SC DEPARTMENT *of* ENVIRONMENTAL SERVICES

2025 SOUTH CAROLINA STATE WATER PLAN

THIRD EDITION

CONTENTS

Downtown Greenville, South Carolina

Acknowledgments

The South Carolina Department of Environmental Services (SCDES) would like to thank the many individuals, agencies, organizations, and additional stakeholders who contributed to the development of the updated State Water Plan and water planning process over the past decade. This includes:

- Governor **Henry McMaster** for his leadership, vision, and continued support for water resource planning and conservation.
- The current **WaterSC** Water Resources Working Group, chaired by SCDES Director Myra Reece, representing academia, public water suppliers, conservation interests, agriculture, forestry, industry, energy, tourism and hospitality, and overall professional water expertise. WaterSC has been advising and assisting SCDES on the comprehensive water resources policy for the state and update of the State Water Plan. WaterSC includes also includes representation from the following state agencies:
  - SC Department of Agriculture
  - SC Department of Commerce
  - SC Department of Natural Resources (DNR)
  - SC Department of Parks, Recreation & Tourism
  - SC Office of Resilience
- The **Surface Water Study Committee** members who are studying the current state of surface and groundwater in South Carolina.
- The more than 130 members of the **Broad, Edisto, Pee Dee, Lower Savannah-Salkehatchie, Saluda, Santee, and Upper Savannah River Bason Councils (RBCs)** who devoted considerable time during the development of their respective River Basin Plans evaluating water resources, identifying water management strategies, and developing recommendations to improve the management of water resources in South Carolina.
- DNR for its leadership of the former **Planning Process Advisory Committee (PPAC)** that represented water suppliers, industry, power generation, agriculture, trade, conservation organizations, state agencies, and academia established to develop and help implement a framework for state and river basin water planning.
- The **Catawba-Wateree Water Management Group (CWWMG)**, that has been performing water planning activities in the Catawba-Wateree River basin since late 2007.
- DNR's State **Climatology Office**, for providing technical expertise and support to the RBCs during the river basin planning process and to WaterSC during development of the State Water Plan.
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SCDES would especially like to thank the agency employees primarily responsible for the development of the State Water Plan and their leadership of the water planning process, particularly (and in alphabetical order): **Brooke Czwartacki, Rob Devlin, Kristy Ellenberg, Rupi Grewal, Scott Harder, Hannah Hartley, Jennifer Hughes, Joseph Koon, Leigh Anne Monroe, Myra Reece, and Andy Wachob.**

Acronyms and Abbreviations

% – Percent

ACE basin – Ashepoo-Combahee-Edisto River basin

AI – Artificial Intelligence

AMI – Advanced Metering Infrastructure

AMR – Automated Meter Reading

ASR – Aquifer Storage and Recovery

BG – Billion Gallons

cfs – Cubic Feet per Second

CMOR – Condition Monitoring Observer Report

CUA – Capacity Use Area

CWCB – Colorado Water Conservation Board

CWWMG – Catawba-Wateree Water Management Group

DCP – Drought Contingency Plan

DMA – Drought Management Area

DRC – Drought Response Committee

EDA – U.S. Economic Development Administration

EIA – U.S. Energy Information Agency

EPA – U.S. Environmental Protection Agency

EQIP – Environmental Quality Incentives Program

ET – Evapotranspiration

FEMA – Federal Emergency Management Agency

FERC – Federal Energy Regulatory Commission

FSA – Farm Service Agency

GAEPD – Georgia Environmental Protection Division

HMGP – Hazard Mitigation Grant Program

IRC – Interbasin River Council

IRP – Integrated Resources Plan

IWRP – Integrated Water Resources Plan

KBDI – Keetch-Byram Drought Index

LEED – Leadership in Energy and Environmental Design

LIDCP – Low Inflow and Drought Contingency Plan

LIP – Low Inflow Protocol

MADF – Mean Annual Daily Flow

MGM – Million Gallons per Month

MGD – Million Gallons per Day

MIF – Minimum Instream Flow

NA – Not Applicable

NDMC – National Drought Mitigation Center

NRCS – Natural Resources Conservation Service

P&R – Permitted and Registered

PDSI – Palmer Drought Severity Index

PFAS – Per- and Polyfluoroalkyl Substances

PPAC – State Water Planning Process Advisory Committee

RBC – River Basin Council

RMA – Risk Management Agency

SCDES – South Carolina Department of Environmental Services

SCDHEC – South Carolina Department of Health and Environmental Control

SCDNR – South Carolina Department of Natural Resources

SCO – State Climatology Office

SCOR – South Carolina Office of Resilience

SC ORFA – South Carolina Office of Revenue and Fiscal Affairs

SPI – Standard Precipitation Index

SWAM – Simplified Water Allocation Model

UIF – Unimpaired Flow

USACE – U.S. Army Corps of Engineers

USDA – U.S. Department of Agriculture

USDM – U.S. Drought Monitor

USGS – U.S. Geological Survey

WaterSC – WaterSC Water Resources Working Group

WFX – Water Finance Exchange

YPDWMG – Yadkin-Pee Dee Water Management Group

Glossary

7Q10 – a hydrological term for the lowest average streamflow over a 7-day period that is expected to occur, on average, once every 10 years.

Adaptive management – a flexible framework used to implement strategies in a structured way as the future unfolds, reacting to changing conditions and improved knowledge.

Aquifer storage and recovery (ASR) – a water management strategy that involves storing treated surface water underground during periods of low demand, to be used during peak consumption periods.

Assimilative capacity – the ability of a natural system (i.e., a river or lake) to absorb or process pollutants without causing harm to the environment or exceeding water quality standards.

Biological response metrics – criteria, such as species richness, developed based on fish and aquatic insect samples and flow and other stream dynamics, used for assessing ecological health as a function of streamflow.

Blue Ridge – one of three physiographic provinces in South Carolina, the Blue Ridge province is the mountainous region along on the northwest edge of South Carolina and occupies only 2 percent of South Carolina's land area.

Capacity Use Area (CUA) – an area designated under the Groundwater Use and Reporting Act where excessive groundwater withdrawals have been shown to present potential adverse effects to the resource; threaten the long-term integrity of a groundwater source; or pose a threat to public health, safety, or economic welfare.

Catawba-Wateree Water Management Group (CWWMG) – a nonprofit organization of public water utilities and Duke Energy Carolinas, LLC (Duke Energy) that collaborates to manage and protect water resources in the Catawba-Wateree River basin.

Coastal Plain – one of three physiographic provinces in South Carolina, the Coastal Plain province occupies the southeastern two-thirds of South Carolina from the Fall Line to the coast.

Condition Monitoring Observer Reports (CMOR) – a system maintained by the National Drought Mitigation Center to provide on-the-ground information to help U.S. Drought Monitor authors better understand local drought conditions.

Cone of depression – potentiometric low areas, often seen on potentiometric maps as concentric loops of contour lines.

Conjunctive use – the coordinated and planned management of both surface water and groundwater to maximize the reliability and availability of a region's water supply.

Current Use Scenario – a surface water or groundwater model simulation incorporating an estimate of current water use, generally estimated as a recent 10-year average for each water user.

Drought – generally defined as a water shortage brought about by a lack of precipitation over an extended period. Numerous more specific definitions of drought have been developed, including meteorological drought (defined by deficiencies in monthly or seasonal precipitation and characterized by higher-than-average temperatures, high winds, low relative humidity, and less cloud cover); agricultural drought (determined by a combination of precipitation shortages, soil water deficits, reduced stream, lake, and groundwater levels, and other factors that impact crops and livestock); hydrological drought (measured by declines in streamflow, lake levels, or groundwater levels on a watershed or river-basin scale); socioeconomic drought (occurs when there is a weather-related shortfall in water supply that is exceeded by the demand for water to meet an economic need); and ecological drought (a deficit in water availability that drives ecosystems beyond thresholds of vulnerability, impacts ecosystem services, and triggers feedback in natural and/or human systems). Drought can also develop rapidly, in what is called flash drought.

Drought management plan – plans that public water suppliers were required to develop as part of the South Carolina Drought Response Act of 2000. Plans include a set of measurable triggers indicating when conditions have entered one of three phases of drought, and corresponding response actions to reduce demand by a target percentage.

Drought Response Act – established in 2000, the Act provides the state with a mechanism to respond to drought conditions and empowers the South Carolina Department of Natural Resources (SCDNR) to formulate, coordinate, and execute a statewide drought mitigation plan. The Act also created the South Carolina Drought Response Committee (DRC) to be the major drought decision making entity in the state. At the local level, public water systems must develop drought response plans aligned with the state framework. These include voluntary and mandatory water use reductions during drought conditions. At the basin level, entities like Duke Energy, Santee Cooper, and the U.S. Army Corps of Engineers (USACE) implement basin-specific protocols to manage water during droughts.

Drought Response Committee (DRC) – a statewide committee designated under the South Carolina Drought Response Act, chaired and supported by SCDNR and the State Climatology Office, which serves as the primary drought decision-making entity in the state.

Evapotranspiration – the combined processes of evaporation and plant transpiration.

Fall Line – the boundary between the Piedmont and Coastal Plain physiographic provinces, defined as the surface contact between the igneous and metamorphic rocks of the Piedmont and the unconsolidated sediments of the Coastal Plain.

Federal Energy Regulatory Commission (FERC) – a U.S. government agency that, among other responsibilities, licenses and inspects private, municipal, and state hydroelectric projects.

Flow-ecology relationships – statistically significant relationships between flow characteristics and ecological suitability for fish and macroinvertebrates.

Groundwater area of concern – an area in the Coastal Plain, designated by a River Basin Council (RBC), where groundwater withdrawals from a specified aquifer are causing or are expected to cause unacceptable impacts to the resource or to the public health and well-being.

Groundwater Management Plan – a management plan established and implemented in Capacity Use Areas by the South Carolina Department of Environmental Services (SCDES) with the support of a stakeholder advisory group and designed to ensure groundwater development is managed to meet the needs of the present without compromising the ability of future generations to meet their needs.

Groundwater Use and Reporting Act – administered by SCDES, is the principal law governing the management of groundwater quantity in South Carolina. This Act establishes conditions for the designation of Capacity Use Areas defined as "*areas in which excessive groundwater withdrawals have been shown to present potential adverse effects to the resource, to threaten the long-term integrity of a groundwater source, or to pose a threat to public health, safety, or economic welfare.*"

Groundwater shortage – a state in which groundwater withdrawals from a specific aquifer violate a groundwater condition applied on that aquifer.

Groundwater condition – a limitation on the amount of groundwater that can be withdrawn from an aquifer.

High Demand Scenario – a surface water or groundwater simulation incorporating water-demand projections based on the assumptions of a hot and dry climate (increased irrigation) and high population and economic growth.

Implementation plan – a management plan describing specific action items to be implemented by a River Basin Council (RBC) and other stakeholders during the first 5 years after completing the initial River Basin Plan. Implementation plans are updated after each subsequent iteration of the River Basin Plan (approximately every 5 years).

Integrated Water Resources Plan (IWRP) – outlines long-term planning approaches for water resources within a basin or geographic area. In the context of this State Water Plan, the IWRP is the type of plan being developed by the CWWMG.

Interbasin River Council (IRC) – a group consisting of members from two or more RBCs, with no more than five members from each RBC, formed to facilitate collaboration between two or more basins.

Minimum instream flow (MIF) – as defined in the South Carolina Surface Water Withdrawal, Permitting, Use, and Reporting Act, "*...the flow that provides an adequate supply of water at the surface water withdrawal point to maintain the biological, chemical, and physical integrity of the stream taking into account the needs of downstream users, recreation, and navigation and that flow is set at forty percent of the mean annual daily flow for the months of January, February, March, and April; thirty percent of the mean annual daily flow for the months of May, June, and December; and twenty percent of the mean annual daily flow for the months of July through November for surface water withdrawers as described in Section 49 4 150(A)(1). For surface water withdrawal points located on a surface water segment downstream of and influenced by a licensed or otherwise flow controlled impoundment, "minimum instream flow" means the flow that provides an adequate supply of water at the surface water withdrawal point to maintain the biological, chemical, and physical integrity of the stream taking into account the needs of downstream users, recreation, and navigation and that flow is set in Section 49 4 150(A)(3).*"

Moderate Demand Scenario – a surface water or groundwater model simulation incorporating a water demand projection based on normal weather conditions (average irrigation) and moderate growth in the population and economy.

Overallocation – occurs when more water has been allocated in permits and registrations than might physically be available, especially during drought conditions.

Palmer Drought Severity Index (PDSI) – a standardized drought index based on a simplified soil water balance and estimates of relative soil moisture conditions. The magnitude of the PDSI indicates the severity of the departure from normal conditions. A PDSI value greater than 4 represents very wet conditions, while a PDSI less than -4 represents extreme drought.

Permitted and Registered (P&R) Scenario – a surface water model simulation incorporating the fully permitted and registered water use allowable under existing surface water permits and registrations for all water users.

Physiographic province – a large geographic area with a distinct set of landforms resulting from similar geological and climatic histories.

Piedmont – one of three physiographic provinces in South Carolina, the Piedmont province lies between the Blue Ridge and Coastal Plain provinces, with topography characterized by rolling hills and a land area of approximately 35 percent of the state.

Planning basin – a geographic area defined for river basin planning, largely matching the major river basins of South Carolina, but with some key differences that are primarily based on the geographic extent of each basin. Throughout this Plan, the terms "river basin" and "planning basin" are used somewhat interchangeably.

Planning Framework – the document (*South Carolina State Water Planning Framework*) that provides guidance on the formation of RBCs and the development of River Basin Plans and the State Water Plan.

Planning horizon – the 50-year period considered within a River Basin Plan for ensuring the surface and groundwater resources of a basin will be available for all current and future uses.

Planning Process Advisory Committee (PPAC) – a diverse group of water-resource experts representing water suppliers, industry, power generation, agriculture, trade, conservation organizations, state agencies, and academia established to develop and help implement a framework for state and river basin water planning.

Planning scenario – the set of surface water and groundwater use data for the planning horizon that will be used by the RBCs to develop water management strategies. The planning scenario is designated as the High Demand Scenario for both surface water and groundwater.

Potentiometric map – a contour map representing the potentiometric surface (or the imaginary surface showing the water level that would rise in a tightly cased well) of an aquifer, used to understand groundwater flow direction, evaluate groundwater conditions, identify areas of over pumping, and assist with water resource planning.

Reach of interest – a stream reach defined by an RBC that experiences undesired impacts, environmental or otherwise, determined from current or future water demand scenarios or proposed water management strategies. Such reaches may or may not have identified surface water shortages.

Reservoir safe yield – the surface water supply for a reservoir or system of reservoirs over the simulated hydrologic period of record. The safe yield of a reservoir or system of reservoirs can be thought of as the maximum annual average demand that can be sustained through the period of record without depleting available storage.

River Basin Council (RBC) – a group of diverse stakeholders with water-related interests in a basin, assembled specifically to develop and help implement a River Basin Plan consistent with the Planning Framework.

River Basin Plan – a collection of recommended water management strategies developed by an RBC and supported by a summary of analyses designed to ensure the surface water and groundwater resources of a river basin will be available for all uses over the Planning Horizon.

Safe yield – as defined in the South Carolina Surface Water Withdrawal, Permitting, Use, and Reporting Act for a stream not influenced by a flow-controlled impoundment, "…*the difference between the mean annual daily flow and twenty (20) percent of mean annual daily flow at the withdrawal point, taking into consideration natural and artificial replenishment of the surface water and affected downstream withdrawals*".

Simplified Water Allocation Model (SWAM) – an Excel-based water allocation model that computes water availability at user-defined nodes in a networked river system. The model incorporates water withdrawals and discharges and can simulate reservoir operations of varying complexity.

Surface water shortage – a state in which water demand exceeds the surface water supply for any water user in the basin.

Surface Water Withdrawal, Permitting, Use, and Reporting Act – administered by SCDES, describes the registration and permitting requirements for surface water withdrawers. This Act requires any surface-water user who withdraws more than three million gallons in any month to obtain a permit or registration, depending on the type of water use. The Act defines three types of surface water users: existing users (those who were already withdrawing, had a proposed withdrawal, or had their application administratively complete to start withdrawing by January 1, 2011); new permitted users (those who would, after the establishment of the Act, apply for a new surface water withdrawal permit not for agricultural use after January 1, 2011); and registered users (persons who make surface water withdrawal for agricultural uses at an agricultural facility or aquaculture facility).

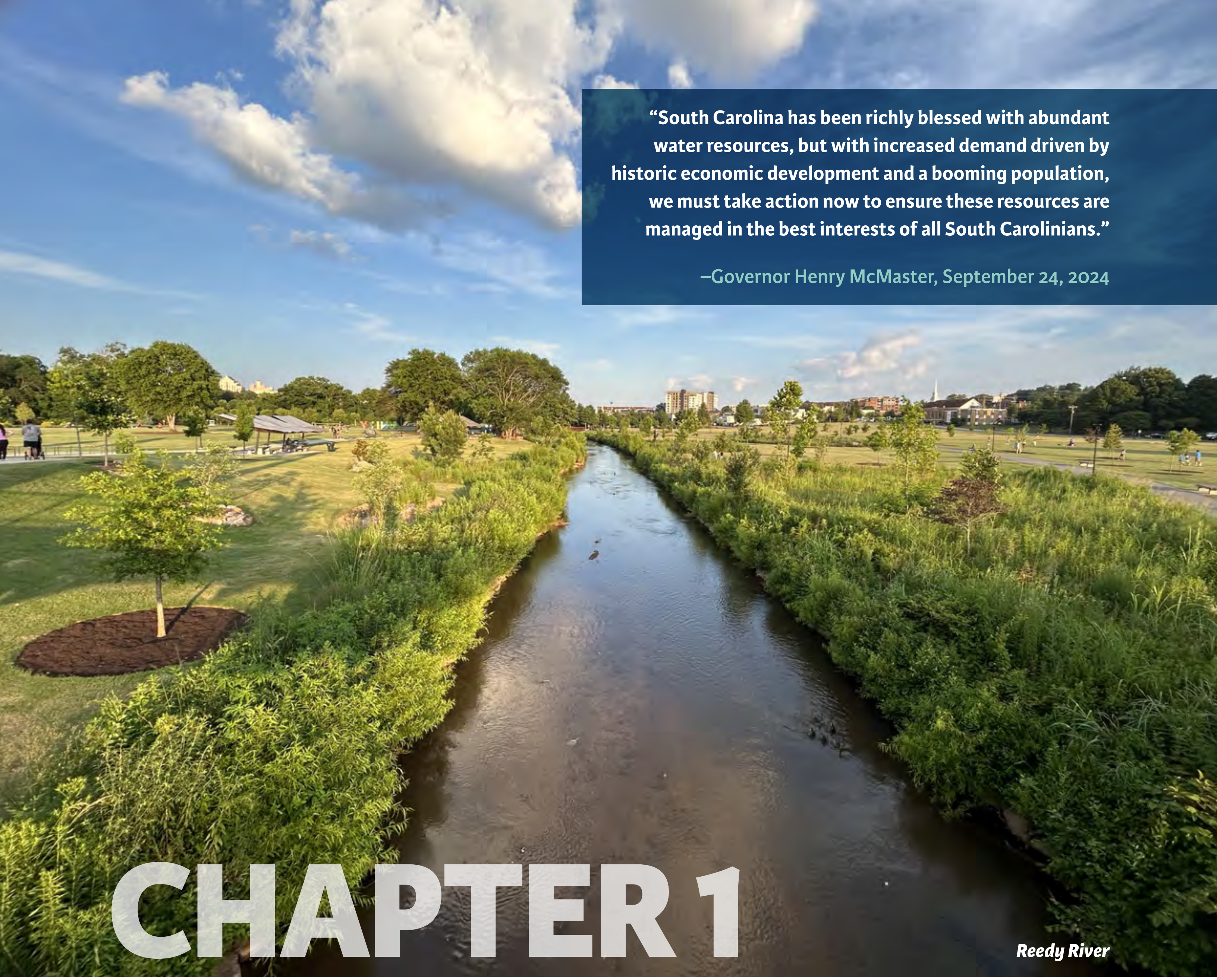
Surface water supply – the maximum amount of water available for withdrawal 100% of the time at a location on a surface water body without violating any applied surface water conditions on the surface water source and considering upstream demands.

Unimpaired Flow (UIF) Scenario – a planning scenario that removes all surface water withdrawals and discharges and simulates conditions before any surface water development.

U.S. Geological Survey (USGS) Atlantic Coastal Plain Groundwater Model – a computer model developed by USGS simulating groundwater through the aquifers and confining units of the Atlantic Coastal Plain, used to study and predict groundwater availability and support resource management in the region.

Water management strategy – a strategy proposed to eliminate a surface water shortage, reduce a surface water shortage, generally increase surface water supply, or address a groundwater area of concern or groundwater shortage. Strategies are often categorized as demand-side or supply-side, by sector (municipal/industrial or agricultural), and by time horizon (short-term being the next 1 to 5 years).

WaterSC Water Resources Working Group (WaterSC) – a group composed of members representing academia, public water suppliers, conservation interests, agriculture, forestry, industry, energy, tourism and hospitality, and overall professional water expertise, whose charter, according to Governor Henry McMaster's Executive Order 2024-22, is to: "… *Advise and assist DES regarding the comprehensive water resources policy for the state such that DES may issue an updated State Water Plan…*" by the end of 2025.



> **"South Carolina has been richly blessed with abundant water resources, but with increased demand driven by historic economic development and a booming population, we must take action now to ensure these resources are managed in the best interests of all South Carolinians."**
>
> –Governor Henry McMaster, September 24, 2024

CHAPTER 1

Reedy River

Introduction

1.1 BACKGROUND AND OBJECTIVES

The South Carolina Water Resources Planning and Coordination Act requires the South Carolina Department of Environmental Services (SCDES) to develop a comprehensive water resources policy for the state. Prior to the creation of SCDES in 2024, the water planning activities for the state were the responsibility of the South Carolina Department of Natural Resources (SCDNR). SCDNR developed the first state water plan—the *South Carolina Water Plan*—in 1998. In 2004, the plan was updated following one of the worst multi-year droughts on record (which ended in 2002), resulting in the *South Carolina State Water Plan Second Edition* (2004 Plan).

Motivations for This 2025 Plan: In a state that has historically been considered to have abundant water, the plan update emerged from these key motivations to support a healthy and prosperous state through a changing future:

- **Support Responsible Population Growth:** South Carolina is one of the fastest growing states in the country, and water demand is increasing.

- **Support Prosperous Agriculture:** Agriculture is vital to the state's economy, as it constitutes the largest industry sector. Much has been accomplished to improve irrigation efficiencies, but future access to irrigation water must continue.

- **Preserve Ecosystem Health:** South Carolina has long enjoyed thriving and diverse aquatic ecosystems, but increased water demands could threaten the environmental health and quality of certain water bodies.

- **Sustain Energy:** All South Carolina residents and businesses rely on sustainable, reliable, resilient, clean, affordable, and efficient energy, which depends on comprehensive and adaptive water management and planning.

- **Support Economic Prosperity:** Many industries have expanded or moved into South Carolina in recent years, including automotive and aerospace manufacturing, tourism, agribusiness, and others. As this growth continues, so will the industrial demand for water.

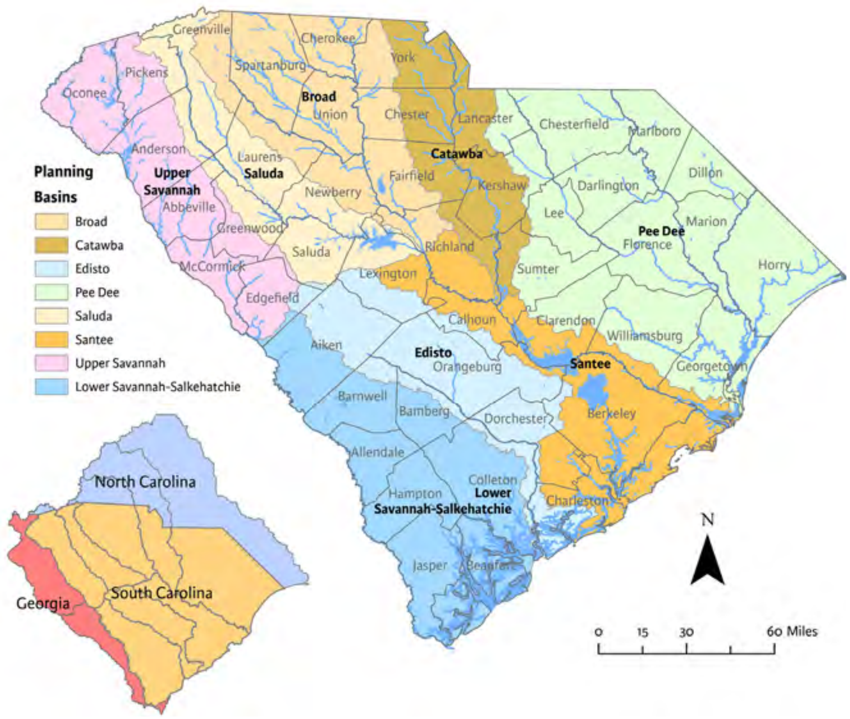


Figure 1-1. Major planning basins of South Carolina. *The inset map shows the basins' extents into adjacent states. Throughout this plan, the terms "river basin" and "planning basin" are used somewhat interchangeably. The term planning basin was created based on differences in the geographic extent that basin-level water planning has being conducted. For planning purposes, the Savannah River basin was divided into an upper and lower basin, and the lower basin was grouped with the Salkehatchie River basin to form the Lower Savannah-Salkehatchie River Basin. Also, the Santee River basin was extended to include the Congaree River, which had originally been assigned as part of the Saluda River basin. The map delineates the eight major planning basins, which are also referred to as river basins in chapters of this plan.*

- **Protect Against Drought:** Following severe droughts in 2007 to 2008 and 2011 to 2012, there has been a recognized need for increased drought resilience and planning.

Goals of This Plan: As prescribed in the South Carolina State Water Planning Framework (SCDNR 2019a), a collaborative guide for water planning in each river basin, River Basin Councils (RBCs) were formed in the state's major planning basins (**Figure 1-1**). Each RBC was charged with supporting the development of a 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." By extension, ensuring the availability of water resources even during drought becomes the overarching goal of this State Water Plan.

This clear objective was reinforced by the Governor Henry McMaster's Executive Order 2024-22, which emphasizes the need for the State Water Plan:

"In furtherance of the State of South Carolina's significant interests in the development of a state water resources policy and plan that will balance the state's economic, environmental and social needs; ensure the reliability, resiliency, sustainability, and sufficiency of the state's water resources for all existing and future uses, while simultaneously protecting the environment; and support and facilitate additional collaboration with ongoing efforts and existing initiatives..."

Therefore, the State Water Plan was formulated around a series of relevant goals, as listed here:

Goals of the State Water Plan

1. **Balance the state's economic, environmental, and social needs**
2. **Concisely assess water availability through 2070: Supply and Demand**
3. **Focus on water quantity: reliability, resiliency, sustainability, and sufficiency for all existing and future uses**
4. **Consider recommendations from RBCs and the newly formed advisory group: WaterSC**
5. **Identify pathways for implementation**
6. **Highlight multiple perspectives on key water management issues**
7. **Serve as a foundation for continued collaboration and planning**

The Planning Process and its Timeline: In 2014, with funding allocated by the state legislature for the development of water quantity models, SCDNR began the work of updating the State Water Plan. The 2004 Plan recognized that, because of the uniqueness of each of the state's major watersheds, future water planning should be done initially at the basin level and established a goal of creating advisory groups for each river basin.

The Planning Process Advisory Committee (PPAC) established and delineated eight planning basins in the *State Water Planning Framework* in 2018 and 2019. With the formation of RBCs for seven of the eight planning basins, a key objective of the 2004 Plan update was realized. The Catawba-Wateree Water Management Group (CWWMG), established in 2007, had previously been established and continues its planning effort to update its Integrated Water Resources Plan (IWRP), therefore an RBC was not established for the Catawba basin. The RBCs—composed of stakeholders from industry, water utilities, agriculture, environmental groups, recreational interests, local government, and energy utilities—used water quantity models to assess water resources availability, identify where demands may outpace supplies, and help formulate policy and water management recommendations for South Carolina's major planning basins.


Broad River near Columbia

On September 24, 2024, South Carolina Governor Henry McMaster issued Executive Order 2024-22, requiring SCDES to issue an updated State Water Plan by the end of 2025. The WaterSC Water Resources Working Group (WaterSC) was formed to advise and assist SCDES in this task. **Figure 1-2** illustrates the timeline of activities leading up to this State Water Plan update.

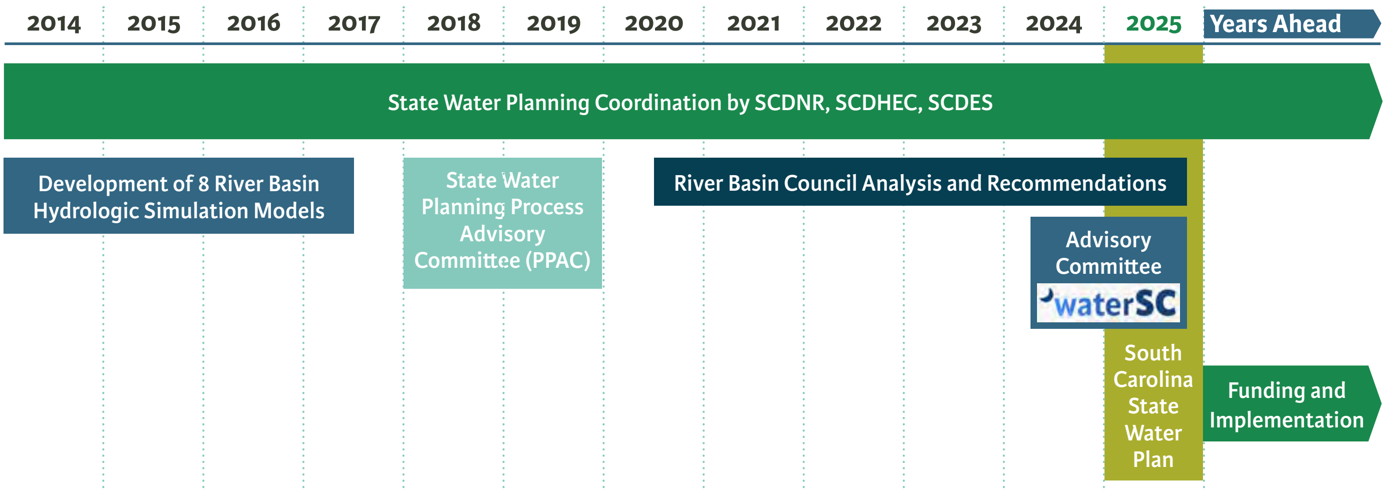


Figure 1-2. Over 10 years of investment leading to a stakeholder-driven State Water Plan.

This State Water Plan update builds on the recommendations of the 2004 Plan, highlighting accomplishments by legislators, agencies, and others who implemented those recommendations. It furthers the understanding of water demands and availability in South Carolina and summarizes actionable recommendations through collaboration with the RBCs and WaterSC.

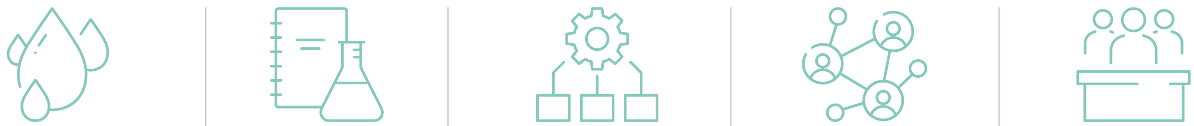
Key accomplishments of the 2004 Plan include:

- Established River Basin Advisory Committees (now termed "River Basin Councils") for each of eight planning basins.
- Water use has been effectively monitored to the extent that current river basin models account for many years of documented water use patterns for all permitted and registered water users.
- To protect the groundwater aquifer systems, the entire Coastal Plain has been designated as six Capacity Use Areas and are routinely evaluated for permitting new groundwater use and renewing existing use permits.
- An updated groundwater flow model of the coastal plain is under development. The current model was used in the Edisto basin to improve understanding the effects of future groundwater pumping. The updated model will be used for the Lower Savannah-Salkehatchie, Pee Dee, and Santee basins, and to reevaluate the Edisto basin.
- Potentiometric maps are routinely developed and made available to understand the impacts of current groundwater pumping patterns.

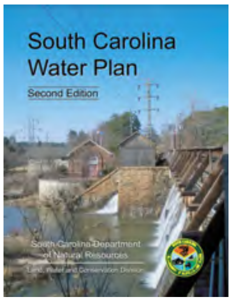
These accomplishments would not have been possible without continual support from the state legislature, SCDNR, the former South Carolina Department of Health and Environmental Control (SCDHEC), and the newly created SCDES. All of these accomplishments required funding, a dedicated commitment to implementing plan recommendations, and deliberate prioritization of the protection of the state's water resources.

1.2 PLANNING PRINCIPLES

The major planning principles for the State Water Plan include the following, each of which is discussed in the subsections that follow:



Addresses 2004 State Water Plan Goals | **Sound Science** | **Collaborative Process** | **Stakeholder Engagement** | **Advisory Committee**



1.2.1 Address 2004 Plan Goals

This plan builds on the work of the 2004 Plan, through ongoing stakeholder collaboration and associated technical analysis and recommendations. Meeting the key goal of the 2004 Plan, advisory groups (the RBCs) have been established and funded in each of the planning basins. Additionally, each RBC has applied technical models of its basin to examine water availability and management strategies. This plan is authorized, administered, and orchestrated through coordinated actions of the government, water utilities, advocacy groups, academia, agricultural representatives, industry, energy producers, and citizens of South Carolina.

1.2.2 Foundation of Sound Science

Funding was authorized in 2014 for SCDNR to develop and calibrate river basin surface water models to simulate surface water hydrology and water management strategies in each of the state's eight major planning basins. An example river basin surface water model is shown in **Figure 1-3**. Groundwater models were also commissioned to support planning in the Coastal Plain region of the state.

Detailed information on the surface water models can be found in the River Basin Plans, and at the SCDES Surface Water Models webpage. More information on the groundwater models can be found at the SCDES Groundwater Models webpage.

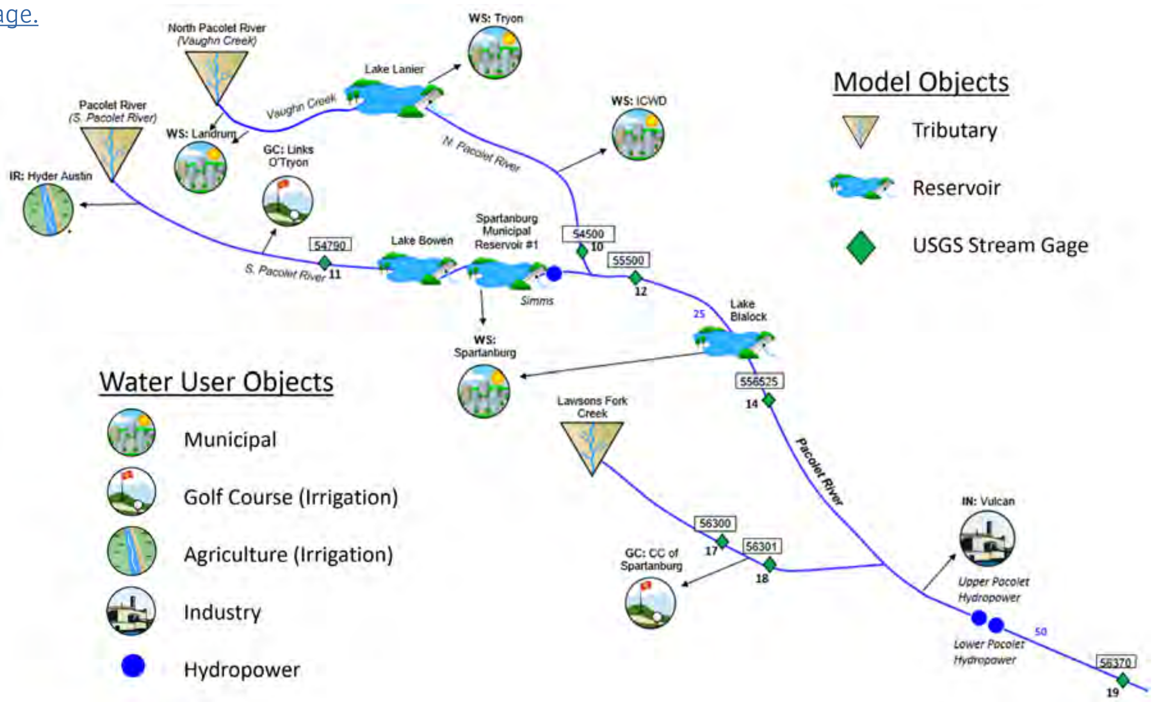


__Figure 1-3. Example river basin surface water model.__ (The Pacolet River portion of the Broad River basin model is shown. Refer to the individual River Basin Plans for details on these models).

