EXECUTIVE SUMMARY

UPPER SAVANNAH RIVER BASIN PLAN 2025

DRAFT

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FOREWORD

The Upper Savannah River Basin Plan is the result of years of preparation, work, and contributions from numerous stakeholders with a vested interest in water management. The State of South Carolina began implementing its vision for a comprehensive and actionable water plan in 2014 with the development of surface water quantity models for each of the eight major river basins in the state. An updated groundwater model of the Coastal Plain Aquifer System and the development of methodologies for projecting water demands for all water use sectors followed. This voluminous preparatory work, grounded firmly in science, provides River Basin Councils (RBCs) in all eight basins with the technical information they need to understand water availability, propose and test alternative management strategies, and make informed recommendations to water users, regulatory agencies, and state legislators on future management practices and policies to manage and protect the resource.

This report constitutes one of the eight river basin plans, and it is organized and supported by the work of the State Water Planning Process Advisory Committee (PPAC). The PPAC participated in a facilitated process to formulate a thorough, practical, and consistent planning approach that is being applied in the different river basins in South Carolina. Published in 2019, the South Carolina State Water Planning Framework now serves as a comprehensive, uniform guide for the RBCs, each charged with developing an understanding of the water resources in their respective basins; identifying the gaps or risks related to current and future water uses; and developing recommended policies, management practices, and legislative considerations "**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 river basin plans are the fourth of a five-step process to update the South Carolina State Water Plan with actionable recommendations and priorities. All eight plans will inform the updated State Water Plan, which is why consistency in the planning process and types of recommendations made is important. The updated State Water Plan will help guide decisions to preserve water for all uses throughout the state. The process of incorporating RBC findings and recommendations into the South Carolina State Water Plan was initiated in September 2024 with Governor's Executive Order # 2024-22, which also established a new advisory committee to the South Carolina Department of Environmental Services (SCDES) called WaterSC, composed with stakeholders from many water interest categories, similar to the RBCs. WaterSC will help summarize and prioritize the collective recommendations from the RBCs for consideration by SCDES. SCDES is leading the development of the State Water Plan, incorporating advice from the newly formed WaterSC Committee, the River Basin Councils, and the pre-existing Catawba Wateree Water Management Group, which fulfills the RBC obligations for the Catawba Basin.

Buffalo Creek on Lake Thurmond, December 2008 (photo courtesy Harry Shelley)

Acknowledgements

The Upper Savannah RBC consists of the following volunteer stakeholders representing eight different water interest categories. These individuals spent nearly two years sharing their diverse perspectives and offering their expertise, culminating in the development of this River Basin Plan.

Name	Organization	Interest Category
Jon Batson	Anderson County	Local Governments
Mack Beaty IV	Beaty Farms	Agriculture, Forestry, and Irrigation
Tonya Bonitatibus	Savannah Riverkeeper	Environmental
Cheryl Daniels	McCormick Commission of Public Works	Water and Sewer Utilities
John Hains	Friends of Lake Keowee Society	Environmental
Katie Hottel	Upstate Forever	Environmental
Daniel Milam	Milam Farms	Agriculture, Forestry, and Irrigation
Jill Miller	SC Rural Water Association	At-Large
Dan Murph	Murph Investments, LLC	At-Large
Reagan Osbon	City of Westminster	Local Governments
Billy Owens	Lake Hartwell Sail and Power Squadron	Water-based Recreational
Jeff Phillips	Greenville Water	Water and Sewer Utilities
Melisa Ramey	Seneca Light and Water	Water and Sewer Utilities
Cole Rogers	Delux Construction, Inc.	Industry and Economic Development
Harold Shelley	Friends of the Savannah River Basin	At-Large
Alan Stuart	Duke Energy	Electric-Power Utilities
Mark Warner	McCormick and Abbeville County Economic Development	Industry and Economic Development
Scott Willett	Anderson Regional Joint Water System	Water and Sewer Utilities
Will Williams	Western SC Economic Development Partnership	Industry and Economic Development
Tonya Winbush	Veterans of Foreign Wars/Adopt-A-Stream	At-Large

The Upper Savannah RBC would like to thank the following individuals and organizations who contributed to the development of this River Basin Plan by providing technical presentations and information, meeting coordination, modeling, administration, and other support services.

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CDM Smith
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Lauren Dwyre
Matthew Hall
Grace Houghton
Dr. Nicholas Rogers
Dr. Amy Shaw
Camren Shea
Kirk Westphal
Ashley Reid

Lake Richard B. Russell Dam and Hydropower Plant

What to Know About this Plan

This plan is one of eight river basin plans to be developed for South Carolina. The Upper Savannah RBC, comprising stakeholders representing various water interests, collaborated with South Carolina Department of Natural Resources (SCDNR) and SCDES, and met monthly for almost 2 years. They followed a carefully designed process to establish goals and actions throughout the basin. Through facilitated dialogue, they discussed issues, increased their understanding of various perspectives, agreed on recommended actions or policies for improved water management where possible, and offered viewpoints to aid decision-makers in realizing progress throughout the basin. This plan is a direct result of their efforts to improve the sustainability of water resources in the Upper Savannah River basin, and to improve the balance between societal and environmental water uses.

Some of the most important findings of and recommendations from the RBC include:

- **Current Water Use:** Surface water availability modeling suggests a low risk of water supply shortages based on current water demands, assuming that droughts will not be more severe than those that have occurred over the previous 82 years in the Upper Savannah River basin.
- **Growth Projection Impacts:** Surface water availability modeling also suggests very low probability of shortages under moderate or high economic growth assumptions through 2070. Very modest and manageable shortages, with extremely low frequency, were simulated for several users near tributary headwaters, but the RBC determined that these were not critical enough to require changes in surface water management strategies and would be adequately addressed by conservation measures. In one case, the City of Pickens is already planning to change supply sources to Lake Keowee to improve future reliability and avoid water shortages.
- **Overallocation:** If surface water users withdrew at their permitted or registered amount, then the basin's surface water resources would be overallocated and there would not be enough water for all users. While there could be shortages, they were not simulated to be as extreme as they were in some of the other basins. Currently, 83.6 percent (2,917.4 million gallons per day, or MGD) of the total permitted and registered surface water amount is withdrawn but only 2 percent (62.0 MGD) is used consumptively within the basin because much of the total withdrawal is returned after supporting power generation. The results of the Fully Permitted and Registered Scenario (a hypothetical scenario in which all users use their full allocation 100 percent of the time, which is generally considered unlikely by RBC members, but allowable) demonstrate that, while there are four headwater users in the basin that could experience shortages when withdrawing at allowable limits, there is sufficient surface water to meet most of the user demands, when considering the range of hydrologic conditions over the 1939 to 2021 period of record. These users are industrial, mining, agriculture, and one water supplier who is already planning to shift supply to a more reliable source. Small on-site storage (not included in the model) may be sufficient to help other users avoid shortages. This does highlight the difference between water that is allocated through permits and registrations, and water that might actually be available in streams. Additionally, future users not foreseen in this analysis could create additional stress in other areas in the basin.

- **Ecological Flow Metrics:** Simulation of flows throughout the basin over the full range of current and future use scenarios estimated no significant change in mean daily flow at selected locations. This translates into low ecological risk at all locations examined for species richness as well as species diversity. The linear relationships and performance measures suggest a low risk of fish species loss because of water use. However, these findings do not rule out all potential risks to ecological integrity or aquatic biodiversity related to other metrics or flow alterations, and the methodology employed is limited to wadable streams, which are most vulnerable to substantial flow alterations.
- **If Future Droughts Worsen:** Without assigning probability or associating future droughts with specific climate projections, the RBC examined the potential impacts of future droughts that might be more severe than historical droughts. Three types of synthetic droughts were tested with the models:
    - A 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. The drought was simulated twice in succession.
    - A 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. The 1-year drought was simulated for 10 years in succession.
    - A synthetic single-year drought year constructed by splicing together the 12 driest calendar month flows in the baseline simulation period. The 1-year synthetic drought was simulated for 10 years in succession.

  These synthetic droughts were considered to be extreme, but not implausible, conditions that could be experienced in the future, though the RBC agreed that the continual recurrence of such severely dry conditions over a 10-year period was certainly conservative. Results suggested significant frequency and magnitude of shortages, as well as restricted access to boating and swimming in managed impoundments. Results were exacerbated by the continual 10-year recurrence of these synthetic droughts, but each suggested that shortages and limitations could occur within their 5-year or 1-year initial durations. While this exercise did not lead to the identification of surface water management strategies, it emphasized the need for demand management (reducing water consumption or using it more efficiently) and coordinated response to droughts throughout the basin, especially under severe and extreme drought conditions. The results also emphasize the need for vigilance in monitoring future hydrologic conditions.

Lake Jocasee

- **Recommended Water Management Strategies:** The RBC identified and recommended a toolbox of water demand management strategies for both municipal and agricultural water users that, if implemented, would help reduce the potential for shortages and help maintain adequate streamflows for environmental needs. Due to the very low risk of water shortages or ecological degradation throughout the basin, water supply strategies were not deemed necessary; however, it was recognized that changing conditions beyond those examined could require supply-side strategies be implemented to reduce or eliminate potential surface water shortages.
- **Policy, Regulatory, and Legislative Recommendations:** In addition to proposing numerous planning process and technical recommendations, the RBC reached consensus on several important policy, regulatory, and legislative recommendations, including:
    - The South Carolina Surface Water Withdrawal, Permitting, Use, and Reporting Act should allow for reasonable use criteria to be applied to all new surface water withdrawals, like those that currently exist for groundwater withdrawals.
    - Improve the current laws that allow for regulation of water use so that they are enforceable and effective. The current water law, which grandfathers most water users, needs to be improved to support effective management of the state's water resources.
    - The RBC recommends that the Legislature approve and adopt the State Water Plan.
    - Increase coordination and planning with Georgia Environmental Protection Division (GAEPD) on Savannah River water resources issues.
    - The state should support and fund water education programs that include all sectors of water use and promote the types of water management strategies recommended in the river basin plans.
    - A grant program should be established to help support the implementation of the actions and strategies identified in each RBC's River Basin Plan.

