EXECUTIVE SUMMARY

SANTEE RIVER BASIN PLAN 2025

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Cypress trees at Santee State Park

FOREWORD

The Santee 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, and the development of methodologies for projecting water demands for all water use sectors followed. An updated groundwater model of the Coastal Plain Aquifer System continues to be developed for future planning use. 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 concerted 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 consideration **"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 group to the South Carolina Department of Environmental Services (SCDES) called WaterSC, composed of stakeholders from many water interest categories, similar to the RBCs. WaterSC will review the work of the RBCs and serve in an advisory role to SCDES. SCDES is leading the development of the State Water Plan, incorporating advice from the newly formed WaterSC Water Resources Working Group, the RBCs, and the pre-existing Catawba Wateree Water Management Group, which fulfills the RBC obligations for the Catawba Basin.

Santee River

Acknowledgements

The Santee RBC consists of the following volunteer stakeholders representing six different water interest categories. These individuals spent nearly a year sharing their diverse perspectives and offering their expertise, culminating in the development of this River Basin Plan.

Name	Organization	Interest Category
Todd Biegger	Crowfield Golf Club	Agriculture, Forestry, and Irrigation
Allan Clum	Mount Pleasant Waterworks	Water and Sewer Authorities
Hixon Copp	Williamsburg County	Industry and Economic Development
Riley Egger*	Coastal Conservation League	Environmental
John Grego	Friends of Congaree Swamp	Environmental
W.E. Mickey Johnson, Jr.*	Four J Family Farms	Agriculture, Forestry, and Irrigation
Michael Melchers	Santee Cooper	Electric Power Utilities
Jeff Ruble*	Richland County	Industry and Economic Development
Brandon Stutts	Dominion Energy	Electric Power Utilities
Jason Thompson	Charleston Water System	Water and Sewer Authorities
David Wielicki	South Carolina Waterfowl Association	Environmental
Sarah Wiggins	State Farm	Agriculture, Forestry, and Irrigation
Alicia Wilson	Summerville Commissioners of Public Works	Water and Sewer Authorities
Mike Wooten	Bolton and Menk, Inc.	At-Large

** RBC member who participated during the process but was not an active member at the time this Plan was prepared.*

The Santee 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.

South Carolina Department of Natural Resources

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Dr. Amy Shaw
Camren Shea
Kirk Westphal

Lake Moultrie

What to Know About this Plan

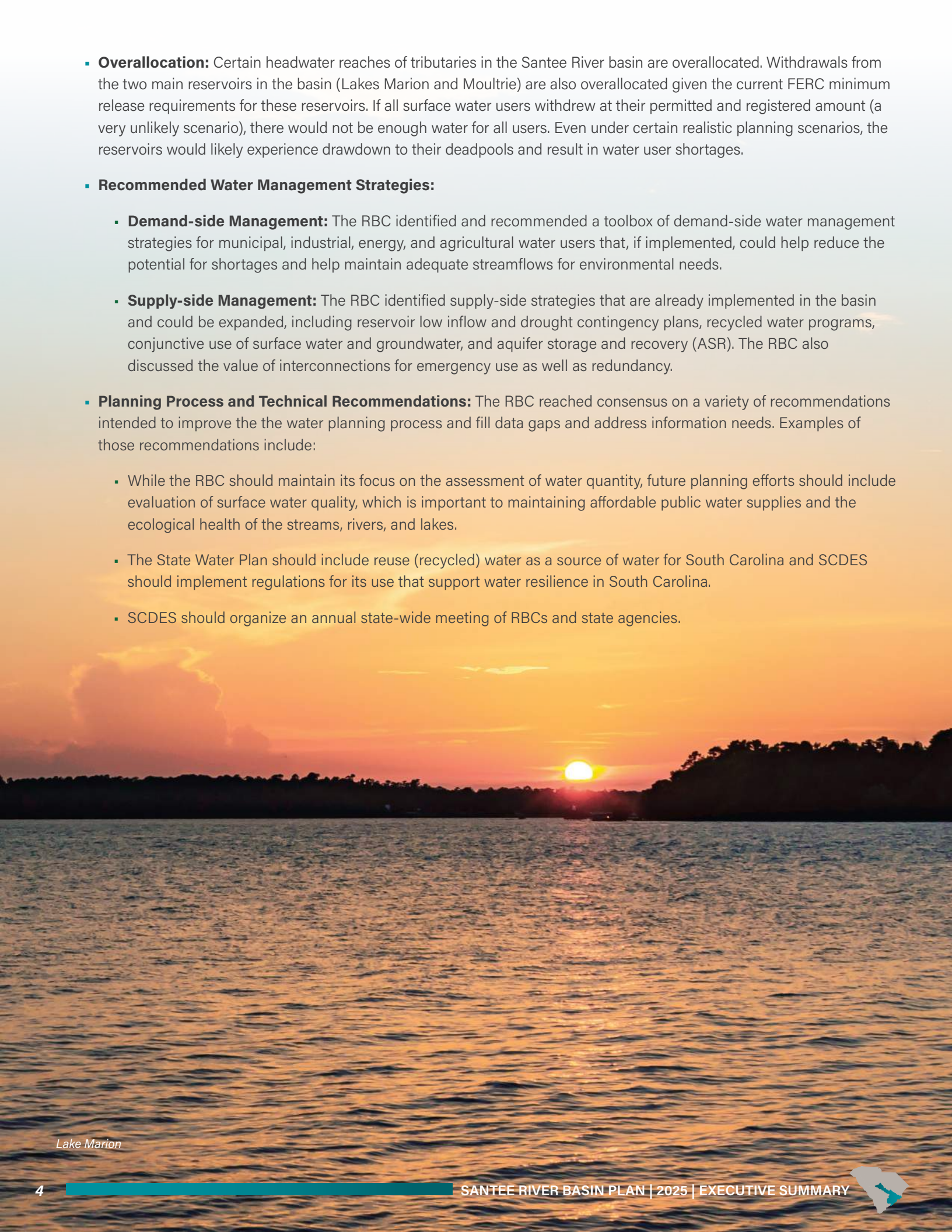
This plan is one of eight river basin plans to be developed for South Carolina. The Santee RBC, comprising stakeholders representing various water interests, collaborated with the South Carolina Department of Natural Resources (SCDNR) and SCDES, and met monthly for almost a year. They followed a carefully 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 Santee River basin, and to improve the balance between all water uses.

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

- **Current Water Use:** Surface water availability modeling utilizing current user-reported demands and hydrologic data from the 37-year period of record for the Santee Basin suggests a risk of water supply shortages during periods of severe drought. Brief potential shortages were identified when current demands were compared to surface water availability during the drought of record (2007 to 2008) for two public water suppliers, two golf courses, and to agricultural operations. Both public water suppliers and one of the golf courses experiencing shortages withdraw water from Lakes Marion and Moultrie. The lakes are governed by new, more demanding requirements for downstream flow releases in accordance with a renewed Federal Energy Regulatory Commission (FERC) license. The modeling approach for these flow releases is intentionally conservative, and fine-tuned management of the two lakes may resolve the modeled potential shortages for current demand conditions.

- **Growth Projection Impacts:** Simulation modeling projects water shortages for six water users (the same six at risk of shortages under current demands) assuming moderate economic growth assumptions through 2070. These water users all exhibit slightly greater shortages under high economic growth assumptions. Small impoundments and wetlands not included in the modeling may provide enough water to prevent projected shortages for the water users on tributary streams. Model sensitivity testing to release rules indicate that, even with fine-tuned management of Lakes Marion and Moultrie, water user shortages may occur under even moderate future demands for users withdrawing from the reservoirs.

- **Overallocation:** Certain headwater reaches of tributaries in the Santee River basin are overallocated. Withdrawals from the two main reservoirs in the basin (Lakes Marion and Moultrie) are also overallocated given the current FERC minimum release requirements for these reservoirs. If all surface water users withdrew at their permitted and registered amount (a very unlikely scenario), there would not be enough water for all users. Even under certain realistic planning scenarios, the reservoirs would likely experience drawdown to their deadpools and result in water user shortages.
- **Recommended Water Management Strategies:**
  - **Demand-side Management:** The RBC identified and recommended a toolbox of demand-side water management strategies for municipal, industrial, energy, and agricultural water users that, if implemented, could help reduce the potential for shortages and help maintain adequate streamflows for environmental needs.
  - **Supply-side Management:** The RBC identified supply-side strategies that are already implemented in the basin and could be expanded, including reservoir low inflow and drought contingency plans, recycled water programs, conjunctive use of surface water and groundwater, and aquifer storage and recovery (ASR). The RBC also discussed the value of interconnections for emergency use as well as redundancy.
- **Planning Process and Technical Recommendations:** The RBC reached consensus on a variety of recommendations intended to improve the the water planning process and fill data gaps and address information needs. Examples of those recommendations include:
  - 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.
  - The State Water Plan should include reuse (recycled) water as a source of water for South Carolina and SCDES should implement regulations for its use that support water resilience in South Carolina.
  - SCDES should organize an annual state-wide meeting of RBCs and state agencies.



Lake Marion

- **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 examples listed below. The full list of recommendations is included in Section ES-6.
    - 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.
    - Improve the current laws that allow for regulation of water use so that they are enforceable and effective.
    - Review periods for groundwater and surface water permit renewal should be re-evaluated to facilitate long-term planning efforts, support bond issuance, protect withdrawers' investment in infrastructure, and protect the biological, physical and chemical integrity of the source.
    - The South Carolina Legislature should approve and adopt the State Water Plan and subsequent updates.
    - The Surface Water Withdrawal, Permitting, Use and Reporting Act should be amended to require all surface water withdrawals (existing, new, and registrants) over 3,000,000 gallons a month to be subject to permit requirements and review.
    - The South Carolina Legislature should authorize recurring funding as requested by SCDES for annual, ongoing water planning activities, including river basin planning.
    - The South Carolina Legislature should establish a grant program to help support the implementation of the actions and strategies identified in each RBC's River Basin Plan.
    - A cost share program should be developed to drill and operate deeper wells into aquifer units with less development pressure.
    - The state should support statewide water education programs through existing agencies such as Cooperative Extensions, (etc.) that include all sectors of water use and promote the types of water management strategies recommended in River Basin Plans.
    - Water users should continue to identify partnerships and alternative sources including interconnections to build resilience and ensure adequate quantity of water.
    - The safe yield definition should be updated using median statistics (80% median rather than 80% mean or average) in recognition that median statistics more accurately characterize typical water availability in stream flows that are non-normally distributed.
    - All permits and registrations requesting volumes above safe yield (80% median) should be required to develop and submit to SCDES, realistic contingency and/or conservation capabilities and plans commensurate with their requested volume which will trigger at minimum instream flow.
    - State and local governments should continue to develop/review/update/adopt and enforce laws, regulations, policies, and/or ordinances that improve the management of stormwater runoff, encourage infiltration, minimize streambank erosion, reduce sedimentation, and protect water resources.

