, where groundwater withdrawals from a specified aquifer are causing or are expected to cause unacceptable impacts to the resource or to the public health and well-being" (SCDNR 2019a). The RBC did not officially designate any Groundwater Areas of Concern; however, the RBC recognized that saltwater intrusion in coastal aquifers was an ongoing concern and should continue to be monitored.

7.4 Adaptive Management

Adaptive management is a flexible framework used to implement options as the future unfolds in a structured way to avoid the pitfalls of either underperformance or overinvestment. This allows for management adjustments based on real-time data and evolving conditions. Adaptive management can provide a means to more effective decisions and enhanced benefits while helping meet environmental, social, and economic goals; increasing scientific knowledge; and reducing tensions among stakeholders (National Research Council 2004).

Several pitfalls may occur because of uncertainties identified during river basin planning. The Lower Savannah-Salkehatchie RBC identified and discussed the following potential uncertainties, which an adaptive management approach may help to address (Bing 2024a, 2024b) as the planning process continues:

- **Climate change** – Adaptive management involves monitoring climate data, updating hydrologic models, and adjusting water management strategies accordingly. If a region experiences more frequent droughts than anticipated, water conservation measures can be implemented or intensified, and alternative water sources can be explored.

- **Population growth** – Population projections can be incorporated into water resource models and updated periodically. This allows planners to anticipate future water needs and develop infrastructure accordingly. If a municipality is expected to grow rapidly, adaptive management might involve expanding water treatment facilities or developing new water sources to meet an increasing demand.

- **Irrigation demand** – In coastal areas of the Lower Savannah and Salkehatchie River basins, including Beaufort and Jasper Counties, irrigation systems have driven up residential water demand, especially during the growing season. Continued development that includes irrigation systems in the coastal areas may further increase water demands and potentially strain certain water systems. An adaptive approach can be used to monitor increasing demand and, where needed, strategies such as recycled water programs, moratoriums on new irrigation systems, requirements for smart irrigation systems, or separate meters for irrigation systems which allow for irrigation-based water rates that discourage high use, should be considered.

- **Infrastructure maintenance** – Regular inspections and maintenance of water resources infrastructure allow for data-driven decision-making. Planners can prioritize maintenance activities based on the condition and criticality of infrastructure components. This approach helps in extending the lifespan of infrastructure and reducing the likelihood of unexpected failures.

- **Industrial growth and types of industry in the basin** – Adaptive management considers the types of industries present and their water usage patterns and may include monitoring industrial growth and adjusting water allocation and treatment processes to ensure that industrial water needs are met without compromising the overall water supply. An approach to monitor industrial growth may be to study and map changes in industrial parks and associated properties. LocateSC and the SC PowerTeam have statewide industrial property databases that can be used.

- **Cyberwarfare** – Adaptive management involves the integration of cybersecurity measures into water resources planning. This may include regular updates to security protocols, continuous monitoring for potential threats, and developing contingency plans to ensure the resilience of water management systems against cyberattacks.

- **Future land use patterns** – Land use changes (and related impacts on water supplies) should be continuously assessed. This could be accomplished through studying the counties' land use plans. The RBC has developed recommendations (discussed in Chapter 9) and implementation actions (discussed in Chapter 10) that are intended to provide information on the potential impact to water quantity and quality from land use changes.

- **Extreme flood events** – Adaptive management could involve using hydrological models and real-time data to predict and respond to flood risks. This approach enables planners to implement adaptive flood management strategies, such as dynamic reservoir operations and floodplain management, to mitigate the impacts of floods. Resiliency measures can be considered to prepare for flood impacts to water quality, treatment, and distribution.

- **Modeling and data gaps** – Adaptive management addresses modeling and data gaps by continuously updating models with new data and refining them based on observed outcomes. This iterative process helps improve the accuracy of water resource models and ensures they remain relevant and reliable. The Lower Savannah-Salkehatchie RBC noted uncertainties resulting from the need for more groundwater data.

- **Georgia water use** – By engaging in continuous dialogue and data sharing with neighboring states, planners can develop mutually beneficial water allocation agreements and adapt to changing water demands and availability.

- **Energy uncertainty and loss of power** – Adaptive management plans for power outages by incorporating backup power systems and alternative energy sources into water management infrastructure. This ensures that water supply and treatment processes can continue uninterrupted during power outages.

- **PFAS, emerging contaminants, and other water quality impacts** – Adaptive management allows for incorporating new scientific findings and regulatory changes into water quality management practices. By continuously updating treatment processes and monitoring programs, planners can better address the technical, financial, and human health risks posed by emerging contaminants and ensure the safety of water supplies. Alternative or emergency sources, such as emergency interconnections, may address acute water quality impacts such as spills or natural disasters. Natural disasters such as hurricanes, tornadoes, and wildfires may impact water quality or cause loss of power, hindering water supply operations. Water quality and transport models could be developed to assess in real-time the anticipated impacts of a spill to a particular intake location in the Savannah River, for example. An adaptive management approach to long-term water quality concerns such as saltwater intrusion may involve implementing an intervention such as a change in pumping depth or pattern or implementation of a groundwater barrier, monitoring the impacts, and adjusting the approach as data dictates.

As part of future Plan updates, the RBC will review these uncertainties, determine if and to what degree they have impacted current and projected water demand, water availability, or other factors, and identify or update strategies and develop recommendations to address them as needed.

Chapter 8
Drought Response

8.1 Existing Drought Management Plans and Drought Management Advisory Groups

8.1.1 Statewide Drought Response

The South Carolina Drought Response Act of 2000 (Code of Laws of South Carolina, 1976, Section 49-23-10, et seq., as amended) was enacted to provide the state with a mechanism to respond to drought conditions (SCDNR 2009). The Act stated that SCDNR will formulate, coordinate, and execute a statewide drought mitigation plan. The Act also created the South Carolina DRC to be the major drought decision-making entity in the state. The DRC is a statewide committee chaired and supported by SCDNR's SCO with representatives from local interests.

To help prevent overly broad response to drought, the Act assigned SCDNR the responsibility of developing smaller DMAs within the state. SCDNR split the state into four DMAs that generally follow the boundaries of the four major river basins but are delineated along geopolitical county boundaries rather than basin boundaries. The Lower Savannah-Salkehatchie River basin is largely within the West (Savannah Basin) DMA but the eastern portion of the basin is in the Southern (ACE Basin) DMA as shown in Figure 8-1. The Governor appoints members from various sectors to represent each DMA within the DRC. The organizational relationship of the DRC, DMAs, SCDNR, and SCO are illustrated in Figure 8-2.

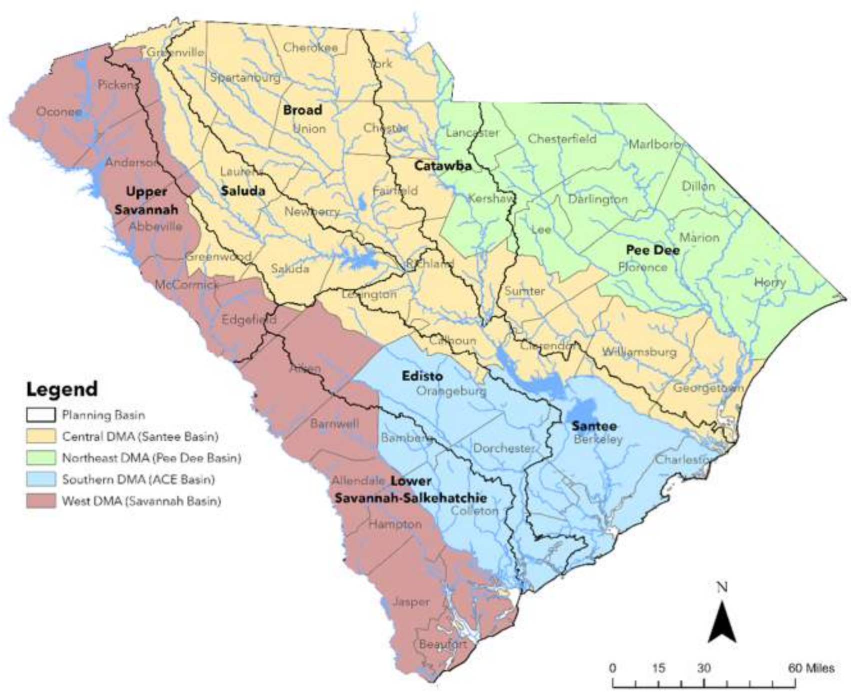


Figure 8-1. The four Drought Management Areas.

In accordance with the Drought Response Act of 2000, SCDNR developed the South Carolina Drought Response Plan, which is included as Appendix 10 of the South Carolina Emergency Operations Plan. South Carolina has four drought alert phases: incipient, moderate, severe, and extreme. SCDNR and the DRC monitor a variety of drought indicators to determine when drought phases are beginning or ending. Examples of

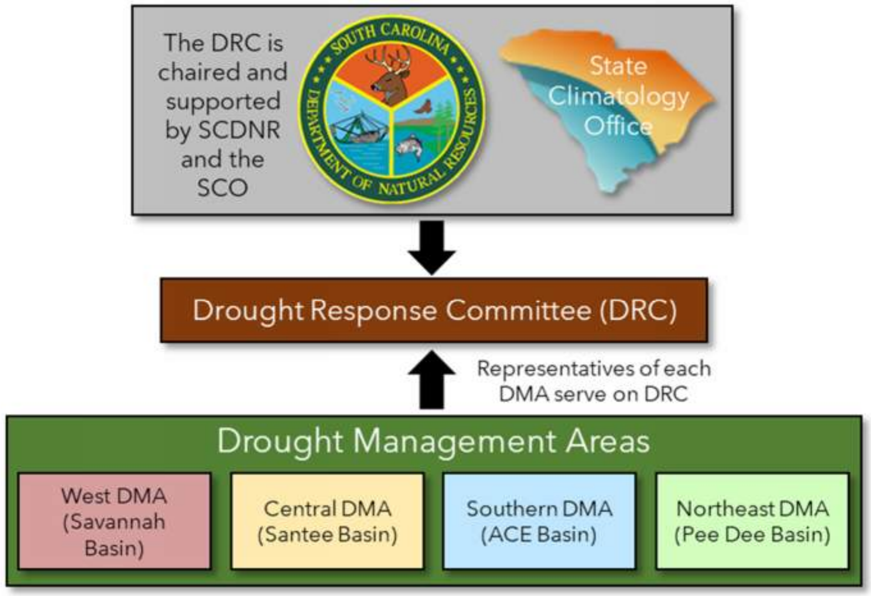


Figure 8-2. Drought Act organizational chart.

drought indicators include streamflows, groundwater levels, the Palmer Drought Severity Index, the Crop Moisture Index, the Standardized Precipitation Index, and the United States Drought Monitor. The South Carolina Drought Regulations establish thresholds for these drought indicators corresponding to the four drought alert phases. Declaration of a drought alert phase is typically not made based only on one indicator, rather a convergence of evidence approach is used. The need for the declaration of a drought alert phase is also informed by additional information including water supply and demand, rainfall records, agricultural and forestry conditions, and climatological data.

Based on their assessment of drought conditions, SCDNR and the DRC coordinate the appropriate response with the affected DMAs or counties. Local drought response is discussed in more detail in the following section. Under Section 49-23-80 of the Drought Response Act, if SCDNR and the DRC determine that drought has reached a level of severity such that the safety and health of citizens are threatened, the DRC shall report such conditions to the Governor. The Governor is then authorized to declare a drought emergency and may require curtailment of water withdrawals.

8.1.2 Local Drought Response

At a local level, Section 49-23-90 of the Drought Response Act states that municipalities, counties, public services districts, and commissions of public works shall develop and implement drought response plans or ordinances. These local plans must be consistent with the State Drought Response Plan. The SCO developed model drought management plan and response ordinance for local governments and water systems to use as templates, and more recently prepared a Drought Planning Guidebook which serves as a sister document to the model drought plan and helps provide context for building a robust local drought plan for water systems. The guidebook uses case studies and best practices taken from water systems within South Carolina.

In a drought mitigation plan, each phase of drought has a set of responses that are set in motion to reduce demand, bolster supply, or both. The drought plans and ordinances include system-specific drought indicators, trigger levels, and responses. Responses include a variety of actions that would be taken to reduce water demand at the levels indicated in Table 8-1. When drought conditions have reached a level of severity beyond the scope of the DRC and local communities, the State Drought Response Plan, Emergency Management Division, and State Emergency Response Team are activated.

The drought response plans and ordinances prepared by public water suppliers located in the Lower Savannah-Salkehatchie River basin or who draw water from the basin largely follow the templates prepared by SCDNR. The drought response plans for all water systems in the Lower Savannah-Salkehatchie River basin are summarized in Table 8-2. Many of the plans were submitted to SCDNR in 2003, shortly after the Drought Response Act went into effect in 2000. As such, they may present information that is outdated. The Drought Response Act of 2000 did not explicitly require drought plans to be updated at a specific interval.

Table 8-1. Demand reduction goals of drought response plans in South Carolina.

Drought Phase	Response
Incipient	None specified
Moderate	Seek voluntary reductions with the goal of 20% reduction in residential use, 15% reduction in other uses and 15% overall reduction.
Severe	Mandatory restrictions for nonessential use and voluntary reductions of all use with the goal of 25% reduction in residential use, 20% reduction in other uses, and 20% overall reduction.
Extreme	Mandatory restrictions of water use for all purposes with the goal of 30% reduction in residential use, 25% reduction in other uses and 25% overall reduction.

Table 8-2. Drought response plans for water suppliers withdrawing water from the Lower Savannah-Salkehatchie River basin.

Water Supplier	Year	DMA	Water Source	Drought Indicator/Trigger Types[1]	Alternative Water Supply Agreements
City of Aiken [2]	2003	West	**Surface Water, Spring, and Groundwater -** Shiloh Spring and Shaws Creek (Masons Branch Reservoir)	- Reservoir Valve 1 or 2 discharge required to maintain flow in Shaws Creek - Aquifer levels falling 5, 10, or 12 feet below historic static level. - Average daily use greater than 15.5, 16.5, or 17.5 MGD for 5 consecutive days.	Cooperative Agreement with the City of New Ellenton
City of Barnwell	2024	West	**Groundwater** - 5 wells	- Aquifer levels less than 5%, 10%, or 15% normal level. - Average daily use greater than 1.43 MGD, for 30 consecutive days. - Average daily use greater than 1.23 MGD for 30 consecutive days in addition to above average daily use, - Average daily use greater than 1.05 MGD for 30 consecutive days in addition to above average daily use,	None
Bamberg Board of Public Works	2003	Southern	**Groundwater** - 8 wells	- Average daily use greater than 1.5, 1.75, or 2.0 MGD for 5 consecutive days.	None
Bath Water and Sewer District	2003	West	**Groundwater** - 2 wells	- Static water level in wells below 25%, 50%, or 75% of normal.	Emergency Assistance Agreements with Valley Public Service Authority and Burnettown Water Works.
Beech Island Water District	2003	West	**Groundwater** - 6 wells	- Aquifer levels less than 85%, 75%, or 65% of normal.	Sell water to Valley Public Service Authority until such time as they can provide their own.

[1]When three trigger points are listed, those reflect trigger points for the moderate, severe, and extreme drought phases, respectively.
[2] The Aiken drought triggers requiring discharge from Reservoir Valve 1 or 2 to Shaws Creek to maintain flow correspond to the severe and extreme drought phases, respectively.

Table 8-2. Drought response plans for water suppliers withdrawing water from the Lower Savannah-Salkehatchie River basin (Continued).

Water Supplier	Year	DMA	Water Source	Drought Indicator/Trigger Types[1]	Alternative Water Supply Agreements
BJWSA - Main System	2003	West	**Surface Water and Groundwater** - Savannah River and 4 auxiliary wells	- Both raw water reservoirs at 66% capacity for 14 consecutive days, 50% capacity for 14 consecutive days, or below 50% capacity for 21 consecutive days. - Daily Savannah River streamflow less than 4,000 cfs river levels are below 3.0 feet mean sea level (MSL), streamflow less than 3,500 cfs, and river levels are below 1.5 feet MSL, or streamflow less than 3,000 cfs and river levels are below 0.5 feet MSL. - Aquifer pumping levels at all auxiliary wells exceed 60, 70, or 80 feet below the top of the well casing elevation. - System-wide elevated & ground storage falls below 50%, 35%, or 25% of total tank capacity and unable to recover above these levels in 24 hours. - Average daily production for any consecutive 15-day period exceeds 85% of total system capacity, for any consecutive 7 days exceeds 95% of total system capacity, or for any consecutive 3 days exceeds 100% of total system capacity.	None
BJWSA - Hardeeville System	2003	West	**Groundwater** - 2 wells	- Aquifer pumping level at Well #2 exceeds 45 feet below the top of the well casing elevation; Well #2 exceeds 55 feet and Well #3 exceeds 75 feet below the top of the well casing elevation; or Well #2 exceeds 65 feet and Well #3 exceeds 85 below the top of the well casing elevation. - Pumping volume at both wells for any consecutive 30-day period exceeds 10%, 15%, or 20% of the monthly permitted withdrawal amount.	None
BJWSA - Point South System	2003	West	**Groundwater** - 2 wells	- Aquifer pumping levels at both wells exceed 65, 75, or 85 feet below the top of the well casing elevation. - Daily pumping volumes at both wells for any consecutive 30-day period exceed 85% of well capacity, for any consecutive 30-day period exceed 95% of monthly permitted withdrawal amount, or for any consecutive 7-day period are at 100% of well capacity.	None
BJWSA - Palm Key System	2003	West	**Groundwater** - 1 well	- Aquifer pumping levels at both wells exceed 65, 75, or 85 feet below the top of the well casing elevation. - Pumping volume for any 24-hour period exceeds 50%, 60%, or 70% of the well capacity.	None

[1]When three trigger points are listed, those reflect trigger points for the moderate, severe, and extreme drought phases, respectively.

Table 8-2. Drought response plans for water suppliers withdrawing water from the Lower Savannah-Salkehatchie River basin (Continued).

Water Supplier	Year	DMA	Water Source	Drought Indicator/Trigger Types[1]	Alternative Water Supply Agreements
Breezy Hill Water & Sewer Company [3]	2003	West	**Groundwater and Purchase** - 13 wells and connections with Edgefield County Water & Sewer Authority (ECW&SA) and North Augusta	- Well run times average 16 hours per day for 7 consecutive days - North Augusta Booster Pump Station run times exceed 20 hours per day (moderate and severe) or 22 hours per day (extreme) for 7 consecutive days - ECW&SA flow increases to 0.5 MGD at Ridge Road or remains at 0.5 MGD at Ridge Road.	Connections with ECW&SA and North Augusta
Broad Creek PSD	2003	West	**Groundwater and Purchase** - 8 wells for potable use, 8 irrigation wells, and purchase from BJWSA	- No triggers are outlined in the plan. The plan states that SCDHEC monitors the aquifer levels, and will inform Broad Creek PSD of the need to implement drought management.	None
Burnettown Water System	2003	West	**Groundwater** - 3 wells	- Aquifer levels less than 85%, 75%, or 65% of normal. - When Palmer Index reaches a value of -2, -3, or -4 or below.	Agreement to tie in with Valley Public Service Authority or Bath Water Works.
College Acres Public Works [4]	2003	West	**Groundwater** - 5 wells	- When the Palmer Index reaches the –1.50 to –2.99 range and moderate drought conditions have been verified by best available information, and conditions indicate this situation is expected to persist. - When the Palmer Index reaches the –3.00 to –3.99 range and severe drought conditions have been verified by best available information. - When the Palmer Index reaches or falls below –4.00 and extreme drought conditions are verified by best available information.	An agreement with the City of Aiken to supply water by hookup to an existing line connection if emergency.
Creeltown Water System	2003	Southern	**Groundwater** - 1 well	- Aquifer levels less than 50%, 25%, or 10%. - Average daily use greater than 0.392 MGD for 7 consecutive days, 0.500 MGD for 7 consecutive days, or 1.4 MGD for 5 consecutive days.	Relies on assistance from Colleton County for short-term water assistance if necessary.
City of Denmark [5]	2003	Southern	**Groundwater** - 3 wells	- Storage falls below 60% of capacity. - Aquifer levels less than 5%, 10%, or 15% normal level. - Average daily use greater than 1.0 MGD for 28, 21, or 14 consecutive days.	None
ECW&SA	--	West	**Surface Water** - Savannah River	No Drought Plan is on file with the SC SCO	
Town of Estill	2003	Southern	**Groundwater** - 3 wells	- Aquifer levels less than 100%, 90%, or 80%. - Average daily use greater than 0.750 MGD for 5 consecutive days, 0.637 MGD for 3 consecutive days, or 0.562 MGD for 3 consecutive days.	None

[1]When three trigger points are listed, those reflect trigger points for the moderate, severe, and extreme drought phases, respectively.

[3] The Breezy Hill drought trigger related to well run times is 16 hours for all drought phases. The drought trigger related to pump station run times is 20 hours for moderate and severe drought phases and 22 hours for the extreme drought phase. The drought triggers related to ECW&SA flow at Ridge Road correspond to severe and extreme drought phases.

[4] The College Acres drought triggers correspond to the moderate, severe, and extreme drought phases, respectively.

[5] The City of Denmark storage drought trigger applies to moderate, severe, and extreme drought phases.

Table 8-2. Drought response plans for water suppliers withdrawing water from the Lower Savannah-Salkehatchie River basin (Continued).

Water Supplier	Year	DMA	Water Source	Drought Indicator/Trigger Types[1]	Alternative Water Supply Agreements
Town of Fairfax	2003	West	**Groundwater** - 2 wells	Average daily use greater than 0.4 MGD for 5 consecutive days, 0.5 MGD for 4 consecutive days, or 0.6 MGD for 4 consecutive days.	Maintains an emergency connection with the Town of Allendale.
Graniteville	--	West	**Surface Water** - Horse Creek	No Drought Plan is on file with the SC SCO	
Town of Hilda	2003	West	**Groundwater** - 2 wells	- Local drought committee drought designation.	None
Hilton Head #1 PSD	2024	West	**Groundwater and Purchase** - 8 wells and purchase from BJWSA	- Elevated and ground storage falls below 50%, 35%, or 25% or total tank capacity and unable to recover above these levels in 24 hours. - Aquifer pumping levels at all wells exceed 28, 36, or 44 feet below the top of the well casing elevation. - Average daily production and purchased surface water use for any consecutive 15-day period exceeds 85% capacity, for any consecutive 7-day period exceeds 95% of capacity, or for any consecutive 3-day period exceeds 100% of capacity.	None
Town of Jackson	2008	Southern	**Groundwater** - 3 wells	- Average daily use greater than 1.1, 1.5, or 1.8 MGD for 7 consecutive days.	None
Marine Corps Air Station	2008	West	**Purchase** - BJWSA	- Uses system triggers established by BJWSA.	None
New Ellenton Commission of Public Works	2003	West	**Groundwater** - 3 wells	- Elevated storage falls below 50%, 35%, or 25% of total capacity. - Average daily use greater than 75%, 95%, or 100% of plant capacity for 7 consecutive days. - Aquifer stabilized static level drops 10, 20, or 30 feet.	The only alternate water supply source is an emergency tie on with the City of Aiken. This agreement states that the water is only to be used in an emergency in the event that there is excess capacity available.
City of North Augusta	2008	West	**Surface Water** - Savannah River	- River flow less than 3,000, 2,400, or 1,500 cfs for 7 or more consecutive days. - Inability to recover full system storage for 2, 5, or 7 consecutive days. - 85%, 90%, or 95% of production capacity for 5 consecutive days.	None
Town of Ridgeland	2003	Southern	**Groundwater** - 2 wells	- Storage falls below 75%, 60%, or 50% of capacity. - Static well water depth drops to 80 feet in well #3 or 95 feet in well #2, drops to 95 feet in well #3 or 110 feet in well #2, or drops to 105 feet in well #3 or 120 feet in well #2.	None
Town of Scotia	2003	West	**Groundwater** - 2 wells	- System triggers are based on Drought Response Committee Declaration.	None
Town of Smoaks	2003	Southern	**Groundwater** - 2 wells	- System triggers are based on Drought Committee Declaration for Southern Area.	None

[1]When three trigger points are listed, those reflect trigger points for the moderate, severe, and extreme drought phases, respectively.

Table 8-2. Drought response plans for water suppliers withdrawing water from the Lower Savannah-Salkehatchie River basin (Continued).

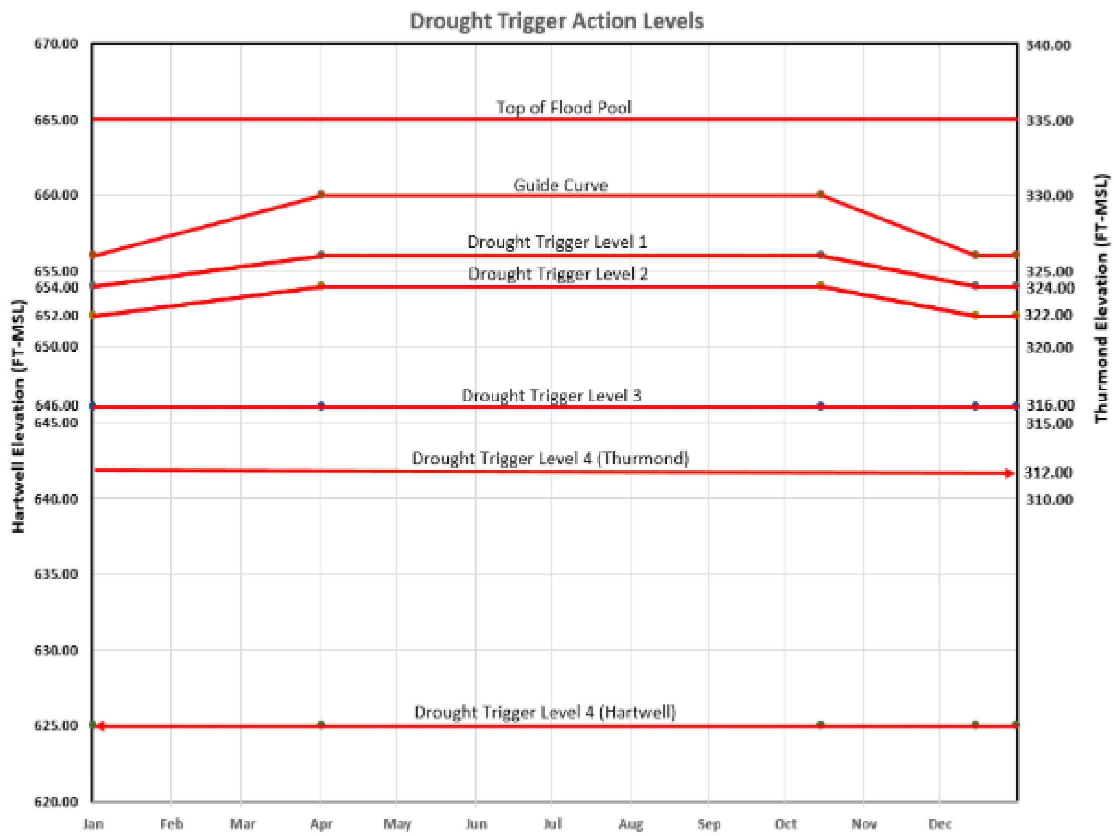
Water Supplier	Year	DMA	Water Source	Drought Indicator/Trigger Types[1]	Alternative Water Supply Agreements
South Island Public Service District	2003	West	**Groundwater** - 18 wells	- No triggers are outlined in the plan. The plan states that SCDHEC has designated South Island Public Service District a Capacity Use district and imposes restrictions on the groundwater flow. South Island Public Service District is required to report all groundwater withdrawals to SCDHEC.	None
Talatha Rural Community Water District	2013	West	**Groundwater** - 3 wells	- Average daily use greater than 0.40 MGD for 30 consecutive days, 0.50 MGD for 5-20 consecutive days, or 0.60 MGD for 5-10 consecutive days. - Loss of #1 well, #1 and #2 wells, or #2 and #3 wells.	None
City of Walterboro	2003	Southern	**Groundwater** - 10 well	- Aquifers static level decreases 10, 20, or 30 feet. Because the City utilizes three different aquifers for groundwater sources, trigger levels are contingent on the decline of any well's static level.	None
Valley Public Service Authority	2003	West	**Groundwater** - 5 wells	- Aquifer levels less than 85%, 75%, or 65% of normal. - When Palmer Index reaches a value of -2, -3, or -4 or below.	Valley Public Service Authority buys water from Beech Island Water District and Breezy Hill Water District.
Town of Williams	2003	Southern	**Groundwater** - 1 well	- Aquifer levels less than 80, 90, or 100 feet.	None
Town of Williston	2003	West	**Groundwater** - 4 wells	- Average daily use greater than 1.1, 1.3, or 1.5 MGD for 5 consecutive days.	Connected to the Elko Water System, but that system is small and has very little excess supply.
The following water systems became part of the LRWS in 2012. A consolidated drought plan has not yet been developed.					
Town of Hampton	2003	Southern	**Groundwater** - 2 wells	- Total well run time is greater than 18, 22, or 24 hours/day for 5 consecutive days.	None
Town of Yemassee	2003	Southern	**Groundwater** - 3 wells	- When the evaluation difference of the aquifer's static water level and the top of the screens at Well #3 reaches 75%, 50%, or 30% of its normal difference.	None
Town of Brunson [6]	2003	West	**Groundwater**	- Storage falls below 70%, 50%, or 10% of capacity. - Average daily use greater than 100,000 gallons per day (gpd) for 14 days.	None
Town of Varnville	2003	West	**Groundwater** - 3 wells	- 120, 90, or 60 days of supply remaining. - Average daily use greater than 816,000 gpd for 30, 60, or 90 consecutive days.	Have a verbal agreement to work together with the Town of Hampton (as noted in drought response plan)
Town of Gifford	2003	Southern	**Groundwater** - 3 wells (2 in service)	- Follows the determination set by the State Drought Committee.	None

[1]When three trigger points are listed, those reflect trigger points for the moderate, severe, and extreme drought phases, respectively.
[6]The Town of Brunson drought trigger related to average daily use is specified for the moderate drought phase only.

8.1.3 USACE Savannah District Drought Response

The USACE Savannah District operates three dams on the Savannah River where they manage lake levels and releases downstream: Hartwell Dam, Russell Dam, and Thurmond Dam. Although these three dams are in the Upper Savannah River Basin, Thurmond Dam is right above the boundary of the Upper and Lower Savannah River Basins and controls the flow entering the Lower Savannah River Basin. The Savannah River Basin Drought Management Plan has evolved from the initial DCP established in 1989 to the latest 2012 version, which includes a number of modifications made primarily as a result of the droughts of 1998-2002 and 2007-2009 (USACE 2012). Water management during droughts has been a major issue, and the USACE was requested to examine the DCP as part of the second interim of the Savannah River Basin Comprehensive Study. Environmental organizations have also requested the USACE consider the environmental benefits that would result from the restoring natural variability to downstream river flows. The Comprehensive Study ended in 2020 due to inadequate analysis, a lack of full partnership concurrence on the recommendation, and insufficient funding. The draft of the Comprehensive Study report tentatively recommended no seasonal variation in drought trigger levels, raising the trigger levels by 3 to 6 feet, and further restricting the flow of water from Thurmond Dam earlier during drought. This recommendation was identified in the study as Alternative 2 (USACE 2020); however, the recommendation was not implemented since the Comprehensive Study ended prior to completion.

The existing Drought Plan trigger action levels and definitions are provided in Figure 8-3. These have been updated slightly since the 2012 DCP, namely basing target releases on weekly average flows (as compared to daily average flows as designated previously) (USACE 2025a). The Drought Plan is implemented when either Hartwell or Thurmond pool elevations drop below the corresponding trigger level 1 elevation. On a rising pool, flow restrictions are lessened only after both Hartwell and Thurmond elevations are 2 feet above the trigger elevation. In Drought Levels 1 and 2, the 28-day running average streamflow measured at the USGS Broad River gage is used to further define the weekly average release from Thurmond. The 28-day running average (BR28) is compared to the 10th percentile of the historical 28-day running average (BR28Q10) for the particular day of the year. The 10th percentile is used as the breakpoint which delineates between normal and moderate drought.



Trigger Level	Time of Year	Drought Response
1	Jan 1 - Dec 31	IF BR index >10%, Target 4200 cfs (weekly average) release at Thurmond Dam
		IF BR index <10%, Target 4000 cfs (weekly average) release at Thurmond Dam
2	Feb 1 - Oct 31	IF BR index >10%, Target 4000 cfs (weekly average) release at Thurmond Dam
		IF BR index <10%, Target 3800 cfs (daily average) release at Thurmond Dam
	Nov 1 - Jan 31	Target 3600 cfs (daily average) release at Thurmond Dam
3	Feb 1 - Oct 31	Target 3800 cfs (daily average) release at Thurmond Dam
	Nov 1 - Jan 31 (Feb 1 - Feb 28) w/NMFS approval	Target 3100 cfs (daily average) release at Thurmond Dam
4	Feb 1 - Oct 31	Target 3600 cfs (daily average) release at Thurmond Dam
	Nov 1 - Jan 31 (Feb 1 – Feb 28) w/NMFS approval	Target 3100 cfs (daily average) release at Thurmond Dam

BR index refers to the relative percentile of the 28 day average flow for the Broad River Gage (02192000) at Bell, GA.

There may be up to a 2 week delay in reducing flows from the normal unrestricted releases at Thurmond to the level 1 drought flow restriction levels.

If in Drought operations, Thurmond will release 200 cfs more than the required Drought trigger target flow for an 11 day period during summer. This additional flow is mitigation for possible Harbor impacts implemented as part of the Storage Balance Agreement update with the Duke Energy.

Figure 8-3. USACE Savannah River reservoirs' Drought Trigger Action Levels and definitions (USACE 2025b).

8.2 RBC Drought Response

8.2.1 Roles and Responsibilities

Under the Planning Framework, the RBC will support drought response, collect drought information, and coordinate drought response activities. With the support of SCDNR and SCDES, the RBC will:

- Collect and evaluate local hydrologic information for drought assessment
- Provide local drought information and recommendations to the DRC regarding drought declarations
- Communicate drought conditions and declarations to the rest of the RBC, stakeholders, and the public
- Advocate for a coordinated, basinwide response by entities with drought management responsibilities (e.g., water utilities, reservoir operators, large water users)
- Coordinate with other drought management groups in the basin as needed

8.2.2 Recommendations

Through consideration and discussion, the Lower Savannah-Salkehatchie RBC developed the following consensus-based recommendations related to drought planning and response. The steps to implement these recommendations, where applicable, are detailed in the 5-year and long-range implementation plans in Chapter 10.

1. The RBC recommends that water utilities review their drought management plan and response ordinance every 5 years and review and update every 10 years or more frequently if conditions change. Once updated, the plans should be submitted to the SCO for review. Changing conditions that could merit an update might include:

- Change in the source(s) of water
- Significant increase in water demand (such as the addition of a new, large wholesale customer)
- Significant change in the proportion of water used by one sector compared to another (e.g., residential versus commercial use)
- Addition (or loss) of another user relying on the same source of water
- New water supply agreement with a neighboring utility

2. The RBC recommends that a state funding be made available to water utilities to support the review and update of drought management plans. Water utilities with limited financial and technical capability may benefit from technical assistance to identify appropriate drought triggers and response strategies.

3. The RBC encourages water utilities in the basin to consider drought surcharges on water use during severe and/or extreme drought phases. Drought surcharges, when used, are typically only implemented if voluntary reductions are not successful in achieving the desired reduction in water use. In some cases, water utilities have already built into their response ordinance the ability to implement drought surcharges during the severe and/or extreme drought phases.

4. The RBC encourages water users and those with water interests to submit drought impact observations through the Condition Monitoring Observer Reports (CMOR). The CMOR system, maintained by the National Drought Mitigation Center (NDMC), provides supporting evidence in the form of on-the-ground information to help the authors of the U.S. Drought Monitor better understand local conditions. The USDA uses the Drought Monitor to trigger disaster declarations and determine eligibility for low-interest loans and some assistance programs. The SCO also reviews and uses the CMOR system in a variety of ways. CMORs can be submitted by clicking the "Submit a Report" button at the NDMC's Drought Impacts Toolkit website. The RBC also recommends that:

a. The SCO conduct outreach to make more stakeholders aware of the CMOR system and encourage its use to report drought conditions.

b. The NRCS promote the use of the CMOR system.

c. The South Carolina Adopt-a-Stream program promote use of the CMOR by its participants so that hydrologic conditions prior to and during drought may be documented.

8.2.3 Communication Plan

The Lower Savannah-Salkehatchie RBC recommends that each RBC have representation on the DRC. The RBC representative on the DRC may be the Chair, Vice Chair, or other RBC member. The Lower Savannah-Salkehatchie RBC will communicate drought conditions and responses within the basin to the DRC through this representative.

If any part of the basin is in a declared drought as determined by the DRC, the representative will solicit input from RBC members and other water managers and users regarding drought conditions and responses in their respective locations or interests. The representative is then responsible for communicating updates on drought conditions and responses within the basin to the DRC and/or the SCO. The DRC has existing mechanisms to communicate and coordinate drought response with stakeholders and the public. Under Section 49-23-70 of the Drought Response Act, SCDNR is responsible for disseminating public information concerning all aspects of the drought.

Chapter 9 Policy, Legislative, Regulatory, Technical, and Planning Process Recommendations

During the fourth and final phase of the planning process, the Lower Savannah-Salkehatchie RBC identified and discussed recommendations related to the river basin planning process; technical and program considerations; and policy, legislative, or regulatory considerations. Various recommendations were proposed by RBC members and discussed over the span of several meetings. They received broad RBC support and are to be taken as having consensus as defined by the River Basin Council Bylaws (SCDNR 2019a). Under these bylaws, consensus is achieved when all members can "live with" a decision, although some members may strongly endorse a solution while others may only accept it as a workable agreement.

The planning process recommendations are summarized in Chapter 9.1; the technical and program recommendations are summarized in Chapter 9.2; and the policy, legislative, and regulatory recommendations are summarized in Chapter 9.3.

9.1 River Basin Planning Process Recommendations

The following planning process recommendations should be taken as considerations for future phases of the river basin planning process. To implement these recommendations, the Lower Savannah-Salkehatchie RBC will need support from SCDES, other RBCs, technical experts, the South Carolina Legislature, and other organizations.

The Lower Savannah-Salkehatchie RBC proposed the following recommendations to improve communication among RBCs and other groups:

- **SCDES, the RBC Planning Teams, and the RBCs should conduct regular reviews of the RBC membership to sustain and make sure all interest categories are adequately represented and attendance across all interest categories meets the requirements of the RBC Bylaws.** Adequate representation of all water use groups may require intentional, targeted outreach to encourage potential members to apply to the RBC. Membership should also be reviewed when any member resigns from the council to ensure there is still sufficient representation of that member's water interest category. Recognizing that RBC members invest significant time over the planning process in understanding the water resources of the river basin and the variety of issues, any appointments of RBC members after the river basin planning process is underway would need to be considered on a case-by-case basis. Appointments would be at the discretion of SCDES and would consider feedback from the RBC. In such instances, orientation would be necessary to bring new members up to speed.

- **SCDES should organize an annual state-wide meeting of RBCs and State agencies.** At least one or two statewide RBC meetings should be held annually. This meeting should have a clear agenda with action items summarized. RBCs should also be present at the Legislature's Water Day, occurring on the first Monday of March. Coordinated concerns or suggestions resulting from these meetings should be shared with the Legislative Surface Water Study Committee and with WaterSC for as long as these groups continue to convene during development of the State Water Plan.

- **As part of future water planning efforts, the RBC should attempt to increase engagement with USACE Planning Division and the USDOE.** The USACE is responsible for management of the Savannah River Basin. Increased engagement with the USACE's Planning Division may help with implementation of the RBC's recommendations.

- **The RBC, with the support of SCDES, should coordinate and communicate with the Coastal Georgia Regional Council.** Through collaboration and planning, Georgia and South Carolina have generally avoided interstate water disputes with each other. Increased coordination would help continue that trend and better leverage the planning and technical analyses that both states have completed over the past decade. Meetings should occur annually, at a minimum. The RBC recognizes the importance of coordination at the governor level, which is included in a separate recommendation in Chapter 9.3; however, the RBC developed this recommendation for coordination of the water planning bodies, where the RBC and SCDES may have greater control.

Members of the Lower Savannah-Salkehatchie RBC proposed the following recommendations for funding needs related to ongoing water planning and sources of funding:

- **The South Carolina Legislature should continue to fund state water planning activities, including river basin planning.** Currently, nearly all the funding for the river basin planning process has come from the legislature. Matching or supplemental funding opportunities may come from the USACE through its Planning Assistance to States program, environmental and conservation organizations like The Nature Conservancy, water utilities, local governments, or other entities with interest in preserving, protecting, and managing water resources.