Lake Jocasee

Introduction: Purpose and Utility of the Plan

This Upper Savannah River Basin Plan is one of eight plans that will be developed for the primary river basins in South Carolina (Figure ES-1). Numerous and diverse stakeholders throughout the basin worked with SCDNR, SCDES, and others during its development. The plan was prepared in response to the South Carolina Water Resources Planning and Coordination Act, and continues the work that began in 1998 with the South Carolina Water Plan.

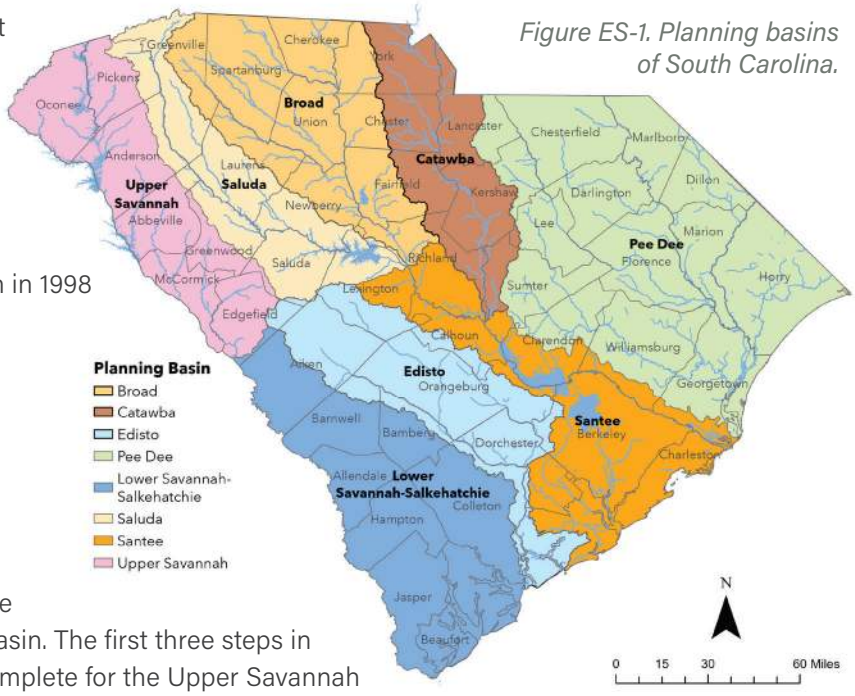


Figure ES-1. Planning basins of South Carolina.

In 2014, a five-step process was initiated to update and actualize the South Carolina Water Plan (Figure ES-2). The process was conceived and organized to provide the necessary scientific and water use information to stakeholders so they could make informed recommendations on water management actions, policies, and potential legislation in response to the needs of each basin. The first three steps in the process, now complete for the Upper Savannah basin, provide tools and data on surface water and groundwater resources, as well as historical water use, current water demand, and estimates of future demand for the basin. The Upper Savannah River Basin Plan is the culmination of Step 4 of the process for the Upper Savannah River basin. The plan assesses water availability in the basin over a 50-year planning horizon and presents the recommendations of the Upper Savannah RBC—a diverse group of volunteer stakeholders representing eight different water-interest categories.

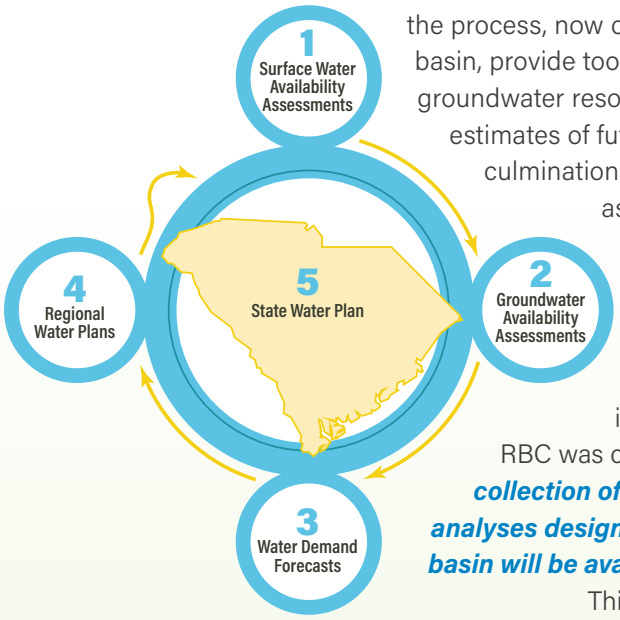
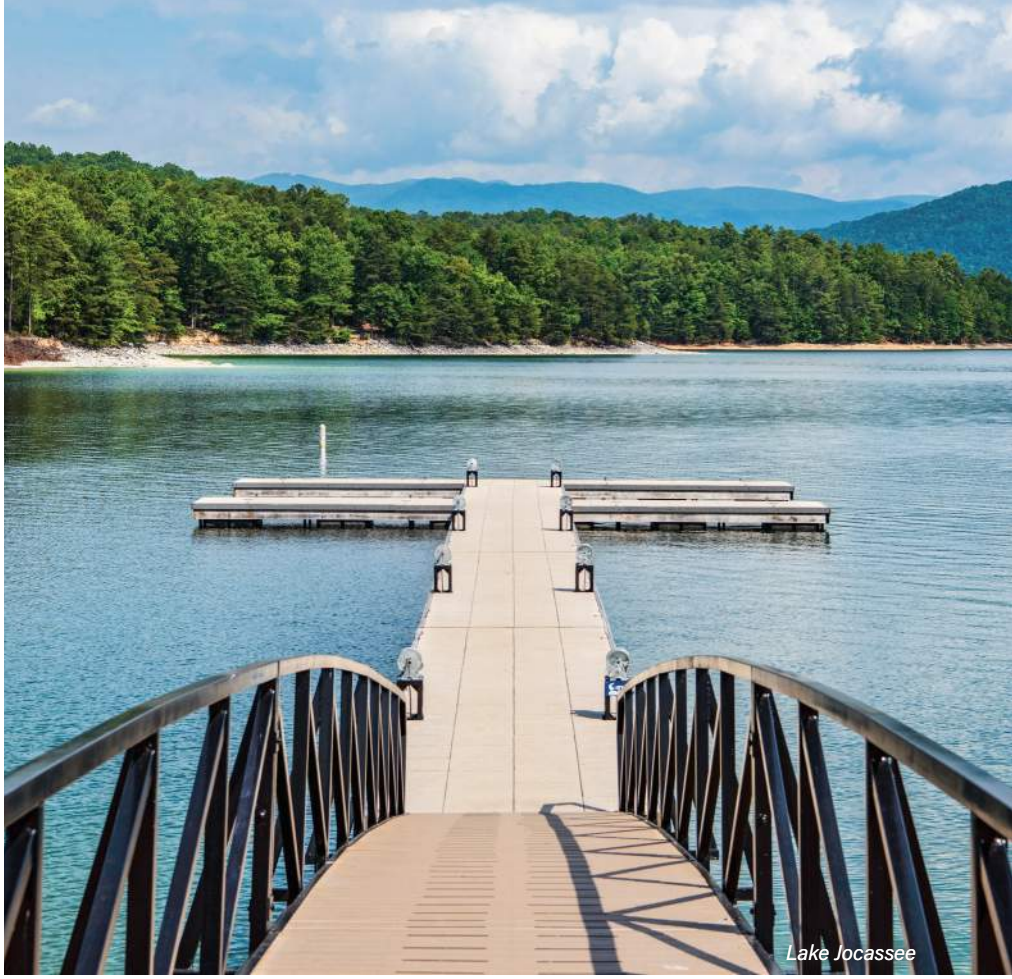


Figure ES-2. South Carolina's five-step process to update the State Water Plan.

Section ES-2 describes the planning process in more detail. As prescribed in the South Carolina State Water Planning Framework, the Upper Savannah RBC was charged with supporting the development of this River Basin Plan 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.***" This same planning process has been or will be applied in all eight South Carolina river basins.

RBC Touring the Clemson's Simpson Agricultural Station

J. Strom Thurmond Dam



Lake Jocassee

Specifically, 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 by answering four principal 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 used in the basin to ensure the available supply meets or exceeds the projected demand throughout the planning horizon?

River Basin Plans will focus principally on the quantity and availability of surface water and groundwater for all designated uses: drinking water, agricultural and other irrigation, forestry, industry and economic development, power generation, nonconsumptive uses such as aquatic habitat suitability and environmental needs, and water-based recreation. Plans will not focus directly on flood management or water quality (these important issues are considered in other plans); however, the RBCs are encouraged to consider water management strategies that have secondary benefits with respect to flood management and water quality.

All eight River Basin Plans will be used to inform and update the South Carolina State Water Plan. While these plans do not prescribe regulatory, policy, or legislative decisions, they represent consensus-based recommendations from diverse and vested stakeholders on prudent actions and policies to be considered by citizens, water managers, state agencies, and elected officials to help ensure future water availability for all uses.

J. Strom Thurmond Lake during the 2008 drought (photo courtesy Harry Shelley)

Overview of the Planning Process

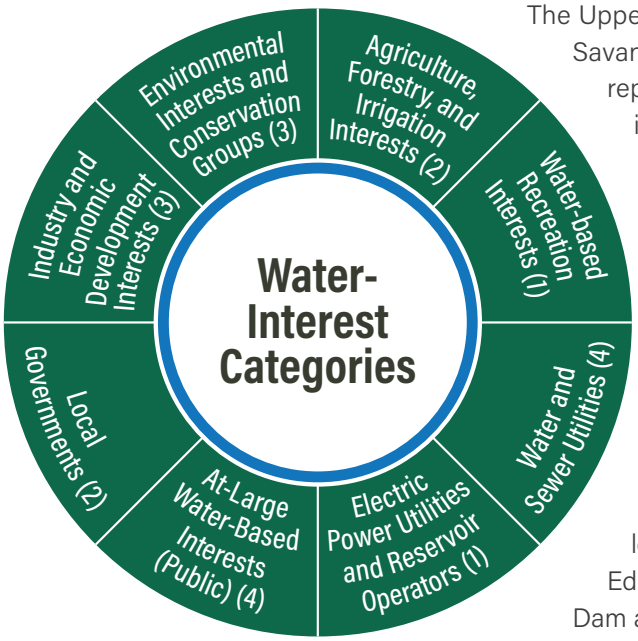


Figure ES-3. RBC water-interest categories represented in the RBC. Numbers in parentheses indicate RBC member representation.