Santee River Delta

Introduction: Purpose and Utility of the Plan

This Santee River Basin Plan is one of eight plans that will be developed for the planning 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.

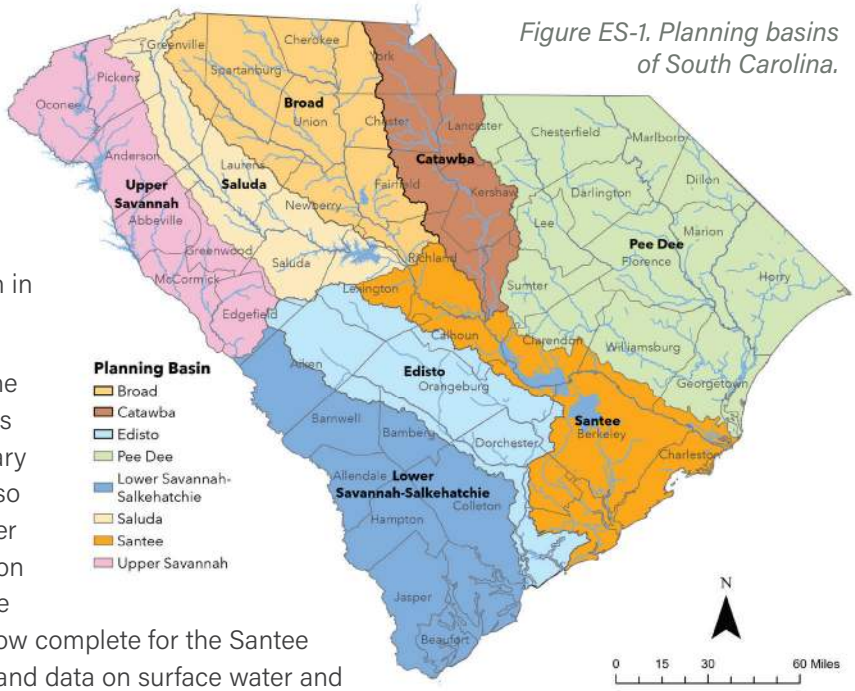


Figure ES-1. Planning basins of South Carolina.

In 2014, a five-step process was initiated to update 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 Santee 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 Santee River Basin Plan is the culmination of Step 4 of the process for the Santee River basin. The plan assesses water availability in the basin over a 50-year planning horizon and presents the recommendations of the Santee RBC—a diverse group of volunteer stakeholders representing six different water-interest categories.

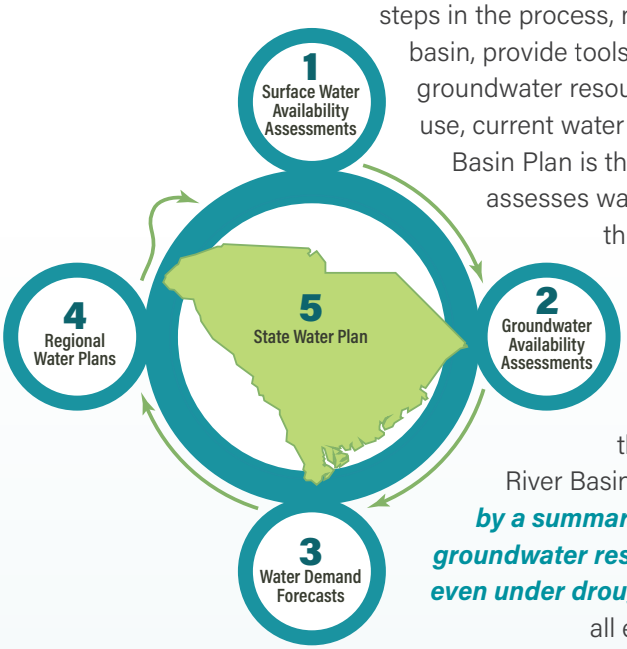


Figure ES-2. South Carolina's five-step process to update the State Water Plan.

Section ES-2 describes the planning process in more detail. As prescribed in the South Carolina State Water Planning Framework, the Santee 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.

Georgetown

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 could 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 help ensure the available supply meets or exceeds the projected demand throughout the planning horizon?

Each River Basin Plan focuses 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 do not currently 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.

RBC Meeting

Overview of the Planning Process

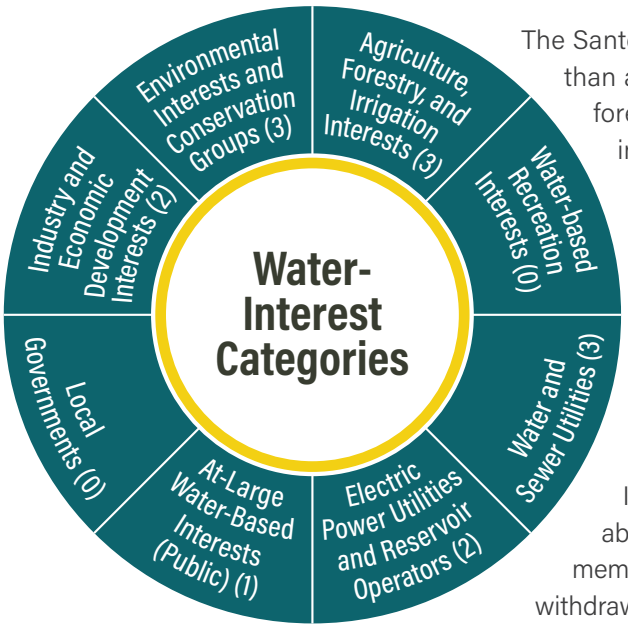


Figure ES-3. Water-interest categories represented in the RBC. Numbers in parentheses indicate RBC member representation.

The Santee River Basin Plan was formulated by the Santee RBC, a group of more than a dozen individual volunteer stakeholders representing agriculture and forestry, environmental interests, utilities (water, sewer, electric power), industry/economic development, and the basin at-large (Figure ES-3).

The Santee RBC met monthly for a year 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 one field trip within the basin. In March 2025, the RBC visited Jefferies Hydroelectric Facility to learn about the Santee Cooper project history and its operations, enabling the RBC members to better understand the water resources of the basin, how water is withdrawn and used to support hydroelectric supply needs, and its importance in energy production. This helped connect RBC members 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 planning process is divided into four phases, discussed below and in greater detail in the Planning Framework. Each phase spanned approximately 3 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 Santee River basin. The RBC also developed a vision statement and a set of supporting goals (see next page).

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 and groundwater 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 and analysis of groundwater conditions, trends, and projections.

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 Santee RBC developed the following vision statement and goals specifically for the Santee River basin.

VISION STATEMENT

A resilient and sustainably managed Santee River Basin that balances human and ecological needs now and in the future.

GOALS

1) Understand and evaluate existing history, hydrology, policies, and management of the basin.
2) Identify information and management gaps and develop new policy and water management strategy recommendations, as may be required, to ensure that water resources are maintained to support stakeholders' and ecological needs.
3) Evaluate current surface water and groundwater demands and project future water demands and needs.
4) Coordinate efforts and collaborate with the upstream and other impacted basins.
5) Enhance the stakeholders' understanding of regional water issues and the need for support of policies and behaviors to protect resources through public education and promotion.

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. An additional meeting was reserved for presentation of the draft plan and solicitation of verbal and written comments.

Overview of the Santee River Basin

The Santee River basin covers approximately 3,704 square miles in South Carolina. It is wholly contained within South Carolina, making up 12 percent of the state's total area. The Santee River basin extends approximately 110 miles from the confluence of the Saluda and Broad Rivers to the Atlantic Ocean. The upper half of the basin spans around 15 to 30 miles wide while the lower half widens to nearly 60 miles. The basin consists of significant portions of Berkeley, Charleston, Calhoun, Clarendon, Richland, Dorchester, and Lexington Counties. Small portions of Orangeburg, Sumter, Williamsburg, and Georgetown Counties are also present in the river basin. Six major subbasins divide the Santee River planning basin: the Congaree, Lake Marion, Santee, Cooper, Bulls Bay, and South Carolina Coastal subbasins, as shown in Figure ES-4. For planning purposes, the extent of the Santee River basin includes the Congaree River subbasin, which is typically considered to be part of the Saluda major river basin. The Santee planning basin receives discharge from the upstream Saluda, Broad, and Catawba planning basins, which were evaluated separately with their RBCs.

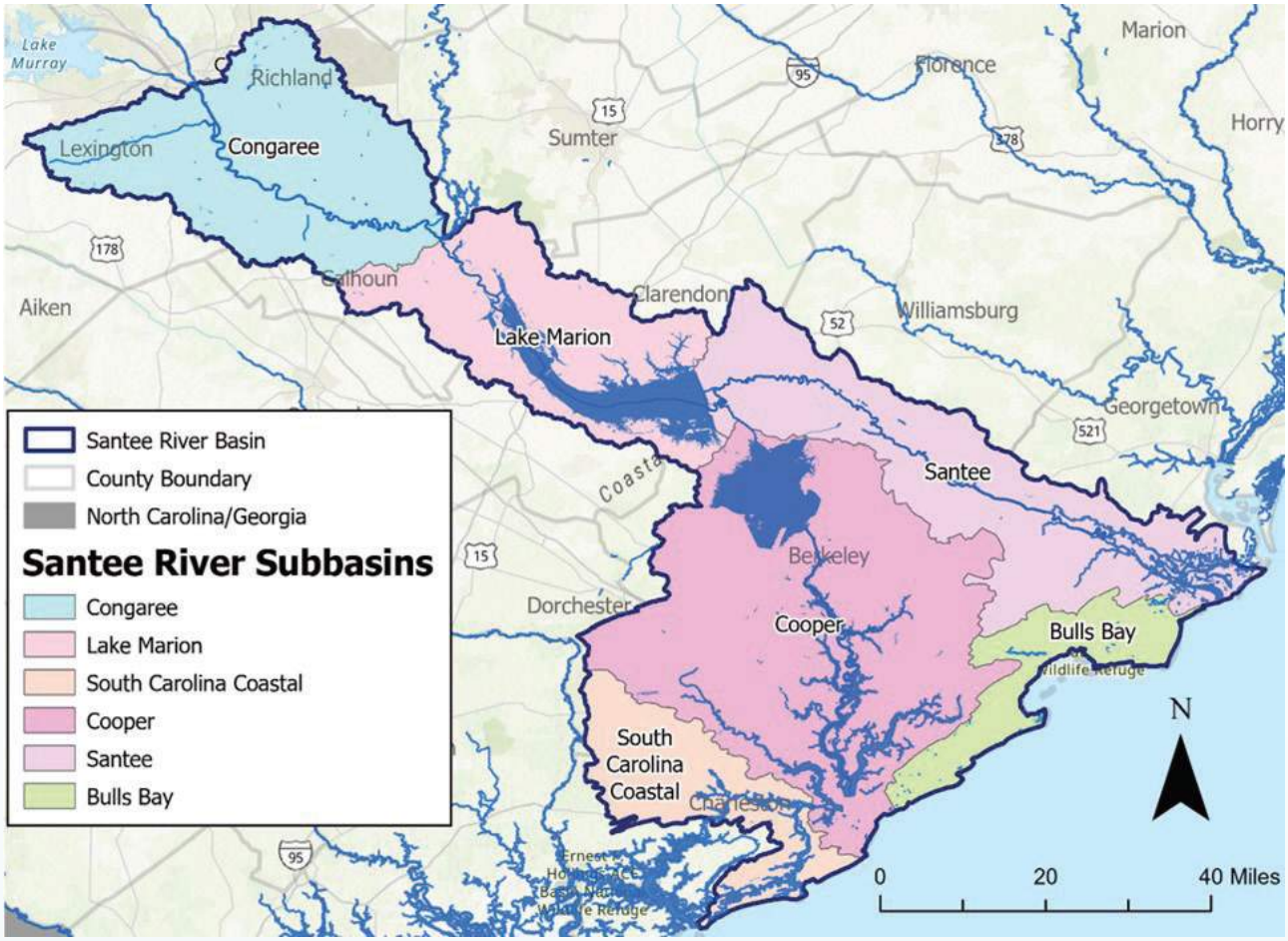


Figure ES-4. The subbasins within the Santee River basin in South Carolina.