- **SCDES should designate staff to continue to coordinate and support ongoing RBC activities.** Staff support is needed to assist with communication, identify meeting locations, help set agendas, keep the RBC focused, identify and bring in technical experts, and perform other activities.

The Lower Savannah-Salkehatchie RBC proposed the following recommendations to promote findings and coordinate implementation of the River Basin Plan:

- **WaterSC should consider recommendations from the RBCs.** As WaterSC develops recommendations for SCDES to consider in development of the State Water Plan, the Lower Savannah-Salkehatchie RBC requests that WaterSC consider the recommendations developed by RBCs through the river basin planning process.

- **RBC members should communicate with legislative delegations throughout the river basin planning process to promote their familiarity with the process and its goals and to generate buy-in on its recommendations.** To facilitate this consistent communication, the RBC may develop talking points that members may use when meeting with legislative representatives. RBC members should seek to meet with representatives at various levels of government, including the county level and the legislature.

- **The RBC will support and promote outreach and education to increase awareness with the general public around watershed-based planning.** The RBC should coordinate with other RBCs and groups that have existing education and outreach efforts focused on water conservation such as Clemson University. Existing groups have the experience and resources to help promote the water conservation ethic strategies and recommended in this River Basin Plan.

9.2 Technical and Program Recommendations

The RBC may make technical and program recommendations to address any data gaps or information needs identified during the river basin planning process. The following recommendations should be taken as considerations for future phases of the river basin planning process. To implement these recommendations, the Lower Savannah-Salkehatchie RBC will need support from SCDES and other technical experts.

The RBC noted that a key limitation of the Lower-Savannah Salkehatchie River Basin Plan is the absence of a groundwater model to assess the capacity of aquifers located within the basin and their ability to sustain future demands. During the planning process, the USGS was working to develop a numerical groundwater model covering the basin; however, the modeling effort was not completed before the plan was completed. The Lower Savannah-Salkehatchie RBC developed the following recommendations related to groundwater analysis:

- **SCDES should continue to work with the USGS to develop a groundwater model covering the LSS basins and use the model to better understand the capacity of each aquifer and its ability to sustain future demands.** The RBC would review results of the groundwater modeling to assess the ability of the basin's aquifers to sustain future demands, as part of the 5-year update to the River Basin Plan.

- **A groundwater model should be used to analyze and predict chloride levels in the Upper Floridan and Middle Floridan aquifers in Beaufort County.** The RBC seeks to better understand the risk of saltwater intrusion. Results of this analysis could be included in the 5-year update to the River Basin Plan.

- **Funding should be provided to SCDES to add deeper aquifer monitoring wells in the central part of the basin, such as Colleton, Bamberg, and Hampton counties.** The scarcity of wells in this part of the basin causes uncertainty in the understanding of groundwater levels and trends. This additional data could be used to better understand the impacts of current groundwater use as well as the capacity of aquifers to sustain future demands.

- The RBC also noted the need to coordinate with Georgia on the use and impacts to the shared groundwater resources. The RBC included a recommendation in Chapter 9.1 for coordination with the Coastal Georgia Regional Council to support this effort. Projected groundwater use in Georgia should be considered in future groundwater modeling scenarios and analysis.

The Lower Savannah-Salkehatchie RBC identified the following needs related to surface water modeling:

- **Future surface water modeling should incorporate scenarios that further examine future uncertainties, such as changes in rainfall and hydrology, alternative population growth scenarios, and potential impacts of future development on runoff.** Much of this can be accomplished by changing input data to the existing SWAM models, and with certain automated scenario development features within the models. Note that increases in runoff potential due to changes in land use would need to be estimated outside of the model and incorporated by adjusting the built-in hydrologic data. Other models may be used to evaluate impacts to water availability and flow regimes due to potential future changes in land use.

The Lower Savannah-Salkehatchie RBC identified the following recommendations pertaining to data needs:

- **Fund and establish a mesoscale network of weather and climate monitoring stations.** Establishing a mesoscale network of weather and climate monitoring stations, known as a Mesonet, provides near real-time data at the local level to improve situational awareness and preparedness and support decision-makers and stakeholders, such as emergency management agencies, water resources managers, agricultural interests, transportation officials, and energy providers. Currently, South Carolina is only one of 12 states without a Mesonet. A network of 46 weather stations (one per county) will provide an essential public service to the citizens of South Carolina.

- **The RBC supports continued efforts to maintain and expand streamflow gages.** The RBC recognizes that comprehensive, reliable, and long-term hydrologic data is critical to water planning and management. Additional partners and sponsors should be identified to help fund and maintain streamflow gages.

The Lower Savannah-Salkehatchie RBC developed the following recommendations for technical studies to improve knowledge of specific issues:

- While the RBC should maintain its focus on the assessment of water quantity, **future planning efforts should include evaluation of surface water quality,** which is important to maintaining affordable public water supplies and the ecological health of the streams, rivers, and lakes. This evaluation may include but is not limited to nutrient loading and sedimentation. As part of future study and planning, the RBC could make recommendations to other planning bodies or departments of water quality parameters or stream segments requiring further study and impairment mitigation. Similarly, the RBC should be educated on other on-going water quality efforts such as §303(d) listings, watershed planning programs, and total maximum daily load (TMDL) development.

- **The state should request for and cost-share in the completion of Phase 2 of the USACE Comprehensive Study and Drought Plan Update**. As discussed in Chapter 8, the USACE was requested to examine The Drought Contingency Plan as part of the second interim of the Savannah River Basin Comprehensive Study. The Comprehensive Study ended in 2020 due to inadequate analysis, a lack of full partnership concurrence on the recommendation, and insufficient funding. The cost share for the Comprehensive Study has been 50 percent Federal and

50 percent non-Federal (cash or work-in-kind). SCDNR, the Georgia Department of Natural Resources, and the Nature Conservancy all contributed to the non-Federal cost of the Comprehensive Study. The RBC also encourages USACE to be more proactive and incorporate forecasting into drought decision-making.

- **SCDES performs studies and analyses in support of a recycled water statute in SC**. Water recycling programs currently exist in the South Carolina; however, there is opportunity to expand the use of reclaimed water. Indirect potable reuse involves discharging highly treated, reclaimed water to an environmental buffer, such as a surface water body or groundwater, before withdrawing the blended water and treating it at a drinking water treatment plant. Another application of this technology could be injection of reclaimed water to groundwater to create a groundwater barrier to prevent saltwater intrusion. Such use of reclaimed water for water recycling programs would require change to South Carolina regulation. Current regulation (Regulation 61-9.505) allows for reclaimed water to be recycled for land application in areas with a high potential for contact.

The Lower Savannah-Salkehatchie RBC developed the following recommendations protecting the water resources of the basin:

- **Encourage the building permitting process where applicable to require developers work with water/wastewater utilities to ensure adequate availability/capacity**. Recognizing this may already happen in some parts of the basin, the RBC encourages the practice be adopted broadly. The RBC also encourages local governments, developers, and others to use this River Basin Plan as a guide to help inform decisions on growth and development, based on water resource availability.

9.3 Policy, Legislative, or Regulatory Recommendations

The Lower Savannah-Salkehatchie RBC engaged in discussion about issues and concerns with the existing policies, laws, and regulations governing water withdrawals and water use. Current (as of May 2025) regulations regarding surface water and groundwater withdrawals are summarized in Table 9-1 located at the end of this chapter. The Lower Savannah-Salkehatchie RBC developed the following recommendations for modifications to existing state or local laws, regulations, or ordinances:

- **Improve the current laws that allow for regulation of water use so that they are effective and enforceable.** The current water law, which grandfathers most water users, needs to be improved to support effective management of the state's water resources. One approach to improve the effectiveness of the laws governing water use is to require sector-specific strategies to improve water use efficiency. The laws should also allow for the reallocation of water resources to where they are needed to support well-planned growth and development. This may require re-evaluation of existing users' permit limits, but only after carefully considering their long-term growth projections, water needs, and planned infrastructure investment.

- **The South Carolina Surface Water Withdrawal, Permitting, Use, and Reporting Act should allow for reasonable use criteria to be applied to all surface water withdrawals, like those**

that currently exist for groundwater withdrawals. Under current regulation for surface water withdrawals, reasonable use criteria vary depending on the water use category and the time of permit application (pre- or post-2011, when SCDHEC's (now SCDES's) regulation, 61-119 Surface Water Withdrawal, Permitting, Use and Reporting, came into effect), as summarized below.

- Existing (pre-2011) non-agricultural surface water withdrawers do not need to meet reasonable use criteria. The permitted withdrawal is based on the largest volume as determined by previously documented use, current treatment capacity, or designed capacity of the intake structure.
- New (post-2011) or expanding non-agricultural surface water withdrawers must demonstrate that the requested water withdrawal amount meets the criteria for reasonable use.
- Agricultural surface water withdrawals, all of which do not require a permit where there is remaining safe yield in a basin, do not need to satisfy reasonableness criteria for the requested withdrawal amount.

Comparatively, under SCDES's regulation 61-113 Groundwater Use and Reporting, permittees of any use category seeking to withdraw greater than 3 million gallons in any month from groundwater must demonstrate to SCDES's satisfaction that groundwater withdrawal is reasonable and necessary and there are no unreasonable adverse effects on other water users. In parts of the Edisto and Pee Dee River basins, the absence of reasonable use as a criterion for issuing surface water registrations has resulted in large registrations being granted which have used up the remaining safe yield. Farmers seeking new registrations in these fully allocated portions of the Edisto and Pee Dee River basins must therefore apply for a permit and abide by permit conditions.

- **The Legislature should approve and adopt the State Water Plan and subsequent updates.** Legislative approval and adoption of the State Water Plan would not only recognize that significant time and money invested in water planning over the past decade but signal the importance of effective and continuous stakeholder-driven water planning that balances the state's economic and environmental interests and ensures the long-term protection of its water resources.

- **The South Carolina Legislature should establish a grant program to help water users implement the actions and strategies identified in the legislatively approved State Water Plan.** One example is Georgia's Regional Water Plan Seed Grant Program which supports and incentivizes local governments and other water users as they address implementation strategies and actions of their regional water plan.

- **The water withdrawal permitting process should specifically assess the permit application's alignment with the legislatively approved State Water Plan.** This recommendation assumes the State Water Plan is adopted by the legislature and SCDES regulations should be consistent with the recommendations contained within.

The Lower Savannah-Salkehatchie RBC emphasized the need for coordination of shared water resources at the state level and made the following recommendation:

- **Recognizing that the resources of the Savannah River Basin are finite and shared between the states, the Governor of South Carolina should communicate with the Governor of Georgia to establish a coordinated, state-level planning and water management process for the Savannah River Basin and their shared groundwater aquifers.** The RBC noted the significance of this recommendation given the impacts of Georgia's growing demands and their potential impact to South Carolina's water users and the overall health of the basin. In 2013, Governor's Nathan Deal and Nikki Haley, the Savannah River Caucus (a group of legislators whose districts touch the Savannah River Basin from both Georgia and South Carolina General Assemblies), and the Colonel of the Savannah District of the USACE met to discuss the basin's water issues and kickoff the USACE's Savannah River Comprehensive Study. A similar effort to foster dialogue and promote collaborative planning is recommended.

The Lower Savannah-Salkehatchie RBC discussed the need for intentional planning around growth and development to protect the water resources and the character of the basin. The RBC made the following recommendations:

- **The SC Legislature should support matching or incentivizing County Green Space Sales and Use Tax programs to establish balance among water and land uses (e.g., agricultural, residential, industrial, recreational, instream requirements).** The County Green Space Tax, passed by legislation in 2022, can be used within a county area for preservation procurements. The tax, if approved by county resident voters, may be up to one percent. Preservation of open space is one approach to maintain balance between growth, which is important to economic development of the state, and the character of the basin that draws growth. Governor Henry McMaster has set the goal to conserve 10 million acres across South Carolina. Recent notable conservation projects include Snow's Island Assemblage, conserving 7,600 acres in Florence County and the 1,090-acre Saluda Bluff property in Pickens County.

- **Local governments and land managers should coordinate to reduce sediment loading to waterways.** Sedimentation has been identified as a threat to the basin's water resources. Small impoundments (i.e., farm ponds) can become filled with sediment and lose their ability to store enough water and maintain irrigation during dry periods. Sediment loading also impacts water quality and habitat. The RBC recognizing that the identification and selection of specific BMPs to reduce sediment loading will vary by locale. The RBC encourages local governments and land managers to identify solutions specific to their needs and location.

- **Towns and counties should develop stormwater design manuals that promote responsible development, protect water resources, and prioritize redevelopment over new development.** The Southern Low Country Design Manual, which was developed with stakeholder representatives from the region's jurisdictions, is one example of a post-construction stormwater management design manual developed that can be considered for adoption at a regional level.

Table 9-1. Summary of regulations related to surface water and groundwater withdrawal.

Water Source	Use Type	User Type	Process	Applicability	Withdrawal Volume	Use Criteria	Low Flow Period Requirements	Review Period	Reporting
Surface Water	Agricultural	Existing (pre Jan 1, 2011)	Registration	Users withdrawing more than 3 MGM	Highest previous water usage	No criteria	No MIF obligations	No review, in perpetuity	Annual
		New (post Jan 1, 2011) or Expanding	Registration	Users withdrawing more than 3 MGM	Amount of water requested by the proposed withdrawer and availability of water at the point of withdrawal based on Safe Yield calculations.	Subject to safe yield assessment	No MIF obligations	No review, in perpetuity	Annual
	Hydropower	All	Exempt (non-consumptive use)						Annual
	All Other Use Types	Existing (pre Jan 1, 2011)	Permit	Users withdrawing more than 3 MGM	Largest volume as determined by previously documented use, current treatment capacity, or designed capacity of the intake structure	No criteria	Must address "appropriate industry standards for water conservation." Not subject to enforcement for MIF.	30 to 50 years[1]	Annual
		New (post Jan 1, 2011) or Expanding	Permit	Users withdrawing more than 3 MGM	Based on reasonableness, availability of water at point of withdrawal based on Safe Yield calculations.	Reasonable use criteria	Development of Contingency Plan for low flow periods, enforceable. Public water suppliers not subject to MIF[2]	20 to 50 years[1]	Annual

Table 9-1. Summary of regulations related to surface water and groundwater withdrawal. (Continued)

Water Source	Use Type	User Type	Process	Applicability	Withdrawal Volume	Use Criteria	Low Flow Period Requirements	Review Period	Reporting
Ground water	All Use Types	Withdrawals in Capacity Use Areas	Permit	Users withdrawing more than 3 MGM	Permit withdrawals based on reasonable use guidelines, which vary by water use sector.	Reasonable use criteria	Requires development of Best Management Plan that identifies water conservation measures, alternate sources of water, justification of water use, and description of beneficial use	Every 5 years	Annual
	All Use Types	Withdrawals Outside of Capacity Use Areas	Registration	Users withdrawing more than 3 MGM	Registrations do not have limits but require reporting.	No criteria	No MIF obligations	No review, in perpetuity	Annual

[1] New surface water permitees may receive permits of 20 years or up to 40 years as determined by department review.
Existing surface water permittees may receive permits of 30 years or up to 40 years as determined by department review.
Municipal or governmental bodies may receive permits of up to 50 years to retire a bond it issues to finance the construction of waterworks (SECTION 49-4-100).
[2] Public water suppliers not subject to MIF but are required to implement their contingency plan in accordance with drought declarations 49-4-150 6.

Chapter 10
River Basin Plan Implementation

10.1 Recommended Five-Year Implementation Plan

10.1.1 Implementation Objectives

The Lower Savannah-Salkehatchie RBC identified seven implementation objectives for the Lower Savannah-Salkehatchie River Basin Plan. These seven objectives were developed based on themes that emerged from the recommendations made and presented in previous chapters including water management strategies from Chapters 6 and 7; drought response strategies from Chapter 8; and policy, legislative, regulatory, technical, and planning process recommendations from Chapter 9. Although the Planning Framework affords the RBC the opportunity to prioritize the objectives, the Lower Savannah-Salkehatchie RBC decided not to prioritize implementation objectives and rather prioritize the strategies under each objective to guide implementation. The objectives are as follows:

- Objective 1. Improve water use efficiency to conserve water resources
- Objective 2. Engage Georgia in Water Planning
- Objective 3. Communicate, coordinate, and promote findings and recommendations from the River Basin Plan
- Objective 4. Promote engagement in the water planning process
- Objective 5. Enhance understanding of groundwater resources
- Objective 6. Improve technical data and understanding of water resource management issues
- Objective 7. Improve drought management

The strategies and corresponding actions to achieve each objective are presented in Table 10-1. The Lower Savannah-Salkehatchie RBC identified a level of prioritization for each strategy under an objective to guide implementation. Table 10-1 also includes an outline of 5-year actions, responsible parties, budget, and potential funding sources to achieve each objective. The funding sources are further described in Chapter 10.1.2.

Table 10-1. Five Year Implementation Plan.

Strategy		Strategy Priority	5-Year Actions	Responsible Parties	Budget	Funding Sources[1]
Objective 1. Improve water use efficiency to conserve water resources						
A. Municipal Conservation	Public Education of Water Conservation	Tool box of strategies. Applicability and priority will vary by utility.	1. RBC and SCDES identify funding opportunities and technical assistance (yrs 1-5). 2. RBC encourages water utilities to conduct a water loss/leak detection audit using AWWA M36 Method, establish a baseline, and continue to measure every 2-3 years (yrs 1-5). 3. RBC works with water utilities to determine how water is being used and understand where conservation measures may have the most impact (yrs 2-3). 4. RBC implements outreach and education program about recommended water management practices and funding opportunities (yrs 1-5). 5. Individual water users implement conservation practices (yrs 3-5). 6. RBC develops survey of practices implemented, funding issues, and funding sources utilized (beginning in yr 5 as part of 5-year Plan update).	RBC with support of SCDES and contractors: Identify funding opportunities and develop information to distribute. Conduct surveys and analyze results. Municipal Withdrawers: Implement appropriate strategies and seek funding from recommended sources as necessary.	Costs of implementation will vary by municipality according to current program capabilities and financial means. See Chapter 6.1.6 for discussion of cost-benefit of individual strategies. The cost of RBC support activities would be included in the budget for on-going RBC planning (if approved)	Individual strategies to be funded using outside funding opportunities or by evaluating existing rate structure. Possible outside funding sources include: Fed-1, 2, 5, 6, 7, and USDA-8 and 9.
	Conservation Pricing Structures/ Drought Surcharge					
	Leak Detection and Water Loss Control Program					
	Advanced Metering Infrastructure (AMI) and Automated Meter Reading (AMR) and district metering					
	Water Waste Ordinance					
	Water Recycling					
	Landscape Irrigation Program and Codes / Time-of-Day Watering Limit					

[1] *See Tables 10-2 and 10-3 for funding source references.*

Table 10-1. Five-Year Implementation Plan (Continued).

Strategy		Strategy Priority	5-Year Actions	Responsible Parties	Budget	Funding Sources[1]
Objective 1. Improve water use efficiency to conserve water resources						
B. Agricultural Conservation	Water Audits and Nozzle Retrofits	Tool box of strategies. Priority varies by operation. * Soil management and cover cropping area recognized as an important first steps to reap the maximum benefits from other strategies.	1. RBC and SCDES identify funding opportunities (yrs 1-5). 2. RBC implements outreach and education program about recommended water management practices and funding opportunities (yrs 1-5). 3. Individual water users implement conservation practices (yrs 3-5). 4. RBC develops survey of practices implemented, funding issues, and funding sources utilized (beginning in yr 5 as part of 5-year Plan update).	RBC with support of SCDES and contractors: Identify funding opportunities and develop information to distribute. Conduct surveys and analyze results. Farmers: Implement appropriate strategies and seek funding from recommended sources as necessary. The Farm Bureau may be able to assist with funding applications.	Costs of implementation will vary by agricultural operation according to size of operation, crops grown, current irrigation practices, and financial means. See Chapter 6.1.6 for discussion of cost-benefit of individual strategies. The cost of RBC support activities would be included in the budget for on-going RBC planning (if approved)	Possible funding sources include: USDA-7.
	Irrigation Equipment Changes					
	Soil Management and Cover Cropping*					
	Irrigation Scheduling					
	Crop Variety, Crop Type, and Crop Conversion					
	Moisture Sensors/ Smart Irrigation Systems					
	Wetting Agents (golf courses)					
	Water Recycling					
	Future technologies					

[1] See Tables 10-2 and 10-3 for funding source references.

Table 10-1. Five-Year Implementation Plan (Continued).

Strategy		Strategy Priority	5-Year Actions	Responsible Parties	Budget	Funding Sources[1]
Objective 1. Improve water use efficiency to conserve water resources						
C. Industrial and Energy Conservation	Water Audits and Leak Detection	Tool box of strategies. Priority varies by operation.	1. RBC develops and implements outreach and education programs about recommended water management practices (yrs 1-5). 2. Individual water users implement conservation practices (yrs 3-5). 3. RBC develops survey of practices implemented, funding issues, and funding sources utilized (beginning in yr 5 as part of 5-year Plan update). 4. RBC reviews and analyzes water usage to improve understanding of water savings of strategies (beginning in yr 5 as part of 5-year Plan update).	RBC with support of SCDES and contractors: Identify funding opportunities and develop and implement outreach program. Conduct surveys and analyze results. Industrial operators: Implement appropriate strategies and seek funding from recommended sources as necessary.	Costs of implementation will vary by industrial operation. See Chapter 6.1.6 for discussion of cost-benefit of individual strategies. The cost of RBC support activities would be included in the budget for on-going RBC planning (if approved)	Funding comes from industry.
	Rebates on Energy Efficiency Appliances					
	Water Recycling and Rainwater Capture and Harvesting					
	Water Saving Equipment and Efficient Water Systems					
	Installing Water Saving Fixtures and Toilets					
	Educating Employees					

[1] *See Tables 10-2 and 10-3 for funding source references.*

Table 10-1. Five-Year Implementation Plan (Continued).

Strategy	Strategy Priority	5-Year Actions	Responsible Parties	Budget	Funding Sources[1]
Objective 2. Engage Georgia in water planning.					
A. Recognizing that the resources of the Savannah River Basin are finite and shared between the states, the Governor of South Carolina communicates with the Governor of Georgia to establish a coordinated, state-level planning and water management process for the Savannah River basin and their shared aquifers.	High	1. RBC communicates with SCDES, the Governor's Office, and legislative representatives to resume a coordinated, on-going, interstate-level planning process (yrs 1-5). 2. RBC assesses outcomes of state-level coordination and revise recommendations for coordination accordingly (yr 5).	RBC's role is to push for action with support from SCDES and legislators. Governor's role is to take action.	To be detremined based on support needs from SCDES and others.	Funding could come from SC Legislature, if approved, and Fed-7.
B. The RBC, with the support of SCDES, communicates with GAEPD and requests to coordinate water planning activities with the Coastal Georgia Regional Council. Meetings with other planning bodies in the Savannah River basin occur annually, at a minimum.	High	1. SCDES and RBCs work with GAEPD and their Regional Water Councils to have an annual meeting, and/or otherwise participate in each other's meetings (yrs 1-5).	SCDES leads the coordination effort. RBC members attend meetings.	If contractor led, RBC meetings may range between $5,000 and $15,000 per meeting, depending on effort needed to prepare for, conduct, and document each meeting.	Funding would come from SC Legislature, if approved, and Fed-7.
Objective 3. Communicate, coordinate, and promote findings and recommendations from the River Basin Plan					
A. The South Carolina Legislature continues to fund state water planning activities, including RBC-based river basin planning.	High	1. SCDES identifies funding needs and communicates with Legislature (yrs 2-5).	SCDES identifies the scope. SC Legislature approves the funding.	Existing SCDES budget can be used to develop the scope. The budget for planning is to be determined.	If approved, funding would come from SC Legislature.
B. The South Carolina Legislature establishes a grant program to help water users implement the actions and strategies identified in the legislatively-approved State Water Plan.	Medium	1. RBC advocates that the Legislature adopt the State Water Plan (yr 1). 2. SCDES identifies funding needs and communicates with Legislature (yrs 2-5).	SCDES identifies the scope. SC Legislature approves the funding.	Existing SCDES budget can be used to develop the scope. The budget for planning is to be determined.	If approved, funding would come from SC Legislature.

[1] *See Tables 10-2 and 10-3 for funding source references.*

Table 10-1. Five-Year Implementation Plan (Continued).

Strategy	Strategy Priority	5-Year Actions	Responsible Parties	Budget	Funding Sources[1]
Objective 3. Communicate, coordinate, and promote findings and recommendations from the River Basin Plan					
C. RBC members communicate with legislative delegations throughout the river basin planning process to promote their familiarity with the process and its goals and to generate buy-in on its recommendations.	Medium	1. RBC develops talking points/script to provide consistent messaging (yrs 1-5). 2. RBC tracks which representatives have been spoken to and by whom from the RBC. RBC notes any outcomes of conversation (yrs 1-5).	RBC coordinates communication with the support of contractors to develop talking points and track interactions.	There is no direct cost, other than ongoing contractor support, if needed. The cost of RBC activities are included in on-going RBC meeting budgets.	There is no direct cost.
D. SCDES designates staff to continue to coordinate and support ongoing RBC activities.	High	1. SCDES identifies staff and funding needs to coordinate and support on-going RBC activities (yrs 1-5).	SCDES to identify staffing needs. SC Legislature approves continued funding.	The existing SCDES budget covers current activities. The budget for continued planning is to be determined.	Funding would come from existing SCDES budget. Additional funding, if approved, would come from SC Legislature.
E. RBC encourages WaterSC to consider the water planning recommendations developed by the RBCs.	High	1. RBC develops communication plan to coordinate with WaterSC and promote RBC-developed recommendations (on-going). 2. WaterSC considers recommendations developed by all RBCs in planning activities (on-going).	RBC coordinates with WaterSC with SCDES and contractor support. WaterSC considers RBC recommendations.	The existing SCDES budget covers current activities.	Funding would come from existing SCDES budget.

[1] See Tables 10-2 and 10-3 for funding source references.

Table 10-1. Five-Year Implementation Plan (Continued).

Strategy	Strategy Priority	5-Year Actions	Responsible Parties	Budget	Funding Sources[1]
Objective 4. Promote engagement in the water planning process					
A. SCDES, the RBC Planning Teams, and the RBCs conduct regular reviews of the RBC membership to sustain and make sure all interest categories are adequately represented and attendance across all interest categories meets the requirements of the RBC Bylaws.	High	1. SCDES, RBC Planning Team, and RBC conduct reviews of membership every 6 months (yrs 1-5). 2. SCDES and RBC conduct outreach to promote membership for under-represented groups as necessary (yrs 1-5).	SCDES, RBC Planning Team, and RBC jointly conduct reviews.	The cost of RBC activities are included in on-going RBC meeting budgets.	There is no direct cost.
B. SCDES organizes an annual state-wide meeting of RBCs and State agencies.	High	1. SCDES gages interest from all active RBCs (yr 1). 2. If other RBCs concur with the recommendation, SCDES plans first annual meeting location, agenda, and invitees. SCDES will also identify cost and assess availability of funding, if needed (yr 1-2). 3. SCDES executes annual meeting (yrs 1-5).	SCDES leads the coordination effort. RBC members attend meetings.	If contractor led, RBC meetings may range between $5,000 and $15,000 per meeting, depending on effort needed to prepare for, conduct, and document each meeting.	Funding would come from SC Legislature, if approved, and Fed-7.
C. As part of future water planning efforts, the RBC attempts to increase engagement with USACE Planning Division and the USDOE.	Medium	1. SCDES and RBCs work with USACE and USDOE to have annual meetings, and/or otherwise participate in each other's meetings. LSS RBC coordinates with US RBC where possible (yrs 1-5).	SCDES leads the coordination effort. RBC members attend meetings.	If contractor led, RBC meetings may range between $5,000 and $15,000 per meeting, depending on effort needed to prepare for, conduct, and document each meeting.	Funding would come from SC Legislature, if approved, and Fed-7.

[1] *See Tables 10-2 and 10-3 for funding source references.*

Table 10-1. Five-Year Implementation Plan (Continued).

Strategy	Strategy Priority	5-Year Actions	Responsible Parties	Budget	Funding Sources[1]
Objective 4. Promote engagement in the water planning process					
D. The RBC supports and promotes outreach and education to increase awareness with the general public around watershed-based planning.	High	1. RBC develops an outreach sub-committee to lead oureach effort. Activities of the sub-committee may include determining the target audience, developing key and consistent messaging points, and identifying existing events or planning new events to promote messaging (yr 1). 2. RBC partners with SCDES and SCDNR to develop a statewide educational strategy and budget needs (yr 1-2). 3. RBC members present at local and state conferences or to local organizations regarding the river basin plan and process (yrs 2-5).	RBC conducts outreach with support of SCDES and contractors.	The cost of RBC activities are included in on-going RBC meeting budgets.	There is no direct cost.
E. Where applicable, developers work with water/wastewater utilities to ensure adequate availability of water resources and current and future capacity of water and wastewater infrastructure to support the development.	Medium	1. RBC develops communication materials and strategy to promote recommendations to county and municipal officials (yr 1). 2. Counties and municipalities consider amendments to permitting process (yrs 2-5). 3. RBC tracks adoption of recommendation (yrs 2-5).	RBC conducts outreach with support of SCDES. Municipal or county officials enact amendments.	The cost of RBC activities are included in on-going RBC meeting budgets.	There is no direct cost.

[1] *See Tables 10-2 and 10-3 for funding source references.*

Table 10-1. Five-Year Implementation Plan (Continued).

Strategy	Strategy Priority	5-Year Actions	Responsible Parties	Budget	Funding Sources[1]
Objective 5. Enhance understanding of groundwater resources					
A. SCDES continues to work with the USGS to develop a groundwater model covering the Lower Savannah and Salkehatchie basins and use the model to better understand the capacity of each aquifer and its ability to sustain future demands.	High	1. USGS completes updates to the South Atlantic Coastal Plain Groundwater model and subregional models of the Lower Savannah and Salkehatchie basins (yrs 1-2). 2. USGS simulates current and future conditions in Lower Savannah and Salkehatchie basins and shares findings with RBC (yrs 1-2). 3. RBC recommends additional scenarios for modeling, and USGS completes and reports findings (yrs 2-3). 4. RBC incorporates findings into 5-yr plan update (yrs 4-5).	USGS completes modeling. RBC recommends scenarios for modeling with SCDES and contractor support.	The SCDES existing budget (covered under the current contract between the SCDES and USGS) covers modeling.	Funding comes from existing SCDES budget and contract with the USGS.
B. SCDES seeks funding to add monitoring wells in deeper aquifers in the central part of the basin (Colleton, Bamberg, and Hampton counties).	High	1. SCDES seeks funding and drills new monitoring wells in groundwater areas of concern, as needed (years 1–5). 2.SCDES analyzes collected water level data (years 1–5).	SCDES develops additional monitoring wells with potential support from USGS.	New monitoring wells and monitoring equipment may range from $15,000 to $100,000 depending on depth.	Funding comes from SCDES and potential USGS budgets, as available.
C. SCDES coordinates with contractor to use a groundwater model to analyze and predict chloride levels in the Upper Floridan and Middle Floridan aquifers in Beaufort County.	Medium	1. Contractor applies groundwater model to simulate chloride levels under various future conditions (yrs 3-4). 2. Contractor shares findings with the RBC (yrs 4-5). 3. RBC incorporates findings into 5-yr plan update (yrs 4-5).	Contractor completes modeling. RBC recommends scenarios for modeling with SCDES and contractor support.	The level of effort and cost is still to be determined, but might resonably be expected to range from $50,000 to $150,000 or more.	Funding from existing SCDES budget and existing or amended contract with the USGS.

[1] *See Tables 10-2 and 10-3 for funding source references.*

Table 10-1. Five-Year Implementation Plan (Continued).

Strategy	Strategy Priority	5-Year Actions	Responsible Parties	Budget	Funding Sources[1]
Objective 6. Improve technical understanding of water resource management issues					
A. The RBC supports continued efforts to maintain and expand streamflow gages.	High	1. RBC develops communication strategy for speaking with USGS and other entities funding stream gages (yr 1-2). 2. RBC conducts outreach to USGS and current funding entities on the importance of streamflow data to the river basin planning process. RBC supports the search for additional funding sources as needed (yr 3-5).	RBC conducts outreach with support from SCDES and contractors.	The costs of monitoring and processing data for existing streamflow gages are included in USGS existing budget. Some gages are maintained by other entities. A stream gauge suitable for inclusion in the USGS system cost between $20,000 and $35,000 to install, depending on the site, and $16,000 a year to operate (Gardner-Smith 2021)	Funding could come from USGS, SCDES, and co-sponsors.
B. Future modeling incorporates scenarios that further examine future uncertainties, such as changes in rainfall and hydrology, alternative population growth scenarios, and potential impacts of future development on runoff.	Medium	1. RBC identifies and assesses any uncertainties for potential model scenario development and analysis (yrs 3-5). 2. Contractor(s) perform analysis and present results to RBC (yrs 3-5). 3. RBC assesses results of analysis and incorporates findings into the next 5-year update (yrs 4-5).	RBC evaluates future uncertainties with support from SCDES and contractors.	Contractor support may range from $10,000 to $100,000 depending on the models used, the scenarios examined, and number of scenarios.	Funding would come from existing SCDES budget for water planning, as available.

[1] *See Tables 10-2 and 10-3 for funding source references.*

Table 10-1. Five-Year Implementation Plan (Continued).

Strategy	Strategy Priority	5-Year Actions	Responsible Parties	Budget	Funding Sources[1]
Objective 6. Improve technical understanding of water resource management issues					
C. Future planning efforts include evaluation of surface water quality and trends.	Medium	1. RBC identifies specific water quality issues and concerns in the basin (yrs 3-5). 2. RBC develops approach to further address those water quality issues and concerns, including the need for development of a watershed plan under SCDES's Watershed Program (yrs 4-5).	RBC evaluates water quality with support from SCDHEC, SCDNR, and contractors.	The cost of RBC activities are included in on-going RBC meeting and support budgets. Development of watershed plans would come from SCDES's existing Watershed Program budget.	Funding would come from existing SCDES budget for water planning, as available, and Fed-9.
D. SCDES performs studies and analyses in support of a recycled water statute in SC.	High	1. SCDES develops scope of study based on input from the WateReuseSC and RBCs and examples from other states (yr 2). 2. SCDES conducts study and reports findings to RBCs (yrs 3-5).	SCDES conducts study.	Funding for a study could come from existing SCDES budget, or by special appropriation from the legilsature. Actual funding amount to be determined.	Funding would come from existing SCDES budget.
E. The SC Legislature funds and establishes a mesoscale network of weather and climate monitoring stations.	High	1. RBC coordinates with SCO and other RBCs on how to best support appropriation of funding and establishment of network (yrs 1-2).	SC legislature funds the effort. SCO oversees development of the monitoring network.	The budget is to be determined with SCO.	Funding sources are to be determined.
F. The RBC encourages local governments and land managers to act to reduce sediment loading to waterways.	Medium	1. RBC works with local governments and land managers to incorporate best management practices into land use, planning, zoning, permitting processes (yrs 1-5).	RBC performs outreach with support of SCDES. Local governments and land managers enact amendments.	The cost of RBC support activities would be included in the budget for on-going RBC planning (if approved)	There is no direct cost.

[1] *See Tables 10-2 and 10-3 for funding source references.*

Table 10-1. Five-Year Implementation Plan (Continued).

Strategy	Strategy Priority	5-Year Actions	Responsible Parties	Budget	Funding Sources[1]
Objective 7. Improve drought management					
A. Water utilities review their drought management plan and response ordinance every 5 years and review and update every 10 years or more frequently if conditions change. Once updated, the plans are submitted to the SCO for review.	High	1. Public suppliers on the RBC review and update their drought management plans and send them to the SCO (yrs 1-5). 2. Public suppliers on the RBC consider ways to incorporate RBC drought management recommendations into their drought plans (yrs 1-5). 3. Public suppliers shared updates to drought management plans with the SCO (e-mailed to drought@dnr.sc.gov).	Public suppliers review and updates their drought management plans.	Drought planning activities occur within public suppliers' annual budgets.	Possible funding sources include: Fed-6.
B. SCDES and SCDNR lobby for state funding to support the review and update of drought management plans by water utilities, especially small utilities with less financial and technical resources.	High	1. RBC works with SCDES and SCDNR to determine the level of funding needed to support small utilities that wish to update their plans and ordinances (yrs 1-2). 2. SCDES and SCDNR communicates funding needs to Legislature (yr 1-5).	SCDES identifies the funding needs. SC legislature approves the funding.	The budget for implementation to be determined.	Funded would come from SC Legislature, if approved.

[1] *See Tables 10-2 and 10-3 for funding source references.*

Table 10-1. Five-Year Implementation Plan (Continued).

Strategy		Strategy Priority	5-Year Actions	Responsible Parties	Budget	Funding Sources[1]
Objective 7. Improve drought management						
C. The RBC develops materials and an outreach strategy to public suppliers in the basin to implement the RBC's drought management recommendations (see Chapter 8.2.3)	1. The RBC encourages water utilities in the basin to consider drought surcharges on water use during severe and/or extreme drought phases. 2. The RBC encourages water users and those with water interests to submit drought impact observations through CMORs.	Medium	1. RBC develops materials on the benefits and implementation of RBC drought management recommendations (yr 1). 2. RBC develops outreach strategy to communicate with public suppliers and distribute materials (yr 2). 3. RBC executes outreach strategy and updates materials as necessary (yrs 3-5). 4. RBC develops approach to track updates to drought management plans in the basin (yrs 3-5).	RBC conducts outreach with support of SCDES and contractors.	There is no direct cost, other than ongoing contractor support, if needed. Cost of RBC activities are included in on-going RBC meeting budgets.	Possible funding sources include: Fed-6.
D. The state requests for and cost-shares in the completion of Phase 2 of the USACE Comprehensive Study and Drought Plan Update.		Medium	1. RBC conducts outreach to State and USACE to communicate recommendations (yr 1). 2. In collaboration with the Upper Savannah RBC, Lower Savannah-Salkehatchie RBC develops outreach materials to educate the area about the Savannah River system (yrs 2-3). 3. USACE the completes Study (yrs 3-5).	RBC conducts outreach. USACE completes the study.	The budget is to be determined in consultation with USACE and partners.	Funding would come from USACE, South Carolina, Georgia, and potential other partners.

[1] *See Tables 10-2 and 10-3 for funding source references.*

10.1.2 Funding Opportunities

Existing external funding sources may be leveraged to promote implementation of the objectives outlined in Chapter 10.1.1. For example, EPA's Water Infrastructure Finance and Information Act program offers funding to support eligible water and wastewater infrastructure projects including those related to drought prevention, reduction, and mitigation. Other funding to support drought mitigation efforts may be available through the Federal Emergency Management Agency's (FEMA's) Hazard Mitigation Grant Program (HMGP). Table 10-2 summarizes federal funding sources for public suppliers that were available at the time this Plan was prepared in May 2025.

The USDA offers numerous programs for farmers and ranchers to reduce risk from drought or to restore land impacted by drought. The Farm Bill has authorized several programs to provide relief to farms and ranches experiencing drought, including the Federal Crop Insurance Program; the Emergency Conservation Program; the Pasture, Rangeland, and Forage Program; and the Livestock Forage Disaster Program. In addition, the Environmental Quality Incentives Program (EQIP) provides assistance to farm operations to conserve water and for other conservation measures. Some EQIP assistance is targeted toward water-conserving efforts in drought-prone regions through the WaterSMART Initiative, a collaboration between the USDA and the U.S. Department of the Interior's Bureau of Reclamation. Table 10-3 summarizes these and other existing USDA funding sources that were available at the time this Plan was prepared in May 2025.

In 2022 Congress passed the Inflation Reduction Act (IRA), which may provide additional funding to programs related to agricultural conservation for fiscal years 2023 through 2026. For example, of the $20 billion allotted to the USDA, Section 21001 of the IRA assigned $8.5 billion in addition to amounts otherwise available to an existing USDA program, EQIP. EQIP pays for ecosystem restoration and emissions reduction projects on farmland and may be used for activities such as the purchase of cover crops (one of the agricultural conservation strategies discussed in this plan). Annual obligations from the EQIP program have been approximately $1.8 to $1.9 billion from 2018 through 2021, with between $36 to $45 million allotted for projects in South Carolina in these years. Additionally, $3.25 billion was allotted to the federal Conservation Stewardship Program, $1.4 million to the Agricultural Conservation Easement Program, and $4.95 billion to the Regional Conservation Partnership Program. The IRA indicates that activities funded by these programs must "directly improve soil carbon, reduce nitrogen losses, or reduce, capture, avoid, or sequester carbon dioxide, methane, or nitrous oxide emissions, associated with agricultural production" (IRA 2022). Projects that provide water efficiency benefits in addition to these climate benefits may be eligible for funding under these programs. Section 30002 of the IRA also designated $837.5 million in funding to the Secretary of Housing and Urban Affairs for projects that improve energy or water efficiency for affordable housing (IRA 2022). On January 20, 2025, an Executive Order was issued requiring all agencies to immediately pause the disbursement of funds appropriated through the IRA and for agency heads to review the IRA to enhance their alignment with the administration's new policies. On February 20, 2025, $20 million in contracts for the EQIP, Conservation Stewardship Program, and Agricultural Conservation Easement Programs was released. At the time this Plan was prepared in May 2025, it is unknown if the IRA funding described above will be continued or eliminated.