The Upper Savannah River Basin Plan was formulated by the Upper Savannah RBC, a group of more than 20 individual volunteer stakeholders representing local governments, agriculture and forestry, environmental interests, water-based recreation, utilities (water, sewer, electric power), and industry/economic development (Figure ES-3).

The Upper Savannah RBC met monthly for nearly 2 years to follow the systematic planning process prescribed in the 2019 South Carolina State Water Planning Framework. SCDNR and the PPAC (a 19-person group composed principally of the same interest groups as each individual RBC but with academic representation), collaboratively developed the Planning Framework

The series of meetings of the RBC involved two field trips within the basin. In October 2023, the RBC visited the Simpson Station to learn about agriculture and irrigation research at the Clemson Research Education Centers. In December 2023, the RBC toured the Lake Jocassee Dam and Hydro Facility. These helped connect each RBC member to the physical setting of the river basin and the multiple needs the water serves. This holistic perspective of the basin helped foster consensus-building. The RBC also had a joint meeting with the Lower Savannah-Salkehatchie RBC to learn about the United States Army Corps of Engineers (USACE) operations, projects, and initiatives in the Savannah River basin.

The planning process is divided into four phases, discussed below and in greater detail in the Planning Framework. Each phase spanned approximately 6 months, equally representing one quarter of the entire process.

PHASE 1

Orientation, Administrative Tasks, and Background Information

During this phase, RBC members reviewed bylaws, protocols, expectations, and the planning process. They selected a chair and vice-chair and reviewed technical information to aid them in the planning process for the Upper Savannah River basin. The RBC also developed a vision statement and a set of supporting goals (Table ES-1).

PHASE 2

Comparison of Water Resource Availability and Demand

In this phase, the RBC reviewed the methods, tools, and results from the first three steps of the overall State Water Plan formulation, including surface water availability analysis and water demand projections. This provided a consistent and scientific perspective on the overall balance of supply and demand throughout the basin, as well as current and future risks. Results were derived from the surface water model developed in earlier steps.

PHASE 3

Evaluation of Water Management Strategies

This was an interactive phase that involved the RBC and technical team identifying and evaluating surface water management strategies to address water shortages or water supply issues identified in Phase 2. Results were reported back to the RBC and evaluated against established performance measures. This interchange allowed the RBC to recognize common benefits and agree on recommended strategies and their relative priorities.

PHASE 4

River Basin Plan Preparation

This final phase involved the development of a draft version of the Plan, including recommendations for water management strategies, policies, legislation, and regulatory actions. It also included the formulation of recommendations for drought response initiatives and recommendations for improving the planning process. It included a period for public review and appropriate incorporation of public comments before finalizing the plan.

During Phase 1, the Upper Savannah RBC developed the following vision statement and goals specifically for the Upper Savannah River basin.

VISION STATEMENT

A resilient Upper Savannah River Basin that collaboratively, sustainably, and equitably manages and balances human and ecological needs.

GOALS

1) Within 24 months, develop water use strategies, policies, and legislative recommendations for the Upper Savannah River Basin in order to:
    a. Ensure water resources are maintained to support current and future human and ecosystem needs.
    b. Improve the resiliency of the water resources and help minimize disruptions within the basin.
    c. Promote balance between development, industry, and economic growth in areas with adequate water resources.
    d. Advocate for responsible land use practices.
    e. Identify funding sources.
2) Develop and implement an education and communication plan to promote the strategies, policies, and recommendations developed for the Upper Savannah River Basin.
3) Enhance collaboration between all stakeholders and water interest groups, including Georgia and the Lower Savannah-Salkehatchie River basin.

The planning process included outreach to the public to educate and augment the RBC with important information and perspectives. Two initial informational meetings were held to explain the planning process and solicit participation in the RBC. Two additional meetings were reserved for presentation of the draft plan and solicitation of verbal and written comments, and for the presentation of the final plan after its release, to highlight changes to the plan made in response to public input.

Lake Hartwell

Overview of the Upper Savannah River Basin

The Upper Savannah River basin covers nearly 7,000 square miles (sq mi) across the states of North Carolina, South Carolina, and Georgia. The South Carolina portion accounts for 10 percent of the state's total area. The basin extends over 140 miles from the central Blue Ridge Mountains to the confluence of the Savannah River and Stevens Creek, 12 miles downstream of the Lake Thurmond dam. Beyond the Stevens Creek confluence, the Upper Savannah River basin flows into the Lower Savannah–Salkehatchie River basin, which outlets into the Atlantic Ocean near the city of Savannah, Georgia. In South Carolina, the river basin spans approximately 40 miles at its widest point and consists of significant portions of Abbeville, Anderson, Edgefield, Greenwood, and Pickens Counties. Oconee and McCormick Counties lie entirely within the basin. A small portion of Saluda County is also present in the river basin. Five major subbasins divide the Upper Savannah River planning basin: the Tugaloo, Seneca, Upper Savannah, Middle Savannah, and Stevens Creek subbasins, as shown in Figure ES-4.

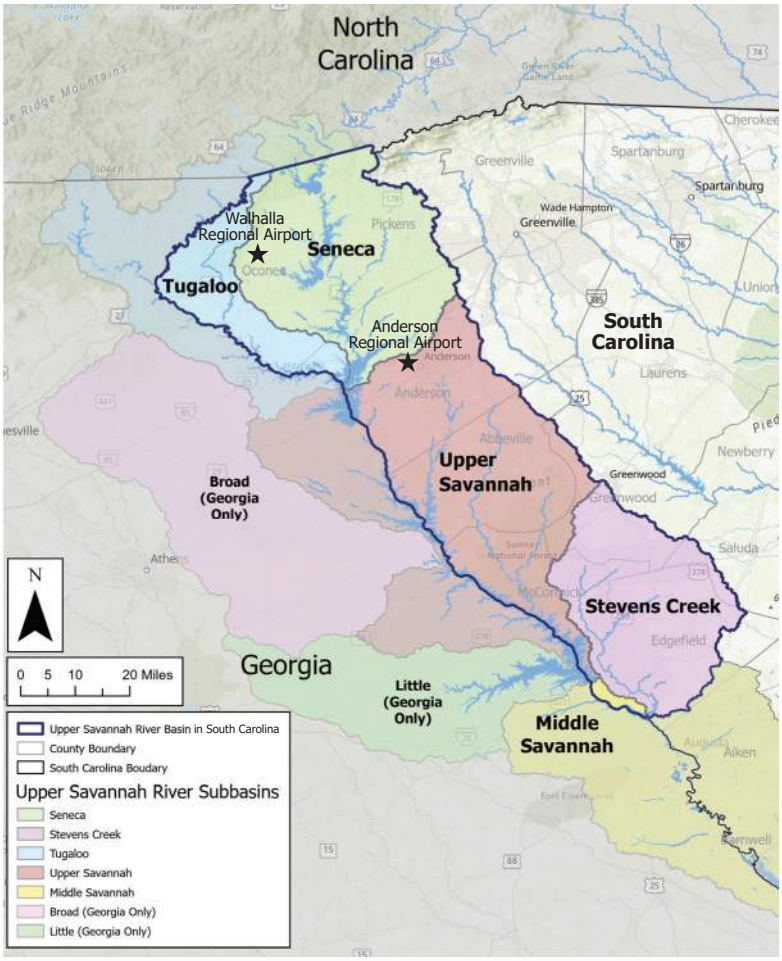


Figure ES-4. The Upper Savannah River basin in South Carolina.

Land use and land cover in the Upper Savannah River basin varies from rural farmland and forested areas to small- and moderate-sized urban areas. The basin is predominantly rural, and its main population centers are the small-to-moderately sized cities of Anderson, Greenwood, Clemson, Seneca, and Abbeville. Land used for agriculture tends to be in the central and southern end of the basin. Woodland is the dominant landcover in the basin, as shown in Figure ES-5.

The annual average precipitation for the entire basin, including the South Carolina part of the basin, ranges from 42 to over 63 inches (in.), with precipitation totals decreasing from the upper basin to the lower basin. Parts of the basin with the highest annual average rainfall are in areas with higher elevations. March is generally the wettest month (averaging 5.97 inches at Walhalla, and 4.71 inches at Anderson Regional Airport), and October and November are generally the driest months (averaging 4.32 inches in November at Walhalla and 3.04 inches in October at Anderson Regional Airport).

Walhalla and Anderson Regional Airport share three of their top five driest years on record (2016, 2007, and 1988). Both 2016 and 2007 were part of notable droughts in South Carolina history, the 2015 to 2016 drought and 2007 to 2009 drought. The least amount of precipitation occurred at both stations in 2016 (approximatley 35 inches at Walhalla and 25 inches at Anderson Regional Airport). Walhalla and Anderson Regional Airport also share three of their top five wettest years on record (2018, 2013, and 1964). Anderson's wettest year on record is 1964 (approximately 68 inches), which matches the wettest year on record for the state of South Carolina. However, this is only the fourth wettest year on record for Walhalla, where the wettest year on record was 2013 (approximately 91 inches).

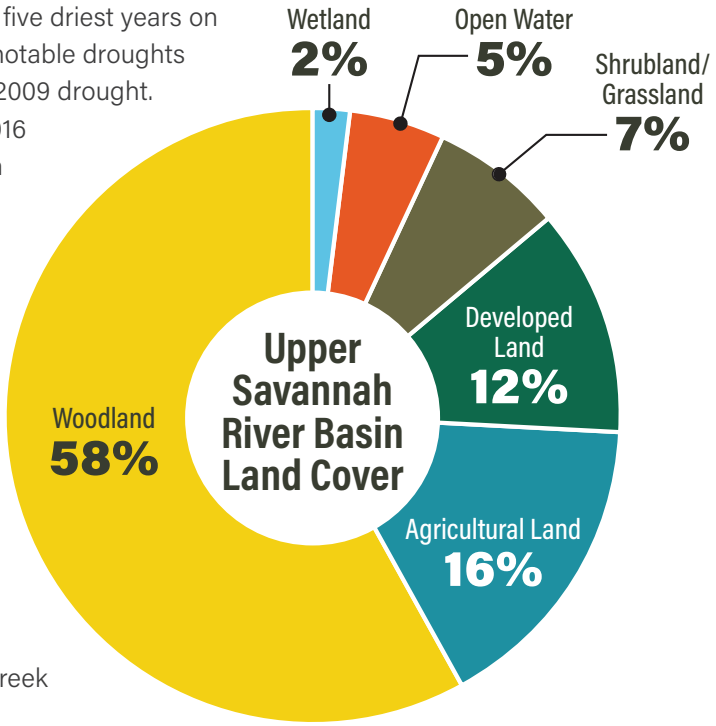


Figure ES-5. 2023 Upper Savannah River Basin land cover (Multi-Resolution Land Characteristics Consortium [MRLC] 2024).