Land use and land cover in the Santee River basin primarily consists of wetlands and forested areas, but there is also a significant amount of developed land. The basin contains a diverse mix of rural and urban areas. Outside of the urban areas around Columbia and Charleston, towns include Santee, Moncks Corner, and St. Stephen, but, overall, this area is more rural in nature. The basin also contains large tracts of protected land, such as the Francis Marion National Forest. Wetlands and woodlands are the dominant landcover types in the basin, as shown in Figure ES-5.

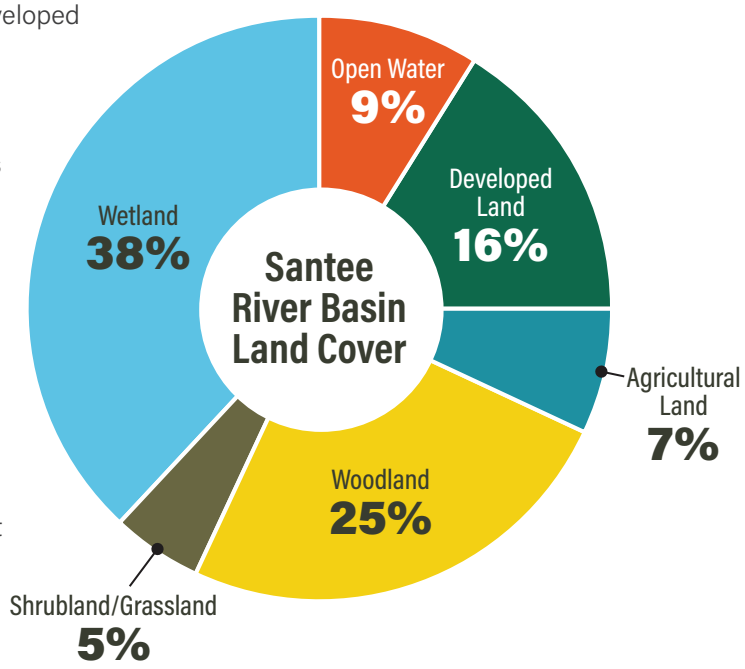


Figure ES-5. 2023 Santee River basin land cover (Multi-Resolution Land Characteristics Consortium [MRLC] 2024).

The annual average precipitation for the entire basin ranges from 45 to 54 inches (in.). Generally, the upper part of the basin receives less precipitation than the lower part. Precipitation varies throughout the year based on location. July is generally the wettest month for Columbia-USC in Richland County (averaging 5.76 in.) and Charleston International Airport in Charleston County (averaging 7.08 in.). The driest month at both locations is November (averaging 2.87 in. at Columbia-USC and 2.42 in. at Charleston International Airport).

Columbia-USC and Charleston International Airport only have one year in common (2004) in their respective top five driest years. However, both locations have experienced notable droughts in South Carolina, including those of the 1950s and early 2000s. The least amount of precipitation occurred in 2007 at Columbia-USC (approximately 32 in.) and in 1954 at Charleston International Airport (approximately 30 in.). Both 2015 (the fourth wettest year statewide) and 1964 (the wettest year on record statewide) are in the top five wettest years on record for both Columbia-USC and Charleston International Airport.

Santee River Delta in Georgetown

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 2007 and 1954 were the driest years on record at the Columbia-USC and Charleston International Airport weather stations, respectively, the stream gage on the Congaree River at Columbia experienced its lowest annual average flow in 2008 and stream gages on Gills Creek and Turkey Creek both experienced theirs in 2012. The Congaree River gage is located downstream of the controlled releases from Lake Murray, while the gages on Gills Creek and Turkey Creek are located on tributary streams and may exhibit more "naturalized" flow than the gages on the controlled mainstem, though the flow in Gills Creek is affected by urbanization within its watershed. The most recent years of drought conditions (defined by a Standard Precipitation Index of less than -1) were in 2019 and 2012 at the Columbia-USC and Charleston International Airport weather stations, respectively.

The Santee River basin encompasses a diverse array of aquatic habitats from freshwater rivers to coastal estuaries and supports a rich variety of fish and wildlife. In the basin, there are 91 native and 9 introduced species of fish (SCDNR 2025a). Popular sportfish include striped bass, largemouth bass, redbreast sunfish, bluegill, and crappie. The Dennis Wildlife Center located on Lake Moultrie was a pioneer in developing striped bass hatchery techniques now used across the country. The basin's most well-known sportfish are catfish, which attract fisherman across the southeast because of the size they can grow in the basin's reservoirs.

Additionally, the basin's rivers are an important habitat for diadromous fish, or those that migrate from freshwater to saltwater (catadromous) and from saltwater to freshwater (anadromous) for spawning. Anadromous fish include American shad, Atlantic and shortnose sturgeon, and blueback herring. Catadromous fish include American eel. Estuarine fish (those that live in the Santee River and Cooper River deltas) include red drum, southern flounder, spot, and multiple coastal sharks (SCDNR 2025b). The basin is home to an ongoing reintroduction program for robust redhorse. Once thought to be extinct, this fish species was rediscovered in Georgia in the 1980s. After years of restocking, recent evidence of wild reproduction indicates that robust redhorse may have successfully established themselves in the basin (SCDNR 2025a). Figure ES-6 shows some representative species within the Santee River basin.

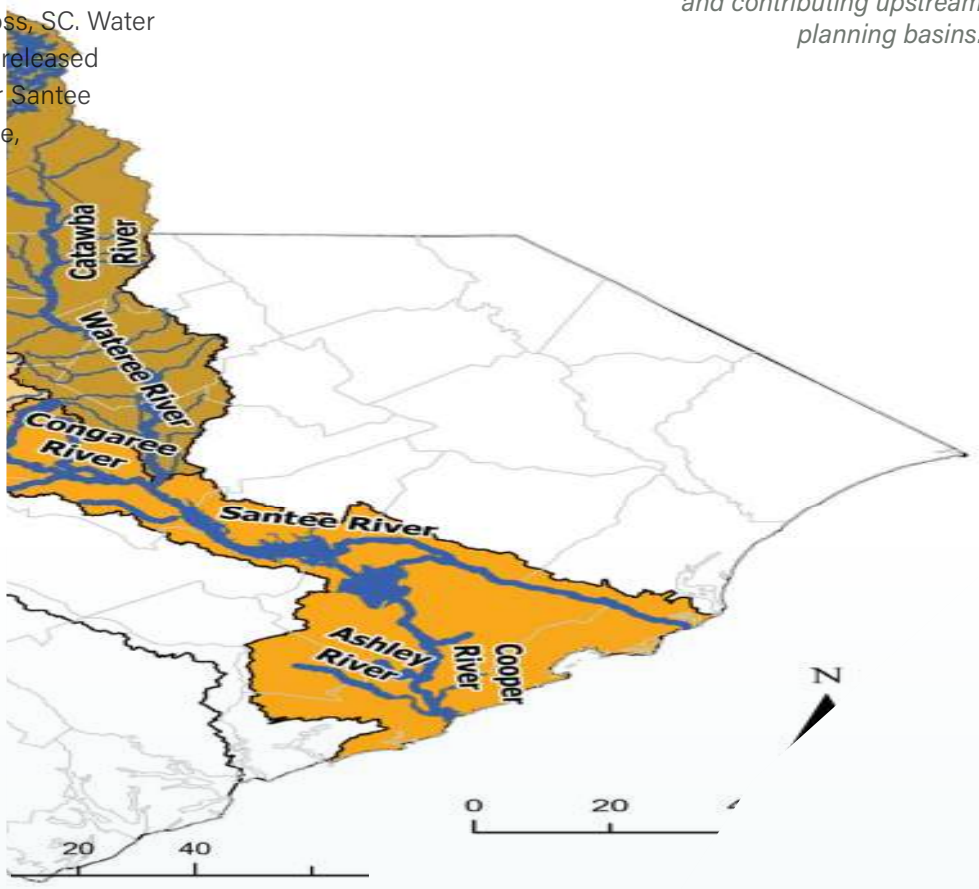
Figure ES-6. Representative aquatic species within the Santee River basin.

ES-4 Water Availability: Supply and Demand

SURFACE WATER SUMMARY

The Congaree, Santee, Cooper, and Ashley Rivers are the main watercourses of the Santee River basin in South Carolina. The river basin's headwaters, as defined for the purposes of this River Basin Plan, originate at the convergence of the Saluda and the Broad Rivers in the upper Coastal Plain. These rivers form the Congaree River near Columbia, SC. The Congaree is subsequently joined by the Wateree River near Ft. Motte, SC to create the Santee River just upstream of the headwaters of Lake Marion. Lake Marion and Lake Moultrie, collectively known as the Santee Cooper reservoirs, are the largest reservoirs in the basin, and they are hydraulically connected by a Diversion Canal that is located near Cross, SC. Water from the Santee Cooper system can be released directly from Lake Marion into the lower Santee River or can be diverted to Lake Moultrie, where it is released either into the Cooper River near Moncks Corner or can be passed through the US Army Corps of Engineers (USACE) St. Stephen Hydroelectric Station, which discharges back to the Santee River. From there, the Santee River flows along the northern part of the Santee River basin into the Atlantic Ocean near Cane Island. From the dam release toward the southern end of Lake Moultrie, the Cooper River is formed and flows towards Charleston, where water is discharged to the Atlantic Ocean. The Ashley River flows south/southeast in the southern portion of this basin, beginning in Dorchester County and discharging to Charleston Harbor. The Santee River splits into the North Santee River and the South Santee River about ten miles from its mouth. Tributaries of the Ashley River include Eagle Creek, Coosaw Creek, Caton Creek, Black Creek, Partridge Creek, and Captains Creek; tributaries of the Cooper River include Mepkin Creek, Chicken Creek, and Bullhead Run.