1.2.3 Collaborative Planning Framework

In 2018, the PPAC was formed to produce the Planning Framework (**Figure 1-4**), a guidance document with a template for RBCs to use in the development of comprehensive River Basin Plans. Membership included representation from water utilities, business groups, agriculture, energy utilities, conservation and environmental groups, recreational interests, state agencies, and academia.

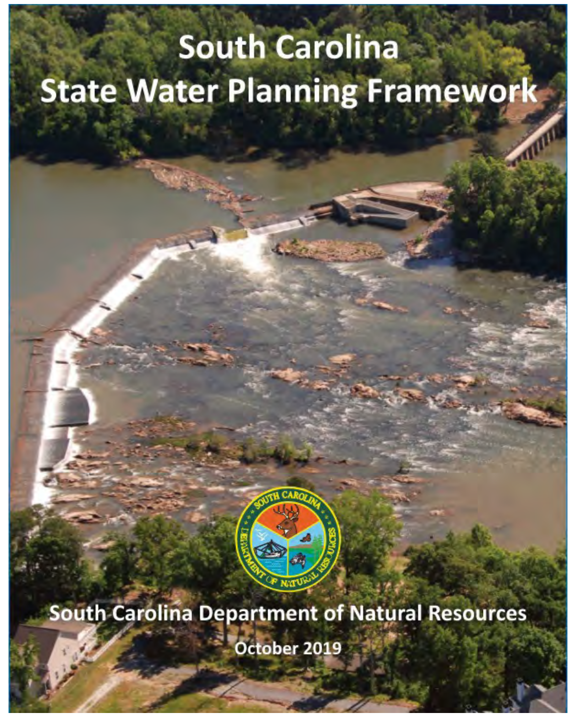


Figure 1-4. State Water Planning Framework.

The mission of the PPAC was to:

- ***Advise SCDNR on the process for including stakeholders in the development of River Basin Plans.***
- ***Produce the Planning Framework, which provides a consistent template for River Basin Plan development, including process, plan content, specific conditions to evaluate, and categories of recommendations.***
- ***Develop guidelines for achieving consensus among stakeholders.***
- ***Develop a strategy and template for assembling the RBC information into a State Water Plan.***

Details of the PPAC can be found at the SCDES PPAC webpage and the Planning Framework can be downloaded from the SCDES Water Planning webpage.

Lake Keowee

1.2.4 Stakeholder Engagement

Committed to going beyond routine stakeholder engagement, SCDNR and SCDES determined the Water Plan would be stakeholder-driven. RBCs were formed in the state's major planning basins (**Figures 1-1** and **1-2**) and initiated the process of developing River Basin Plans in accordance with the Planning Framework. Each RBC consists of approximately 15 to 25 members, representing eight water interest categories, as shown in **Figure 1-5**. According to the Planning Framework, each plan was to be "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 update of the State Water Plan considers the analyses and recommendations developed in the RBCs, which can be found at the SCDES River Basin Planning webpage and in the CWWMG's IWRP.

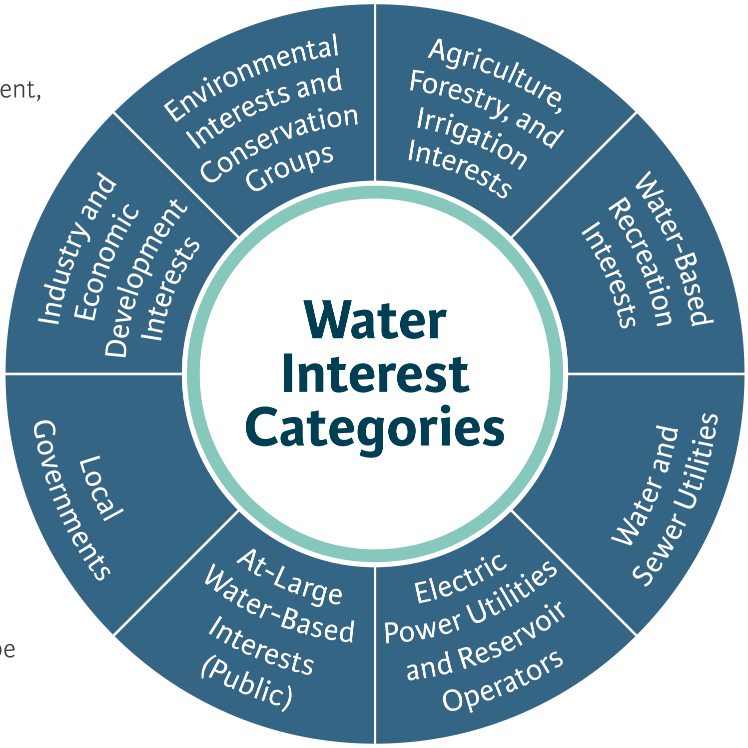
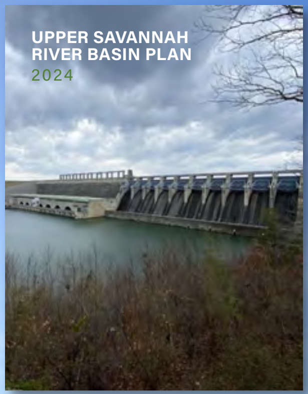


Figure 1-5. Water interest categories represented in the RBCs.

CONTENTS OF A RIVER BASIN PLAN

- Description of basin features, including land use and water resources
- Demand projections and scenarios
- Supply-demand comparisons and availability assessment
- Recommended water management strategies
- Drought response recommendations
- Policy, legislative, and regulatory recommendations
- Technical and planning process recommendations
- Implementation plan



RBC Tour of the Lake Jocassee Dam

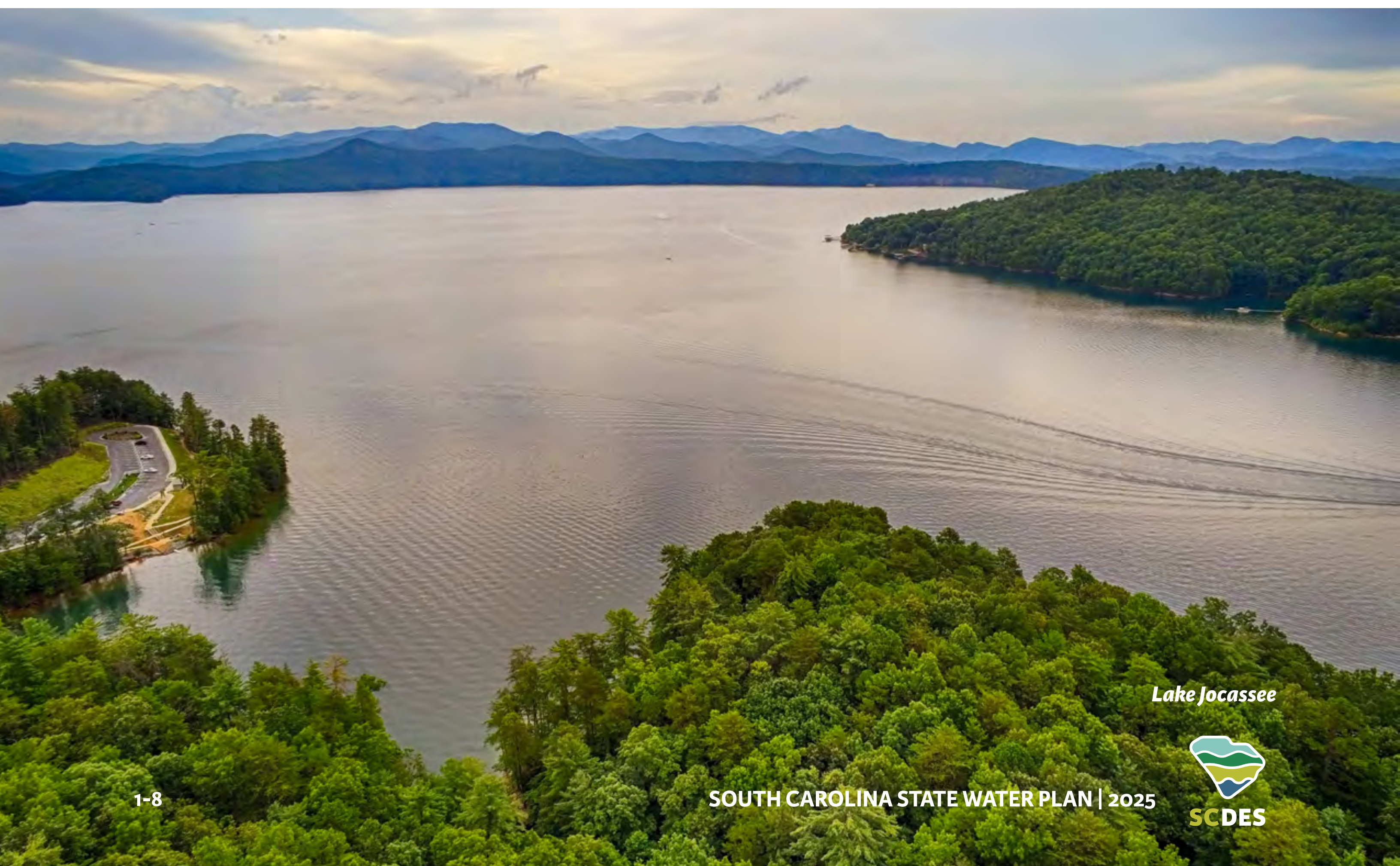
1.2.5 Advisory Group: WaterSC

To combine more than 10 years of work together into a comprehensive State Water Plan, Governor Henry McMaster issued Executive Order 2024-22 in September 2024, requiring SCDES to develop the new State Water Plan by December 2025. To provide SCDES with advice and recommendations on water law and regulations, the executive order established WaterSC, composed of members representing academia, public water suppliers, conservation interests, agriculture, forestry, industry, energy, tourism and hospitality, and overall professional water expertise. Their charter, according to the executive order, is to: ***"…Advise and assist DES regarding the comprehensive water resources policy for the state such that DES may issue an updated State Water Plan…"***

WaterSC began meeting monthly starting in October 2024, in facilitated sessions to hear from a diverse spectrum of speakers, discuss water resources policy, review recommendations from the RBCs, and prioritize issues and recommendations for SCDES to include in the State Water Plan. Further information on WaterSC can be found at the SCDES WaterSC Water Resources Working Group webpage.

Excerpts from Governor McMaster's Executive Order

"…In furtherance of the State of South Carolina's significant interests in the development of a State water resources policy and plan that will balance the State's economic, environmental, and social needs; ensure the reliability, resiliency, sustainability, and sufficiency of the State's water resources for all existing and future uses, while simultaneously protecting the environmental and support and facilitate additional collaboration with ongoing efforts and existing initiatives, I hereby authorize and direct DES to convene, and to coordinate the activities of the WaterSC Water Resource Working Group ("WaterSC"), which shall…advise and assist DES regarding the comprehensive water resources policy for the State such that DES may issue an updated State Water Plan on or before December 31, 2025. WaterSC shall inform DES concerning recommendations regarding any changes in law or regulation that may be required to implement the updated State Water Plan, including any changes related to the use and control of surface water and groundwater in the State."



Lake Jocassee

1.3 OVERVIEW OF THE PLANNING PROCESS

The process of formulating an actionable, updated State Water Plan builds on the accomplishments of implementing the prior State Water Plan recommendations and continued stakeholder collaboration. The process used is outlined in **Figure 1-6**. Specific activities and products of the RBCs, WaterSC, and SCDES are discussed in Sections 1.3.1 and 1.3.2.

The planning process was intended to be flexible and adaptive. The relevance of each planning group and activity serves as an important roadmap. This process has benefited from lessons learned in other states in terms of both process and ultimate recommendations.

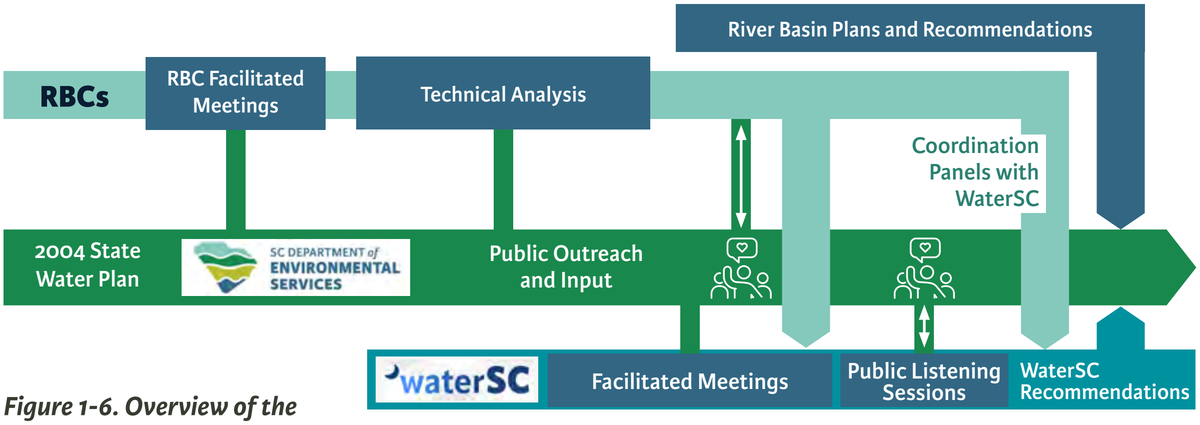


Figure 1-6. Overview of the water planning process.

1.3.1 RBC Planning Process

Stakeholder engagement was the foundation of this plan—it drove the technical analysis and ultimately the development of a broad array of recommendations. In each of the major planning basins in the state, RBCs met monthly for approximately 2 years to follow the steps outlined in the Planning Framework. Exceptions to this included the Santee RBC, which accelerated the process because of the executive order deadline of December 2025, and the Catawba River basin, for which a commensurate IWRP is being developed by the pre-existing CWWMG.

Facilitated RBC Meetings: During the planning process, facilitated meetings, as shown in **Figure 1-7**, were conducted as outlined in **Table 1-1**. The goals were to understand the water availability, needs, and vulnerabilities throughout each basin and recommend actions in response to the technical assessment. While some variation occurred to accommodate schedules or the need for further discussion, the outline of each RBC process was generally consistent. Each of the four phases spanned approximately 6 months on average, with monthly meetings throughout.

Figure 1-7. Broad River Basin Council meeting.

Table 1-1. Typical facilitated RBC meeting discussion topics and activities.

PHASE 1 Orientation, Vision, and Goals	**PHASE 2** Water Availability	**PHASE 3** Water Management Strategies	**PHASE 4** Recommendations and River Basin Plans
Orientation / kickoff	<u>Surface water model analysis scenarios:</u> Current Use Moderate Demand – 2070 High Demand – 2070 Fully Permitted and Registered Use Unimpaired Flows	Overview of water management strategies and evaluation methods	Development of drought management, planning process, technical, policy, legislative, and regulatory recommendations
Vision and goals	<u>Groundwater model analysis</u> (where applicable)	Evaluation of water management strategies	Preparation of draft and final River Basin Plans
Basin hydrology and water legislation		Water management strategy recommendations and prioritization	
Water demands			
Other topics / field visit			
Preview of methods to examine water availability, demands, etc.			

Technical Data and Modeling: To support these meetings, and in direct response to the 2004 Plan, the RBCs furthered the technical understanding of water availability and management options in each basin through surface water modeling. The Simplified Water Allocation Model was used in seven of the eight basins. A pre-existing model with specialized software was used for the Catawba River basin. Each model simulated the flows (water quantity) throughout the river network in the basin, considering water withdrawals and discharges.

Additionally, the groundwater model of the aquifers in the Coastal Plain is being updated by the U.S. Geological Survey. Its intent is to examine the potential impacts of current and future groundwater pumping patterns on groundwater levels. The current version was used to support the planning process in the Edisto River basin, and the updated version will be used in the Lower Savannah-Salkehatchie, Pee Dee, and Santee River basins.

South Edisto River from Bobcat Landing

RBC Recommendations: Based on the technical needs assessment and facilitated dialogue, the RBCs formulated recommendations for their own planning basins, while also considering ideas that could provide value to the whole state. Five key types of recommendations were made and are discussed further in Chapters 7, 8, and 9 of each River Basin Plan. The recommendation types are summarized below; recommendations are discussed further in Chapter 7 of this State Water Plan.

- **Drought Management Recommendations:** In accordance with the South Carolina Drought Response Act of 2000, SCDNR developed a statewide drought mitigation plan. To supplement this, and to help coordinate drought preparedness and response across the state, RBCs developed specific recommendations on drought communication, regional coordination, and utility-level plan updates. Their recommendations and a discussion of drought history, impacts, and response are included in Chapter 3.

- **Water Management Strategies:** Most RBCs and WaterSC recommended both demand-side strategies (e.g., conservation and efficiency) and supply-side strategies (e.g., source expansion, new sources, alternative operations). These were often divided into municipal (including industrial) and agricultural measures and were frequently categorized by time horizon (short-term, meaning in the next 1 to 5 years, or longer-term, meaning in more than 5 years). The strategies are summarized in Chapter 6.

- **Planning Process Recommendations:** Each RBC identified ways the planning process can improve and evolve in future phases. Recommendations included process improvements and expanding the scope of topics that should be considered in future planning phases.

- **Technical and Program Recommendations:** RBCs identified data or information gaps that would be helpful in future phases of planning.

- **Policy, Legislative, and Regulatory Recommendations:** The RBCs engaged in discussion about issues and concerns with the existing policies, laws, and regulations governing water withdrawals and water use. Most RBCs made recommendations in their plans that garnered either full consensus or majority consensus for further consideration.

Savannah River at Augusta

1.3.2 WaterSC Planning Process

WaterSC was formed in 2024, in response to the governor's executive order. Its specific charges were to:

- Report to the General Assembly's Surface Water Study Committee (functionally expanded to also consider groundwater) on the state of surface water in South Carolina and make any consensus-based recommendations on additions or changes to current water law.
- Advise and assist SCDES regarding statewide water resources policy and recommendations for changes in law or regulations required to implement this updated State Water Plan.

Throughout the meetings, the group adopted the following as its guiding principles to help focus discussion and evaluate potential recommendations:

- Water is a shared resource with shared responsibility.
- A collaborative approach to develop and implement a science-based actionable plan.
- A plan that balances economic, environmental, and community needs.
- A plan that secures reliable and resilient water resources for the future.

WaterSC, shown in **Figure 1-8**, is composed of largely the same water interest groups as the RBCs (**Figure 1-5**). The group's process is characterized by a series of facilitated meetings intended to develop recommendations for SCDES by blending participants' knowledge about water needs in South Carolina with the comprehensive technical information and recommendations in the River Basin Plans developed by the RBCs.

Figure 1-8. WaterSC with Governor McMaster.

Figure 1-9 summarizes the general activities that WaterSC performed to formulate practical and comprehensive recommendations. Like the RBCs, the group's deliberations were grounded in science, and early meetings included informative presentations on hydrology and water needs throughout the state. The group then developed recommendations, which are summarized in Chapter 7.

Figure 1-9. WaterSC activities throughout 2025.

1.3.3 Focus on Actionable Recommendations

As with any comprehensive planning process, not all issues are fully reconcilable because of limited time and differing opinions and values. For this reason, this plan focuses its summary of recommendations on those that are actionable and broadly supported. The individual River Basin Plans provide additional recommendations and a discussion of diverse viewpoints that can aid decision-makers now and in the future.

Lake Marion Dam and Santee River

1.4 ROLES AND RESPONSIBILITIES

This plan has been developed by SCDES, with substantial guidance and input from the RBCs and WaterSC. The public was also invited to participate during plan development. The roles of each group involved are noted below, for context while reading the document:

- **SCDES:** Responsible for developing a stakeholder-driven plan that embodies the recommendations of the RBCs and WaterSC, and the strategic vision and goals of the agency. The State Water Plan will incorporate recommendations for water management; drought response; the planning process; data needs; and conceptual changes to water policy, laws, and regulations that extend across the eight river basins within the state.

- **River Basin Councils:** Each RBC has drafted a River Basin Plan that includes condition assessments on the balance between supply and demand; impacts of water use on users and ecological conditions; and recommendations for water management, the planning process, data needs, and conceptual changes to water policy, laws, and regulations. RBC leadership has interacted with WaterSC and SCDES to help explain the key priorities in each basin, and the level of support from RBC membership.

- **WaterSC:** Advises and assists SCDES regarding the comprehensive water resources policy for the state such that SCDES may issue an updated State Water Plan on or before December 31, 2025. WaterSC will inform SCDES concerning recommendations regarding any changes in law or regulation that may be required to implement the updated State Water Plan, including any changes related to the use and control of surface water and groundwater in the state.

- **Public:** Several rounds of statewide listening sessions offered opportunities to connect with a broader range of community leaders and others with interests in the state's water resources. The public was also invited to submit comments throughout the WaterSC process and in response to the draft State Water Plan.

Saluda Lake Dam

1.5 NAVIGATING THIS PLAN

This plan is generally structured per the recommended guidelines in the Planning Framework, with adaptations to effectively report on the process, its findings, and a list of actionable recommendations. It stands as both a summary document and a directive for action. **Table 1-2** outlines the contents of each chapter.

Table 1-2. Organization of the State Water Plan.

	Chapter Title	Description
1	Introduction	Drivers for this plan, aspirational goals, basis of this plan in prior and ongoing work, and overview of the planning process.
2	Water Resources and Management	Description of the state's water resources/climate, water law and management, and data and modeling tools.
3	Drought and Drought Response in SC	Summary of current drought management practices and advisory groups, and overview of RBC-developed recommendations to improve communication, coordination, and the implementation of drought management strategies.
4	Current and Future Water Demand	Summary of RBC assessments of past, current, and projected sectoral water demands, including aggregation into statewide statistics.
5	Water Availability Assessment	Summary of RBC assessments of vulnerabilities, potential for shortages, and impacts of water use on river flows and reservoir and groundwater levels, including aggregation into a statewide characterization of water availability and supply.
6	Water Management Strategies	Summary of water management strategies recommended by the RBCs and WaterSC, including the priorities per basin and recommendations for statewide strategies.
7	WaterSC Recommendations	Recommendations made by WaterSC focusing on water planning, interstate water management, drought response, permitting, and other topics.
8	River Basin Council Recommendations	RBC recommendations for enhancing the water planning process, improving technical information to support better decision making, and changes to policy, regulation, and law.
9	Next Steps and Considerations	SCDES's next planning steps and considerations to sustain water planning efforts and improve water resource management and resilience.
10	References	List of cited references used throughout the State Water Plan.


Bushy Park Reservoir

Jones Gap State Park

Water Resources and Management

One of South Carolina's greatest natural resources is its plentiful supply of water. The state's numerous rivers, human-made reservoirs, and vast underground aquifers provide an abundant supply of water that supports the state's population, economy, and natural systems. Although South Carolina's water resources are usually more than adequate to meet these needs, increasing water demands from a growing population and expanding economy will eventually begin to strain the resources. For water planners and managers, knowing the quantity and location of water is critical, and anticipating the impact of future water demands can help managers prepare for potential problems or avoid them altogether.

This chapter provides a brief description of South Carolina's surface water and groundwater resources, the monitoring networks used to quantify those resources, tools used by the River Basin Councils (RBCs) to predict future water availability, and the current laws and regulations that are used to manage the state's water resources.

SUMMARY

South Carolina is fortunate to have an abundant supply of water, thanks to its rivers, streams, reservoirs, and groundwater aquifers. These water resources support the state's population, economy, and ecosystems, but growing demands from development and population increases are beginning to challenge their sustainability. Understanding where water is located and how much is available is essential for effective water planning and management.

The state's geography and climate are important in shaping the state's water resources. South Carolina spans three physiographic provinces—Blue Ridge, Piedmont, and Coastal Plain—each with distinct geological and hydrological characteristics. The Coastal Plain, which covers most of the state, contains the major aquifers, while the Piedmont relies more heavily on surface water. The climate is humid subtropical, with hot summers and mild winters, and the state receives about 48 inches of precipitation annually. However, droughts are a recurring threat, with notable events in recent decades highlighting the vulnerability of water supplies.

Surface water primarily occurs in rivers, streams, and reservoirs. These systems are shaped by topography and organized into drainage basins, which define how water flows across the landscape. South Carolina's four major river basins—Ashepoo-Combahee-Edisto (ACE), Pee Dee, Santee, and Savannah—drain approximately 30 billion gallons of water to the ocean daily. Reservoirs, which primarily occur in the Piedmont, are critical for water storage, power generation, and recreation, but can also alter ecosystems and streamflow patterns.

Groundwater, primarily found in the Coastal Plain, is stored in thick layers of sand and limestone. These aquifers can yield hundreds of gallons per minute, making them vital for agriculture, industry, and other uses. In contrast, groundwater in the Piedmont is limited because it is stored in bedrock fractures that yield much less water. Overuse of groundwater can lead to declining levels and environmental consequences such as saltwater intrusion and land subsidence.

To manage these resources, South Carolina uses a combination of monitoring networks and predictive models. The U.S. Geological Survey (USGS) and state agencies operate hundreds of streamflow and groundwater monitoring stations. Tools like the Simplified Water Allocation Model (SWAM) simulate surface water availability, while a groundwater flow model being developed will help assess aquifer conditions in the Coastal Plain. Biological metrics are also used to evaluate how changes in streamflow affect aquatic life, guiding planning decisions.

Water use is regulated by two key state laws. The South Carolina Surface Water Withdrawal, Permitting, Use, and Reporting Act requires permits or registrations for users withdrawing over three million gallons per month, with 307 users currently reporting. The Groundwater Use and Reporting Act governs groundwater use, establishing six Capacity Use Areas (CUAs) across the Coastal Plain, where permits and management plans are required. Over 1,000 groundwater users report their withdrawals annually, providing essential data for planning.

Bushy Park Reservoir

2.1 PHYSIOGRAPHIC SETTING

The state's physiographic, geologic, and climatic settings are key factors determining the availability and distribution of the state's water resources. South Carolina contains parts of three major physiographic provinces that encompass the southeastern United States: the Blue Ridge, Piedmont, and Coastal Plain. These provinces are defined based on physical geography and geology (**Figure 2-1**). The boundary between the Blue Ridge and Piedmont is defined by a sharp change in topographic slope at an elevation of about 1,000 feet, but from a hydrogeologic perspective, the Piedmont and Blue Ridge provinces are similar. The boundary between the Piedmont and Coastal Plain, called the Fall Line, is defined as the surface contact between the igneous and metamorphic rocks of the Piedmont and the unconsolidated sediments of the Coastal Plain. The Coastal Plain encompasses roughly the southeastern two-thirds of the state, extending from the Fall Line to the coast, and is relatively flat compared to the Piedmont. Hydrologically, the Piedmont and Coastal Plain regions are very different, particularly regarding groundwater availability, as the state's major aquifers are found only in the Coastal Plain.

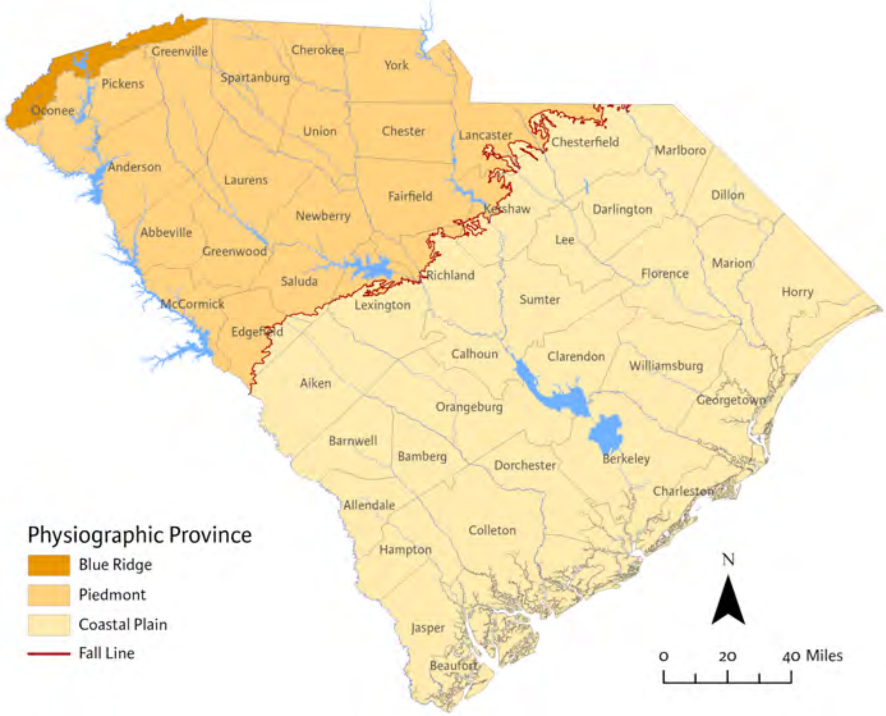


Figure 2-1. Map showing the Blue Ridge, Piedmont, and Coastal Plain physiographic provinces in South Carolina.

Lake Jocassee

2.2 CLIMATE

Most of South Carolina has a humid subtropical climate, resulting in hot, humid summers and mild winters. Because of South Carolina's position within the mid-latitudes, prevailing westerly winds help steer weather systems across the region, but the Appalachian Mountains tend to block most cold air outbreaks, contributing to the state's mild winters. The presence of the Atlantic Ocean provides a persistent flow of warm, moist air into the region. As a coastal state, South Carolina regularly experiences severe weather in the form of thunderstorms, tornadoes, tropical cyclones, and winter storms.

Average annual temperatures vary from the mid-50s in the Upstate to the low 60s along the coast. During the winter, average temperatures range from the mid-30s in the mountains to the lower 50s near the coast. During the summer, average temperatures range from the upper 60s in the Upstate to the mid-70s in the southern part of the state. Summer maximum temperatures can exceed 100 degrees Fahrenheit (SCDNR State Climatology Office [SCO] 2025a).

The statewide annual average precipitation is 48 inches. Of this amount, about 34 inches is returned to the atmosphere through evapotranspiration (the combined processes of evaporation and plant transpiration), 13 inches enters the ocean as streamflow, and less than 1 inch enters the ocean as groundwater discharge (SCDNR 2009).

The distribution of precipitation and evapotranspiration varies across the state. Average annual precipitation is highest in the Blue Ridge region (up to about 80 inches), and lowest in the central part of the state (less than 40 inches), Evapotranspiration is highest in the coastal part of the state (more than 40 inches) and lowest in the northwestern part (less than 30 inches) (SCDNR 2009).

Although South Carolina typically receives adequate precipitation, droughts can occur at any time of the year and last for several months to several years (**Figure 2-2**). Droughts in 1998 to 2002, 2007 to 2009, and 2011 to 2012 demonstrated there are limitations to the state's water supplies. During the drought of 1998 to 2002, rivers and lakes throughout the state were at historic lows, threatening water-supply intakes and causing saltwater encroachment in coastal areas. Severe, multi-year droughts like those experienced during the past 20 years illustrate the vulnerability of the state's water resources, and the wide-ranging impacts droughts can have on agriculture, forestry, power generation, public water supply, tourism, recreation, fisheries, and ecosystems. Drought and drought management strategies are discussed in more detail in Chapter 3.

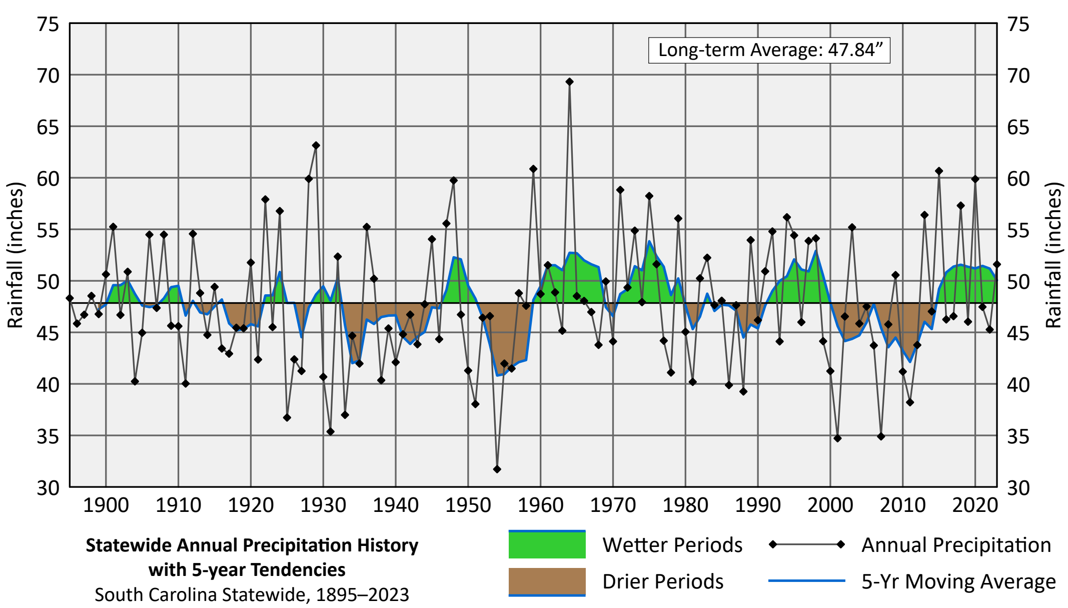


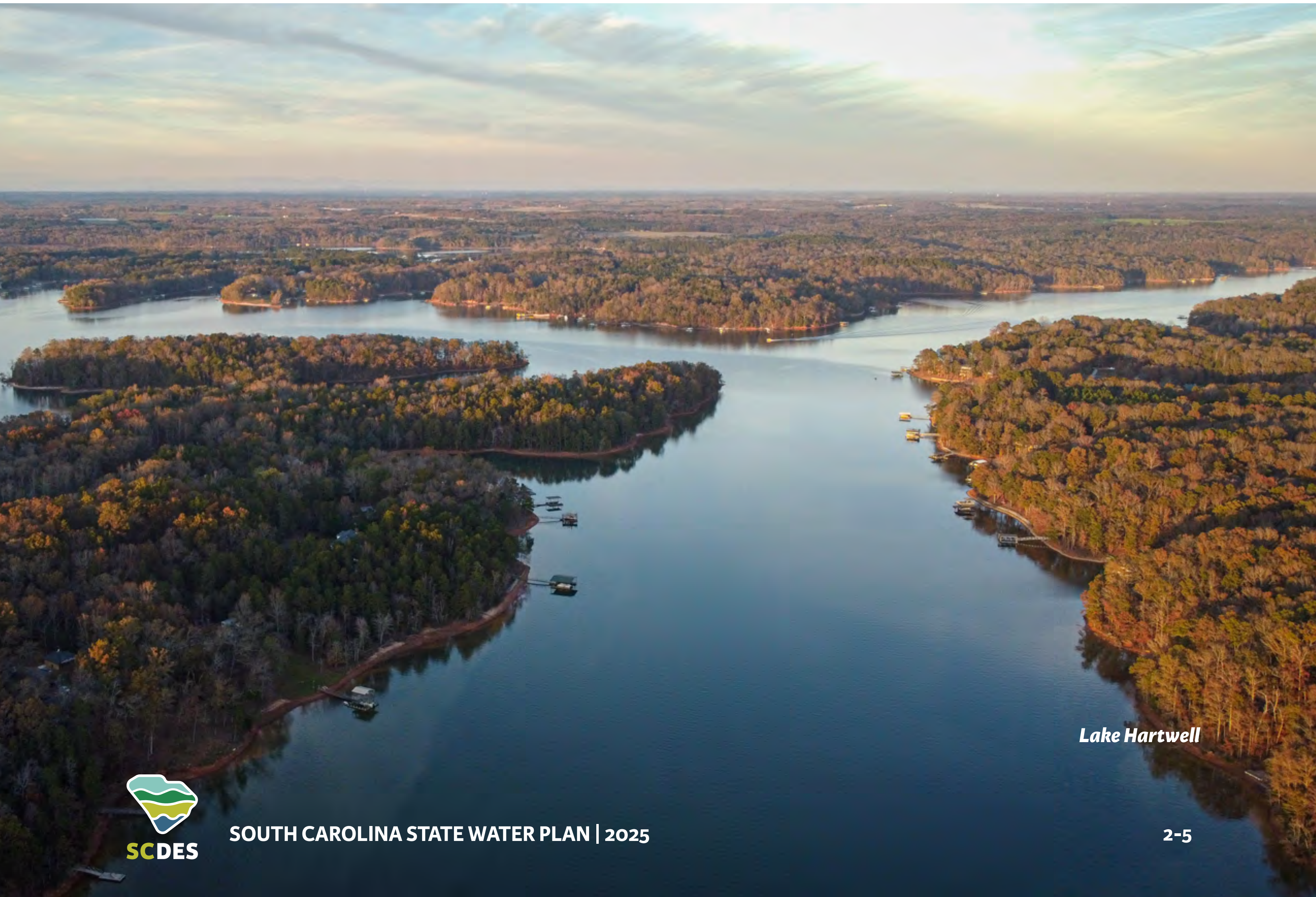
Figure 2-2. Statewide annual precipitation (in inches) for South Carolina, with 10-year averages used to show wetter (green) and drier (brown) periods. *(Data from SCDNR SCO.)*

2.3 SOUTH CAROLINA'S WATER RESOURCES

The water resources of South Carolina include both surface water and groundwater. Surface water refers to any water occurring on the surface of the earth, in creeks, streams, rivers, lakes, ponds, and wetlands. Surface water originates as precipitation that falls to the ground and drains overland or through shallow soil to small streams, then passes through increasingly larger streams and rivers, and ultimately drains to the ocean. Groundwater refers to any water present beneath the land surface, in pore spaces of soils and sediments, and in fractures of rock formations. Groundwater originates as precipitation or surface water that infiltrates into the soil, slowly moving deeper into the pore spaces of sediments or fractures in rock. Most groundwater occurs in aquifers, which are thick layers of buried sediment that extend over large areas and can store and transmit large quantities of water.