In September 2022, $70 million in USDA "Partnerships for Climate-Smart Commodities" funding was invested in South Carolina's two land-grant universities, Clemson University and South Carolina State University, to promote "climate-smart" agricultural practices in South Carolina. The project will utilize a coalition of 27 entities to promote the program to farmers, with a focus on peanuts, leafy greens, beef cattle, and forestry. Most of the funding will go directly to growers to offset the costs of implementing conservation practices. There may be opportunities to leverage this new funding source to implement the agricultural conservation strategies recommended in this plan. Although enrollment is currently closed as of the drafting of this plan in March 2025, interested parties are encouraged to sign up to learn about future opportunities. At the time this Plan was prepared in May 2025, funding disbursements for the program were frozen and it is unknown if funding will be continued or eliminated.

Table 10-2. Federal funding sources.

Funding Source Index[1]	Program	Agency	Grant/Loan Funds Available	Description
Fed-1	U.S. Economic Development Administration (EDA) Grants	EDA	No limit (subject to federal appropriation)	EDA's Public Works Program and Economic Adjustment Assistance Program aids distressed communities by providing funding for existing physical infrastructure improvements and expansions.
Fed-2	Water Infrastructure Finance and Information Act	U.S. EPA	Up to 49 percent of eligible project costs (minimum project size is $20 million for large communities and $5 million for small communities)	A federal credit program administered by EPA for eligible water and wastewater infrastructure projects, including drought prevention, reduction, and mitigation.
Fed-3	Section 502 Direct Loan Program	USDA Rural Development	Loans based on individual county mortgage limits	Loans are available for wells and water connections in rural communities. Availability is based on community income.
Fed-4	National Rural Water Association Revolving Loan Fund	USDA Rural Utilities Service	$100,000 or 75% of the total project	Provides loans for predevelopment costs associated with water and wastewater projects and for existing systems in need of small-scale capital improvements.
Fed-5	Emergency Community Water Assistance Grants	USDA Rural Development	Up to $100,000 or $1,000,000 depending on the type of project	Offers grants to rural areas and towns with populations of 10,000 or less to construct waterline extensions; repair breaks or leaks; address maintenance necessary to replenish the water supply; or construct a water source, intake, or treatment facility.
Fed-6	HMGP	FEMA	Variable	Provides funds to states, territories, tribal governments, and communities for hazard mitigation planning and the implementation of mitigation projects following a presidentially declared disaster event
Fed-7	Planning Assistance to States	USACE	Variable – funding is 50% federal and 50% nonfederal	USACE can provide states, local governments, and other nonfederal entities assistance in the development of comprehensive plans for the development, use, and conservation of water resources.

[1] As referenced in the "Funding Sources" column of Table 10-1.

Table 10-2. Federal funding sources (Continued).

Funding Source Index[1]	Program	Agency	Grant/Loan Funds Available	Description
Fed-8	Drinking Water State Revolving Fund	SCDES and SC Rural Infrastructure Authority	Congress appropriates funding for the Drinking Water State Revolving Fund that is then awarded to states by EPA based on results of the most recent Drinking Water Infrastructure Needs Survey and Assessment.	This program is a federal-state partnership aimed at ensuring that communities have safe drinking water by providing low-interest loans and grants to eligible recipients for drinking water infrastructure projects.
Fed-9	Clean Water State Revolving Fund	SCDES, SC Rural Infrastructure Authority	Congress appropriates funding for the Clean Water State Revolving Fund that is then awarded to states by EPA.	This program is a federal-state partnership that provides funding for water quality infrastructure projects including wastewater treatment facilities, nonpoint source pollution control, stormwater runoff mitigation, and water reuse.

[1] As referenced in the "Funding Sources" column of Table 10-1.

Table 10-3. USDA disaster assistance programs.

Funding Source Index[1]	Program	Agency	Description
USDA-1	Crop Insurance	Risk Management Agency (RMA)	Provides indemnity payments to growers who purchased crop insurance for production and quality losses related to drought, including losses from an inability to plant caused by an insured cause of loss.
USDA-2	Conservation Reserve Program Haying and Grazing	FSA	Provides for emergency haying and grazing on certain Conservation Reserve Program practices in a county designated as D2 or higher on the United States Drought Monitor, or in a county where there is at least a 40% loss in forage production.
USDA-3	Emergency Assistance for Livestock, Honeybees, and Farm-Raised Fish Program	FSA	Provides assistance to eligible owners of livestock and producers of honeybees and farm-raised fish for losses.
USDA-4	Emergency Conservation Program	FSA	Provides funding and technical assistance for farmers and ranchers to restore farmland damaged by natural disasters and for emergency water conservation measures in severe droughts.
USDA-5	Emergency Forest Restoration Program	FSA	Provides funding to restore privately owned forests damaged by natural disasters. Assistance helps landowners carry out emergency measures to restore forest health on land damaged by drought disasters.
USDA-6	Farm Loans	FSA	Provides emergency and operating loans to help producers recover from production and physical losses due to natural disasters and can pay for farm operating and family living expenses.

[1] As referenced in the "Funding Sources" column of Table 10-1.

Table 10-3. USDA disaster assistance programs (Continued).

Funding Source Index[1]	Program	Agency	Description
USDA-7	EQIP	FSA	Provides agricultural producers with financial resources and assistance to plan and implement improvements on the land in support of disaster recovery and repair and can help mitigate loss from future natural disasters. Assistance may also be available for emergency animal mortality disposal from natural disasters.
USDA-8	Emergency Watershed Program (Recovery)	NRCS	Offers vital recovery options for local communities to help people reduce hazards to life and property caused by droughts.
USDA-9	Emergency Community Water Assistance Grants	Rural Development	Offers grants to rural areas and towns with populations of 10,000 or less to construct waterline extensions; repair breaks or leaks; address maintenance necessary to replenish the water supply; or construct a water source, intake, or treatment facility.
USDA-10	Pasture, Rangeland, and Forage Program	RMA	Offers farmers and ranchers financial support to replace lost income due to forage losses caused by lower-than-average rainfall.
USDA-11	Livestock Forage Disaster Program	FSA	Offers financial support to livestock producers who experience grazing losses due to qualifying drought conditions or fire on federally managed lands. Payments compensate for lost grazing opportunities and additional feed costs incurred due to the disaster.

[1] As referenced in the "Funding Sources" column of Table 10-1.

10.1.3 Implementation Considerations

To effectively implement the recommended strategies of the River Basin Plan, the RBC must continue to meet as a planning body. The implementation plan presented in this chapter assumes that the RBC has funding and staffing support from SCDES to continue to meet and work through implementation. The Planning Framework states that the River Basin Plan should not be perceived as a static document and the RBC should not be a stagnant planning body between successive updates. Rather, the RBC is to be "actively engaged in promoting the implementation of the recommendations proposed" and "will continue to meet on a periodic basis to pursue River Basin Plan implementation activities as needed" (SCDNR 2019a, p. 90). The Lower Savannah-Salkehatchie RBC may meet quarterly in the first year after publication of the River Basin Plan to pursue funding and implementation. After the first year, meetings may be held less frequently as needed, but at least once per year. To support continued river basin planning, the RBC included recommendations to continue funding of the planning process, to have SCDES designate staff to continue supporting RBC activities, to promote coordination with other RBCs, and to promote coordination with Georgia planning bodies and between Governors directly. Additional RBCs, including the Upper Savannah RBC, Broad RBC, and Saluda RBC, have recommended joint meetings of multiple RBCs, suggesting there is broad support for this recommendation.

The Lower Savannah-Salkehatchie RBC may encounter additional challenges in the implementation of the identified strategies. One such challenge is the identification of sufficient funding. For the implementation of Objective 1, water withdrawers may have limited financial capacity to pursue the recommended water management strategies. A municipal water utility's budget is limited by its customer base and rate structure. The increases to water rates necessary to fund implementation of the actions associated with these objectives may not be feasible for some communities. Agricultural water withdrawers may have limited financial resources to invest in new and potentially expensive water conservation or augmentation strategies. Although some outside funding sources exist, applications for such programs may present a technical or resource barrier to many water withdrawers. Any new funding sources pursued by the RBC with SCDES support may take time to develop, leading to delays in implementation. The identification of immediately available funding opportunities, the provision of support in funding applications, and the investigation of new funding sources are vital to implementation of the recommended strategies under Objective 1. The Lower Savannah-Salkehatchie RBC included a recommendation of establishing a grant program to support implementation of River Basin Plan recommendations. This strategy is included under Objective 3, communicate, coordinate, and promote findings and recommendations from the River Basin Plan.

Another challenge in the implementation of the River Basin Plan is stakeholder acceptance. The RBC itself has no authority to enforce recommendations in the basin. Therefore, implementation of these strategies is dependent upon effective communication of RBC findings and recommendations to stakeholders. For example, stakeholder acceptance is vital for achieving Objectives 1 and 7, as these strategies rely on individual water withdrawers reducing their demands or modifying their drought management plans. To gain acceptance, water withdrawers must understand the need for and goals of the recommended strategies as well as have assurance that they are viable and effective in improving equitable access to the basin's water resources. Additional strategies, including those under Objectives 2, 3, 4, 5, and 6 require action on the part of SCDES, USGS, the state Legislature, USGS, Governors, and Georgia water planning bodies, with the RBC playing a role in recommending and supporting the strategy. These strategies include outreach components as part of their 5-year actions in the implementation table. Outreach may include direct communication or the development of print or online materials to describe the recommendation, benefits, funding sources, and how these strategies relate to findings from the planning process. Recognizing the importance of support of decision makers, the RBC has included a recommendation under Objective 3, to communicate with the legislative delegation throughout the planning process to promote buy-in.

As the RBC makes decisions related to implementation, the RBC should aim to build consensus where possible and consider documenting alternative points of view when consensus is not possible. Documenting alternative points of view can be equally valuable to officials who have a role implementing water management strategies and/or recommendations made by a portion of the RBC. Full consensus on every issue is an unrealistic goal, but the RBC should continue to discuss, revisit, and document issues from this and later planning phases that are marked by alternative or opposing points of view.

10.2 Long-term Planning Objectives

The Lower Savannah-Salkehatchie RBC's objectives described in Chapter 10.1 represent both short-term, 5-year actions and long-term objectives. For each objective, the 5-year actions are discussed in Chapter 10.1 and long-term strategies are presented below in Table 10-4.

Table 10-4. Long-term planning objectives.

Strategy	Long-Term Goals & Objectives
Objective 1. Improve water use efficiency to conserve water resources	
A. Municipal Conservation	Continue short term goals. Adjust recommended actions based on water savings realized. Seek additional funding sources.
B. Agricultural Conservation	Continue short term goals. Adjust recommended actions based on water savings realized. Seek additional funding sources. Explore new technologies and incorporate into recommendations as appropriate.
C. Industrial and Energy Conservation	Continue short term goals. Adjust recommended actions based on water savings realized. Seek additional funding sources. Explore new technologies and incorporate into recommendations as appropriate.
Objective 2. Engage Georgia in water planning.	
A. Recognizing that the resources of the Savannah River Basin are finite and shared between the states, the Governor of South Carolina communicates with the Governor of Georgia to establish a coordinated, state-level planning and water management process for the Savannah River basin and their shared aquifers.	Coordinate planning activities with Georgia and the Upper Savannah RBC.
B. The RBC, with the support of SCDES, communicates with GAEPD and requests to coordinate water planning activities with the Coastal Georgia Regional Council. Meetings with other planning bodies in the Savannah River basin occur annually, at a minimum.	Coordinate planning activities with Georgia and the Upper Savannah RBC.

Table 10-4. Long-term planning objectives (Continued)

Strategy	Long-Term Goals & Objectives
Objective 3. Communicate, coordinate, and promote findings and recommendations from the River Basin Plan	
A. The South Carolina Legislature continues to fund state water planning activities, including RBC-based river basin planning.	Continue funding river basin and state water planning activities.
B. The South Carolina Legislature establishes a grant program to help water users implement the actions and strategies identified in the legislatively approved State Water Plan.	Develop funding to support implementation of river basin and state water planning activities.
C. RBC members communicate with legislative delegations throughout the river basin planning process to promote their familiarity with the process and its goals and to generate buy-in on its recommendations.	Continue regular communication to emphasize the on-going work and impacts of the RBC.
D. SCDES designates staff to continue to coordinate and support ongoing RBC activities.	RBC activities will be coordinated and supported by SCDES.
E. RBC encourages WaterSC to consider the water planning recommendations developed by the RBCs.	Align RBC recommendations with State Water Plan recommendations.
Objective 4. Promote engagement in the water planning process	
A. SCDES, the RBC Planning Teams, and the RBCs conduct regular reviews of the RBC membership to sustain and make sure all interest categories are adequately represented and attendance across all interest categories meets the requirements of the RBC Bylaws.	Maintain RBC membership and engagement in water planning processes in the state.
B. SCDES organizes an annual state-wide meeting of RBCs and State agencies.	Coordinate efforts and recommendations among RBCs.
C. As part of future water planning efforts, the RBC attempts to increase engagement with USACE Planning Division and US Department of Energy.	Coordinate planning activities with USACE.
D. The RBC supports and promotes outreach and education to increase awareness with the general public around watershed-based planning.	Continue short term goals.
E. Where applicable, developers work with water/wastewater utilities to ensure adequate availability of water resources and current and future capacity of water and wastewater infrastructure to support the development.	Encourage development in portions of the basin with sufficient and/or abundant water resources.

Table 10-4. Long-term planning objectives (Continued)

Strategy	Long-Term Goals & Objectives
Objective 5. Enhance understanding of groundwater resources	
A. SCDES continues to work with the USGS to develop a groundwater model covering the Lower Savannah and Salkehatchie basins and use the model to better understand the capacity of each aquifer and its ability to sustain future demands.	Understand the capacity of aquifers and sustainability of groundwater use in the Lower Savannah and Salkehatchie basins.
B. SCDES seeks funding to add monitoring wells in deeper aquifers in the central part of the basin (Colleton, Bamberg, and Hampton counties).	Improve data availability and understanding of groundwater levels, trends, and aquifer capacity.
C. SCDES coordinates with contractor to use a groundwater model to analyze and predict chloride levels in the Upper Floridan and Middle Floridan aquifers in Beaufort County.	Understand the potential for saltwater intrusion in future scenarios.
Objective 6. Improve technical understanding of water resource management issues	
A. The RBC supports continued efforts to maintain and expand streamflow gages.	Continue short-term goals. Monitor the number of active gages in the basin.
B. Future modeling incorporates scenarios that further examine future uncertainties, such as changes in rainfall and hydrology, alternative population growth scenarios, and potential impacts of future development on runoff.	Consider the findings of uncertainty analysis and include recommendations in next 5-yr Plan update.
C. Future planning efforts include evaluation of surface water quality and trends.	Consider findings of water quality analysis and include recommendations in next 5-yr Plan update.
D. SCDES performs studies and analyses in support of a recycled water statute in SC.	Explore expanded use of reclaimed water for recycled water programs in South Carolina.
E. The SC Legislature funds and establishes a mesoscale network of weather and climate monitoring stations.	Develop and maintain a mesoscale network. Incorporate data to improve drought management.
F. The RBC encourages local governments and land managers to act to reduce sediment loading to waterways.	Reduce sediment loading to reservoirs.

Table 10-4. Long-term planning objectives (Continued)

<table>
<tr><th colspan="2">Strategy</th><th>Long-Term Goals & Objectives</th></tr>
<tr><td colspan="2">Objective 7. Improve drought management</td><td></td></tr>
<tr><td colspan="2">A. Water utilities review their drought management plan and response ordinance every 5 years and review and update every 10 years or more frequently if conditions change. Once updated, the plans are submitted to the SCO for review.</td><td>Public suppliers maintain up-to-date drought management plans that are consistent (where possible) with the recommendations of the RBC.</td></tr>
<tr><td colspan="2">B. SCDES and SCDNR lobby for state funding to support the review and update of drought management plans by water utilities, especially small utilities with less financial and technical resources.</td><td>Public suppliers with financial constraints are supported in maintaining up-to-date drought management plans.</td></tr>
<tr><td rowspan="2">C. The RBC develops materials and an outreach strategy to public suppliers in the basin to implement the RBC's drought management recommendations (see Chapter 8.2.3)</td><td>1. The RBC encourages water utilities in the basin to consider drought surcharges on water use during severe and/or extreme drought phases.</td><td rowspan="2">Continue short-term goals.</td></tr>
<tr><td>2. The RBC encourages water users and those with water interests to submit drought impact observations through CMORs.</td></tr>
<tr><td colspan="2">D. The state requests for and cost-shares in the completion of Phase 2 of the USACE Comprehensive Study and Drought Plan Update.</td><td>Encourage drought forecasting in future planning efforts and decisions.</td></tr>
</table>

[1] *See Tables 10-3 and 10-4 for funding source references.*

10.3 Progress on River Basin Plan Implementation

To assess the performance of and quality of actions taken by the RBC, the Framework proposes the development of progress metrics. A progress metric is a "*benchmark used to monitor the success or failure of an action taken by an RBC*" (SCDNR 2009). Noting that the ultimate value and impact of the river basin planning process is the dissemination of its findings and implementation of its recommendations, the Lower Savannah-Salkehatchie RBC developed progress metrics around each of the seven implementation objectives defined at the beginning of this chapter. Successful tracking of metrics is dependent on RBCs continuing to meet after the River Basin Plans are published and having support from SCDES and contractors to track progress. The progress metrics are:

1. Improve water use efficiency to conserve water resources
    a. Metric 1a: Water utilities establish a baseline water loss/leak detection measure and improvement is seen over 5 years in subsequent surveys.
    b. Metric 1b: Water utilities establish a baseline per capita usage considering their unique customer base, and improvement is seen over 5 years in subsequent surveys.
    c. Metric 1c: Funding opportunities are identified and used to implement conservation strategies.
2. Engage Georgia in water planning
    a. Metric 2a: A Governor coordinated state-level water planning and management process is re-established between Georgia and South Carolina.
    b. Metric 2b: Annual meetings between Savannah River basin South Carolina RBCs and Georgia Regional Councils are held.
3. Communicate, coordinate, and promote fundings and recommendations from the River Basin Plan
    a. Metric 3a: The South Carolina State Water Plan incorporates the Lower Savannah-Salkehatchie River Basin Plan's recommendations.
    b. Metric 3b: The RBC meets at least bi-annually with support of SCDES.
    c. Metric 3c: Outreach leads to local, legislative or federal actions, decisions, and funding that support implementation strategies and actions.
4. Promote engagement in the water planning process
    a. Metric 4a: The RBCs continue beyond 2025 with a diverse, active and representative membership with balanced representation from all eight interest categories.

   b. Metric 4b: Collaboration has occurred with other RBCs, Georgia, the Georgia Regional Water Planning Councils, and the USACE. At least one collaboration event has occurred annually.

   c. Metric 4c: Coordination occurs with groups that have existing education and outreach efforts focused on water conservation.

5. Enhance Understanding of Groundwater Resources

   a. Metric 5a: The USGS-led groundwater modeling effort is completed and results are presented to the RBC and incorporated into a 2026 update of the River Basin Plan.

   b. Metric 5b: Funding is identified and allocated, and additional monitoring wells are installed by SCDES in the deeper aquifers of Colleton, Bamberg and/or Hampton Counties to monitor groundwater levels and trends.

6. Improve technical understanding of water resources management issues

   a. Metric 6a: USGS streamflow gages in the basin are maintained and increased.

   b. Metric 6b: Future modeling incorporates RBC-developed scenarios to assess future uncertainties.

   c. Metric 6c: Water quality issues and concerns in the basin are identified and a strategy to study approaches to address them is developed.

7. Improve drought management

   a. Metric 7a: One hundred percent of public water supplier's drought management plans are updated within the last 10 years and submitted to the SCO for review.

   b. Metric 7b: State funding is designated to complete Phase 2 of the USACE Comprehensive Study and Drought Plan Update.

This 2025 publication is the first Lower Savannah-Salkehatchie River Basin Plan publication. Future 5-year updates will evaluate the Lower Savannah-Salkehatchie RBC's performance relative to the progress metrics.

As noted throughout this plan, communication and the development of stakeholder buy-in is key to successful plan implementation. To develop stakeholder acceptance, RBC members, who are the ambassadors of the River Basin Plan, must have confidence in the planning process and outcomes. A key responsibility of RBC members, as defined in the Framework, is to regularly communicate with stakeholders to maintain a current understanding of RBC activities, the River Basin Plan, and emerging issues. To assess each RBC member's confidence in the plan, the plan approval process dictates that there will first be a test for consensus on the Draft Lower Savannah-Salkehatchie River Basin Plan. For the test of consensus, each member rates their concurrence with the plan using a five-point scale, as shown below:

1. Full Endorsement (i.e., member likes it).
2. Endorsement but with minor points of contention (i.e., basically member likes it).
3. Endorsement but with major points of contention (i.e., member can live with it).
4. Stand aside with major reservations (i.e., member cannot live with it in its current state and can only support it if changes are made).
5. Withdraw - Member will not support the draft river basin plan. The Planning Framework indicates that if a member votes 5 they will not continue working within the RBC's process and will leave the RBC. In practice, if a member votes 5 but wishes to remain engaged in future work of the RBC, the RBC has the discretion to vote on whether the member may remain on the RBC.

For the Final River Basin Plan, each RBC member votes simply to support or not support the plan. By indicating support, the member would be acknowledging his/her concurrence with the Final River Basin Plan and their commitment to support implementation of the plan. The results of the test for consensus on the Draft River Basin Plan and the RBC's votes on the Final River Basin Plan are shown in Table 10-5. The full results are included in Appendix D.

Table 10-5. Test of consensus results.

Test of Consensus Result	Number of RBC Members
Draft River Basin Plan[1]	
1. Full Endorsement (i.e., Member likes it).	**14**
2. Endorsement but with Minor Points of Contention (i.e., basically Member likes it).	**5**
3. Endorsement but with Major Points of Contention (i.e., Member can live with it).	**0**
4. Stand aside with Major Reservations (i.e., Member cannot live with it in its current state and can only support it if changes are made).	**0**
5. Withdraw – Member will not support the Draft River Basin Plan and will not continue working within the RBC's process. Member has decided to leave the RBC.	**0**
Final River Basin Plan[2]	
Support	**20**
Does Not Support	**0**

[1] Five members were not present during the test of consensus and did not provide an indication of their level of endorsement prior to publication of the Draft River Basin Plan.

[2] Four members, three of who were not active on the RBC during the time that the final Plan was prepared, did not cast a vote. One member, representing Dominion Energy did not vote but noted that "*Dominion Energy supports elements of the Plan and the intent to safeguard our resources but abstains from approving any policy recommendations at this time.*"

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Appendix A
Inactive Gage Table

Table A-1. Streamflow characteristics at inactive[1] USGS gaging stations in the Lower Savannah-Salkehatchie River basin.

Map ID	Gaging Station Name	Station Number	Period of Record	Drainage (sq mi)	Average Daily Flow (cfs)	90% Exceeds Flow [2] (cfs)	Minimum Daily Flow (cfs), (year)	Max Daily Flow (cfs), (year)
Middle Savannah River Subbasin-HUC 03060106								
2	Savannah River below Stevens Creek Dam near Morgana	021964831	1988–2000	7,150	NA	NA	NA	NA
3	Savannah River above Augusta Canal near Bonair, Georgia	021964832	2010–2017	Not reported by USGS	6,720	3,660	924 (2017)	43,700 (2016)
4	Savannah River near North Augusta	02196484	1988–2002	7,150	6,698	1,790	65 (1989)	39,000 (1993)
6	Augusta Canal Lower at Augusta, Georgia	02196500	1930–1992	Not reported by USGS	2,679	1,700	0 (1936)	4,380 (1948)
7	Little Horse Creek near Graniteville	02196689	1989–2003	27	33	16	4.1 (1993)	403 (2003)
12	Tinker Creek on SRS Rd 8-11 at SRS	021973005	1992–2002	16	21	10	2.2 (2001)	107 (1993)
13	Mill Creek at SRS	021973007	1994–2000	Not reported by USGS	6.1	1.3	0.71 (2000)	78 (1995)
14	McQueen Branch at Road F at SRS	021973008	1990–2002	Not reported by USGS	1.1	0.23	0.02 (1999)	50 (1993)
15	H-002 at SRS	021973011	1996–2002	Not reported by USGS	0.16	0.05	0.02 (1998)	4.6 (2000)
16	Crouch Branch near H Area at SRS	021973012	1990–2002	Not reported by USGS	0.16	0	0 (1994, 1996, 1997, 1999–2002)	7.0 (1993)
17	A-003 at SRS	021973026	1983–1994	Not reported by USGS	0.24	0.07	0.02 (1985–1987)	2.4 (1990)
18	A-011 at SRS	021973028	1983–1994	Not reported by USGS	0.15	0.02	0 (1986, 1992–1994)	5.2 (1986)
19	Upper Three Runs above F-Area At SRS	021973055	2001–2002	Not reported by USGS	133	95	79 (2002)	456 (2001)
20	Tims Branch at Road 2 at SRS	02197306	1993–1996	14	3.1	1.6	0.74 (1996)	57 (1995)

Table A-1. Streamflow characteristics at inactive[1] USGS gaging stations in the Lower Savannah-Salkehatchie River basin. (Continued)

Map ID	Gaging Station Name	Station Number	Period of Record	Drainage (sq mi)	Average Daily Flow (cfs)	90% Exceeds Flow [2] (cfs)	Minimum Daily Flow (cfs), (year)	Max Daily Flow (cfs), (year)
Middle Savannah River Subbasin-HUC 03060106 (Continued)								
21	Tims Branch at Road C (SRS)	02197309	1974–1996	18	5.9	3.0	1 (1981)	92 (1990)
22	Upper Three Runs above Road C (SRS)	02197310	1974–2002	176	205	128	72 (2002)	1,740 (1990)
23	Upper Three Runs at Road A (SRS)	02197315	1974–2002	203	235	138	79 (2002)	2,000 (1990)
24	Savannah River near Jackson	02197320	1971–2002	8,110	8,831	4,990	3,220 (1981)	22,000 (1976, 1977, 1994, 1997, 1998)
25	X-004 at SRS	02197321	1983–1996	Not reported by USGS	0.06	0.01	0 (1995, 1996)	0.73 (1993)
26	D-003 at SRS	02197324	1983–2000	Not reported by USGS	0.10	0.02	0 (1986, 1994–1998, 2000)	1.2 (1994)
28	Site 1 at SRS	02197330	1972–1996	Not reported by USGS	1.2	0.46	0.02 (1992)	25 (1978)
29	HP-52 Outfall at SRS	021973305	1984–1996	Not reported by USGS	1.1	0.43	0.11 (1990)	12 (1990)
30	H-008 at SRS	02197331	1984–1996	Not reported by USGS	1.9	0.66	0.15 (1990, 1996)	20 (1990)
31	Site No. 2 at SRS	02197332	1972–1990	Not reported by USGS	1.7	0.81	0.24 (1973)	50 (1990)
32	Site No. 3 at SRS	02197334	1972–1999	6.0	7.2	2.6	0.61 (1974)	155 (1991)
33	Site No. 4 at SRS	02197336	1972–1992	7.0	8.2	3.2	0 (1974, 1978)	155 (1990)
34	Site No. 5 at SRS	02197338	1972-2002	0.28	2.7	1.7	0.46 (1990)	48 (1990)
35	Site No. 5B at SRS	02197339	1980-2002	0.57	3.0	1.8	0.60 (1990)	33 (1995)
36	Site No. 6 at SRS	02197340	1972-2002	7.5	11	4.7	2.1 (1997)	186 (1990)
37	C-001 at SRS	021973405	1983–1996	Not reported by USGS	0.19	0	0 (1988, 1989, 1991–1996)	5.8 (1994)

Table A-1. Streamflow characteristics at inactive[1] USGS gaging stations in the Lower Savannah-Salkehatchie River basin. (Continued)

Map ID	Gaging Station Name	Station Number	Period of Record	Drainage (sq mi)	Average Daily Flow (cfs)	90% Exceeds Flow [2] (cfs)	Minimum Daily Flow (cfs), (year)	Max Daily Flow (cfs), (year)
Middle Savannah River Subbasin-HUC 03060106 (Continued)								
38	Site No. 7 at SRS	02197342	1972–2002	13	17	6.9	2.7 (1990)	830 (1991)
39	C-003 at SRS	021973424	1983–1996	Not reported by USGS	0.67	0.38	0 (1988)	3.5 (1985)
40	C-004 at SRS	021973426	1983–1996	Not reported by USGS	54	3.2	0 (1987)	439 (1985)
41	Four Mile Creek at Road A12.2 (SRS)	02197344	1976–2002	22	131	14	5.7 (2002)	1,200 (1991)
42	Four Mile Creek at Road 13 at SRS	021973441	1994–1996	Not reported by USGS	NA	NA	NA	NA
43	K-011 at SRS	02197345	1983–1996	Not reported by USGS	174	28	0.20 (1992)	497 (1984)
44	Indian Grave Branch at SRS	021973455	1986–1996	2.1	1.3	0.32	0.07 (1987)	40 (1990)
45	Pen Branch at Rd B, at SRS	021973471	1983–1996	Not reported by USGS	7.9	1.7	0.21 (1990)	372 (1991)
46	Pen Branch at Road A-13 (SRS)	02197348	1976-2002	21	174	11	2.5 (1997)	760 (1991)
47	Pen Branch at Road A-17 at SRS	021973482	1993–1996	Not reported by USGS	NA	NA	NA	NA
48	P-013 at SRS	02197351	1983–1996	Not reported by USGS	8.5	0.19	0.03 (1992)	170 (1991)
49	Steel Creek above Rd B at SRS	021973515	1986–2002	Not reported by USGS	6.5	0.90	0.36 (2002)	220 (1991)
50	L-007 Outfall at SRS	021973525	1985–2002	Not reported by USGS	92	10	1.4 (1993)	470 (1985)
51	L Lake above Dam at SRS	02197353	1987–1996	Not reported by USGS	NA	NA	NA	NA
52	P-007 at SRS	02197354	1983–1996	Not reported by USGS	0.58	0	0 (1987–1990, 1992–1996)	9.0 (1985)

Table A-1. Streamflow characteristics at inactive[1] USGS gaging stations in the Lower Savannah-Salkehatchie River basin. (Continued)

Map ID	Gaging Station Name	Station Number	Period of Record	Drainage (sq mi)	Average Daily Flow (cfs)	90% Exceeds Flow [2] (cfs)	Minimum Daily Flow (cfs), (year)	Max Daily Flow (cfs), (year)
Middle Savannah River Subbasin-HUC 03060106 (Continued)								
53	Meyers Branch on RSR Rd 9 at SRS	021973561	1992–1996	Not reported by USGS	11	5.9	3.3 (1996)	101 (1993)
54	Steel Creek at Road A at SRS	021973565	1985–2002	Not reported by USGS	106	15	6.9 (2001)	530 (1998)
55	P-19 at SRS	02197362	1983–1996	Not reported by USGS	134	0.55	0 (1985, 1988, 1991, 1993)	523 (1987)
56	Lower Three Runs below Par Pond at SRS	02197380	1974–2002	35	33	8.6	0.60 (1981)	515 (1998)
57	Lower Three Runs near Snelling	02197400	1974–2002	59	77	27	13 (1986, 1999)	743 (1990)
58	Lower Three Runs at Martin	02197415	1997–2002	Not reported by USGS	114	44	25 (2002)	2,180 (1998)
Lower Savannah River Subbasin-HUC 03060109								
60	Savannah River near Estill	02198375	2009–2020	9,670	7,641	4,740	3,690 (2012)	20,200 (2009)
62	Savannah River near Rincon, Georgia	02198745	2009–2010	10,201	NA	NA	NA	NA
69	Savannah River at Broad Street at Savannah, Georgia	02198977	1987–2007	Not reported by USGS	NA	NA	NA	NA
72	Little Back River at Lucknow Canal, near Limehouse	02198979	1987–2004	Not reported by USGS	NA	NA	NA	NA
77	South Channel (Savannah River) near Savannah, GA	02199000	2007–2017	Not reported by USGS	NA	NA	NA	NA
Salkehatchie River Subbasin-HUC 03050207								
80	Savannah Creek at Ehrhardt	02175445	2001–2003	4.5	3.9	0.27	0.11 (2002)	95.9 (2003)
Broad-St. Helena Subbasin-HUC 03050208								
85	Coosawhatchie River near Early Branch	02176517	1995–1998	382	387	5.7	0 (1998)	5,630 (1998)
89	Okatee River near Bluffton	02176575	2001–2004	Not reported by USGS	NA	NA	NA	NA

Table A-1. Streamflow characteristics at inactive[1] USGS gaging stations in the Lower Savannah-Salkehatchie River basin. (Continued)

Map ID	Gaging Station Name	Station Number	Period of Record	Drainage (sq mi)	Average Daily Flow (cfs)	90% Exceeds Flow [2] (cfs)	Minimum Daily Flow (cfs), (year)	Max Daily Flow (cfs), (year)
Broad-St. Helena Subbasin-HUC 03050208 (Continued)								
90	Malind Creek near Chelsea	02176576	2001–2004	Not reported by USGS	NA	NA	NA	NA
91	Brickyard Creek near Beaufort[4]	02176585	1998–2013	Not reported by USGS	-568	-1,890	-3,760 (2002)	2,480 (2002)
92	Albergotti Creek at Beaufort	02176587	1998–2001	Not reported by USGS	NA	NA	NA	NA
93	Beaufort River above Beaufort	02176589	1998–2004	Not reported by USGS	NA	NA	NA	NA
95	Beaufort River near Port Royal[4]	02176611	1998–2007	Not reported by USGS	-6,831	-11,900	-21,700 (2003)	12,000 (2006)
96	Battery Creek at Port Royal	02176635	1998–2007	Not reported by USGS	NA	NA	NA	NA
97	Beaufort River at Parris Island	02176640	1998–2013	Not reported by USGS	NA	NA	NA	NA
Calibogue Sound-Wright River Subbasin-HUC 03060110								
98	May River near Pritchardville[4]	02176711	2002–2004	14	32	-133	-357 (2004)	355 (2003)
99	May River near Bluffton[3]	02176720	2002–2004	21	NA	NA	NA	NA
100	Great Swamp near Ridgeland	02176875	1977–1984	Not reported by USGS	32	0	0 (1977–1983)	1950 (1984)

[1] Only inactive gages (as of September 30, 2024) are listed here. Active gages are provided in Table 3-1.
[2] "90% exceeds flow" is the flow for which 90% of daily flows are higher and 10% are lower.
[3] These gages are influenced by tidal currents, and they report daily tidal high and low discharges instead of a daily mean discharge.
[4] The Brickyard Creek near Beaufort, Beaufort River near Port Royal, and May River near Pritchardville gages are influenced by tidal fluctuations, resulting in negative daily mean discharge flows reported because of negative flows during flood tide.

Appendix B
Current Use and Demand Projections for Individual Water Users

Table B-1. Current Water Demands, Consumptive Use, and Returns.