Because of the nature of drought, one type of indicator cannot fully encapsulate the intensity of drought impacts or capture the variation in impacts among sectors and location within a river basin. While 2016 was the driest year at both the Walhalla and Anderson Regional Airport weather stations, stream gages on the Chattooga River near Clayton, Georgia and on Stevens Creek near Modoc experienced their lowest annual average flows in 2001 and 2012, respectively. The most recent year of drought conditions (defined by a Standard Precipitation Index of less than -1) in the Upper Savannah basin was in 2016 at both Walhalla and Anderson Regional Airport.

The rivers and streams of the Upper and Lower Savannah River basins are home to a total of 118 native fish species, which is more than the total in some states (Marcy et al. 2005). Many amphibians and reptiles also live within the Upper and Lower Savannah basins, including endangered salamanders and newts. The Middle Savannah River subbasin is home to the robust redhorse (Moxostoma robustum), a fish once thought to be extinct but rediscovered in the 1980s (U.S. Fish and Wildlife Service [USFWS] 2011). In the Middle Savannah River subbasin, 15 fish species have been introduced. These include the yellow perch (Perca flavescens) and rainbow trout (Oncorhynchus mykiss), which were introduced for recreational fisheries purposes (Marcy et al. 2005). The Walhalla State Fish Hatchery, one of five hatcheries within the state of South Carolina, is located within the upper reaches of the Upper Savannah River basin (SCDNR 2007a). The Walhalla hatchery is the only cold-water hatchery operated by SCDNR and raises more than 500,000 brown, brook, and rainbow trout annually to stock South Carolina waters (SCDNR 2007b). Figure ES-6 shows some representative species within the Upper Savannah River basin.

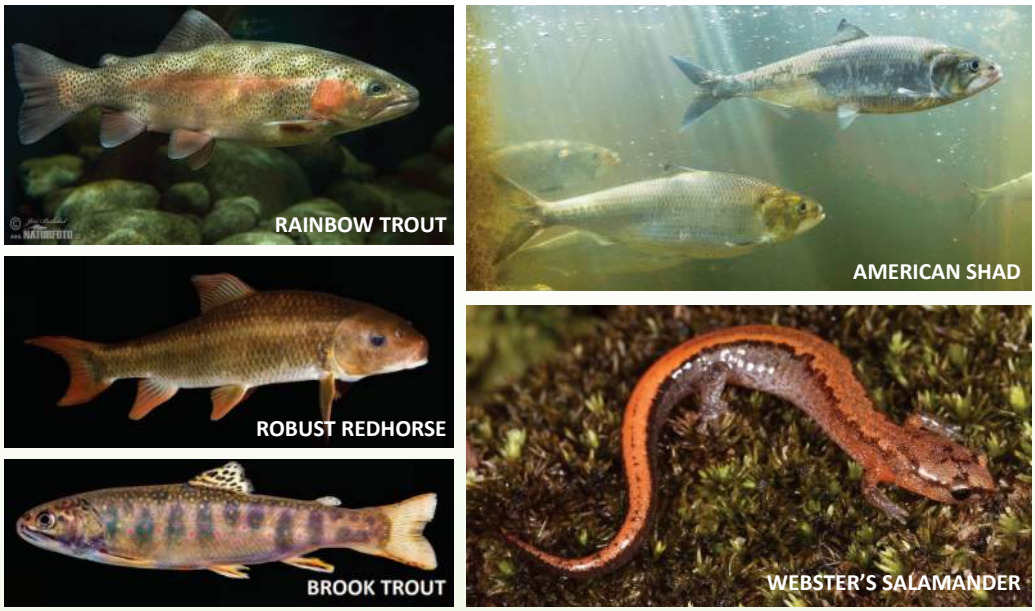


Figure ES-6. Representative aquatic species within the Upper Savannah River basin.

J. Strom Thurmond Lake

Water Availability: Supply and Demand

SURFACE WATER SUMMARY

The Upper Savannah River basin, as defined for South Carolina's river basin planning process, extends from the North Carolina state line down to the Savannah River confluence with Stevens Creek in Edgefield County. The Savannah River headwaters originate in the Blue Ridge physiographic provinces of North Carolina and Georgia, including the Tugaloo and the Seneca Rivers. Major tributaries of the Savannah River include the Chattooga River, Twelvemile Creek, Rocky River, Little River, and Stevens Creek. The Broad River tributary in Georgia also drains to the Savannah River and is used to modify flows from Lake Thurmond during drought conditions.

Unregulated streams in the basin depend on direct precipitation, surface runoff, and groundwater discharge to maintain flows. Tributary flows in the upper Blue Ridge region of the basin are more reliable, as compared to the flashier tributaries in the lower portion of the basin, because of the higher rainfall and groundwater storage capabilities (SCDNR 2009). Controlled releases from hydroelectric power facilities on these and additional smaller reservoirs greatly impact streamflow in the mainstem of the river. Development has eliminated most of the free-flowing streams in the basin (SCDNR 2009).

Table ES-1. Characteristics of the largest lakes and reservoirs in the Upper Savannah River basin.

Name	Stream	Storage Capacity[1] (acre-feet)	Purpose
Lake Thurmond	Savannah River	2,460,000	Power, navigation, flood control, water supply, water quality, recreation, and fish and wildlife management
Lake Hartwell	Savannah River	2,190,000	Power, navigation, flood control, water supply, water quality, recreation, and fish and wildlife management
Lake Russell	Savannah River	910,000	Power, flood control, water supply, water quality, recreation, and fish and wildlife management
Lake Keowee	Keowee-Little River	1,000,000	Power, recreation, and water supply
Lake Jocassee	Whitewater-Toxaway	1,185,000	Power and recreation
Stevens Creek	Savannah River and Stevens Creek	23,600	Power
Lake Secession	Rocky River	31,200	Power, recreation, and water supply
Lake Tugaloo	Chattooga River	43,000	Power and recreation
Bad Creek Reservoir	Bad Creek	35,513	Power
Broadway Lake	Rocky River	1,800	Recreation
Lake Yonah	Tugaloo River	10,200	Power and recreation

Source: Adapted from Table 8-2 in SCDNR (2009), and SCDNR (2023a) and U.S. Army Corps of Engineers (USACE) (2024).

[1] Storage capacities and surface areas listed for Lake Thurmond, Lake Hartwell, and Lake Russell are at the top of the designated summer conservation pool (330 feet for Lake Thurmond, 660 feet for Lake Hartwell, and 475 feet for Lake Russell). These storage capacities are based on surveys conducted by USACE between 2015 and 2023

The largest reservoirs and lakes in the Upper Savannah River basin serve as a critical source of water supply and/or support hydropower operations (Table ES-1). Secondary uses include recreation and flood control. Five large reservoirs have been built on the Savannah River and its tributaries: Lake Thurmond, Lake Hartwell, and Lake Russell on the Savannah River mainstem, and Lake Keowee and Lake Jocassee on the Keowee River. Additionally, 230 regulated dams and numerous unregulated small dams create small impoundments on many of the Upper Savannah River tributaries in South Carolina. Most of the regulated dams, particularly those designated as High Hazard dams, are on the upper reaches of the basin. Primarily Low Hazard regulated dams are also clustered at the southeastern end of the basin, north of Augusta, Georgia.

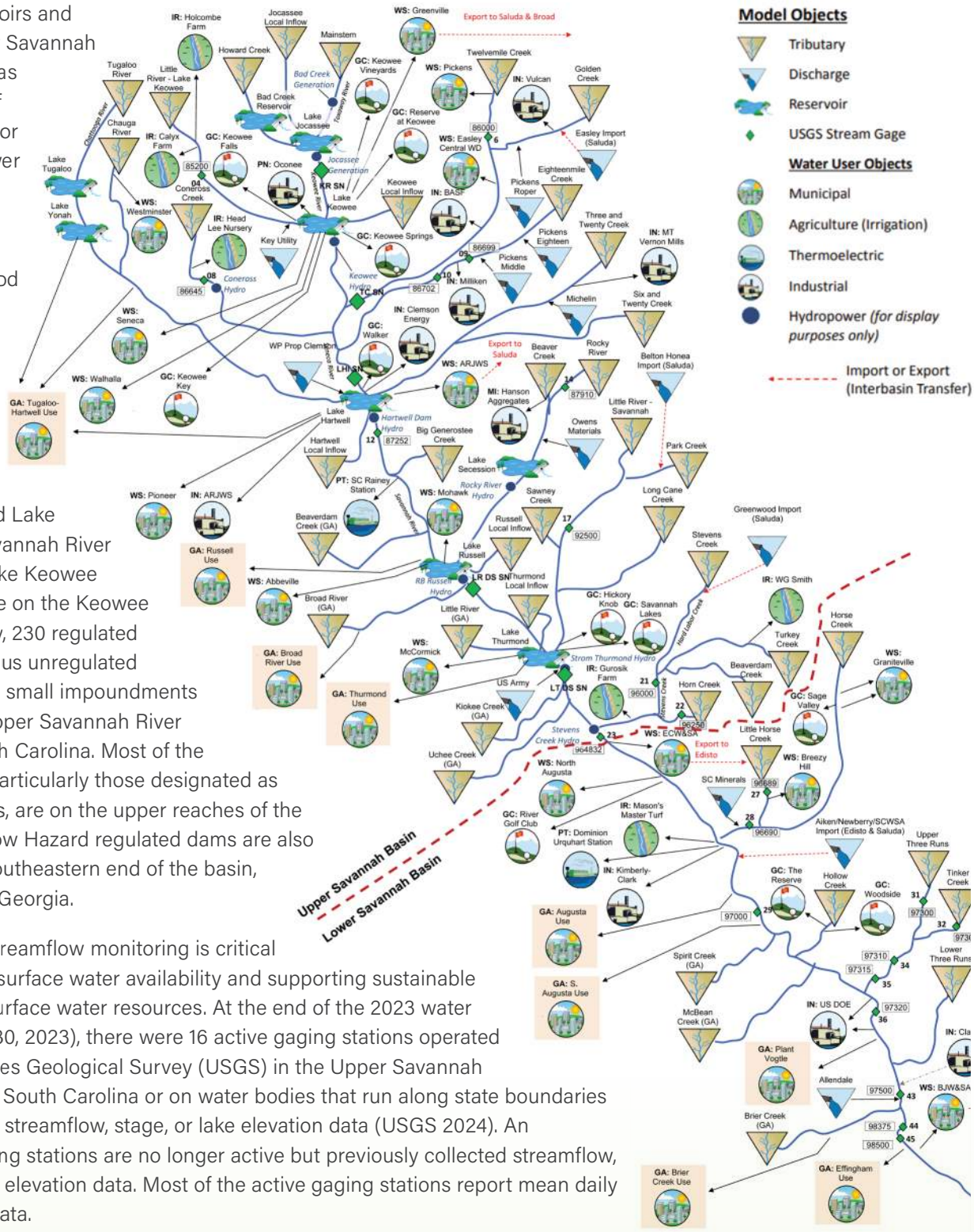


Figure ES-7. Simplified Water Allocation Model framework of the Savannah River basin.