South Carolina has an abundance of clean, fresh water, but it is unevenly distributed in both location and time. Almost all the state's water occurs as groundwater, with only about 1 percent of the state's water occurring as surface water. Most groundwater is stored in Coastal Plain aquifers, while most surface water is stored in reservoirs on large rivers in the Piedmont. Water is usually more abundant during the spring months, when streamflow and groundwater levels are highest, and less abundant during late summer and early fall, when streamflow and groundwater levels are typically at their lowest.

Although much more water is available underground, surface water is used for most large water supplies in the state because of its convenience and availability. About three-quarters of the state's population uses surface water for household use, and about one-quarter uses groundwater. Unlike surface water, some groundwater is available almost everywhere in the state and can be used without large-scale water treatment facilities and distribution systems, making groundwater a much more practical water supply in rural areas.



Lake Hartwell

2.3.1 Surface Water Resources

Surface water systems are generally controlled by the topography in which the water occurs. A drainage basin (or watershed) is an area of land in which precipitation collects and drains down-gradient to a common outlet, such as a stream or river. Drainage basins connect with other drainage basins as streams join to form larger streams and rivers that eventually drain to the ocean. Drainage basins can vary greatly in size, from local watersheds only a few square miles in area, to large river basins encompassing thousands of square miles. Because basins are defined by surface topography, the movement of surface water is contained within individual basins.

Streamflow is influenced by the physical characteristics of the watershed, and streams in different physiographic provinces have behaviors characteristic of those regions. Piedmont streams are highly dependent on rainfall and runoff, with groundwater providing little additional flow. In the lower Piedmont, no-flow conditions during dry summer and fall months are common. In the upper Coastal Plain, groundwater discharge from shallow aquifers to streams helps support streamflow, resulting in less variable flow year-round. In the lower Coastal Plain, streams are more dependent on rainfall and runoff than on groundwater discharge, and zero streamflow can be common during dry periods.

There are more than 11,000 miles of permanently flowing streams in South Carolina, draining an average of more than 30 billion gallons per day to the ocean through four major river basins (SCDNR 2009). The two largest basins, the Pee Dee and the Santee, encompass almost 60 percent of South Carolina's area. Both basins are shared with North Carolina, and a small portion of the Pee Dee basin is shared with Virginia. The Savannah basin encompasses about 15 percent of the state and is evenly shared with Georgia, with a small area at its northern tip located in North Carolina. The ACE river basin, which covers about 26 percent of the state, is the only major basin entirely within South Carolina (**Figure 2-3**). Large basins can be divided based on local drainage patterns into smaller subbasins, which can be further partitioned into even smaller local watersheds.

Although there are no significant naturally occurring lakes in South Carolina, there are more than 1,600 human-made lakes having an area of 10 acres or more (SCDNR 2009). These impoundments store more than 15 million acre-feet (nearly 5 trillion gallons) of water, 95 percent of which is contained in the state's 12 largest reservoirs. These 12 reservoirs, each of which can store more than 250,000 acre-feet, are primarily in the Piedmont province. Only two (Lakes Marion and Moultrie) are in the Coastal Plain.

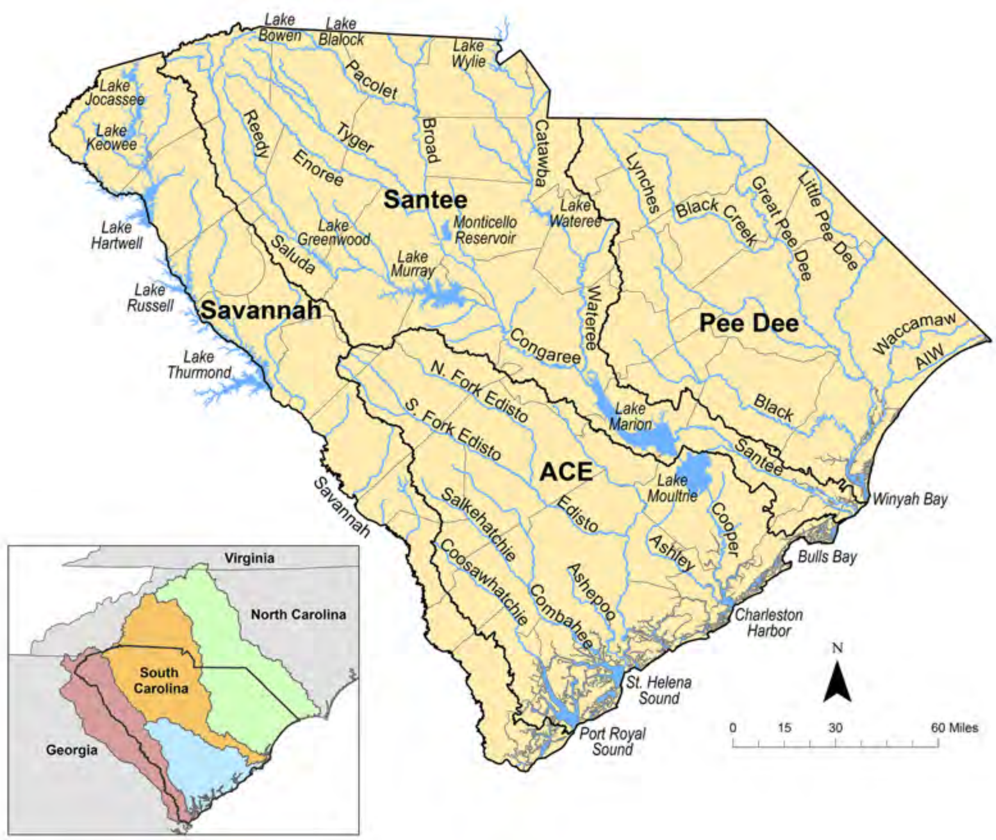


Figure 2-3. Map of South Carolina showing the major rivers, reservoirs, and river basins.

The state's large reservoirs have hydroelectric power plants, with most also serving as water sources for municipal supplies and as sites for recreation. Several smaller reservoirs, also mostly in the Piedmont, have been constructed for hydroelectric power generation and reliable water supply. Thousands of smaller, mostly privately owned ponds have been constructed on lesser streams throughout the state.

Reservoirs and rivers in a common basin are connected and interdependent. What happens in a river affects downstream reservoirs, and what happens in a reservoir affects the river downstream. Reservoir releases can sustain streamflow during extended dry periods, but reservoirs can also alter ecosystems and interrupt fish passage along a river. Perhaps the most significant impact a reservoir has on its river is the change in the downstream flow regime. The effective management of the state's surface water systems requires a coordinated and balanced management of both reservoirs and rivers.

Although surface water is used throughout the state, it is of particular importance in the Piedmont region, where groundwater supplies are limited. Most municipalities and larger water systems in the Piedmont withdraw water from reservoirs or rivers. Numerous larger water providers in the Coastal Plain also rely on surface water for their needs.

2.3.2 Groundwater Resources

The Coastal Plain is characterized by a wedge of sand, clay, silt, and limestone sediments overlying metamorphic and igneous bedrock. These sediments, which thicken seaward from a featheredge at the Fall Line to more than 1,500 feet in Horry County and almost 4,000 feet in southern Jasper and Beaufort counties, occur as distinct layers of sand, clay, or limestone, all of which are saturated with water (**Figure 2-4**). The extensive, permeable sand and limestone layers hold vast quantities of water and form the state's largest and most important aquifers. Impermeable clay layers form confining units that separate the aquifers and generally prevent water moving vertically from one aquifer to another. Water enters an aquifer primarily in its outcrop area, which is the location where the sediments are at or close to land surface. In these recharge areas, precipitation and surface water slowly move down into the sediment, eventually moving laterally through the aquifer toward the coast.

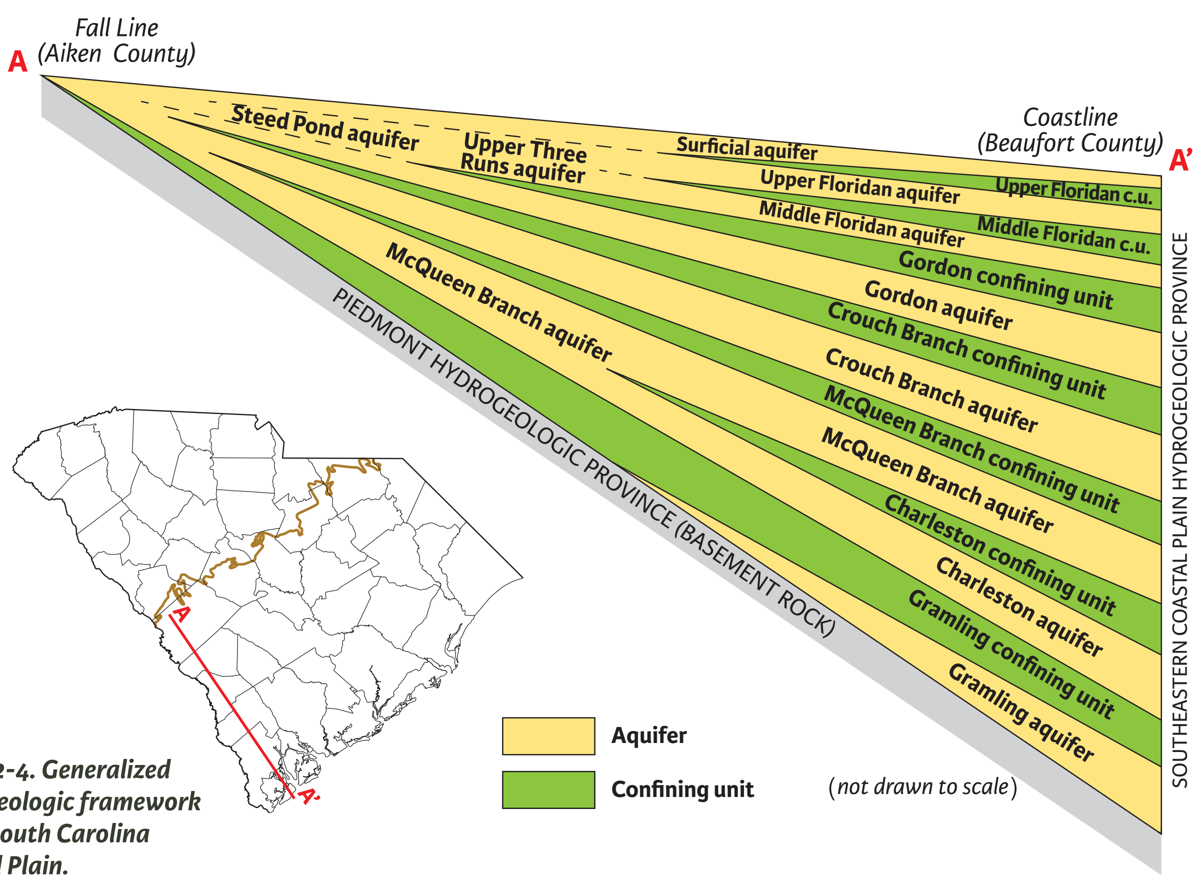


Figure 2-4. Generalized hydrogeologic framework of the South Carolina Coastal Plain.

Because of their volume, Coastal Plain aquifers can store and transmit large quantities of water. The permeable nature of these aquifers also means wells pumping from them can typically produce at least several hundred gallons of water per minute.

Owing to its abundance and availability, groundwater is a source of water for many public, industrial, agricultural, and domestic uses throughout the Coastal Plain. In some areas, groundwater is the only significant water source available, and many small towns not located near large rivers rely exclusively on groundwater for their water supplies. Other cities and regional water systems use groundwater in conjunction with surface water. In rural areas where residents do not have access to regional water systems, groundwater is the primary water source for household use. The ability to produce hundreds of gallons per minute from wells makes groundwater especially important for agricultural irrigation almost everywhere in the Coastal Plain.

In the Piedmont and Blue Ridge regions, which lack the porous sediments that form aquifers like those of the Coastal Plain, groundwater is stored in fractures in the bedrock and in a soil-like layer of weathered rock called saprolite that rests on the bedrock. The continuity and permeability of bedrock fractures and the thickness of saprolite control the occurrence of groundwater. Generally, the storage capacity of fractures and saprolite is very small compared to Coastal Plain aquifers, and wells in the Piedmont typically yield less than 10 gallons per minute. Because Piedmont wells generally have low yields, groundwater is rarely used for applications requiring large volumes of water; however, groundwater is an important source of water for many rural domestic uses in the Piedmont.

Groundwater is a renewable resource, but pumping from wells at rates exceeding natural replenishment ultimately causes groundwater levels to decline. Regional water-level declines have been observed in most aquifers, and local water-level declines of more than 200 feet have been measured in some areas of heavy groundwater use. Significant lowering of groundwater levels can result in many undesirable consequences, including a reduction in the yields of nearby wells, increased pumping costs, reduced flow rates in streams, altered groundwater flow patterns that can lead to saltwater intrusion in coastal areas, the depletion of wetlands, land subsidence, the development of sinkholes, and the irreversible compaction of the aquifer and permanent depletion of the resource.

Table Rock at Lake Oolenoy, Table Rock State Park

2.3.3 Development of Basin-Scale Water Planning Areas

Because surface water in a watershed is geographically controlled and generally isolated from water in surrounding basins, the river basin is a natural unit for planning. A river basin offers a means of accounting for surface water availability and use, and thus for planning. Aquifers, however, are generally not bounded by surface topography, and the occurrence and movement of groundwater is largely unconstrained by drainage divides defining river basins. Ideally, groundwater would be managed over the entire extent of each aquifer; but because the boundaries of aquifers do not coincide with the boundaries of surface water basins, a compromise is needed if both systems are to be considered concurrently during the water planning process. For this water planning effort, planning regions were chosen to correspond to surface water basins. Additional interaction and cooperation among neighboring planning regions will be required to address groundwater issues common to multiple basins.

Although the *South Carolina State Water Plan Second Edition* (2004 Plan) recommended developing water plans for the state's four major basins (**Figure 2-3**), for this iteration of water planning, SCDNR, SCDHEC, and the State Water Planning Process Advisory Committee recognized the logistical difficulty of planning for such large basins and decided to subdivide several larger basins to develop the eight planning basins shown in **Figure 1-1**.

Center pivot irrigation system

2.4 RESOURCE MONITORING AND PLANNING TOOLS

2.4.1 Surface Water Monitoring Network

USGS conducts most of the streamflow monitoring in South Carolina. USGS streamflow data are one of the most important hydrologic datasets for water resource management in the state. The USGS surface water monitoring network in South Carolina currently consists of about 275 gages across the state (**Figure 2-5**). More than half of the gages measure both stream stage (water level in feet above a defined datum/point in a river or lake) and stream discharge (volumetric flow rate), while the remaining gages measure stage only. Funding support for the gages are provided by various public and private entities in the state and include state and federal agencies, water and electric utilities, industrial users, local governments, and conservation groups.

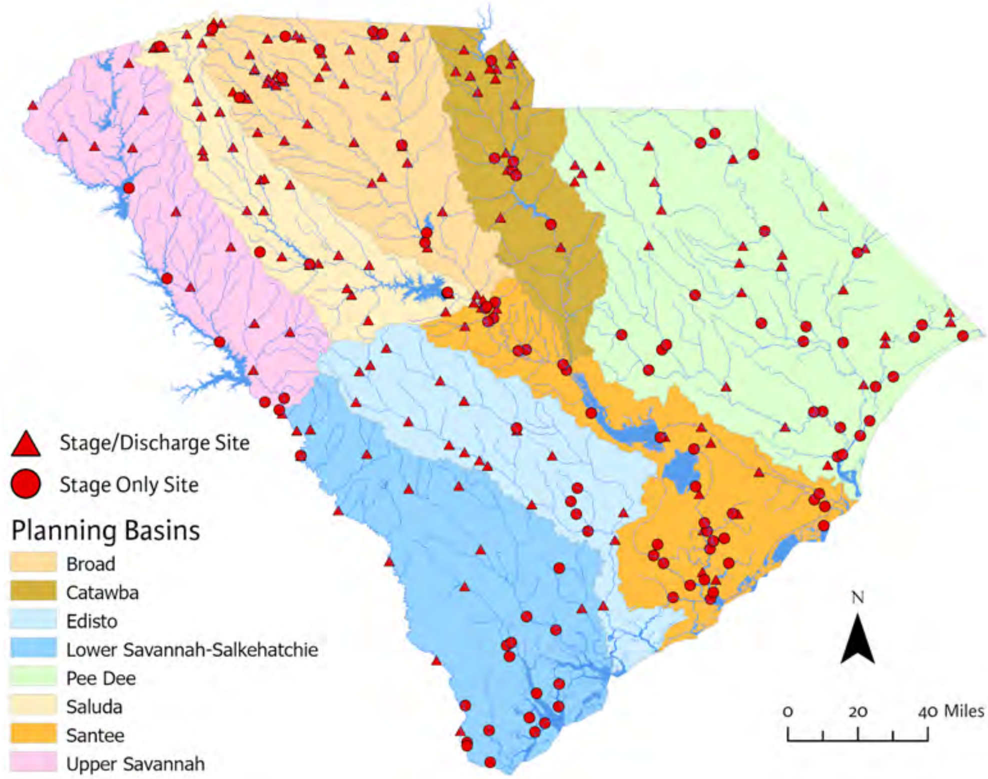


Figure 2-5. Map showing the locations of USGS streamflow and stage-only gages currently operating in South Carolina (as of December 2025).

Several gages, mostly on major rivers and larger tributaries, have been in operation since the 1920s and 1930s. Long-term records for stream stage and discharge are vital for understanding the magnitude, timing, and frequency of streamflow (including flood and drought flows) in the state, and meaningful streamflow statistics typically require at least 20 years of record.

Streamflow data are critical to numerous water management activities such as drought assessments, determination of low-flow statistics (such as 7Q10s), determination of minimum instream flows and other ecological flow assessments, flood frequency studies, flood forecasting, calibrating hydrologic models, and general water availability information. USGS streamflow data are essential for the development of surface water quantity models such as those used in this planning effort.

2.4.2 Groundwater Monitoring Network

The water stored in most aquifers is under enough pressure that when a well is installed into an aquifer, the water level in the well will rise inside the well, far above the top of the aquifer. The depth from land surface to the water in the well is referred to as the groundwater level. Because groundwater levels are a function of water pressure in an aquifer, they serve as an indication of how much water is stored within an aquifer.

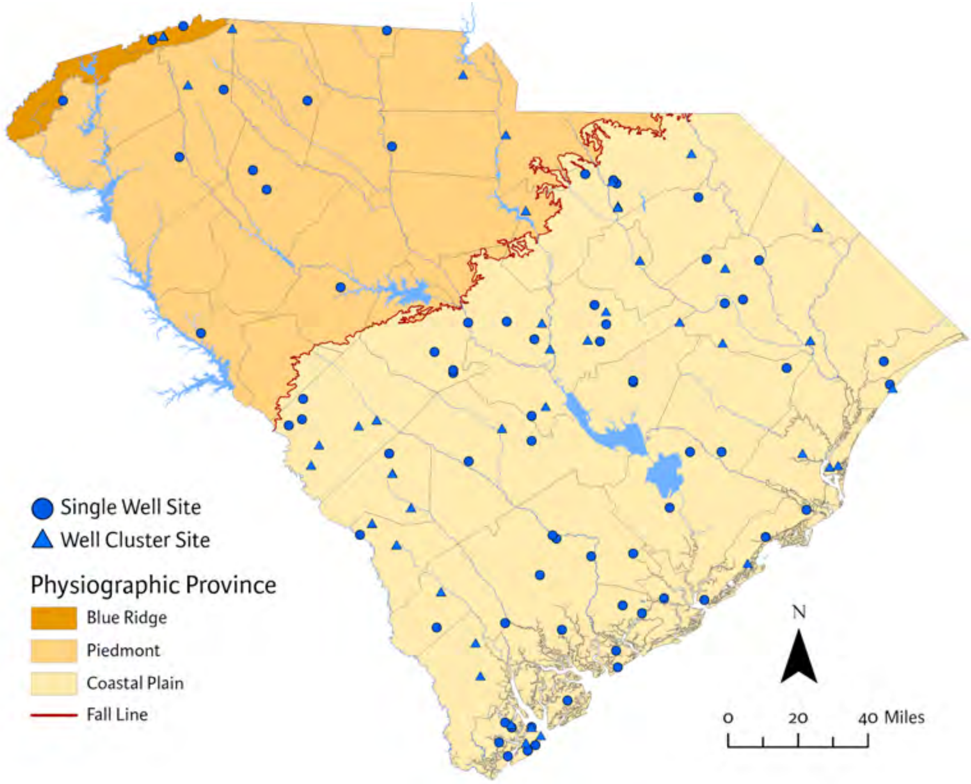


Figure 2-6. Map showing the locations of SCDES and USGS groundwater monitoring wells currently monitored in South Carolina (as of December 2025).

Groundwater levels are routinely measured throughout the state in a network of dedicated monitoring wells. SCDES regularly monitors approximately 190 wells at more than 100 sites, almost all of which are in the Coastal Plain. USGS monitors another 20 wells in South Carolina. Forty-one monitoring locations are well-cluster sites, meaning the site contains two or more wells open to different aquifers. The locations of SCDES and USGS monitoring wells are shown in **Figure 2-6**.

Terry Creek stream restoration site

Declining groundwater levels indicate the amount of water stored in an aquifer is decreasing, which occurs when the volume of water pumped from an aquifer exceeds the volume of water recharging into it (**Figure 2-7**). The severity of an observed groundwater level decline is dependent on several factors, including the magnitude of the decline, the groundwater level relative to the top of the aquifer, and the depths of the pump intakes in the wells withdrawing water.

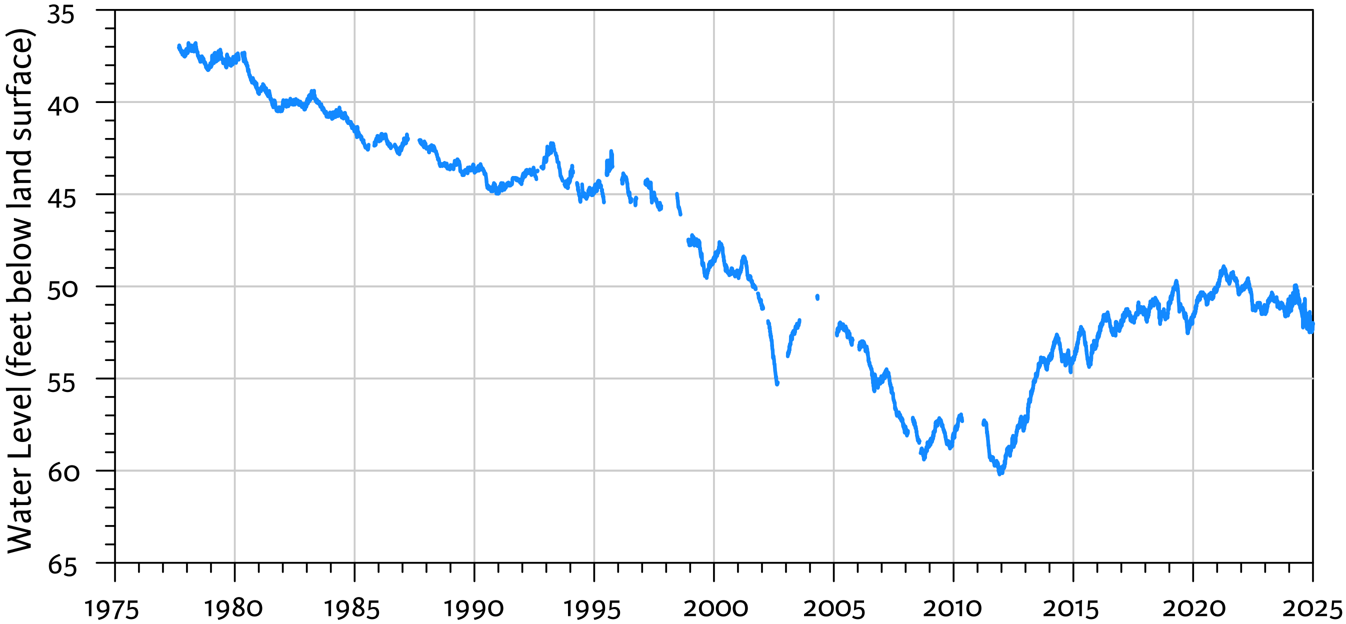
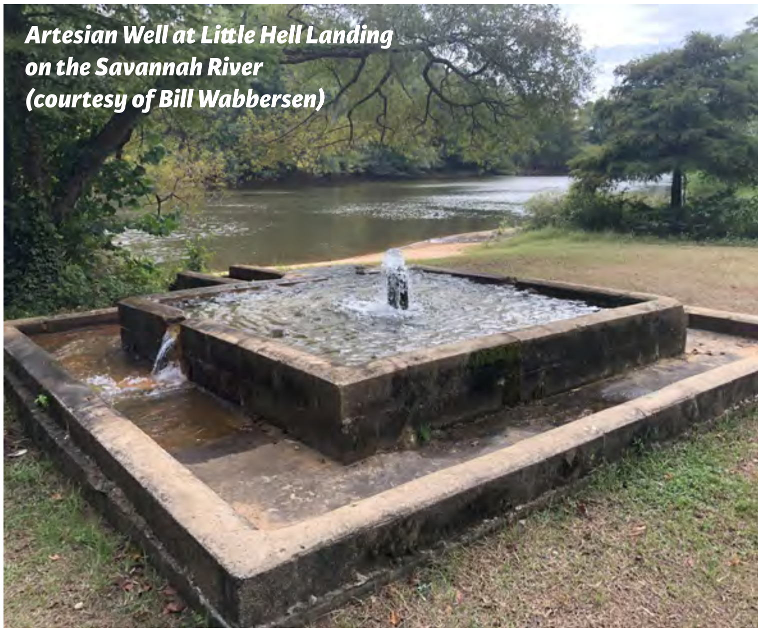


Figure 2-7. Hydrograph showing groundwater levels measured for more than 40 years in a monitoring well in Colleton County. *Declining water levels indicate less water is being stored in the aquifer, whereas rising groundwater levels indicate the aquifer is being recharged.*

While monitoring wells provide long-term, continuous records of aquifer conditions at specific points, potentiometric maps provide "snapshots" of aquifer conditions over the full extent of the aquifer at one moment in time. A potentiometric map is a contour map that illustrates the elevation to which groundwater will rise in wells open to a particular aquifer and is made using water level measurements from numerous wells located throughout an aquifer's extent, all measured at nearly the same time. Typically, SCDES produces new potentiometric maps for the Floridan, Gordon, Crouch Branch, McQueen Branch and Charleston aquifers every 3 years. Areas of relatively significant groundwater level declines are indicated on potentiometric maps by locally lower potentiometric elevations, known as cones of depression, which are usually centered near the pumping causing the decline. Cones of depression are often shown on potentiometric maps as concentric loops of contour lines; changes in the magnitude or areal extent of a cone of depression can be seen by viewing successive potentiometric maps.



Artesian Well at Little Hell Landing on the Savannah River (courtesy of Bill Wabbersen)

In addition to groundwater levels, groundwater electrical conductivity is also measured in 10 wells along the coast. Because conductivity varies with the salinity of the water, these wells are used to monitor for saltwater intrusion into coastal aquifers.

2.4.3 Surface Water Model

In August 2014, SCDNR contracted with CDM Smith, Inc. to develop surface water models for the eight designated river basins in the state (**Figure 1-1**) using SWAM. SWAM served as the primary planning model for assessing surface water availability in each river basin, providing a consistent technical platform throughout the planning process. The eight SWAM models were completed in 2017, but the models were updated as needed as planning activities began, to include more recent hydrologic information and water use data.

SWAM is an Excel-based water allocation model that computes water availability at user-defined nodes in a networked river system. The model incorporates water withdrawals and discharges, and can simulate reservoir operations of varying complexity. SWAM was developed to provide efficient planning-level analyses of water supply and river basins while maintaining a high level of accessibility to a wide range of end-users. A range of water user types can be represented in the model, including municipal water suppliers, agricultural irrigators, power companies, and industrial water users (**Figure 2-8**). SWAM's reservoir object can include basic hydrology-dependent calculations including storage as a function of inflow, outflow, and evaporation. It can also include operational rules of varying complexity. Municipal water conservation programs can similarly be simulated with sets of rules of varying complexity. The model user chooses the appropriate level of complexity given the modeling objectives and data availability.

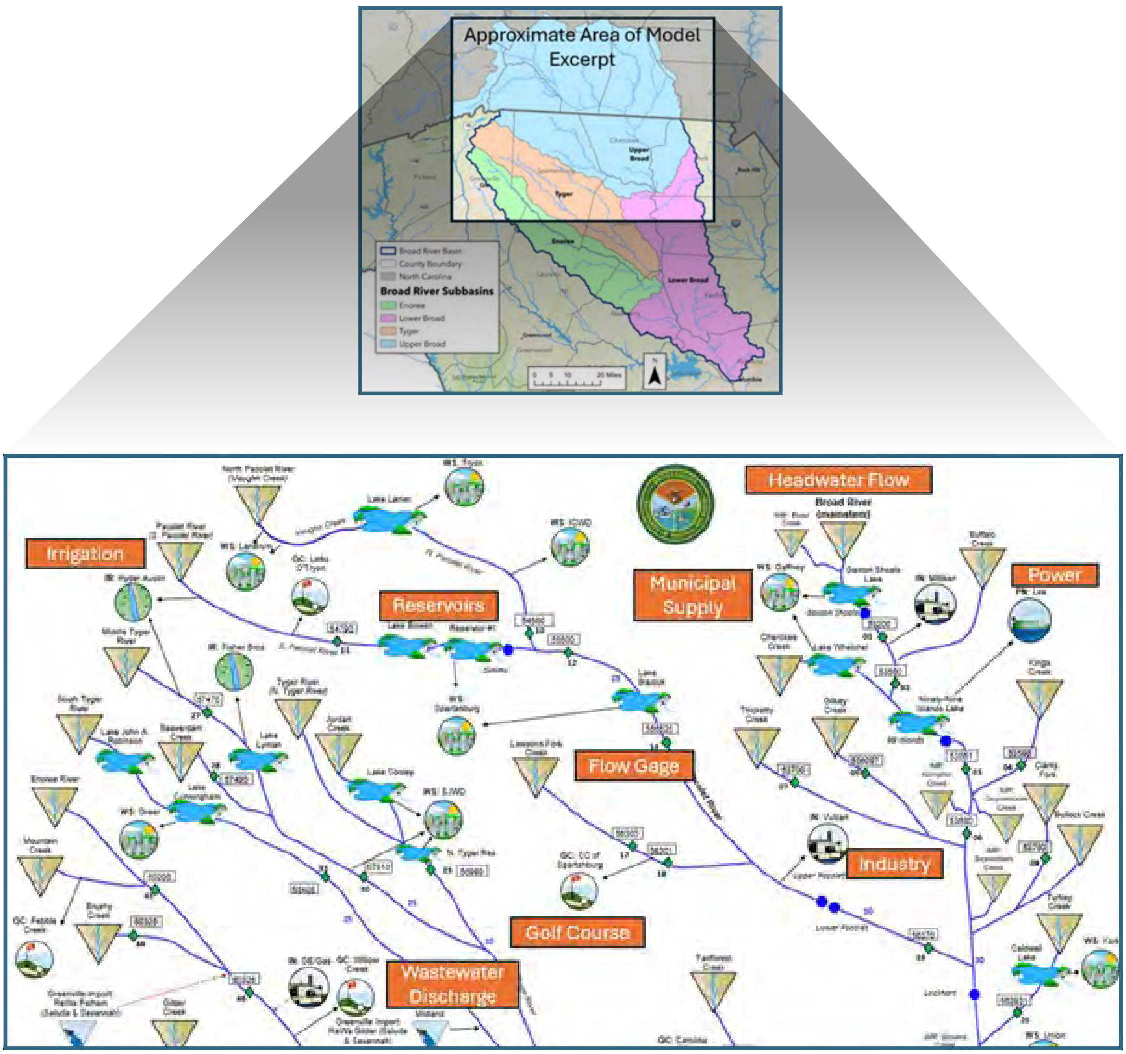


Figure 2-8. Excerpt of the Broad River basin SWAM model, illustrating key model elements. *Orange boxes highlight different types of elements in the SWAM model.*

For each basin, a SWAM model was developed using the basin's hydrology over the past 80 to 100 years, determined primarily from USGS streamflow data. The evaluation of future water availability during this planning effort assumed future hydrologic conditions will be similar to past conditions. Future planning efforts may investigate how variations in long-term climate cycles might change the frequency and severity of future droughts and their impacts on water availability.

The SWAM models were used to evaluate current and future water availability for the range of future water use scenarios described in Chapter 4. The models can also be used to assess various water management strategies that could be implemented to address water availability issues. More information about the SWAM models and their functionality can be found in the *South Carolina Surface Water Quantity Models Modeling Plan* (CDM Smith 2014).

2.4.4 Coastal Plain Groundwater Model

One important tool available to assist groundwater managers and planners is a groundwater flow model. Groundwater models use various hydrogeological properties of aquifers and confining units, measured groundwater levels, and groundwater use data to predict water levels in all aquifers throughout the modeled area at different times. Groundwater models can help managers understand the impact of groundwater withdrawals on an aquifer, and they can help evaluate the effectiveness of proposed groundwater management strategies. The models are particularly useful for identifying potential problems in areas for which actual water level measurements are unavailable.

In recent years, the USGS has been working with South Carolina state resource agencies to develop a groundwater flow model for the Coastal Plain of South Carolina with the intention to use the model for this planning effort. The new model will update and improve on the previous USGS model published in 2010 (Campbell and Coes 2010). For the four planning basins located primarily in the Coastal Plain, where groundwater is a significantly used and manageable resource, the new Coastal Plain groundwater flow model was intended to serve as the primary assessment tool for evaluating the potential impacts of future groundwater withdrawals on groundwater levels.

An early version of the updated groundwater model was used for the Edisto basin planning, and the model produced meaningful results: it identified of two areas that may experience potential water level problems in the future (**Figure 2-9**). During subsequent model development for the Pee Dee basin, previously unknown problems with the model were identified; resolving these problems delayed completing the model to the extent that it was unavailable for use in the Lower Savannah-Salkehatchie, Pee Dee, and Santee basins.

Regional groundwater models for all four Coastal Plain planning basins will be available in future planning activities to perform a more complete groundwater assessment.

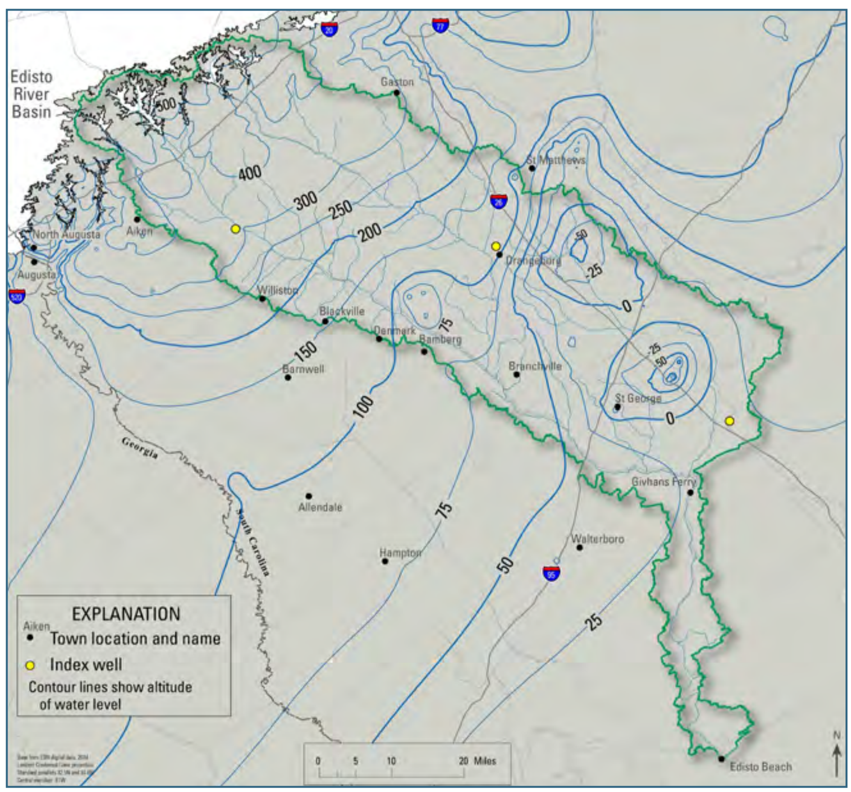


Figure 2-9. Potentiometric map showing simulated groundwater levels in the Crouch Branch aquifer produced by the Coastal Plain groundwater model used for planning in the Edisto basin.