User	Use Category	Source	Withdrawal (MGD)	Consumptive Use (%)	Consumptive Use (MGD)	Return (MGD)	Basin
Kimberly-Clark	Manufacturing	Surface Water	8.92	4%	0.33	8.59	Lower Savannah
Woodside	Golf Course	Surface Water	0.16	0%	0.00	0.16	Lower Savannah
River Golf Club	Golf Course	Surface Water	0.05	0%	0.00	0.05	Lower Savannah
Sage Valley	Golf Course	Surface Water	0.16	0%	0.00	0.16	Lower Savannah
The Reserve	Golf Course	Surface Water	0.25	0%	0.00	0.25	Lower Savannah
US DOE	Manufacturing	Surface Water	9.81	1%	0.15	9.66	Lower Savannah
Dominion Urquhart Station	Thermoelectric	Surface Water	103.06	3%	2.58	100.48	Lower Savannah
Breezy Hill	Public Supply	Surface Water	1.22	81%	0.99	0.23	Lower Savannah
North Augusta	Public Supply	Surface Water	3.78	44%	1.66	2.12	Lower Savannah
Graniteville	Public Supply	Surface Water	8.17	84%	6.91	1.26	Lower Savannah
BJW&SA	Public Supply	Surface Water	27.57	66%	18.32	9.24	Lower Savannah
ECW&SA	Public Supply	Surface Water	4.50	71%	3.21	1.29	Lower Savannah
Mohawk	Public Supply	Surface Water	0.00	45%	0.00	0.00	Lower Savannah
Mason's Master Turf	Agriculture	Surface Water	0.00	100%	0.00	0.00	Lower Savannah
Breland	Agriculture	Surface Water	0.00	100%	0.00	0.00	Salkehatchie
Brubaker	Agriculture	Surface Water	0.14	100%	0.14	0.00	Salkehatchie
Chappell	Agriculture	Surface Water	0.01	100%	0.01	0.00	Salkehatchie
Connelly (Mainstem)	Agriculture	Surface Water	0.33	100%	0.33	0.00	Salkehatchie
Connelly (Miller)	Agriculture	Surface Water	0.32	100%	0.32	0.00	Salkehatchie
Coosaw Farms	Agriculture	Surface Water	0.19	100%	0.19	0.00	Salkehatchie
Danny Hege	Agriculture	Surface Water	0.25	100%	0.25	0.00	Salkehatchie
Diem Aden	Agriculture	Surface Water	0.06	100%	0.06	0.00	Salkehatchie
Gary Hege (Mainstem)	Agriculture	Surface Water	0.15	100%	0.15	0.00	Salkehatchie
JCO Farms	Agriculture	Surface Water	0.03	100%	0.03	0.00	Salkehatchie
Williams (Little Salkehatchie)	Agriculture	Surface Water	0.00	100%	0.00	0.00	Salkehatchie

User	Use Category	Source	Withdrawal (MGD)	Consumptive Use (%)	Consumptive Use (MGD)	Return (MGD)	Basin
Williams (Willow)	Agriculture	Surface Water	0.02	100%	0.02	0.00	Salkehatchie
Sharp & Sharp	Agriculture	Surface Water	0.88	100%	0.88	0.00	Salkehatchie
Riddle Dairy Farm	Agriculture	Surface Water	0.37	100%	0.37	0.00	Salkehatchie
Withycombe Farm	Agriculture	Surface Water	0.00	100%	0.00	0.00	Salkehatchie
Cedar Creek Golf Club	Golf Course	Groundwater	0.05	100%	0.05	0.00	Lower Savannah
Woodside Golf LLC / DBA The Reserve Club	Golf Course	Groundwater	0.01	100%	0.01	0.00	Lower Savannah
Kimberly Clark Corporation	Manufacturing	Groundwater	0.20	100%	0.20	0.00	Lower Savannah
SRNS SRS A Area Ind	Manufacturing	Groundwater	1.30	100%	1.30	0.00	Lower Savannah
SRS F AREA IND	Manufacturing	Groundwater	0.02	100%	0.02	0.00	Lower Savannah
SRNS FORESTRY	Manufacturing	Groundwater	0.00	100%	0.00	0.00	Lower Savannah
SRNS SRS H AREA IND	Manufacturing	Groundwater	0.06	100%	0.06	0.00	Lower Savannah
Savannah River Remediation - Defense Waste Processing Facility	Manufacturing	Groundwater	0.05	100%	0.05	0.00	Lower Savannah
Savannah River Remediation - T-Area Industrial Well	Manufacturing	Groundwater	0.03	100%	0.03	0.00	Lower Savannah
Bridgestone Americas, Inc./BATO Aiken Plant	Manufacturing	Groundwater	0.01	100%	0.01	0.00	Lower Savannah
Savannah River Site-Saltstone Disposal Facility	Manufacturing	Groundwater	0.03	100%	0.03	0.00	Lower Savannah
Cowden Plantation Farms	Agriculture	Groundwater	0.28	100%	0.28	0.00	Lower Savannah
City of Aiken	Public Supply	Groundwater	5.53	100%	5.53	0.00	Lower Savannah
Talatha Rural Water District	Public Supply	Groundwater	0.13	100%	0.13	0.00	Lower Savannah

User	Use Category	Source	Withdrawal (MGD)	Consumptive Use (%)	Consumptive Use (MGD)	Return (MGD)	Basin
Bath Water & Sewer District	Public Supply	Groundwater	0.06	100%	0.06	0.00	Lower Savannah
Breezy Hill Water & Sewer Co.	Public Supply	Groundwater	1.25	100%	1.25	0.00	Lower Savannah
VALLEY PSA	Public Supply	Groundwater	0.92	100%	0.92	0.00	Lower Savannah
Beech Island Rural Community Water District	Public Supply	Groundwater	1.70	100%	1.70	0.00	Lower Savannah
Langley Water Sewer and Fire District	Public Supply	Groundwater	0.13	100%	0.13	0.00	Lower Savannah
Jackson Town of	Public Supply	Groundwater	0.34	100%	0.34	0.00	Lower Savannah
Burnnettown Town of	Public Supply	Groundwater	0.09	100%	0.09	0.00	Lower Savannah
New Ellenton CPW	Public Supply	Groundwater	0.97	100%	0.97	0.00	Lower Savannah
College Acres Public Works District	Public Supply	Groundwater	0.15	100%	0.15	0.00	Lower Savannah
SRNS B Area WS	Public Supply	Groundwater	0.79	100%	0.77	0.00	Lower Savannah
SRNS SRS G AREA MISC WS	Public Supply	Groundwater	0.005	100%	0.00	0.00	Lower Savannah
Trolley Run Station Development	Public Supply	Groundwater	0.30	100%	0.30	0.00	Lower Savannah
ARCHROMA MARTIN PLANT	Manufacturing	Groundwater	1.84	12%	0.22	1.62	Lower Savannah
Rouse Farms - Allendale	Agriculture	Groundwater	0.37	100%	0.37	0.00	Salkehatchie
Chappell Farms	Agriculture	Groundwater	0.10	100%	0.10	0.00	Lower Savannah
J&J Farms of Estill, SC Inc.	Agriculture	Groundwater	0.48	100%	0.48	0.00	Lower Savannah
Sharp & Sharp Certified Seed	Agriculture	Groundwater	1.80	100%	1.80	0.00	Salkehatchie
Duncan Farms	Agriculture	Groundwater	0.06	100%	0.06	0.00	Lower Savannah

User	Use Category	Source	Withdrawal (MGD)	Consumptive Use (%)	Consumptive Use (MGD)	Return (MGD)	Basin
Creek Plantation, LLC	Agriculture	Groundwater	0.86	100%	0.86	0.00	Lower Savannah
JCO Farms	Agriculture	Groundwater	4.34	100%	4.34	0.00	Salkehatchie
Connelly Farms	Agriculture	Groundwater	0.30	100%	0.30	0.00	Salkehatchie
Allendale Peanut Farms, LLC	Agriculture	Groundwater	0.10	100%	0.10	0.00	Salkehatchie
CF Bowers & Son	Agriculture	Groundwater	0.06	100%	0.06	0.00	Lower Savannah
Coosaw Ag, LLC	Agriculture	Groundwater	0.47	100%	0.47	0.00	Salkehatchie
T&M Farms	Agriculture	Groundwater	0.41	100%	0.41	0.00	Salkehatchie
Nimmer Sycamore Farm	Agriculture	Groundwater	0.02	100%	0.02	0.00	Salkehatchie
Carolina Turfgrass	Agriculture	Groundwater	0.06	100%	0.06	0.00	Salkehatchie
Allendale Biomass, LLC	Thermoelectric	Groundwater	0.37	100%	0.37	0.00	Salkehatchie
Allendale Water System	Public Supply	Groundwater	0.64	100%	0.64	0.00	Salkehatchie
Town of Fairfax	Public Supply	Groundwater	0.22	100%	0.22	0.00	Salkehatchie
Town of Ulmer	Public Supply	Groundwater	0.04	100%	0.04	0.00	Salkehatchie
Allendale Industrial Park	Public Supply	Groundwater	0.28	100%	0.28	0.00	Salkehatchie
West Fraser	Public Supply	Groundwater	0.09	100%	0.09	0.00	Salkehatchie
Brubaker Farms, Inc.	Agriculture	Groundwater	0.89	100%	0.89	0.00	Salkehatchie
Platt Farm - Home Place	Agriculture	Groundwater	0.05	100%	0.05	0.00	Salkehatchie
Gary Hege Farm	Agriculture	Groundwater	0.75	100%	0.75	0.00	Salkehatchie
Sunrise Dairy - Bamberg	Agriculture	Groundwater	0.19	100%	0.19	0.00	Salkehatchie
Diem Farm	Agriculture	Groundwater	0.04	100%	0.04	0.00	Salkehatchie

User	Use Category	Source	Withdrawal (MGD)	Consumptive Use (%)	Consumptive Use (MGD)	Return (MGD)	Basin
Triple R Farms of Ehrhardt, LLC	Agriculture	Groundwater	0.35	100%	0.35	0.00	Salkehatchie
Laurie W. Copeland Farms	Agriculture	Groundwater	0.34	100%	0.34	0.00	Salkehatchie
Double B Farms	Agriculture	Groundwater	0.16	100%	0.16	0.00	Salkehatchie
Kirkland Creek Farms	Agriculture	Groundwater	0.08	100%	0.08	0.00	Salkehatchie
Old Salem Dairy LLC	Agriculture	Groundwater	1.19	100%	1.19	0.00	Salkehatchie
Federate Farm, LLC	Agriculture	Groundwater	0.10	100%	0.10	0.00	Salkehatchie
Sease Farm, LLC	Agriculture	Groundwater	0.07	100%	0.07	0.00	Salkehatchie
Travis Still Farms	Agriculture	Groundwater	0.74	100%	0.74	0.00	Salkehatchie
Richard Rentz Farm	Agriculture	Groundwater	0.05	100%	0.05	0.00	Salkehatchie
Tractor Road Bamberg SC LLC - Tractor Road	Agriculture	Groundwater	0.45	100%	0.45	0.00	Salkehatchie
FPI Properties, LLC - Cypress Bay Farm	Agriculture	Groundwater	0.67	100%	0.67	0.00	Salkehatchie
FPI Properties, LLC - Olar Farm	Agriculture	Groundwater	0.81	100%	0.81	0.00	Salkehatchie
Hughes Field	Agriculture	Groundwater	0.18	100%	0.18	0.00	Salkehatchie
Chitty Farm	Agriculture	Groundwater	0.04	100%	0.04	0.00	Salkehatchie
Jade Collins Farms, LLC	Agriculture	Groundwater	0.03	100%	0.03	0.00	Salkehatchie
Herndon Farms	Agriculture	Groundwater	0.05	100%	0.05	0.00	Salkehatchie
Cypress Dairy	Agriculture	Groundwater	0.08	100%	0.08	0.00	Salkehatchie
Jason Still Farms - Honey Ford	Agriculture	Groundwater	0.63	100%	0.63	0.00	Salkehatchie
Jason Still Farms - Olar	Agriculture	Groundwater	0.06	100%	0.06	0.00	Salkehatchie
Carolina Turfgrass and Landscape Supply	Agriculture	Groundwater	0.13	100%	0.13	0.00	Salkehatchie

User	Use Category	Source	Withdrawal (MGD)	Consumptive Use (%)	Consumptive Use (MGD)	Return (MGD)	Basin
Bamberg Board of Public Works - Lower Savannah	Public Supply	Groundwater	0.30	100%	0.30	0.00	Lower Savannah
Bamberg Board of Public Works - Salkehatchie	Public Supply	Groundwater	0.42	100%	0.42	0.00	Salkehatchie
City of Denmark Water System	Public Supply	Groundwater	0.30	100%	0.30	0.00	Salkehatchie
Ehrhardt Town of	Public Supply	Groundwater	0.04	100%	0.04	0.00	Salkehatchie
Olar Town of	Public Supply	Groundwater	0.02	100%	0.02	0.00	Salkehatchie
US DOE Owner and SRNS Operator - D Area Ind	Manufacturing	Groundwater	0.03	100%	0.03	0.00	Lower Savannah
Edisto Research & Education Center	Agriculture	Groundwater	0.16	100%	0.16	0.00	Salkehatchie
Walker Nix Farms, LLC	Agriculture	Groundwater	0.64	100%	0.64	0.00	Salkehatchie
Rob Bates Farms, LLC	Agriculture	Groundwater	0.02	100%	0.02	0.00	Salkehatchie
JWB Farming LLC	Agriculture	Groundwater	0.13	100%	0.13	0.00	Salkehatchie
Jason Still Farms	Agriculture	Groundwater	0.17	100%	0.17	0.00	Salkehatchie
Blackville Farm	Agriculture	Groundwater	0.36	100%	0.36	0.00	Salkehatchie
Jason Still Farms - Barry Creech	Agriculture	Groundwater	0.03	100%	0.03	0.00	Salkehatchie
Heritage Green	Agriculture	Groundwater	0.30	100%	0.30	0.00	Salkehatchie
Sunrise Dairy - Barnwell	Agriculture	Groundwater	0.13	100%	0.13	0.00	Salkehatchie
Sandifer & Son Farms, LLC	Agriculture	Groundwater	0.05	100%	0.05	0.00	Salkehatchie
Matthew Urwick Farm	Agriculture	Groundwater	0.08	100%	0.08	0.00	Salkehatchie
Jason Still Farms - Hwy 304	Agriculture	Groundwater	0.06	100%	0.06	0.00	Salkehatchie

User	Use Category	Source	Withdrawal (MGD)	Consumptive Use (%)	Consumptive Use (MGD)	Return (MGD)	Basin
Jason Still Farms - Robertson Circle	Agriculture	Groundwater	0.06	100%	0.06	0.00	Salkehatchie
Jason Still Farms - Patty	Agriculture	Groundwater	0.01	100%	0.01	0.00	Salkehatchie
Jr's Farm	Agriculture	Groundwater	0.20	100%	0.20	0.00	Salkehatchie
Jason Still Farms LLC	Agriculture	Groundwater	0	100%	0	0	Salkehatchie
Williston Town of	Public Supply	Groundwater	0.60	100%	0.60	0.00	Salkehatchie
Barnwell City of	Public Supply	Groundwater	1.26	100%	1.26	0.00	Salkehatchie
Hilda Town of	Public Supply	Groundwater	0.03	100%	0.03	0.00	Salkehatchie
Waddell Mariculture	Aquaculture	Groundwater	0.03	100%	0.03	0.00	Salkehatchie
Ocean Point Golf Course	Golf Course	Groundwater	0.01	100%	0.01	0.00	Salkehatchie
Water Oak Utility	Golf Course	Groundwater	0.12	100%	0.12	0.00	Lower Savannah
Dataw Island Club	Golf Course	Groundwater	0.06	100%	0.06	0.00	Salkehatchie
Spanish Wells Club	Golf Course	Groundwater	0.05	100%	0.05	0.00	Lower Savannah
Olde Beaufort Golf Club	Golf Course	Groundwater	0.22	100%	0.22	0.00	Salkehatchie
Sanctuary Golf Club	Golf Course	Groundwater	0.04	100%	0.04	0.00	Salkehatchie
Callawassie Island Club	Golf Course	Groundwater	0.06	100%	0.06	0.00	Salkehatchie
Colleton River Club - Nicklaus Course - Lower Savannah	Golf Course	Groundwater	0.01	100%	0.01	0.00	Lower Savannah
Colleton River Club - Nicklaus Course - Salkehatchie	Golf Course	Groundwater	0.38	100%	0.38	0.00	Salkehatchie
Island West Golf Club; IW Homeowners Association	Golf Course	Groundwater	0.02	100%	0.02	0.00	Salkehatchie
Spring Island Club	Golf Course	Groundwater	0.16	100%	0.16	0.00	Salkehatchie

User	Use Category	Source	Withdrawal (MGD)	Consumptive Use (%)	Consumptive Use (MGD)	Return (MGD)	Basin
Bloody Point Golf Club	Golf Course	Groundwater	0.02	100%	0.02	0.00	Lower Savannah
Okatie Creek/Hidden Cypress Golf Club - Lower Savannah	Golf Course	Groundwater	0.03	100%	0.03	0.00	Lower Savannah
Okatie Creek/Hidden Cypress Golf Club - Salkehatchie	Golf Course	Groundwater	0.05	100%	0.05	0.00	Salkehatchie
Belfair Property Owners Association	Golf Course	Groundwater	0.13	100%	0.13	0.00	Salkehatchie
Ocean Creek Golf Course	Golf Course	Groundwater	0.07	100%	0.07	0.00	Salkehatchie
Oldfield Club	Golf Course	Groundwater	0.08	100%	0.08	0.00	Salkehatchie
Eagle's Pointe Golf Club	Golf Course	Groundwater	0.08	100%	0.08	0.00	Salkehatchie
Crescent Pointe Golf club	Golf Course	Groundwater	0.12	100%	0.12	0.00	Salkehatchie
Colleton River Club - Dye Course	Golf Course	Groundwater	0.23	100%	0.23	0.00	Salkehatchie
Chechessee Creek Club	Golf Course	Groundwater	0.11	100%	0.11	0.00	Salkehatchie
Haig Point Club & Community Association	Golf Course	Groundwater	0.10	100%	0.10	0.00	Lower Savannah
Berkeley Hall Club	Golf Course	Groundwater	0.04	100%	0.04	0.00	Salkehatchie
Hampton Hall Golf Club	Golf Course	Groundwater	0.04	100%	0.04	0.00	Lower Savannah
Pinecrest Golf Club	Golf Course	Groundwater	0.13	100%	0.13	0.00	Salkehatchie
May River Golf Club	Golf Course	Groundwater	0.13	100%	0.13	0.00	Lower Savannah
Bray's Island Plantation Colony	Golf Course	Groundwater	0.006	100%	0.01	0.00	Salkehatchie
Argent 2 Golf Course	Golf Course	Groundwater	0.04	100%	0.04	0.00	Lower Savannah

User	Use Category	Source	Withdrawal (MGD)	Consumptive Use (%)	Consumptive Use (MGD)	Return (MGD)	Basin
Resort Services Inc.	Manufacturing	Groundwater	0.07	100%	0.07	0.00	Lower Savannah
Kuzzens Inc. - Capers Farm	Agriculture	Groundwater	0.06	100%	0.06	0.00	Salkehatchie
Seaside Farm, Inc.	Agriculture	Groundwater	0.48	100%	0.48	0.00	Salkehatchie
Dempsey Farms	Agriculture	Groundwater	0.01	100%	0.01	0.00	Salkehatchie
Henry Farms Inc. - Dairy Farm	Agriculture	Groundwater	0.04	100%	0.04	0.00	Salkehatchie
Kuzzens Inc. - Bayview Farm	Agriculture	Groundwater	0.13	100%	0.13	0.00	Salkehatchie
Kuzzens Inc. - Johnny & Norman Jones Farm	Agriculture	Groundwater	0.10	100%	0.10	0.00	Salkehatchie
Kuzzens Inc. - Orange Grove Farm	Agriculture	Groundwater	0.14	100%	0.14	0.00	Salkehatchie
Henry Farms	Agriculture	Groundwater	0.08	100%	0.08	0.00	Salkehatchie
Station Creek Inc. - Seaside Farms	Agriculture	Groundwater	0.05	100%	0.05	0.00	Salkehatchie
Kuzzens Inc. - Station Creek Farm	Agriculture	Groundwater	0.06	100%	0.06	0.00	Salkehatchie
Kuzzens Inc. - Pine Grove Farm	Agriculture	Groundwater	0.04	100%	0.04	0.00	Salkehatchie
Kuzzens Inc. - Tommy Sanders Fields	Agriculture	Groundwater	0.08	100%	0.08	0.00	Salkehatchie
Kuzzens Inc. - Penn Center Fields	Agriculture	Groundwater	0.12	100%	0.12	0.00	Salkehatchie
Beaufort National Cemetery	Agriculture	Groundwater	0.04	100%	0.04	0.00	Salkehatchie
Coosaw Ag, LLC - Station Creek	Agriculture	Groundwater	0.02	100%	0.02	0.00	Salkehatchie
St. Helena Community Farm	Agriculture	Groundwater	0.02	100%	0.02	0.00	Salkehatchie

User	Use Category	Source	Withdrawal (MGD)	Consumptive Use (%)	Consumptive Use (MGD)	Return (MGD)	Basin
Country Club Bluff Lake Association	Golf Course	Groundwater	0.06	100%	0.06	0.00	Salkehatchie
Beaufort Jasper W&SA - Main Plant	Public Supply	Groundwater	0.32	100%	0.32	0.00	Salkehatchie
Broad Creek PSD - Main Water System	Public Supply	Groundwater	1.57	100%	1.57	0.00	Lower Savannah
South Island PSD - Main Complex	Public Supply	Groundwater	4.15	100%	4.15	0.00	Lower Savannah
Hilton Head No. 1 PSD - Salkehatchie	Public Supply	Groundwater	0.05	100%	0.05	0.00	Salkehatchie
Daufuskie Island Utility Co. - Melrose Pappy	Public Supply	Groundwater	0.05	100%	0.05	0.00	Lower Savannah
Daufuskie Island Utility Co. - Haig Point	Public Supply	Groundwater	0.15	100%	0.15	0.00	Lower Savannah
South Island PSD - Long Cove	Public Supply	Groundwater	0.23	100%	0.23	0.00	Lower Savannah
South Island PSD - Cordillo	Public Supply	Groundwater	1.69	100%	1.69	0.00	Lower Savannah
South Island PSD - Wexford Club	Public Supply	Groundwater	0.25	100%	0.25	0.00	Lower Savannah
Cherokee Plantation Owners, LLC	Golf Course	Groundwater	0.13	100%	0.13	0.00	Salkehatchie
Williams Farms Partnership	Agriculture	Groundwater	3.01	100%	3.01	0.00	Salkehatchie
Carter Farms	Agriculture	Groundwater	0.01	100%	0.01	0.00	Salkehatchie
Indigo Branch Farm	Agriculture	Groundwater	0.004	100%	0.004	0.000	Salkehatchie
Rizer Farms	Agriculture	Groundwater	0.08	100%	0.08	0.00	Salkehatchie
Kinard Farms	Agriculture	Groundwater	0.01	100%	0.01	0.00	Salkehatchie
Benton Farms	Agriculture	Groundwater	0.17	100%	0.17	0.00	Salkehatchie
Big O Farm, LLC	Agriculture	Groundwater	0.11	100%	0.11	0.00	Salkehatchie

User	Use Category	Source	Withdrawal (MGD)	Consumptive Use (%)	Consumptive Use (MGD)	Return (MGD)	Basin
RRR Farms, LLC - Myers Farm	Agriculture	Groundwater	0.01	100%	0.01	0.00	Salkehatchie
City of Walterboro	Public Supply	Groundwater	1.62	100%	1.62	0.00	Salkehatchie
Fish Network Inc.	Aquaculture	Groundwater	0.38	100%	0.38	0.00	Salkehatchie
Recycled Group of South Carolina, LLC	Manufacturing	Groundwater	0.07	100%	0.07	0.00	Salkehatchie
Youmans Farms - Peeples Pivot	Agriculture	Groundwater	0.18	100%	0.18	0.00	Lower Savannah
Corrin F. Bowers & Son - Lower Savannah	Agriculture	Groundwater	0.14	100%	0.14	0.00	Lower Savannah
Corrin F. Bowers & Son - Salkehatchie	Agriculture	Groundwater	0.25	100%	0.25	0.00	Salkehatchie
Rouse Farms - Lower Savannah	Agriculture	Groundwater	0.25	100%	0.25	0.00	Lower Savannah
Rouse Farms - Salkehatchie	Agriculture	Groundwater	0.79	100%	0.79	0.00	Salkehatchie
Mole Farms	Agriculture	Groundwater	0.08	100%	0.08	0.00	Salkehatchie
Corrin F. Bowers & Son - Laffitte	Agriculture	Groundwater	0.15	100%	0.15	0.00	Lower Savannah
Crapse Farms	Agriculture	Groundwater	0.49	100%	0.49	0.00	Salkehatchie
Mickey Ginn Farm	Agriculture	Groundwater	0.17	100%	0.17	0.00	Salkehatchie
Kuzzens Inc. - Weekly Farm	Agriculture	Groundwater	0.06	100%	0.06	0.00	Salkehatchie
Kuzzens Inc. - Varnville Farm	Agriculture	Groundwater	0.10	100%	0.10	0.00	Salkehatchie
Nimmer Turf & Tree Farm	Agriculture	Groundwater	0.47	100%	0.47	0.00	Salkehatchie
Mixon 100 Acre Plot	Agriculture	Groundwater	0.09	100%	0.09	0.00	Salkehatchie
TBR Way	Agriculture	Groundwater	0.05	100%	0.05	0.00	Salkehatchie

User	Use Category	Source	Withdrawal (MGD)	Consumptive Use (%)	Consumptive Use (MGD)	Return (MGD)	Basin
Jarrell Jerry Farms - Lower Savannah	Agriculture	Groundwater	0.05	100%	0.05	0.00	Lower Savannah
Jarrell Jerry Farms - Salkehatchie	Agriculture	Groundwater	0.03	100%	0.03	0.00	Salkehatchie
David Jarrell Farm	Agriculture	Groundwater	0.04	100%	0.04	0.00	Salkehatchie
Nimmer Turf & Tree Farm - Estill Farm	Agriculture	Groundwater	0.21	100%	0.21	0.00	Salkehatchie
Nimmer Turf & Tree Farm - Ti Aun Crossroads	Agriculture	Groundwater	0.07	100%	0.07	0.00	Salkehatchie
Coosaw Ag., LLC	Agriculture	Groundwater	0.22	100%	0.22	0.00	Salkehatchie
Jarrell Jerry Farms - Hamilton Road	Agriculture	Groundwater	0.03	100%	0.03	0.00	Salkehatchie
T&J Farms	Agriculture	Groundwater	0.09	100%	0.09	0.00	Lower Savannah
C&C Farms of Brunson	Agriculture	Groundwater	0.85	100%	0.85	0.00	Salkehatchie
Youmans Farms - Salkehatchie	Agriculture	Groundwater	0.72	100%	0.72	0.00	Salkehatchie
Youmans Farms - Lower Savannah	Agriculture	Groundwater	1.19	100%	1.19	0.00	Lower Savannah
McMillan Farms	Agriculture	Groundwater	0.06	100%	0.06	0.00	Salkehatchie
Sarah Tuten Field	Agriculture	Groundwater	0.15	100%	0.15	0.00	Lower Savannah
Griner Farms - Doc Harper & Lawton	Agriculture	Groundwater	0.16	100%	0.16	0.00	Lower Savannah
Griner Farms - Tuten	Agriculture	Groundwater	0.21	100%	0.21	0.00	Salkehatchie
Tony Jarrell Farm	Agriculture	Groundwater	0.07	100%	0.07	0.00	Salkehatchie
J&J Farms of Estill SC	Agriculture	Groundwater	0.01	100%	0.01	0.00	Lower Savannah
Smith Farms	Agriculture	Groundwater	0.01	100%	0.01	0.00	Salkehatchie
D&D Connelly Farm	Agriculture	Groundwater	0.01	100%	0.01	0.00	Salkehatchie

User	Use Category	Source	Withdrawal (MGD)	Consumptive Use (%)	Consumptive Use (MGD)	Return (MGD)	Basin
Lowcountry Regional Water System - Hampton	Public Supply	Groundwater	0.33	100%	0.33	0.00	Salkehatchie
Lowcountry Regional Water System - Varnville	Public Supply	Groundwater	0.22	100%	0.22	0.00	Salkehatchie
Town of Estill - Lower Savannah	Public Supply	Groundwater	0.21	100%	0.21	0.00	Savannah
Town of Estill - Salkehatchie	Public Supply	Groundwater	0.28	100%	0.28	0.00	Salkehatchie
Lowcountry Regional Water System - Yemassee	Public Supply	Groundwater	0.15	100%	0.15	0.00	Salkehatchie
Town of Furman	Public Supply	Groundwater	0.04	100%	0.04	0.00	Lower Savannah
Lowcountry Regional Water System - Brunson & Gifford	Public Supply	Groundwater	0.07	100%	0.07	0.00	Salkehatchie
Lowcountry Regional Water System - Hampton County Industrial Park	Public Supply	Groundwater	0.02	100%	0.02	0.00	Salkehatchie
Hampton Pointe Golf Course	Golf Course	Groundwater	0.05	100%	0.05	0.00	Lower Savannah
Golf Club at Hilton Head Lakes	Golf Course	Groundwater	0.04	100%	0.04	0.00	Lower Savannah
Congaree Golf Club	Golf Course	Groundwater	0.13	100%	0.13	0.00	Salkehatchie
Wise Batten Farm	Agriculture	Groundwater	0.10	100%	0.10	0.00	Lower Savannah
Nimmer Turf & Tree Farm - Main Farm	Agriculture	Groundwater	0.34	100%	0.34	0.00	Lower Savannah
Nimmer Turf & Tree Farm - Hwy 652	Agriculture	Groundwater	0.06	100%	0.06	0.00	Lower Savannah

User	Use Category	Source	Withdrawal (MGD)	Consumptive Use (%)	Consumptive Use (MGD)	Return (MGD)	Basin
Nimmer Turf & Tree Farm - Nursery	Agriculture	Groundwater	0.05	100%	0.05	0.00	Lower Savannah
Nimmer Turf & Tree Farm - Hwy 278	Agriculture	Groundwater	0.17	100%	0.17	0.00	Lower Savannah
Nimmer Turf & Tree Farm - Coosawahatchie	Agriculture	Groundwater	0.02	100%	0.02	0.00	Salkehatchie
Low Country Chemical Lawn Care Inc. - Coosawhatchie	Agriculture	Groundwater	0.04	100%	0.04	0.00	Salkehatchie
Nimmer Turf & Tree Farm - Road 654	Agriculture	Groundwater	0.09	100%	0.09	0.00	Lower Savannah
Youmans Farms - Barnes Robertville	Agriculture	Groundwater	0.11	100%	0.11	0.00	Lower Savannah
Youmans Farms - Church Newground	Agriculture	Groundwater	0.03	100%	0.03	0.00	Salkehatchie
CW Degler Septic Tank	Agriculture	Groundwater	0.0002	100%	0.0002	0.0000	Salkehatchie
Minto Communities - Margaritaville	Agriculture	Groundwater	0.14	100%	0.14	0.00	Lower Savannah
ANILORAC FARM	Agriculture	Groundwater	0.003	100%	0.003	0.000	Salkehatchie
Beaufort Jasper W&SA - Hardeeville	Public Supply	Groundwater	0.01	100%	0.01	0.00	Lower Savannah
Town of Ridgeland	Public Supply	Groundwater	0.74	100%	0.74	0.00	Salkehatchie
Beaufort Jasper W&SA - Point South	Public Supply	Groundwater	0.05	100%	0.05	0.00	Salkehatchie
Beaufort Jasper W&SA - Levy	Public Supply	Groundwater	0.03	100%	0.03	0.00	Lower Savannah
Beaufort Jasper W&SA - Palm Key	Public Supply	Groundwater	0.01	100%	0.01	0.00	Salkehatchie
Deer Hill Farms	Agriculture	Groundwater	0.36	100%	0.36	0.00	Salkehatchie

User	Use Category	Source	Withdrawal (MGD)	Consumptive Use (%)	Consumptive Use (MGD)	Return (MGD)	Basin
Bray's Island Plantation Colony - WS	Public Supply	Groundwater	0.009	100%	0.01	0.00	Salkehatchie
Hilton Head No. 1 PSD - Lower Savannah	Public Supply	Groundwater	5.61	100%	5.61	0.00	Lower Savannah
Allendale	Public Supply	Discharge				1.46	Lower Savannah
Aiken/Newberry/SCW SA Import	Public Supply	Discharge				10.26	Lower Savannah
SC Minerals	Manufacturing	Discharge				0.77	Lower Savannah
Barnwell	Public Supply	Discharge				1.10	Salkehatchie
Denmark	Public Supply	Discharge				0.43	Salkehatchie
Hampton	Public Supply	Discharge				0.87	Salkehatchie
Yemassee	Public Supply	Discharge				0.18	Salkehatchie

*Groundwater consumptive use was not calculated and is listed as 100%

Table B-2. Permit and Registration Amounts for Current Water Users.

User	Use Category	Water Source	Permit or Registration	Permit or Registration Amount (MGD)	Permit or Registration Amount (MGM)	Permit or Registration Amount (MGY)	Basin
US DOE	Manufacturing	Surface Water	Permit	828.5	25185.0	302220	Lower Savannah
BJW&SA	Public Supply	Surface Water	Permit	159.1	4836.0	58032	Lower Savannah
The Reserve	Golf Course	Surface Water	Permit	0.7	22.0	264	Lower Savannah
Connelly (Miller)	Agriculture	Surface Water	Registration	3.5	107.0	1283.484	Salkehatchie
Kimberly-Clark	Manufacturing	Surface Water	Permit	52.9	1607.0	19284	Lower Savannah
Dominion Urquhart Station	Thermoelectric	Surface Water	Permit	217.1	6600.0	79200	Lower Savannah
Woodside	Golf Course	Surface Water	Permit	6.2	187.5	2249.856	Lower Savannah
River Golf Club	Golf Course	Surface Water	Permit	1.0	30.1	361.56	Lower Savannah
Riddle Dairy Farm	Agriculture	Surface Water	Registration	0.7	22.7	272.4	Salkehatchie
North Augusta	Public Supply	Surface Water	Permit	42.8	1302.0	15624	Lower Savannah
Breezy Hill	Public Supply	Surface Water	Permit	55.1	1674.0	20088	Lower Savannah
ECW&SA	Public Supply	Surface Water	Permit	22.9	697.5	8370	Lower Savannah
Mohawk	Public Supply	Surface Water	Permit	4.9	150.0	1800	Lower Savannah
Graniteville	Public Supply	Surface Water	Permit	24.4	741.7	8900.4	Lower Savannah
Sage Valley	Golf Course	Surface Water	Permit	5.3	160.6	1926.96	Lower Savannah
Chappell	Agriculture	Surface Water	Registration	1.3	40.7	488.832	Salkehatchie

User	Use Category	Water Source	Permit or Registration	Permit or Registration Amount (MGD)	Permit or Registration Amount (MGM)	Permit or Registration Amount (MGY)	Basin
JCO Farms	Agriculture	Surface Water	Registration	20.2	615.4	7384.8	Salkehatchie
Sharp & Sharp	Agriculture	Surface Water	Registration	6.7	204.0	2448	Salkehatchie
Withycombe Farm	Agriculture	Surface Water	Registration	1.3	40.0	480	Salkehatchie
Coosaw Farms	Agriculture	Surface Water	Registration	0.9	27.5	330.12	Salkehatchie
Diem Aden	Agriculture	Surface Water	Registration	0.6	16.9	202.416	Salkehatchie
Danny Hege	Agriculture	Surface Water	Registration	1.4	41.3	495.6	Salkehatchie
Connelly (Mainstem)	Agriculture	Surface Water	Registration	3.0	90.8	1089.6	Salkehatchie
Williams (Little Salkehatchie)	Agriculture	Surface Water	Registration	1.0	30.0	360	Salkehatchie
Gary Hege (Mainstem)	Agriculture	Surface Water	Registration	2.3	68.6	823.2	Salkehatchie
Breland	Agriculture	Surface Water	Registration	0.1	3.0	36	Salkehatchie
Williams (Willow)	Agriculture	Surface Water	Registration	3.6	108.0	1296	Salkehatchie
Brubaker	Agriculture	Surface Water	Registration	1.0	30.0	360	Salkehatchie
Mason's Master Turf	Agriculture	Surface Water	Registration	0.0	0.0	0.084	Lower Savannah
SRS F AREA IND	Manufacturing	Groundwater	Registration	0.02	0.5	6.0	Savannah
SRNS FORESTRY	Manufacturing	Groundwater	Registration	0.00	0.03	0.4	Savannah
Bridgestone Americas, Inc./BATO Aiken Plant	Manufacturing	Groundwater	Registration	0.01	0.3	4.1	Savannah
SRNS SRS G AREA MISC WS	Public Supply	Groundwater	Registration	0.00	0.15	1.8	Savannah

User	Use Category	Water Source	Permit or Registration	Permit or Registration Amount (MGD)	Permit or Registration Amount (MGM)	Permit or Registration Amount (MGY)	Basin
ANILORAC FARM	Agriculture	Groundwater	Registration	0.00	0.09	1.1	Salkehatchie
Ehrhardt Town of	Public Supply	Groundwater	Registration	0.04	1.2	14.2	Salkehatchie
Olar Town of	Public Supply	Groundwater	Registration	0.02	0.6	7.0	Salkehatchie
Bloody Point Golf Club	Golf Course	Groundwater	Registration	0.02	0.6	7.5	Savannah
Henry Farms Inc. - Dairy Farm	Agriculture	Groundwater	Registration	0.04	1.1	13.4	Salkehatchie
CW Degler Septic Tank	Agriculture	Groundwater	Registration	0.00	0.0	0.1	Salkehatchie
Youmans Farms - Peeples Pivot	Agriculture	Groundwater	Permit	0.26	8.0	96.0	Lower Savannah
Youmans Farms - Church Newground	Agriculture	Groundwater	Permit	0.05	1.4	17.0	Salkehatchie
Youmans Farms - Barnes Robertville	Agriculture	Groundwater	Permit	0.16	5.0	60.0	Lower Savannah
YOUMANS FARMS - Lower Savannah	Agriculture	Groundwater	Permit	1.94	59.0	707.7	Lower Savannah
YOUMANS FARMS - Salkehatchie	Agriculture	Groundwater	Permit	0.71	21.4	257.3	Salkehatchie
Woodside Golf LLC / DBA The Reserve Club	Golf Course	Groundwater	Permit	0.07	2.0	24.0	Lower Savannah
Wise Batten Farm	Agriculture	Groundwater	Permit	0.17	5.3	63.0	Lower Savannah

User	Use Category	Water Source	Permit or Registration	Permit or Registration Amount (MGD)	Permit or Registration Amount (MGM)	Permit or Registration Amount (MGY)	Basin
Williston Town of	Public Supply	Groundwater	Permit	0.65	19.9	239.0	Salkehatchie
WILLIAMS FARMS PARTNERSHIP	Agriculture	Groundwater	Permit	6.01	182.9	2,195.0	Salkehatchie
Water Oak Utility	Golf Course	Groundwater	Permit	0.21	6.3	75.0	Lower Savannah
Walker Nix Farms, LLC	Agriculture	Groundwater	Permit	1.12	33.9	407.0	Salkehatchie
Waddell Mariculture	Aquaculture	Groundwater	Permit	0.10	3.0	36.0	Salkehatchie
VALLEY PSA	Public Supply	Groundwater	Permit	1.28	38.9	467.2	Lower Savannah
US DOE Owner and SRNS Operator - D Area Ind	Manufacturing	Groundwater	Permit	0.33	10.0	120.0	Lower Savannah
Trolley Run Station Development	Public Supply	Groundwater	Permit	0.42	12.6	151.6	Lower Savannah
Triple R Farms of Ehrhardt, LLC	Agriculture	Groundwater	Permit	0.52	15.8	189.0	Salkehatchie
Travis Still Farms	Agriculture	Groundwater	Permit	0.92	28.0	335.6	Salkehatchie
Tractor Road Bamberg SC LLC - Tractor Road	Agriculture	Groundwater	Permit	0.75	23.0	275.4	Salkehatchie
Town of Ulmer	Public Supply	Groundwater	Permit	0.08	2.5	30.0	Salkehatchie
Town of Ridgeland	Public Supply	Groundwater	Permit	1.16	35.3	424.0	Salkehatchie

User	Use Category	Water Source	Permit or Registration	Permit or Registration Amount (MGD)	Permit or Registration Amount (MGM)	Permit or Registration Amount (MGY)	Basin
Town of Furman	Public Supply	Groundwater	Permit	0.07	2.0	24.0	Lower Savannah
Town of Fairfax	Public Supply	Groundwater	Permit	0.33	10.2	122.0	Salkehatchie
Town of Estill - Salkehatchie	Public Supply	Groundwater	Permit	0.41	12.5	150.0	Salkehatchie
Town of Estill - Lower Savannah	Public Supply	Groundwater	Permit	0.21	6.3	75.0	Lower Savannah
Tony Jarrell Farm	Agriculture	Groundwater	Permit	0.10	2.9	35.0	Salkehatchie
TBR Way	Agriculture	Groundwater	Permit	0.10	3.0	36.0	Salkehatchie
Talatha Rural Water District	Public Supply	Groundwater	Permit	0.16	4.7	56.8	Lower Savannah
T&M Farms	Agriculture	Groundwater	Permit	0.89	27.1	325.0	Salkehatchie
T&J Farms	Agriculture	Groundwater	Permit	0.11	3.4	41.0	Lower Savannah
Sunrise Dairy - Barnwell	Agriculture	Groundwater	Permit	0.25	7.5	90.0	Salkehatchie
Sunrise Dairy - Bamberg	Agriculture	Groundwater	Permit	0.25	7.5	90.0	Salkehatchie
Station Creek Inc. - Seaside Farms	Agriculture	Groundwater	Permit	0.12	3.8	45.0	Salkehatchie
St. Helena Community Farm	Agriculture	Groundwater	Permit	0.10	3.2	38.0	Salkehatchie
SRNS SRS H AREA IND	Manufacturing	Groundwater	Permit	0.89	27.1	325.0	Lower Savannah
SRNS SRS A Area Ind	Manufacturing	Groundwater	Permit	1.88	57.2	686.5	Lower Savannah

User	Use Category	Water Source	Permit or Registration	Permit or Registration Amount (MGD)	Permit or Registration Amount (MGM)	Permit or Registration Amount (MGY)	Basin
SRNS B Area WS	Public Supply	Groundwater	Permit	1.05	31.8	382.0	Lower Savannah
SPRING ISLAND CLUB	Golf Course	Groundwater	Permit	0.26	8.0	96.0	Salkehatchie
Spanish Wells Club	Golf Course	Groundwater	Permit	0.07	2.3	27.4	Lower Savannah
South Island PSD - Wexford Club	Public Supply	Groundwater	Permit	9.64	293.4	3,520.3	Lower Savannah
South Island PSD - Main Complex	Public Supply	Groundwater	Permit	9.64	293.4	3,520.3	Lower Savannah
South Island PSD - Long Cove	Public Supply	Groundwater	Permit	9.64	293.4	3,520.3	Lower Savannah
South Island PSD - Cordillo	Public Supply	Groundwater	Permit	9.64	293.4	3,520.3	Lower Savannah
Smith Farms	Agriculture	Groundwater	Permit	0.06	1.9	22.8	Salkehatchie
SHARP & SHARP CERTIFIED SEED	Agriculture	Groundwater	Permit	2.53	76.9	922.8	Salkehatchie
Seaside Farm, Inc.	Agriculture	Groundwater	Permit	0.76	23.3	279.0	Salkehatchie
Sease Farm, LLC	Agriculture	Groundwater	Permit	0.21	6.5	78.3	Salkehatchie
Savannah River Site-Saltstone Disposal Facility	Manufacturing	Groundwater	Permit	0.09	2.9	34.6	Lower Savannah
Savannah River Remediation - T-Area Industrial Well	Manufacturing	Groundwater	Permit	0.05	1.5	18.1	Lower Savannah

User	Use Category	Water Source	Permit or Registration	Permit or Registration Amount (MGD)	Permit or Registration Amount (MGM)	Permit or Registration Amount (MGY)	Basin
Savannah River Remediation - Defense Waste Processing Facility	Manufacturing	Groundwater	Permit	0.09	2.9	34.5	Lower Savannah
Sarah Tuten Field	Agriculture	Groundwater	Permit	0.22	6.7	80.0	Lower Savannah
Sandifer & Son Farms, LLC	Agriculture	Groundwater	Permit	0.20	6.0	71.7	Salkehatchie
Sanctuary Golf Club	Golf Course	Groundwater	Permit	0.14	4.2	50.0	Salkehatchie
RRR Farms, LLC - Myers Farm	Agriculture	Groundwater	Permit	0.30	9.0	107.8	Salkehatchie
Rouse Farms - Allendale	Agriculture	Groundwater	Permit	0.40	12.2	146.3	Salkehatchie
Rouse Farms - Salkehatchie	Agriculture	Groundwater	Permit	0.85	25.7	308.7	Salkehatchie
Rouse Farms - Lower Savannah	Agriculture	Groundwater	Permit	0.38	11.4	137.2	Lower Savannah
Rob Bates Farms, LLC	Agriculture	Groundwater	Permit	0.95	28.8	345.0	Salkehatchie
Rizer Farms	Agriculture	Groundwater	Permit	0.13	4.1	49.1	Salkehatchie
Richard Rentz Farm	Agriculture	Groundwater	Permit	0.10	2.9	35.0	Salkehatchie
Resort Services Inc.	Manufacturing	Groundwater	Permit	0.13	4.0	48.0	Lower Savannah
Recycled Group of South Carolina, LLC	Manufacturing	Groundwater	Permit	0.64	19.3	231.8	Salkehatchie
Platt Farm - Home Place	Agriculture	Groundwater	Permit	0.04	1.3	15.0	Salkehatchie