Figure ES-7. Santee River and contributing upstream planning basins.



The Santee River basin has experienced surface water development primarily for hydroelectric power production, municipal water supply provision, and recreation. Additionally, numerous navigation and flood-control projects have been constructed in and around the port of Charleston. The largest lakes in the basin are Lake Marion (surface area of 110,600 acres) and Lake Moultrie (surface area of 60,400 acres) (SCDNR 2009). The Santee Dam, which impounds Lake Marion, is located about seventeen miles south of Manning and was initially constructed in 1941 for hydroelectric power production. The lake also supports flood-control efforts, and now also serves recreation and water supply purposes. The Jefferies Hydroelectric Station is located at the outlet of Lake Moultrie into the Cooper River. Much of the release from Lake Moultrie is returned to the Santee River through the Rediversion Canal. The St. Stephen project is located along the Rediversion Canal and consists of a hydroelectric power station and a fish lift (built by the USACE and operated by SCDNR) that allows for inland migration of anadromous shad, bass, and sturgeon from the Santee River into Lake Moultrie. Lakes Marion and Moultrie are required to release a certain amount of water into the Santee and Cooper Rivers per their FERC license. The FERC license was recently updated in 2023 with new, significantly increased seasonal minimum target releases, including a 5,600 cubic feet per second (cfs) release target from Lake Moultrie into the Santee River to support fish passage at the St. Stephen Hydroelectric Station, and a 4,500 cfs release from Lake Moultrie to the Cooper River, and increased seasonal minimum flows at the Santee Dam of 1,200 cfs and 2,400 cfs in support of aquatic habitat improvement and associated ecological objectives in the lower Santee River. Two other reservoirs in the basin are owned by the Commissioners of Public Works (d.b.a. Charleston Water System): the Bushy Park (or Back River) Reservoir and Goose Creek Reservoir. Bushy Park Reservoir is fed primarily from the Cooper River, while Goose Creek Reservoir is fed by Goose Creek. The Columbia Canal takes water from the Broad River and discharges it to the Congaree River, and is also used as municipal water supply for the City of Columbia (SCDNR 2009).

Additionally, 205 regulated dams and numerous unregulated small dams create small impoundments on the tributaries in the Santee River basin. Most of the regulated dams, particularly those designated as High Hazard dams, are in the upper reaches of the planning basin.

Comprehensive streamflow monitoring is critical to understanding surface water availability and supporting sustainable management of surface water resources. At the end of the 2024 water year (September 30, 2024), there were 43 active gaging stations operated by the United States Geological Survey (USGS) in the Santee River basin in South Carolina that report daily streamflow, stage, or lake elevation data. An additional 16 gaging stations are no longer active but previously collected daily streamflow data. Twelve of the active gaging stations report mean daily discharge (flow) data.

Jefferies Hydroelectric Station

Supported by data from the active and inactive gaging stations, the Simplified Water Allocation Model (SWAM), pictured in Figure ES-8, simulates the surface water stream network of the Santee River planning basin (CDM Smith 2017). 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.

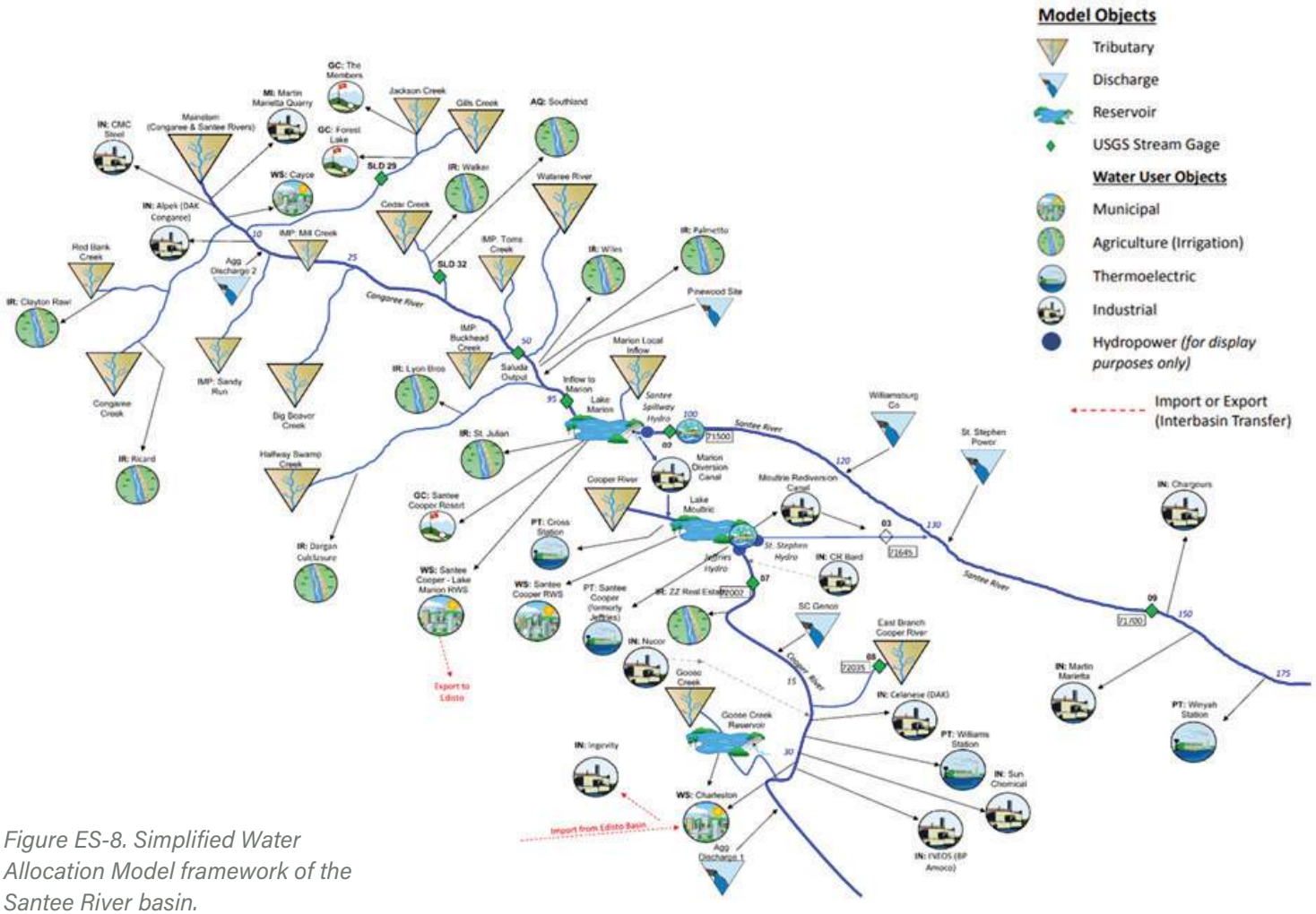


Figure ES-8. Simplified Water Allocation Model framework of the Santee River basin.

The Georgetown lighthouse on North Island at the end of Winyah bay near Georgetown

GROUNDWATER SUMMARY

The Santee 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 (Figure ES-9). Aquifers in the Coastal Plain are composed of permeable sand or limestone units.

The lowermost aquifers in the basin are the Gramling and Charleston aquifers. While there are very few wells in the basin in the Gramling aquifer (primarily because of its depth), the Charleston aquifer is used for public water supply, industry, and golf course irrigation. The overlying McQueen Branch aquifer reaches a depth of almost 1,440 feet in southern Dorchester County and has a maximum thickness of about 300 feet in Orangeburg County. McQueen Branch wells in the central part of the basin can produce more than 2,000 gallons per minute (gpm) (SCDNR 2009). In the middle to lower portion of the basin, beginning in southern Orangeburg County, the sands of the McQueen Branch aquifer become very fine and yield so little water that the unit is no longer defined as a viable aquifer in this area.

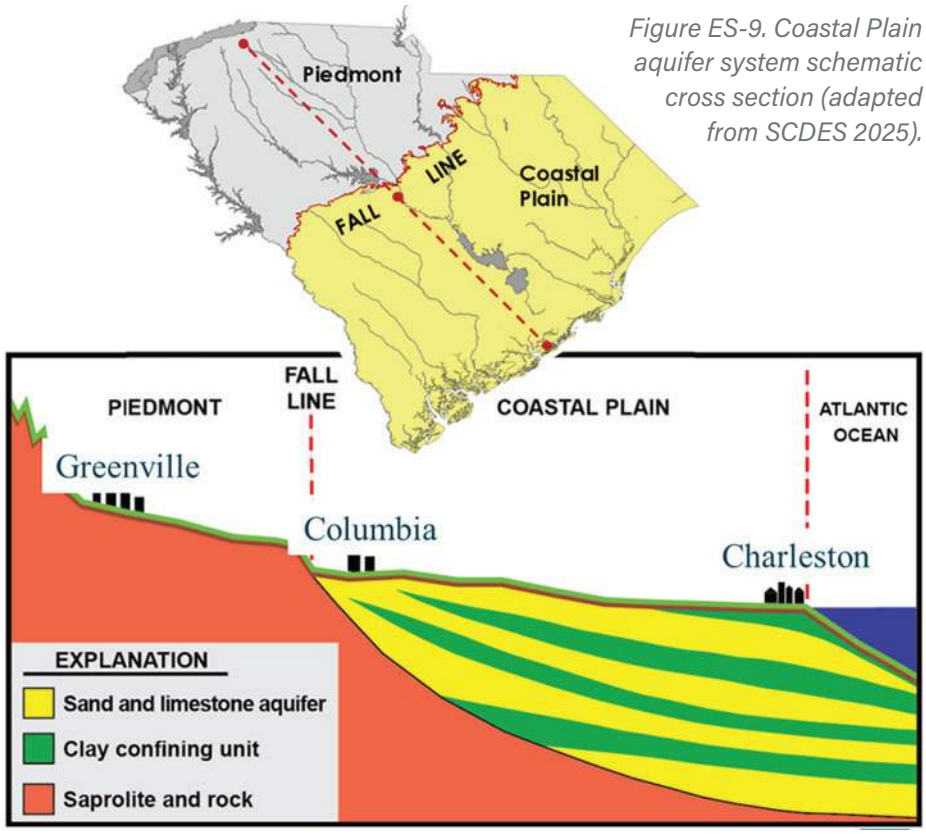


Figure ES-9. Coastal Plain aquifer system schematic cross section (adapted from SCDES 2025).