2.4.5 Biological Response Metrics and Flow-Ecology Relationships

Responses of organisms to changes in stream flow have long been recognized in scientific literature, and the evaluation of this response can help inform water resources management. SCDNR and SCDES have been collecting fish and invertebrate data for the past several decades at over 1,000 sampling sites across the state; the evolution of methods, large data sets, and statistical improvements over the last 20 years have advanced the ability to characterize these responses.

Biological response metrics, such as species richness (the number of species found at a given site), were developed by Bower et al. (2022) and combined with hydrologic metrics, such as mean daily flow or the timing of lowest observed flow, to identify statistically significant relationships between flow characteristics and ecological suitability for fish and macroinvertebrates.

Flow–ecology relationships are represented graphically as a series of plots scaled to represent the estimated proportional change in the biotic metric that would result from a proportional change in the flow metric (**Figure 2-10**). The plots are used to identify potential flow thresholds that indicate a rapid change in a biological metric owing to a change in the flow regime. Two distinct thresholds were typically identified for each applied flow–ecology relationship, which produced three zones corresponding to high, medium, and low levels of biological health risk.

These flow–ecology relationships were used as performance measures to help guide RBC discussions and recommendations. Changes in flow regimes were simulated by SWAM for current and future water use scenarios and used to assess the biological risk at select locations in each basin.

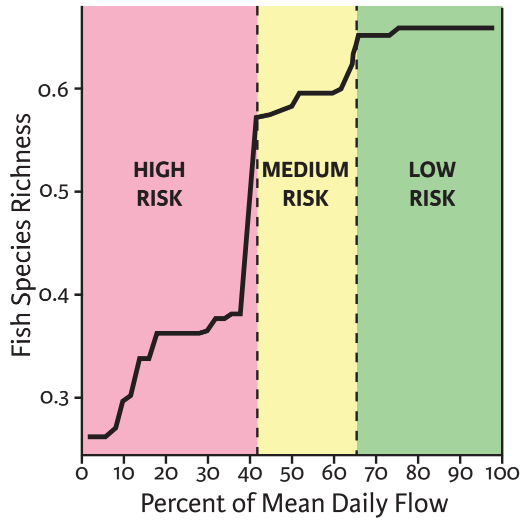


Figure 2-10. Example of the conversion of changes in biological metrics into risk. *This example compares decreased streamflow (compared to mean daily flow) to changes in fish species richness.*

2.5 STATE WATER LAW AND MANAGEMENT

While there are numerous state and federal laws regarding the use and management of the state's surface water and groundwater resources, the two most pertinent state laws are the South Carolina Surface Water Withdrawal, Permitting, Use, and Reporting Act, S.C. Code Sec. 49-4-10, et seq. (Surface Water Act), and the Groundwater Use and Reporting Act, S.C. Code Sec. 49-5-10 et seq. (Groundwater Act). These laws, and the regulations implementing them, address water withdrawal permitting, withdrawal limits, and reporting requirements for water withdrawers in South Carolina.

2.5.1 South Carolina Surface Water Withdrawal, Permitting, Use, and Reporting Act

The Surface Water Act, administered by SCDES, describes registration and permitting requirements for surface water withdrawers. The Surface Water Act requires any surface water user who withdraws more than three million gallons in any month to obtain a permit or registration, depending on the type of water use. The Surface Water Act defines three types of surface water users: existing (users who were already withdrawing, had a proposed withdrawal, or had their application administratively complete to start withdrawing by January 1, 2011); newly permitted (users who would, after the establishment of the Act, apply for a new surface water withdrawal permit not for agricultural use after January 1, 2011); and registered (users who make surface water withdrawals for agricultural uses at an agricultural facility or aquaculture facility).

Permits are issued for a duration of 20 to 50 years, whereas registrations have no expiration date. When the law went into effect, all existing withdrawers were "grandfathered in" and automatically issued permits or registrations. Newly permitted users are subject to restrictions that could limit their withdrawals if the streams from which they withdraw reach certain low-flow thresholds; existing permitted users and registered users are exempt from these restrictions.

All permitted and registered surface water withdrawers are required to report their monthly water use to SCDES annually. Surface water use has been reported since 1983, but the quality and completeness of the water use data greatly increased after 2000, when more stringent reporting requirements were implemented. After enactment in 2011, reported surface water use information has become more accurate and complete. Reported withdrawals are the primary source of surface water use knowledge for the state. As of November 2025, there are 307 reporting surface water withdrawers in South Carolina (**Figure 2-11**). Reported surface water withdrawal data were a key component of the surface water availability assessments conducted for the basin water planning efforts leading to this State Water Plan.

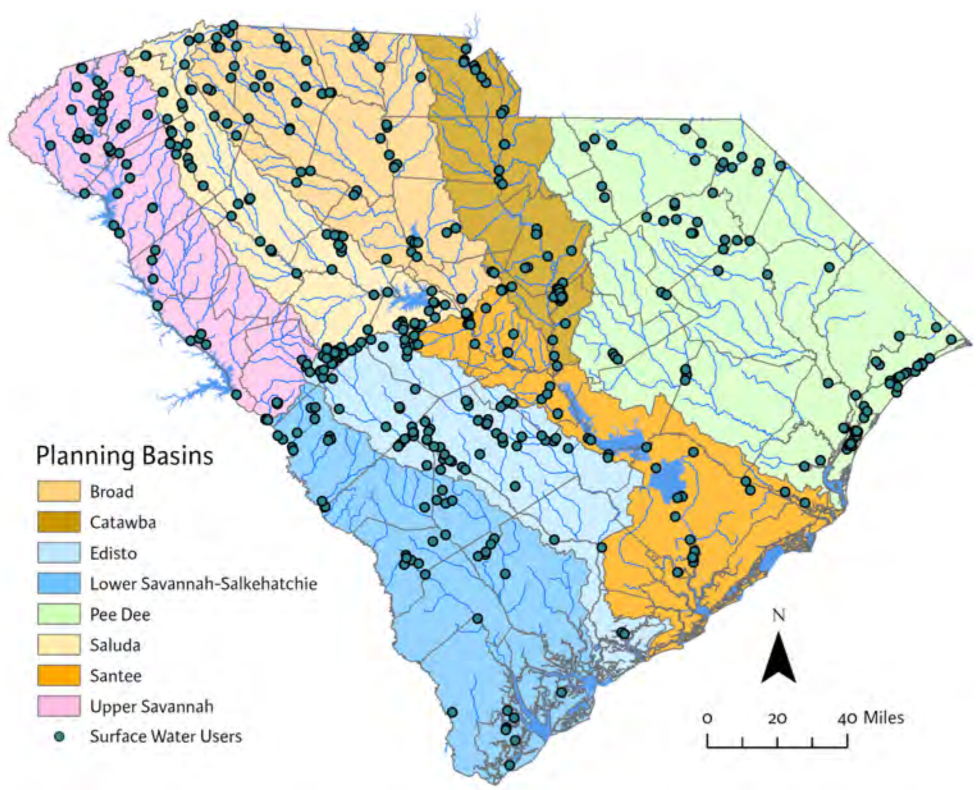


Figure 2-11. Map showing the locations of currently permitted and registered surface water users in South Carolina.

2.5.2 The Groundwater Use and Reporting Act

The Groundwater Act, administered by SCDES, is the principal law governing the management of groundwater quantity in South Carolina. The Groundwater Act establishes conditions for the designation of CUAs, which are defined as "areas in which excessive groundwater withdrawals have been shown to present potential adverse effects to the resource, to threaten the long-term integrity of a groundwater source, or to pose a threat to public health, safety, or economic welfare."

Six designated CUAs encompass all the counties in the Coastal Plain of South Carolina (**Figure 2-12**). These are:

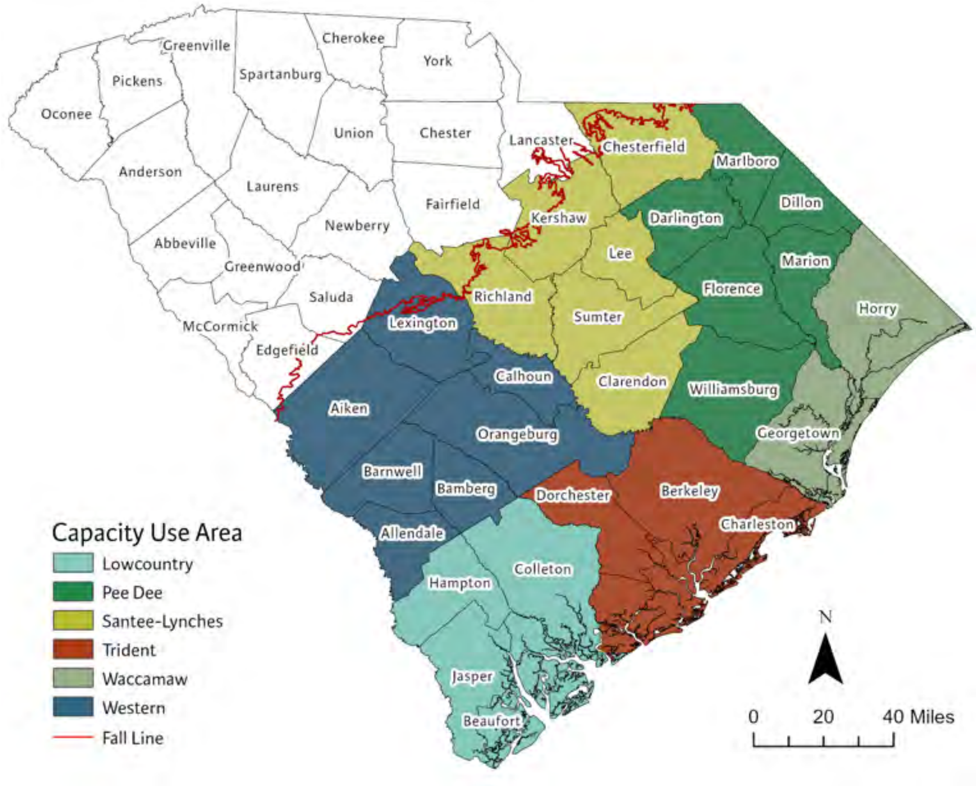


Figure 2-12. Map showing the designated Capacity Use Areas in South Carolina.

1. Waccamaw CUA, consisting of Georgetown and Horry Counties.
2. Trident CUA, consisting of Berkeley, Charleston, and Dorchester Counties.
3. Lowcountry CUA, consisting of Beaufort, Colleton, Hampton, and Jasper Counties.
4. Pee Dee CUA, consisting of Darlington, Dillon, Florence, Marion, Marlboro, and Williamsburg Counties.
5. Western CUA, consisting of Aiken, Allendale, Bamberg, Barnwell, Calhoun, Lexington, and Orangeburg Counties.
6. Santee-Lynches CUA, consisting of Chesterfield, Clarendon, Kershaw, Lee, Richland, and Sumter Counties.

The Groundwater Act directs SCDES to establish and implement local groundwater management plans for each CUA. The guiding principle in the development of these plans is "sustainability of the resource" such that groundwater development is managed to meet the needs of the present without compromising the ability of future generations to meet their needs. SCDES coordinates with local stakeholders during the development of the groundwater management plans.

In the CUAs, permits are required for groundwater users who withdraw three million gallons or more in any month. Permitting decisions must be consistent with the established groundwater management plans. Every 5 years, existing permits are evaluated and renewed in line with the findings of the current plan. In areas not within a CUA (essentially the Upstate counties), all groundwater users withdrawing more than three million gallons in any month are required to register their use with SCDES.

All permitted and registered groundwater withdrawers must report their groundwater sources and monthly groundwater use to SCDES annually. Groundwater use reporting has improved as each CUA has come into existence, with the last CUA, the Santee-Lynches, having been established in 2021. Like the reported surface water use data, reported groundwater withdrawal data is the primary source of information on groundwater use in the state. This withdrawal data documents how much water is withdrawn from each aquifer and when, which shows trends over time and average water use. As of September 2025, there are 1,021 reporting groundwater withdrawers in South Carolina (**Figure 2-13**). Reported groundwater use data were a key component of the groundwater availability assessments conducted for the basin water planning efforts leading to this State Water Plan.

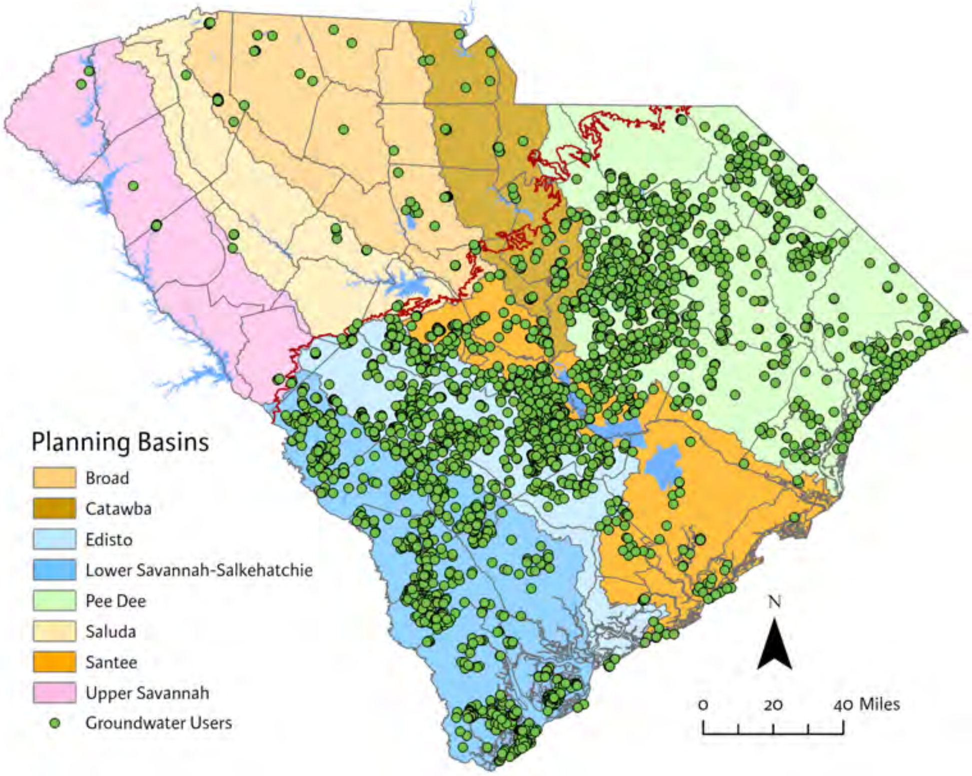


Figure 2-13. Map showing the locations of currently permitted and registered groundwater users in South Carolina.

Six of the eight river basin planning areas overlie at least one CUA, but the boundaries of the planning basins (which are defined by watersheds) and CUAs (which are defined by county boundaries) rarely align. Further, the boundaries of the major aquifers do not coincide with the boundaries of either the CUAs or planning basins. As such, groundwater use in one CUA or planning basin may impact groundwater availability in an adjacent CUA or planning basin.

Golf Course on Hilton Head

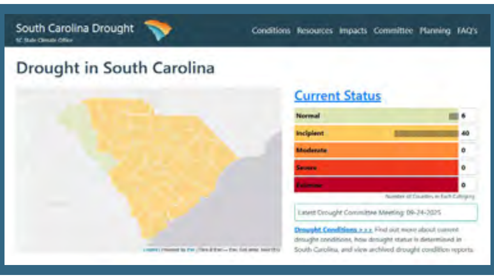
CHAPTER 3

Buffalo Creek at Lake Thurmond (courtesy Harry Shelley)

Drought and Drought Response

Drought can have widespread economic, social, and environmental impacts, and requires a comprehensive approach related to water planning.

Find comprehensive information about drought monitoring, resources, impacts and more at the South Carolina State Climatology Office website, www.scdrought.com.



This section defines drought; explores the different types of droughts that may affect South Carolina; reviews the history and impacts of drought in the state; summarizes existing state, basin, and local drought response plans; presents the drought planning and response recommendations made by the RBCs during the river basin planning process; and highlights the uncertainty around the future frequency, severity, and duration of drought.

SUMMARY

Drought is generally defined as a prolonged water shortage owing to insufficient precipitation. Droughts are further characterized based on how they develop and their impacts. Droughts can be classified as meteorological, hydrological, agricultural, socioeconomic, or ecological, and can range from short term (flash drought) to long term.

South Carolina's humid subtropical climate is prone to droughts year-round. Historical droughts, especially those in 1950 to 1957, 1998 to 2002, and 2007 to 2009, caused severe impacts across the agriculture, forestry, recreation, and public water supply sectors. These events highlight the need for effective drought planning, robust monitoring and response systems, and increased resilience.

The South Carolina Drought Response Act established in 2000 provides the state with a mechanism to respond to drought conditions and empowers SCDNR to formulate, coordinate, and execute a statewide drought mitigation plan. The Act also created the South Carolina Drought Response Committee (DRC) to be the major drought decision-making entity in the state. At the local level, public water systems must develop drought response plans aligned with the state's framework. These include voluntary and mandatory water use reductions during drought conditions. At the basin level, entities like Duke Energy, Santee Cooper, and the U.S. Army Corps of Engineers (USACE) implement basin-specific protocols to manage water during droughts.

During the river basin planning process, the RBCs developed recommendations intended to improve how local and state organizations plan, mitigate, and respond to drought. The RBCs' recommendations included several proposed improvements:

- Conduct 5-year updates to drought management plans and support smaller public water systems with technical and financial assistance for plan updates.
- Consider using drought surcharges to disincentivize high water use during drought.
- Coordinate drought response messaging and consistency in response actions between water utilities.
- Encourage more frequent and widespread drought condition reporting through the Condition Monitoring Observer Reports (CMOR) system.
- Enhance drought and climate monitoring via developing a statewide automated environmental monitoring network.
- Discourage decreasing block rate structures that incentivize high water use.

With increasing hydrologic variability, future droughts may be more frequent, severe, or longer. Proactive planning, improved data collection, and interagency coordination to address uncertainties are required. Protecting water resources and ecosystems will be increasingly necessary to build resiliency and mitigate impacts from drought as reliance on the state's water resources grows.

Buffalo Creek at Lake Thurmond (courtesy Harry Shelley)

3.1 DEFINING DROUGHT

Generally, drought may be defined as a water shortage brought about by a lack of precipitation over an extended period. In contrast to other environmental hazards, droughts develop slowly over weeks, months, or years. Given the many different types of drought and the multitude of environmental, social, and economic impacts they have, more specific definitions of drought have been developed, as shown in **Figure 3-1**. For example, a hydrologic drought could be defined conceptually as a reduction in streamflow, reservoir levels, and aquifer levels, resulting in reduced water supply availability. On the other hand, operational definitions of drought typically describe the degrees of departure from climatic variables to analyze drought frequency, severity, and duration. For example, the Standard Precipitation Index (SPI), the Palmer Drought Severity Index (PDSI), the Keetch-Byram Drought Index (KBDI), and indicators such as streamflow and soil moisture are often used to operationally identify the onset and severity of drought. Operationally defining drought helps water users, policy makers, and resource planners in recognizing and planning for drought (National Drought Mitigation Center [NDMC] 2025).

Traditionally defined by how they develop and their impacts, drought types can be classified as meteorological, hydrological, agricultural, socioeconomic, or ecological, and as either short term or long term.

- A **meteorological drought** may be defined by deficiencies in monthly or seasonal precipitation and is characterized by higher-than-average temperatures, high winds, low relative humidity, and less cloud cover. In South Carolina, one of the first impacts during the onset of a meteorological drought is the onset of brush fires.

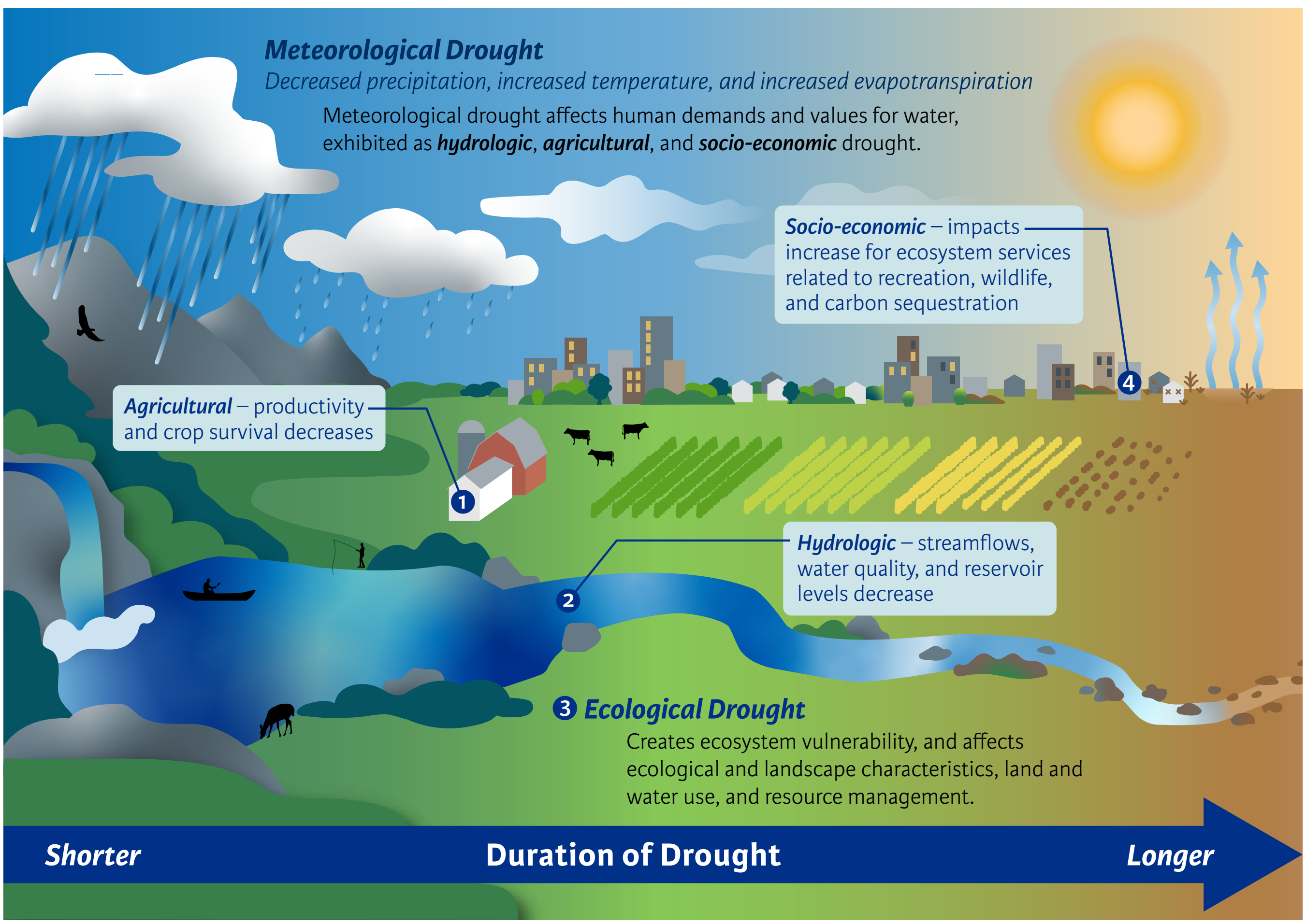


Figure 3-1. Types of drought.

Adapted from US Forest Service

- An **agricultural drought** may be determined by a combination of precipitation shortages; soil water deficits; reduced stream, lake, and groundwater levels; and other factors that impact crops and livestock. Soil water deficiencies in an agricultural drought may lead to plant water stress and reduced biomass and yield. **Flash drought** is a rapid onset, short-duration type of drought that fits into the broader categories of short-term drought and agricultural drought. Flash drought intensifies rapidly because of changes in precipitation, temperature, wind, and radiation. These changes in the weather increase evapotranspiration and lower soil moisture. Flash droughts can cause extensive damage to agriculture, economies, and ecosystems.

- A **hydrological drought** is measured by declines in streamflow, lake levels, or groundwater levels on a watershed- or river-basin scale. While a hydrological drought originates with the meteorological deficit in precipitation, it is measured based on the impacts to the hydrologic system. Generally, hydrologic impacts and deficiencies lag meteorological and agricultural indicators. For example, it may take several months for precipitation deficiencies to cause declines in reservoir levels.

- A **socioeconomic drought** considers the impacts of meteorological, agricultural, or hydrologic droughts on the supply and demand of economic goods. Socioeconomic drought occurs when there is a weather-related shortfall in water supply that is exceeded by the demand for water to meet an economic need. All regions of the state may experience a socioeconomic drought, although the economic drivers and impacts in each region are likely to differ.

- An **ecological drought** is a deficit in water availability that drives ecosystems beyond thresholds of vulnerability, impacts ecosystem services, and triggers feedback in natural and/or human systems. Ecological drought impacts may include reduced biodiversity, forest conversion, fish kills in streams, river degradation, and/or species migration. Short-term droughts may cause woody plants such as trees and shrubs to wilt, while long-term drought may cause native plants to die back and allow invasive plant species to intrude. Changes in plant cover during long-term drought reduce habitat for wildlife and affect water resources. Dry vegetation and higher-than-average temperatures can also leave regions more susceptible to wildfire. All regions of the state may experience ecological drought, although the impacts may differ substantially based on the type of ecosystems present.

Periods of precipitation deficit that last for a few weeks or months are considered short-term droughts. Indicators used to monitor short-term drought include topsoil moisture and streamflow, and indices used to monitor for short-term drought impacts include the SPI, Palmer Z Index, and Crop Moisture Index. Periods of precipitation deficit and drought patterns that last more than 6 months are typically considered long-term droughts (NDMC 2025). Indicators used to monitor long-term drought impacts include reservoir storage and groundwater levels. Drought can also develop rapidly, in what is referred to as flash drought. In addition to the lack of precipitation associated with conventional drought, flash droughts are often driven by abnormally high temperatures, winds, and/or incoming solar radiation, which leads to high evapotranspiration rates.

Center pivot sprinkler in the Edisto River basin

3.2 CLIMATE

South Carolina boasts a rather diverse climate, which can be attributed to several factors. Because of its position within the mid-latitudes, the prevailing westerly winds help steer weather systems across the state. Its position on the continent's eastern coast makes the state susceptible to cold air masses moving in from the northwest. The Appalachian Mountains tend to block most cold air outbreaks, contributing to mild winters. The presence of the Atlantic Ocean, with the Gulf Stream flowing northward off the coast, is also important since land and water heat and cool at different rates. South Carolina's weather is dominated by the position of the Bermuda High during the warm season, which provides a persistent flow of warm, moist air into the region.

Although South Carolina typically receives adequate precipitation, droughts can occur at any time of the year and last for several months to several years. While precipitation is the primary driver of water availability in the state, multiple factors, including temperature, evapotranspiration, and water demands, must be considered when evaluating how drought periods impact stream and river flows, reservoir levels, and groundwater availability.

South Carolina regularly experiences severe weather in the form of thunderstorms, tornadoes, tropical cyclones, and winter storms. Elevated temperatures during the summer months often result in greater water loss from the top layers of soil owing to high evaporation and transpiration. If precipitation does not occur at regular intervals, or with enough intensity to replenish water loss, a drought will occur.

Figure 3-2 demonstrates how South Carolina has moved in and out of drought conditions over the last 130 years. The graph shows the monthly PDSI, which is a standardized drought index based on a simplified soil water balance and estimates of relative soil moisture conditions. The magnitude of the PDSI indicates the severity of the departure from normal conditions. A PDSI value greater than 4 represents very wet conditions, while a PDSI less than -4 represents an extreme drought.

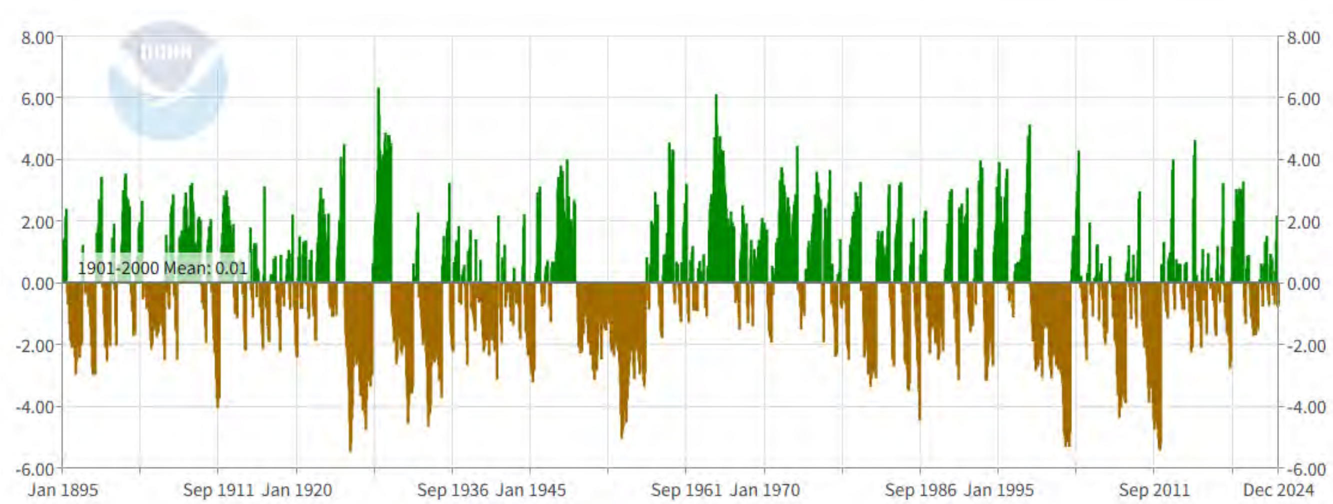


Figure 3-2. Annual statewide PDSI, 1895 through 2024 (National Oceanic and Atmospheric Administration 2025).

3.3 IMPACTS AND HISTORY OF DROUGHT

A drought impact is defined as any observable effect or change on human activity or a natural process at a specific time that is directly or indirectly caused by drought. The extent of this impact is dictated by the interaction of the drought event and the impacted elements, such as people, agricultural areas, reservoirs, and water supplies, and the vulnerabilities of these elements to droughts. Economic, environmental, and social impacts from drought conditions can cause widespread hardship.

Initially, economic impacts may include direct impacts to farmers, businesses, and individuals, or indirect impacts to businesses that support farmers or depend on farming, such as agricultural supply companies. The loss of this capital may affect the availability of food and other agricultural products. Municipal and industrial economic impacts may include additional expenses for water companies or industries to secure additional water supplies. Power companies may have to reduce hydroelectric generation and have greater reliance on more expensive energy sources to meet customer needs. Recreation-and navigation-related industries may also lose business or incur additional expenses as a result of decreased water levels.

Many environmental impacts can result from drought conditions. Plant and animal habitat can be destroyed or damaged. Diseases can increase in wild animals because of a lack of food and water supply. Although migration may be an option in some cases, extreme drought can lead to more dire circumstances. Drought can also cause decreased water levels in reservoirs and streams, and loss of acquatic and wetland habitats, which may result in increased water temperatures, poor water quality, and fish kills. Susceptibility to wildfire also increases during drought conditions. Forest fires have caused large economic losses for the timber industry and dry conditions have made forests more susceptible to pest infestations like the southern pine beetle.

The social impacts of drought affect not only lifestyle, but health and safety. Reduced incomes, relocating families or businesses to areas with adequate and reliable water supply, and a decreased availability of water-based recreational activities are examples of such social impacts. More extreme impacts can include stress from economic loss caused by drought, health-related impacts from poor water quality, decreased water availability, and/or increased dust. There may also be public safety concerns because of an increased range and frequency of wildfires.

Lake Russell

While historical events are not necessarily indicative of future conditions, evaluating the history of drought and its associated impacts can identify potential impacts of future droughts and help identify effective mitigation, monitoring, and response measures. The South Carolina State Climatology Office (SCO), which is part of SCDNR, maintains a timeline that highlights some of the major droughts and their impacts and has developed the report *Keystone Drought Events in South Carolina,* which summarizes the significant droughts dating back to 1910. Three of the more notable droughts are described as follows:

- **1950 to 1957:** One of the most prolonged and widespread droughts occurred from 1950 to 1957 and covered at least 60 percent of the contiguous United States at its peak. In South Carolina, every year from 1950 to 1956 and most of 1957 experienced below-average rainfall. 1954 was the driest year in state history, with an annual precipitation of 31.72 inches—16.08 inches below normal. During this period, many streams ran dry and some major rivers, like the Black and Coosawhatchie Rivers, stopped flowing for prolonged periods.

- **1998 to 2002:** Beginning in 1998, much of South Carolina experienced 4 years of below-normal precipitation and some of the largest precipitation deficits ever recorded. On August 13, 2002, the US Drought Monitor (USDM) classified most of the Upstate to be in D4 (Exceptional Drought) status, with the rest of the state in D3 (Extreme Drought) (**Figure 3-3**). On August 26, 2002, the South Carolina DRC declared every county to be in extreme drought status. Severe impacts across multiple sectors, including agriculture, recreation, forestry, energy production, and public water supply, were recognized. Agricultural impacts included reduced crop yields, an increase in the cost of digging new wells for irrigation, ponds drying up, and a decrease in the ability of pastures to adequately sustain livestock (SCDNR SCO 2002). The forestry industry dealt with the cascading impact of the increased potential for fire, leading to outdoor burn bans, while the reduced water availability stressed trees. This stress increased susceptibility to the southern pine beetle, resulting in over a billion dollars in losses to the timber industry. Some mandatory conservation efforts were enforced, and streamflows reached record lows. Low flows exposed boats to hazards and negatively affected businesses that relied on river recreation for income. Groundwater levels and reservoir storage were significantly depleted, and coastal areas such as Charleston experienced the effects of saltwater intrusion on their water supplies.

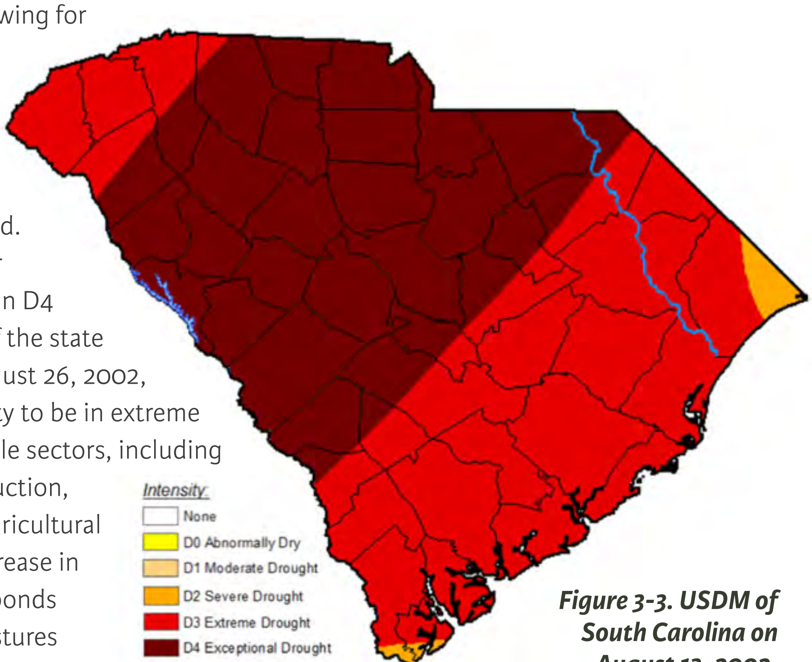


Figure 3-3. USDM of South Carolina on August 13, 2002.