User	Use Category	Water Source	Permit or Registration	Permit or Registration Amount (MGD)	Permit or Registration Amount (MGM)	Permit or Registration Amount (MGY)	Basin
Pinecrest Golf Club	Golf Course	Groundwater	Permit	0.23	6.9	83.0	Salkehatchie
Oldfield Club	Golf Course	Groundwater	Permit	0.21	6.3	75.0	Salkehatchie
Olde Beaufort Golf Club	Golf Course	Groundwater	Permit	0.27	8.1	97.0	Salkehatchie
Old Salem Dairy LLC	Agriculture	Groundwater	Permit	1.50	45.8	549.0	Salkehatchie
Old Barnwell Golf Course	Golf Course	Groundwater	Permit	0.08	2.5	30.0	Lower Savannah
Okatie Creek/Hidden Cypress Golf Club - Salkehatchie	Golf Course	Groundwater	Permit	0.20	6.1	73.3	Salkehatchie
Okatie Creek/Hidden Cypress Golf Club - Lower Savannah	Golf Course	Groundwater	Permit	0.10	3.1	36.7	Lower Savannah
Ocean Point Golf Course	Golf Course	Groundwater	Permit	0.10	3.0	36.0	Salkehatchie
Ocean Creek Golf Course	Golf Course	Groundwater	Permit	0.17	5.2	62.9	Salkehatchie
West Fraser	Public Supply	Groundwater	Permit	0.16	5.0	60.0	Salkehatchie
Nimmer Turf & Tree Farm - Ti Aun Crossroads	Agriculture	Groundwater	Permit	0.10	3.0	36.0	Salkehatchie
Nimmer Turf & Tree Farm - Road 654	Agriculture	Groundwater	Permit	0.16	5.0	60.0	Lower Savannah

User	Use Category	Water Source	Permit or Registration	Permit or Registration Amount (MGD)	Permit or Registration Amount (MGM)	Permit or Registration Amount (MGY)	Basin
Nimmer Turf & Tree Farm - Nursery	Agriculture	Groundwater	Permit	0.10	3.2	38.0	Lower Savannah
Nimmer Turf & Tree Farm - Main Farm	Agriculture	Groundwater	Permit	0.55	16.7	200.0	Lower Savannah
Nimmer Turf & Tree Farm - Hwy 652	Agriculture	Groundwater	Permit	0.12	3.8	45.0	Lower Savannah
Nimmer Turf & Tree Farm - Hwy 278	Agriculture	Groundwater	Permit	0.17	5.3	63.5	Lower Savannah
Nimmer Turf & Tree Farm - Estill Farm	Agriculture	Groundwater	Permit	0.27	8.2	98.0	Salkehatchie
Nimmer Turf & Tree Farm - Coosawahatchie	Agriculture	Groundwater	Permit	0.04	1.3	16.0	Salkehatchie
Nimmer Turf & Tree Farm	Agriculture	Groundwater	Permit	0.74	22.5	270.0	Salkehatchie
Nimmer Sycamore Farm	Agriculture	Groundwater	Permit	0.33	10.0	120.0	Salkehatchie
New Ellenton CPW	Public Supply	Groundwater	Permit	1.31	39.8	478.0	Lower Savannah
Mole Farms	Agriculture	Groundwater	Permit	0.10	3.0	36.0	Salkehatchie
Mixon 100 Acre Plot	Agriculture	Groundwater	Permit	0.20	6.0	72.0	Salkehatchie
Minto Communities - Margaritaville	Agriculture	Groundwater	Permit	0.70	21.4	257.0	Lower Savannah

User	Use Category	Water Source	Permit or Registration	Permit or Registration Amount (MGD)	Permit or Registration Amount (MGM)	Permit or Registration Amount (MGY)	Basin
Mickey Ginn Farm	Agriculture	Groundwater	Permit	0.16	5.0	60.0	Salkehatchie
McMillan Farms	Agriculture	Groundwater	Permit	0.12	3.6	43.0	Salkehatchie
May River Golf Club	Golf Course	Groundwater	Permit	0.23	7.1	85.0	Lower Savannah
Matthew Urwick Farm	Agriculture	Groundwater	Permit	0.30	9.1	109.4	Salkehatchie
Lowcountry Regional Water System - Yemassee	Public Supply	Groundwater	Permit	0.20	6.1	73.0	Salkehatchie
Lowcountry Regional Water System - Varnville	Public Supply	Groundwater	Permit	0.31	9.5	114.0	Salkehatchie
Lowcountry Regional Water System - Hampton County Industrial Park	Public Supply	Groundwater	Permit	0.10	3.0	36.0	Salkehatchie
Lowcountry Regional Water System - Hampton	Public Supply	Groundwater	Permit	0.58	17.8	213.0	Salkehatchie
Lowcountry Regional Water System - Brunson & Gifford	Public Supply	Groundwater	Permit	0.12	3.5	42.1	Salkehatchie
Low Country Chemical Lawn Care Inc. - Coosawhatchie	Agriculture	Groundwater	Permit	0.10	2.9	35.0	Salkehatchie

User	Use Category	Water Source	Permit or Registration	Permit or Registration Amount (MGD)	Permit or Registration Amount (MGM)	Permit or Registration Amount (MGY)	Basin
Little R Farms	Agriculture	Groundwater	Permit	0.08	2.5	30.0	Salkehatchie
Laurie W. Copeland Farms	Agriculture	Groundwater	Permit	0.49	15.0	180.0	Salkehatchie
Langley Water Sewer and Fire District	Public Supply	Groundwater	Permit	0.19	5.7	68.0	Lower Savannah
Kuzzens Inc. - Weekly Farm	Agriculture	Groundwater	Permit	0.19	5.8	69.0	Salkehatchie
Kuzzens Inc. - Varnville Farm	Agriculture	Groundwater	Permit	0.30	9.0	108.0	Salkehatchie
Kuzzens Inc. - Tommy Sanders Fields	Agriculture	Groundwater	Permit	0.09	2.7	32.3	Salkehatchie
Kuzzens Inc. - Station Creek Farm	Agriculture	Groundwater	Permit	0.22	6.7	80.0	Salkehatchie
Kuzzens Inc. - Pine Grove Farm	Agriculture	Groundwater	Permit	0.13	3.8	45.8	Salkehatchie
Kuzzens Inc. - Penn Center Fields	Agriculture	Groundwater	Permit	0.25	7.5	89.8	Salkehatchie
Kuzzens Inc. - Orange Grove Farm	Agriculture	Groundwater	Permit	0.32	9.7	116.6	Salkehatchie
Kuzzens Inc. - Johnny & Norman Jones Farm	Agriculture	Groundwater	Permit	0.23	7.0	84.0	Salkehatchie
Kuzzens Inc. - Capers Farm	Agriculture	Groundwater	Permit	0.17	5.1	60.7	Salkehatchie

User	Use Category	Water Source	Permit or Registration	Permit or Registration Amount (MGD)	Permit or Registration Amount (MGM)	Permit or Registration Amount (MGY)	Basin
Kuzzens Inc. - Bayview Farm	Agriculture	Groundwater	Permit	0.27	8.3	99.1	Salkehatchie
Kirkland Creek Farms	Agriculture	Groundwater	Permit	0.17	5.3	63.5	Salkehatchie
Kinard Farms	Agriculture	Groundwater	Permit	0.04	1.3	15.0	Salkehatchie
Kimberly Clark Corporation	Manufacturing	Groundwater	Permit	0.26	8.0	95.7	Lower Savannah
JWB Farming LLC	Agriculture	Groundwater	Permit	0.17	5.1	61.0	Salkehatchie
Jr's Farm	Agriculture	Groundwater	Permit	0.03	0.8	9.7	Salkehatchie
JCO Farms	Agriculture	Groundwater	Permit	7.13	216.8	2,601.9	Salkehatchie
Jason Still Farms	Agriculture	Groundwater	Permit	0.14	4.2	50.8	Salkehatchie
Jason Still Farms - Robertson Circle	Agriculture	Groundwater	Permit	0.03	0.8	10.0	Salkehatchie
Jason Still Farms - Patty	Agriculture	Groundwater	Permit	0.03	0.8	10.0	Salkehatchie
Jason Still Farms - Olar	Agriculture	Groundwater	Permit	0.09	2.7	32.0	Salkehatchie
Jason Still Farms - Hwy 304	Agriculture	Groundwater	Permit	0.03	1.0	12.0	Salkehatchie
Jason Still Farms - Honey Ford	Agriculture	Groundwater	Permit	0.89	27.0	323.6	Salkehatchie
Jason Still Farms - Barry Creech	Agriculture	Groundwater	Permit	0.04	1.3	15.0	Salkehatchie

User	Use Category	Water Source	Permit or Registration	Permit or Registration Amount (MGD)	Permit or Registration Amount (MGM)	Permit or Registration Amount (MGY)	Basin
Jarrell Jerry Farms - Hamilton Road	Agriculture	Groundwater	Permit	0.10	3.0	36.0	Salkehatchie
Jarrell Jerry Farms - Salkehatchie	Agriculture	Groundwater	Permit	0.05	1.5	18.0	Salkehatchie
Jarrell Jerry Farms - Lower Savannah	Agriculture	Groundwater	Permit	0.07	2.3	27.0	Lower Savannah
Jade Collins Farms, LLC	Agriculture	Groundwater	Permit	0.30	9.3	111.0	Salkehatchie
Jackson Town of	Public Supply	Groundwater	Permit	0.37	11.3	136.2	Lower Savannah
J&J Farms of Estill, SC Inc.	Agriculture	Groundwater	Permit	0.50	15.2	181.9	Lower Savannah
J&J Farms of Estill SC	Agriculture	Groundwater	Permit	0.09	2.7	32.5	Lower Savannah
Island West Golf Club; IW Homeowners Association	Golf Course	Groundwater	Permit	0.12	3.6	43.5	Salkehatchie
Indigo Branch Farm	Agriculture	Groundwater	Permit	0.03	0.8	10.0	Salkehatchie
Hughes Field	Agriculture	Groundwater	Permit	0.17	5.1	61.0	Salkehatchie
Hilton Head No. 1 PSD - Salkehatchie	Public Supply	Groundwater	Permit	1.07	32.5	389.7	Salkehatchie
Hilton Head No. 1 PSD - Lower Savannah	Public Supply	Groundwater	Permit	9.30	283.0	3,396.1	Lower Savannah

User	Use Category	Water Source	Permit or Registration	Permit or Registration Amount (MGD)	Permit or Registration Amount (MGM)	Permit or Registration Amount (MGY)	Basin
Hilda Town of	Public Supply	Groundwater	Permit	0.04	1.2	14.2	Salkehatchie
Herndon Farms	Agriculture	Groundwater	Permit	0.05	1.7	20.0	Salkehatchie
Heritage Green	Agriculture	Groundwater	Permit	0.47	14.2	170.0	Salkehatchie
Henry Farms	Agriculture	Groundwater	Permit	0.27	8.2	98.0	Salkehatchie
Hampton Pointe Golf Course	Golf Course	Groundwater	Permit	0.14	4.2	50.0	Lower Savannah
Hampton Hall Golf Club	Golf Course	Groundwater	Permit	0.12	3.7	44.0	Lower Savannah
Haig Point Club & Community Association	Golf Course	Groundwater	Permit	0.35	10.7	128.0	Lower Savannah
Griner Farms - Tuten	Agriculture	Groundwater	Permit	0.23	7.1	85.0	Salkehatchie
Griner Farms - Doc Harper & Lawton	Agriculture	Groundwater	Permit	0.33	10.0	120.0	Lower Savannah
Golf Club at Hilton Head Lakes	Golf Course	Groundwater	Permit	0.07	2.1	25.0	Lower Savannah
GARY HEGE FARM	Agriculture	Groundwater	Permit	1.37	41.7	500.0	Salkehatchie
FPI Properties, LLC - Olar Farm	Agriculture	Groundwater	Permit	1.26	38.4	461.0	Salkehatchie
FPI Properties, LLC - Cypress Bay Farm	Agriculture	Groundwater	Permit	1.10	33.3	400.0	Salkehatchie
Fish Network Inc.	Aquaculture	Groundwater	Permit	0.52	15.8	190.0	Salkehatchie

User	Use Category	Water Source	Permit or Registration	Permit or Registration Amount (MGD)	Permit or Registration Amount (MGM)	Permit or Registration Amount (MGY)	Basin
Federate Farm, LLC	Agriculture	Groundwater	Permit	0.27	8.1	97.5	Salkehatchie
Edisto Research & Education Center	Agriculture	Groundwater	Permit	0.42	12.8	153.0	Salkehatchie
Eagle's Pointe Golf Club	Golf Course	Groundwater	Permit	0.18	5.6	67.0	Salkehatchie
Duncan Farms	Agriculture	Groundwater	Permit	0.15	4.6	55.0	Lower Savannah
Double B Farms	Agriculture	Groundwater	Permit	0.60	18.4	220.4	Salkehatchie
Diem Farm	Agriculture	Groundwater	Permit	0.07	2.1	25.0	Salkehatchie
Dempsey Farms	Agriculture	Groundwater	Permit	0.07	2.1	25.0	Salkehatchie
Deer Hill Farms	Agriculture	Groundwater	Permit	0.69	20.9	251.1	Salkehatchie
David Jarrell Farm	Agriculture	Groundwater	Permit	0.10	3.0	36.0	Salkehatchie
Daufuskie Island Utility Co. - Melrose Pappy	Public Supply	Groundwater	Permit	0.13	4.1	49.1	Lower Savannah
Daufuskie Island Utility Co. - Haig Point	Public Supply	Groundwater	Permit	0.21	6.3	75.0	Lower Savannah
DATAW ISLAND CLUB	Golf Course	Groundwater	Permit	0.16	5.0	60.0	Salkehatchie
D&D Connelly Farm	Agriculture	Groundwater	Permit	0.06	1.8	21.2	Salkehatchie
Cypress Dairy	Agriculture	Groundwater	Permit	0.34	10.3	123.0	Salkehatchie

User	Use Category	Water Source	Permit or Registration	Permit or Registration Amount (MGD)	Permit or Registration Amount (MGM)	Permit or Registration Amount (MGY)	Basin
CRESCENT POINTE GOLF CLUB	Golf Course	Groundwater	Permit	0.21	6.3	75.0	Salkehatchie
Creek Plantation, LLC	Agriculture	Groundwater	Permit	1.88	57.1	685.0	Lower Savannah
Crapse Farms	Agriculture	Groundwater	Permit	0.92	28.1	337.5	Salkehatchie
Cowden Plantation Farms	Agriculture	Groundwater	Permit	0.22	6.6	79.8	Lower Savannah
Country Club Bluff Lake Association	Golf Course	Groundwater	Permit	0.13	4.1	49.0	Salkehatchie
Corrin F. Bowers & Son - Laffitte	Agriculture	Groundwater	Permit	0.29	8.9	107.0	Lower Savannah
Corrin F. Bowers & Son - Salkehatchie	Agriculture	Groundwater	Permit	0.45	13.6	162.7	Salkehatchie
Corrin F. Bowers & Son - Lower Savannah	Agriculture	Groundwater	Permit	0.30	9.0	108.3	Lower Savannah
Coosaw Ag., LLC	Agriculture	Groundwater	Permit	0.49	14.9	178.2	Salkehatchie
Coosaw Ag, LLC - Station Creek	Agriculture	Groundwater	Permit	0.29	8.8	105.0	Salkehatchie
Coosaw Ag, LLC	Agriculture	Groundwater	Permit	1.18	36.0	431.9	Salkehatchie
CONNELLY FARMS	Agriculture	Groundwater	Permit	1.26	38.3	459.8	Salkehatchie
Congaree Golf Partners	Golf Course	Groundwater	Permit	0.16	5.0	60.0	Salkehatchie
Congaree Golf Club	Golf Course	Groundwater	Permit	0.21	6.5	78.3	Salkehatchie

User	Use Category	Water Source	Permit or Registration	Permit or Registration Amount (MGD)	Permit or Registration Amount (MGM)	Permit or Registration Amount (MGY)	Basin
Colleton River Club - Nicklaus Course - Salkehatchie	Golf Course	Groundwater	Permit	0.40	12.2	145.8	Salkehatchie
Colleton River Club - Nicklaus Course - Lower Savannah	Golf Course	Groundwater	Permit	0.08	2.4	29.2	Lower Savannah
Colleton River Club - Dye Course	Golf Course	Groundwater	Permit	0.47	14.2	170.0	Salkehatchie
College Acres Public Works District	Public Supply	Groundwater	Permit	0.20	6.1	73.0	Lower Savannah
City of Walterboro	Public Supply	Groundwater	Permit	2.13	64.9	778.3	Salkehatchie
City of Denmark Water System	Public Supply	Groundwater	Permit	0.82	25.0	300.0	Salkehatchie
CITY OF AIKEN	Public Supply	Groundwater	Permit	9.23	280.9	3,370.7	Lower Savannah
Chitty Farm	Agriculture	Groundwater	Permit	0.10	3.2	38.0	Salkehatchie
Cherokee Plantation Owners, LLC	Golf Course	Groundwater	Permit	0.20	6.0	72.0	Salkehatchie
CHECHESSEE CREEK CLUB	Golf Course	Groundwater	Permit	0.14	4.2	50.0	Salkehatchie
CHAPPELL FARMS	Agriculture	Groundwater	Permit	0.08	2.3	27.6	Lower Savannah
CF Bowers & Son	Agriculture	Groundwater	Permit	0.12	3.7	44.0	Lower Savannah

User	Use Category	Water Source	Permit or Registration	Permit or Registration Amount (MGD)	Permit or Registration Amount (MGM)	Permit or Registration Amount (MGY)	Basin
Cedar Creek Golf Club	Golf Course	Groundwater	Permit	0.09	2.8	34.0	Lower Savannah
Carter Farms	Agriculture	Groundwater	Permit	0.08	2.6	31.0	Salkehatchie
Carolina Turfgrass and Landscape Supply	Agriculture	Groundwater	Permit	0.18	5.4	65.0	Salkehatchie
Carolina Turfgrass	Agriculture	Groundwater	Permit	0.04	1.3	15.0	Salkehatchie
Callawassie Island Club	Golf Course	Groundwater	Permit	0.13	4.0	48.0	Salkehatchie
C&C Farms of Brunson	Agriculture	Groundwater	Permit	0.93	28.3	340.0	Salkehatchie
Burnnettown Town of	Public Supply	Groundwater	Permit	0.13	3.8	46.0	Lower Savannah
Brubaker Farms, Inc.	Agriculture	Groundwater	Permit	1.21	36.8	441.0	Salkehatchie
Broad Creek PSD - Main Water System	Public Supply	Groundwater	Permit	1.71	52.0	623.8	Lower Savannah
Breezy Hill Water & Sewer Co.	Public Supply	Groundwater	Permit	1.62	49.4	593.0	Lower Savannah
Bray's Island Plantation Colony - WS	Public Supply	Groundwater	Permit	0.02	0.6	7.0	Salkehatchie
Bray's Island Plantation Colony	Golf Course	Groundwater	Permit	0.11	3.3	40.0	Salkehatchie
Blackville Farm	Agriculture	Groundwater	Permit	0.68	20.8	250.0	Salkehatchie

User	Use Category	Water Source	Permit or Registration	Permit or Registration Amount (MGD)	Permit or Registration Amount (MGM)	Permit or Registration Amount (MGY)	Basin
Big O Farm, LLC	Agriculture	Groundwater	Permit	0.25	7.5	90.0	Salkehatchie
Berkeley Hall Club	Golf Course	Groundwater	Permit	0.05	1.5	18.0	Salkehatchie
Benton Farms	Agriculture	Groundwater	Permit	0.75	22.8	274.0	Salkehatchie
Belfair Property Owners Association	Golf Course	Groundwater	Permit	0.27	8.1	97.5	Salkehatchie
Beech Island Rural Community Water District	Public Supply	Groundwater	Permit	2.05	62.3	748.0	Lower Savannah
Beaufort National Cemetery	Agriculture	Groundwater	Permit	0.04	1.3	15.6	Salkehatchie
Beaufort Jasper W&SA - Point South	Public Supply	Groundwater	Permit	0.08	2.6	31.0	Salkehatchie
Beaufort Jasper W&SA - Palm Key	Public Supply	Groundwater	Permit	0.01	0.3	4.0	Salkehatchie
Beaufort Jasper W&SA - Main Plant	Public Supply	Groundwater	Permit	0.82	25.0	300.0	Salkehatchie
Beaufort Jasper W&SA - Hardeeville/Levy	Public Supply	Groundwater	Permit	0.26	7.823	93.9	Lower Savannah
Bath Water & Sewer District	Public Supply	Groundwater	Permit	0.10	3.2	38.3	Lower Savannah
Barnwell City of	Public Supply	Groundwater	Permit	2.05	62.3	748.0	Salkehatchie

User	Use Category	Water Source	Permit or Registration	Permit or Registration Amount (MGD)	Permit or Registration Amount (MGM)	Permit or Registration Amount (MGY)	Basin
Bamberg Board of Public Works - Salkehatchie	Public Supply	Groundwater	Permit	0.99	30.3	363.0	Salkehatchie
Bamberg Board of Public Works - Lower Savannah	Public Supply	Groundwater	Permit	0.63	19.1	229.7	Lower Savannah
Argent 2 Golf Course	Golf Course	Groundwater	Permit	0.15	4.6	55.0	Lower Savannah
ARCHROMA MARTIN PLANT	Manufacturing	Groundwater	Permit	2.23	67.9	815.0	Lower Savannah
Allendale Water System	Public Supply	Groundwater	Permit	0.84	25.7	308.0	Salkehatchie
Allendale Peanut Farms, LLC	Agriculture	Groundwater	Permit	0.45	13.6	163.0	Salkehatchie
Allendale Industrial Park	Public Supply	Groundwater	Permit	0.40	12.1	145.0	Salkehatchie
Allendale Biomass, LLC	Thermoelectric	Groundwater	Permit	0.46	14.0	167.7	Salkehatchie

Table B-3. Projected Water Demands by Water User.

User	Water Source	Use Category	Projection	Year	Demand (MGD)	Basin
BJW&SA	Surface Water	WS	High Demand	2025	31.00	Lower Savannah
BJW&SA	Surface Water	WS	High Demand	2030	32.61	Lower Savannah
BJW&SA	Surface Water	WS	High Demand	2035	34.31	Lower Savannah
BJW&SA	Surface Water	WS	High Demand	2040	36.10	Lower Savannah
BJW&SA	Surface Water	WS	High Demand	2050	39.96	Lower Savannah
BJW&SA	Surface Water	WS	High Demand	2060	44.23	Lower Savannah
BJW&SA	Surface Water	WS	High Demand	2070	48.97	Lower Savannah
Breezy Hill	Surface Water	WS	High Demand	2025	1.73	Lower Savannah
Breezy Hill	Surface Water	WS	High Demand	2030	1.81	Lower Savannah
Breezy Hill	Surface Water	WS	High Demand	2035	1.90	Lower Savannah
Breezy Hill	Surface Water	WS	High Demand	2040	1.98	Lower Savannah
Breezy Hill	Surface Water	WS	High Demand	2050	2.17	Lower Savannah
Breezy Hill	Surface Water	WS	High Demand	2060	2.38	Lower Savannah
Breezy Hill	Surface Water	WS	High Demand	2070	2.61	Lower Savannah
Dominion Urquhart Station	Surface Water	PT	High Demand	2025	150.14	Lower Savannah
Dominion Urquhart Station	Surface Water	PT	High Demand	2030	150.14	Lower Savannah
Dominion Urquhart Station	Surface Water	PT	High Demand	2035	150.14	Lower Savannah
Dominion Urquhart Station	Surface Water	PT	High Demand	2040	149.93	Lower Savannah
Dominion Urquhart Station	Surface Water	PT	High Demand	2050	150.14	Lower Savannah

User	Water Source	Use Category	Projection	Year	Demand (MGD)	Basin
Dominion Urquhart Station	Surface Water	PT	High Demand	2060	149.93	Lower Savannah
Dominion Urquhart Station	Surface Water	PT	High Demand	2070	150.14	Lower Savannah
ECW&SA	Surface Water	WS	High Demand	2025	5.81	Lower Savannah
ECW&SA	Surface Water	WS	High Demand	2030	6.08	Lower Savannah
ECW&SA	Surface Water	WS	High Demand	2035	6.36	Lower Savannah
ECW&SA	Surface Water	WS	High Demand	2040	6.66	Lower Savannah
ECW&SA	Surface Water	WS	High Demand	2050	7.29	Lower Savannah
ECW&SA	Surface Water	WS	High Demand	2060	7.98	Lower Savannah
ECW&SA	Surface Water	WS	High Demand	2070	8.75	Lower Savannah
Graniteville	Surface Water	WS	High Demand	2025	12.95	Lower Savannah
Graniteville	Surface Water	WS	High Demand	2030	13.55	Lower Savannah
Graniteville	Surface Water	WS	High Demand	2035	14.18	Lower Savannah
Graniteville	Surface Water	WS	High Demand	2040	14.84	Lower Savannah
Graniteville	Surface Water	WS	High Demand	2050	16.26	Lower Savannah
Graniteville	Surface Water	WS	High Demand	2060	17.80	Lower Savannah
Graniteville	Surface Water	WS	High Demand	2070	19.50	Lower Savannah
Kimberly-Clark	Surface Water	IN	High Demand	2025	14.34	Lower Savannah
Kimberly-Clark	Surface Water	IN	High Demand	2030	15.91	Lower Savannah
Kimberly-Clark	Surface Water	IN	High Demand	2035	17.66	Lower Savannah
Kimberly-Clark	Surface Water	IN	High Demand	2040	19.54	Lower Savannah

User	Water Source	Use Category	Projection	Year	Demand (MGD)	Basin
Kimberly-Clark	Surface Water	IN	High Demand	2050	24.11	Lower Savannah
Kimberly-Clark	Surface Water	IN	High Demand	2060	29.61	Lower Savannah
Kimberly-Clark	Surface Water	IN	High Demand	2070	36.54	Lower Savannah
North Augusta	Surface Water	WS	High Demand	2025	4.90	Lower Savannah
North Augusta	Surface Water	WS	High Demand	2030	5.12	Lower Savannah
North Augusta	Surface Water	WS	High Demand	2035	5.36	Lower Savannah
North Augusta	Surface Water	WS	High Demand	2040	5.61	Lower Savannah
North Augusta	Surface Water	WS	High Demand	2050	6.15	Lower Savannah
North Augusta	Surface Water	WS	High Demand	2060	6.73	Lower Savannah
North Augusta	Surface Water	WS	High Demand	2070	7.38	Lower Savannah
River Golf Club	Surface Water	GC	High Demand	2025	0.09	Lower Savannah
River Golf Club	Surface Water	GC	High Demand	2030	0.09	Lower Savannah
River Golf Club	Surface Water	GC	High Demand	2035	0.09	Lower Savannah
River Golf Club	Surface Water	GC	High Demand	2040	0.09	Lower Savannah
River Golf Club	Surface Water	GC	High Demand	2050	0.09	Lower Savannah
River Golf Club	Surface Water	GC	High Demand	2060	0.09	Lower Savannah
River Golf Club	Surface Water	GC	High Demand	2070	0.09	Lower Savannah
Sage Valley	Surface Water	GC	High Demand	2025	0.27	Lower Savannah
Sage Valley	Surface Water	GC	High Demand	2030	0.27	Lower Savannah
Sage Valley	Surface Water	GC	High Demand	2035	0.27	Lower Savannah
Sage Valley	Surface Water	GC	High Demand	2040	0.27	Lower Savannah

User	Water Source	Use Category	Projection	Year	Demand (MGD)	Basin
Sage Valley	Surface Water	GC	High Demand	2050	0.27	Lower Savannah
Sage Valley	Surface Water	GC	High Demand	2060	0.27	Lower Savannah
Sage Valley	Surface Water	GC	High Demand	2070	0.27	Lower Savannah
The Reserve	Surface Water	GC	High Demand	2025	0.45	Lower Savannah
The Reserve	Surface Water	GC	High Demand	2030	0.45	Lower Savannah
The Reserve	Surface Water	GC	High Demand	2035	0.45	Lower Savannah
The Reserve	Surface Water	GC	High Demand	2040	0.45	Lower Savannah
The Reserve	Surface Water	GC	High Demand	2050	0.45	Lower Savannah
The Reserve	Surface Water	GC	High Demand	2060	0.45	Lower Savannah
The Reserve	Surface Water	GC	High Demand	2070	0.45	Lower Savannah
US DOE	Surface Water	IN	High Demand	2025	10.47	Lower Savannah
US DOE	Surface Water	IN	High Demand	2030	10.47	Lower Savannah
US DOE	Surface Water	IN	High Demand	2035	10.47	Lower Savannah
US DOE	Surface Water	IN	High Demand	2040	10.44	Lower Savannah
US DOE	Surface Water	IN	High Demand	2050	10.47	Lower Savannah
US DOE	Surface Water	IN	High Demand	2060	10.44	Lower Savannah
US DOE	Surface Water	IN	High Demand	2070	10.47	Lower Savannah
Woodside	Surface Water	GC	High Demand	2025	0.40	Lower Savannah
Woodside	Surface Water	GC	High Demand	2030	0.40	Lower Savannah
Woodside	Surface Water	GC	High Demand	2035	0.40	Lower Savannah
Woodside	Surface Water	GC	High Demand	2040	0.40	Lower Savannah

User	Water Source	Use Category	Projection	Year	Demand (MGD)	Basin
Woodside	Surface Water	GC	High Demand	2050	0.40	Lower Savannah
Woodside	Surface Water	GC	High Demand	2060	0.40	Lower Savannah
Woodside	Surface Water	GC	High Demand	2070	0.40	Lower Savannah
305020701	Surface Water	IR	High Demand	2025	0.01	Salkehatchie
305020701	Surface Water	IR	High Demand	2030	0.04	Salkehatchie
305020701	Surface Water	IR	High Demand	2035	0.07	Salkehatchie
305020701	Surface Water	IR	High Demand	2040	0.11	Salkehatchie
305020701	Surface Water	IR	High Demand	2050	0.17	Salkehatchie
305020701	Surface Water	IR	High Demand	2060	0.25	Salkehatchie
305020701	Surface Water	IR	High Demand	2070	0.33	Salkehatchie
305020702	Surface Water	IR	High Demand	2025	0.01	Salkehatchie
305020702	Surface Water	IR	High Demand	2030	0.04	Salkehatchie
305020702	Surface Water	IR	High Demand	2035	0.06	Salkehatchie
305020702	Surface Water	IR	High Demand	2040	0.09	Salkehatchie
305020702	Surface Water	IR	High Demand	2050	0.15	Salkehatchie
305020702	Surface Water	IR	High Demand	2060	0.21	Salkehatchie
305020702	Surface Water	IR	High Demand	2070	0.28	Salkehatchie
305020704	Surface Water	IR	High Demand	2025	0.01	Salkehatchie
305020704	Surface Water	IR	High Demand	2030	0.04	Salkehatchie
305020704	Surface Water	IR	High Demand	2035	0.07	Salkehatchie
305020704	Surface Water	IR	High Demand	2040	0.09	Salkehatchie

User	Water Source	Use Category	Projection	Year	Demand (MGD)	Basin
305020704	Surface Water	IR	High Demand	2050	0.16	Salkehatchie
305020704	Surface Water	IR	High Demand	2060	0.22	Salkehatchie
305020704	Surface Water	IR	High Demand	2070	0.29	Salkehatchie
305020706	Surface Water	IR	High Demand	2025	0.00	Salkehatchie
305020706	Surface Water	IR	High Demand	2030	0.02	Salkehatchie
305020706	Surface Water	IR	High Demand	2035	0.03	Salkehatchie
305020706	Surface Water	IR	High Demand	2040	0.04	Salkehatchie
305020706	Surface Water	IR	High Demand	2050	0.07	Salkehatchie
305020706	Surface Water	IR	High Demand	2060	0.10	Salkehatchie
305020706	Surface Water	IR	High Demand	2070	0.13	Salkehatchie
305020802	Surface Water	IR	High Demand	2025	0.02	Salkehatchie
305020802	Surface Water	IR	High Demand	2030	0.06	Salkehatchie
305020802	Surface Water	IR	High Demand	2035	0.10	Salkehatchie
305020802	Surface Water	IR	High Demand	2040	0.15	Salkehatchie
305020802	Surface Water	IR	High Demand	2050	0.24	Salkehatchie
305020802	Surface Water	IR	High Demand	2060	0.35	Salkehatchie
305020802	Surface Water	IR	High Demand	2070	0.46	Salkehatchie
Connelly (Miller)	Surface Water	IR	High Demand	2025	0.66	Salkehatchie
Connelly (Miller)	Surface Water	IR	High Demand	2030	0.66	Salkehatchie
Connelly (Miller)	Surface Water	IR	High Demand	2035	0.66	Salkehatchie
Connelly (Miller)	Surface Water	IR	High Demand	2040	0.66	Salkehatchie

User	Water Source	Use Category	Projection	Year	Demand (MGD)	Basin
Connelly (Miller)	Surface Water	IR	High Demand	2050	0.66	Salkehatchie
Connelly (Miller)	Surface Water	IR	High Demand	2060	0.66	Salkehatchie
Connelly (Miller)	Surface Water	IR	High Demand	2070	0.66	Salkehatchie
Coosaw Farms	Surface Water	IR	High Demand	2025	0.29	Salkehatchie
Coosaw Farms	Surface Water	IR	High Demand	2030	0.29	Salkehatchie
Coosaw Farms	Surface Water	IR	High Demand	2035	0.29	Salkehatchie
Coosaw Farms	Surface Water	IR	High Demand	2040	0.29	Salkehatchie
Coosaw Farms	Surface Water	IR	High Demand	2050	0.29	Salkehatchie
Coosaw Farms	Surface Water	IR	High Demand	2060	0.29	Salkehatchie
Coosaw Farms	Surface Water	IR	High Demand	2070	0.29	Salkehatchie
Danny Hege	Surface Water	IR	High Demand	2025	0.33	Salkehatchie
Danny Hege	Surface Water	IR	High Demand	2030	0.33	Salkehatchie
Danny Hege	Surface Water	IR	High Demand	2035	0.33	Salkehatchie
Danny Hege	Surface Water	IR	High Demand	2040	0.33	Salkehatchie
Danny Hege	Surface Water	IR	High Demand	2050	0.33	Salkehatchie
Danny Hege	Surface Water	IR	High Demand	2060	0.33	Salkehatchie
Danny Hege	Surface Water	IR	High Demand	2070	0.33	Salkehatchie
Diem Aden	Surface Water	IR	High Demand	2025	0.17	Salkehatchie
Diem Aden	Surface Water	IR	High Demand	2030	0.17	Salkehatchie
Diem Aden	Surface Water	IR	High Demand	2035	0.17	Salkehatchie
Diem Aden	Surface Water	IR	High Demand	2040	0.17	Salkehatchie

User	Water Source	Use Category	Projection	Year	Demand (MGD)	Basin
Diem Aden	Surface Water	IR	High Demand	2050	0.17	Salkehatchie
Diem Aden	Surface Water	IR	High Demand	2060	0.17	Salkehatchie
Diem Aden	Surface Water	IR	High Demand	2070	0.17	Salkehatchie
Gary Hege (Mainstem)	Surface Water	IR	High Demand	2025	0.34	Salkehatchie
Gary Hege (Mainstem)	Surface Water	IR	High Demand	2030	0.34	Salkehatchie
Gary Hege (Mainstem)	Surface Water	IR	High Demand	2035	0.34	Salkehatchie
Gary Hege (Mainstem)	Surface Water	IR	High Demand	2040	0.34	Salkehatchie
Gary Hege (Mainstem)	Surface Water	IR	High Demand	2050	0.34	Salkehatchie
Gary Hege (Mainstem)	Surface Water	IR	High Demand	2060	0.34	Salkehatchie
Gary Hege (Mainstem)	Surface Water	IR	High Demand	2070	0.34	Salkehatchie
JCO Farms	Surface Water	IR	High Demand	2025	0.06	Salkehatchie
JCO Farms	Surface Water	IR	High Demand	2030	0.06	Salkehatchie
JCO Farms	Surface Water	IR	High Demand	2035	0.06	Salkehatchie
JCO Farms	Surface Water	IR	High Demand	2040	0.06	Salkehatchie
JCO Farms	Surface Water	IR	High Demand	2050	0.06	Salkehatchie
JCO Farms	Surface Water	IR	High Demand	2060	0.06	Salkehatchie
JCO Farms	Surface Water	IR	High Demand	2070	0.06	Salkehatchie
Riddle Dairy Farm	Surface Water	IR	High Demand	2025	0.54	Salkehatchie
Riddle Dairy Farm	Surface Water	IR	High Demand	2030	0.54	Salkehatchie
Riddle Dairy Farm	Surface Water	IR	High Demand	2035	0.54	Salkehatchie
Riddle Dairy Farm	Surface Water	IR	High Demand	2040	0.54	Salkehatchie

User	Water Source	Use Category	Projection	Year	Demand (MGD)	Basin
Riddle Dairy Farm	Surface Water	IR	High Demand	2050	0.54	Salkehatchie
Riddle Dairy Farm	Surface Water	IR	High Demand	2060	0.54	Salkehatchie
Riddle Dairy Farm	Surface Water	IR	High Demand	2070	0.54	Salkehatchie
Withycombe Farm	Surface Water	IR	High Demand	2025	0.00	Salkehatchie
Withycombe Farm	Surface Water	IR	High Demand	2030	0.00	Salkehatchie
Withycombe Farm	Surface Water	IR	High Demand	2035	0.00	Salkehatchie
Withycombe Farm	Surface Water	IR	High Demand	2040	0.00	Salkehatchie
Withycombe Farm	Surface Water	IR	High Demand	2050	0.00	Salkehatchie
Withycombe Farm	Surface Water	IR	High Demand	2060	0.00	Salkehatchie
Withycombe Farm	Surface Water	IR	High Demand	2070	0.00	Salkehatchie
Sharp & Sharp	Surface Water	IR	High Demand	2025	0.88	Salkehatchie
Sharp & Sharp	Surface Water	IR	High Demand	2030	0.88	Salkehatchie
Sharp & Sharp	Surface Water	IR	High Demand	2035	0.88	Salkehatchie
Sharp & Sharp	Surface Water	IR	High Demand	2040	0.88	Salkehatchie
Sharp & Sharp	Surface Water	IR	High Demand	2050	0.88	Salkehatchie
Sharp & Sharp	Surface Water	IR	High Demand	2060	0.88	Salkehatchie
Sharp & Sharp	Surface Water	IR	High Demand	2070	0.88	Salkehatchie
Brubaker	Surface Water	IR	High Demand	2025	0.14	Salkehatchie
Brubaker	Surface Water	IR	High Demand	2030	0.14	Salkehatchie
Brubaker	Surface Water	IR	High Demand	2035	0.14	Salkehatchie
Brubaker	Surface Water	IR	High Demand	2040	0.14	Salkehatchie

User	Water Source	Use Category	Projection	Year	Demand (MGD)	Basin
Brubaker	Surface Water	IR	High Demand	2050	0.14	Salkehatchie
Brubaker	Surface Water	IR	High Demand	2060	0.14	Salkehatchie
Brubaker	Surface Water	IR	High Demand	2070	0.14	Salkehatchie
Chappell	Surface Water	IR	High Demand	2025	0.01	Salkehatchie
Chappell	Surface Water	IR	High Demand	2030	0.01	Salkehatchie
Chappell	Surface Water	IR	High Demand	2035	0.01	Salkehatchie
Chappell	Surface Water	IR	High Demand	2040	0.01	Salkehatchie
Chappell	Surface Water	IR	High Demand	2050	0.01	Salkehatchie
Chappell	Surface Water	IR	High Demand	2060	0.01	Salkehatchie
Chappell	Surface Water	IR	High Demand	2070	0.01	Salkehatchie
Connelly (Mainstem)	Surface Water	IR	High Demand	2025	0.33	Salkehatchie
Connelly (Mainstem)	Surface Water	IR	High Demand	2030	0.33	Salkehatchie
Connelly (Mainstem)	Surface Water	IR	High Demand	2035	0.33	Salkehatchie
Connelly (Mainstem)	Surface Water	IR	High Demand	2040	0.33	Salkehatchie
Connelly (Mainstem)	Surface Water	IR	High Demand	2050	0.33	Salkehatchie
Connelly (Mainstem)	Surface Water	IR	High Demand	2060	0.33	Salkehatchie
Connelly (Mainstem)	Surface Water	IR	High Demand	2070	0.33	Salkehatchie
BJW&SA	Surface Water	WS	Moderate	2025	25.84	Lower Savannah
BJW&SA	Surface Water	WS	Moderate	2030	27.15	Lower Savannah
BJW&SA	Surface Water	WS	Moderate	2035	28.22	Lower Savannah
BJW&SA	Surface Water	WS	Moderate	2040	29.07	Lower Savannah
BJW&SA	Surface Water	WS	Moderate	2050	31.34	Lower Savannah
BJW&SA	Surface Water	WS	Moderate	2060	33.60	Lower Savannah
BJW&SA	Surface Water	WS	Moderate	2070	35.87	Lower Savannah