Overlying the McQueen Branch aquifer are the Crouch Branch, Gordon, and surficial aquifers. The Crouch Branch aquifer is an important source of water for agriculture, public supply, and industry in the upper and middle portions of the basin. Crouch Branch wells are common in Lexington, Calhoun, Clarendon, and Orangeburg Counties, where the yields can exceed 1,000 gpm (SCDNR 2009). The top of the Gordon aquifer occurs near land surface in Calhoun County and slopes down to a depth of 670 feet in southern Charleston County. Gordon aquifer well yields are typically less than 600 gpm (SCDNR 2009); these wells are common in the coastal counties due the relatively shallow depth, and higher yields from having two water bearing zones (Santee Limestone and Black Mingo) when compared to the surficial aquifer. There are many private Gordon aquifer wells used for domestic and light commercial use that do not meet the volume requirements for reporting water use.

The surficial aquifer is shallow, unconfined, and hydraulically connected to surface water, and is often referred to as the water table aquifer. 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 generally yield less than 75 gpm and are typically used for domestic and light commercial purposes (SCDNR 2009). Ponds that are hydraulically connected to the surficial aquifer may also be used as water supply for golf courses or agricultural irrigation.

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. The basin includes parts of five CUAs. The lower portion of the basin is within the Trident CUA, and middle and upper portions of the basin include portions of the Western and Santee-Lynches CUAs. The Santee basin also includes small portions of the Waccamaw and Pee Dee CUAs. Within the Trident

CUA, groundwater level declines of up to 200 feet have been observed in the Charleston aquifer. While significant rebounds have occurred in recent years, maintaining current water levels to prevent saltwater from entering the freshwater zones of the aquifer is a priority. In the Western CUA, significant withdrawals from the Crouch Branch and McQueen Branch aquifers have lowered the groundwater levels by 50 to 75 feet in the basin. Within the Santee-Lynches CUA, seasonal water level declines associated with agricultural irrigation have been observed in the Crouch Branch and McQueen Branch aquifers. These declines typically rebound each year, but long-term aquifer demand has caused a lowering of water levels by about 50 feet in western Clarendon County.

Water level declines have been observed in all aquifers since predevelopment, but the current declines in much of the basin do not appear to pose risks to the resource. The most significant declines have occurred in the coastal region in the Charleston aquifer centered near Mount Pleasant, in Charleston County. This cone of depression is well documented and is the is the cumulative result of historical groundwater use in the coastal areas of the lower basin. In recent years, due to reduced pumping and more reliance on surface water, the center of the cone has rebounded by 20 feet or more. The legacy effects of pumping have created a potentiometric low across much of Charleston and Berkeley Counties in the Charleston aquifer.

There are potential concerns of seasonal groundwater availability in the Crouch Branch and McQueen Branch aquifers near the middle of the basin. Farms and small public water systems dependent on groundwater supply in Orangeburg and Calhoun Counties aquifers are susceptible to seasonal drawdowns during the summer months.

Water levels in the Gordon aquifer have declined by more than 50 feet since predevelopment. While this aquifer is not used as frequently for large groundwater withdrawals, it is still an important resource for domestic and commercial needs. Relict seawater that naturally exists at the base of the aquifer at the coast, has encroached landward due to groundwater development.

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. USGS is currently developing a regional groundwater flow model to estimate future groundwater conditions resulting from various water use scenarios and to quantify the impacts of proposed groundwater management recommendations.

Lake Marion

WATER DEMAND SUMMARY

Figures ES-10 through ES-12 summarize the current and projected water demands in the Santee River basin. Total current water use in the planning basin is approximately 547 million gallons per day (MGD). Approximately 30 MGD of this total demand is withdrawn from groundwater, with the rest coming from surface water. Current withdrawals are dominated by thermoelectric water use, which represents 68.2 percent of the basin's total withdrawal; however, only 26 percent of water withdrawn for thermoelectric use is used consumptively with the remaining 74 percent being returned to streams and rivers downstream. Public supply is the second largest use category with 15.2 percent of total basin withdrawals. The next largest use categories are manufacturing (13.1 percent) and agriculture (2.7 percent). Minimal withdrawals are from golf course irrigation, mining, aquaculture, and other user categories with less than 1 percent of the total use.

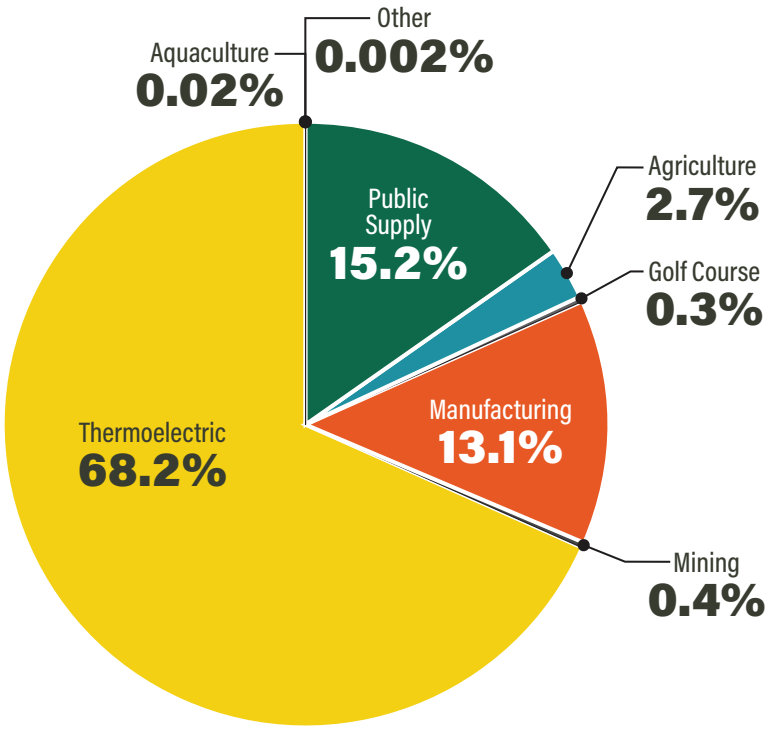


Figure ES-10. Current total water use category percentages of total demand for the Santee River basin.

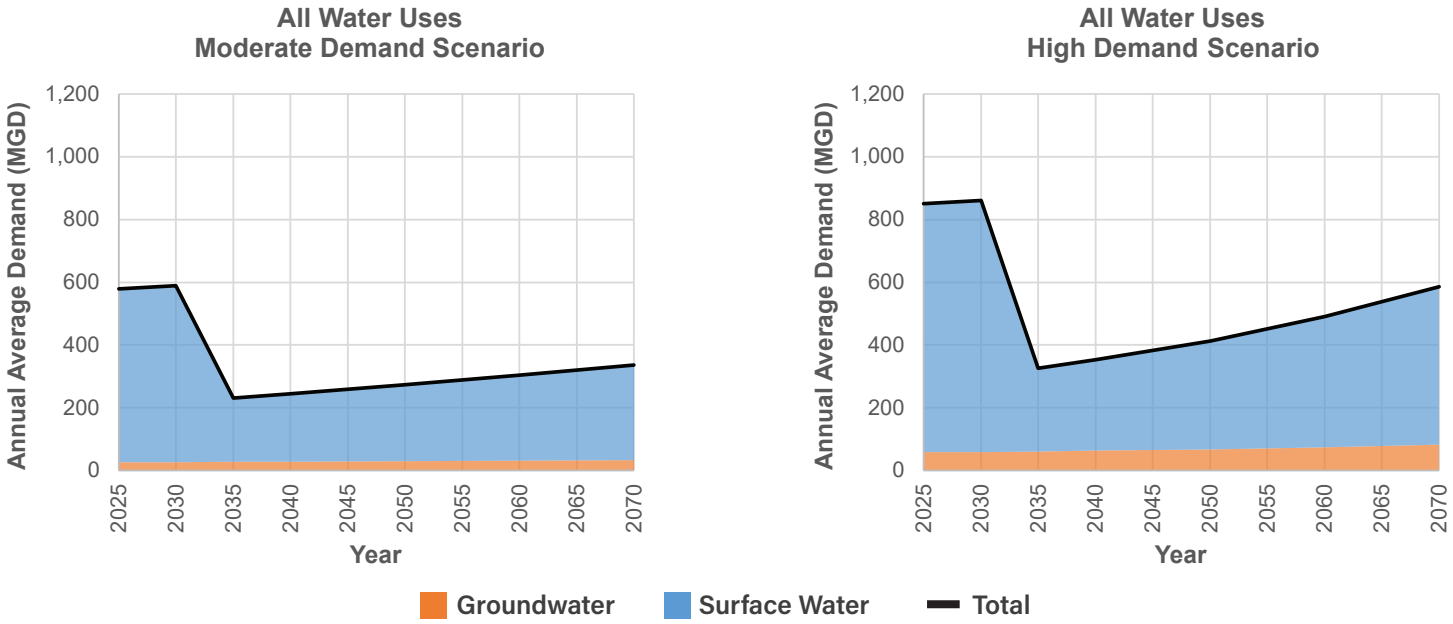
Of the 517 MGD of total basin surface water withdrawal, an estimated 24 percent (126 MGD) of the water is consumptively used and 76 percent (391 MGD) is returned to streams and rivers after use. Consumptive use was not calculated for groundwater users. Just over half of groundwater withdrawals are for agriculture and golf course irrigation and are assumed to consumptively use all of the groundwater withdrawn.

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. There is a projected reduction in future total withdrawals driven by the anticipated closure of thermoelectric facilities. From 2025 to 2070, total water demand in the Santee River basin is projected to decrease by 41 percent (from 579 MGD to 339 MGD) for the Moderate Demand Scenario and decrease by 30 percent (from 851 MGD to 596 MGD) for the High Demand Scenario. Excluding thermoelectric demands, demands for the remaining use categories are projected to increase 78 percent from 175 MGD to 313 MGD in the Moderate Demand Scenario and by 125 percent from 252 MGD to 566 MGD in 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 over the previous 10 years. This difference can be substantial in cases of users which have substantially different use throughout the year.

Approximately half of the water demand growth in the Santee River basin is expected to come from increasing demand for public water supply, as shown in Figure ES-12. Between 2025 and 2070, public supply demands are projected to increase 75 percent for the Moderate Demand Scenario and increase 135 percent for the High Demand Scenario. Approximately 90 percent of the public supply demand will be met by surface water for both the High Demand and Moderate Demand Scenarios. Manufacturing demands are projected to increase 94 percent between 2025 and 2070 in the Moderate Demand Scenario. In the High Demand Scenario, manufacturing demands are projected to increase 152 percent between 2025 and 2070. Agriculture demands are projected to increase 34 and 39 percent for the Moderate and High Demand Scenarios, respectively. Nearly all agriculture

demands are projected to be met with groundwater. Thermoelectric demands are projected to decrease 93 percent between 2025 and 2070 in the Moderate Demand Scenario and to decrease 95 percent between 2025 and 2070 in the High Demand Scenario. Winyah Station is projected to be decommissioned by 2030, and Williams Station is projected to be decommissioned by 2035, leaving only Cross Station with projected demands in 2070. Golf course, mining, and aquaculture demands were held constant across the planning horizon.