Lake Wallace

- **2007 to 2009:** The drought from 2007 to 2009 was a statewide event in South Carolina, with the most severe conditions observed north of the Fall Line. 2007 was South Carolina's third driest year on record, with a statewide average annual precipitation of 34.90 inches (SCDNR SCO 2025b) compared to typical average annual rainfall of approximately 48 inches. With low upstream flows from the Broad and Saluda basins, the effects were felt across various sectors in the state, including agriculture, recreation, forestry, energy production, and public water supplies. The combination of low soil moisture and tree stress caused by reduced water availability led to increased wildfire risks. In July and August 2007, wildfire occurrences exceeded normal levels, with 518 fires burning a total of 2,730 acres. By April 2008, the number of fires had risen to 2,800, damaging 17,000 acres (SCDNR SCO 2008a). By September 2008, the state saw a 66 percent increase in the number of acres burned compared to the 5-year average (SCDNR SCO 2008b). It was not until April 2009 that the risk of wildfires began to decrease as drought conditions improved. Public water supplies were also severely impacted by the intensity and duration of the 2007 to 2009 drought. During summer and fall 2007, the number of water systems implementing water restrictions increased significantly. Water levels in Lake Marion dropped more than 6 feet between July 2007 and November 2007 (**Figure 3-4**). By January 2008, 191 water systems statewide had implemented some level of water conservation measures, and of these, 146 had imposed voluntary restrictions and 45 had imposed mandatory restrictions (SCDNR SCO 2008c). In July 2008, the Governor and SCDNR issued a statement encouraging water conservation, particularly in counties experiencing severe and extreme drought conditions. This message aimed to promote water-saving practices for all residents throughout the state (SCDNR SCO 2008d). The Governor had rarely needed to exercise his executive authority to promote water conservation in South Carolina, underscoring the severity of the drought situation. It was not until June 2009 that conditions returned to normal.

Figure 3-4. 2007 to 2009 drought impacts. *Clockwise from top left: Lake Marion, 2008; Lake Moultrie 2007; Lake Jocassee 2007; Deep Hole Swamp in Florence County, 2008.*

Bushy Park Reservoir (courtesy Charleston Water System)

3.4 DROUGHT RESPONSE

3.4.1 State Drought Response

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

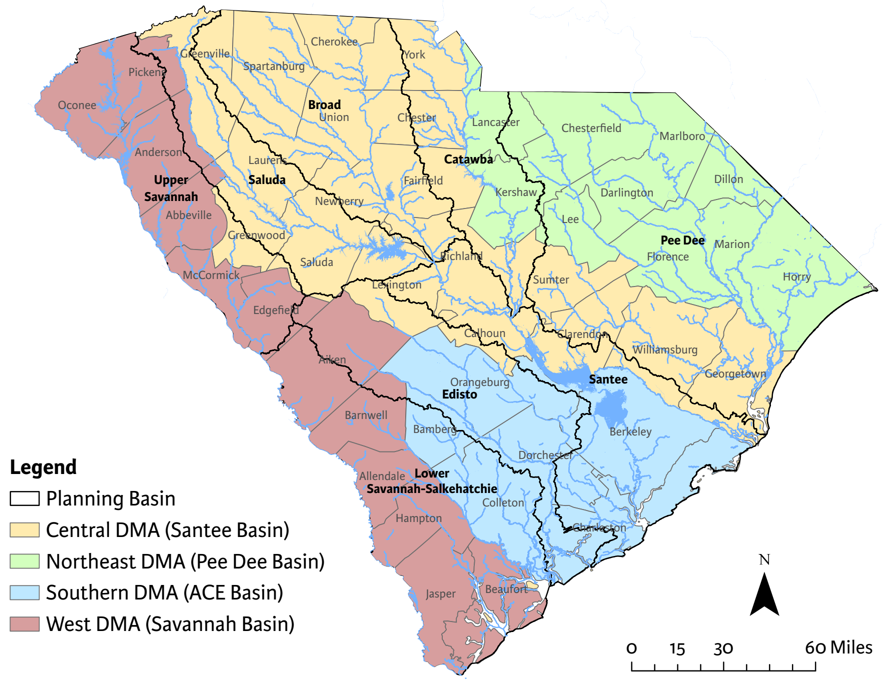


Figure 3-5. The four Drought Management Areas.

To help prevent overly broad response to drought, the Act assigned SCDNR the responsibility of developing smaller Drought Management Areas (DMAs) within the state. The state was split into four DMAs that generally follow the boundaries of the four major river basins but are delineated along geopolitical county boundaries rather than basin boundaries, as shown in **Figure 3-5**. The Governor appoints members, to include representatives from various state agencies and from 12 different stakeholder groups, within each DMA (**Figure 3-6**).

In accordance with the Act, SCDNR developed the South Carolina Drought Response Plan. South Carolina has four drought alert phases: incipient, moderate, severe, and extreme. SCDNR and the DRC primarily monitor seven drought indicators and indices to determine when drought phases are beginning or ending. These include the USDM, Crop Moisture Index, PDSI, KBDI, and streamflow and reservoir levels. The South Carolina Drought Regulations establish thresholds for these drought indicators, corresponding to the four drought alert phases. Declaration of a drought alert phase is typically not made based only on one indicator but on a convergence-of-evidence approach. The need for a drought declaration alert phase is also informed by additional information, including water supply and demand, rainfall records, agricultural and forestry conditions, and climatological data.

The South Carolina Emergency Response Plan has an appendix that describes actions when drought conditions have reached a severity level beyond the scope of local communities. The South Carolina Emergency Operations Plan is an all-hazard plan developed for use by state government departments and agencies to ensure a coordinated and effective response to natural, technological, or man-made disasters that may occur in South Carolina.

State Agency Representation	Local DMA Representation	
SC Department of Natural Resources	Agriculture	Private Water Supplier
SC Department of Environmental Services	Commission of Public Works	Public Service District
SC Emergency Management Division	Counties	Regional Council of Governments
SC Department of Agriculture	Domestic User	Soil & Water Conservation District
SC Forestry Commission	Industry	Special Purpose District
	Municipalities	
	Power Generation Facilities	

Figure 3-6. State agency and local stakeholder representation on the DRC.

3.4.2 Local Drought Response

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

In a drought mitigation plan, each phase of drought has a set of responses that are set in motion to reduce demand, bolster supply, or both. The drought plans and ordinances include system-specific drought indicators, trigger levels, and responses. Responses include a variety of actions that would be taken to reduce water demand at the levels indicated in **Table 3-1**.

When drought conditions have reached a level of severity beyond the scope of the DRC and local communities, the State Drought Response Plan, Emergency Management Division, and State Emergency Response Team are activated. Under Section 49-23-80 of the Act, if SCDNR and the DRC determine that drought has reached a level of severity such that the safety and health of citizens are threatened, the DRC shall report such conditions to the Governor. The Governor is then authorized to declare a drought emergency and may require curtailment of water withdrawals.

Table 3-1. Demand reduction goals of drought response plans in South Carolina.

DROUGHT PHASE	RESPONSE
Incipient	None specified
Moderate	Seek voluntary reductions with the goal of: • 20% reduction in residential use • 15% reduction in other uses • 15% overall reduction
Severe	Mandatory restrictions for nonessential use and voluntary reductions of all use with the goal of: • 25% reduction in residential use • 20% reduction in other uses • 20% overall reduction
Extreme	Mandatory restrictions of water use for all purposes with the goal of: • 30% reduction in residential use • 25% reduction in other uses • 25% overall reduction

Lake Thurmond
(courtesy Harry Shelley)

3.4.3 Regional Drought Response

Several of the eight planning basins have regional drought response protocols already in place that are designed to manage water use during periods of low inflow caused by drought. These protocols and plans establish trigger points, define stages of response, and coordinate water conservation efforts and water use reductions with the goal of extending water availability, supporting operational needs (typically for energy and municipal water production) and ecosystem needs for as long as possible. The Edisto RBC, as part of their planning process, developed a voluntary low flow management strategy. It, and other drought response protocols in the river basins, are described below.

Catawba-Wateree River Basin

During Duke Energy's Catawba-Wateree hydroelectric relicensing process, a Low Inflow Protocol (LIP) was developed to establish procedures for reductions in water use during periods of low inflow to the Catawba-Wateree basin. The LIP was originally established in 2006, on the basis that all parties with interests in water quantity will share the responsibility of establishing priorities and conserving the limited water supply (Duke Energy 2022). The protocol was developed collaboratively by the Catawba-Wateree Drought Management Advisory Group, which includes state agencies, federal entities, and large water users. The LIP, which was most recently updated in 2022, does not supersede the requirements of the Drought Response Act.

This five-stage LIP provides objective trigger points and procedures for how the reservoirs, hydroelectric facilities, and thermoelectric facilities will be operated by Duke Energy. The LIP also outlines water withdrawal reduction measures (voluntary, mandatory, or emergency as needed) and goals for municipal and other major water users during periods of low inflow. During times that inflow is not adequate to meet all normal demands for water and maintain reservoir levels as normally targeted, the LIP calls for Duke Energy to progressively reduce hydropower generation. If hydrologic conditions worsen, various stages of response are triggered. Each progressive stage of low inflow conditions calls for greater reductions in hydropower station water releases and reductions in water withdrawals by the public water systems and those irrigating directly from the eleven reservoir system. The goal of the staged LIP is to take the actions needed in the Catawba-Wateree River Basin to delay the point at which the usable water storage inventory of the reservoirs is fully depleted. The triggers for the various stages and the actions required of all major water users are objective, clear, and aligned, so that the basins response to drought occurs early enough to have significant water savings and without requiring political decision making. The LIP is intended to provide additional time to allow precipitation to restore streamflow, reservoir levels, and groundwater levels to normal ranges.

Lake Wylie Hydro Station (courtesy Duke Energy)

Edisto River Basin

During the RBC planning process, the Edisto RBC developed and approved by consensus, a low flow management strategy. The intent of the low flow management strategy is to incrementally reduce surface water withdrawals so that water users, including the most downstream users on the Edisto River, still have access to water under conditions that might arise during severe and extreme drought. The strategy, which calls for increasing reductions in withdrawal as river flows drop below certain thresholds, also works to maintain water in the river to support ecological needs.

The strategy takes effect when flow in the Edisto River measured at the Givhan's Ferry USGS gaging station (02175000) is less than 332 cubic feet per second (cfs), which is 20 percent of the long-term median flow of 1,660 cfs. When flow drops below this threshold, the strategy calls for voluntary reductions in withdrawals of certain surface water users by a specified amount, depending on the level of flow.

The Edisto RBC recognized that surface water users in the basin do not have equal means to comply with the voluntary withdrawal reductions. To ease the burden on users with fewer resources, the low flow management strategy applies to surface water users when their cumulative peak monthly withdrawal has exceeded 60 million gallons per month (MGM) in any of the previous 12 months. With this threshold, and based on current withdrawals, the strategy captures 92 percent of the volumetric withdrawal from the Edisto River but excludes the lower 86 percent of small withdrawers that may have more difficulty in reducing withdrawals and/or using alternative sources of water, such as groundwater.

The low flow strategy does not apply to surface water users who have existing agreements with SCDES to shift withdrawals from surface water to groundwater or vice versa, based on agreed-to triggers. In such cases, the timing of their shift from surface water to groundwater will be dictated by their agreement with SCDES, not the low flow management strategy. The low flow strategy does not set any new (lower) minimum flow requirements for new surface water withdrawals permitted in the basin. New permits will still be governed by the prescribed minimum instream flow in the South Carolina Surface Water Withdrawal, Permitting, Use, and Reporting Act.

Edisto River

Santee River Basin

Water management during droughts in the lower portion of the Santee River basin has been a major issue, especially during recent droughts occurring in 1998 to 2002, 2007 to 2009, and 2015 to 2016. The Low Inflow and Drought Contingency Plan (LIDCP) was required per License Article 406 as part of the new 50-year license granted by the Federal Energy Regulatory Commission (FERC) to the South Carolina Public Service Authority for the Santee Cooper Project (Santee Cooper 2024). Santee Cooper operates the Santee Dam on the Santee River where they manage the level of Lake Marion and releases downstream. The Santee Dam controls the flow entering Lake Moultrie and the southern portion of the Santee River basin.

The LIDCP has triggers tied to the water level in Lake Marion and streamflow on the Congaree and Wateree Rivers, upstream. The triggers can result in designation of a short-term low inflow (flash drought) condition and three increasingly severe drought levels. Reductions in reservoir releases generally occur when Lake Marion's water level drops below the target operating range and other conditions are met. The level of response varies depending on the magnitude and duration of hydrologic drought on the Congaree and Wateree Rivers. For rising lake levels, the need to ease restrictions is triggered when Lake Marion's level displays a sustained rise toward the operating range of the response curve. Unlike the Catawba-Wateree's LIP or the Edisto's low flow management strategy, the Santee LIDCP does not require voluntary or mandatory conservation by public supply, industrial, or other water users on or upstream of Lake Marion.

Jefferies Hydro Plant


Santee River

Upper Savannah River Basin

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, Russell, and Thurmond. The Savannah River Basin Drought Management Plan has evolved from the initial Drought Contingency Plan (DCP) established in 1989 to the latest 2012 version, which includes a number of modifications made primarily as a result of the droughts of 1998 to 2002 and 2007 to 2009 (USACE 2012).

The DCP is implemented when either Hartwell or Thurmond pool elevations drop below a defined trigger elevation. Four successively lower trigger levels result in reduced releases ranging from 4,200 to 3,100 cfs at the Thurmond Dam, depending on the time of year. On a rising pool, flow restrictions are lessened only after both Hartwell and Thurmond elevations are 2 feet above the trigger elevation. In Drought Levels 1 and 2, the 28-day running average streamflow measured at the USGS Broad River gage (in Georgia) is used to further define the weekly average release from Thurmond.

Water management in the Savannah basin during droughts has been a major issue, and USACE was requested to examine the DCP as part of the second interim of the Savannah River Basin Comprehensive Study. Environmental organizations have also requested USACE consider the environmental benefits that would result from restoring natural variability to downstream river flows. The Comprehensive Study ended in 2020 because of insufficient funding and other reasons. The draft Comprehensive Study Report tentatively recommended no seasonal variation in drought trigger levels, raising the trigger levels by 3 to 6 feet, and further restricting the flow of water from Thurmond Dam earlier during drought. This recommendation was identified in the study as Alternative 2 (USACE 2020); however, the recommendation was not implemented since the Comprehensive Study ended prior to completion.

In addition, the Duke Energy LIP was established as part of the relicensing agreement for the Keowee-Toxaway Hydro Project and it effects operations of the three Duke Energy reservoirs (Bad Creek, Lake Jocassee, and Lake Keowee) in the Upper Savannah River basin (Duke Energy Carolinas, LLC 2013). The LIP establishes 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 on the Savannah River USACE reservoirs (Hartwell, Russell, and Thurmond) agree to follow under drought conditions. The LIP has five stages (0 through 4) that specify how the reservoirs will be operated during drought conditions. The five stages are triggered by remaining usable storage, USACE DCP levels, composite average streamflow, and the USDM. Under Stage 1, the goal is to reduce water usage by 3 to 5 percent from the amount that otherwise would be expected. Similarly, stages 2, 3, and 4 call for 5 to 10 percent, 10 to 20 percent, and 20–30 percent reductions, respectively.

Savannah River (courtesy Beaufort-Jasper Water & Sewer Authority)

Broad, Pee Dee, and Saluda River Basins

Additional low inflow protocols are associated with FERC-licensed projects in the Saluda and Broad River basins, and in North Carolina's Yadkin-Pee Dee River basin, which drains to the Pee Dee River basin in South Carolina. These are generally in the form of minimum reservoir flow releases during low inflow periods.

3.4.4 River Basin Council Involvement in Drought Response

The *State Water Planning Framework* encourages the RBCs to play a role in supporting drought response, collecting drought information, and coordinating drought response activities. Specific RBC responsibilities, with the support of SCDNR and SCDES, include:

- Collecting and evaluating local hydrologic information for drought assessment.
- Providing local drought information and recommendations to the DRC regarding drought declarations.
- Communicating drought conditions and declarations to the rest of the RBC, to stakeholders, and to the public.
- Advocating for a coordinated, basin-wide response by entities with drought management responsibilities (e.g., water utilities, reservoir operators, large water users).
- Coordinating with other drought management groups in the basin as needed.

During development of their River Basin Plans, the RBCs reviewed and discussed these responsibilities. Each RBC developed a communication strategy, identifying one or more members to serve as a designated liaison to receive and communicate information to the DRC. In recent years, the SCO has worked with the Governor's Office to appoint RBC members to the DRC, representing the four DMAs. As of August 2025, there were 11 RBC members on the DRC and 1 member from the Catawba-Wateree Water Management Group Board of Directors. Of the seven RBCs, only the Saluda RBC does not currently have representation on the DRC. Having consistent RBC representation on the DRC will improve communication of drought impacts at the basin level, enhance coordination between groups, and better support drought declaration and response decisions.

Pee Dee River

3.5 RECOMMENDATIONS FROM THE RIVER BASIN COUNCILS

During the river basin planning process, each RBC had the opportunity to learn about the basin and state climate and become more familiar with drought monitoring, occurrence, designation, response, recovery, and the roles played by the SCO, DRC, and others. Each RBC then discussed and developed recommendations intended to improve how local and state organizations plan, mitigate, and respond to drought. The RBCs also sent one or more representatives to a statewide Drought Tabletop Exercise led by the SCO in March 2025.

There was a high level of consistency in consensus-based recommendations developed by the RBCs related to drought. The recommendations that were most consistent across the RBCs are summarized below.

Water utilities should review and update their drought management plan and response ordinance every 5 years or more frequently if conditions change. Many of the plans were submitted to the SCO in 2003, shortly after the Drought Response Act went into effect, and have not been updated. As such, they may contain information that is outdated. The Act did not explicitly require drought plans to be updated at a specific interval; however, the SCO is actively encouraging public water suppliers to update their plans, and many have done so within the past year.

Water utilities should consider drought surcharges on water use during severe and/or extreme drought phases. Drought surcharges, when used, are typically only implemented if voluntary reductions are not successful in achieving the desired reduction in water use. In the Saluda River basin, some water utilities have already built into their response ordinance the ability to implement drought surcharges during the severe and/or extreme drought phases.

Water utilities within a basin should coordinate, to the extent practical, their drought response messaging. Consistent and coordinated drought response messaging can be important, especially when there are drought conditions impacting the entire basin and possibly neighboring basins. Consistent and coordinated messaging can prevent confusion and provide efficiency. The RBCs recognized that coordinated and consistent messaging may not be possible when drought conditions are appreciably different across the basin, when utilities are in different stages of drought response, or when response strategies between two or more utilities are different.

Water users and those with water interests should submit drought impact observations through CMORs. The CMOR system, maintained by NDMC, provides supporting evidence in the form of on-the-ground information to help the authors of the USDM better understand local conditions. The SCO also reviews and uses the CMOR system in a variety of ways. CMORs can be submitted by clicking the "Submit a Report" button at NDMC's Drought Impacts Toolkit website.

Broad River at Columbia

Additional drought recommendations that were made by one or more RBCs, but not all, are listed below. Like the previous set of drought recommendations, these were consensus-based recommendations which represented RBC support ranging from strong to "can live with it."

To improve monitoring conditions that may lead to drought, and to monitor changing conditions during drought, an automated environmental monitoring network of weather and climate monitoring stations in South Carolina should be funded and established. An automated network of weather and climate monitoring stations provides near real-time data at the local level to improve situational awareness and preparedness and support decision-makers and stakeholders, such as emergency management agencies, water resources managers, agricultural interests, transportation officials, energy providers, and the DRC. Currently, South Carolina is only one of 10 states in the United States without an automated network of weather and climate monitoring stations.

Water utilities, when updating their drought management plan and response ordinance, should look for opportunities to develop response actions that are consistent with those of neighboring utilities. While triggers are likely to be unique to each water utility based on their source(s) of water, coordination of response actions identified in their ordinance, to the extent practical, supports consistent messaging through the basin and helps avoid confusion between customers.

State funding should be made available to water utilities to support the review and update of drought management plans. Water utilities with limited financial and technical capability may benefit from technical assistance to identify appropriate drought triggers and response strategies.

The use of decreasing block rate structures by water providers should be discouraged. Under a decreasing block rate structure, water customers pay a lower per unit rate as their water use increases. This type of rate structure discourages water conservation, and may lead to higher water use during drought, especially by residential customers. In North Carolina, the use of decreasing block rate structures is prohibited for local governments and large community water systems applying for state funds for extending water lines or expanding water treatment capacity.

Industries should continue and enhance information-sharing on best practices for drought management.

Reedy River at Greenville

3.6 UNCERTAINTY AND THE FUTURE OF DROUGHT

Since the turn of the century, hydrologic variability in the Southeastern United States has increased in the form of more frequent and severe rainstorms that have caused devastating flooding and more frequent periods of drought. **Figure 3-7** provides an illustration from the Saluda Basin, where low flow periods in sequential years are highlighted in yellow. During the past 25 years, the periods of time in which interannual drought conditions have been observed have become more frequent, and in many cases more severe, than in the 50 years prior.

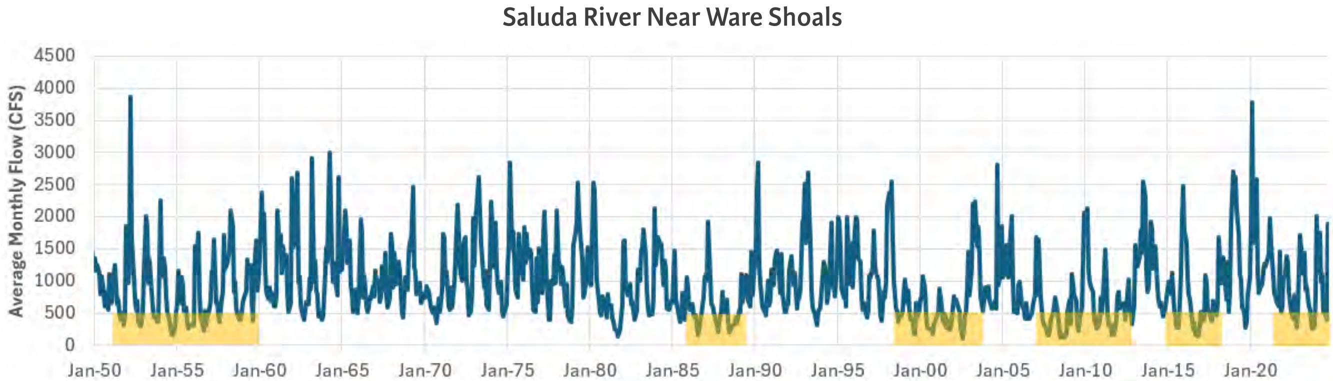
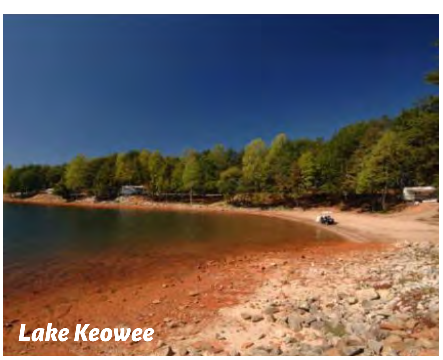


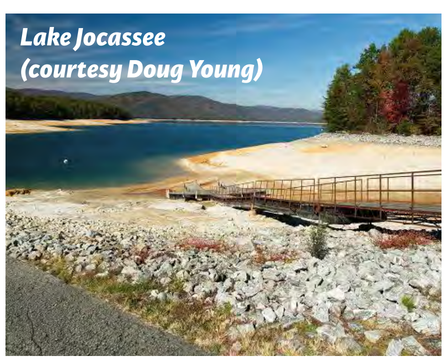
Figure 3-7. Hydrograph of Saluda River near Ware Shoals. *Yellow-shaded periods illustrate consecutive years of low flow.*

Because of the significant uncertainty associated with future hydrologic patterns, future drought conditions and consequences cannot be projected with certainty. To help cope with uncertainty in future droughts, several RBCs elected to simulate hypothetical future droughts that were more severe than historical droughts. These simulations proved that future droughts could exacerbate stress on water supply systems to concerning levels if they were to occur with such severity. Given that the frequency and severity of drought could be increasing and informed by simulations that evaluated impacts to reservoir levels from more severe droughts, the RBCs recommended improvements in South Carolinas drought planning and management policies and procedures. These are intended to help cope with the uncertainty in drought conditions that could be very different than historical droughts.

Information from future droughts, including rainfall patterns, river flows, reservoir and groundwater levels, and temperature trends will continually expand the database used by SCDNR, SCDES, and other agencies to better prepare the state for future drought conditions. Droughts do not only pose risks for water supply, but pose risks for wastewater disposal (as assimilative capacities of rivers and streams may become lower) and for aquatic ecosystems that depend on river depths, flow velocities, and water temperatures. As future droughts occur, coordination between state agencies and departments, including those with responsibility for water quality, discharge permitting, and fish and wildlife habitat, will be essential. Future updates to this State Water Plan and the River Basin Plans should carefully assess trends in rainfall, streamflow, and storage levels for surface water and groundwater to determine whether additional protective measures should be considered.

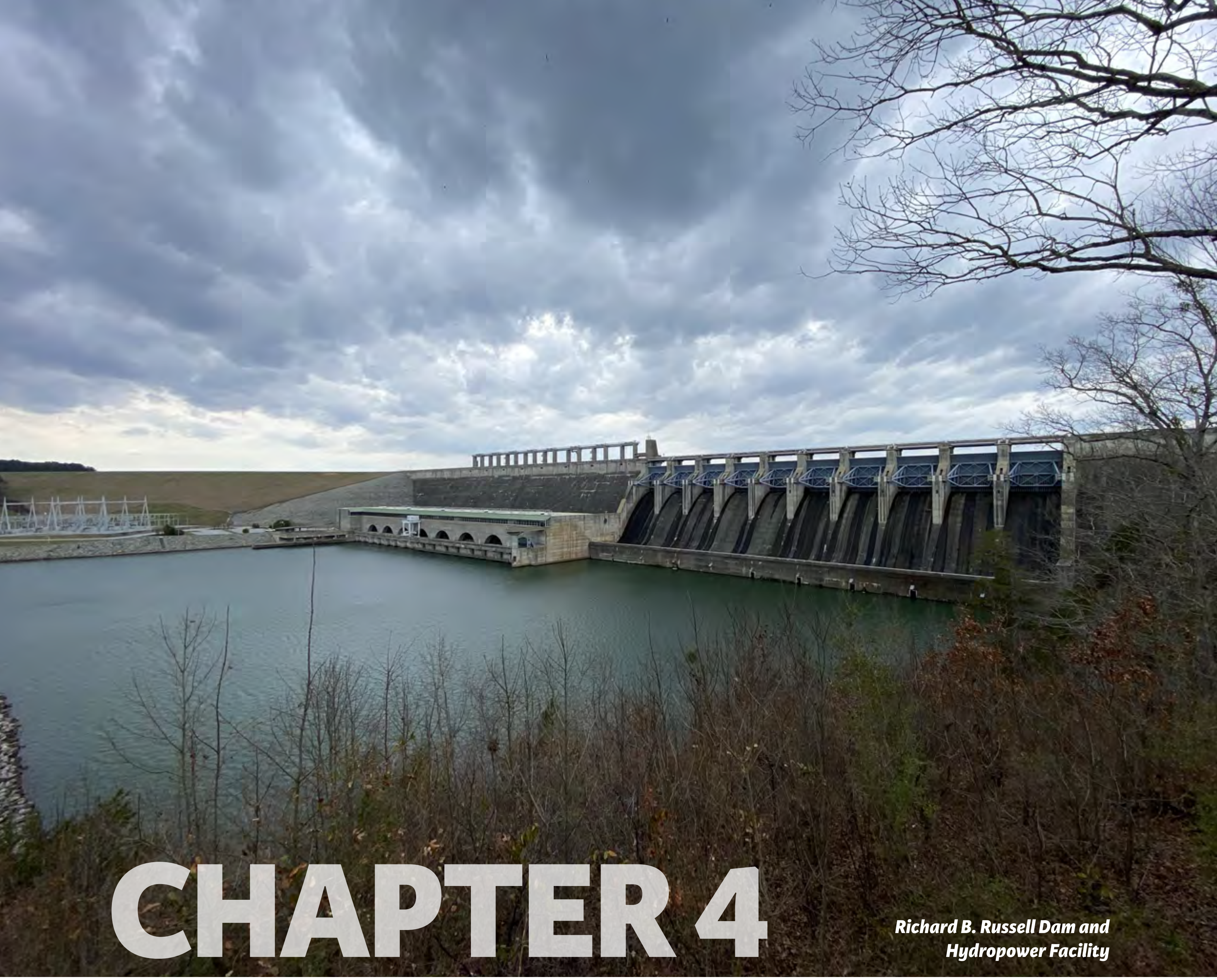


Lake Keowee



Lake Jocassee (courtesy Doug Young)

Lake Hartwell (courtesy Doug Young)



CHAPTER 4

Richard B. Russell Dam and Hydropower Facility

Current and Future Water Demand

To properly manage and develop a plan for South Carolina's water resources, it is critical to quantify how much and for what purposes water is being withdrawn and consumed. It is equally important to estimate how much water may be needed in the future to support a growing population and economy. Quantifying current water use and developing sector-specific water demand projections provides the groundwork for understanding how and where water is used and helps identify areas of the state where potential future water use could exceed available water supplies.

This chapter:

- Summarizes current water demands in each planning basin.
- Compares current demands to the amount of water that has been permitted and registered for withdrawal.
- Provides an overview of population projections by county.
- Describes the methodology used to develop the water demand projections.
- Summarizes projected water demands for two water use scenarios that formed the basis for the water availability assessment.

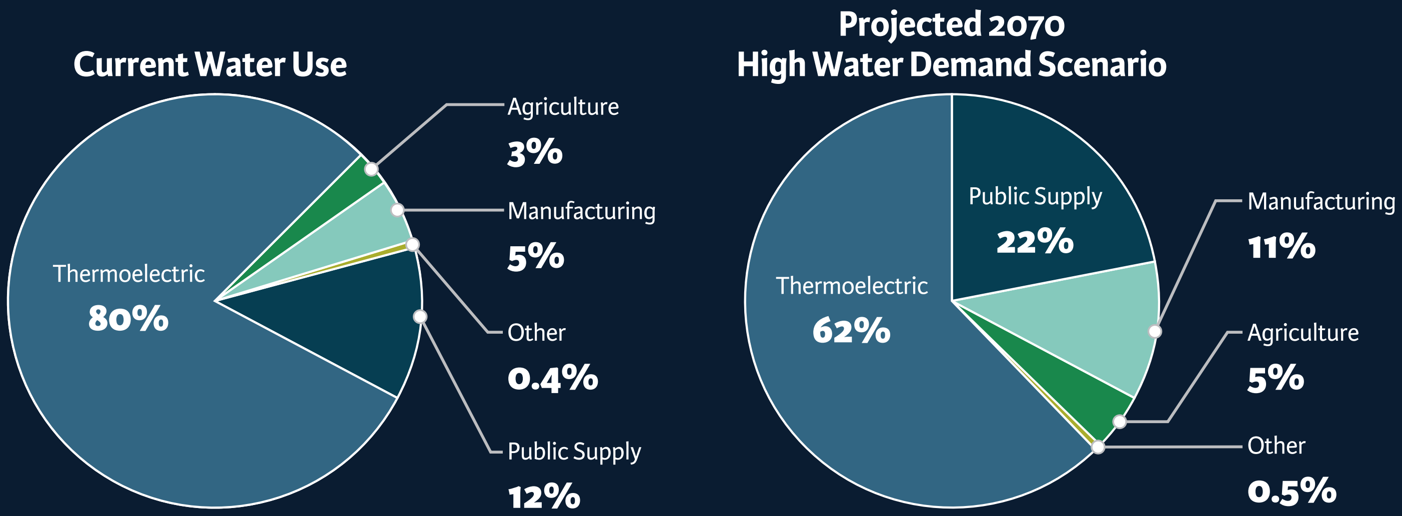
SUMMARY

Throughout South Carolina, water is withdrawn from rivers, streams, reservoirs, and groundwater aquifers to meet off-stream needs for drinking and sanitation, food production, manufacturing, energy generation, and other uses that are important in maintaining a high quality of life and a strong economy. The water that remains in streams and reservoirs is also important to provide habitat and sustain ecological functions, enhance recreational opportunities, and support navigation.

SCDES requires all users withdrawing more than 3 million gallons per month (MGM), approximately the amount of water needed to serve the residential needs of 1,000 people, to either permit or register their use with the state. This reported water use provides the data necessary to characterize current water use and to help project future water demands.

Statewide, the largest category of water use is for energy production, followed by public supply, manufacturing and industrial use, agriculture, and other minor uses including golf course irrigation, mining, and aquaculture. Nearly 95 percent of total demand is met by surface water, which includes rivers, streams, and reservoirs. The remaining demand is met by groundwater. The left side of the summary figure below shows the percentage of total demand by water use category under current conditions.

To support the assessment of water availability, two water demand projections through 2070 were developed. The Moderate Demand Scenario represents a reasonable estimate of future water demand, and the High Demand Scenario represents a high-end (conservative) projection of future water demand for planning purposes. These scenarios both project the largest growth in water demand to occur within the public supply and manufacturing sectors, where demands are projected to grow by over 50 percent in the Moderate Demand Scenario and more than double in the High Demand Scenario. Agricultural water demands are projected to increase by about one-third. Although water demand from thermoelectric power plants is projected to decrease with the planned closure of several coal-fired plants by 2070, there is considerable uncertainty in projected water demands for energy production, given the growing need for electricity. The right side of the summary figure shows the percentage of total water demand by water use category projected for 2070 in the High Demand Scenario.



Summary Figure. Statewide water demand by water use category for current water use (left) and projected 2070 demand from the High Demand Scenario (right).

4.1 Types of Water Use

Throughout South Carolina, water is withdrawn from rivers, streams, reservoirs, and aquifers and is vital to many sectors:

- Water is used for drinking, cooking, sanitation, and to support other critical **public health** needs.
- In **agriculture**, water is used for irrigating crops and sustaining livestock.
- **Industrially**, water is used in manufacturing processes, in cooling systems, and as a solvent.
- For **energy production**, water is heated to produce steam to drive turbines, and for cooling purposes, to condense steam back into liquid form.
- Water is also used in a myriad of other ways, including for turf and landscape irrigation (**golf courses**), for dust suppression (**mining**), and to grow fish (**aquaculture**).

In addition to these off-stream demands for water, maintaining enough water to support instream demands is also important. Instream demands refer to the amount of water needed to sustain ecological function, provide habitat, support navigation, afford recreational opportunities, assimilate treated wastewater discharges, and generate electricity at hydroelectric power plants. The assessment of water demands presented in this chapter focuses on off-stream demands. Instream demands, and the ability to meet both instream and off-stream demands now and into the future, is further evaluated in Chapter 5.

Lake Monticello Park

The off-stream demands presented in this chapter can be further broken down into consumptive use and nonconsumptive use. When water is withdrawn from a stream, river, reservoir, or aquifer, a portion of that may be used and not returned to the system (i.e., used consumptively), for example, if water evaporates from cooling towers during the energy production process at thermoelectric power plants. Another portion of water demand may be used, collected, potentially treated, then returned to the system (i.e., used nonconsumptively), such as treated wastewater discharges that are assimilated into streamflow. **Figure 4-1** shows examples of consumptive and nonconsumptive uses. The portion of water use that is consumptive varies by the type of water use and by the facility using the water. Unless noted otherwise, all water use and demand figures presented in this chapter represent the total withdrawal, not just the amount used consumptively.

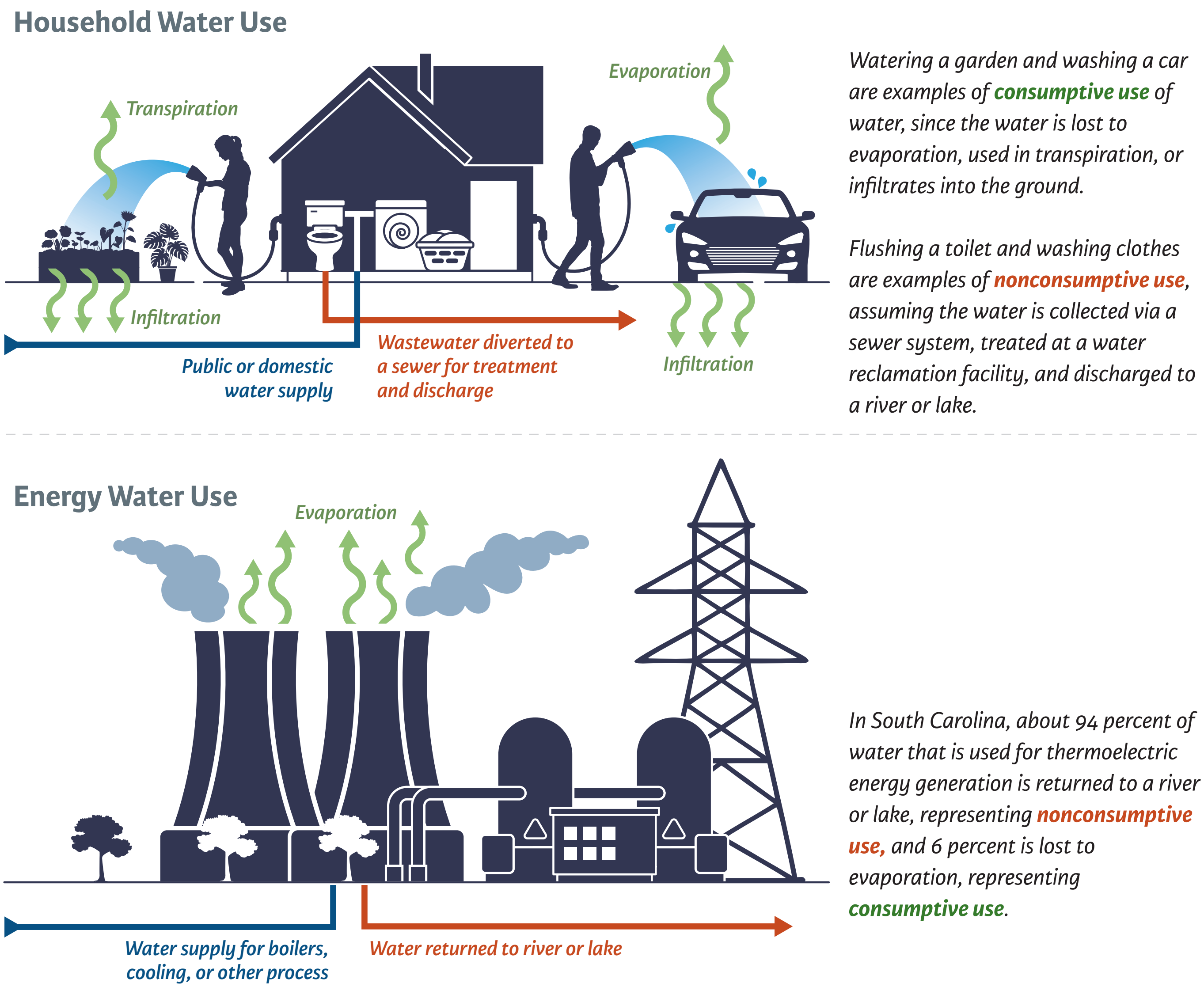


Figure 4-1. Examples of consumptive and nonconsumptive water use.