User	Water Source	Use Category	Projection	Year	Demand (MGD)	Basin
Breezy Hill	Surface Water	WS	Moderate	2025	1.50	Lower Savannah
Breezy Hill	Surface Water	WS	Moderate	2030	1.51	Lower Savannah
Breezy Hill	Surface Water	WS	Moderate	2035	1.51	Lower Savannah
Breezy Hill	Surface Water	WS	Moderate	2040	1.51	Lower Savannah
Breezy Hill	Surface Water	WS	Moderate	2050	1.53	Lower Savannah
Breezy Hill	Surface Water	WS	Moderate	2060	1.54	Lower Savannah
Breezy Hill	Surface Water	WS	Moderate	2070	1.56	Lower Savannah
Dominion Urquhart Station	Surface Water	PT	Moderate	2025	89.91	Lower Savannah
Dominion Urquhart Station	Surface Water	PT	Moderate	2030	89.91	Lower Savannah
Dominion Urquhart Station	Surface Water	PT	Moderate	2035	89.91	Lower Savannah
Dominion Urquhart Station	Surface Water	PT	Moderate	2040	89.81	Lower Savannah
Dominion Urquhart Station	Surface Water	PT	Moderate	2050	89.91	Lower Savannah
Dominion Urquhart Station	Surface Water	PT	Moderate	2060	89.81	Lower Savannah
Dominion Urquhart Station	Surface Water	PT	Moderate	2070	89.91	Lower Savannah
ECW&SA	Surface Water	WS	Moderate	2025	4.50	Lower Savannah
ECW&SA	Surface Water	WS	Moderate	2030	4.25	Lower Savannah
ECW&SA	Surface Water	WS	Moderate	2035	3.99	Lower Savannah
ECW&SA	Surface Water	WS	Moderate	2040	3.83	Lower Savannah
ECW&SA	Surface Water	WS	Moderate	2050	3.83	Lower Savannah
ECW&SA	Surface Water	WS	Moderate	2060	3.83	Lower Savannah
ECW&SA	Surface Water	WS	Moderate	2070	3.83	Lower Savannah
Graniteville	Surface Water	WS	Moderate	2025	9.39	Lower Savannah
Graniteville	Surface Water	WS	Moderate	2030	9.46	Lower Savannah
Graniteville	Surface Water	WS	Moderate	2035	9.46	Lower Savannah
Graniteville	Surface Water	WS	Moderate	2040	9.45	Lower Savannah

User	Water Source	Use Category	Projection	Year	Demand (MGD)	Basin
Graniteville	Surface Water	WS	Moderate	2050	9.54	Lower Savannah
Graniteville	Surface Water	WS	Moderate	2060	9.63	Lower Savannah
Graniteville	Surface Water	WS	Moderate	2070	9.72	Lower Savannah
Kimberly-Clark	Surface Water	IN	Moderate	2025	9.24	Lower Savannah
Kimberly-Clark	Surface Water	IN	Moderate	2030	9.49	Lower Savannah
Kimberly-Clark	Surface Water	IN	Moderate	2035	9.84	Lower Savannah
Kimberly-Clark	Surface Water	IN	Moderate	2040	10.11	Lower Savannah
Kimberly-Clark	Surface Water	IN	Moderate	2050	10.60	Lower Savannah
Kimberly-Clark	Surface Water	IN	Moderate	2060	10.90	Lower Savannah
Kimberly-Clark	Surface Water	IN	Moderate	2070	11.26	Lower Savannah
North Augusta	Surface Water	WS	Moderate	2025	3.82	Lower Savannah
North Augusta	Surface Water	WS	Moderate	2030	3.85	Lower Savannah
North Augusta	Surface Water	WS	Moderate	2035	3.85	Lower Savannah
North Augusta	Surface Water	WS	Moderate	2040	3.85	Lower Savannah
North Augusta	Surface Water	WS	Moderate	2050	3.89	Lower Savannah
North Augusta	Surface Water	WS	Moderate	2060	3.92	Lower Savannah
North Augusta	Surface Water	WS	Moderate	2070	3.96	Lower Savannah
River Golf Club	Surface Water	GC	Moderate	2025	0.05	Lower Savannah
River Golf Club	Surface Water	GC	Moderate	2030	0.05	Lower Savannah
River Golf Club	Surface Water	GC	Moderate	2035	0.05	Lower Savannah
River Golf Club	Surface Water	GC	Moderate	2040	0.05	Lower Savannah
River Golf Club	Surface Water	GC	Moderate	2050	0.05	Lower Savannah

User	Water Source	Use Category	Projection	Year	Demand (MGD)	Basin
River Golf Club	Surface Water	GC	Moderate	2060	0.05	Lower Savannah
River Golf Club	Surface Water	GC	Moderate	2070	0.05	Lower Savannah
Sage Valley	Surface Water	GC	Moderate	2025	0.15	Lower Savannah
Sage Valley	Surface Water	GC	Moderate	2030	0.15	Lower Savannah
Sage Valley	Surface Water	GC	Moderate	2035	0.15	Lower Savannah
Sage Valley	Surface Water	GC	Moderate	2040	0.15	Lower Savannah
Sage Valley	Surface Water	GC	Moderate	2050	0.15	Lower Savannah
Sage Valley	Surface Water	GC	Moderate	2060	0.15	Lower Savannah
Sage Valley	Surface Water	GC	Moderate	2070	0.15	Lower Savannah
The Reserve	Surface Water	GC	Moderate	2025	0.24	Lower Savannah
The Reserve	Surface Water	GC	Moderate	2030	0.24	Lower Savannah
The Reserve	Surface Water	GC	Moderate	2035	0.24	Lower Savannah
The Reserve	Surface Water	GC	Moderate	2040	0.24	Lower Savannah
The Reserve	Surface Water	GC	Moderate	2050	0.24	Lower Savannah
The Reserve	Surface Water	GC	Moderate	2060	0.24	Lower Savannah
The Reserve	Surface Water	GC	Moderate	2070	0.24	Lower Savannah
US DOE	Surface Water	IN	Moderate	2025	9.77	Lower Savannah
US DOE	Surface Water	IN	Moderate	2025	9.77	Lower Savannah
US DOE	Surface Water	IN	Moderate	2030	9.77	Lower Savannah
US DOE	Surface Water	IN	Moderate	2030	9.77	Lower Savannah
US DOE	Surface Water	IN	Moderate	2035	9.77	Lower Savannah
US DOE	Surface Water	IN	Moderate	2035	9.77	Lower Savannah
US DOE	Surface Water	IN	Moderate	2040	9.74	Lower Savannah
Woodside	Surface Water	GC	Moderate	2040	0.11	Lower Savannah
Woodside	Surface Water	GC	Moderate	2050	0.11	Lower Savannah
Woodside	Surface Water	GC	Moderate	2050	0.11	Lower Savannah
Woodside	Surface Water	GC	Moderate	2060	0.11	Lower Savannah
Woodside	Surface Water	GC	Moderate	2060	0.11	Lower Savannah
Woodside	Surface Water	GC	Moderate	2070	0.11	Lower Savannah
Woodside	Surface Water	GC	Moderate	2070	0.11	Lower Savannah
305020701	Surface Water	IR	Moderate	2025	0.01	Salkehatchie
305020701	Surface Water	IR	Moderate	2030	0.02	Salkehatchie
305020701	Surface Water	IR	Moderate	2035	0.04	Salkehatchie

User	Water Source	Use Category	Projection	Year	Demand (MGD)	Basin
305020701	Surface Water	IR	Moderate	2040	0.05	Salkehatchie
305020701	Surface Water	IR	Moderate	2050	0.08	Salkehatchie
305020701	Surface Water	IR	Moderate	2060	0.12	Salkehatchie
305020701	Surface Water	IR	Moderate	2070	0.16	Salkehatchie
305020702	Surface Water	IR	Moderate	2025	0.00	Salkehatchie
305020702	Surface Water	IR	Moderate	2030	0.02	Salkehatchie
305020702	Surface Water	IR	Moderate	2035	0.03	Salkehatchie
305020702	Surface Water	IR	Moderate	2040	0.04	Salkehatchie
305020702	Surface Water	IR	Moderate	2050	0.07	Salkehatchie
305020702	Surface Water	IR	Moderate	2060	0.09	Salkehatchie
305020702	Surface Water	IR	Moderate	2070	0.12	Salkehatchie
305020704	Surface Water	IR	Moderate	2025	0.01	Salkehatchie
305020704	Surface Water	IR	Moderate	2030	0.02	Salkehatchie
305020704	Surface Water	IR	Moderate	2035	0.03	Salkehatchie
305020704	Surface Water	IR	Moderate	2040	0.05	Salkehatchie
305020704	Surface Water	IR	Moderate	2050	0.08	Salkehatchie
305020704	Surface Water	IR	Moderate	2060	0.11	Salkehatchie
305020704	Surface Water	IR	Moderate	2070	0.15	Salkehatchie
305020706	Surface Water	IR	Moderate	2025	0.00	Salkehatchie
305020706	Surface Water	IR	Moderate	2030	0.01	Salkehatchie
305020706	Surface Water	IR	Moderate	2035	0.01	Salkehatchie
305020706	Surface Water	IR	Moderate	2040	0.02	Salkehatchie
305020706	Surface Water	IR	Moderate	2050	0.03	Salkehatchie
305020706	Surface Water	IR	Moderate	2060	0.04	Salkehatchie
305020706	Surface Water	IR	Moderate	2070	0.06	Salkehatchie
305020802	Surface Water	IR	Moderate	2025	0.01	Salkehatchie
305020802	Surface Water	IR	Moderate	2030	0.04	Salkehatchie
305020802	Surface Water	IR	Moderate	2035	0.07	Salkehatchie
305020802	Surface Water	IR	Moderate	2040	0.09	Salkehatchie
305020802	Surface Water	IR	Moderate	2050	0.15	Salkehatchie
305020802	Surface Water	IR	Moderate	2060	0.22	Salkehatchie
305020802	Surface Water	IR	Moderate	2070	0.29	Salkehatchie
Connelly (Miller)	Surface Water	IR	Moderate	2025	0.33	Salkehatchie

User	Water Source	Use Category	Projection	Year	Demand (MGD)	Basin
Connelly (Miller)	Surface Water	IR	Moderate	2030	0.33	Salkehatchie
Connelly (Miller)	Surface Water	IR	Moderate	2035	0.33	Salkehatchie
Connelly (Miller)	Surface Water	IR	Moderate	2040	0.33	Salkehatchie
Connelly (Miller)	Surface Water	IR	Moderate	2050	0.33	Salkehatchie
Connelly (Miller)	Surface Water	IR	Moderate	2060	0.33	Salkehatchie
Connelly (Miller)	Surface Water	IR	Moderate	2070	0.33	Salkehatchie
Coosaw Farms	Surface Water	IR	Moderate	2025	0.21	Salkehatchie
Coosaw Farms	Surface Water	IR	Moderate	2030	0.21	Salkehatchie
Coosaw Farms	Surface Water	IR	Moderate	2035	0.21	Salkehatchie
Coosaw Farms	Surface Water	IR	Moderate	2040	0.21	Salkehatchie
Coosaw Farms	Surface Water	IR	Moderate	2050	0.21	Salkehatchie
Coosaw Farms	Surface Water	IR	Moderate	2060	0.21	Salkehatchie
Coosaw Farms	Surface Water	IR	Moderate	2070	0.21	Salkehatchie
Danny Hege	Surface Water	IR	Moderate	2025	0.25	Salkehatchie
Danny Hege	Surface Water	IR	Moderate	2030	0.25	Salkehatchie
Danny Hege	Surface Water	IR	Moderate	2035	0.25	Salkehatchie
Danny Hege	Surface Water	IR	Moderate	2040	0.25	Salkehatchie
Danny Hege	Surface Water	IR	Moderate	2050	0.25	Salkehatchie
Danny Hege	Surface Water	IR	Moderate	2060	0.25	Salkehatchie
Danny Hege	Surface Water	IR	Moderate	2070	0.25	Salkehatchie
Diem Aden	Surface Water	IR	Moderate	2025	0.06	Salkehatchie
Diem Aden	Surface Water	IR	Moderate	2030	0.06	Salkehatchie
Diem Aden	Surface Water	IR	Moderate	2035	0.06	Salkehatchie
Diem Aden	Surface Water	IR	Moderate	2040	0.06	Salkehatchie
Diem Aden	Surface Water	IR	Moderate	2050	0.06	Salkehatchie
Diem Aden	Surface Water	IR	Moderate	2060	0.06	Salkehatchie

User	Water Source	Use Category	Projection	Year	Demand (MGD)	Basin
Diem Aden	Surface Water	IR	Moderate	2070	0.06	Salkehatchie
Gary Hege (Mainstem)	Surface Water	IR	Moderate	2025	0.15	Salkehatchie
Gary Hege (Mainstem)	Surface Water	IR	Moderate	2030	0.15	Salkehatchie
Gary Hege (Mainstem)	Surface Water	IR	Moderate	2035	0.15	Salkehatchie
Gary Hege (Mainstem)	Surface Water	IR	Moderate	2040	0.15	Salkehatchie
Gary Hege (Mainstem)	Surface Water	IR	Moderate	2050	0.15	Salkehatchie
Gary Hege (Mainstem)	Surface Water	IR	Moderate	2060	0.15	Salkehatchie
Gary Hege (Mainstem)	Surface Water	IR	Moderate	2070	0.15	Salkehatchie
JCO Farms	Surface Water	IR	Moderate	2025	0.05	Salkehatchie
JCO Farms	Surface Water	IR	Moderate	2030	0.05	Salkehatchie
JCO Farms	Surface Water	IR	Moderate	2035	0.05	Salkehatchie
JCO Farms	Surface Water	IR	Moderate	2040	0.05	Salkehatchie
JCO Farms	Surface Water	IR	Moderate	2050	0.05	Salkehatchie
JCO Farms	Surface Water	IR	Moderate	2060	0.05	Salkehatchie
JCO Farms	Surface Water	IR	Moderate	2070	0.05	Salkehatchie
Riddle Dairy Farm	Surface Water	IR	Moderate	2025	0.37	Salkehatchie
Riddle Dairy Farm	Surface Water	IR	Moderate	2030	0.37	Salkehatchie
Riddle Dairy Farm	Surface Water	IR	Moderate	2035	0.37	Salkehatchie
Riddle Dairy Farm	Surface Water	IR	Moderate	2040	0.37	Salkehatchie
Riddle Dairy Farm	Surface Water	IR	Moderate	2050	0.37	Salkehatchie
Riddle Dairy Farm	Surface Water	IR	Moderate	2060	0.37	Salkehatchie
Riddle Dairy Farm	Surface Water	IR	Moderate	2070	0.37	Salkehatchie
Withycombe Farm	Surface Water	IR	Moderate	2025	0.00	Salkehatchie
Withycombe Farm	Surface Water	IR	Moderate	2030	0.00	Salkehatchie

User	Water Source	Use Category	Projection	Year	Demand (MGD)	Basin
Withycombe Farm	Surface Water	IR	Moderate	2035	0.00	Salkehatchie
Withycombe Farm	Surface Water	IR	Moderate	2040	0.00	Salkehatchie
Withycombe Farm	Surface Water	IR	Moderate	2050	0.00	Salkehatchie
Withycombe Farm	Surface Water	IR	Moderate	2060	0.00	Salkehatchie
Withycombe Farm	Surface Water	IR	Moderate	2070	0.00	Salkehatchie
Sharp & Sharp	Surface Water	IR	Moderate	2025	0.88	Salkehatchie
Sharp & Sharp	Surface Water	IR	Moderate	2030	0.88	Salkehatchie
Sharp & Sharp	Surface Water	IR	Moderate	2035	0.88	Salkehatchie
Sharp & Sharp	Surface Water	IR	Moderate	2040	0.88	Salkehatchie
Sharp & Sharp	Surface Water	IR	Moderate	2050	0.88	Salkehatchie
Sharp & Sharp	Surface Water	IR	Moderate	2060	0.88	Salkehatchie
Sharp & Sharp	Surface Water	IR	Moderate	2070	0.88	Salkehatchie
Brubaker	Surface Water	IR	Moderate	2025	0.14	Salkehatchie
Brubaker	Surface Water	IR	Moderate	2030	0.14	Salkehatchie
Brubaker	Surface Water	IR	Moderate	2035	0.14	Salkehatchie
Brubaker	Surface Water	IR	Moderate	2040	0.14	Salkehatchie
Brubaker	Surface Water	IR	Moderate	2050	0.14	Salkehatchie
Brubaker	Surface Water	IR	Moderate	2060	0.14	Salkehatchie
Brubaker	Surface Water	IR	Moderate	2070	0.14	Salkehatchie
Chappell	Surface Water	IR	Moderate	2025	0.01	Salkehatchie
Chappell	Surface Water	IR	Moderate	2030	0.01	Salkehatchie
Chappell	Surface Water	IR	Moderate	2035	0.01	Salkehatchie
Chappell	Surface Water	IR	Moderate	2040	0.01	Salkehatchie
Chappell	Surface Water	IR	Moderate	2050	0.01	Salkehatchie
Chappell	Surface Water	IR	Moderate	2060	0.01	Salkehatchie
Chappell	Surface Water	IR	Moderate	2070	0.01	Salkehatchie
Connelly (Mainstem)	Surface Water	IR	Moderate	2025	0.33	Salkehatchie
Connelly (Mainstem)	Surface Water	IR	Moderate	2030	0.33	Salkehatchie
Connelly (Mainstem)	Surface Water	IR	Moderate	2035	0.33	Salkehatchie

User	Water Source	Use Category	Projection	Year	Demand (MGD)	Basin
Connelly (Mainstem)	Surface Water	IR	Moderate	2040	0.33	Salkehatchie
Connelly (Mainstem)	Surface Water	IR	Moderate	2050	0.33	Salkehatchie
Connelly (Mainstem)	Surface Water	IR	Moderate	2060	0.33	Salkehatchie
Connelly (Mainstem)	Surface Water	IR	Moderate	2070	0.33	Salkehatchie
Allendale Biomass	Groundwater	PN	High Demand	2025	0.49	Salkehatchie
Allendale Biomass	Groundwater	PN	High Demand	2030	0.49	Salkehatchie
Allendale Biomass	Groundwater	PN	High Demand	2035	0.49	Salkehatchie
Allendale Biomass	Groundwater	PN	High Demand	2040	0.49	Salkehatchie
Allendale Biomass	Groundwater	PN	High Demand	2050	0.49	Salkehatchie
Allendale Biomass	Groundwater	PN	High Demand	2060	0.49	Salkehatchie
Allendale Biomass	Groundwater	PN	High Demand	2070	0.49	Salkehatchie
Allendale Industrial Park	Groundwater	WS	High Demand	2025	0.23	Salkehatchie
Allendale Industrial Park	Groundwater	WS	High Demand	2030	0.24	Salkehatchie
Allendale Industrial Park	Groundwater	WS	High Demand	2035	0.25	Salkehatchie
Allendale Industrial Park	Groundwater	WS	High Demand	2040	0.26	Salkehatchie
Allendale Industrial Park	Groundwater	WS	High Demand	2050	0.29	Salkehatchie
Allendale Industrial Park	Groundwater	WS	High Demand	2060	0.32	Salkehatchie
Allendale Industrial Park	Groundwater	WS	High Demand	2070	0.35	Salkehatchie
Allendale Water Systems	Groundwater	WS	High Demand	2025	0.94	Salkehatchie
Allendale Water Systems	Groundwater	WS	High Demand	2030	0.98	Salkehatchie

User	Water Source	Use Category	Projection	Year	Demand (MGD)	Basin
Allendale Water Systems	Groundwater	WS	High Demand	2035	1.02	Salkehatchie
Allendale Water Systems	Groundwater	WS	High Demand	2040	1.07	Salkehatchie
Allendale Water Systems	Groundwater	WS	High Demand	2050	1.17	Salkehatchie
Allendale Water Systems	Groundwater	WS	High Demand	2060	1.29	Salkehatchie
Allendale Water Systems	Groundwater	WS	High Demand	2070	1.41	Salkehatchie
Archroma US Inc.	Groundwater	IN	High Demand	2025	2.32	Lower Savannah
Archroma US Inc.	Groundwater	IN	High Demand	2030	2.57	Lower Savannah
Archroma US Inc.	Groundwater	IN	High Demand	2035	2.86	Lower Savannah
Archroma US Inc.	Groundwater	IN	High Demand	2040	3.17	Lower Savannah
Archroma US Inc.	Groundwater	IN	High Demand	2050	3.90	Lower Savannah
Archroma US Inc.	Groundwater	IN	High Demand	2060	4.80	Lower Savannah
Archroma US Inc.	Groundwater	IN	High Demand	2070	5.91	Lower Savannah
Argent 2	Groundwater	GC	High Demand	2025	0.14	Lower Savannah
Argent 2	Groundwater	GC	High Demand	2030	0.14	Lower Savannah
Argent 2	Groundwater	GC	High Demand	2035	0.14	Lower Savannah
Argent 2	Groundwater	GC	High Demand	2040	0.14	Lower Savannah
Argent 2	Groundwater	GC	High Demand	2050	0.14	Lower Savannah
Argent 2	Groundwater	GC	High Demand	2060	0.14	Lower Savannah
Argent 2	Groundwater	GC	High Demand	2070	0.14	Lower Savannah

User	Water Source	Use Category	Projection	Year	Demand (MGD)	Basin
Bath	Groundwater	WS	High Demand	2025	0.10	Lower Savannah
Bath	Groundwater	WS	High Demand	2030	0.10	Lower Savannah
Bath	Groundwater	WS	High Demand	2035	0.11	Lower Savannah
Bath	Groundwater	WS	High Demand	2040	0.11	Lower Savannah
Bath	Groundwater	WS	High Demand	2050	0.12	Lower Savannah
Bath	Groundwater	WS	High Demand	2060	0.13	Lower Savannah
Bath	Groundwater	WS	High Demand	2070	0.15	Lower Savannah
Beaufort Jasper W&SA	Groundwater	WS	High Demand	2025	0.95	Salkehatchie
Beaufort Jasper W&SA	Groundwater	WS	High Demand	2030	1.00	Salkehatchie
Beaufort Jasper W&SA	Groundwater	WS	High Demand	2035	1.06	Salkehatchie
Beaufort Jasper W&SA	Groundwater	WS	High Demand	2040	1.11	Salkehatchie
Beaufort Jasper W&SA	Groundwater	WS	High Demand	2050	1.23	Salkehatchie
Beaufort Jasper W&SA	Groundwater	WS	High Demand	2060	1.36	Salkehatchie
Beaufort Jasper W&SA	Groundwater	WS	High Demand	2070	1.51	Salkehatchie
Beech Island Rural Community Water District	Groundwater	WS	High Demand	2025	1.89	Lower Savannah
Beech Island Rural Community Water District	Groundwater	WS	High Demand	2030	1.98	Lower Savannah
Beech Island Rural Community Water District	Groundwater	WS	High Demand	2035	2.07	Lower Savannah
Beech Island Rural Community Water District	Groundwater	WS	High Demand	2040	2.17	Lower Savannah

User	Water Source	Use Category	Projection	Year	Demand (MGD)	Basin
Beech Island Rural Community Water District	Groundwater	WS	High Demand	2050	2.37	Lower Savannah
Beech Island Rural Community Water District	Groundwater	WS	High Demand	2060	2.61	Lower Savannah
Beech Island Rural Community Water District	Groundwater	WS	High Demand	2070	2.85	Lower Savannah
Belfair	Groundwater	GC	High Demand	2025	0.31	Salkehatchie
Belfair	Groundwater	GC	High Demand	2030	0.31	Salkehatchie
Belfair	Groundwater	GC	High Demand	2035	0.31	Salkehatchie
Belfair	Groundwater	GC	High Demand	2040	0.31	Salkehatchie
Belfair	Groundwater	GC	High Demand	2050	0.31	Salkehatchie
Belfair	Groundwater	GC	High Demand	2060	0.31	Salkehatchie
Belfair	Groundwater	GC	High Demand	2070	0.31	Salkehatchie
Berkeley Hall	Groundwater	GC	High Demand	2025	0.11	Salkehatchie
Berkeley Hall	Groundwater	GC	High Demand	2030	0.11	Salkehatchie
Berkeley Hall	Groundwater	GC	High Demand	2035	0.11	Salkehatchie
Berkeley Hall	Groundwater	GC	High Demand	2040	0.11	Salkehatchie
Berkeley Hall	Groundwater	GC	High Demand	2050	0.11	Salkehatchie
Berkeley Hall	Groundwater	GC	High Demand	2060	0.11	Salkehatchie
Berkeley Hall	Groundwater	GC	High Demand	2070	0.11	Salkehatchie
Bluff Lake	Groundwater	GC	High Demand	2025	0.11	Salkehatchie
Bluff Lake	Groundwater	GC	High Demand	2030	0.11	Salkehatchie

User	Water Source	Use Category	Projection	Year	Demand (MGD)	Basin
Bluff Lake	Groundwater	GC	High Demand	2035	0.11	Salkehatchie
Bluff Lake	Groundwater	GC	High Demand	2040	0.11	Salkehatchie
Bluff Lake	Groundwater	GC	High Demand	2050	0.11	Salkehatchie
Bluff Lake	Groundwater	GC	High Demand	2060	0.11	Salkehatchie
Bluff Lake	Groundwater	GC	High Demand	2070	0.11	Salkehatchie
Brays Island (Golf Course Course)	Groundwater	GC	High Demand	2025	0.03	Salkehatchie
Brays Island (Golf Course Course)	Groundwater	GC	High Demand	2030	0.03	Salkehatchie
Brays Island (Golf Course Course)	Groundwater	GC	High Demand	2035	0.03	Salkehatchie
Brays Island (Golf Course Course)	Groundwater	GC	High Demand	2040	0.03	Salkehatchie
Brays Island (Golf Course Course)	Groundwater	GC	High Demand	2050	0.03	Salkehatchie
Brays Island (Golf Course Course)	Groundwater	GC	High Demand	2060	0.03	Salkehatchie
Brays Island (Golf Course Course)	Groundwater	GC	High Demand	2070	0.03	Salkehatchie
Brays Island (Public Supply)	Groundwater	WS	High Demand	2025	0.05	Salkehatchie
Brays Island (Public Supply)	Groundwater	WS	High Demand	2030	0.05	Salkehatchie
Brays Island (Public Supply)	Groundwater	WS	High Demand	2035	0.05	Salkehatchie
Brays Island (Public Supply)	Groundwater	WS	High Demand	2040	0.05	Salkehatchie

User	Water Source	Use Category	Projection	Year	Demand (MGD)	Basin
Brays Island (Public Supply)	Groundwater	WS	High Demand	2050	0.05	Salkehatchie
Brays Island (Public Supply)	Groundwater	WS	High Demand	2060	0.05	Salkehatchie
Brays Island (Public Supply)	Groundwater	WS	High Demand	2070	0.05	Salkehatchie
Breezy Hill	Groundwater	WS	High Demand	2025	1.49	Lower Savannah
Breezy Hill	Groundwater	WS	High Demand	2030	1.56	Lower Savannah
Breezy Hill	Groundwater	WS	High Demand	2035	1.63	Lower Savannah
Breezy Hill	Groundwater	WS	High Demand	2040	1.71	Lower Savannah
Breezy Hill	Groundwater	WS	High Demand	2050	1.87	Lower Savannah
Breezy Hill	Groundwater	WS	High Demand	2060	2.05	Lower Savannah
Breezy Hill	Groundwater	WS	High Demand	2070	2.24	Lower Savannah
Bridgestone	Groundwater	IN	High Demand	2025	0.02	Lower Savannah
Bridgestone	Groundwater	IN	High Demand	2030	0.03	Lower Savannah
Bridgestone	Groundwater	IN	High Demand	2035	0.03	Lower Savannah
Bridgestone	Groundwater	IN	High Demand	2040	0.03	Lower Savannah
Bridgestone	Groundwater	IN	High Demand	2050	0.04	Lower Savannah
Bridgestone	Groundwater	IN	High Demand	2060	0.05	Lower Savannah
Bridgestone	Groundwater	IN	High Demand	2070	0.06	Lower Savannah
Broad Creek PSD	Groundwater	WS	High Demand	2025	1.78	Lower Savannah
Broad Creek PSD	Groundwater	WS	High Demand	2030	1.87	Lower Savannah
Broad Creek PSD	Groundwater	WS	High Demand	2035	1.97	Lower Savannah

User	Water Source	Use Category	Projection	Year	Demand (MGD)	Basin
Broad Creek PSD	Groundwater	WS	High Demand	2040	2.08	Lower Savannah
Broad Creek PSD	Groundwater	WS	High Demand	2050	2.30	Lower Savannah
Broad Creek PSD	Groundwater	WS	High Demand	2060	2.55	Lower Savannah
Broad Creek PSD	Groundwater	WS	High Demand	2070	2.82	Lower Savannah
Burnnettown	Groundwater	WS	High Demand	2025	0.19	Lower Savannah
Burnnettown	Groundwater	WS	High Demand	2030	0.20	Lower Savannah
Burnnettown	Groundwater	WS	High Demand	2035	0.21	Lower Savannah
Burnnettown	Groundwater	WS	High Demand	2040	0.22	Lower Savannah
Burnnettown	Groundwater	WS	High Demand	2050	0.24	Lower Savannah
Burnnettown	Groundwater	WS	High Demand	2060	0.27	Lower Savannah
Burnnettown	Groundwater	WS	High Demand	2070	0.29	Lower Savannah
Callawassie	Groundwater	GC	High Demand	2025	0.14	Salkehatchie
Callawassie	Groundwater	GC	High Demand	2030	0.14	Salkehatchie
Callawassie	Groundwater	GC	High Demand	2035	0.14	Salkehatchie
Callawassie	Groundwater	GC	High Demand	2040	0.14	Salkehatchie
Callawassie	Groundwater	GC	High Demand	2050	0.14	Salkehatchie
Callawassie	Groundwater	GC	High Demand	2060	0.14	Salkehatchie
Callawassie	Groundwater	GC	High Demand	2070	0.14	Salkehatchie
Cedar Creek	Groundwater	GC	High Demand	2025	0.12	Lower Savannah
Cedar Creek	Groundwater	GC	High Demand	2030	0.12	Lower Savannah
Cedar Creek	Groundwater	GC	High Demand	2035	0.12	Lower Savannah

User	Water Source	Use Category	Projection	Year	Demand (MGD)	Basin
Cedar Creek	Groundwater	GC	High Demand	2040	0.12	Lower Savannah
Cedar Creek	Groundwater	GC	High Demand	2050	0.12	Lower Savannah
Cedar Creek	Groundwater	GC	High Demand	2060	0.12	Lower Savannah
Cedar Creek	Groundwater	GC	High Demand	2070	0.12	Lower Savannah
Chechessee	Groundwater	GC	High Demand	2025	0.22	Salkehatchie
Chechessee	Groundwater	GC	High Demand	2030	0.22	Salkehatchie
Chechessee	Groundwater	GC	High Demand	2035	0.22	Salkehatchie
Chechessee	Groundwater	GC	High Demand	2040	0.22	Salkehatchie
Chechessee	Groundwater	GC	High Demand	2050	0.22	Salkehatchie
Chechessee	Groundwater	GC	High Demand	2060	0.22	Salkehatchie
Chechessee	Groundwater	GC	High Demand	2070	0.22	Salkehatchie
Cherokee Plantation	Groundwater	GC	High Demand	2025	0.29	Salkehatchie
Cherokee Plantation	Groundwater	GC	High Demand	2030	0.29	Salkehatchie
Cherokee Plantation	Groundwater	GC	High Demand	2035	0.29	Salkehatchie
Cherokee Plantation	Groundwater	GC	High Demand	2040	0.29	Salkehatchie
Cherokee Plantation	Groundwater	GC	High Demand	2050	0.29	Salkehatchie
Cherokee Plantation	Groundwater	GC	High Demand	2060	0.29	Salkehatchie
Cherokee Plantation	Groundwater	GC	High Demand	2070	0.29	Salkehatchie
City of Aiken	Groundwater	WS	High Demand	2025	5.92	Lower Savannah
City of Aiken	Groundwater	WS	High Demand	2030	6.20	Lower Savannah
City of Aiken	Groundwater	WS	High Demand	2035	6.48	Lower Savannah

User	Water Source	Use Category	Projection	Year	Demand (MGD)	Basin
City of Aiken	Groundwater	WS	High Demand	2040	6.80	Lower Savannah
City of Aiken	Groundwater	WS	High Demand	2050	7.43	Lower Savannah
City of Aiken	Groundwater	WS	High Demand	2060	8.16	Lower Savannah
City of Aiken	Groundwater	WS	High Demand	2070	8.92	Lower Savannah
City of Barnwell	Groundwater	WS	High Demand	2025	1.83	Salkehatchie
City of Barnwell	Groundwater	WS	High Demand	2030	1.92	Salkehatchie
City of Barnwell	Groundwater	WS	High Demand	2035	2.01	Salkehatchie
City of Barnwell	Groundwater	WS	High Demand	2040	2.11	Salkehatchie
City of Barnwell	Groundwater	WS	High Demand	2050	2.30	Salkehatchie
City of Barnwell	Groundwater	WS	High Demand	2060	2.53	Salkehatchie
City of Barnwell	Groundwater	WS	High Demand	2070	2.76	Salkehatchie
City of Walterboro	Groundwater	WS	High Demand	2025	1.94	Salkehatchie
City of Walterboro	Groundwater	WS	High Demand	2030	2.03	Salkehatchie
City of Walterboro	Groundwater	WS	High Demand	2035	2.13	Salkehatchie
City of Walterboro	Groundwater	WS	High Demand	2040	2.23	Salkehatchie
City of Walterboro	Groundwater	WS	High Demand	2050	2.44	Salkehatchie
City of Walterboro	Groundwater	WS	High Demand	2060	2.68	Salkehatchie
City of Walterboro	Groundwater	WS	High Demand	2070	2.93	Salkehatchie
College Acres	Groundwater	WS	High Demand	2025	0.28	Lower Savannah
College Acres	Groundwater	WS	High Demand	2030	0.29	Lower Savannah
College Acres	Groundwater	WS	High Demand	2035	0.30	Lower Savannah

User	Water Source	Use Category	Projection	Year	Demand (MGD)	Basin
College Acres	Groundwater	WS	High Demand	2040	0.32	Lower Savannah
College Acres	Groundwater	WS	High Demand	2050	0.35	Lower Savannah
College Acres	Groundwater	WS	High Demand	2060	0.38	Lower Savannah
College Acres	Groundwater	WS	High Demand	2070	0.42	Lower Savannah
Colleton - Dye	Groundwater	GC	High Demand	2025	0.53	Salkehatchie
Colleton - Dye	Groundwater	GC	High Demand	2030	0.53	Salkehatchie
Colleton - Dye	Groundwater	GC	High Demand	2035	0.53	Salkehatchie
Colleton - Dye	Groundwater	GC	High Demand	2040	0.53	Salkehatchie
Colleton - Dye	Groundwater	GC	High Demand	2050	0.53	Salkehatchie
Colleton - Dye	Groundwater	GC	High Demand	2060	0.53	Salkehatchie
Colleton - Dye	Groundwater	GC	High Demand	2070	0.53	Salkehatchie
Congaree	Groundwater	GC	High Demand	2025	0.24	Salkehatchie
Congaree	Groundwater	GC	High Demand	2030	0.24	Salkehatchie
Congaree	Groundwater	GC	High Demand	2035	0.24	Salkehatchie
Congaree	Groundwater	GC	High Demand	2040	0.24	Salkehatchie
Congaree	Groundwater	GC	High Demand	2050	0.24	Salkehatchie
Congaree	Groundwater	GC	High Demand	2060	0.24	Salkehatchie
Congaree	Groundwater	GC	High Demand	2070	0.24	Salkehatchie
Crescent Point	Groundwater	GC	High Demand	2025	0.37	Salkehatchie
Crescent Point	Groundwater	GC	High Demand	2030	0.37	Salkehatchie
Crescent Point	Groundwater	GC	High Demand	2035	0.37	Salkehatchie

User	Water Source	Use Category	Projection	Year	Demand (MGD)	Basin
Crescent Point	Groundwater	GC	High Demand	2040	0.37	Salkehatchie
Crescent Point	Groundwater	GC	High Demand	2050	0.37	Salkehatchie
Crescent Point	Groundwater	GC	High Demand	2060	0.37	Salkehatchie
Crescent Point	Groundwater	GC	High Demand	2070	0.37	Salkehatchie
Dataw	Groundwater	GC	High Demand	2025	0.24	Salkehatchie
Dataw	Groundwater	GC	High Demand	2030	0.24	Salkehatchie
Dataw	Groundwater	GC	High Demand	2035	0.24	Salkehatchie
Dataw	Groundwater	GC	High Demand	2040	0.24	Salkehatchie
Dataw	Groundwater	GC	High Demand	2050	0.24	Salkehatchie
Dataw	Groundwater	GC	High Demand	2060	0.24	Salkehatchie
Dataw	Groundwater	GC	High Demand	2070	0.24	Salkehatchie
Daufuskie Island Utility Company Inc.	Groundwater	WS	High Demand	2025	0.36	Lower Savannah
Daufuskie Island Utility Company Inc.	Groundwater	WS	High Demand	2030	0.37	Lower Savannah
Daufuskie Island Utility Company Inc.	Groundwater	WS	High Demand	2035	0.39	Lower Savannah
Daufuskie Island Utility Company Inc.	Groundwater	WS	High Demand	2040	0.41	Lower Savannah
Daufuskie Island Utility Company Inc.	Groundwater	WS	High Demand	2050	0.45	Lower Savannah
Daufuskie Island Utility Company Inc.	Groundwater	WS	High Demand	2060	0.49	Lower Savannah
Daufuskie Island Utility Company Inc.	Groundwater	WS	High Demand	2070	0.54	Lower Savannah

User	Water Source	Use Category	Projection	Year	Demand (MGD)	Basin
Eagle's Pointe	Groundwater	GC	High Demand	2025	0.29	Salkehatchie
Eagle's Pointe	Groundwater	GC	High Demand	2030	0.29	Salkehatchie
Eagle's Pointe	Groundwater	GC	High Demand	2035	0.29	Salkehatchie
Eagle's Pointe	Groundwater	GC	High Demand	2040	0.29	Salkehatchie
Eagle's Pointe	Groundwater	GC	High Demand	2050	0.29	Salkehatchie
Eagle's Pointe	Groundwater	GC	High Demand	2060	0.29	Salkehatchie
Eagle's Pointe	Groundwater	GC	High Demand	2070	0.29	Salkehatchie
Fish Network	Groundwater	AQ	High Demand	2025	0.75	Salkehatchie
Fish Network	Groundwater	AQ	High Demand	2030	0.75	Salkehatchie
Fish Network	Groundwater	AQ	High Demand	2035	0.75	Salkehatchie
Fish Network	Groundwater	AQ	High Demand	2040	0.75	Salkehatchie
Fish Network	Groundwater	AQ	High Demand	2050	0.75	Salkehatchie
Fish Network	Groundwater	AQ	High Demand	2060	0.75	Salkehatchie
Fish Network	Groundwater	AQ	High Demand	2070	0.75	Salkehatchie
Haig Point	Groundwater	GC	High Demand	2025	0.20	Lower Savannah
Haig Point	Groundwater	GC	High Demand	2030	0.20	Lower Savannah
Haig Point	Groundwater	GC	High Demand	2035	0.20	Lower Savannah
Haig Point	Groundwater	GC	High Demand	2040	0.20	Lower Savannah
Haig Point	Groundwater	GC	High Demand	2050	0.20	Lower Savannah
Haig Point	Groundwater	GC	High Demand	2060	0.20	Lower Savannah
Haig Point	Groundwater	GC	High Demand	2070	0.20	Lower Savannah