Projected water demands in the Santee River basin are well below the total permitted and registered surface and groundwater amount of 1,750.2 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, most of which is returned downstream. The significant decrease in surface water demand is due to anticipated closures of thermoelectric facilities.

Figure ES-11. Santee River basin water demand projections by water source.

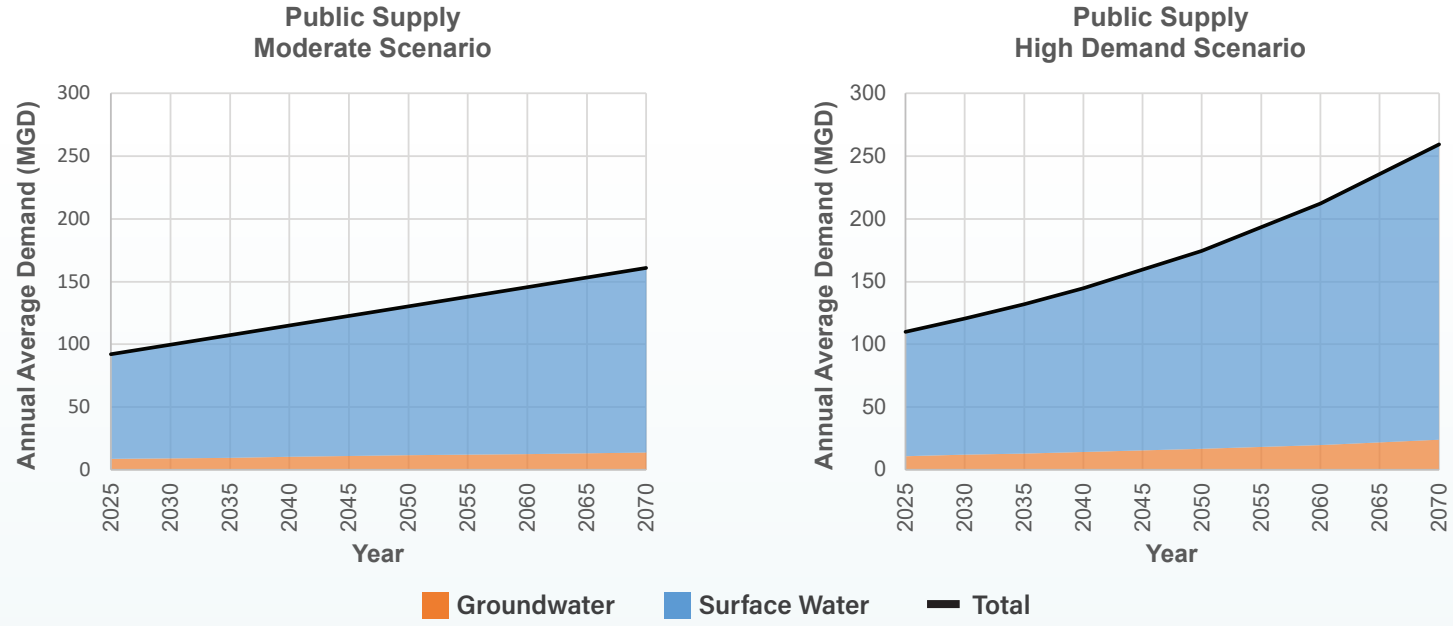
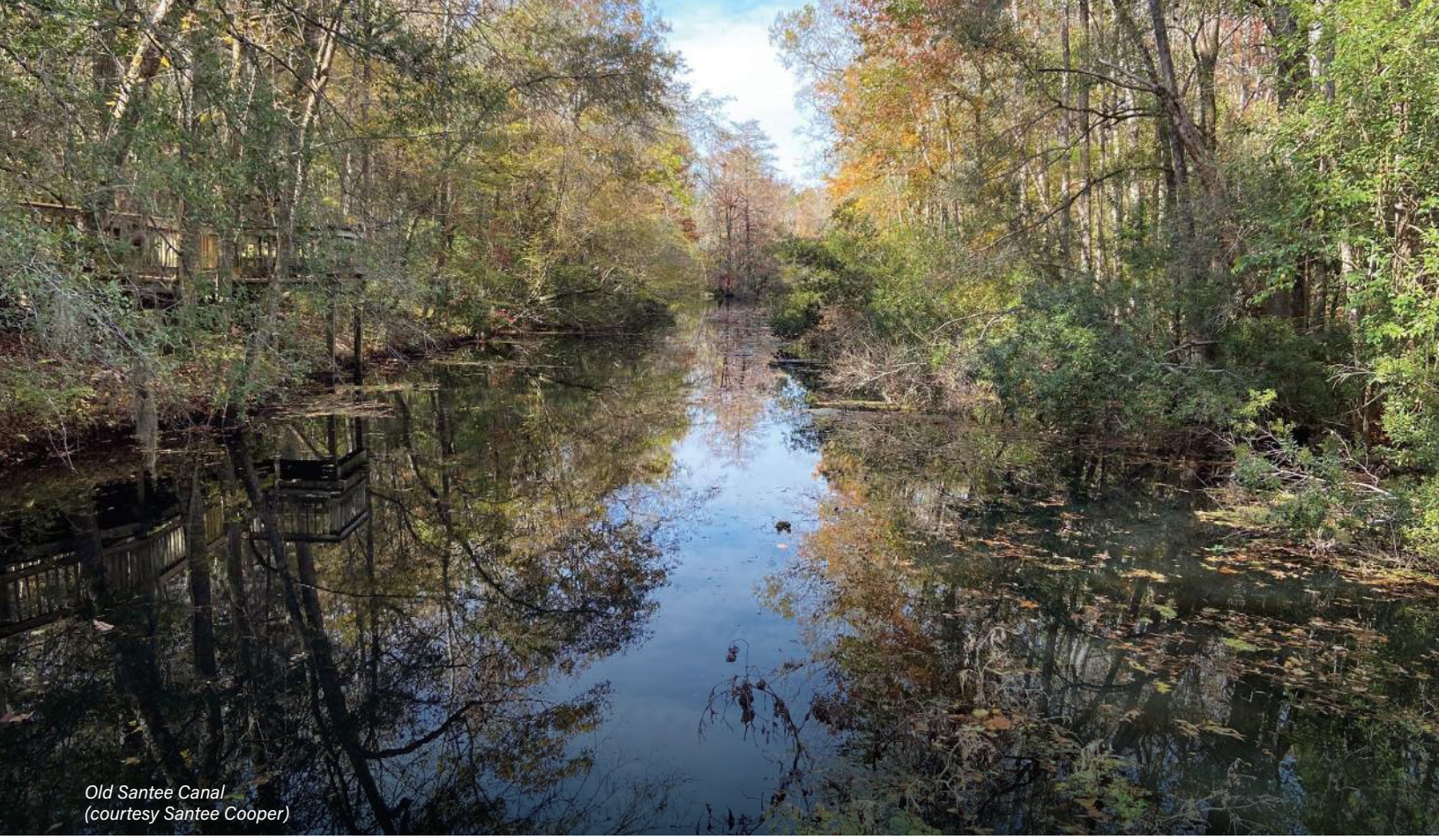


Figure ES-12. Santee River basin projected public supply water demands.



Old Santee Canal
(courtesy Santee Cooper)

WATER AVAILABILITY SUMMARY

The results of surface water 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 Santee 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 Planning 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 37-year period of available records from 1982 through 2019. The following scenarios were evaluated in this analysis:

- **Current Use 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.

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

- **Current Use Scenario.** Surface water availability modeling suggests a risk of brief, potential water supply shortages under the Current Use Scenario, specifically when current demands are superimposed over the hydrologic conditions that existed during the 2007 to 2008 drought. Shortages were identified for two public water suppliers, two golf courses, and two agricultural operations. Both public water suppliers and one of the golf courses experiencing shortages withdraw water from Lakes Marion and Moultrie, both of which are governed by new, more demanding requirements for downstream flow releases in accordance with a renewed FERC license. The modeling approach for these flow releases is intentionally conservative, and fine-tuned management of the two lakes may resolve shortages for current demand conditions. Small impoundments and wetlands not included in the modeling may provide enough water to prevent projected shortages for the remaining water users.
- **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 through the 2070 planning horizon, resulting from moderate economic and population growth. Based on 2070 demands, the same six water users that are experiencing a shortage in the Current scenario experience a shortage in the Moderate Scenario. The magnitude and frequency of shortage for these water users is about the same as the Current Use Scenario for all but one water user. Model sensitivity testing to release rules indicate that, even with fine-tuned management of Lakes Marion and Moultrie, water user shortages will occur under moderate future demands for users withdrawing from the lakes. River flows are predicted to decrease slightly or stay relatively consistent, depending on location, compared to the Current Use Scenario. Low flows downstream of Lakes Marion and Moultrie increase due to the release rules of the lakes. At the most downstream location assessed along the mainstem, median flows are predicted to decrease by approximately 7 percent based on 2070 demands.
- **High Demand Scenario.** The same six water users with shortages in the Moderate Demand Scenario exhibit slightly greater shortages under the High Demand Scenario. River flows are predicted to decrease moderately to substantially compared to the Current Use Scenario throughout the basin. Median flow at the most downstream site assessed on the Santee River Mainstem is predicted to decrease by approximately 19 percent, based on 2070 demands.
- **P&R Scenario.** Results of this hypothetical and unlikely scenario, which include projected shortages for two public water suppliers, two golf courses, three agricultural operations, and one thermoelectric power plant, demonstrate that the surface water resources of the basin are overallocated in certain places based on existing permits and registrations. At the most downstream location assessed along the mainstem, median flows are predicted to decrease by approximately 48 percent, and low flows by about 36 percent.

Results and conclusions are based on modeling that assumed historical climate patterns from the past 37 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. This analysis also indicates that the newly-imposed FERC requirements for downstream flow releases from Lakes Marion and Moultrie may be challenging to satisfy under all conditions.

Lake Marion
(courtesy Santee Cooper)

Groundwater conditions in the Santee River basin were evaluated based on available groundwater monitoring data, potentiometric aquifer surface contours, current groundwater demand, current and historical groundwater usage, and estimates of future water demand. Water levels are relatively stable basin-wide across all aquifers in response to groundwater development, and for a majority of the basin, especially in the upper portion, declines in aquifer levels from predevelopment have been minimal. The greatest concern in the Santee River basin exists in the Charleston aquifer, which has historically been affected by a large cone of depression. The aquifers underlying the basin can transmit 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 only an informed estimate and it is difficult to predict if groundwater supply shortages will exist under reasonable future demand scenarios.