The vast majority of energy production in South Carolina comes from hydroelectric and thermoelectric facilities. Thermoelectric facilities use coal, gas, or nuclear fuel to generate electricity. Statewide, hydroelectric facilities have by far the largest water demands of any use category, as shown in **Figure 4-2**. Appendix A provides tables detailing the demands shown in this figure and the remaining bar charts in this chapter. However, hydroelectric facilities generate power using the flow of water, rather than through the removal and off-stream use of water. Since the water is used in place, hydroelectric water demands are nearly all nonconsumptive, with potentially the only water losses associated with evaporation from reservoirs. Hydroelectric use occurs in the Upper Savannah, Saluda, Broad, Catawba, and Santee River basins. Water used by hydroelectric facilities is not included in the demand totals presented in this chapter because the analysis focuses on off-stream use.

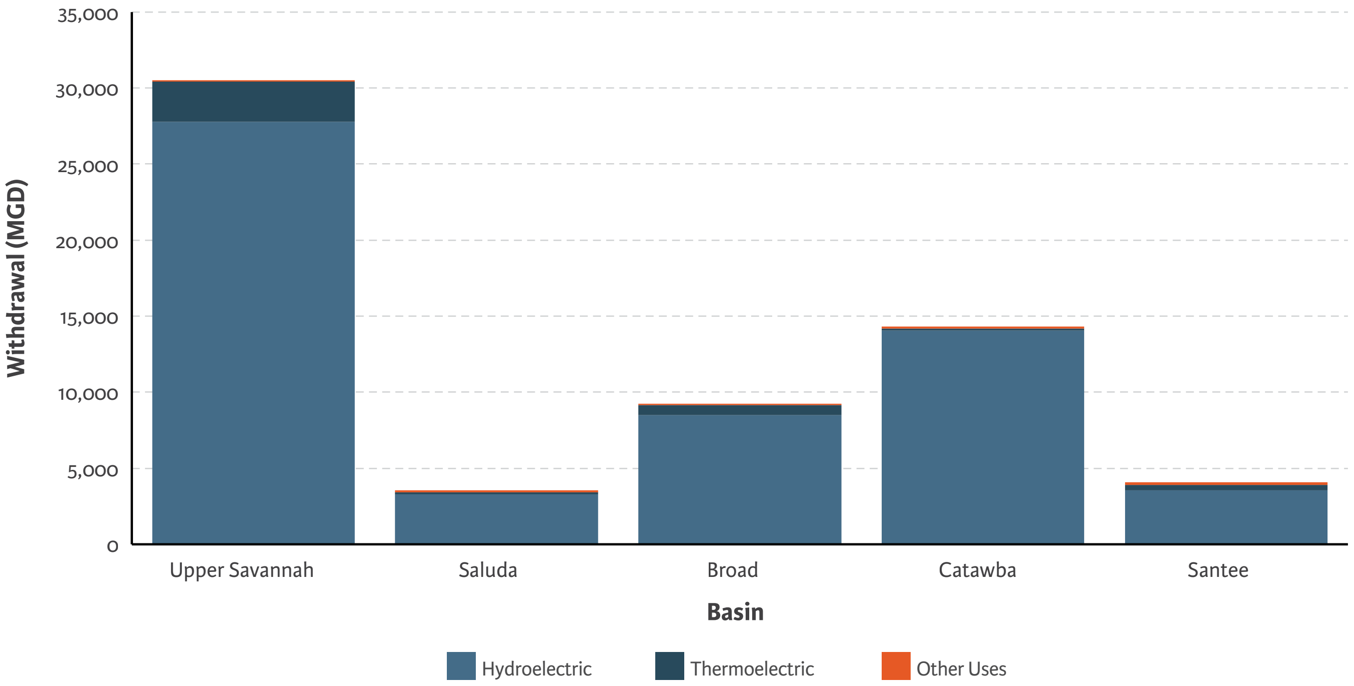


Figure 4-2. Water use, including hydroelectric power, for basins with hydroelectric use.

Dominion Energy Parr Hydroelectric Plant

4.2 CURRENT WATER USE

Current statewide off-stream water use totals 5,913 million gallons per day (MGD), with 5,612 MGD withdrawn from surface water sources and 301 MGD withdrawn from groundwater. Current water use was calculated as the average water use reported to SCDES from 2014 through 2023 in accordance with the South Carolina Surface Water Withdrawal, Permitting, Use, and Reporting Act and the Groundwater Use and Reporting Act. **Table 4-1** shows the current total and net water use for each planning basin. All demands presented in this chapter by planning basin represent only withdrawals for South Carolina users. The net withdrawals reflect the amount that is used consumptively. To put these numbers in perspective, the Cherokee County Board of Public Work's elevated water storage tank on Interstate 85, sometimes called the "Peachoid" (see photo on this page), holds approximately 1 million gallons of water. The daily net (consumptive use) across the entire state amounts to just under 1,000 Peachoids.

Table 4-1. Total and net water use by basin.

Basin	Groundwater (MGD)	Surface Water (MGD)	Total Use (MGD)	Net Use (MGD)
Upper Savannah	0.4	2,718	2,719	62
Saluda	0.2	271	272	52
Broad	0.6	766	766	174
Catawba	7	258	265	95
Lower Savannah-Salkehatchie	75	163	238	115
Edisto	69	70	139	112
Santee	30	518	548	156
Pee Dee	118	848	966	191
Total	**301**	**5,612**	**5,913**	**955**

Notes: If a water user reported zero water use for the last 3 years of data (2021 to 2023) the user's historical water use was excluded from the calculations.

Net use assumed groundwater users without discharge permits have 100 percent consumptive use.

Peachoid Water Tank (which holds 1 million gallons of drinking water) (courtesy Cherokee County BPW)

The largest water use category is thermoelectric, which represents 80 percent of total use. Statewide, thermoelectric use is approximately 6 percent consumptive, with 94 percent of the withdrawals returned to surface water. Because of its high total withdrawal but low consumptive use, thermoelectric use is excluded from some of the summaries in the remainder of the chapter, as noted, to make the remaining use categories more apparent and comparable. **Figure 4-3** shows the comparison of the total use by category, with thermoelectric use included (left) and thermoelectric use excluded (right). The "Other" category includes minor uses associated mostly with golf course irrigation, mining, and aquaculture.

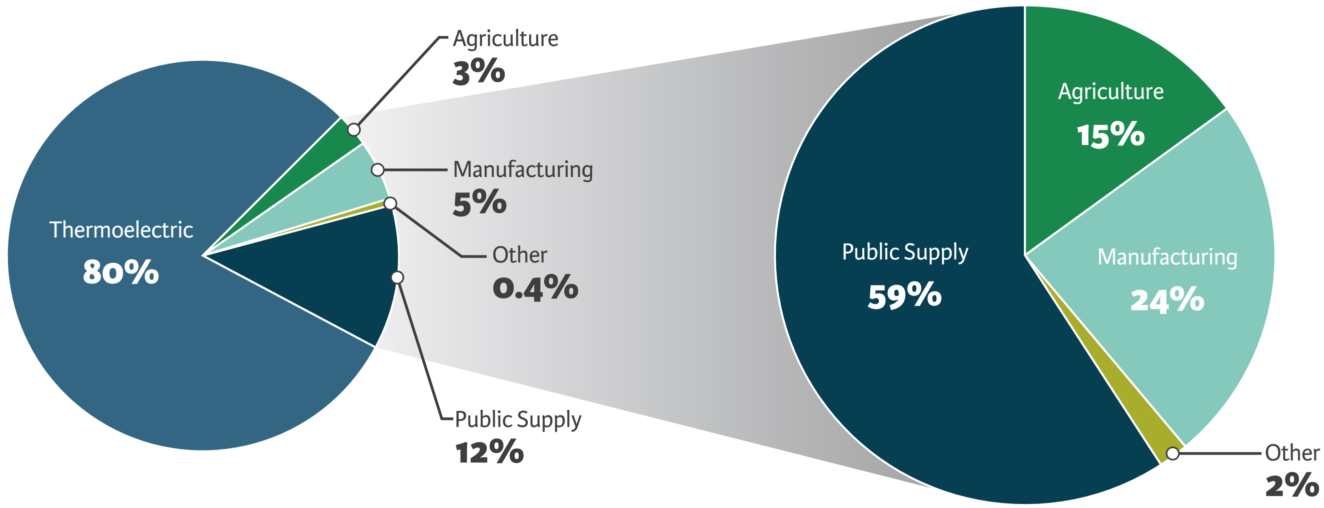


Figure 4-3. Statewide current demand by water use category, with thermoelectric use (left) and without thermoelectric use (right).

Cherry Point Water Reclamation Facility (courtesy Beaufort-Jasper Water & Sewer Authority)

Figure 4-4 shows the breakdown of current demand by water use category for each planning basin. Thermoelectric is the highest use category for all basins except the Edisto River basin. **Figure 4-5** shows the same breakdown, excluding thermoelectric use. After thermoelectric, public supply is the largest water use category for all basins except the Edisto, where agricultural water use is highest, and the Catawba, where manufacturing water use is highest.

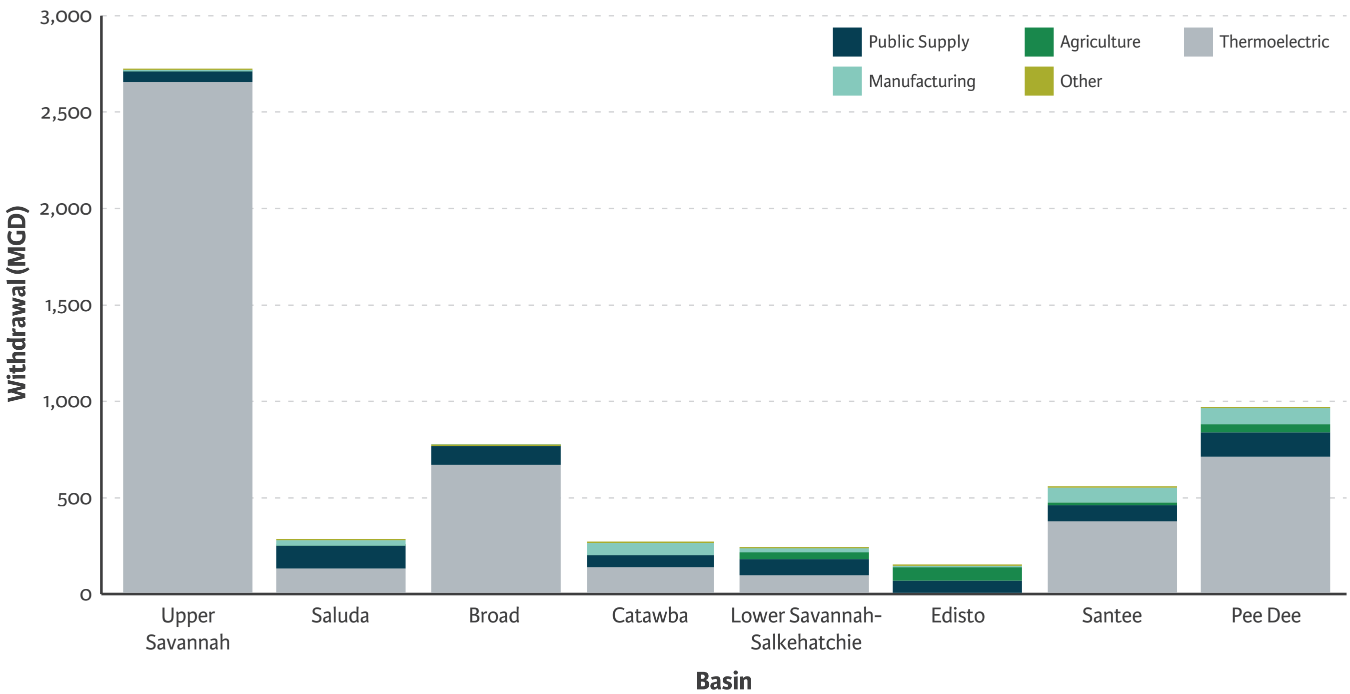


Figure 4-4. Current demand by water use category and by basin, including thermoelectric demand.

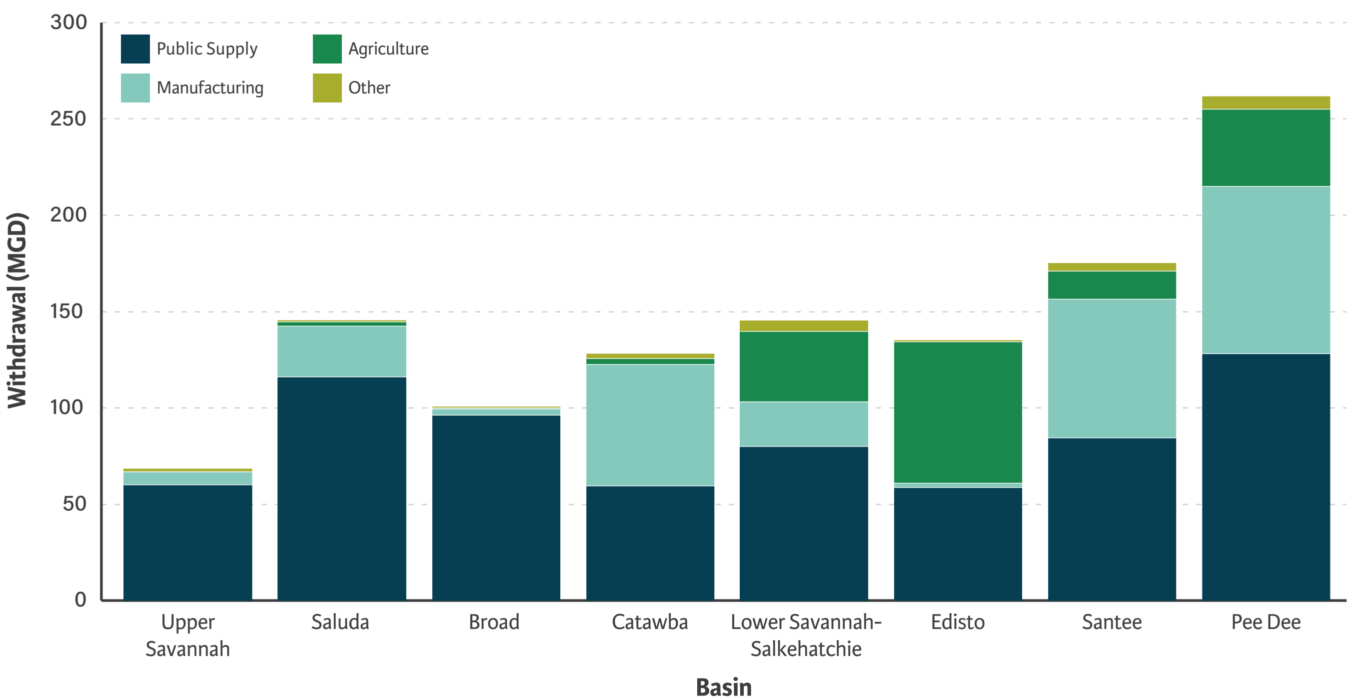


Figure 4-5. Current demand by water use category and by basin, excluding thermoelectric demand.

Figure 4-6 shows current demand from surface water and groundwater in each planning basin. Demands for thermoelectric energy production are excluded. The four Upstate basins withdraw nearly all water from surface water. Groundwater use is more prevalent in the basins in the Coastal Plain, where groundwater aquifers are productive and more readily accessible. Groundwater withdrawals are the highest in the Pee Dee, Lower Savannah-Salkehatchie, and Edisto River basins, at 117 MGD, 75 MGD, and 65 MGD, respectively. Comparatively, the Saluda and Upper Savannah River basins have the smallest groundwater withdrawals, at 0.2 MGD and 0.4 MGD, respectively. The Saluda, Santee, and Pee Dee River basins have the largest withdrawals of surface water, at approximately 145 MGD each, while the Edisto, Upper Savannah, and Lower Savannah-Salkehatchie River basins have the smallest withdrawals of surface water, at approximately 70 MGD each.

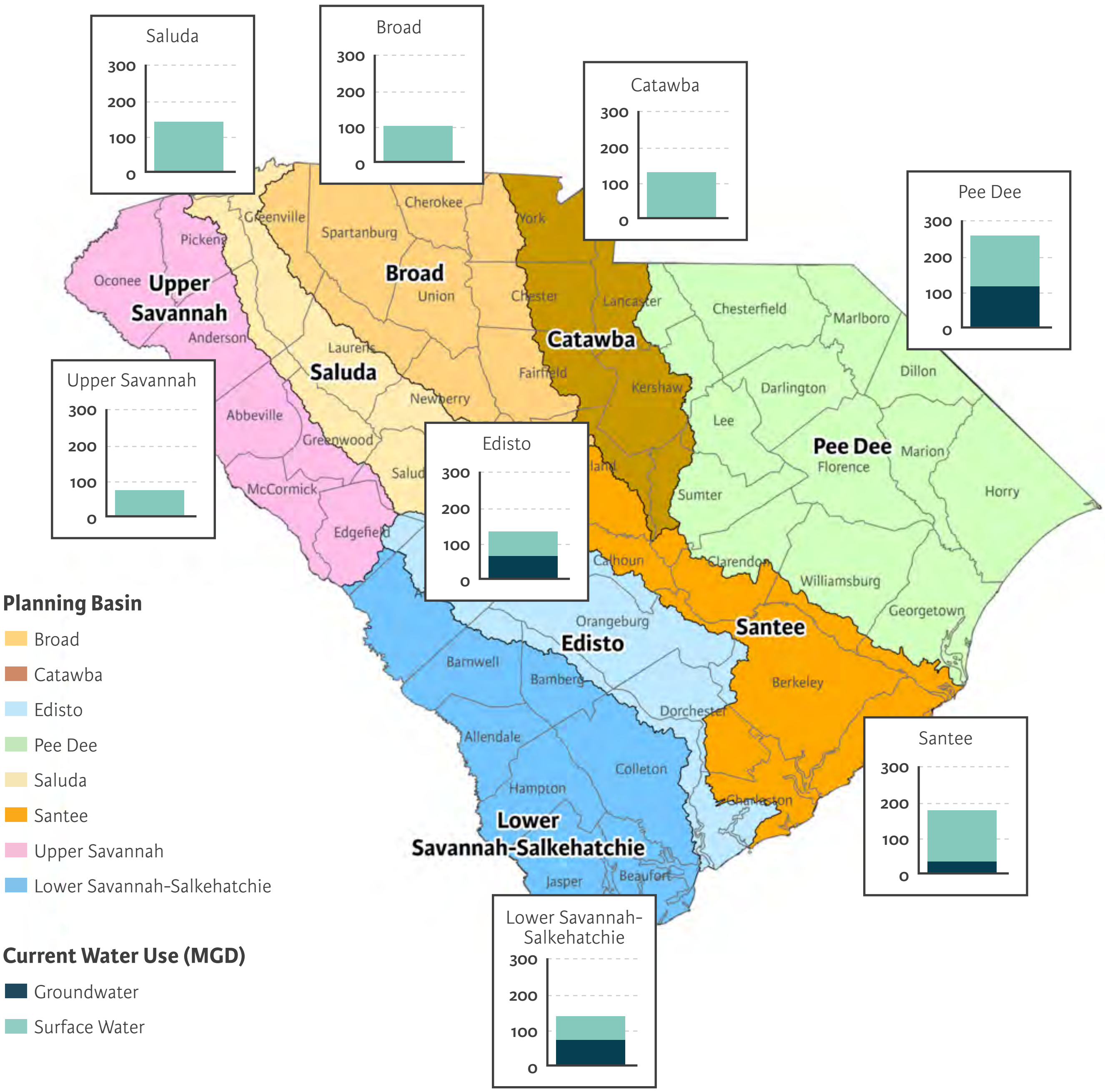


Figure 4-6. Current demand by basin (in MGD) and by source, excluding thermoelectric demand.

4.3 TRENDS IN WATER USE

As described in Chapter 2, since 2000, the State of South Carolina has required that permitted and registered (P&R) water users who withdraw more than 3 MGM report their monthly surface and groundwater withdrawals. Collection of these data promotes the effective management of the state's water resources, allows for the assessment of trends in water use, and supports the development of water demand projections. **Figure 4-7** shows the trend in statewide surface water, groundwater, and total withdrawals for the 10-year period ending in 2023.

Although water use varies based on factors such as weather or disruptions from the COVID–19 pandemic in 2020, an overall increasing trend in both surface water and groundwater withdrawals is observed. Without thermoelectric use (as shown in **Figure 4-7**), total withdrawal from 2014 to 2023 increased 12 percent. Withdrawals from groundwater increased by 31 percent and surface water increased by 7 percent. Some of the increase in groundwater withdrawal is from improvements in groundwater use reporting over this period. If thermoelectric use is included, the total withdrawal increased by only 3 percent.

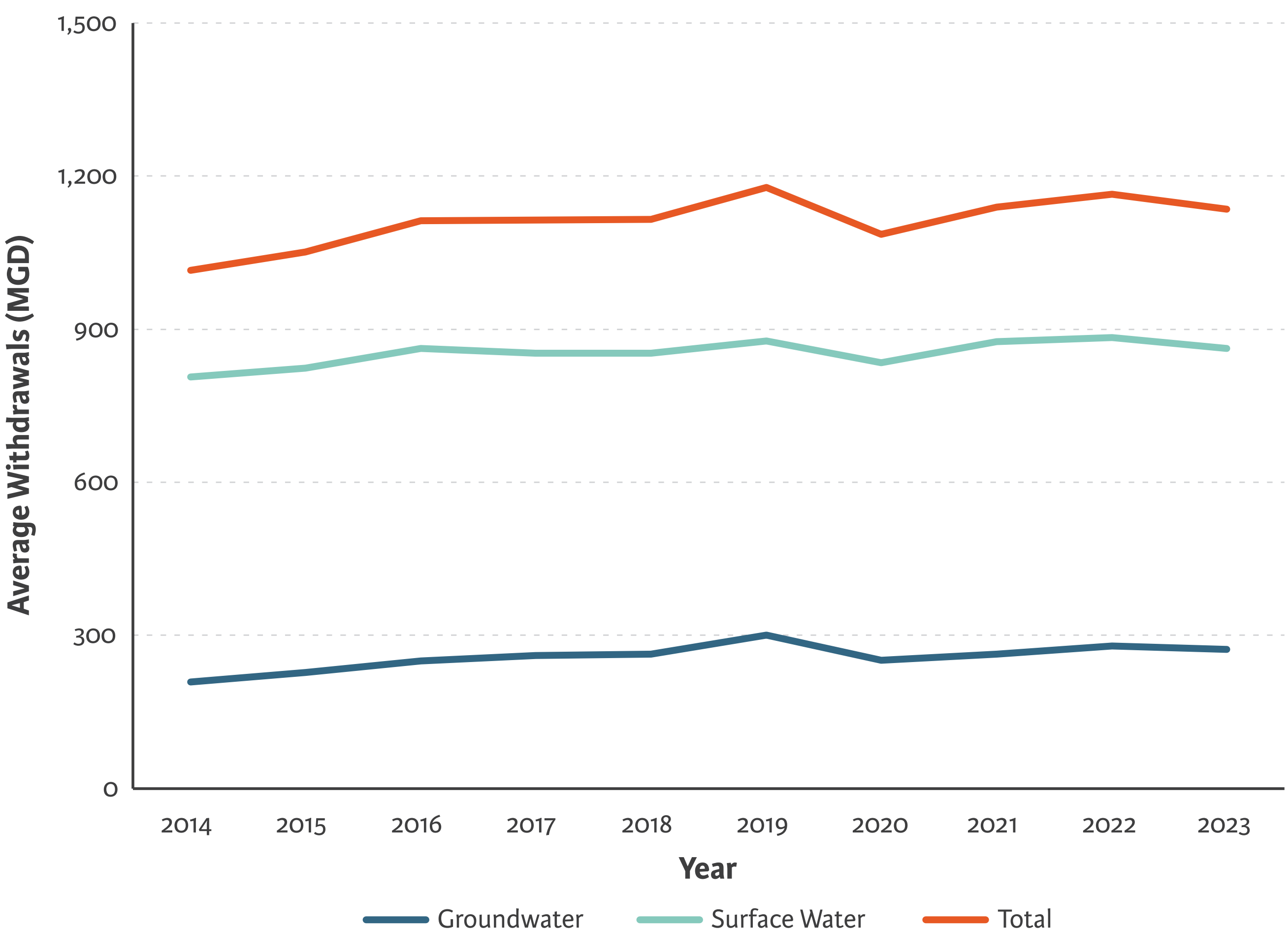


Figure 4-7. Statewide withdrawals by source for 2014 to 2023, excluding thermoelectric demand.

Figure 4-8 shows the trend in demands by water use category for the 10-year period ending in 2023. Public supply increased the most, by 81 MGD (13 percent), with a peak in 2022 at 704 MGD. Public supply growth is occurring to the greatest degree in the Broad (from 84 MGD to 101 MGD), Catawba (from 45 MGD to 61 MGD), and the Upper Savannah (from 50 MGD to 66 MGD) River basins. Nearly all of the growth in water use for public supply in these basins is from surface water.

Water use for agriculture also has an increasing trend, which may be partly driven by increases in reporting and the establishment of two new CUAs: the Western CUA in 2018, and the Santee-Lynches CUA in 2021. Reported agricultural water use has increased 51 MGD (53 percent) between 2014 and 2023, with the largest increases reported in the Pee Dee (from 17 MGD to 38 MGD) and Edisto (from 46 MGD to 61 MGD) River basins. Water use for manufacturing has generally remained steady with a high of 293 MGD in 2016 and a low of 270 MGD in 2023. Water use for the "other" category, consisting of golf courses, mining, and aquaculture, has generally remained steady. Thermoelectric use is not shown in this figure, as its magnitude would mask the trends in the other use categories; however, it has increased an average of 2 percent, from 4,707 MGD in 2014 to 4,778 MGD in 2023. The largest growth in thermoelectric use has occurred in the Upper Savannah River basin (from a low of 2,514 MGD in 2014 to a high of 2,787 MGD in 2023), while thermoelectric use has declined in the Santee River basin (from a high of 486 MGD in 2014 to a low of 305 MGD in 2023).

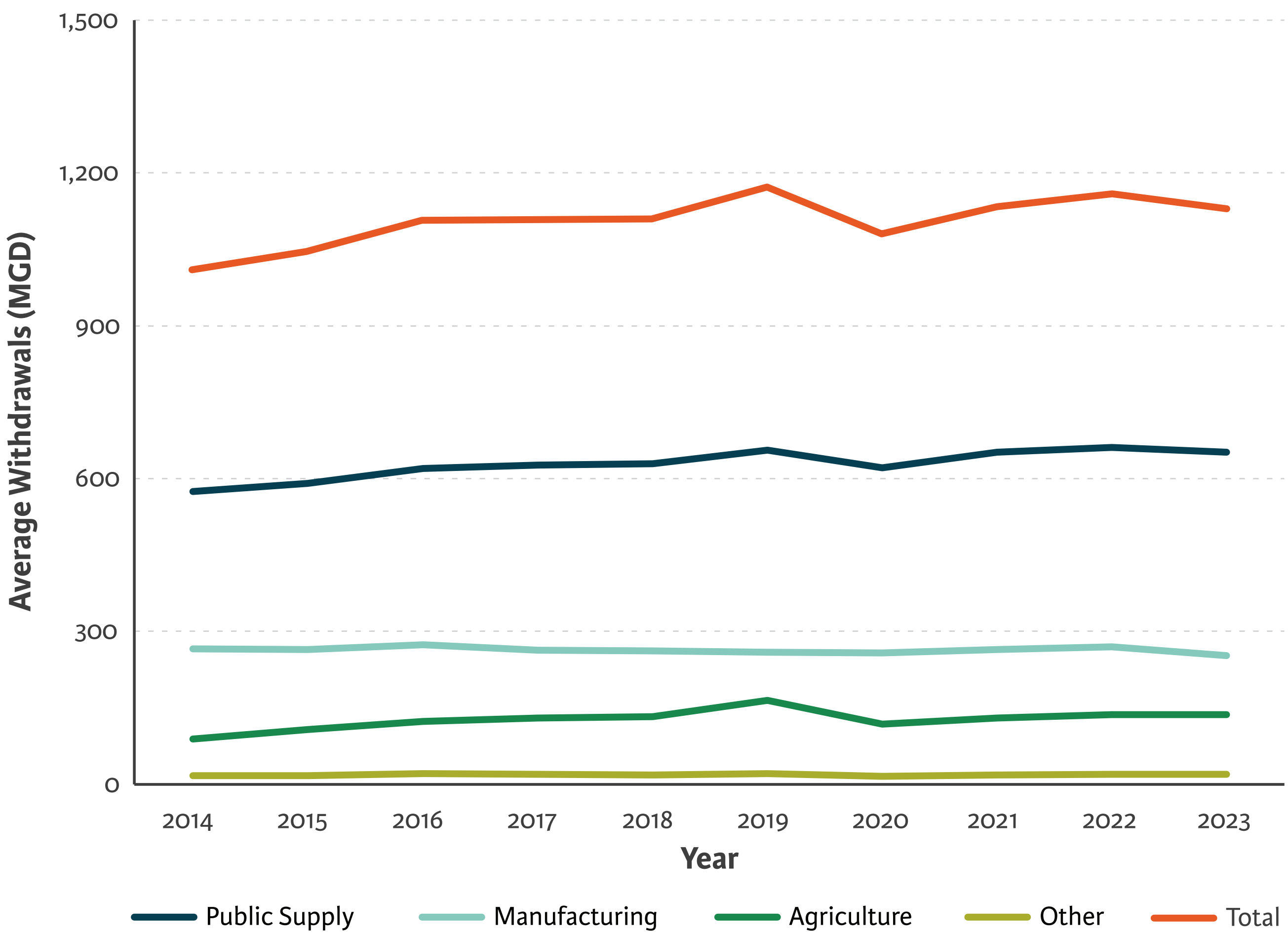


Figure 4-8. Statewide withdrawals by water use category for 2014 to 2023, excluding thermoelectric demand.

4.4 PERMITTED AND REGISTERED AMOUNT

As of April 2025, a total of 12,866 MGD of water has been permitted and registered. Of this amount, 5,913 MGD, or 46 percent, is currently withdrawn on average. Current water use is lower than the full P&R amount because most users have permits that account for estimated future demand. Also, when permits and registrations were originally issued, they were based on the maximum intake capacity. In some instances, the maximum intake capacity is well above the estimated future demand. **Table 4-2** shows the P&R amount compared to current use by water use category.

Hydroelectric use is not regulated with the same permitting process as other uses. Instead, it is mostly governed by permits issued by the Federal Energy Regulatory Commission (FERC) or governed by other federal use agreements. Because of this, current hydroelectric use is not included in Figures 4-9 or 4-10.

Table 4-2. Total P&R amounts by water use category, with portion currently withdrawn.

Water Use Category	P&R Amount (MGD)	Current Use (MGD)	Current Use (%)
Thermoelectric	7,019	4,753	68%
Public Supply	3,126	683	22%
Manufacturing	1,732	284	16%
Agriculture	829	171	21%
Other	160	23	14%
Total	**12,866**	**5,913**	**46%**

Figures 4-9 and **4-10** show the total P&R amounts of water by planning basin (the overall height of each bar) and the current average withdrawal (the dark portion of each bar) for surface water and groundwater, respectively.

P&R amounts are not reflective of water availability in the basin, as sufficient flows to satisfy such withdrawal rates cannot be guaranteed now or into the future. Chapter 3 of this report identifies river reaches that are, or may be, at risk of not being able to provide the full P&R water volumes all the time. Chapter 2 provides a map that shows the location of P&R users.

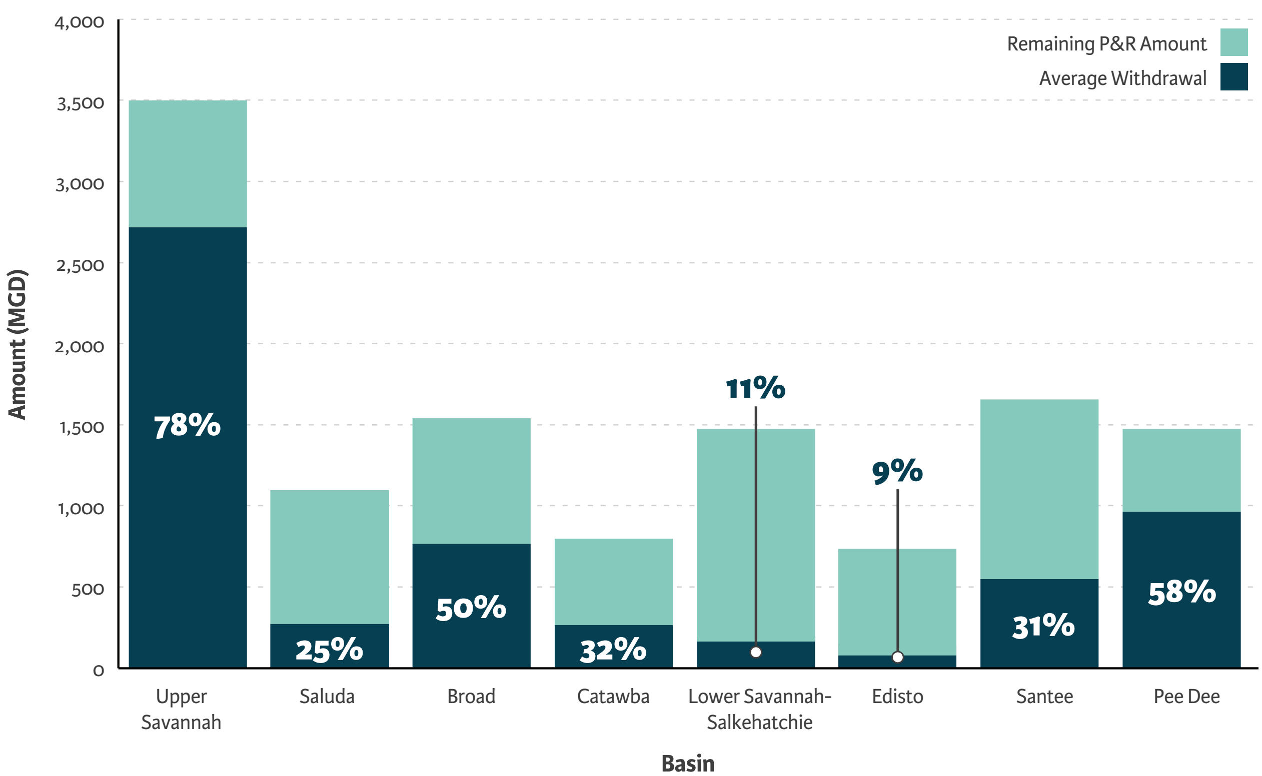


Figure 4-9. Surface water P&R amounts by basin, with the portion currently withdrawn.