Comprehensive streamflow monitoring is critical to understanding surface water availability and supporting sustainable management of surface water resources. At the end of the 2023 water year (September 30, 2023), there were 16 active gaging stations operated by the United States Geological Survey (USGS) in the Upper Savannah River basin within South Carolina or on water bodies that run along state boundaries which report daily streamflow, stage, or lake elevation data (USGS 2024). An additional 24 gaging stations are no longer active but previously collected streamflow, stage, or reservoir elevation data. Most of the active gaging stations report mean daily discharge (flow) data.

Supported by data from the active and inactive gaging stations, the Simplified Water Allocation Model (SWAM), pictured in Figure ES-7, simulates the surface water stream network of the Savannah River system, including the Upper Savannah River basin and its subbasins which terminate below the confluence with Stevens Creek. The model quantifies current and future surface water availability based on natural hydrology and current and projected water demand. It also simulates future water management strategies to identify risks and reliability of surface water utilization. It is used throughout this analysis to help characterize surface water availability under different scenarios.

GROUNDWATER SUMMARY

Groundwater in the Upper Savannah River basin is primarily stored in saprolite rock, which stores rainfall and recharges water to underlying rock fractures (SCDNR 2009). The Upper Savannah River lies in both the Blue Ridge and Piedmont physiographic provinces.

The saprolite layer is as thick as 150 feet within the basin (SCDNR 2009). Roughly a quarter of the wells within the basin serve domestic purposes and are bored into the saprolite. The quantity and size of the bedrock fractures beneath the saprolite diminish with depth. Most wells in the basin are less than 300 feet deep, and the maximum well is 1,100 feet deep. Well yields from fractured rock are reliable but are typically limited to less than 50 gallons per minute. Wells located in valleys tend to have larger yields than those in topographically high areas because of low areas, providing larger areas for recharge and being areas of weak, more fractured rock. Groundwater supply potential is not known in much of the basin, and aquifer or hydrogeologic units have not been delineated.

Under South Carolina's Groundwater Use and Reporting Act (Chapter 5, Section 49-5-60), a Capacity Use Area (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. Groundwater withdrawals in the Upper Savannah River basin are minimal, and none of the Upper Savannah basin lies within a CUA.

Groundwater use within the basin is limited. In 2022, the Upper Savannah River basin had the second lowest volume of groundwater withdrawals of the eight basins in the state, with only the Saluda reporting less groundwater usage (SCDNR 2023b). Reported groundwater withdrawals in the Upper Savannah River basin are typically less than 0.5 MGD. Consequently, there are no areas experiencing significant water level declines as a result of overpumping within the Upper Savannah River basin (SCDNR 2009).

Lake Keowee below Lake Jocassee Dam

WATER DEMAND SUMMARY

Figures ES-8 through ES-10 summarize the current and projected water demands in the Upper Savannah River basin. Total current water use in the South Carolina portion of the basin is approximately 2,917.4 MGD. Less than 1 MGD of this demand is withdrawn from groundwater, with the rest coming from surface water. Current withdrawals are dominated by thermoelectric water use, which represents 97.6 percent of the basin's total withdrawal; however, only 1 percent of water withdrawn for thermoelectric use is used consumptively with the remaining 99 percent being returned to streams and rivers downstream. After thermoelectric use, public supply is the next largest use category (2 percent of basin withdrawals), then manufacturing (0.3 percent), then minimal withdrawals associated with agriculture (0.01 percent), golf course irrigation (0.04 percent), and mining (0.01 percent). Of the total basin withdrawal, only an estimated 2 percent (62 MGD) of the water is consumptively used and 98 percent (2,855 MGD) is returned to streams and rivers after use. Additionally, approximately 22 MGD of surface water is withdrawn from Georgia-side water users in the basin.

For this planning effort, two future demand scenarios were developed: the Moderate Demand Scenario, which is based on median rates of water use in recent reporting and moderate growth projections, and the High Demand Scenario, which is based on the maximum monthly rates of water use in recent reporting and high growth projections. From 2025 to 2070, total water demand in the Upper Savannah River basin is projected to increase by 2 percent from 2,676 MGD to 2,740 MGD (**82 MGD of which is consumptive**) for the Moderate Demand Scenario and by

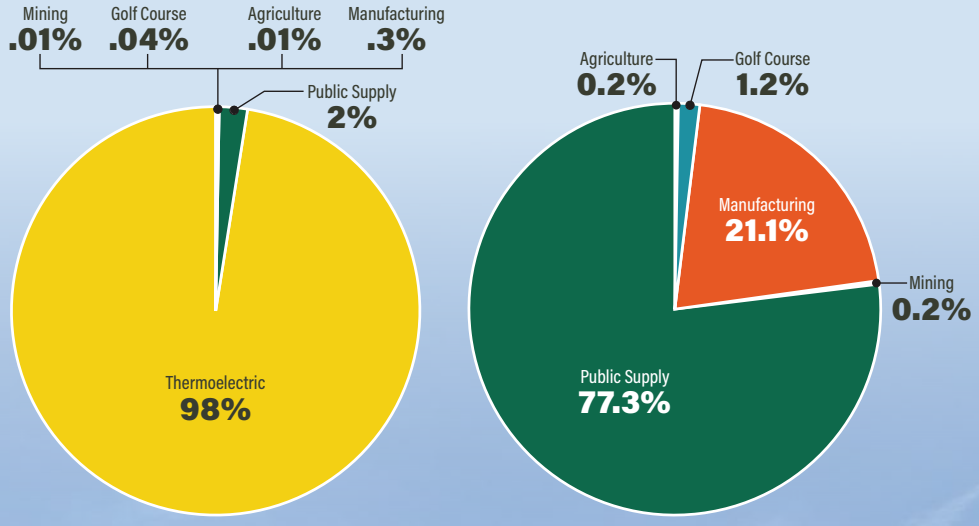
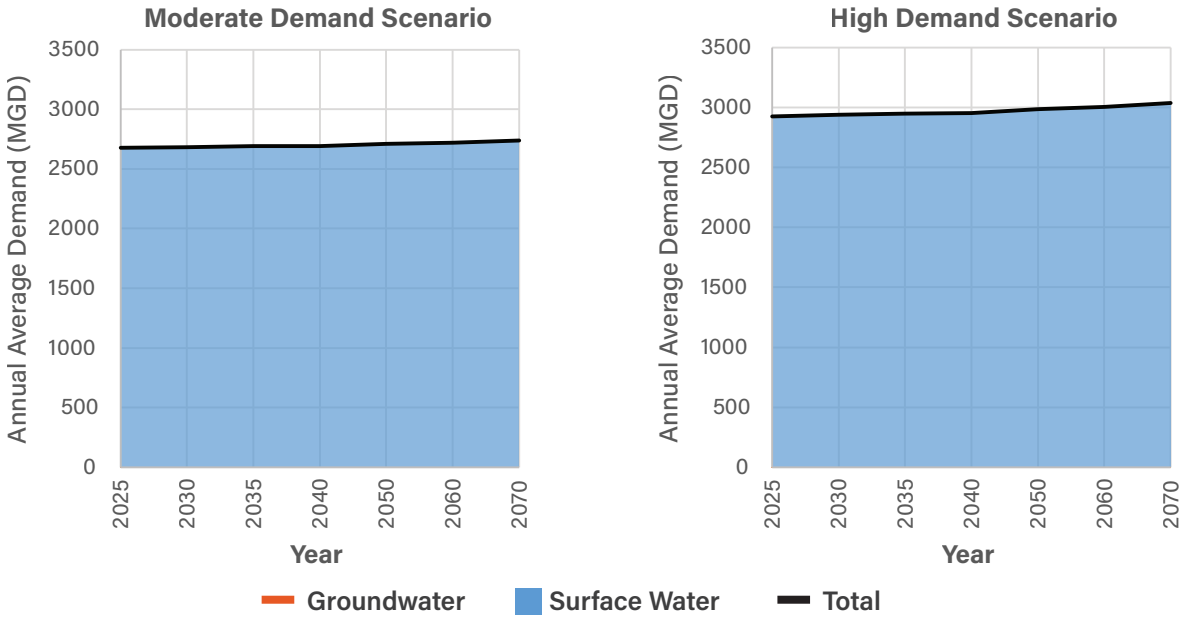


Figure ES-8. Current total water use category percentages of total demand, with and without thermoelectric.