Specific observations and conclusions relative to the groundwater assessment include:

- Although the Crouch Branch and McQueen Branch aquifers have experienced declines of up to 100 feet from predevelopment levels in the upper part of the basin because of consistent and continued use for agriculture and water supply, recharge to both aquifers is generally adequate. It is likely that no groundwater supply shortages will occur under projected use scenarios in the upper basin.
- Agricultural irrigation is the largest groundwater use in the basin and is concentrated in the upper to middle basin in Calhoun, Clarendon, Orangeburg, Richland, and Sumter Counties. Irrigation in this area is projected to continue to 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.
- Public water supply demand is expected to increase in Berkeley, Charleston, Dorchester, Lexington, and Richland Counties over the next several decades. While most large public suppliers already use both groundwater and surface water, additional supply-side and demand-side groundwater management strategies, such as aquifer storage and recovery or the use of underutilized or deeper aquifers, should be explored to meet the growing demand.
- 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.

Bushy Park Reservoir (photo courtesy Charleston Water System)

This water availability analysis answered three of the four questions posed in section ES-1 of this Executive Summary:

1. **What is the basin's current available supply and demand?** Current demands are approximately 547 MGD from the Santee River basin (95 percent from surface water and 5 percent from groundwater). While the available supply varies by location and time, surface water modeling suggests a risk of water supply shortages under severe and/or extended droughts under current demands, including two public water suppliers with withdrawals from Lakes Marion and Moultrie. A calibrated groundwater model was not available at the time of this analysis. However, the stability of groundwater levels generally suggests sufficient supply to meet current demands. The greatest concern in the Santee River basin exists in the Charleston aquifer, which has historically been affected by a large cone of depression centered near Mount Pleasant.

2. **What are the current permitted and registered water uses with the basin?** In the Santee River basin, 1,750 MGD is currently permitted or registered for the following uses: thermoelectric (57 percent of total), public supply (22 percent), manufacturing (18 percent), agriculture (2 percent), golf course (<1 percent), mining (<1 percent), and aquaculture (<1 percent).

3. **What could be water demand in the basin throughout the planning horizon, and will the available water supply be adequate to meet that demand?** Demands for water for the High Demand Scenario, which assumes hot and dry conditions (high irrigation) and high population and economic growth, are projected to decrease to 596 MGD by 2070 in the Santee River basin. This reduction in total withdrawals is driven by the closure of thermoelectric facilities. Excluding thermoelectric demands, demands for the remaining use categories are projected to increase by 125 percent in the High Demand Scenario. Surface water modeling indicates a greater risk of shortages under severe and/or extended droughts in the High Demand Scenario for the same water users at risk of shortages currently. Without a groundwater model it is difficult to predict the capacity of the basin's aquifers and whether there is sufficient supply to meet future demand. The RBC recommends the groundwater availability analysis and Plan be updated when a calibrated groundwater model is available.

The answer to question 4, **what water management strategies will be used in the basin to help ensure the available supply meets or exceeds the projected demand throughout the planning horizon**, is included in ES-6.

Lake Marion Dam and Santee River

Water Management Strategies Evaluated

The Planning Framework identifies a two-step process to evaluate water management strategies. As a first step, proposed management strategies may be 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.

The RBC identified and discussed a portfolio of demand-side strategies consisting of municipal water conservation and efficiency practices and irrigation (agricultural and golf courses) water efficiency practices. While the demand-side strategies were identified for surface water withdrawers, they also apply to the basin's groundwater withdrawers. Some examples of the municipal demand-side strategies considered include incentives and requirements for low flow fixtures and appliances, conservation-based water rate pricing structures, public education of water conservation, landscape irrigation programs and codes, and water efficiency standards for new construction. For agriculture and/or golf course irrigation, strategies considered include irrigation equipment changes, water audits and nozzle retrofits, and the use of wetting agents on turf grasses. The RBC additionally outlined water conservation approaches for manufacturing (industrial) and energy water users; several of these approaches (such as water recycling programs and education about water conservation) overlap those identified for municipal users.

The RBC also discussed several strategies that increase the amount of surface water available for withdrawal (supply-side strategies). Existing supply-side strategies, such as conjunctive use of both surface water and groundwater, interbasin transfers, ASR, and use of small impoundments to provide storage during low flow periods are already effectively used in the Santee River basin. The projected shortages in the basin are driven by the downstream flow requirements into the Santee and Cooper Rivers imposed by FERC licensing. Santee Cooper's Low Inflow & Drought Contingency Plan for Lake Marion and Lake Moultrie does provide for reductions in releases into the Santee River during periods of low inflow. Other contingency plans include adding temporary intakes and pumping at the Santee Cooper Regional Water Systems if reservoir elevations drop below existing intakes. There may also be opportunities to negotiate appropriate balances between water supply and instream flow during drought emergencies. These were not simulated or evaluated by the RBC, but discussed as potential supply-side mitigation strategies.

The effectiveness of surface water management strategies in the Santee River basin was evaluated using the SWAM surface water model. This analysis focused on the impact of demand-side strategies on projected shortages and water availability in the High Demand Scenario. Technical analysis consisted of creating scenarios (using a monthly timestep) that evaluated the aggregated impact of municipal, industrial, and agricultural (including golf courses) demand-side management strategies. The municipal and industrial demand-side strategies were evaluated as a portfolio of strategies by assuming a decrease in projected municipal and industrial water demands resulting from implementing one or more strategies from the toolbox, such as water audits, low-flow appliances, public and employee education, conservation pricing structures, and water loss control programs. For irrigators, the same methodology was used to evaluate the impact of incremental reductions in overall water demands resulting from a combination of irrigation water efficiency techniques. Results indicate that for most of the water users with projected shortages in the High Demand Scenario, implementing demand-side management strategies alone may not be enough to eliminate the simulated shortages, but may be successful in reducing the frequency and magnitude such shortages.

Lake Moultrie

Recommendations

RECOMMENDED WATER MANAGEMENT STRATEGIES

The RBC's water management strategy recommendations align with their vision and goal statements developed for the Santee 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: "**A resilient and sustainably managed Santee River Basin that balances human and ecological needs now and in the future.**" The recommended strategies support the RBC's goal to **identify information and management gaps and develop new policy and water management strategy recommendations, as may be required, to ensure that water resources are maintained to support stakeholders' and ecological needs**.

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 reservoir low inflow and drought contingency plans; recycled water programs; conjunctive use of surface water and groundwater; 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 alternative 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 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.

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, agricultural, and industrial/energy sector demand-side water management strategies. The RBC did not prioritize these recommendations, as they recognized that their applicability varies between users. Recommended strategies are summarized in Table ES-1:

Table ES-1. Recommended demand-side water management strategies.

Municipal Conservation and Efficiency Practices	Agricultural Conservation and Efficiency Practices	Industrial Conservation and Efficiency Practices
Public Education of Water Conservation	Water Audits and Nozzle Retrofits	Water Audits
Conservation Pricing Structures/Drought Surcharge	Irrigation Scheduling	Rebates on Energy-Efficient Appliances
Leak Detection and Water Loss Control Programs including Advanced Metering Infrastructure (AMI) and Automatic Meter Reading (AMR)	Moisture Sensors/Smart Irrigation Systems	Water Recycling
Landscape Irrigation Program and Codes/Time-of-Day Watering Limit	Soil Management and Cover Cropping	Water-Saving Equipment and Efficient Water Systems
Recycled Water Programs and Promotion of Water Recycling to Customers	Crop Variety, Crop Type, and Crop Conversion	Water-Saving Fixtures and Toilets
Residential Water Use Review	Irrigation Equipment Changes	Educating Employees about Water Conservation
	Future Technologies (precision agriculture)	
	Wetting Agents (golf courses)	

Mount Pleasant Waterworks Reverse Osmosis Facility (courtesy Mount Pleasant Waterworks)

Adaptive Management: 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:

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

DROUGHT RESPONSE RECOMMENDATIONS

Ongoing drought management in South Carolina occurs at the state, regional, and local levels. At the state level, SCDNR/SCDES 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 SCDES, SCDNR, and the State Climatology Office (SCO), 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 Santee River basin is split between the Central DMA (shared with the Pee Dee, Catawba, Broad, Saluda, Upper Savannah, and Edisto planning basins) and the Southern DMA (shared with the Edisto and Lower Savannah-Salkehatchie planning basins).

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:

- 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.
- The RBC recommends that water utilities coordinate, to the extent practical, their drought response messaging.
- The RBC encourages water utilities in the basin to consider drought surcharges on water use during severe and/or extreme drought phases.
- The RBC encourages water users and those with water interests to submit drought impact observations through the Condition Monitoring Observer Reports (CMOR).
- The RBC recommends the funding and establishment of an automated, environmental monitoring network of weather and climate stations in South Carolina.

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

During the final phase of the planning process, the Santee 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 Santee 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-2 are intended to guide SCDES and the Legislature when considering changes to existing policies, laws, and regulations that govern water withdrawals and assist local government efforts to protect water resources.

Table ES-2. Santee RBC policy, legislative, and regulatory recommendations.

Policy, 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 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.
- Review periods for groundwater and surface water permit renewal should be re-evaluated, to facilitate long-term planning efforts, support bond issuance, protect withdrawers' investment in infrastructure, and protect the biological, physical and chemical integrity of the source.
- The Legislature should approve and adopt the State Water Plan and subsequent updates.
- The Surface Water Withdrawal, Permitting, Use and Reporting Act (SC Code Sections 49-4-10 and the R. 61-119) should be amended to require all surface water withdrawals (existing, new, and registrants) over 3,000,000 gallons a month to be subject to permit requirements and review.
- The South Carolina Legislature should authorize recurring funding as requested by SCDES for annual, ongoing water planning activities, including river basin planning.
- The South Carolina Legislature should establish a grant program to help support the implementation of the actions and strategies identified in each RBC's River Basin Plan.
- A cost share program should be developed to drill deeper wells into aquifer units with less development pressure, and operate them.
- The State should support statewide water education programs through existing agencies such as Cooperative Extensions, Soil and Water Conservation Districts, etc., that include all sectors of water use and promote the types of water management strategies recommended in River Basin Plans.
- Water users should continue to identify partnerships and alternative sources including interconnections to build resilience and ensure adequate quantity of water.
- The RBC made the following recommendations related to how safe yield is defined and improving water availability characterization for permits and registrations:
    - The safe yield definition should be updated using median statistics (80 percent median rather than 80 percent mean or average) in recognition that median statistics more accurately characterize typical water availability in stream flows that are non-normally distributed. Minimum instream flows (MIF) and minimum water levels (MWL) should be based on median statistics.
    - All permits and registrations requesting volumes above safe yield (80 percent median) should be required to develop and submit to SCDES, realistic contingency and/or conservation capabilities and plans commensurate with their requested volume which will trigger at minimum instream flow.
    - When considering MIF and MWL criteria for new permits, SCDES should be allowed to use alternative hydrologic assessments and take into account water quality considerations due to complex hydrology, as is the case in coastal areas impacted by tides.
    - SCDES should require high use industrial water users (3 million gallons per month) purchasing from a municipal supply to report their monthly water usage, aligning with existing SCDES water use reporting requirements.