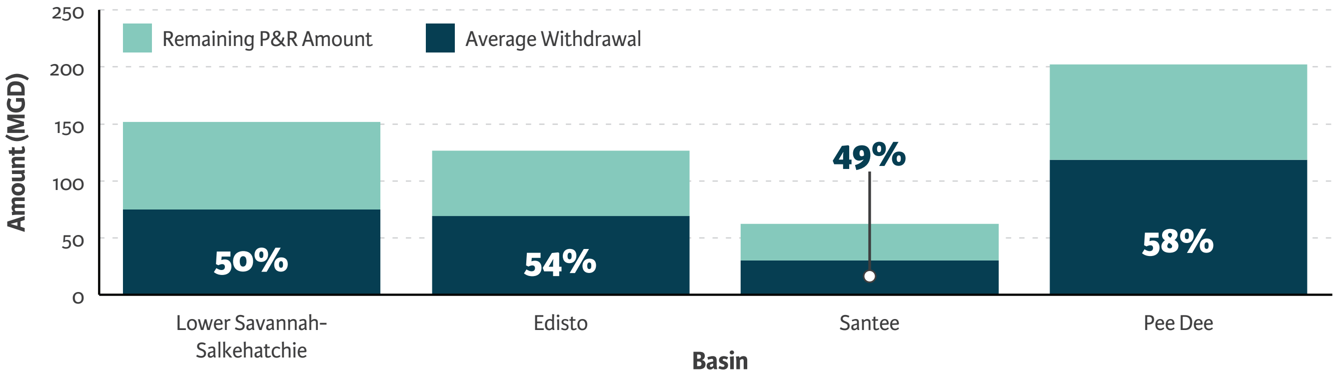


Figure 4-10. Groundwater P&R[1] amounts by basin, with the portion currently withdrawn.

[1]Only the planning basins in the Coastal Plain are shown since nearly all groundwater use in the Upstate basins is registered, not permitted, and groundwater registrations, unlike surface water registrations, do not include an amount.

4.5 WATER DEMAND PROJECTION METHODOLOGY

To assess the availability of South Carolina's water resources to meet future water demands, SCDES developed two water demand projections: the Moderate Demand Scenario and the High Demand Scenario. These demand projections are hypothetical planning scenarios of water use by sector through 2070 and support the analysis of water availability presented in Chapter 5. Water demand projection methodologies generally followed the guidance documented in the SCDNR report, *Projection Methods for Off-stream Water Demand in South Carolina* (SCDNR 2019b). Several RBCs made slight adjustments to certain projection methods to better reflect the conditions in their specific basin; however, these changes were generally minor, and all results are directly comparable.

Projections are not the same as forecasts. Forecasts aim to be accurate estimates based on expected conditions and actions, and they may be limited by the predictability of future conditions beyond a certain time frame. Projections aim to be informative rather than predictive. They help explore "what if" scenarios. For example, if water users withdraw on the high end of their historical use and growth continues at a higher-than-anticipated rate, would there be enough water to meet all of the demand?

The Moderate Demand Scenario is based on the assumptions of a normal climate (requiring average irrigation) and moderate population and economic growth. The High Demand Scenario is based on the assumptions of a hot and dry climate (requiring increased irrigation) and high population and economic growth. Assumptions about water use in different climate conditions are made by calculating users' median and maximum rates of monthly water use from the most recent 10-year period of water withdrawal reporting. Assumptions of normal climate conditions, requiring average irrigation, are incorporated by using median monthly rates of water use, while assumptions of hotter and drier conditions are represented by using the maximum monthly rates of water use. The High Demand Scenario is considered an extreme, upper limit, while the Moderate Demand Scenario represents a more reasonable expectation of future use.

Demand projections are calculated by multiplying either the median monthly rates of water use (Moderate Demand Scenario) or maximum monthly rates of water use (High Demand Scenario) by a driver variable applied for each major water use sector. **Table 4-3** lists the driver variable applied to each sector, data sources, and other assumptions included in the projection methods for each sector and scenario. Driver variable data were typically updated as new datasets became available; the River Basin Plans used the latest data available at the time they were written. The River Basin Plans provide additional details on the demand projection methodology. Projections were not developed for hydroelectric use.

Water demands are assigned to planning basins based on the point of withdrawal. There are some instances where water withdrawn in one basin is used to meet demand in a different basin (interbasin transfer). In that case, the water demand is assigned to the basin where water was withdrawn, not the basin where it is used. Water withdrawers were also assumed to meet their additional demand using the same source (surface water or groundwater) or using the same proportion of surface water to groundwater if the user had recent withdrawals from both sources.

Table 4-3. Driver variables and associated assumptions for each water use category.[1]

Water Use Category	Driver Variable	Driver Variable Data Source	Moderate Demand Scenario	High Demand Scenario
Public Supply	County Population	County-level population projections from SC ORFA	SC ORFA projection to 2038; extend linearly or assume constant population at 2038 levels if the population projection is negative from 2039 to 2070	Assumes exponential growth, with projected county growth rates set to 10% above the county rate or the state average rate, whichever is higher
Manufacturing	Economic Production	Subsector growth rates from EIA	Subsector growth rate, with the minimum adjusted to 0% to 2050 and then 0.3% from 2051 to 2070	Subsectors with growth rates above EIA national average are increased by 10%, otherwise, growth is set to EIA national average
Agriculture	Irrigated Acreage	National-scale studies[2]	Annual growth rate of 0.65%	Annual growth rate of 0.73%
Thermoelectric	Energy Demand	IRP information and communication with facility representatives	Varies by facility	Varies by facility
Other (Golf Course, Mining, Aquaculture)	NA	NA	Assumed constant	Assumed constant

Key: % – percent, EIA – U.S. Energy Information Agency, IRP – Integrated Resources Plan, NA – not applicable, SC ORFA – South Carolina Office of Revenue and Fiscal Affairs

[1] *This table represents the methodology applied to all basins except the Catawba, as further explained later in this chapter.*

[2] *Based on national studies from Brown et al. (2013) and Crane-Droesch et al. (2019).*

Demand projections for the Catawba River basin were developed for the Catawba-Wateree Water Management Group's (CWWMG's) Integrated Water Resources Plan (IWRP). The CWWMG's IWRP included a single deterministic projection based on best estimates of future demand and a range of probabilistic projections to represent lower and higher ranges of possible future use. The IWRP's 50th percentile projection is used as the Moderate Demand Scenario projection, and the IWRP's 95th percentile projection is used as the High Demand Scenario projection. *The Integrated Water Resources Plan: Water Demand Projection Updates* report summarizes additional information for water demand projections for the Catawba River basin (HDR 2023).

SC ORFA regularly updates their county-level projections. Each River Basin Plan used the most recent population projection available at the time. ***Figure 4-11*** *presents SC ORFA's 2022 historical population projections, which were used for all River Basin Plans except for the Edisto and Broad.*

Demand projections for the public supply sector were developed based on county-level population projections from SC ORFA, which do not extend to the end of the planning horizon in 2070. For the Moderate Demand Scenario, SC ORFA projections are extended linearly to 2070. If SC ORFA projections indicate a decline in population, then the extension to 2070 is held steady at the last year of projected data. For the High Demand Scenario, populations are projected to grow exponentially. If SC ORFA projected growth, then the fitted exponential growth rate was increased by 10 percent. If the SC ORFA projection for a county was less than the state average, then the exponential growth rate was set at 10 percent above the state average. This approach results in estimates of population growth that are likely to be conservatively high for both demand scenarios. Using this approach, population is projected to increase from 5.13 million in 2020 to 7.73 million in 2070 in the Moderate Demand Scenario, and to 10.6 million in the High Demand Scenario.

Figure 4-11 shows the projected percent change in population from 2025 to 2038, based on the SC ORFA population projections. Some counties are projected to experience population declines, while others may experience substantial growth. Some areas of higher population growth are projected in coastal and northwestern counties. Populations are multiplied by a systemwide per capita usage to calculate public supply demand projections.

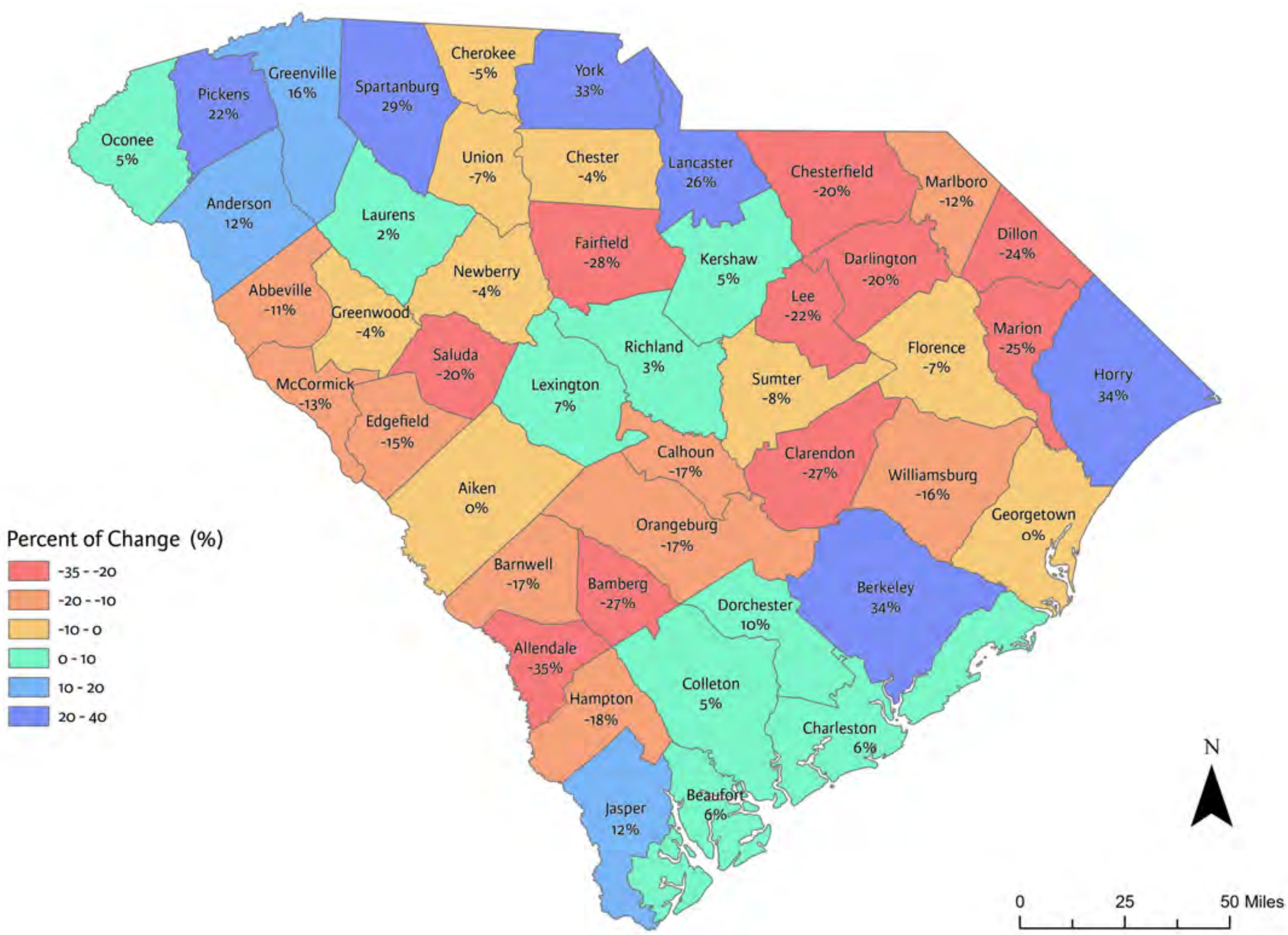


Figure 4-11. SC ORFA 2025 to 2038 projected population growth from 2022 historical projections.

4.6 WATER DEMAND PROJECTIONS

4.6.1 Demand Projections Statewide

*This chapter discusses projected changes in demand by comparing the projected 2025 demand to the projected 2070 demand (the beginning and the end of the dashed lines shown in **Figure 4-12**), rather than comparing the current water use (the average of the solid lines shown in **Figure 4-12**) to projected 2070 demand. The Moderate Demand Scenario and High Demand Scenario have different starting points in 2025 because, while they have the same number of starting users, the rates of water use for those users differ. The Moderate Demand Scenario uses the median rate of recent historical use and the High Demand Scenario uses the maximum rate of recent historical use.*

For planning purposes, statewide total water demands, including thermoelectric but excluding hydroelectric, are projected to reach 6,190 MGD in the Moderate Demand Scenario and 7,919 MGD in the High Demand Scenario by 2070. Thermoelectric water demand, which is almost entirely returned to the surface water system after use, is projected to decrease by 2070 because of two coal-fired power plant closures in the Santee River basin in 2030 and 2035, and one nuclear power plant closure in the Catawba River basin in 2065. However, there is considerable uncertainty in projected water demands for energy production, given the growing need for electricity and the federal government's recent phasing out of subsidies for renewable sources such as solar and wind, which do not require water. Excluding thermoelectric use, water demands for the remaining use categories are projected to increase between 2025 and 2070 by 51 percent, from 1,177 to 1,777 MGD, in the Moderate Demand Scenario, and by 95 percent, from 1,542 to 3,008 MGD, in the High Demand Scenario. **Figure 4-12** shows the projected demand scenarios with recent historical use.

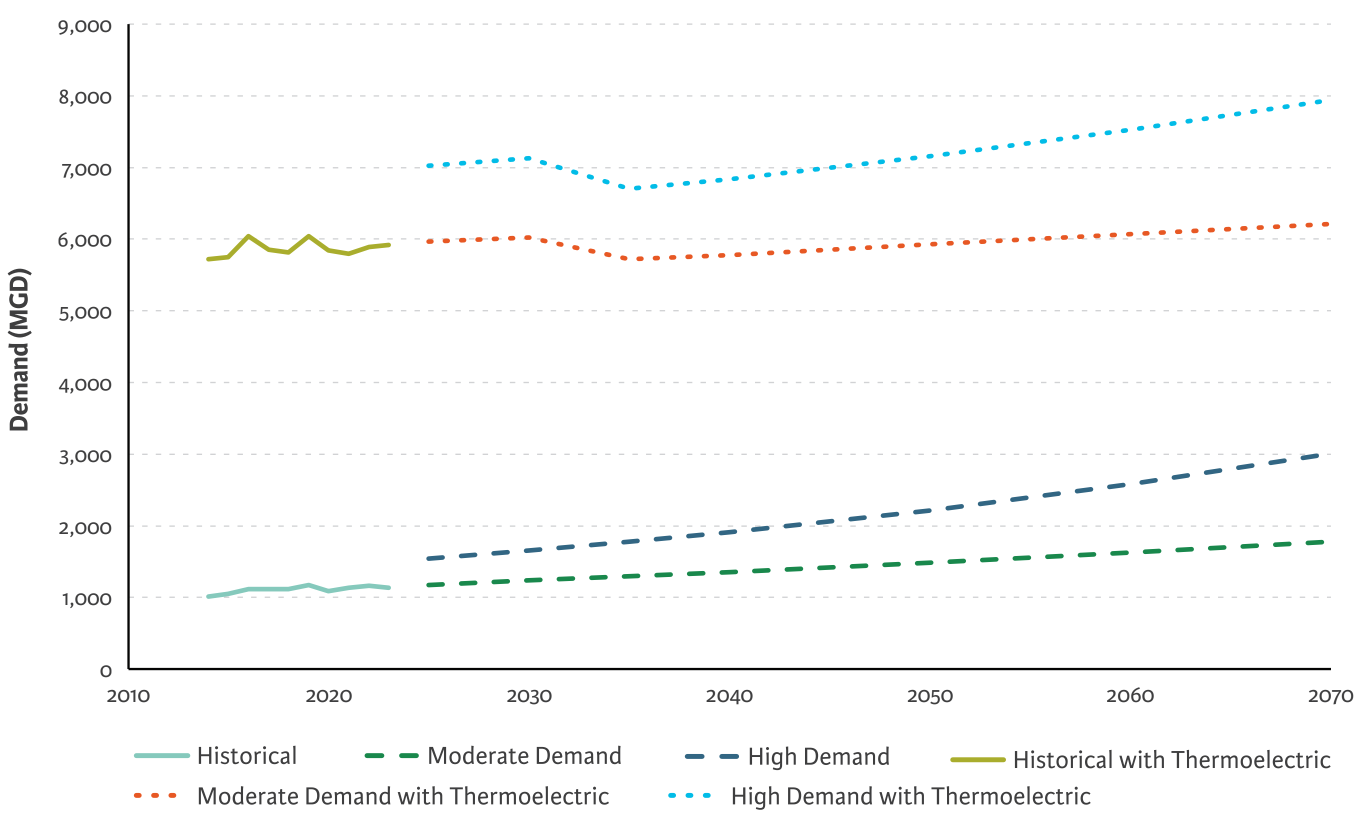


Figure 4-12. Historical and projected statewide water demands.

Even though thermoelectric demands are projected to decrease by 2070, thermoelectric is still projected to be the largest use category statewide. However, the percentage of total statewide demand coming from thermoelectric use is projected to drop from 80 percent under current conditions to 62 percent by 2070 (in the High Demand Scenario), while demands from public supply, agriculture, and manufacturing increase. Similar trends are observed in the Moderate Demand Scenario. **Figure 4-13** shows the percentage of total demand for each water use category in 2070 under the High Demand Scenario.

Water resources do not follow political boundaries, meaning South Carolina's water resources are shared with and impacted by use from adjacent states. The Savannah River flows between Georgia and South Carolina, with both states withdrawing for their needs and returning the nonconsumptive portion. The Broad, Catawba, and Pee Dee River basins have their headwaters in North Carolina, with withdrawals from North Carolina users impacting the availability of flow for South Carolina users. Similarly, declines in groundwater levels associated with withdrawals may extend across state boundaries. The surface water modeling effort associated with the River Basin Plans accounted for current and future demands projected in these states.

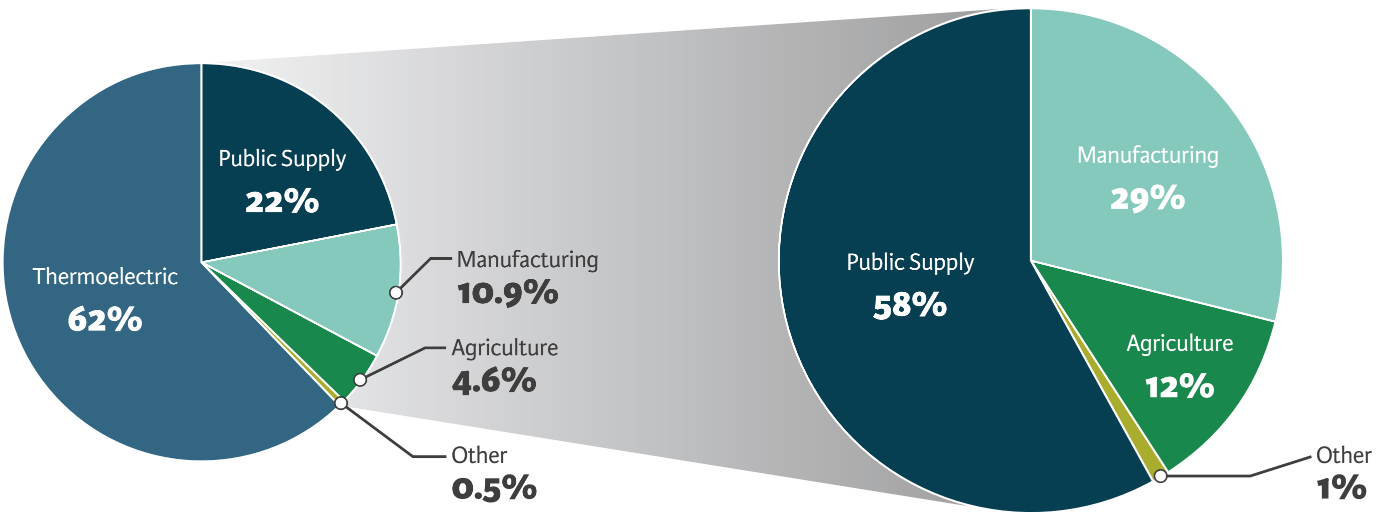
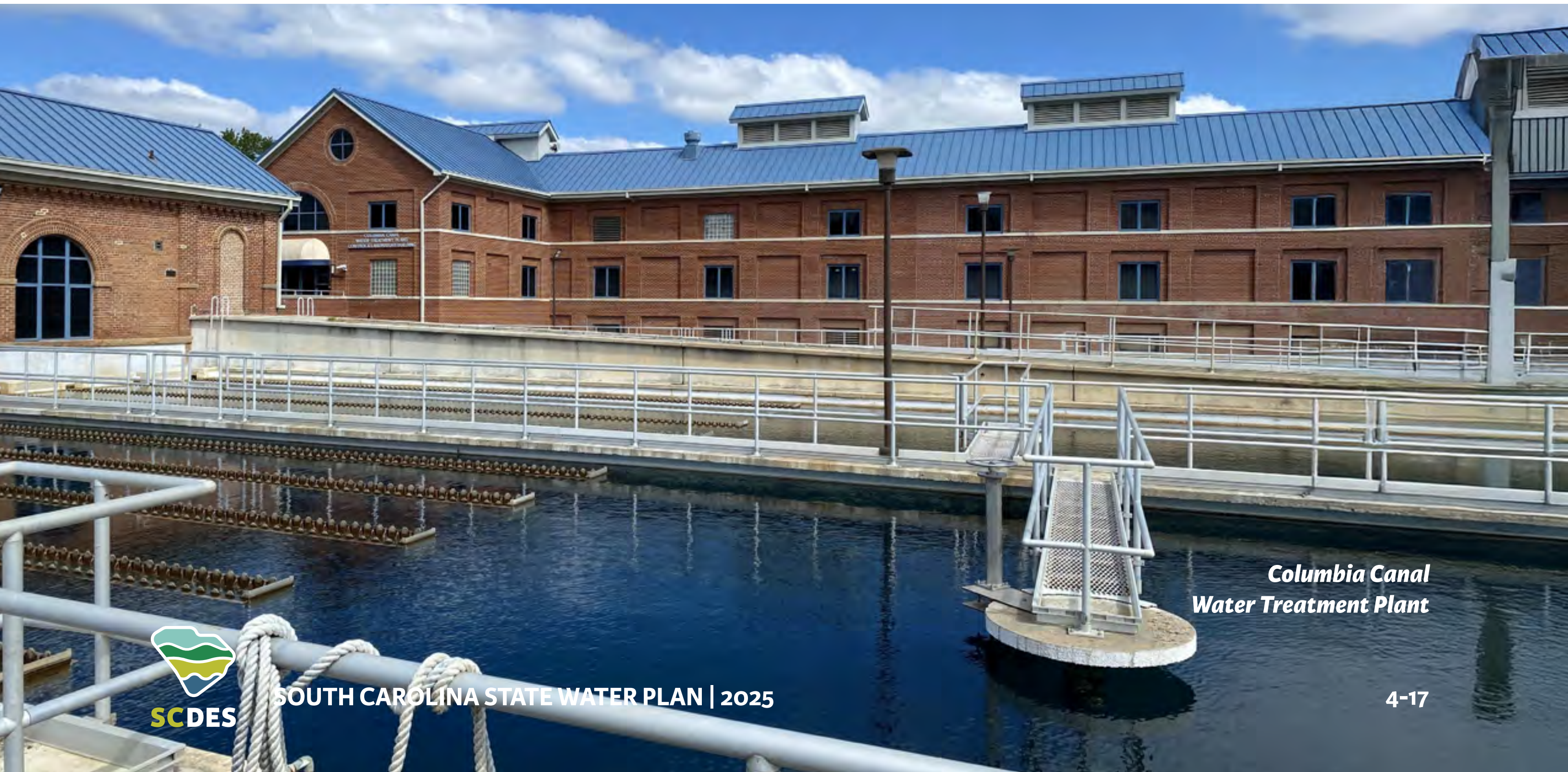


Figure 4-13. Percentage of demand by water use category in 2070 under the High Demand Scenario, with thermoelectric use (left) and without thermoelectric use (right).



Columbia Canal Water Treatment Plant

The total withdrawal statewide is projected to increase 2 percent in the Moderate Demand Scenario and 11 percent in the High Demand Scenario. The net withdrawal of water (water that is withdrawn from surface water or groundwater, used, and not returned to the system after use) is projected to increase by 18 percent in the Moderate Demand Scenario and 43 percent in the High Demand Scenario in 2070. **Table 4-4** summarizes the projected change in withdrawal. All demands presented after this point are the total demand rather than just the consumptive or net use.

Table 4-4. Projected total and net water demand.

	MODERATE DEMAND SCENARIO				HIGH DEMAND SCENARIO			
Water Use	Projected 2025	Projected 2040	Projected 2070	Percent Change 2025 to 2070	Projected 2025	Projected 2040	Projected 2070	Percent Change 2025 to 2070
Total Use	6,058	5,869	6,190	2%	7,142	6,957	7,919	11%
Net Use	984	979	1,163	18%	1,310	1,362	1,879	43%

4.6.2 Demand Projections by Water Use Category

The magnitude of projected increases (or decreases) in water demand vary by sector, as shown in **Figure 4-14**. Most of the growth in both scenarios is projected to occur in the public supply sector, followed by the manufacturing sector. Most of the withdrawals for both public supply and manufacturing are expected to come from surface water. Approximately 10 percent of total growth is projected to occur in the agricultural sector. Most of the projected agricultural withdrawal will be from groundwater. Other uses, including golf course irrigation, mining, and aquaculture, are projected to remain stable through 2070. The percentage of water demand met by surface water or groundwater is projected to stay nearly constant as demands increase since each user's current proportion of demand met by surface water to groundwater was assumed to remain constant.

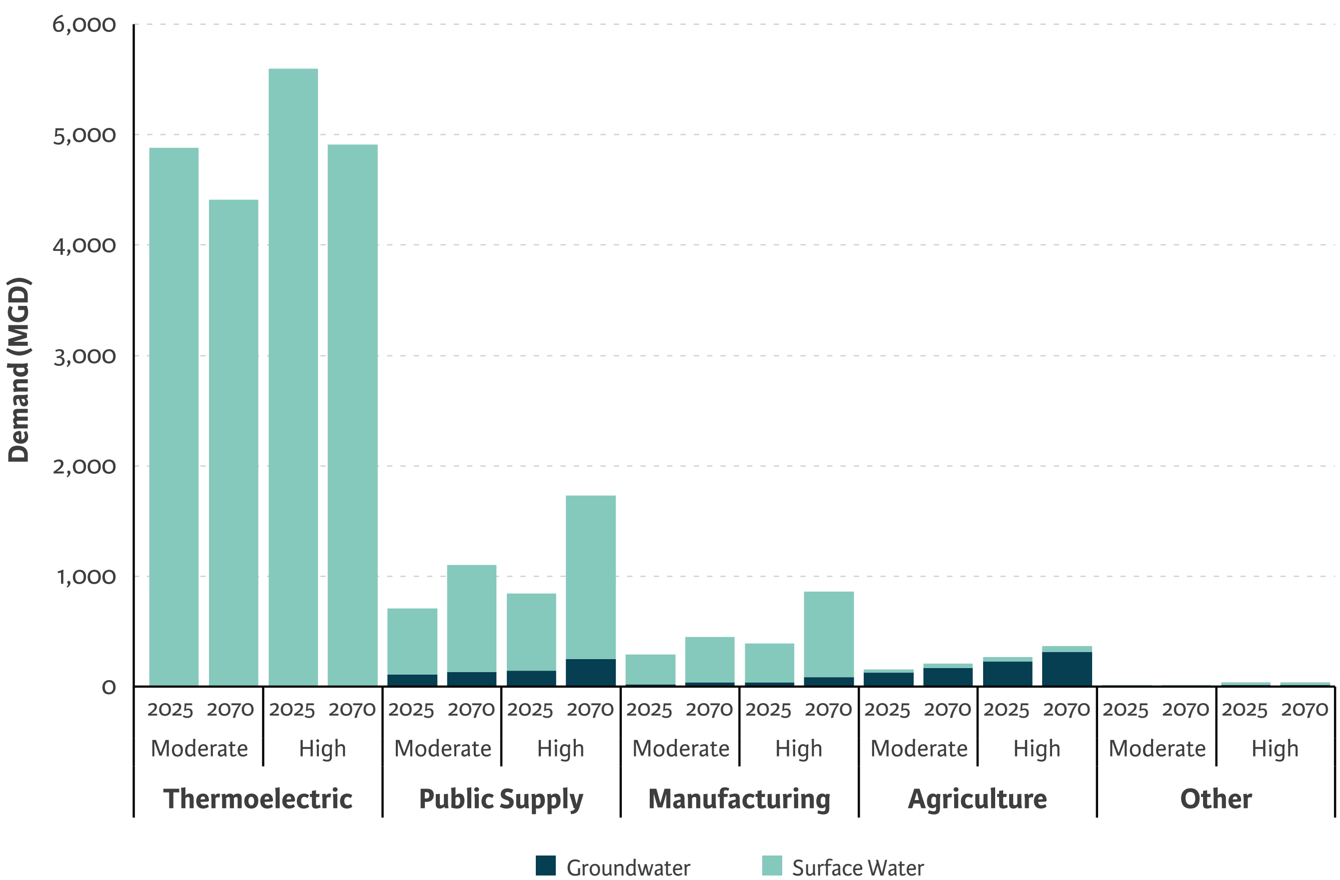


Figure 4-14. Statewide demand projections by water use category and source.

4.6.2 Demand Projections by Planning Basin

Demand projections by planning basin and water source are shown for the Moderate Demand Scenario in **Figure 4-15** and for the High Demand Scenario in **Figure 4-16**. The largest demand growth by volume is projected in the Pee Dee River basin, where demand is projected to increase by 118 MGD (12 percent) and 417 MGD (34 percent) over 2025 demands for the Moderate and High Demand Scenarios, respectively. The largest levels of growth by percentage are projected in the Edisto River basin. Overall demands are projected to decrease in the Santee River basin for both demand scenarios and in the Catawba basin for the Moderate Demand Scenario because of the closure of thermoelectric facilities. The lowest levels of positive growth by volume are in the Lower Savannah-Salkehatchie and Saluda planning basins. In each basin, the percentage of withdrawal coming from groundwater or surface water is projected to remain nearly constant as demands increase.

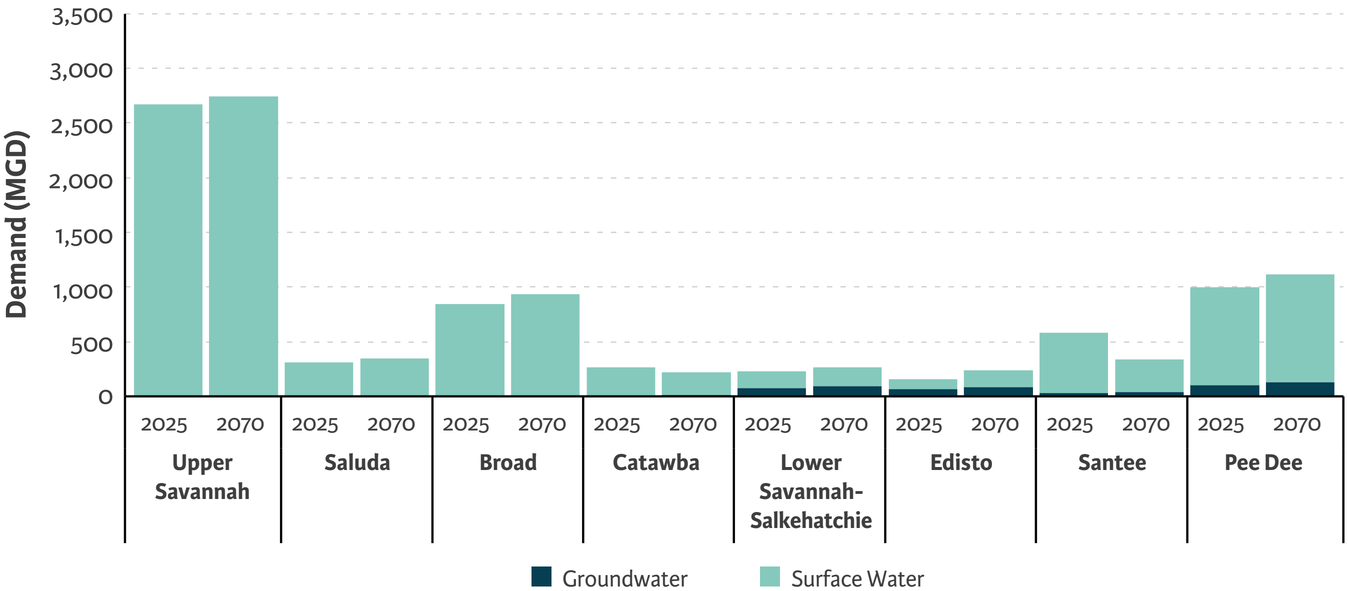


Figure 4-15. Moderate Demand Scenario projections by source and by basin.

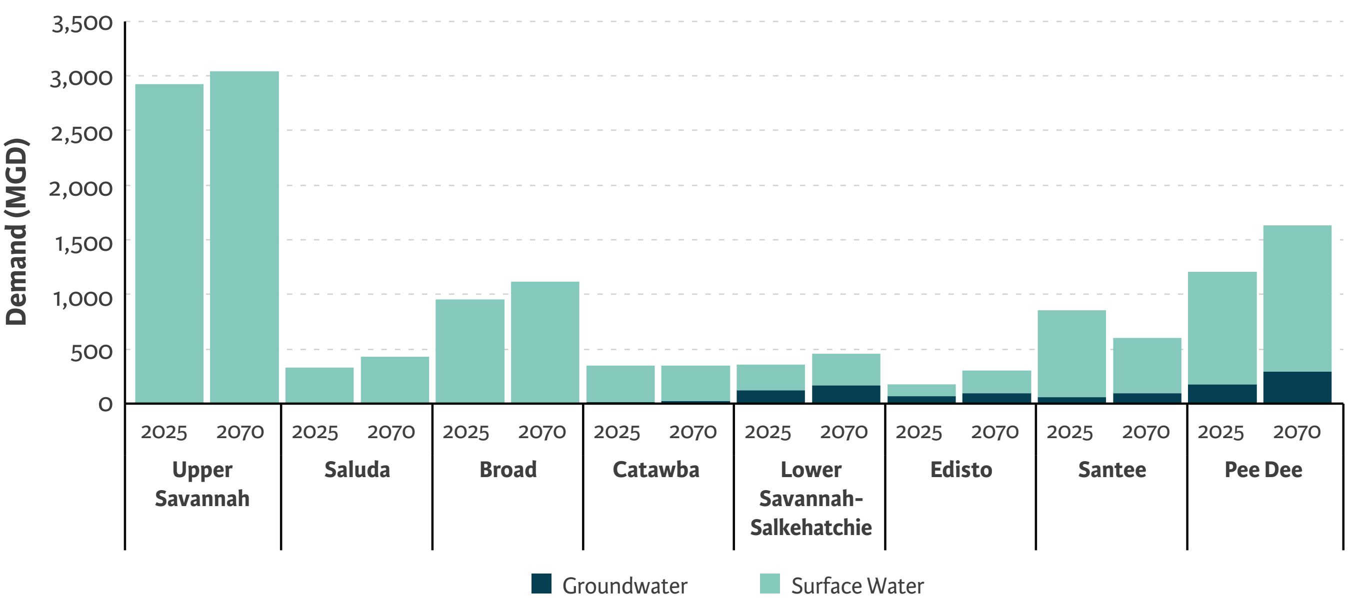


Figure 4-16. High Demand Scenario projections by source and by basin.

Figures 4-17 and **4-18** present demand projections by planning basin and for each water use category. Thermoelectric use is projected to be the largest use category in 2070 for the Upper Savannah, Saluda, Broad, and Pee Dee planning basins; however, demand levels are projected to decrease, be steady, or grow minimally between 2025 and 2070. The remaining basins have public supply as the largest projected 2070 use category.

Demand growth may not be as high as expected in some planning basins based on the communities located within them. For example, Greenville, while located in the Saluda basin, sources water from both the Saluda and Upper Savannah basins. Based on discussions with Greenville Water, future growth will be met from Lake Keowee in the Upper Savannah River basin. Demand projections are shown based on the location of withdrawal, so all projected increases in demand for Greenville are included in the Upper Savannah basin, and Greenville's demand from the Saluda basin will remain at current levels.

Public supply is the category of use with the largest projected increase in demand by volume for all basins except the Santee and Saluda River basins, where manufacturing is projected to increase at similar or slightly higher levels. The Edisto, Lower Savannah-Salkehatchie, and Pee Dee River basins, which are almost entirely within the Coastal Plain, also have significant agricultural water use, which is projected to increase by approximately 30 percent in the Moderate Demand Scenario and 40 percent in the High Demand Scenario, compared to 2025 agricultural water demands.

The recent demand trends described in Section 4.3 showed the largest growth in water demands for public supply and agriculture over the last 10 years. The projected demands also show the largest growth by volume in the public supply water use sector; however, where manufacturing demands have been relatively constant in recent years, they are projected to increase in both the Moderate and High Demand Scenarios by 2070, with a significant portion of the growth occurring in the Pee Dee and Santee River basins.