User	Water Source	Use Category	Projection	Year	Demand (MGD)	Basin
Hampton Hall	Groundwater	GC	High Demand	2025	0.16	Lower Savannah
Hampton Hall	Groundwater	GC	High Demand	2030	0.16	Lower Savannah
Hampton Hall	Groundwater	GC	High Demand	2035	0.16	Lower Savannah
Hampton Hall	Groundwater	GC	High Demand	2040	0.16	Lower Savannah
Hampton Hall	Groundwater	GC	High Demand	2050	0.16	Lower Savannah
Hampton Hall	Groundwater	GC	High Demand	2060	0.16	Lower Savannah
Hampton Hall	Groundwater	GC	High Demand	2070	0.16	Lower Savannah
Hampton Pointe	Groundwater	GC	High Demand	2025	0.17	Lower Savannah
Hampton Pointe	Groundwater	GC	High Demand	2030	0.17	Lower Savannah
Hampton Pointe	Groundwater	GC	High Demand	2035	0.17	Lower Savannah
Hampton Pointe	Groundwater	GC	High Demand	2040	0.17	Lower Savannah
Hampton Pointe	Groundwater	GC	High Demand	2050	0.17	Lower Savannah
Hampton Pointe	Groundwater	GC	High Demand	2060	0.17	Lower Savannah
Hampton Pointe	Groundwater	GC	High Demand	2070	0.17	Lower Savannah
Hilton Head Lakes	Groundwater	GC	High Demand	2025	0.08	Lower Savannah
Hilton Head Lakes	Groundwater	GC	High Demand	2030	0.08	Lower Savannah
Hilton Head Lakes	Groundwater	GC	High Demand	2035	0.08	Lower Savannah
Hilton Head Lakes	Groundwater	GC	High Demand	2040	0.08	Lower Savannah
Hilton Head Lakes	Groundwater	GC	High Demand	2050	0.08	Lower Savannah
Hilton Head Lakes	Groundwater	GC	High Demand	2060	0.08	Lower Savannah
Hilton Head Lakes	Groundwater	GC	High Demand	2070	0.08	Lower Savannah

User	Water Source	Use Category	Projection	Year	Demand (MGD)	Basin
Island West	Groundwater	GC	High Demand	2025	0.10	Salkehatchie
Island West	Groundwater	GC	High Demand	2030	0.10	Salkehatchie
Island West	Groundwater	GC	High Demand	2035	0.10	Salkehatchie
Island West	Groundwater	GC	High Demand	2040	0.10	Salkehatchie
Island West	Groundwater	GC	High Demand	2050	0.10	Salkehatchie
Island West	Groundwater	GC	High Demand	2060	0.10	Salkehatchie
Island West	Groundwater	GC	High Demand	2070	0.10	Salkehatchie
Kimberly Clark	Groundwater	IN	High Demand	2025	0.26	Lower Savannah
Kimberly Clark	Groundwater	IN	High Demand	2030	0.29	Lower Savannah
Kimberly Clark	Groundwater	IN	High Demand	2035	0.32	Lower Savannah
Kimberly Clark	Groundwater	IN	High Demand	2040	0.36	Lower Savannah
Kimberly Clark	Groundwater	IN	High Demand	2050	0.44	Lower Savannah
Kimberly Clark	Groundwater	IN	High Demand	2060	0.55	Lower Savannah
Kimberly Clark	Groundwater	IN	High Demand	2070	0.67	Lower Savannah
Langley	Groundwater	WS	High Demand	2025	0.20	Lower Savannah
Langley	Groundwater	WS	High Demand	2030	0.21	Lower Savannah
Langley	Groundwater	WS	High Demand	2035	0.22	Lower Savannah
Langley	Groundwater	WS	High Demand	2040	0.24	Lower Savannah
Langley	Groundwater	WS	High Demand	2050	0.26	Lower Savannah
Langley	Groundwater	WS	High Demand	2060	0.28	Lower Savannah
Langley	Groundwater	WS	High Demand	2070	0.31	Lower Savannah

User	Water Source	Use Category	Projection	Year	Demand (MGD)	Basin
Lowcountry Regional Water System	Groundwater	WS	High Demand	2025	1.04	Salkehatchie
Lowcountry Regional Water System	Groundwater	WS	High Demand	2030	1.08	Salkehatchie
Lowcountry Regional Water System	Groundwater	WS	High Demand	2035	1.14	Salkehatchie
Lowcountry Regional Water System	Groundwater	WS	High Demand	2040	1.19	Salkehatchie
Lowcountry Regional Water System	Groundwater	WS	High Demand	2050	1.30	Salkehatchie
Lowcountry Regional Water System	Groundwater	WS	High Demand	2060	1.43	Salkehatchie
Lowcountry Regional Water System	Groundwater	WS	High Demand	2070	1.56	Salkehatchie
May River	Groundwater	GC	High Demand	2025	0.27	Lower Savannah
May River	Groundwater	GC	High Demand	2030	0.27	Lower Savannah
May River	Groundwater	GC	High Demand	2035	0.27	Lower Savannah
May River	Groundwater	GC	High Demand	2040	0.27	Lower Savannah
May River	Groundwater	GC	High Demand	2050	0.27	Lower Savannah
May River	Groundwater	GC	High Demand	2060	0.27	Lower Savannah
May River	Groundwater	GC	High Demand	2070	0.27	Lower Savannah
Ocean Creek	Groundwater	GC	High Demand	2025	0.21	Salkehatchie
Ocean Creek	Groundwater	GC	High Demand	2030	0.21	Salkehatchie
Ocean Creek	Groundwater	GC	High Demand	2035	0.21	Salkehatchie
Ocean Creek	Groundwater	GC	High Demand	2040	0.21	Salkehatchie

User	Water Source	Use Category	Projection	Year	Demand (MGD)	Basin
Ocean Creek	Groundwater	GC	High Demand	2050	0.21	Salkehatchie
Ocean Creek	Groundwater	GC	High Demand	2060	0.21	Salkehatchie
Ocean Creek	Groundwater	GC	High Demand	2070	0.21	Salkehatchie
Ocean Point	Groundwater	GC	High Demand	2025	0.10	Salkehatchie
Ocean Point	Groundwater	GC	High Demand	2030	0.10	Salkehatchie
Ocean Point	Groundwater	GC	High Demand	2035	0.10	Salkehatchie
Ocean Point	Groundwater	GC	High Demand	2040	0.10	Salkehatchie
Ocean Point	Groundwater	GC	High Demand	2050	0.10	Salkehatchie
Ocean Point	Groundwater	GC	High Demand	2060	0.10	Salkehatchie
Ocean Point	Groundwater	GC	High Demand	2070	0.10	Salkehatchie
Olar-Govan Regional Water System	Groundwater	WS	High Demand	2025	0.03	Salkehatchie
Olar-Govan Regional Water System	Groundwater	WS	High Demand	2030	0.03	Salkehatchie
Olar-Govan Regional Water System	Groundwater	WS	High Demand	2035	0.03	Salkehatchie
Olar-Govan Regional Water System	Groundwater	WS	High Demand	2040	0.03	Salkehatchie
Olar-Govan Regional Water System	Groundwater	WS	High Demand	2050	0.04	Salkehatchie
Olar-Govan Regional Water System	Groundwater	WS	High Demand	2060	0.04	Salkehatchie
Olar-Govan Regional Water System	Groundwater	WS	High Demand	2070	0.04	Salkehatchie
Old Barnwell Golf Course Course	Groundwater	GC	High Demand	2025	0.07	Lower Savannah

User	Water Source	Use Category	Projection	Year	Demand (MGD)	Basin
Old Barnwell Golf Course Course	Groundwater	GC	High Demand	2030	0.07	Lower Savannah
Old Barnwell Golf Course Course	Groundwater	GC	High Demand	2035	0.07	Lower Savannah
Old Barnwell Golf Course Course	Groundwater	GC	High Demand	2040	0.07	Lower Savannah
Old Barnwell Golf Course Course	Groundwater	GC	High Demand	2050	0.07	Lower Savannah
Old Barnwell Golf Course Course	Groundwater	GC	High Demand	2060	0.07	Lower Savannah
Old Barnwell Golf Course Course	Groundwater	GC	High Demand	2070	0.07	Lower Savannah
Olde Beaufort	Groundwater	GC	High Demand	2025	0.26	Salkehatchie
Olde Beaufort	Groundwater	GC	High Demand	2030	0.26	Salkehatchie
Olde Beaufort	Groundwater	GC	High Demand	2035	0.26	Salkehatchie
Olde Beaufort	Groundwater	GC	High Demand	2040	0.26	Salkehatchie
Olde Beaufort	Groundwater	GC	High Demand	2050	0.26	Salkehatchie
Olde Beaufort	Groundwater	GC	High Demand	2060	0.26	Salkehatchie
Olde Beaufort	Groundwater	GC	High Demand	2070	0.26	Salkehatchie
Oldfield	Groundwater	GC	High Demand	2025	0.24	Salkehatchie
Oldfield	Groundwater	GC	High Demand	2030	0.24	Salkehatchie
Oldfield	Groundwater	GC	High Demand	2035	0.24	Salkehatchie
Oldfield	Groundwater	GC	High Demand	2040	0.24	Salkehatchie
Oldfield	Groundwater	GC	High Demand	2050	0.24	Salkehatchie
Oldfield	Groundwater	GC	High Demand	2060	0.24	Salkehatchie

User	Water Source	Use Category	Projection	Year	Demand (MGD)	Basin
Oldfield	Groundwater	GC	High Demand	2070	0.24	Salkehatchie
Pinecrest	Groundwater	GC	High Demand	2025	0.19	Salkehatchie
Pinecrest	Groundwater	GC	High Demand	2030	0.19	Salkehatchie
Pinecrest	Groundwater	GC	High Demand	2035	0.19	Salkehatchie
Pinecrest	Groundwater	GC	High Demand	2040	0.19	Salkehatchie
Pinecrest	Groundwater	GC	High Demand	2050	0.19	Salkehatchie
Pinecrest	Groundwater	GC	High Demand	2060	0.19	Salkehatchie
Pinecrest	Groundwater	GC	High Demand	2070	0.19	Salkehatchie
Resort	Groundwater	IN	Moderate	2025	0.07	Lower Savannah
Resort	Groundwater	IN	Moderate	2030	0.07	Lower Savannah
Resort	Groundwater	IN	Moderate	2035	0.07	Lower Savannah
Resort	Groundwater	IN	Moderate	2040	0.08	Lower Savannah
Resort	Groundwater	IN	Moderate	2050	0.09	Lower Savannah
Resort	Groundwater	IN	Moderate	2060	0.10	Lower Savannah
Resort	Groundwater	IN	Moderate	2070	0.11	Lower Savannah
Sanctuary	Groundwater	GC	Moderate	2025	0.03	Salkehatchie
Sanctuary	Groundwater	GC	Moderate	2030	0.03	Salkehatchie
Sanctuary	Groundwater	GC	Moderate	2035	0.03	Salkehatchie
Sanctuary	Groundwater	GC	Moderate	2040	0.03	Salkehatchie
Sanctuary	Groundwater	GC	Moderate	2050	0.03	Salkehatchie
Sanctuary	Groundwater	GC	Moderate	2060	0.03	Salkehatchie
Sanctuary	Groundwater	GC	Moderate	2070	0.03	Salkehatchie
South Island Public Service District	Groundwater	WS	Moderate	2025	6.68	Lower Savannah
South Island Public Service District	Groundwater	WS	Moderate	2030	6.88	Lower Savannah
South Island Public Service District	Groundwater	WS	Moderate	2035	7.02	Lower Savannah

User	Water Source	Use Category	Projection	Year	Demand (MGD)	Basin
South Island Public Service District	Groundwater	WS	Moderate	2040	7.15	Lower Savannah
South Island Public Service District	Groundwater	WS	Moderate	2050	7.47	Lower Savannah
South Island Public Service District	Groundwater	WS	Moderate	2060	7.83	Lower Savannah
South Island Public Service District	Groundwater	WS	Moderate	2070	8.15	Lower Savannah
Spanish Wells	Groundwater	GC	Moderate	2025	0.05	Lower Savannah
Spanish Wells	Groundwater	GC	Moderate	2030	0.05	Lower Savannah
Spanish Wells	Groundwater	GC	Moderate	2035	0.05	Lower Savannah
Spanish Wells	Groundwater	GC	Moderate	2040	0.05	Lower Savannah
Spanish Wells	Groundwater	GC	Moderate	2050	0.05	Lower Savannah
Spanish Wells	Groundwater	GC	Moderate	2060	0.05	Lower Savannah
Spanish Wells	Groundwater	GC	Moderate	2070	0.05	Lower Savannah
Spring Island	Groundwater	GC	Moderate	2025	0.21	Salkehatchie
Spring Island	Groundwater	GC	Moderate	2030	0.21	Salkehatchie
Spring Island	Groundwater	GC	Moderate	2035	0.21	Salkehatchie
Spring Island	Groundwater	GC	Moderate	2040	0.21	Salkehatchie
Spring Island	Groundwater	GC	Moderate	2050	0.21	Salkehatchie
Spring Island	Groundwater	GC	Moderate	2060	0.21	Salkehatchie
Spring Island	Groundwater	GC	Moderate	2070	0.21	Salkehatchie
SRS (Manufacturing)	Groundwater	IN	Moderate	2025	1.84	Lower Savannah
SRS (Manufacturing)	Groundwater	IN	Moderate	2030	1.84	Lower Savannah
SRS (Manufacturing)	Groundwater	IN	Moderate	2035	1.84	Lower Savannah
SRS (Manufacturing)	Groundwater	IN	Moderate	2040	1.84	Lower Savannah
SRS (Manufacturing)	Groundwater	IN	Moderate	2050	1.84	Lower Savannah

User	Water Source	Use Category	Projection	Year	Demand (MGD)	Basin
SRS (Manufacturing)	Groundwater	IN	Moderate	2060	1.84	Lower Savannah
SRS (Manufacturing)	Groundwater	IN	Moderate	2070	1.84	Lower Savannah
SRS (Public Supply)	Groundwater	WS	Moderate	2025	1.42	Lower Savannah
SRS (Public Supply)	Groundwater	WS	Moderate	2030	1.42	Lower Savannah
SRS (Public Supply)	Groundwater	WS	Moderate	2035	1.42	Lower Savannah
SRS (Public Supply)	Groundwater	WS	Moderate	2040	1.42	Lower Savannah
SRS (Public Supply)	Groundwater	WS	Moderate	2050	1.42	Lower Savannah
SRS (Public Supply)	Groundwater	WS	Moderate	2060	1.42	Lower Savannah
SRS (Public Supply)	Groundwater	WS	Moderate	2070	1.42	Lower Savannah
Talatha	Groundwater	WS	Moderate	2025	0.13	Lower Savannah
Talatha	Groundwater	WS	Moderate	2030	0.13	Lower Savannah
Talatha	Groundwater	WS	Moderate	2035	0.13	Lower Savannah
Talatha	Groundwater	WS	Moderate	2040	0.13	Lower Savannah
Talatha	Groundwater	WS	Moderate	2050	0.13	Lower Savannah
Talatha	Groundwater	WS	Moderate	2060	0.13	Lower Savannah
Talatha	Groundwater	WS	Moderate	2070	0.13	Lower Savannah
Town of Denmark	Groundwater	WS	Moderate	2025	0.26	Salkehatchie
Town of Denmark	Groundwater	WS	Moderate	2030	0.23	Salkehatchie
Town of Denmark	Groundwater	WS	Moderate	2035	0.20	Salkehatchie
Town of Denmark	Groundwater	WS	Moderate	2040	0.19	Salkehatchie
Town of Denmark	Groundwater	WS	Moderate	2050	0.19	Salkehatchie
Town of Denmark	Groundwater	WS	Moderate	2060	0.19	Salkehatchie
Town of Denmark	Groundwater	WS	Moderate	2070	0.19	Salkehatchie

User	Water Source	Use Category	Projection	Year	Demand (MGD)	Basin
Town of Ehrhardt	Groundwater	WS	Moderate	2025	0.03	Salkehatchie
Town of Ehrhardt	Groundwater	WS	Moderate	2030	0.03	Salkehatchie
Town of Ehrhardt	Groundwater	WS	Moderate	2035	0.03	Salkehatchie
Town of Ehrhardt	Groundwater	WS	Moderate	2040	0.02	Salkehatchie
Town of Ehrhardt	Groundwater	WS	Moderate	2050	0.02	Salkehatchie
Town of Ehrhardt	Groundwater	WS	Moderate	2060	0.02	Salkehatchie
Town of Ehrhardt	Groundwater	WS	Moderate	2070	0.02	Salkehatchie
Town of Fairfax	Groundwater	WS	Moderate	2025	0.21	Salkehatchie
Town of Fairfax	Groundwater	WS	Moderate	2030	0.18	Salkehatchie
Town of Fairfax	Groundwater	WS	Moderate	2035	0.15	Salkehatchie
Town of Fairfax	Groundwater	WS	Moderate	2040	0.14	Salkehatchie
Town of Fairfax	Groundwater	WS	Moderate	2050	0.14	Salkehatchie
Town of Fairfax	Groundwater	WS	Moderate	2060	0.14	Salkehatchie
Town of Fairfax	Groundwater	WS	Moderate	2070	0.14	Salkehatchie
Town of Furman	Groundwater	WS	Moderate	2025	0.04	Lower Savannah
Town of Furman	Groundwater	WS	Moderate	2030	0.04	Lower Savannah
Town of Furman	Groundwater	WS	Moderate	2035	0.03	Lower Savannah
Town of Furman	Groundwater	WS	Moderate	2040	0.03	Lower Savannah
Town of Furman	Groundwater	WS	Moderate	2050	0.03	Lower Savannah
Town of Furman	Groundwater	WS	Moderate	2060	0.03	Lower Savannah
Town of Furman	Groundwater	WS	Moderate	2070	0.03	Lower Savannah
Town of Hilda	Groundwater	WS	Moderate	2025	0.02	Salkehatchie

User	Water Source	Use Category	Projection	Year	Demand (MGD)	Basin
Town of Hilda	Groundwater	WS	Moderate	2030	0.02	Salkehatchie
Town of Hilda	Groundwater	WS	Moderate	2035	0.02	Salkehatchie
Town of Hilda	Groundwater	WS	Moderate	2040	0.02	Salkehatchie
Town of Hilda	Groundwater	WS	Moderate	2050	0.02	Salkehatchie
Town of Hilda	Groundwater	WS	Moderate	2060	0.02	Salkehatchie
Town of Hilda	Groundwater	WS	Moderate	2070	0.02	Salkehatchie
Town of Jackson	Groundwater	WS	Moderate	2025	0.34	Lower Savannah
Town of Jackson	Groundwater	WS	Moderate	2030	0.35	Lower Savannah
Town of Jackson	Groundwater	WS	Moderate	2035	0.35	Lower Savannah
Town of Jackson	Groundwater	WS	Moderate	2040	0.35	Lower Savannah
Town of Jackson	Groundwater	WS	Moderate	2050	0.35	Lower Savannah
Town of Jackson	Groundwater	WS	Moderate	2060	0.35	Lower Savannah
Town of Jackson	Groundwater	WS	Moderate	2070	0.36	Lower Savannah
Town of New Ellenton	Groundwater	WS	Moderate	2025	1.01	Lower Savannah
Town of New Ellenton	Groundwater	WS	Moderate	2030	1.01	Lower Savannah
Town of New Ellenton	Groundwater	WS	Moderate	2035	1.01	Lower Savannah
Town of New Ellenton	Groundwater	WS	Moderate	2040	1.01	Lower Savannah
Town of New Ellenton	Groundwater	WS	Moderate	2050	1.02	Lower Savannah
Town of New Ellenton	Groundwater	WS	Moderate	2060	1.03	Lower Savannah
Town of New Ellenton	Groundwater	WS	Moderate	2070	1.04	Lower Savannah
Town of Ridgeland	Groundwater	WS	Moderate	2025	0.80	Salkehatchie
Town of Ridgeland	Groundwater	WS	Moderate	2030	0.84	Salkehatchie
Town of Ridgeland	Groundwater	WS	Moderate	2035	0.88	Salkehatchie

User	Water Source	Use Category	Projection	Year	Demand (MGD)	Basin
Town of Ridgeland	Groundwater	WS	Moderate	2040	0.91	Salkehatchie
Town of Ridgeland	Groundwater	WS	Moderate	2050	0.99	Salkehatchie
Town of Ridgeland	Groundwater	WS	Moderate	2060	1.07	Salkehatchie
Town of Ridgeland	Groundwater	WS	Moderate	2070	1.14	Salkehatchie
Town of Ulmer	Groundwater	WS	Moderate	2025	0.03	Salkehatchie
Town of Ulmer	Groundwater	WS	Moderate	2030	0.02	Salkehatchie
Town of Ulmer	Groundwater	WS	Moderate	2035	0.02	Salkehatchie
Town of Ulmer	Groundwater	WS	Moderate	2040	0.02	Salkehatchie
Town of Ulmer	Groundwater	WS	Moderate	2050	0.02	Salkehatchie
Town of Ulmer	Groundwater	WS	Moderate	2060	0.02	Salkehatchie
Town of Ulmer	Groundwater	WS	Moderate	2070	0.02	Salkehatchie
Town of Williston	Groundwater	WS	Moderate	2025	0.41	Salkehatchie
Town of Williston	Groundwater	WS	Moderate	2030	0.39	Salkehatchie
Town of Williston	Groundwater	WS	Moderate	2035	0.36	Salkehatchie
Town of Williston	Groundwater	WS	Moderate	2040	0.34	Salkehatchie
Town of Williston	Groundwater	WS	Moderate	2050	0.34	Salkehatchie
Town of Williston	Groundwater	WS	Moderate	2060	0.34	Salkehatchie
Town of Williston	Groundwater	WS	Moderate	2070	0.34	Salkehatchie
Trolley Run	Groundwater	WS	Moderate	2025	0.38	Lower Savannah
Trolley Run	Groundwater	WS	Moderate	2030	0.38	Lower Savannah
Trolley Run	Groundwater	WS	Moderate	2035	0.38	Lower Savannah
Trolley Run	Groundwater	WS	Moderate	2040	0.38	Lower Savannah
Trolley Run	Groundwater	WS	Moderate	2050	0.38	Lower Savannah

User	Water Source	Use Category	Projection	Year	Demand (MGD)	Basin
Trolley Run	Groundwater	WS	Moderate	2060	0.39	Lower Savannah
Trolley Run	Groundwater	WS	Moderate	2070	0.39	Lower Savannah
Valley PSA	Groundwater	WS	Moderate	2025	0.89	Lower Savannah
Valley PSA	Groundwater	WS	Moderate	2030	0.90	Lower Savannah
Valley PSA	Groundwater	WS	Moderate	2035	0.90	Lower Savannah
Valley PSA	Groundwater	WS	Moderate	2040	0.90	Lower Savannah
Valley PSA	Groundwater	WS	Moderate	2050	0.90	Lower Savannah
Valley PSA	Groundwater	WS	Moderate	2060	0.91	Lower Savannah
Valley PSA	Groundwater	WS	Moderate	2070	0.92	Lower Savannah
Waddell	Groundwater	AQ	Moderate	2025	0.00	Salkehatchie
Waddell	Groundwater	AQ	Moderate	2030	0.00	Salkehatchie
Waddell	Groundwater	AQ	Moderate	2035	0.00	Salkehatchie
Waddell	Groundwater	AQ	Moderate	2040	0.00	Salkehatchie
Waddell	Groundwater	AQ	Moderate	2050	0.00	Salkehatchie
Waddell	Groundwater	AQ	Moderate	2060	0.00	Salkehatchie
Waddell	Groundwater	AQ	Moderate	2070	0.00	Salkehatchie
Water Oak	Groundwater	GC	Moderate	2025	0.09	Lower Savannah
Water Oak	Groundwater	GC	Moderate	2030	0.09	Lower Savannah
Water Oak	Groundwater	GC	Moderate	2035	0.09	Lower Savannah
Water Oak	Groundwater	GC	Moderate	2040	0.09	Lower Savannah
Water Oak	Groundwater	GC	Moderate	2050	0.09	Lower Savannah
Water Oak	Groundwater	GC	Moderate	2060	0.09	Lower Savannah
Water Oak	Groundwater	GC	Moderate	2070	0.09	Lower Savannah
West Fraser	Groundwater	WS	Moderate	2025	0.10	Salkehatchie
West Fraser	Groundwater	WS	Moderate	2030	0.10	Salkehatchie
West Fraser	Groundwater	WS	Moderate	2035	0.10	Salkehatchie
West Fraser	Groundwater	WS	Moderate	2040	0.11	Salkehatchie
West Fraser	Groundwater	WS	Moderate	2050	0.11	Salkehatchie
West Fraser	Groundwater	WS	Moderate	2060	0.11	Salkehatchie
West Fraser	Groundwater	WS	Moderate	2070	0.11	Salkehatchie
Hilton Head No. 1 PSD - Salkehatchie	Groundwater	WS	Moderate	2025	0.05	Salkehatchie

User	Water Source	Use Category	Projection	Year	Demand (MGD)	Basin
Hilton Head No. 1 PSD - Salkehatchie	Groundwater	WS	Moderate	2030	0.05	Salkehatchie
Hilton Head No. 1 PSD - Salkehatchie	Groundwater	WS	Moderate	2035	0.06	Salkehatchie
Hilton Head No. 1 PSD - Salkehatchie	Groundwater	WS	Moderate	2040	0.06	Salkehatchie
Hilton Head No. 1 PSD - Salkehatchie	Groundwater	WS	Moderate	2050	0.06	Salkehatchie
Hilton Head No. 1 PSD - Salkehatchie	Groundwater	WS	Moderate	2060	0.07	Salkehatchie
Hilton Head No. 1 PSD - Salkehatchie	Groundwater	WS	Moderate	2070	0.07	Salkehatchie
Hilton Head No. 1 PSD - Savannah	Groundwater	WS	Moderate	2025	5.87	Lower Savannah
Hilton Head No. 1 PSD - Savannah	Groundwater	WS	Moderate	2030	6.17	Lower Savannah
Hilton Head No. 1 PSD - Savannah	Groundwater	WS	Moderate	2035	6.41	Lower Savannah
Hilton Head No. 1 PSD - Savannah	Groundwater	WS	Moderate	2040	6.62	Lower Savannah
Hilton Head No. 1 PSD - Savannah	Groundwater	WS	Moderate	2050	7.12	Lower Savannah
Hilton Head No. 1 PSD - Savannah	Groundwater	WS	Moderate	2060	7.65	Lower Savannah
Hilton Head No. 1 PSD - Savannah	Groundwater	WS	Moderate	2070	8.15	Lower Savannah
Town of Estill - Salkehatchie	Groundwater	WS	Moderate	2025	0.26	Salkehatchie
Town of Estill - Salkehatchie	Groundwater	WS	Moderate	2030	0.24	Salkehatchie
Town of Estill - Salkehatchie	Groundwater	WS	Moderate	2035	0.22	Salkehatchie

User	Water Source	Use Category	Projection	Year	Demand (MGD)	Basin
Town of Estill - Salkehatchie	Groundwater	WS	Moderate	2040	0.21	Salkehatchie
Town of Estill - Salkehatchie	Groundwater	WS	Moderate	2050	0.21	Salkehatchie
Town of Estill - Salkehatchie	Groundwater	WS	Moderate	2060	0.21	Salkehatchie
Town of Estill - Salkehatchie	Groundwater	WS	Moderate	2070	0.21	Salkehatchie
Town of Estill - Savannah	Groundwater	WS	Moderate	2025	0.19	Lower Savannah
Town of Estill - Savannah	Groundwater	WS	Moderate	2030	0.18	Lower Savannah
Town of Estill - Savannah	Groundwater	WS	Moderate	2035	0.16	Lower Savannah
Town of Estill - Savannah	Groundwater	WS	Moderate	2040	0.16	Lower Savannah
Town of Estill - Savannah	Groundwater	WS	Moderate	2050	0.16	Lower Savannah
Town of Estill - Savannah	Groundwater	WS	Moderate	2060	0.16	Lower Savannah
Town of Estill - Savannah	Groundwater	WS	Moderate	2070	0.16	Lower Savannah
Colleton River Club - Nicklaus Course - Salkehatchie	Groundwater	GC	Moderate	2025	0.35	Salkehatchie
Colleton River Club - Nicklaus Course - Salkehatchie	Groundwater	GC	Moderate	2030	0.35	Salkehatchie
Colleton River Club - Nicklaus Course - Salkehatchie	Groundwater	GC	Moderate	2035	0.35	Salkehatchie
Colleton River Club - Nicklaus Course - Salkehatchie	Groundwater	GC	Moderate	2040	0.35	Salkehatchie

User	Water Source	Use Category	Projection	Year	Demand (MGD)	Basin
Colleton River Club - Nicklaus Course - Salkehatchie	Groundwater	GC	Moderate	2050	0.35	Salkehatchie
Colleton River Club - Nicklaus Course - Salkehatchie	Groundwater	GC	Moderate	2060	0.35	Salkehatchie
Colleton River Club - Nicklaus Course - Salkehatchie	Groundwater	GC	Moderate	2070	0.35	Salkehatchie
Colleton River Club - Nicklaus Course - Savannah	Groundwater	GC	Moderate	2025	0.01	Lower Savannah
Colleton River Club - Nicklaus Course - Savannah	Groundwater	GC	Moderate	2030	0.01	Lower Savannah
Colleton River Club - Nicklaus Course - Savannah	Groundwater	GC	Moderate	2035	0.01	Lower Savannah
Colleton River Club - Nicklaus Course - Savannah	Groundwater	GC	Moderate	2040	0.01	Lower Savannah
Colleton River Club - Nicklaus Course - Savannah	Groundwater	GC	Moderate	2050	0.01	Lower Savannah
Colleton River Club - Nicklaus Course - Savannah	Groundwater	GC	Moderate	2060	0.01	Lower Savannah

User	Water Source	Use Category	Projection	Year	Demand (MGD)	Basin
Colleton River Club - Nicklaus Course - Savannah	Groundwater	GC	Moderate	2070	0.01	Lower Savannah
Okatie Creek/Hidden Cypress Golf Course Club - Salkehatchie	Groundwater	GC	Moderate	2025	0.05	Salkehatchie
Okatie Creek/Hidden Cypress Golf Course Club - Salkehatchie	Groundwater	GC	Moderate	2030	0.05	Salkehatchie
Okatie Creek/Hidden Cypress Golf Course Club - Salkehatchie	Groundwater	GC	Moderate	2035	0.05	Salkehatchie
Okatie Creek/Hidden Cypress Golf Course Club - Salkehatchie	Groundwater	GC	Moderate	2040	0.05	Salkehatchie
Okatie Creek/Hidden Cypress Golf Course Club - Salkehatchie	Groundwater	GC	Moderate	2050	0.05	Salkehatchie
Okatie Creek/Hidden Cypress Golf Course Club - Salkehatchie	Groundwater	GC	Moderate	2060	0.05	Salkehatchie
Okatie Creek/Hidden Cypress Golf Course Club - Salkehatchie	Groundwater	GC	Moderate	2070	0.05	Salkehatchie
Okatie Creek/Hidden Cypress Golf Course Club - Savannah	Groundwater	GC	Moderate	2025	0.04	Lower Savannah

User	Water Source	Use Category	Projection	Year	Demand (MGD)	Basin
Okatie Creek/Hidden Cypress Golf Course Club - Savannah	Groundwater	GC	Moderate	2030	0.04	Lower Savannah
Okatie Creek/Hidden Cypress Golf Course Club - Savannah	Groundwater	GC	Moderate	2035	0.04	Lower Savannah
Okatie Creek/Hidden Cypress Golf Course Club - Savannah	Groundwater	GC	Moderate	2040	0.04	Lower Savannah
Okatie Creek/Hidden Cypress Golf Course Club - Savannah	Groundwater	GC	Moderate	2050	0.04	Lower Savannah
Okatie Creek/Hidden Cypress Golf Course Club - Savannah	Groundwater	GC	Moderate	2060	0.04	Lower Savannah
Okatie Creek/Hidden Cypress Golf Course Club - Savannah	Groundwater	GC	Moderate	2070	0.04	Lower Savannah
Bamberg Public Works - Salkehatchie	Groundwater	WS	Moderate	2025	0.34	Salkehatchie
Bamberg Public Works - Salkehatchie	Groundwater	WS	Moderate	2030	0.31	Salkehatchie
Bamberg Public Works - Salkehatchie	Groundwater	WS	Moderate	2035	0.27	Salkehatchie
Bamberg Public Works - Salkehatchie	Groundwater	WS	Moderate	2040	0.25	Salkehatchie
Bamberg Public Works - Salkehatchie	Groundwater	WS	Moderate	2050	0.25	Salkehatchie

User	Water Source	Use Category	Projection	Year	Demand (MGD)	Basin
Bamberg Public Works - Salkehatchie	Groundwater	WS	Moderate	2060	0.25	Salkehatchie
Bamberg Public Works - Salkehatchie	Groundwater	WS	Moderate	2070	0.25	Salkehatchie
Bamberg Public Works - Savannah	Groundwater	WS	Moderate	2025	0.24	Lower Savannah
Bamberg Public Works - Savannah	Groundwater	WS	Moderate	2030	0.22	Lower Savannah
Bamberg Public Works - Savannah	Groundwater	WS	Moderate	2035	0.19	Lower Savannah
Bamberg Public Works - Savannah	Groundwater	WS	Moderate	2040	0.18	Lower Savannah
Bamberg Public Works - Savannah	Groundwater	WS	Moderate	2050	0.18	Lower Savannah
Bamberg Public Works - Savannah	Groundwater	WS	Moderate	2060	0.18	Lower Savannah
Bamberg Public Works - Savannah	Groundwater	WS	Moderate	2070	0.18	Lower Savannah

Appendix C
Flow-Ecology Relationships in the Lower Savannah-Salkehatchie River Basin

02/07/2025

Flow-Ecology Relationships in the Lower Savannah-Salkehatchie River Basin

With Applications for Flow Performance Measures in SWAM

DISCLAIMER

The following peer-reviewed scientific publications contain detailed information on data sources, flow metric calculations, statistical analyses relating flow to aquatic organisms, etc.:

- Bower, L. M., Peoples, B. K., Eddy, M. C., & Scott, M. C. (2022). Quantifying flow–ecology relationships across flow regime class and ecoregions in South Carolina. Science of the Total Environment, 802, 149721. URL: https://www.sciencedirect.com/science/article/pii/S0048969721047963
- Eddy, M. C., Lord, B., Perrot, D., Bower, L. M., & Peoples, B. K. (2022). Predictability of flow metrics calculated using a distributed hydrologic model across ecoregions and stream classes: Implications for developing flow–ecology relationships. Ecohydrology, 15(2), e2387. URL: https://onlinelibrary.wiley.com/doi/full/10.1002/eco.2387

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EXECUTIVE SUMMARY

Responses of organisms to stream flow change have long been recognized in scientific literature. The evolution of methods, large data sets, and statistical improvements over the last 20 years have advanced our ability to characterize these responses. If the necessary data is available, it is now possible to understand these responses to a specificity, making them useful for water resource management.

We identified a wide variety of flow–biological relationships to derive a set of recommended performance measures and predict changes in biological metrics in response to changes in flow for the Lower Savannah-Salkehatchie River basin. These relationships:

1) are highly relevant to drought management and water withdrawal,

2) are the strongest relationships between flow and river health, and

3) capture the greatest number of flow regime components of the streams and rivers of the Lower Savannah-Salkehatchie Basin.

We found statistically significant effects of flow on fish and invertebrates for all attributes of the natural flow regime, including magnitude, duration, frequency, timing, or rate of change. For this recommendation, only measures that are relevant to the Lower Savannah-Salkehatchie River, can be calculated in SWAM, and meet the three principles cited above that were used.

Priority Flow Characteristics

Four flow metrics emerged as having the greatest impact on instream health in the Basin. They are:

1. *Mean Daily Flow*: The mean daily flow is the mean of daily flows over the period of record.
2. *Duration of High Flow*: Duration of high flow is defined by the annual average number of days of flow above the 75th percentile of all daily values over the period of record.
3. *Frequency of High Flow*: Frequency of high flow is defined by the annual average of the number of flow events above the 75th percentile of all daily values over the period of record.
4. *Duration of Low Flow*: The average pulse duration for each year for flow events below a threshold equal to the 25th percentile value for the entire flow record. DL16 is the median of the yearly average durations (number of days).

Results Summary:

Mean daily flow is expected to be impacted more by water use than the duration of low flow based on the SWAM scenarios. The change in mean daily flow predicted by the full allocation scenario is expected to substantially reduce the number of fish species and pose a medium risk to fish species at one strategic node with reductions in the number of fish species up 27% ± 20%. All other SWAM scenarios generally indicated little change in mean daily flow and duration of low flow suggesting a low risk to the fish assemblages.

INTRODUCTION

South Carolina is home to a rich diversity of freshwater organisms, including a variety of fishes and invertebrates. These organisms have unique traits that make them especially adapted for life in rivers. Many species have traits that make them *sensitive* to environmental change. Some of these traits include spawning or living in gravel habitats, or specialized body shapes for living in high-flow conditions. Likewise, other species have traits that make them *tolerant* to environmental change, such as the ability to spawn in a variety of habitats or tolerate a wide range of temperatures.

Over 50 years of research supports the fact that aquatic organisms respond readily to changes in their environment. It is well known that key *biological metrics* such as the total number of species in a location and the representation of species with similar traits are directly indicative of *aquatic ecosystem health*. As ecosystems become less healthy, sensitive species are removed and replaced by tolerant species. Scientists use these biological metrics to assess aquatic ecosystem health to (a) identify high quality ecosystems to maintain and (b) identify ecosystems in poor health for remediation.

Aquatic ecosystem health is influenced strongly by instream flow. Sensitive species are especially adapted to the *natural flow regime*. The natural flow regime is described by five aspects of flow events that culminate to describe the overall flow conditions in a stream or river. These include:

-*Magnitude*: The size of high- and low-flow events

-*Frequency*: How often high- and low-flow events occur

-*Duration*: How long high- and low-flow events last when they do occur

-*Timing:* The time of year in which high- and low-flow events occur

-*Rate of change*: How often flows change from increasing to decreasing, or vice versa

Historically, instream flow management recommendations have focused only on maintaining minimum daily flows. However, it is becoming increasingly recognized that management for all five components of the natural flow regime is necessary for maintaining aquatic ecosystem health.

The natural flow regime is different across regions, and changes based on geology, natural vegetation, and precipitation patterns (see **Lower Savannah-Salkehatchie River Stream Types** below). Humans can alter the natural flow regime by withdrawing water directly from surface water or indirectly through groundwater withdrawal. Humans can also affect flow by changing land cover. Converting natural forests, grasslands, and wetlands into intensive agriculture or urban/suburban land cover types changes natural patterns of surface runoff and groundwater recharge. These changes have direct effects on aquatic ecosystem health and are indicated by aquatic organisms.

South Carolina is a state that is rich in water resources. However, the state is experiencing a period of rapid economic growth and population expansion. As such, identifying relationships between key instream flow metrics and biological metrics (hereafter, *flow-ecology relationships*) will provide guidance for developing recommendations for instream flow management that allows for smart development while maintaining the natural flow regime for aquatic ecosystem health.

THIS STUDY

The goal of this study was to estimate flow-ecology relationships for fishes and macroinvertebrates across streams and small rivers in the Lower Savannah-Salkehatchie River basin, South Carolina to provide recommendations for guiding instream flow management in the basin. The best available data sources and statistical modeling tools were used to accomplish this goal. The approach is summarized as follows:

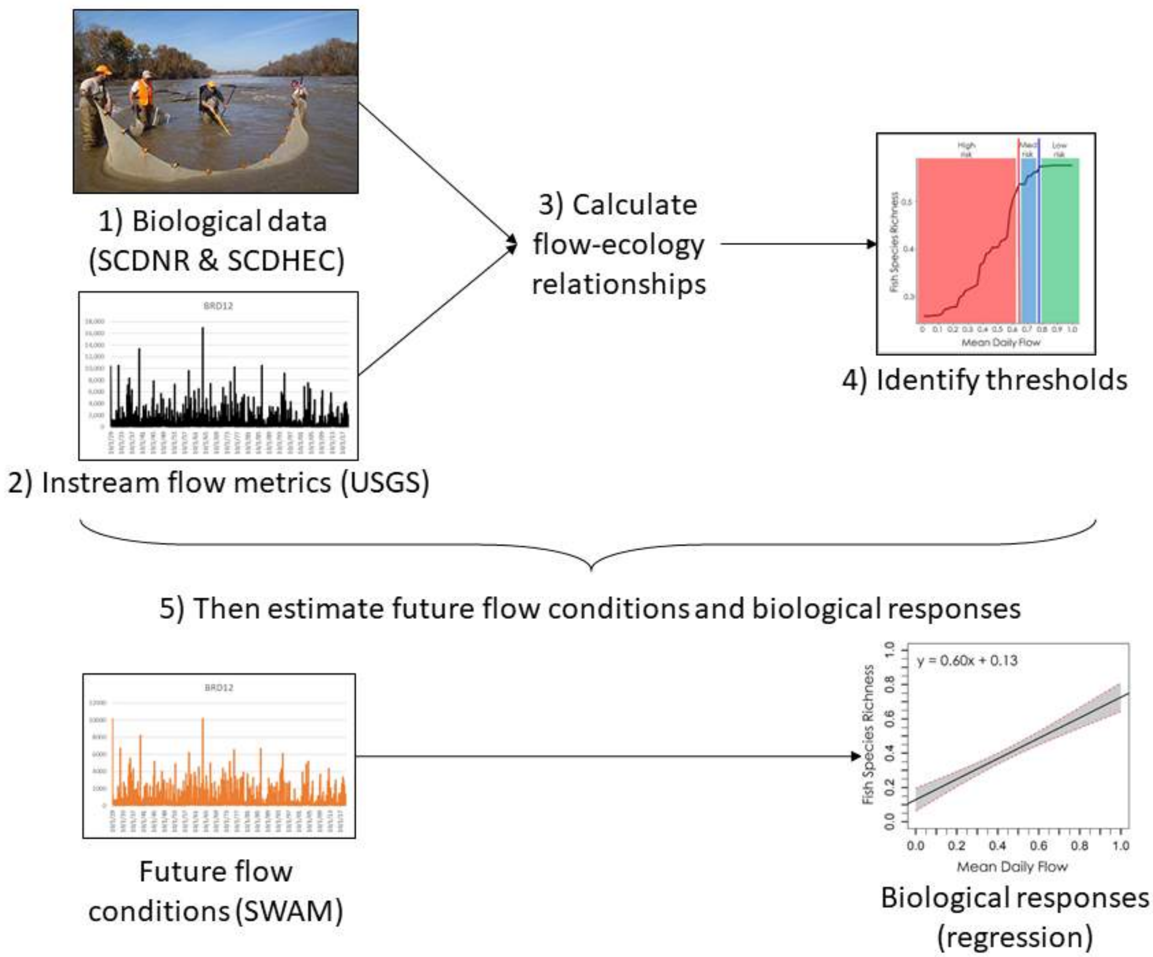


Figure 1: Flow chart of the described methods.