RBC Tour of the Lake Jocassee Dam

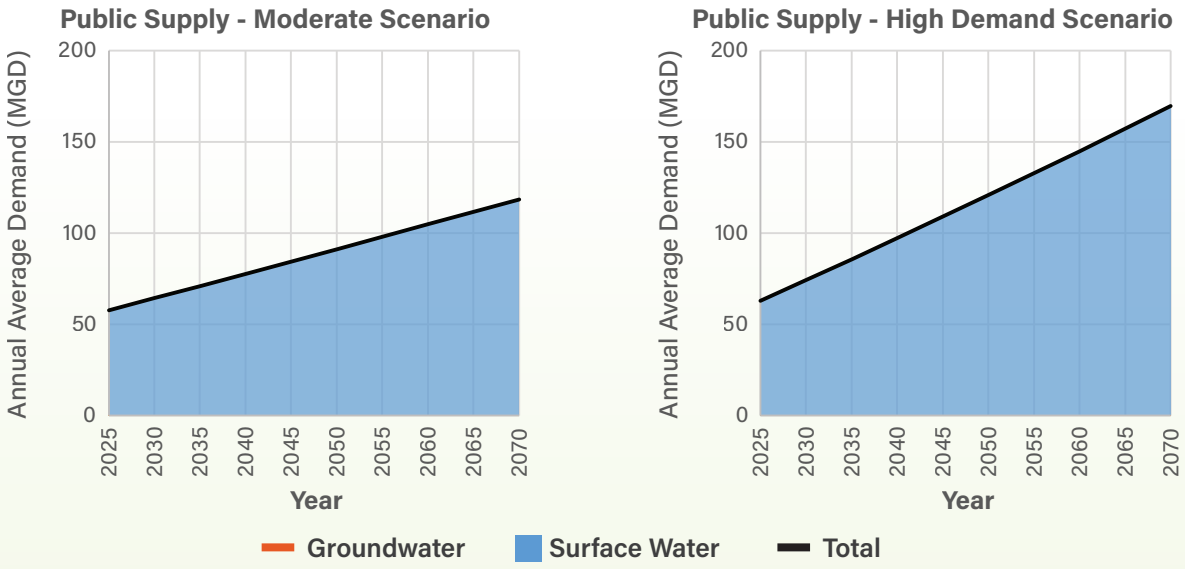
4 percent, from 2,927 MGD to 3,042 MGD (**95 MGD of which is consumptive**) for the High Demand Scenario. Included in these projections is 0.4 MGD of groundwater withdrawals, which are projected to remain constant over the planning horizon. The Moderate and High Demand Scenarios have different starting 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. In this way, we are able to explore a wide range of future demand scenarios and reduce the impact of inherent uncertainty. Most of the water demand growth in the Upper Savannah River basin is expected to come from increasing demand for public water supply, as shown in Figure ES-10. The largest use category of thermoelectric use is projected to remain constant over the planning horizon.

Projected water demands are below the total permitted and registered surface water amount of 3,491.3 MGD in the basin. Permitted and registered withdrawals are not, however, proxies for water availability in the basin, because sufficient flows to satisfy such withdrawals rates cannot be guaranteed into the future.



*This total demand includes thermoelectric demand, almost all of which is returned downstream.
Note: Groundwater demands, projected at a constant average annual demand of 0.4 MGD are too small to be seen on this chart.

Figure ES-9. Total water demand projections by water source.



Note: Groundwater demands, projected at a constant average annual demand of 0.4 MGD are too small to be seen on this chart.

Figure ES-10. Projected public supply water demands.

Lake Hartwell Dam

Devil's Fork State Park on Lake Jocassee during 2012 drought

WATER AVAILABILITY SUMMARY

The results of surface water availability modeling using current and projected rates of water withdrawals helped the RBC identify several key observations and conclusions about the availability of surface water resources in the Upper Savannah River basin. These key conclusions, presented in the subsection below, led to the RBC evaluating and selecting a suite of water management strategies to promote the sustainable use of the resource and maintain adequate river flows during low flow conditions. Section ES-5 summarizes the evaluation and selection of water management strategies.

In accordance with the Framework, multiple planning scenarios were conducted to evaluate different levels of water demands. The demand scenarios were superimposed on historical hydrology, reflecting conditions over the 82-year period from 1939 through 2021. The following scenarios were evaluated in this analysis:

- **Current Scenario.** A snapshot in time of current demands.
- **Moderate Demand Scenario.** Projected moderate increase in demands through 2070.
- **High Demand Scenario.** Aggressive assumptions of water demand based on maximum monthly rates of water use in recent reporting and high population and demand growth through 2070. 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 provided the RBC with information on which to base conservative management strategies.
- **Permitted and Registered (P&R) Scenario.** A hypothetical scenario in which all existing permitted and registered water users withdraw water at their fully permitted or registered amount. This scenario also represents an unlikely maximum for total water demand because most water users are not expected to need to withdraw their fully permitted or registered amount even 50 years from now, nor would they need to withdrawal at that level month after month and year after year.
- **Unimpaired Flow (UIF) Scenario.** The RBC requested a fifth scenario be run to understand naturally occurring water in the absence of any human impacts (no withdrawals or returns and no reservoirs).

Lake Keowee

Following are the specific observations and conclusions relative to each planning scenario.

- **Current Use Scenario.** Surface water availability modeling suggests a low risk of water supply shortages under the Current Use Scenario. No water supply shortages were identified using current, monthly average demands when considering the 82-year period of record covering hydrologic conditions observed from 1939 through 2021.
- **P&R Scenario.** Results of this hypothetical and unlikely scenario, which include projected shortages for one public water supplier, one agricultural operation, one industrial water user, and one mining water user demonstrate that, while there are a few locations in the basin that cannot support withdrawals at the fully permitted and registered rates, there is sufficient surface water to meet most of the demands, when considering the range of hydrologic conditions over the 1939 to 2021 period of record.
- **Moderate Demand Scenario.** 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. At 2070 demand levels, one water user (City of Pickens) is simulated to experience shortages at a frequency of less than 1 percent; this shortage may be alleviated in the future with the planned source water change from Twelvemile Creek to Lake Keowee. River flows are predicted to decrease modestly compared to the Current Use Scenario, based on overall higher withdrawal rates. On the Savannah River above Augusta Canal, mean and median flows are predicted to decrease by approximately 1 to 3 percent, and low flows are projected to increase by less than 1 percent, based on 2070 demands.
- **High Demand Scenario.** The one water user with a shortage in the Moderate Demand 2070 Scenario (City of Pickens) exhibits slightly greater shortages under the High Demand 2070 Scenario. Two additional water users (Vulcan Construction Materials and Hanson Aggregates) experience shortages as well. River flows are predicted to decrease modestly to moderately, compared to the Current Use Scenario, depending on the location and based on overall higher withdrawal rates. Mean and median flows on the Savannah River above Augusta Canal are predicted to decrease by approximately 2 to 5 percent, and low flows are projected to increase by less than 1 percent, based on 2070 demands.
- **UIF Scenario.** Simulated flow under natural conditions (referred to in the planning framework as "Unimpaired Flows, or UIFs") suggest that under natural conditions without withdrawals, storage, or return flows, portions of the river would exhibit slightly lower flow than current conditions, and other portions slightly higher. It is important to note that under these simulated conditions, the natural river on its own would not be able to support the state's targets for minimum instream flow for environmental purposes under all conditions which are computed as percentages of typical (median) conditions, but do not necessarily represent lowest possible flow levels.

To assess potential ecological risk associated with increasing water use in the basin, biological response metrics developed by Bower et al. (2022) were correlated to model-simulated flows from the various planning scenarios. Based on the model simulations, mean daily flow is not expected to be strongly impacted more by water use across all scenarios and locations assessed. Ecological flow performance measures suggest a low risk of fish species loss due to water use. However, these findings do not rule out all potential risks to ecological integrity or aquatic biodiversity related to other metrics or flow alterations.

Results and conclusions are based on modeling that assumed historical climate patterns from the past 82 years. In subsequent phases of river basin planning, the RBC has identified the need to evaluate potential impacts to water supply availability, resulting from more severe droughts and changing climate, such as increasing temperatures and more variable precipitation.

Lake Richard B. Russell

Water Management Strategies Evaluated

The Planning Framework identifies a two-step process to evaluate water management strategies. As a first step, proposed management strategies are simulated using models to assess their effectiveness in eliminating or reducing identified shortages or in increasing water supply. For strategies deemed potentially effective, their feasibility for implementation is addressed considering cost and benefits, consistency with state regulations, reliability, environmental and socioeconomic impacts, and potential interstate or interbasin impacts. Section ES-6 discusses recommendations based on this information. The RBC identified and evaluated the water management strategies, which are grouped into agricultural and municipal demand-side strategies in Table ES-2. The RBC did not identify any supply-side strategies (strategies that increase the amount of surface water available for withdrawal) because modeling results of the High Demand Scenario did not indicate any significant Surface Water Shortages.

Table ES-2. Demand-side water management strategies evaluated by the Upper Savannah RBC.

Agricultural Conservation and Efficiency Practices	Municipal Conservation and Efficiency Practices
Water Audits and Nozzle Retrofits	Development, Update, and Implementation of Drought Management Plans
Irrigation Scheduling and Smart Irrigation	Public Education of Water Conservation
Soil Management and Cover Cropping	Conservation Pricing Structures / Drought Surcharge
Crop Variety, Crop Types, and Crop Conversions	Residential Water Audits
Irrigation Equipment Changes	Leak Detection and Water Loss Control Programs
Future Technologies	Time-of-Day Watering Limits
	Reclaimed Water Programs
	Landscape Irrigation Programs and Codes
	Water Efficiency Standards for New Construction

Pasture in the Upper Savannah River basin
(photo courtesy Daniel Milam)

Recommendations

RECOMMENDED WATER MANAGEMENT STRATEGIES

The RBC's water management strategy recommendations align with their vision and goal statements developed for the Upper Savannah River basin. By assessing and recommending these specific strategies, the stakeholders who make up the RBC are recommending actions that help achieve their vision statement to support "***a resilient Upper Savannah River Basin that collaboratively, sustainably, and equitably manages and balances human and ecological needs.***" The feasibility assessment supports the RBC's goal to "***develop water use strategies, policies, and legislative recommendations for the Upper Savannah River Basin***" in order to "***ensure water resources are maintained to support current and future human and ecosystem needs***" and "***improve the resiliency of the water resources and help minimize disruptions within the basin.***"

Supply-side Strategies: Because simulation modeling revealed very low risk of unmanageable water shortages, and only in tributary headwater reaches for users who may already have management alternatives in place or in planning stages, the RBC did not recommend any new supply management strategies.