Table ES-2. Santee RBC policy, legislative, and regulatory recommendations. (continued)

Local Government Recommendations to Protect Water Resources	▪ State and local governments should continue to develop/review/update/adopt and enforce laws, regulations, policies, and/or ordinances that improve the management of stormwater runoff, encourage infiltration, minimize streambank erosion, reduce sedimentation, and protect water resources.

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-3 should be taken as considerations for future phases of the river basin planning process. To implement these recommendations, the Santee RBC will need support from SCDES and other technical experts.

Table ES-3. Santee RBC technical and program recommendations.

Data-Related Recommendations	▪ The RBC supports the SCDES and USGS monitoring of groundwater levels. ▪ The RBC supports the continued efforts to maintain USGS streamflow gages.
Technical Study Recommendations	▪ Incorporate future climate projections into modeling analyses. ▪ Future planning efforts should include evaluation of surface water quality. ▪ Work on the groundwater model developed by the USGS should be continued and completed. ▪ The RBC endeavors to learn more about the Pinewood site including the regulation, consent orders, controls, and monitoring in place. The site, located in Sumter County, operated as a hazardous waste landfill between 1978 and 2000. ▪ Study the impacts of land use changes on the supply of and demand for water resources. ▪ The State Water Plan should include reuse (recycled) water as a source of water for South Carolina and SCDES should implement regulations for its use that support water resilience in South Carolina.

Recommendations to Improve the River Basin Planning Process

Table ES-4 lists the recommendations that should be considered for development of future river basin plans.

Table ES-4. Santee RBC recommendations to improve the river basin planning process.

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 make sure all interest categories are adequately represented and attendance across all interest categories meets the requirements of the RBC Bylaws. ▪ SCDES should organize an annual state-wide meeting of RBCs and State agencies. ▪ SCDES should continue to designate staff to coordinate and support ongoing RBC activities. ▪ RBC members should be encouraged to present observations and outcomes of the river basin planning process.

Charleston

Santee River Basin Plan Implementation

The Santee RBC identified five implementation objectives for its River Basin Plan. These five objectives were developed based on themes that emerged from the recommendations made in previous chapters. The Planning Framework provides the RBC the opportunity to prioritize these objectives. The Santee RBC implementation objectives are listed below and discussed further in Table ES-5, which lists some of the short-term strategies and actions for these objectives. The RBC deemed objectives 2 and 3 to be the highest priority since they are supported mostly by actions and strategies that the RBC is responsible for. The other objectives were not prioritized.

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, enhance access to new sources, and build resilience.

OBJECTIVE 5. Improve drought management.

Table ES-5. Implementation objectives and representative short-term strategies and actions.

Objective	Representative Short-Term (5-Year) Actions[1]
Objective 1. Improve water use efficiency to conserve water resources	**MUNICIPAL** ▪ RBC and SCDES identify funding opportunities and technical assistance ▪ 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 ▪ RBC implements outreach and education program about recommended water management practices and funding opportunities ▪ RBC develops survey of practices implemented, funding issues, and funding sources utilized **AGRICULTURAL** ▪ RBC and SCDES identify funding opportunities ▪ RBC implements outreach and education program about recommended water management practices and funding opportunities **INDUSTRIAL AND ENERGY** ▪ RBC develops and implements outreach and education programs about recommended water management practices ▪ RBC reviews and analyzes water usage to improve understanding of water savings of strategies

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

Table ES-5. Implementation objectives and representative short-term strategies and actions. (continued)

Objective	Representative Short-Term (5-Year) Actions[1]
Objective 2. Communicate, coordinate, and promote findings and recommendations from the River Basin Plan	▪ SCDES identifies funding needs and communicates with Legislature ▪ RBCs and SCDES to determine education topics of importance and target audience for education program ▪ SCDES and RBC conduct outreach to promote membership for under-represented groups as necessary ▪ SCDES gages interest from all active RBCs in an annual state-wide meeting of RBCs and State agencies ▪ SCDES identifies staff and funding needs to coordinate and support on-going RBC activities ▪ RBC to develop outreach sub-committee to help identify opportunities to present observations and outcomes of the river basin planning process and advocate for the recommendations and strategies contained in the Santee River basin
Objective 3. Improve technical understanding of water resource management issues	▪ Contractor to perform modeling analyses incorporating future climate projections and present results to the RBC ▪ RBC Members review information available about the Pinewood Site Custodial Trust ▪ RBC develops approach to further address water quality issues and concerns, including the need for development of a watershed plan under SCDES's Watershed Program ▪ 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. ▪ USGS completes updates to the South Atlantic Coastal Plain Groundwater model ▪ SCDES seeks funding and drills new monitoring wells in groundwater areas of concern, as needed ▪ RBC to consider performing land conservation modeling to identify how land use changes may impact water resources ▪ SCDES develops scope of study on a recycled water statute based on input from the WateReuseSC and RBCs and examples from other states
Objective 4. Protect water resources, enhance access to new sources, and build resilience	▪ RBC shares findings of potential future user shortages from modeling analysis with water users in the basin ▪ RBC recommends water management strategies in the River Basin Plan to implement to reduce potential shortages, including development of partnerships (e.g., interconnections) and alternative sources where feasible ▪ Work with local governments and Councils of Government (COGs) to incorporate strategies into land use, planning, zoning, and permitting processes ▪ Coastal RBCs work together to encourage the legislature to approve a cost share program that promotes installation of deeper production wells, where development pressure occurs
Objective 5. Improve drought management	▪ Public suppliers on the RBC review and update their drought management plans and send them to the SCO ▪ Public suppliers on the RBC consider ways to incorporate RBC drought management recommendations into their drought plans ▪ 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 ▪ SCDES and SCDNR communicate funding needs to Legislature

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

Jefferies Hydroelectric Station

FUNDING OPPORTUNITIES

Existing external funding sources may be leveraged to promote implementation actions. For example, the U.S. Environmental Protection Agency (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 of the River Basin Plan summarizes federal funding sources for public suppliers that were available at the time this Plan was prepared in October 2025.

The United States 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 10-3 of the River Basin Plan summarizes these and other existing USDA funding sources that were available at the time this Plan was prepared in October 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. 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 October 2025, it is unknown if the IRA funding described above will be continued or eliminated.

Railroad bridge over Santee River in Jamestown

IMPLEMENTATION CONSIDERATIONS

Funding: Water withdrawers may have limited financial capacity to pursue the recommended water management strategies. 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.

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. To gain acceptance, water withdrawers must understand and communicate the goals and the recommended strategies as well as have assurance that they are viable and effective in improving balanced access to the basin's water resources.

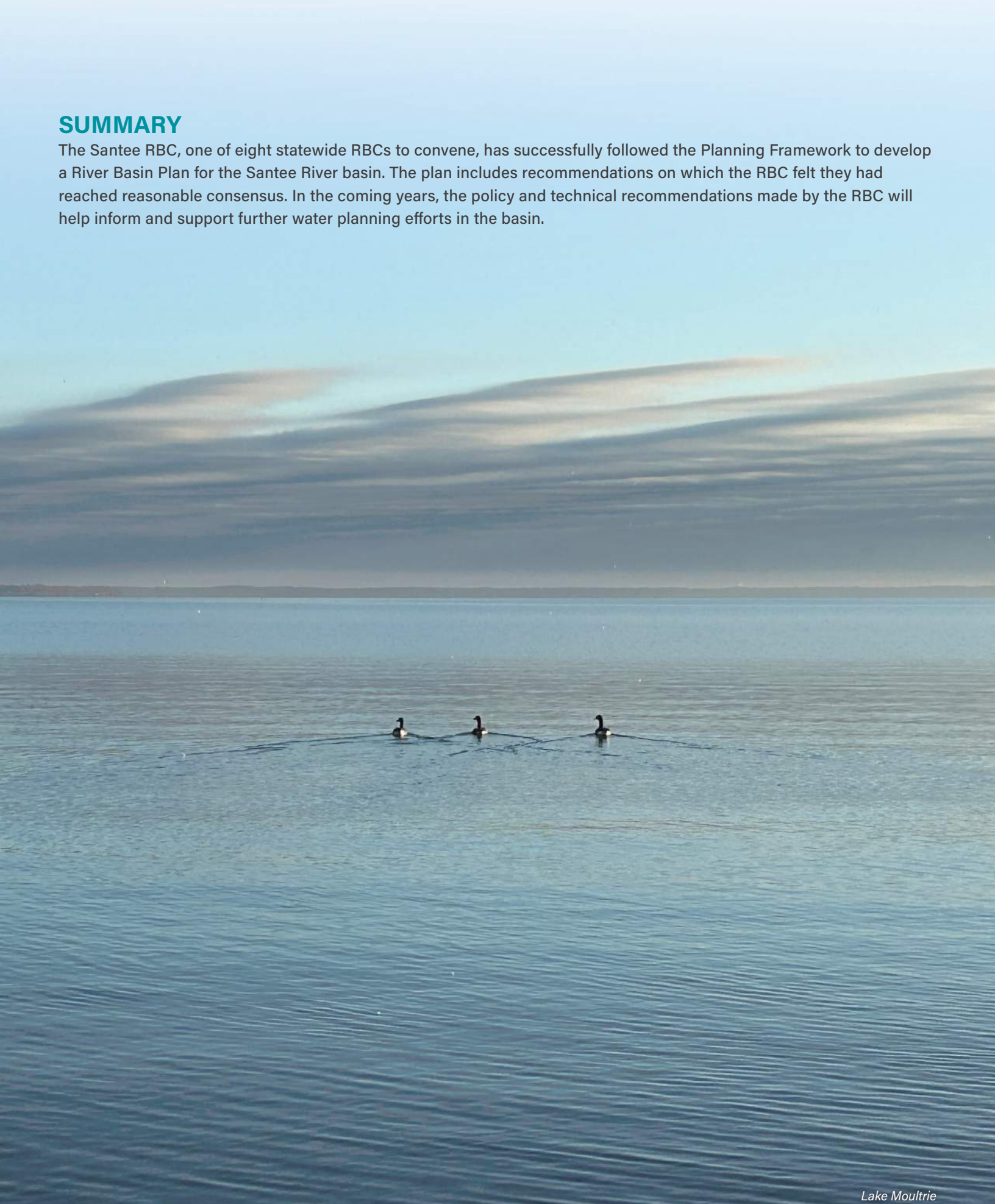
Agency Cooperation: Some recommended actions require collaboration with SCDES, USGS, the state Legislature, and the Governor, with the RBC playing a role in recommending and supporting the strategy. Outreach may include direct communication or the development of print or online materials to describe the recommendation, benefits, funding sources, and how these strategies relate to findings from the planning process.

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. 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 2019). The Santee RBC may also promote coordination with other RBCs.

Consensus-Building: As it did during the development of this plan, the RBC should aim to build consensus where possible during implementation 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.

SUMMARY

The Santee RBC, one of eight statewide RBCs to convene, has successfully followed the Planning Framework to develop a River Basin Plan for the Santee River basin. The plan includes recommendations on which the RBC felt they had reached reasonable consensus. 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.



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Courtesy: Charleston Water System