1. *Obtain biological data*: Fish community data is collected by the South Carolina Department of Natural Resources (SCDNR). Aquatic invertebrate community data is collected by the South Carolina Department of Environmental Services (SCDES). In total, these include 1,022 sampling locations across the state, and 59 in the Lower Savannah-Salkehatchie River basin (Figure 2). All data are collected using standardized protocols designed to fully characterize the aquatic community for the purpose of quantifying aquatic ecosystem health. Sampling protocols can be found in Scott et al. (2009) and SCDHEC (2017). Raw fish and invertebrate community data were summarized into numerous biological metrics for each sampling site based on the number of species and proportional representation of species with similar traits. These metrics have been shown in previous studies to be directly indicative of aquatic ecosystem health. The full list of biological metrics included in this study is presented in Appendix Table 1.

2. *Estimate instream flow metrics*. The US Geological Survey maintains 26 flow gauges in the Lower Savannah-Salkehatchie River Basin. However, biological sampling does not always occur at those

locations, and the number of gauged sites does not present sufficient sample sites for estimating flow ecology relationships. Accordingly, flow metrics were estimated for every stream/river in the Lower Savannah-Salkehatchie River basin using the WaterFALL(™) flow allocation model. This work was accomplished by researchers from RTI International and is reported in full detail in Eddy et al. (2022). The full list of candidate flow metrics used in this study is presented in Appendix Table 2.

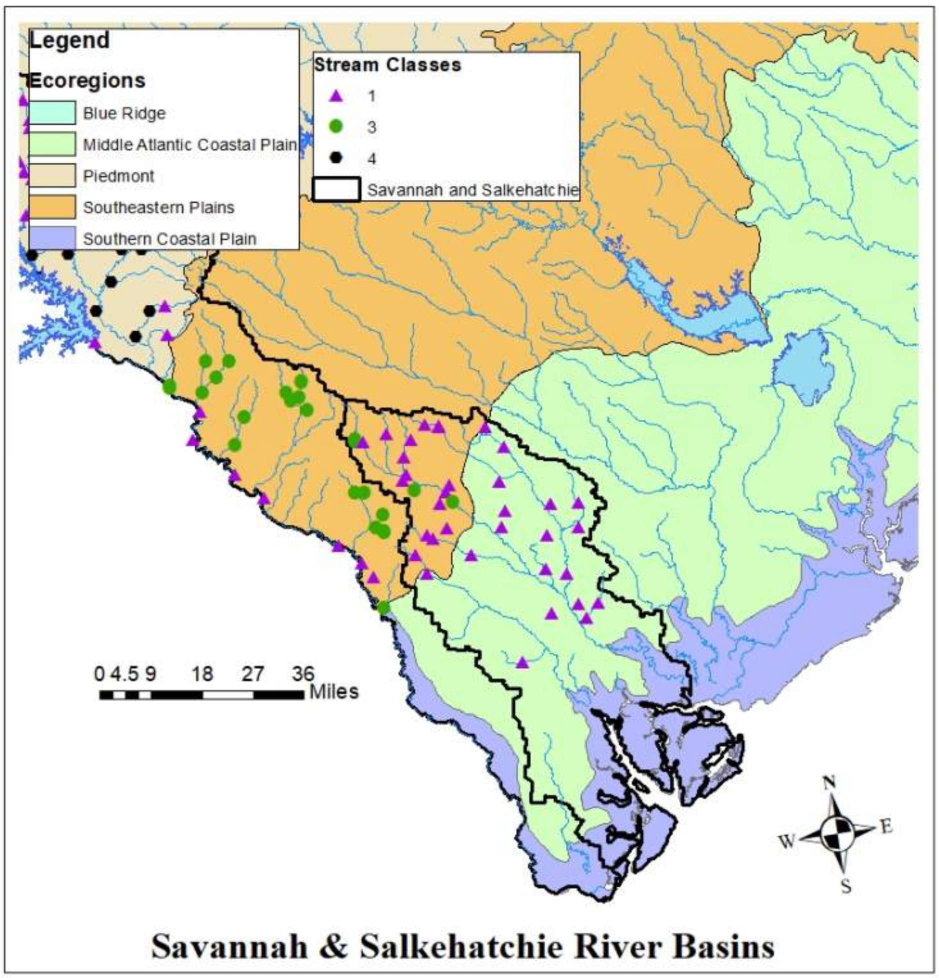


Figure 2: *Map of the Lower Savannah-Salkehatchie River Basin overlain with ecoregion boundaries and stream classifications. Each point is also a biological sampling point for either fish, or aquatic invertebrates, or both. Stream classes are labeled as follows:1 (perennial runoff),* 3 (stable base flow), and 4 (perennial flashy).

3. *Identify critical flow-ecology relationships*. The modeling approach started with 24 flow metrics and 14 biological metrics, yielding an untenable number of potential relationships. To reduce this complexity, we only analyzed flow metrics that were (a) shown to be biologically relevant (b) captured all components of the flow regime, and (c) were non-redundant (Appendix Table 2). Because many biological metrics will be weakly correlated with some flow metrics, it was critical to identify the strongest and most informative flow-ecology relationships to develop recommendations. This was accomplished using *random forests*—a type of machine learning statistical model that is ideal for identifying complex ecological relationships.

4. *Use flow-ecology relationships to identify potentially harmful/protective levels of flow change*. The most important relationships can be identified by random forest in two ways: 1) as a performance measure to determine the potential biological impact of water withdrawal, and 2) to estimate predicted change in a biological metric based on estimated change in flow due to water withdrawal. To create the performance measures, the random forest model plots were used as seen below (Figure 2). These plots are scaled to represent the estimated proportional change in the biotic metric that would result from a proportional change in the flow metric. These plots were used to identify potential flow thresholds – a point along a flow metric that corresponds to large shifts in biological health. The thresholds define the best points to set performance measures. Two distinct thresholds were identified in each relationship to produce 3 zones corresponding to high, medium, and low levels of risk to the chosen biotic metric.

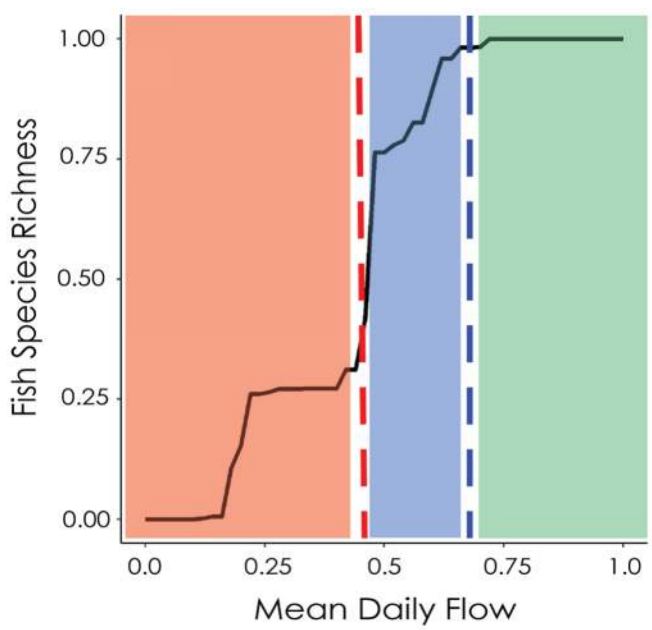


Figure 3: *Model-estimated risk ranges for the selected biota and flow metrics. in Piedmont Flashy Streams. Areas of high risk are shaded red, medium risk in blue, and low risk in green. Changes in the overall flow regime cause mean daily flow to fall between 71 and 49% of current values in Piedmont flashy perennial streams correspond to low and high risk for fish species loss, respectively. Reducing mean daily flow into the zone of 49-71% constitutes medium risk for fish species loss.*

5. *Estimate potential future flow conditions and biological response*. Researchers from CDM Smith used the Surface Water Allocation Model (SWAM) to estimate future flow conditions at *strategic*

nodes–key locations in tributaries to the Lower Savannah-Salkehatchie River (Figure 4 and 5). Estimates were provided for four potential future water withdrawal scenarios: (1) unimpaired flow (no water withdrawals occur in the system), (2) moderate development by 2070, (3) high development by 2070, and (4) full allocation (all permitted water withdrawals are realized) for each strategic node. Finally, potential future changes in biological metrics were estimated in each of the four future water withdrawal scenarios based on (a) model-predicted responses of biological metrics to instream flow, and (b) SWAM-based predicted flow metrics. To do this, linear relationships between each flow metric and biological metric were used for the important relationships identified by random forest models. This method provides a more precise estimate of the biological change in response to flow alteration and the error associated with this estimate (Figure 6). This process was conducted for each of three main categories of streams and rivers in the Lower Savannah-Salkehatchie River Basin (see below).

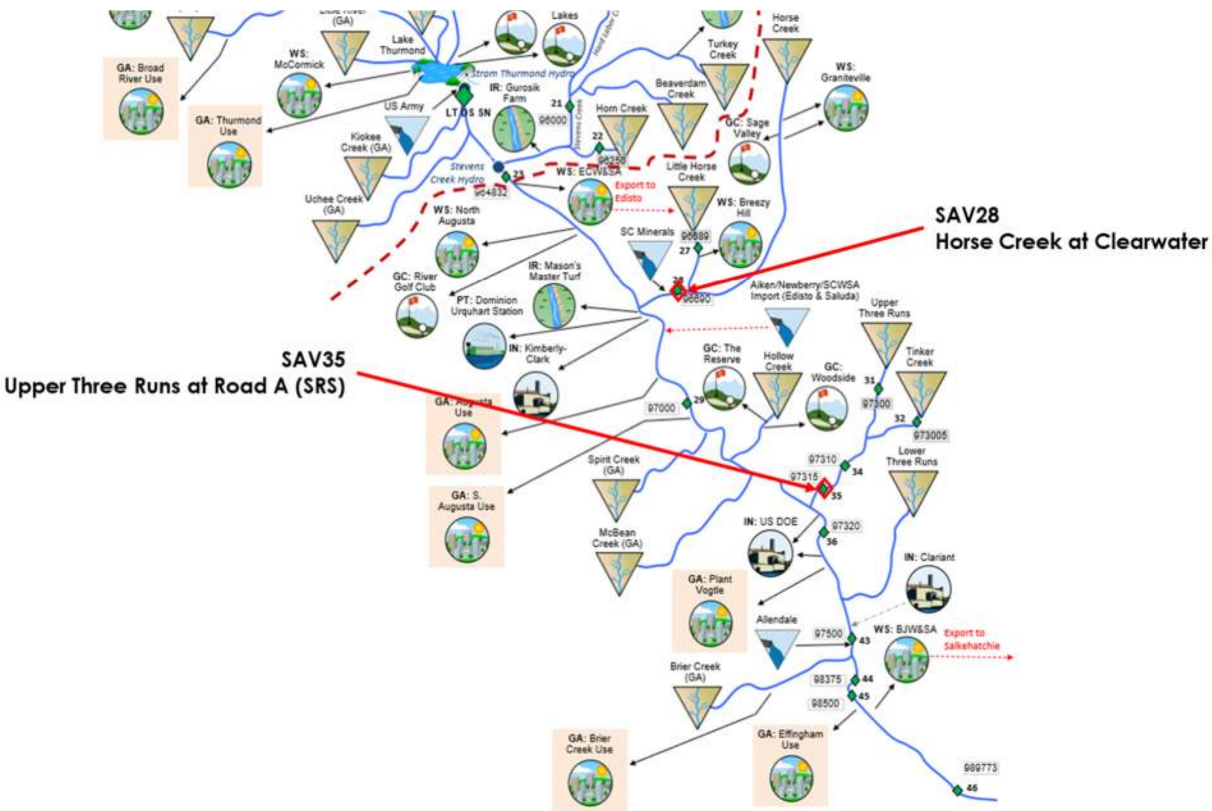


Figure 4: *Location of example strategic nodes from the Lower Savannah River Basin*

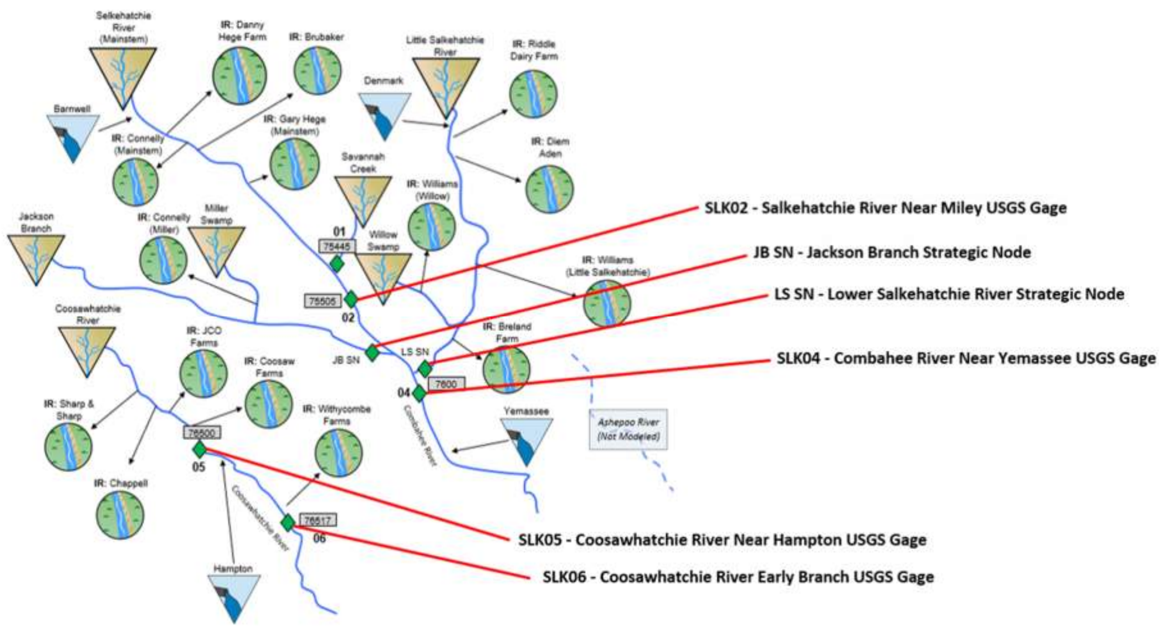


Figure 5: *Location of example strategic nodes from the Salkehatchie River Basin*

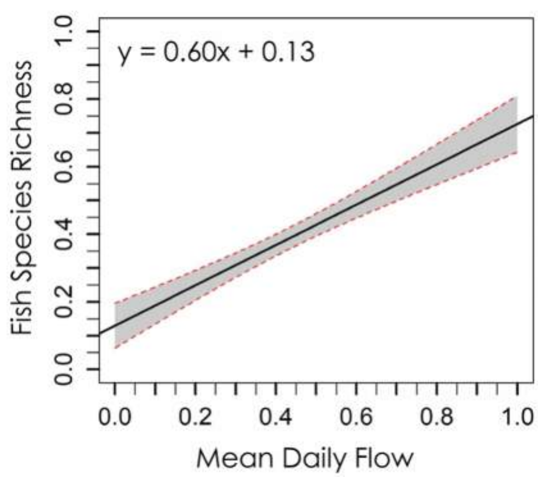


Figure 6*. Example of the linear relationship established between mean daily flow and fish species richness in Piedmont Flashy Streams. The formula,* $Y = 0.60x + 0.13$*, allows us to apply this relationship to the flow projection scenarios by replacing* x *with the predicted mean daily flow to derive the predicted change in fish richness, represented by* Y.

LOWER SAVANNAH-SALKEHATCHIE RIVER STREAM TYPES

There are 5 stream types in the Lower Savannah-Salkehatchie River Basin (**Figure 2**), determined by ecoregion and water source / behavior:

1. Piedmont Perennial Runoff (P1): Streams and rivers in the Piedmont ecoregion characterized by moderately stable flow and distinct seasonal extremes.

2. Piedmont Perennial Flashy (P4): Streams in the Piedmont ecoregion with moderately stable flow with high variability.
3. Southeastern Plains Perennial Runoff (SE1): Streams and rivers in the Southeastern Plains ecoregion characterized by moderately stable flow and distinct seasonal extremes.
4. Southeastern Plains Stable Base Flow (SE3): Streams and rivers in the Southeastern Plains ecoregion whose flow is composed of both high stable base flow and rainfall runoff.
5. Middle Atlantic Plains Perennial Runoff (MID1): Streams and rivers in the Middle Atlantic Plains ecoregion whose flow is composed of both high stable base flow and rainfall runoff.

However, no strategic nodes were selected in the Piedmont or Middle Atlantic Plains ecoregions, restricting the results to a single stream class: Southeastern Plains Stable Base Flow.

ASSUMPTIONS OF THE APPROACH

Like all model-based studies, the approach relies on a few assumptions that should be considered when interpreting the results.

First, the flow-ecology relationship analyses assume that flow metrics were estimated perfectly. This is not the case, and indeed is impossible, as described in detail in Eddy et al. (2022). However, this study relied on the most precisely estimated flow metrics estimated by Eddy et al. (2022), and omitted flow metrics with high levels of uncertainty.

Second, models are only as good as the data on which they are based. The most up-to-date sources to estimate flow metrics and their relationships with biological metrics were used. However, data are continuously being collected by USGS, SCDES, and SCDNR. As such, the inclusion of new data into potential future approaches could yield different results. However, the inclusion of new data would be expected to only increase the precision of the estimates.

A third assumption is that future flow-ecology relationships will exist in the same shape and magnitude as they currently do. The future flow scenarios are based solely on changes to instream flow metrics due to known surface water withdrawal demands. These scenarios assume that land cover, temperature, and precipitation, and thus instream flow, will remain the same in the future. While this may not be a reasonable assumption, incorporating these factors into more detailed estimates of future instream flow conditions is beyond the scope of the present work, but will be an important contribution to ongoing flow management efforts.

Finally, this work was developed on streams in rivers with watershed areas of 3 to 600 km^2. Streams of this size represent 87% of the surface water in South Carolina. This work did not include data from reservoirs or large rivers, and as such it is not informative for making recommendations regarding flow management of any waterbody with a watershed greater than 600 km^2. All strategic nodes in the Salkehatchie River basin were on river greater than 600 km^2 and could not be used to inform flow management.

RESULTS: IDENTIFYING FLOW-ECOLOGY RELATIONSHIPS

Biotic metrics: Random Forest models allowed us to identify clear flow-ecology relationships. A single biotic metric was found to be informative of changes in instream flow in the one stream class. This included:

- Species Richness: the number of species found at a given site

Flow metrics: Statistically significant effects of flow on fish and invertebrates were found for all attributes of the natural flow regime, including magnitude, duration, frequency, timing, or rate of change. However, for this recommendation, we are only bringing forward measures that are relevant to the one stream class within Lower Savannah-Salkehatchie River basin, can be calculated in SWAM, and meet the three principles cited above. Two flow metrics emerged as having the greatest impact on aquatic ecosystem health in the Lower Savannah-Salkehatchie River Basin:

1. *Mean Daily Flow*: The mean of all daily flows over the period of record.
2. *Duration of Low Flow*: The average pulse duration for each year for flow events below a threshold equal to the 25th percentile value for the entire flow record. DL16 is the median of the yearly average durations (number of days).

RECOMMENDED PERFORMANCE MEASURES

Based on the flow-ecology relationships identified above, we suggest the following performance measures (Table 1). The recommended measures reflect the variability of biological responses in different ecoregions and stream types while producing a manageable set of responses to consider.

Table 1: The risk ranges for the most informative flow and biological metric for each stream class in the Lower Savannah-Salkehatchie River basin. The biological metric is given in brackets. The risk ranges are colored as green (low risk), yellow (medium risk), and red (high risk).

	Performance Recommendations and Risk Ranges					
Stream Type:	**Southeastern Perennial**			**Mid Perennial**		
	Low	**Med**	**High**	**Low**	**Med**	**High**
Flow Metric						
Mean Daily Flow (FR)	>0.66	0.42-0.66	<0.42	>0.71	0.49-0.71	<0.49
Mean Daily Flow (FS)	>0.78	0.46-0.78	<0.46			

FR=Fish Species Richness: The number of fish species found in a stream or river reach

FS=Fish Species Shannon's diversity: The evenness of fish species found in a stream or river reach

APPLICATION: EVALUATING WATER USE SCENARIOS IN SWAM

SWAM was used to create four flow scenarios based on water withdrawals:

1. Unimpaired flow (no water withdrawals occur in the system)
2. Moderate development by 2070
3. High development by 2070
4. Full allocation (all permitted water withdrawals are realized) for each strategic node.

We used the flow–biological relationships in conjunction with SWAM results to estimate the responses of the organisms to these various water withdrawal scenarios at each strategic node. The performance measures can be used in an intuitive graphic approach to quickly compare the scenario performance and identify patterns. The performance measures can be used to

1) analyze the impacts or benefits of flow changes within a SWAM scenario
2) to compare impacts or benefits across multiple SWAM scenarios
3) to compare the benefits of water management strategies to a SWAM scenario(s)

Performance measure plots provide a visual way to compare the water withdrawal scenarios with respect to aquatic ecosystem health. This feature can also be informative when water management strategies are applied to the scenarios, revealing which strategies best protect stream health while still meeting essential water needs. Figure 7 shows an example of the performance measure plots.

Linear relationships were used to estimate the change in a biological metric from current flows for each SWAM scenario, producing color-coded output with the specific percentage change of the biological metric and its associated estimate error. Figure 8 shows an example of the linear relationship output.

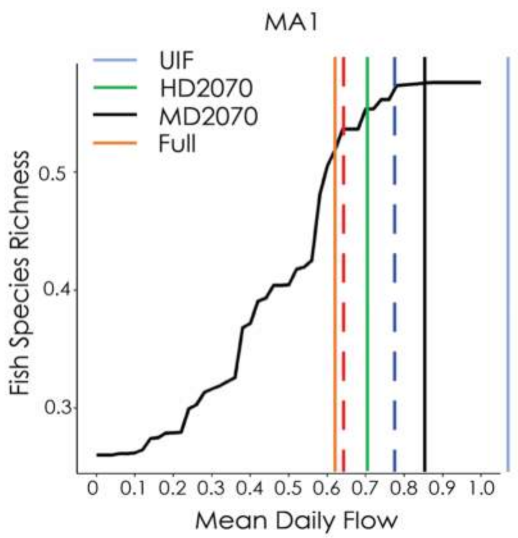


***Figure** 7: In this example (Mean daily flow at Middle Tyger River in the Broad River Basin), the predicted change in mean daily flow was plotted for the four SWAM scenarios along the X axis, allowing for quick determination of risk to the biologic metric. In this example, the full allocation model (orange) had a 37.3% reduction in flow, meaning only 62.7% of current flows remain, which is considered 'high risk' to the biotic metric, fish species richness. Alternatively, the medium development scenario (vertical black line), predicted only a 14% reduction in flow, which was considered 'low risk'.*

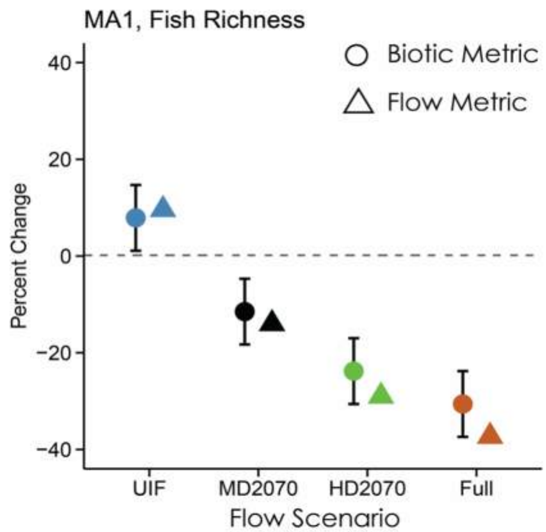


Figure 8*: In this figure, the four SWAM scenarios are plotted along the X axis, and percent change for each scenario is plotted along the Y axis. The horizontal dashed line indicates the current conditions. Predicted flow metrics (triangles) were derived from the SWAM model, whereas predicted biotic metrics (circles) were derived from linear regression (Figure 5). Error bars on the biotic metrics represent the standard error or the uncertainty in the predictions.*

<u>SWAM results summary.</u>

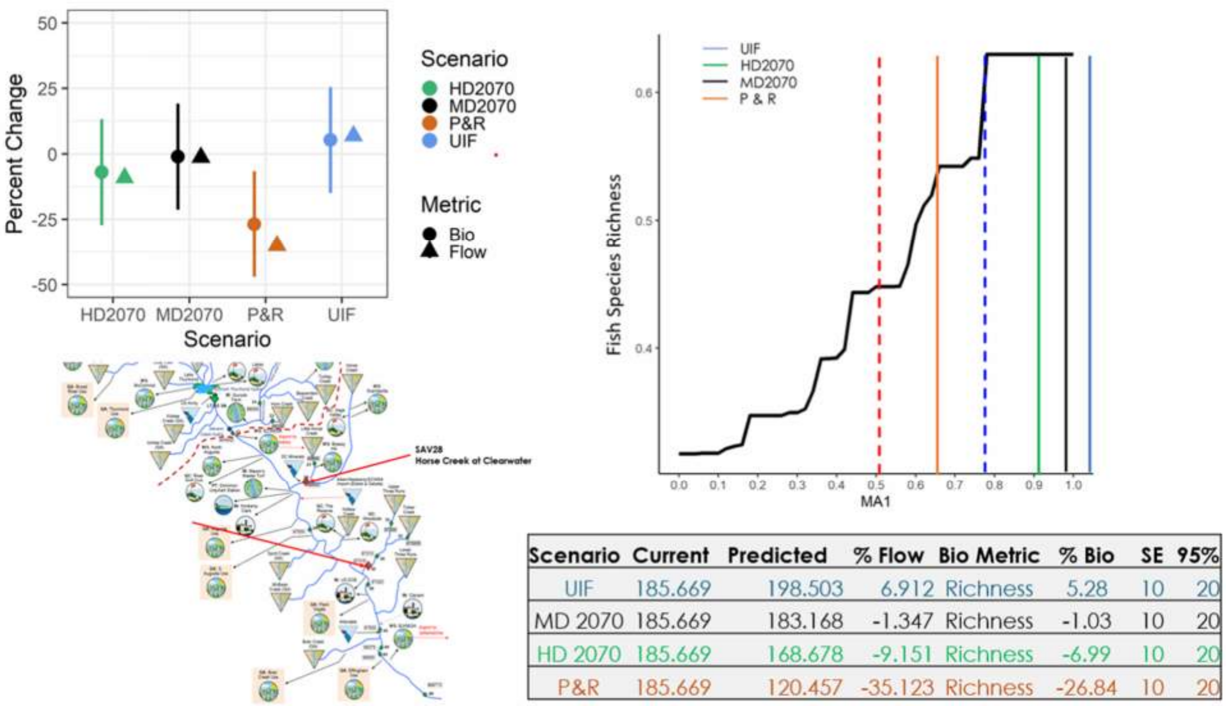
All strategic nodes in the Salkehatchie River basin were on rivers greater than 600 km^2 and could not be used to inform flow management. Only one strategic node in the lower Savanah River basin was used: Horse Creek at Clearwater. SWAM estimated large changes in mean daily flow (MA1) only for the full allocation model (P&R) at this strategic node (Figure 9). This 35% change in mean daily flow was predicted to reduce the number of fish species by 27%. The high development scenario showed a 9% reduction in mean daily flow model, resulting in a predicted change in fish species richness by 7% (Figures 9). For the duration in low flow metric, the medium development SWAM scenario predicted a 6% increase in this flow metric at the Horse Creek at Clearwater strategic node. The increase in the duration of low flow was predicted to decrease the number of fish species by 4% (Figure 10). All other SWAM scenarios predicted low changes in duration in low flow between <1% to 3% and low losses in the number of fish species ranging between <1% and 2%. The standard error associated with these estimates is important to consider because it provides a range associated with each prediction. For example, the linear relationships predicted a 27% reduction in fish species with a standard error of 10% at Horse Creek for mean daily flow and the full allocation scenario, suggesting reduction in fish species could be as low as 7% or as high as 47%.

The performance measures based on mean daily flow and species richness showed the full allocation scenario at the Horse Creek strategic node moving into the medium risk zone (Figures 9). All SWAM scenarios remained in the low-risk range for high flow duration and mean daily flow (Figures 9-10).

CONCLUSIONS

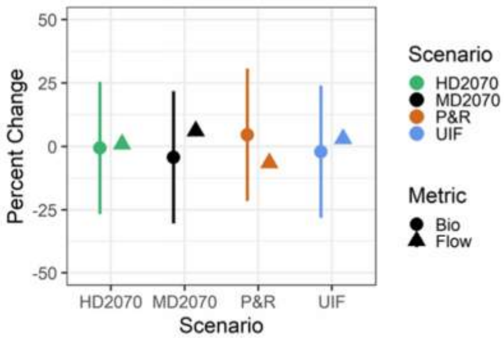
Mean daily flow is expected to be impacted more by water use than the duration of low flow based on the SWAM scenarios. The changes in mean daily flow predicted by the full allocation SWAM scenario is expected to substantially reduce the number of fish species and pose a medium risk to fish species at Horse

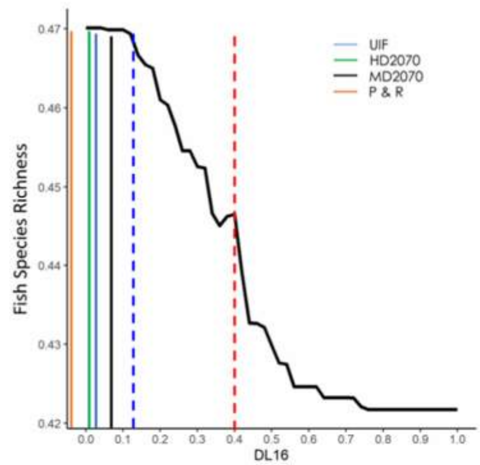
Creek. These results suggest high water withdrawals, mainly the full allocation water use scenarios, would pose a medium risk to fish species and result in large losses in the number of fish species. However, these findings do not rule out all potential risks to ecological integrity or aquatic biodiversity related to other metrics or flow alterations.



Scenario	Current	Predicted	% Flow	Bio Metric	% Bio	SE	95%
UIF	185.669	198.503	6.912	Richness	5.28	10	20
MD 2070	185.669	183.168	-1.347	Richness	-1.03	10	20
HD 2070	185.669	168.678	-9.151	Richness	-6.99	10	20
P&R	185.669	120.457	-35.123	Richness	-26.84	10	20

Figure 9: Mean daily flow (MA1) projections for Horse Creek of Clearwater (SAV28). The triangles indicate the percent change in mean daily flow for the four scenarios predicted by the SWAM model. The circles indicate the percentage change in fish species richness based on the SWAM predictions, with the uncertainty of that prediction described by standard error (error bars). The percent change in mean daily flow for each SWAM scenario is shown on performance measure plots to quickly assess risk, finding the full allocation model (P&R) to be in the 'medium risk' zone. All other scenarios were in the low-risk zone. The table shows the SWAM scenario, the current conditions, predicted flow metric value by SWAM, precent change in flow metric, the biological metric of interest, percent change in biological metric for given SWAM scenario, the standard error, and 95% confidence interval.





Scenario	Current	Predicted	% Flow	Bio Metric	% Bio	SE	95%
UIF	7.967	8.205	2.987	Richness	-2.11	13	25
MD 2070	7.967	8.452	6.088	Richness	-4.30	13	25
HD 2070	7.967	8.038	0.891	Richness	-0.63	13	25
P&R	7.967	7.45	-6.489	Richness	4.58	13	25

Figure 10: Duration of low flow (DL16) projections for Horse Creek of Clearwater (SAV28). The triangles indicate the percent change in mean daily flow for the four scenarios predicted by the SWAM model. The circles indicate the percentage change in fish species richness based on the SWAM predictions, with the uncertainty of that prediction described by standard error (error bars). The percent change in mean daily flow for each SWAM scenario is shown on performance measure plots to quickly assess risk, finding all scenarios were in the 'low risk' zone. The table shows the SWAM scenario, the current conditions, predicted flow metric value by SWAM, precent change in flow metric, the biological metric of interest, percent change in biological metric for given SWAM scenario, the standard error, and 95% confidence interval.

Appendix Table 1: *Abbreviation, description, and association with type of biological metrics*

Fish metrics	
Abbreviation	***Description***
Richness	*Taxa richness*
Shannon	*Shannon's diversity index*
Lepomis	*proportional representation of individuals in the genus Lepomis*
Brood Hider	*proportional representation of individuals in the brood hiding breeding strategy (Balon, 1975).*
Nest Spawner	*proportional representation of individuals in the nest spawning breeding strategy (Balon, 1975).*
Open substrate	*proportional representation of individuals an open substrate spawning breeding strategy (Balon, 1975).*
Lotic	*proportional representation of individuals that prefer lotic environments*
Tolerance	*proportional representation of tolerant individuals*
Benthic Macroinvertebrate metrics	

Abbreviation	***Description***
Richness	*Taxa richness*
Shannon	*Shannon's diversity index*
EPT	*proportional representation of individuals in*
Chronomidae	*proportional representation of individuals in Chrionomidae family*
M-O index	*Average of an index indicative of Odonata and Megaloptera taxa preference for lotic or lentic conditions*
Tolerance	*Average tolerance index for macroinvertebrate taxa*

Appendix Table 2: List of hydrologic metrics, their associated flow regime component, and description.

Code	**Flow regime**	**Description**
DL16	Duration	Low flow pulse duration. The average pulse for flow events below a threshold equal to the 25th percentile value for the entire flow record.
DL17	Duration	Coefficient of vitiation in DL16
DL18	Duration	Number of zero-flow days
DH15	Duration	High flow pulse duration. The average duration for flow events with flows above a threshold equal to the 75th percentile value for each year in the flow record.
DH16	Duration	Coefficient of vitiation in DH15
FL1	Frequency	Low flow pulse count. Average number of flow events with flows below a threshold equal to the 25th percentile value for the entire flow record
FL2	Frequency	Coefficient of vitiation in FL1
FH1	Frequency	High flow pulse count. Average pulse duration for each year for flow events below a threshold equal to the 25th percentile value for the entire flow record.
FH2	Frequency	Coefficient of vitiation in FH1
MA1	Magnitude	Mean daily flow (cfs)
MA3	Magnitude	Mean of the coefficient of vitiation (standard deviation/mean) for each year of daily flows
MA41	Magnitude	Annual runoff computed as the mean of the annual means divided by the

MA42	Magnitude	Coefficient of vitiation of MA41
ML17	Magnitude	Base flow index. The minimum of a 7-day moving average flow divided by the mean annual flow for each year.
ML18	Magnitude	Coefficient of vitiation in ML17
ML22	Magnitude	Specific mean annual minimum flow. Annual minimum flows divided by the drainage area
MH14	Magnitude	Median of annual maximum flows. The ratio of annual maximum flow to median annual flow for each year
MH20	Magnitude	Specific mean annual maximum flow. The annual maximum flows divided by the drainage area
RA8	Rate	Number of reversals. Number of days in each year when the change in flow from one day to the next changes direction
TA1	Timing	Constancy or stability of flow regime computed via the formulation of Colwell (see example in Colwell, 1974).
TL1	Timing	Julian date of annual minimum
TL2	Timing	Coefficient of vitiation in TL1
TH1	Timing	Julian date of annual maximum starting at day 100
TH2	Timing	Coefficient of vitiation in TH1

References:

Eddy, M. C., Lord, B., Perrot, D., Bower, L. M., & Peoples, B. K. (2022). Predictability of flow metrics calculated using a distributed hydrologic model across ecoregions and stream classes: Implications for developing flow–ecology relationships. *Ecohydrology*, *15*(2), e2387.

Scott, M. C., L. Rose, K. Kubach, C. Marion, C. Thomason, and J. Price. 2009. The South Carolina stream assessment standard operating procedures. South Carolina Dept. of Natural Resources, Columbia, SC.

South Carolina Department of Health and Environmental Control (SCDHEC). 2017. Standard Operating and Quality Control Procedures for Macroinvertebrate Sampling. Bureau of Water, Columbia, South Carolina, USA.

Appendix D
Draft and Final Plan Survey Consensus Results

To assess each RBC member's confidence in the plan, the plan approval process dictates that there will be a test for consensus on the Draft River Basin Plan and a vote of support or disagreement on the Final River Basin Plan. For the test of consensus on the Draft Plan, each member rates their concurrence with the plan using a five-point scale, as shown below:

1. Full Endorsement (i.e., member likes it).
2. Endorsement but with minor points of contention (i.e., basically member likes it).
3. Endorsement but with major points of contention (i.e., member can live with it).
4. Stand aside with major reservations (i.e., member cannot live with it in its current state and can only support it if changes are made).
5. Withdraw - Member will not support the draft river basin plan and will not continue working within the RBC's process. Member has decided to leave the RBC.

For the Final River Basin Plan, each RBC member votes simply to support or disagree with the plan. By indicating support, the member would be acknowledging his/her concurrence with the Final River Basin Plan and their commitment to support implementation of the plan. The RBC member's votes on the Draft and Final River Basin Plans are listed below.

Table D-1. Level of consensus for the Draft and Final River Basin Plan.

RBC Member	Draft Plan Level of Endorsement[1]	Final Plan Support or Disagree[2]
Danny Black	**(did not vote)**	**(did not vote)**
Taylor Brewer	**1**	**Support**
Kenneth Caldwell	**1**	**Support**
John Carman	**2**	**Support**
Brian Chemsak	**1**	**Support**
Austin Connelly	**(did not vote)**	**(did not vote)**
Leslie Dickerson	**1**	**Support**
Kari Foy	**1**	**Support**
Samuel Grubbs	**2**	**Support**
Lawrence Hayden	**1**	**Support**
Jeff Hynds	**1**	**Support**
Courtney Kimmel	**1**	**Support**
Lynn McEwen	**1**	**Support**
Dean Moss	**1**	**Support**
Pete Nardi	**1**	**Support**
Sara O'Connor	**1**	**Support**
Brad O'Neal	**(did not vote)**	**Support**
Joseph Oswald III	**2**	**Support**
Tommy Paradise	**1**	**Support**
Reid Pollard	**1**	**Support**
Brandon Stutts	**(did not vote)**	**(did not vote)**
Bill Wabbersen	**2**	**Support**
Will Williams	**(did not vote)**	**(did not vote)**
Brad Young	**2**	**Support**

[1] Five members were not present during the test of consensus and did not provide an indication of their level of endorsement prior to publication of the Draft River Basin Plan.

[2] Four members, three of who were not active on the RBC during the time that the final Plan was prepared, did not cast a vote. Brandon Stutts, representing Dominion Energy did not vote but noted that "*Dominion Energy supports elements of the Plan and the intent to safeguard our resources but abstains from approving any policy recommendations at this time.*"

Appendix E
Public Comments and Responses

A public comment period was held from July 22, 2025 to August 22, 2025. No public comments on the Draft River Basin Plan were submitted. Consequently, there were no changes made when preparing the Final Lower Savannah-Salkehatchie River Basin Plan.

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