Demand-side Strategies: To help guard against unforeseen water shortages and ecological impacts, and to promote stewardship of the water resources in the basin, the RBC recommended a suite of municipal and agricultural demand-side water management strategies. Recognizing that education is the cornerstone to building a water conservation ethic and that focusing education on youth is the most-effective, long-term approach, the Upper Savannah RBC prioritized public education of water conservation. Conservation pricing structures and leak detection and water loss control programs were considered to be the next highest priority, as they can have significant benefits in sustaining supplies during drought, if implemented. The RBC did not prioritize the remaining municipal or agricultural strategies, leaving these decisions to individual water users. The strategies represent a "toolbox" of potential approaches to reduce water demands. Water users may find the descriptions and feasibility assessment presented in Chapter 6 helpful for determining which strategies to pursue.

Adaptive Management: Though the simulation of historic conditions revealed low risks for the Upper Savannah Basin with respect to water availability and ecological flow needs, the RBC emphasized that future uncertainties should not be ignored. In keeping with a predominant trend throughout the United States, an adaptive approach, in which water users and the RBC continually monitor and evaluate emerging risks and respond accordingly is recommended. This avoids over-investment now, and can ward off under-investment if risks are recognized in time. Specific risks or conditions that the RBC recommends monitoring and planning for as needed include:

- Climate change
- Population growth
- Infrastructure maintenance
- Industrial growth and types of industry in the basin
- Cyberwarfare
- Energy uncertainty and loss of power
- Per- and polyfluoroalkyl substances (PFAS, also known as "forever chemicals") and other emerging contaminants
- Future land use patterns
- Extreme flood events
- Uncertainties associated with modeling and data gaps
- Georgia water use

DROUGHT RESPONSE RECOMMENDATIONS

Ongoing drought management in South Carolina occurs at the state, regional, and local levels. At the state level, SCDNR develops, coordinates, and executes a statewide drought mitigation plan. The state also created the South Carolina Drought Response Committee (DRC) to be the major drought decision-making entity in the state. The DRC is a statewide committee chaired and supported by SCDNR and its South Carolina State Climatology Office, with representatives from local interests. Because the severity and impact of drought conditions can vary across the state, SCDNR delineated four Drought Management Areas (DMAs) that generally follow the major basin divides within the state (recognizing that some of the eight basins with RBCs flow into other basins downstream). The Upper Savannah River basin is primarily within the West DMA but includes parts of the Central DMA, which is shared with the Saluda River Basin.

Coordination and Communication:

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

Drought Recommendations:

1. The RBC recommends that the DMAs be replaced by the eight river basins and that a diverse set of stakeholder representatives from the RBCs serve on the DRC to help inform the DRC and SCO of conditions in each river basin.
2. The RBC recommends that water utilities review and update their drought management plan and response ordinance every 5 years or more frequently if conditions change.
3. The RBC recommends that water utilities, when updating their drought management plan and response ordinance, look for opportunities to develop response actions that are consistent with those of neighboring utilities.
4. The RBC recommends that water utilities coordinate, to the extent practical, their drought response messaging.
5. The RBC encourages water utilities in the basin to consider drought surcharges on water use during severe and/or extreme drought phases.
6. The RBC discourages the use of decreasing block rate structures by water providers.
7. The RBC encourages water users and those with water interests to submit drought impact observations through the Condition Monitoring Observer Reports (CMOR).

Buffalo Creek on Lake Thurmond, December 2008 (photo courtesy Harry Shelley)

Lake Jocasee

Other Drought Activities

In addition, the RBC noted the existing drought management efforts in the Upper Savannah Basin developed by water suppliers and other entities. Particular detail is included in Chapter 8 on two large-scale drought management efforts through the USACE Savannah District and Duke Energy:

- The USACE Savannah District operates three dams on the Savannah River in the Upper Savannah River basin where they manage lake levels and releases downstream: Hartwell Dam, Russell Dam, and Thurmond Dam. The Savannah River Basin Drought Management Plan has evolved from the initial Drought Contingency Plan 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.
- The Duke Energy Low Inflow Protocol (LIP) was established as part of the relicensing agreement for the Keowee-Toxaway Project reservoirs (Lake Jocassee and Lake Keowee) (Duke Energy Carolinas, LLC 2013). The purpose of the LIP is to establish a joint management plan that Duke Energy, public water suppliers with large water intakes withdrawing from project reservoirs, and public water suppliers with large water intakes (who choose to participate) on the Savannah River USACE reservoirs (Hartwell, Russell, and Thurmond) agree to follow under drought conditions.

POLICY, LEGISLATIVE, REGULATORY, TECHNICAL, AND PLANNING PROCESS RECOMMENDATIONS

During the final phase of the planning process, the Upper Savannah RBC developed, considered, and agreed on various policy, legislative, and regulatory recommendations. The RBC also offered technical recommendations and suggestions for improving the planning process in other river basins throughout the state. The following subsections summarize these recommendations.

Policy, Legislative, and Regulatory Recommendations

The Upper Savannah RBC engaged in discussion about issues and concerns with existing policies, laws, and regulations governing water withdrawals and water use. The following recommendations in Table ES-3 are intended to guide SCDES and the legislature when considering changes to existing laws and regulations that govern water withdrawals and assist local government efforts to protect water resources.

Table ES-3. Upper Savannah RBC policy, legislative, and regulatory recommendations.

Legislation and Regulatory Recommendations	▪ The South Carolina Surface Water Withdrawal, Permitting, Use, and Reporting Act should allow for reasonable use criteria to be applied to all new surface water withdrawals, like those that currently exist for groundwater withdrawals. ▪ Improve the current laws that allow for regulation of water use so that they are enforceable and effective. The current water law, which grandfathers most water users, needs to be improved to support effective management of the state's water resources. ▪ The RBC recommends that the Legislature approve and adopt the State Water Plan. This recommendation assumes that the River Basin Plans will be included as appendices to the State Water Plan, and therefore they be similarly adopted. ▪ Increase coordination and planning with GAEPD on Savannah River water resources issues. ▪ The state should support and fund water education programs that include all sectors of water use and promote the types of water management strategies recommended in the River Basin Plans. ▪ A grant program should be established to help support the implementation of the actions and strategies identified in each RBC's River Basin Plan.
Local Government Recommendations to Protect Water Resources	▪ The RBC recommends that as part of the comprehensive planning process that each local jurisdiction across the state consult the Resilience Plan developed by the South Carolina Office of Resilience, local Hazard Mitigation Plans, and the associated River Basin Plan(s) developed by the RBCs for inclusion within the resilience element as required by the South Carolina Local Government Comprehensive Planning Enabling Act as amended in 2020.

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 in Table ES-4 should be taken as considerations for future phases of the river basin planning process. To implement these recommendations, the Upper Savannah RBC will need support from SCDNR, SCDES, and other technical experts.

Table ES-4. Upper Savannah RBC technical and program recommendations.

Data-Related Recommendations	▪ Compile the data obtained from established credible systems in alignment with RBC goals for utilization across the state before creating new systems, databases, or monitoring stations. ▪ Fund and establish a mesoscale network of weather and climate monitoring stations. ▪ Fund all existing and future state agency recommended streamflow gage locations.
Technical Study Recommendations	▪ While the RBC should maintain its focus on the assessment of water quantity, future planning efforts should include evaluation of surface water quality, including bacteria, nutrient loading and sedimentation. ▪ Study the impacts of drought on fishkills due to dissolved oxygen. ▪ Study the impacts of changing land use on streamflow characteristics including the magnitude of flows, timing of flows, and flashiness. ▪ Identify and prioritize properties for conservation to protect quantity and quality of water. ▪ State and local governments develop and fund county conservation and mitigation banks and collaborate with South Carolina Conservation Bank and Land Trusts to conserve priority properties. ▪ Continue discussion of data needs for flow-ecology relationships. ▪ The state should request for and cost-share in the completion of Phase 2 of the USACE Comprehensive Study and Drought Plan Update. ▪ In future planning phases, the RBC recommends a study be performed to understand the extent and potential impacts of private and community/commercial wells, their vulnerability, and to what extent they may reduce surface water availability, especially during droughts.
Water Resource Protection Recommendations	▪ The RBC encourages local governments and land managers to act to reduce sediment loading to reservoirs. ▪ The RBC recommends that the financial impacts of increased sedimentation on reservoirs and water resources be identified, and the results be communicated to local governments to demonstrate the value of riparian buffers, sedimentation and erosion control measures, and other policies and controls that reduce sediment generation and transport. ▪ Encourage the building permitting process where applicable to require developers work with water/wastewater utilities to ensure adequate availability/capacity.

Jocassee Hydro Station

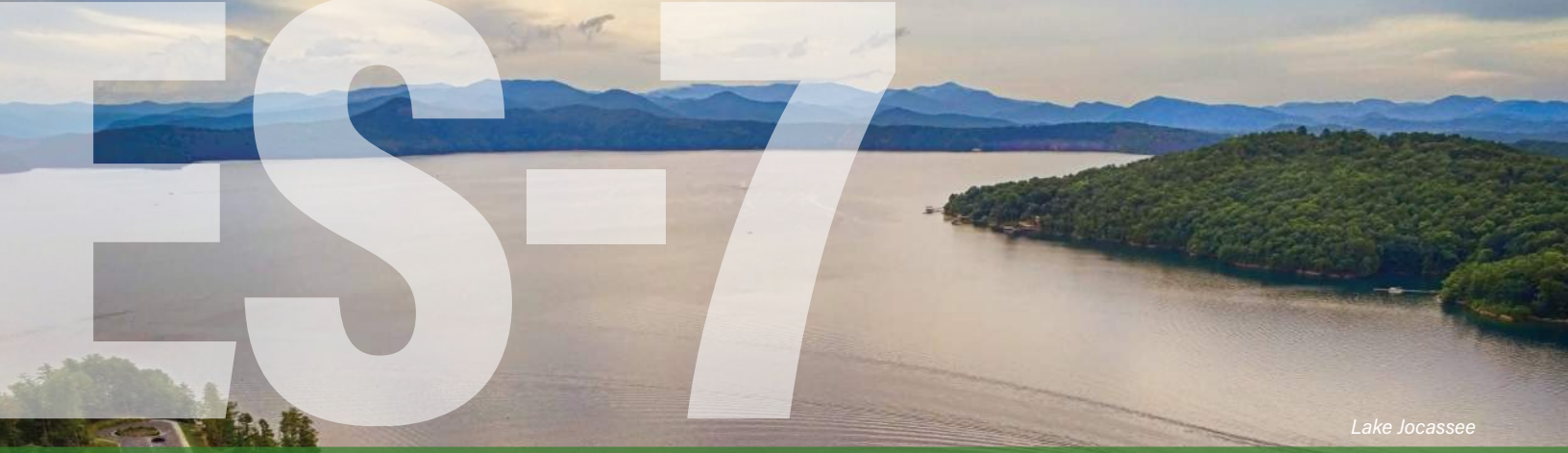
Savannah River below Lake Hartwell Dam during 2024 spillway test

Recommendations to Improve the River Basin Planning Process

Table ES-5 lists the recommendations that should be considered for development of future river basin plans.

Table ES-5. Upper Savannah RBC recommendations to improve the river basin planning process.

Recommendations to Promote Findings and Coordinate Implementation	▪ RBCs should develop and implement an engagement plan to improve awareness and build support for the recommendations, actions, and strategies identified in the River Basin Plan. ▪ When conducting education and outreach, the Upper Savannah RBC should coordinate with groups that have existing education and outreach efforts focused on water conservation such as Clemson University, Lake Keowee Source Water Protection Team, Lake Hartwell Partners for Clean Water, and Anderson Pickens Stormwater Partners.
Recommendations to Improve Communication Among RBCs and Other Groups	▪ SCDES should develop a strategy for maintaining membership and sustaining the RBCs. Elected officials should be invited and considered to participate on the RBCs as part of the Local Government water interest category. ▪ During 2025, the RBCs should initiate and coordinate discussions with SCDES to begin the process of updating the State Water Plan. ▪ Future water planning efforts should consider increased collaboration between all of South Carolina's RBCs. ▪ As part of future water planning efforts, the RBC should attempt to increase engagement with USACE, and specifically with the Planning and Operations Divisions.
Funding Recommendation	▪ Following development of the initial River Basin Plans, the RBCs should work with SCDES to identify the scope of future RBC activities and help develop funding needs and requests. ▪ The South Carolina Legislature should authorize recurring funding for state water planning activities, including river basin planning.



Lake Jocassee

Upper Savannah River Basin Plan Implementation

The Upper Savannah RBC identified six implementation objectives for the Upper Savannah River Basin Plan. These six objectives were developed based on themes that emerged from the recommendations made in previous chapters. The objectives are as follows:

- **Objective 1.** Improve water use efficiency to conserve water resources
- **Objective 2.** Communicate, coordinate, and promote findings and recommendations from the River Basin Plan
- **Objective 3.** Improve technical understanding of water resource management issues
- **Objective 4.** Protect water resources
- **Objective 5.** Improve drought management
- **Objective 6.** Promote engagement in water planning process

Although the Planning Framework affords the RBC the opportunity to prioritize the objectives, the Upper Savannah RBC decided not to prioritize implementation objectives and rather prioritize the strategies under each objective to guide implementation. Table ES-6 identifies some of the short-term strategies and actions for these objectives.

Table ES-6. Implementation objectives and representative short-term actions.

Objective	Representative Short-Term (5-Year) Actions[1]
Objective 1. Improve water use efficiency to conserve water resources	**MUNICIPAL** ▪ Identify funding opportunities and technical assistance ▪ Establish a baseline of residential per capita water use by system ▪ Survey to understand the extent of advanced metering infrastructure (AMI) and automated meter reading (AMR) use amongst utilities ▪ Encourage water utilities to conduct a water loss/leak detection audit using the American Water Works Association (AWWA) M36 Method, establish a baseline, and continue to measure every 2-3 years ▪ Work with water utilities to determine how water is being used and understand where conservation measures may have the most impact ▪ Implement outreach and education program about recommended water management practices and funding opportunities **AGRICULTURAL** ▪ Identify funding opportunities ▪ Implement outreach and education program about recommended water management practices and funding opportunities ▪ Individual water users to implement conservation practices ▪ Develop survey of practices implemented, funding issues, and funding sources utilized

Table ES-6. Implementation objectives and representative short-term actions. (continued)

Objective	Representative Short-Term (5-Year) Actions[1]
Objective 2. Communicate, coordinate, and promote findings and recommendations from the River Basin Plan	▪ RBC to meet quarterly as needed following publishing of River Basin Plan. Meetings will focus on implementation and developing a communication and engagement plan ▪ RBC to consider the formation of subcommittees to lead engagement ▪ SCDES to identify funding needs and communicate with Legislature ▪ RBC to develop and conduct outreach to local governments
Objective 3. Improve technical understanding of water resource management issues	▪ RBC to first identify specific water quality and quantity issues and concerns in the basin ▪ RBC to determine if there are data gaps and recommend data collection to fill gaps ▪ RBC to develop approach to further address water quality issues and concerns, including the need for development of a watershed plan under SCDES Watershed Program ▪ RBC to invite Research Triangle Institute (RTI) and/or others to educate the RBC on the Catawba-Wateree Water Management Group's (CWWMG's) land conservation modeling ▪ Develop communication strategy for speaking with USGS and other entities funding stream gages ▪ Work with Saluda RBC to continue discussions with USGS and Clemson about the need for additional data in the Blue Ridge
Objective 4. Protect water resources	▪ Work with local governments and Councils of Governments (COGs) to incorporate strategies into land use, planning, zoning, permitting processes ▪ RBC to develop communication materials and strategy to promote recommendations to county and municipal officials ▪ Counties and municipalities to consider amendments to permitting process
Objective 5. Improve drought management	▪ Public suppliers on the RBC to review and update their drought management plans and send them to the State Climatology Office (SCO) ▪ Public suppliers on the RBC to consider ways to incorporate RBC drought management recommendations into their drought plans ▪ RBC to conduct outreach to State and USACE to communicate recommendations ▪ In collaboration with the Lower Savannah-Salkehatchie RBC, develop outreach materials to educate the area about the Savannah River system ▪ USACE to complete Comprehensive Study and Drought Plan Update ▪ Develop materials on benefits and implementation of RBC drought management recommendations ▪ Develop outreach strategy to communicate with public suppliers and distribute materials
Objective 6. Promote engagement in water planning process	▪ SCDES, RBC Planning Team, and RBC to conduct review of membership every 6 months ▪ SCDES and RBCs to invite elected officials of local governments and COGs to join the RBC ▪ RBC to coordinate with SCDES on the role of RBCs in updating the State Water Plan ▪ SCDES to gauge interest in joint RBC meetings from all active RBCs ▪ SCDES and RBCs to work with GAEPD and their Regional Water Councils to have annual meetings, and/or otherwise participate in each other's meetings.

[1]*These examples are representative and do not reflect the complete list developed by the RBC, which are in Table 10-1 of the Upper Savannah River Basin Plan.*


The Upper Savannah RBC


Richard B. Russell Lake

FUNDING OPPORTUNITIES

Existing federal funding sources may be leveraged to support the River Basin Plan implementation. For example, the U.S. Environmental Protection Agency'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 Hazard Mitigation Grant Program or Building Resilient Infrastructure and Communities programs.

Although agricultural water use in the Upper Savannah River basin is limited and expected to already be efficient, funding opportunities related to agricultural programs are also included for reference. The U.S. Department of Agriculture (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 10-2 in the report lists specific funding sources and programs that are relevant to the implementation of recommendations in this Plan.

IMPLEMENTATION CONSIDERATIONS

Public Funding: 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 Funding: 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.

Stakeholder and Public Acceptance: 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.

RBC Momentum: To effectively implement the recommended strategies of the River Basin Plan, the RBC must continue to meet as a planning body. 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. Part of this continued engagement assumes interaction with the recently formed WaterSC Working Group who is currently helping SCDES translate RBC recommendations into the State Water Plan.

Clear Documentation of Agreement and Views: 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.

SUMMARY

The Upper Savannah RBC, one of eight statewide RBCs to convene, has successfully followed the Planning Framework to develop a River Basin Plan for the Upper Savannah River basin. The plan includes consensus-based recommendations on water management strategies, as well as documented dialogue on major policy, legislative, and regulatory issues that should help inform decision-makers on a broad array of stakeholder viewpoints and priorities. In the coming years, the policy and technical recommendations made by the RBC will help inform and support further water planning efforts in the basin.

In addition, the Upper Savannah RBC has shared information with the Lower Savannah RBC so that decisions downstream can be informed by the decisions and priorities in the upper basin.

References

Bower, L.M., B.K. Peoples, M.C. Eddy, and M.C. Scott. 2022. Quantifying flow–ecology relationships across flow regime class and ecoregions in South Carolina. Science of the Total Environment, 802 (2022) 149721. https://doi.org/10.1016/j.scitotenv.2021.149721.

Marcy, B.C., D.E. Fletcher, F.D. Martin, M.J.M. Reichert, and M.H. Paller. 2005. "Fishes of the Middle Savannah River Basin." University of Georgia Press, Athens, Georgia.

MRLC. 2024. "Annual National Land Cover Database (NCLD) Land Cover (CONUS) 2023". Accessed November 20, 2024, https://www.mrlc.gov/data.

SCDNR. 2007a. "Fish Hatcheries." Accessed November 6, 2023, https://hatcheries.dnr.sc.gov/index.html.

SCDNR. 2007b. "Walhalla State Fish Hatchery." Accessed November 6, 2023, https://hatcheries.dnr.sc.gov/walhalla/index.html.

SCDNR. 2009. South Carolina State Water Assessment, Second Edition. Accessed August 15, 2023, https://hydrology.dnr.sc.gov/pdfs/assessment/SC_Water_Assessment_2.pdf.

SCDNR. 2023a. "Surface Water Resources of the Upper Savannah River Basin." Presented by Priyanka More to the Upper Savannah River Basin Council on October 11, 2023.

SCDNR. 2023b. "Groundwater Resources of the Upper Savannah River Basin." Presented by Joe Gellici to the Upper Savannah River Basin Council on November 8, 2023.

USACE. 2024. Hartwell Lake Draft Integrated Water Supply Storage Reallocation Report and Environmental Assessment and Finding of No Significant Effect South Carolina and Georgia. February 2024.

USFWS. 2011. "Robust Redhorse." Accessed November 6, 2023, https://fws.gov/species/robust-redhorse-moxostoma-robustum.

USGS. 2024. "National Water Information System: USGS Surface-Water Data for the Nation." Accessed September 19, 2024, https://waterdata.usgs.gov/nwis/sw.

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