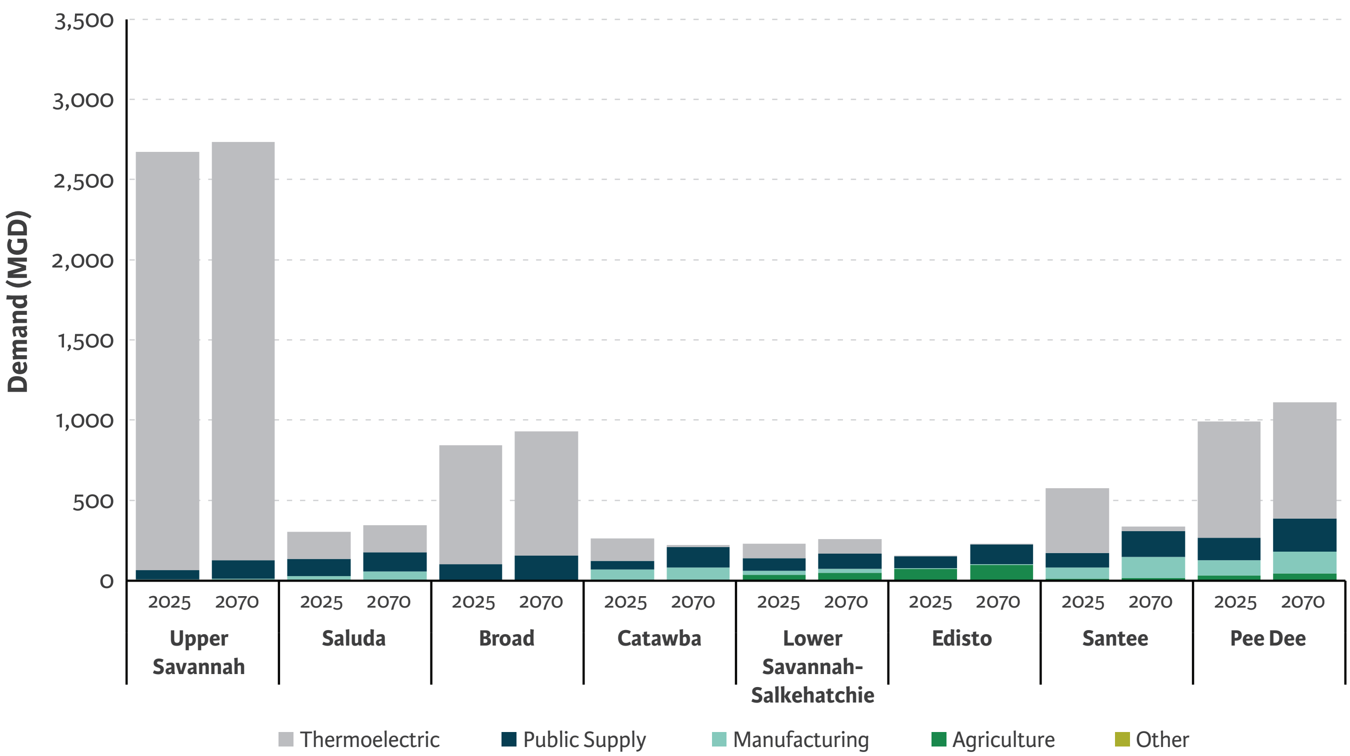


Figure 4-17. Moderate Demand Scenario projections by water use category and by basin.

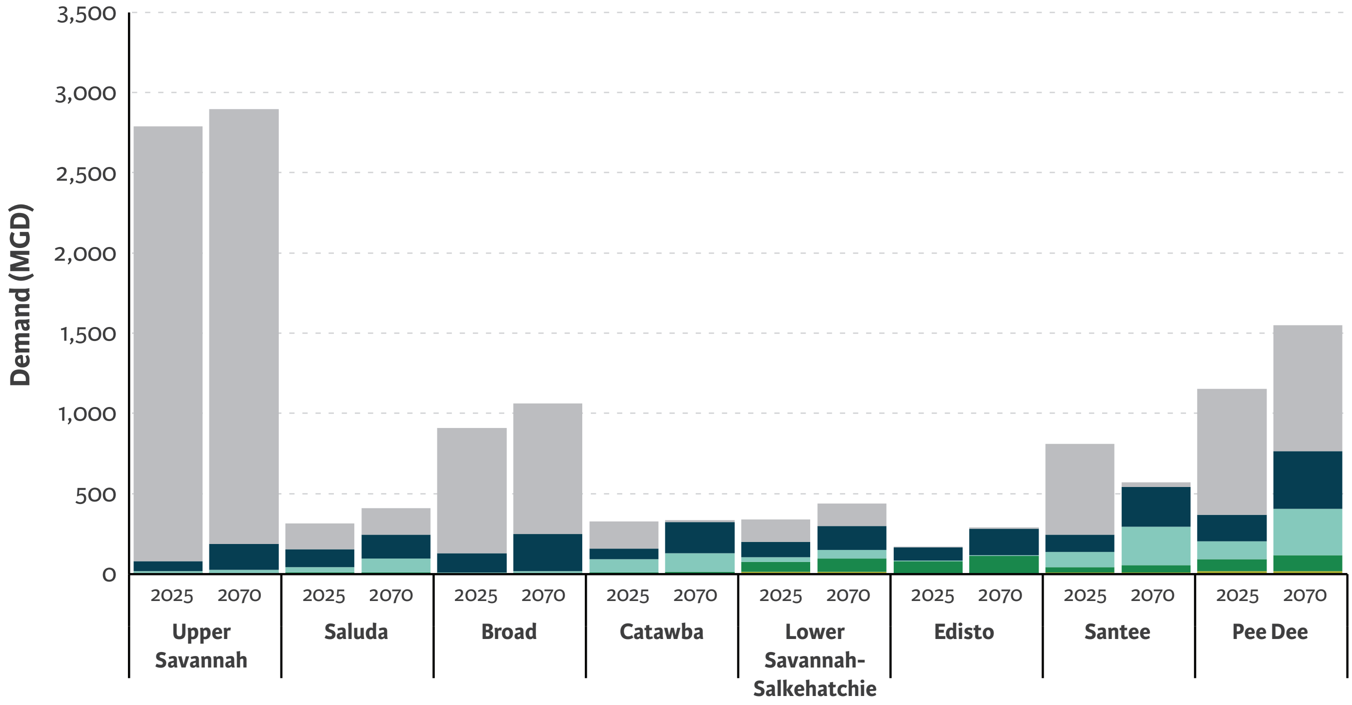


Figure 4-18. High Demand Scenario projections by water use category and by basin.

ReWa Mauldin Road Water Resource Recovery Facility

4.6.3 Comparison to P&R Amount

Excluding hydroelectric use, which is not governed by state permits and is generally regulated by FERC, the total projected water demand in 2070 in the High Demand Scenario is 7,919 MGD, which is still below the current total P&R surface water amount of 12,866 MGD. The 2070 demand projections reach 62 percent of current P&R amounts statewide, with basin-specific amounts ranging from 28 percent in the Lower Savannah-Salkehatchie River basin to 98 percent in the Pee Dee planning basin (**Figure 4-19**).

This comparison of projected demands to current P&R amounts highlights how some planning basins have P&R amounts far above current water demand and even above the projected 2070 demand of the High Demand Scenario. The high P&R amounts may lead to difficulty obtaining new registrations or permits in some basins as the safe yield is neared, even though actual demands are much lower.

As previously noted, P&R amounts are not reflective of water availability, and the amount permitted or registered to users cannot be guaranteed at all times. Additionally, the current P&R amount does not account for any new users in the basin between now and 2070. Some of the projected water demand growth will be from increased use by existing users, as is likely the case for most public supply users, while some of the growth may be from new users, such as new manufacturing or agricultural operations. New users would require new permits or registrations and would increase the P&R amount.

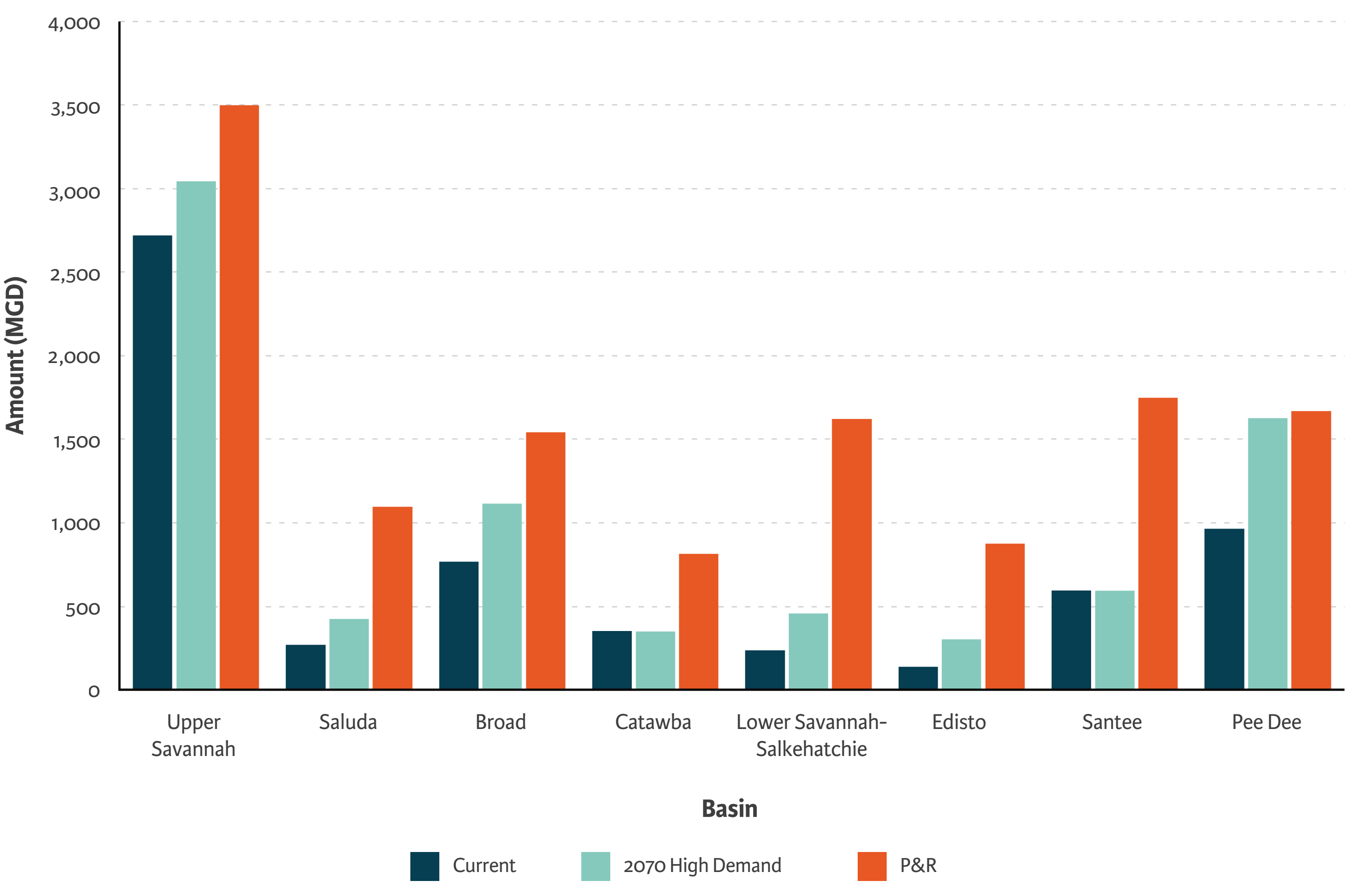


Figure 4-19. Permitted and registered amounts by basin compared to the projected 2070 withdrawal in the High Demand Scenario and current water use. *P&R amounts do not represent water availability.*

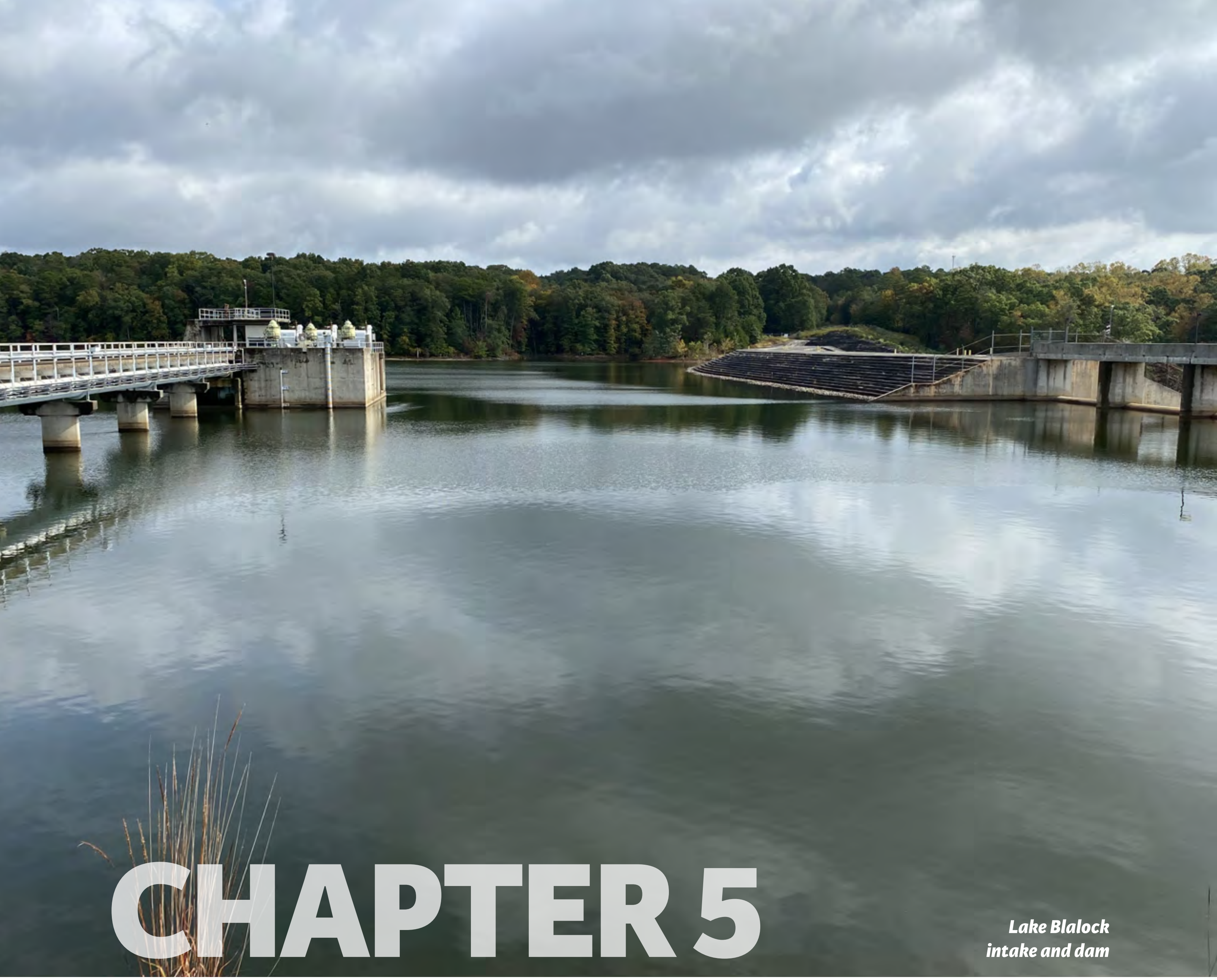
4.6.4 Energy Projection Uncertainties

The water demands associated with energy production presented herein were based on the U.S. Energy Information Agency (EIA) reports available at the time of River Basin Plan development, and on direct communication with representatives from the energy-producing facilities. Since the River Basin Plans were published, changes have been forthcoming for energy-producing facilities in South Carolina. For example, as of August 2025, there are plans to potentially restart construction of the V.C. Summer Nuclear Station in Jenkinsville, and transform a retired coal plant in Canadys into a natural gas plant. Also, Duke Energy recently announced plans for a new natural-gas-fired power plant in Anderson County. Future iterations of River Basin Plans and the State Water Plan will assess the total and consumptive water use of these and any other newly proposed facilities.

Considerations related to energy and data center demands: The demand projections presented in this chapter followed the methodology of the Planning Framework and were based on best available information at the time each River Basin Plan was developed. Changes to water demands from energy production facilities and from the growing industry associated with data centers represent an uncertainty with the current projections. Future updates to River Basin Plans and the State Water Plan will include revisions to these projections based on the ever-changing state of development.

With the increasing use of cloud computing, artificial intelligence, and cryptocurrency mining, data centers have just recently become a more prominent user of energy and water, and represent an uncertainty in future demands. Data centers are large warehouses filled with internet-connected devices that perform computing tasks. As of March 2025, there are 5,426 data centers nationally (Taylor 2025). One estimate places the current number of data centers in South Carolina at 39 (Baxtel 2025). Data centers are energy intensive, generating heat from completing computations. Water withdrawn for data centers is typically used for cooling the equipment, with rates of water usage dependent on the facility's location, size, and equipment density, and the local climate and water availability. Google reports that across its data centers, approximately 80 percent of the water that was withdrawn in 2024 was used consumptively by evaporation, and the remaining 20 percent was returned (Google 2025). The annual withdrawal by facility varied from 0.1 million gallons per year to 1.4 billion gallons per year (Google 2025). In addition to the water use required directly by the data centers for cooling purposes, there is also water demand for the power plants that provide electricity to the data centers. Water use parallels energy use in that as data centers consume more energy, they also withdraw larger amounts of water (Shehabi 2024). Future planning cycles will continue to revisit and address how data centers impact water use in South Carolina.

Canoeing the Edisto River



CHAPTER 5

Lake Blalock intake and dam

Water Availability Assessment

This chapter summarizes the results of the technical analyses completed to assess current and future water availability as documented in each River Basin Plan, with the goal of providing an overview of the adequacy of supply and vulnerabilities by basin and by stream reach. The assessment considers a range of future demand scenarios. For surface water supplies, potential impacts on streamflow and aquatic ecosystem health are discussed.

SUMMARY

Analysis throughout the state based on historical average river flows suggests that surface water supplies are generally sufficient through 2070, with isolated risks of shortages. This analysis has limitations and cannot fully assess future water availability. It is imperative that the state routinely reassess through time and adapt the analysis to changing conditions and the best available data. The state continues to grow in population and attract new industry. Increased energy production will be needed to meet the growing demands which will result in higher water use and impact water availability. Continuous planning, adaptive management, adjusted demand projections, and updated water availability assessments will allow for beneficial water use for all users and extend that use as much as possible in severe and extreme drought conditions.

Many of the projected shortages, especially those related to irrigation needs in tributary headwaters, currently can be managed with smaller, site-specific storage already in place but not included in the broader modeling framework. Operational flexibility and supplemental supply can also alleviate risks for most of the state's larger reservoirs with identified risks. Some tributary reaches are overallocated, meaning that more water has been allocated in permits and registrations than might physically be available during drought conditions. Overallocation is most common in headwater reaches but does occur in some larger tributaries.

In addition to the assessment of ability to meet off-stream demands, the River Basin Councils (RBCs) evaluated the impacts of projected future demands on minimum instream flow (MIF) and ecological function. Future withdrawals generally pose a low risk to the ecological function of streams, although there are select areas of moderate or higher risk. Comparison to MIF targets conducted across the state suggest that, in most cases, the frequency of time streamflow drops below seasonal MIF targets will increase slightly under future demand projections, and more markedly if all surface water users were withdrawing at their fully permitted amount.

The groundwater aquifers that underlie the Coastal Plain are generally capable of transmitting large volumes of water and are expected to support projected water demand over the planning horizon with limited exceptions. One notable exception is the groundwater level decline centered around Savannah, Georgia and extending into South Carolina, which has reversed the direction of groundwater flow and introduced saltwater intrusion to coastal communities. Decades of management have led to some rebound in levels, but the condition must be actively managed. Other exceptions occur in the Pee Dee and Edisto basins, where projected increases in pumping in the Crouch and McQueen Branch aquifers could impact water availability and reduce the ability of the aquifers to store and transmit water. These assessments are based on groundwater levels collected over decades and analysis of trends in groundwater level declines. An updated groundwater model was not available at the time most River Basin Plans were developed. Future water planning will utilize the updated groundwater model to assess the ability of aquifers to meet projected demands Continued monitoring of groundwater levels is necessary to track trends, assess impacts from pumping and drought, and support modeling efforts.

Charleston

5.1 Surface Water Availability

Surface water planning scenarios were simulated using previously constructed and recently updated river basin surface water quantity models developed in the Simplified Water Allocation Model (SWAM) software. In total, seven different SWAM models were updated and applied in all river basins except for the Catawba River basin. The Catawba-Wateree Water Management Group (CWWMG) used a different set of models to assess water availability during development of their Integrated Water Resources Plan (IWRP): the CHEOPS (Computer Hydro-Electric Operations and Planning Software) model for the portion of the basin above the outfall of Lake Wateree and the WaterFALL® model for below Lake Wateree. Although surface water availability results from their planning process were not available at the time this State Water Plan was prepared, combined outflows from the CHEOPS and WaterFALL® models were used in the Santee River basin modeling effort.

The SWAM models simulate river basin hydrology, water availability, and water use across a network over an extended timeseries. SWAM provides efficient planning-level analyses of surface water supply systems. A range of water user types can be represented in the model, including municipal water suppliers, agricultural irrigators, power companies, and industrial water users. SWAM's reservoir object can include basic hydrology-dependent calculations including storage as a function of inflow, outflow, and evaporation. It can also include operational rules of varying complexity. Municipal water conservation programs can similarly be simulated with sets of rules of varying complexity.

As outlined in the Planning Framework, surface water supplies were assessed using historical hydrology from U.S. Geological Survey (USGS) stream gages having periods of record ranging from 40 to 90 years, depending on the basin. The four planning scenarios that were evaluated included Current Use, 2070 Moderate Demand, 2070 High Demand, and Permitted and Registered (P&R) Scenarios. In most basins, a fifth scenario, the Unimpaired Flow (UIF) Scenario, was also evaluated. The UIF Scenario removes all surface water withdrawals and discharges and simulates conditions before any surface water development. The results summarized in this chapter focus on the Current Use and 2070 High Demand Scenarios. The High Demand Scenario is defined as "*a future water demand projection based on the assumptions of a hot and dry climate (i.e., increased irrigation) and high population and economic growth.*" The RBCs generally relied on the 2070 High Demand Scenario for developing their water management strategy recommendations, as it covers the desired planning period and is based on conservative (high demand) assumptions. Additional discussion of model results for the other planning scenarios is provided in the River Basin Plans.

5.1.1 Current and Future Surface Water Shortages

Generally, surface water shortages under both the Current Use and 2070 High Demand Scenarios are projected to be small and infrequent across the state. Many of the simulated shortages are for agricultural water users and golf courses withdrawing from small streams or near the headwaters of streams and rivers. At these locations, extended periods of drought can result in low streamflow. Permitted and registered water users at these locations, which are projected to see small and infrequent shortages, may not actually experience shortages, since many of them withdraw water from small impoundments that are not included in the models. These impoundments may provide enough storage to mitigate the modeled shortages.

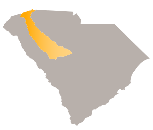
Santee River Dam on Lake Marion

Even with high economic growth rates and conservative assumptions about water demand during dry periods, demands are not projected to outpace surface water supplies through the year 2070, in most cases. When shortages are projected during periods of drought, most can be managed with existing on-site impoundments or achievable demand reductions through conservation programs. **Figures 5-1** and **5-2** summarize the surface water user shortages in each planning basin for the Current Use and 2070 High Demand Scenarios, respectively. The figures show:

- The **number of users with shortages,** calculated by summing the number of users that experience a shortage of any magnitude in the approximately 40 to 90 years of historic hydrology simulated. Small impoundments, which are commonly used as supply sources for agriculture and golf course irrigation, are not included in the models, and therefore, the number of users with projected shortages is likely overstated.
- The **frequency of shortage occurrence** for those users with shortages, calculated as the number of months in which demand was not met divided by the total number of months simulated.

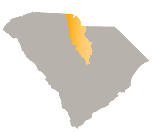
Minor increases in shortages are projected for the 2070 High Demand Scenario compared to the Current Use Scenario in a few of the basins, but projected shortages overall are low. The modeled shortages observed in each basin are as follows:

Upper Savannah River Basin – No shortages are simulated under the Current Use Scenario. Under the 2070 High Demand Scenario, one public water supplier, one industry, and one mining operation are projected to have shortages. The maximum shortages in the 2070 High Demand Scenario over the 82-year simulation period range from 0.3 to 2.5 million gallons per day (MGD).

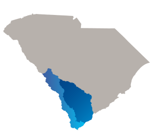


Saluda River Basin – All four shortages under the Current Use Scenario occur for agricultural irrigation users. Under the 2070 High Demand Scenario, one additional agriculture user and one golf course user are also projected to have shortages. The maximum shortages in the 2070 High Demand Scenario over the 94-year simulation period range from 0.03 to 2.5 MGD.

Broad River Basin – No shortages are simulated under the Current Use Scenario. Under the 2070 High Demand Scenario, five water suppliers and three golf courses are projected to have shortages, in addition to a proposed new nuclear power station projected to come online in 2035. In the 2070 High Demand Scenario, the maximum shortages range from 0.03 to 37 MGD over the 90-year simulation period. However, of these projected shortages, all but one (for a public supplier) can likely be alleviated by the operational flexibility of existing or planned reservoirs or the use of existing, supplemental sources.



Catawba River Basin – Water availability in the Catawba Basin is being re-evaluated as part of the Catawba-Wateree IWRP, under the direction of the CWWMG. Revised information on availability and shortage potential were not available during development of the State Water Plan.



Lower Savannah-Salkehatchie River Basin – All five shortages under the Current Use Scenario occur for agricultural irrigation users in the Salkehatchie basin. Under the 2070 High Demand Scenario, one water supplier in the Lower Savannah basin plus seven existing agricultural water users in the Salkehatchie basin are projected to have shortages. In addition, meeting anticipated new agricultural demands in three Salkehatchie River subbasins could be challenging. The maximum shortages in the 2070 High Demand Scenario for the Salkehatchie basin range from 0.01 to 3.0 MGD over the 70-year simulation period. In the 82-year simulation period of the Lower Savannah basin, the maximum shortage is 3.3 MGD.

Edisto River Basin – All 12 shortages under the Current Use Scenario occur for agricultural irrigation users, many of whom have small, unmodeled impoundments that may reduce the frequency and magnitude of shortages or eliminate them in some instances. Under the 2070 High Demand Scenario, two additional agriculture users and three public water suppliers are also projected to have shortages. In the 2070 High Demand Scenario, the maximum shortages for the public water suppliers range from 0.3 to 5.1 MGD over the 87-year simulation period.

Santee River Basin – Under the Current Use Scenario, two agricultural water users, two golf courses, and two public water suppliers could experience shortages. The golf courses experiencing a shortage have small, unmodeled impoundments that may reduce frequency of shortages or eliminate them in some instances. The two public water suppliers withdraw from Lake Marion and Lake Moultrie. The water levels of both lakes are simulated to drop below the water intake elevation for these users during extended drought conditions, assuming no operational flexibility of reservoir releases is granted by the Federal Energy Regulatory Commission (FERC), and downstream fish passage release requirements are met until reservoir levels drop to approximately 0.5 feet above the bottom of the normal operating range. These are conservative assumptions intended to evaluate a worst case. In the 2070 High Demand Scenario, the maximum shortages range from 0.2 to 70.7 MGD over the 37-year simulation period.

Pee Dee River Basin – Three agriculture, two golf courses, and one mining operation are projected to have shortages under the Current Use Scenario. Under the 2070 High Demand Scenario, one additional mining operation and one additional industrial user are projected to have shortages. In the 2070 High Demand Scenario, the maximum shortages range from 0.1 to 21.0 MGD over the 89-year simulation period.

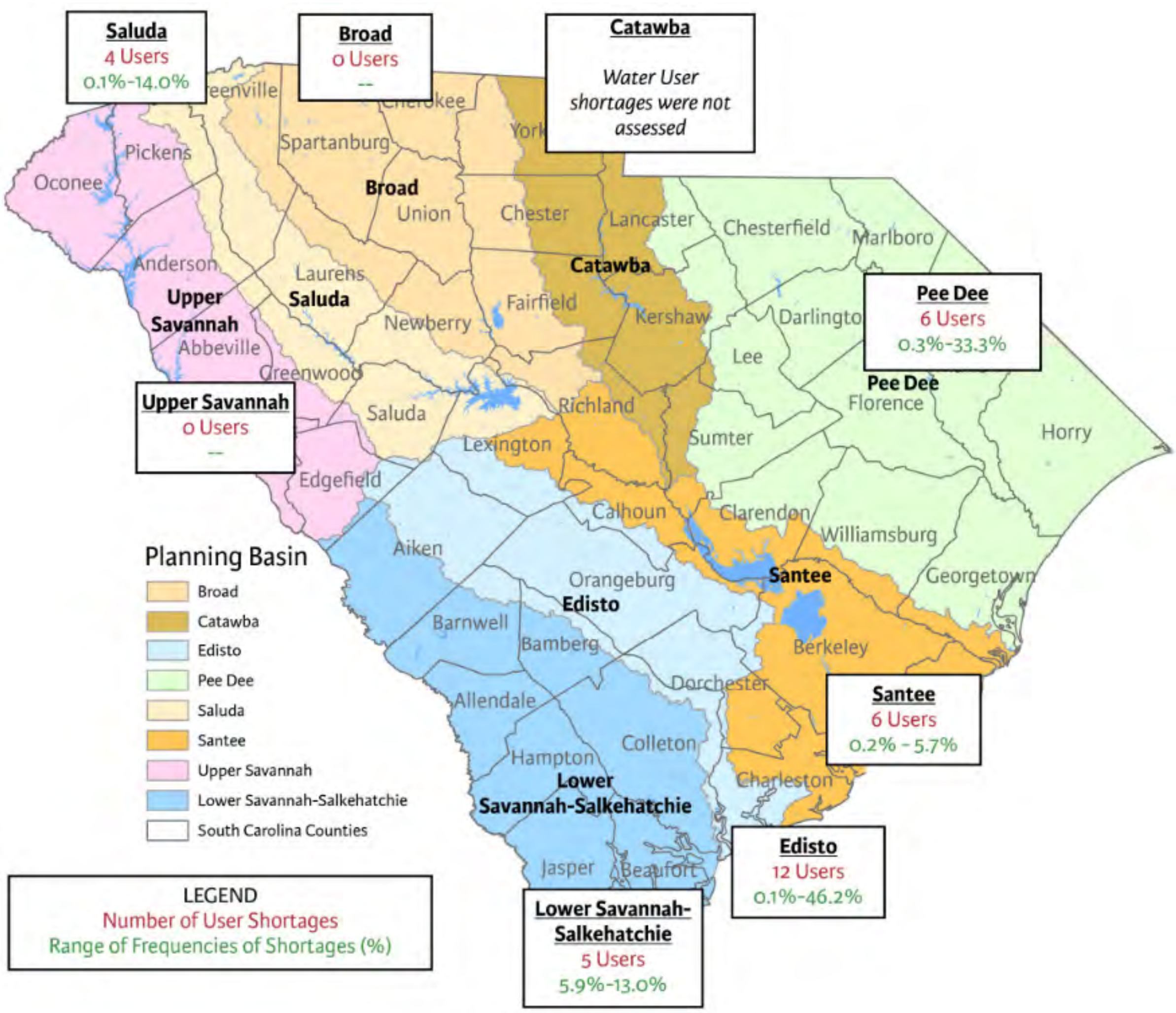


Figure 5-1. Current Use Scenario surface water shortages by planning basin.

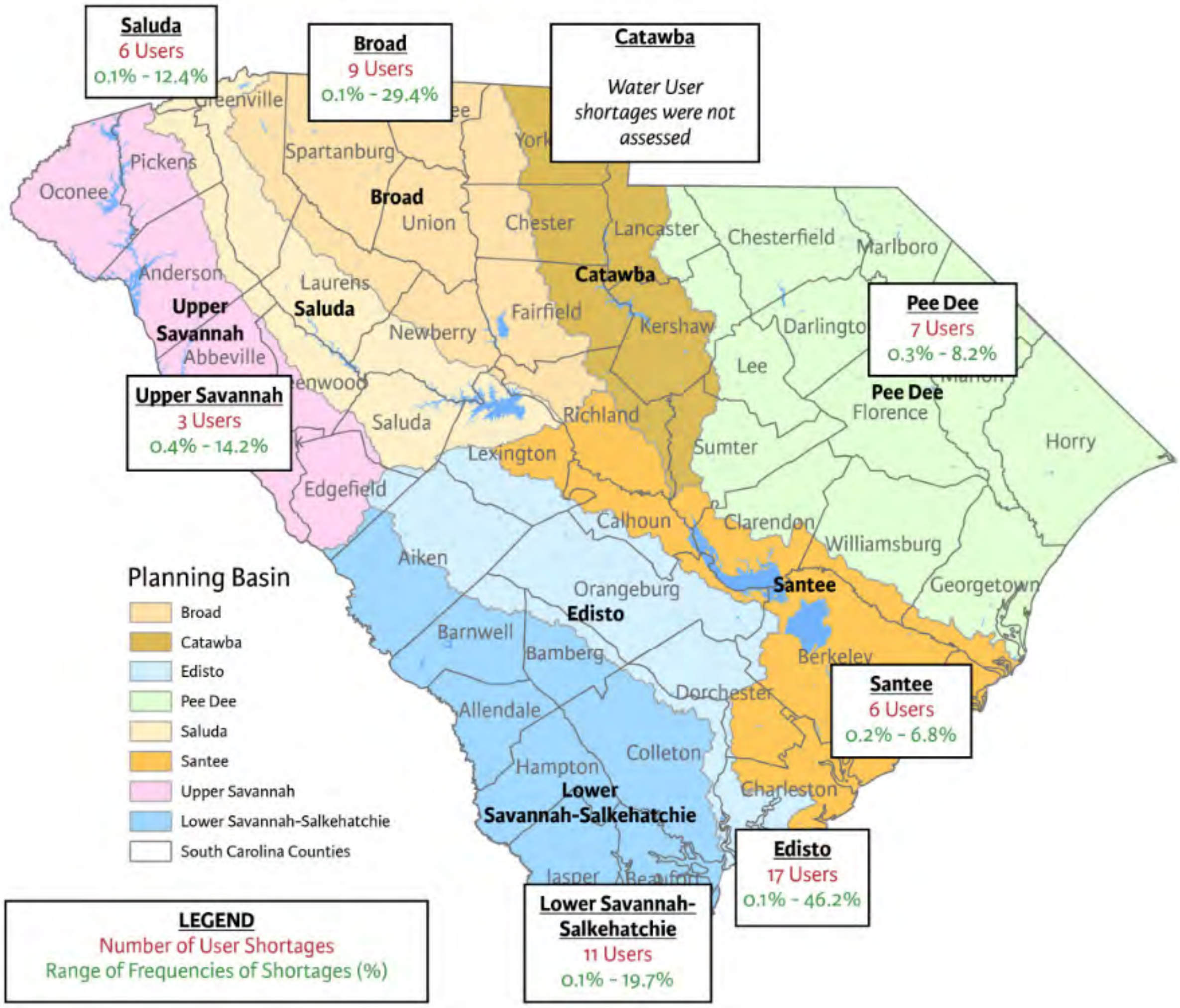


Figure 5-2. 2070 High Demand Scenario surface water shortages by planning basin.

The P&R Scenario assumes all water users withdraw their maximum permitted and registered volumes simultaneously. Shortages generally increased under this scenario, indicating that some stream reaches, or portions of reaches, are not able to support the fully permitted and registered amounts. This most often occurs on tributary streams but also occurred on the mainstem of the Edisto River. Streams where this occurs (in whole or in part) include the Little River, North Fork Edisto River, and the mainstem of the Edisto River in the Edisto River basin; Naked Creek and Black Creek in the Pee Dee River basin; Pacolet, Middle Tyger, and South Tygser Rivers in the Broad River basin; Reedy River and Rabon Creek in the Saluda River basin; Twelvemile Creek and Golden Creek in the Upper Savannah River basin; and the Little Salkehatchie and Coosawhatchie Rivers in the Salkehatchie River basin. In the Santee River basin, Lake Marion and Lake Moultrie are not able to support the fully permitted and registered withdrawals. **Figure 5-3** shows the locations of the streams that are not able to support the permitted and registered amounts, and the frequencies of the shortages.

The results suggest that while many tributaries cannot support the fully permitted and registered withdrawals, most tributaries and mainstem reaches are not overallocated. It is important to distinguish river reaches that may be "overallocated" from the basins as a whole. Chapter 4 presents comparisons of current and projected demands to the P&R amount, and illustrates that in most basins, P&R amounts far exceed anticipated use. As shown in **Figures 5-1** and **5-2**, in general, water supply is expected to be mostly sufficient to meet statewide demand through 2070.

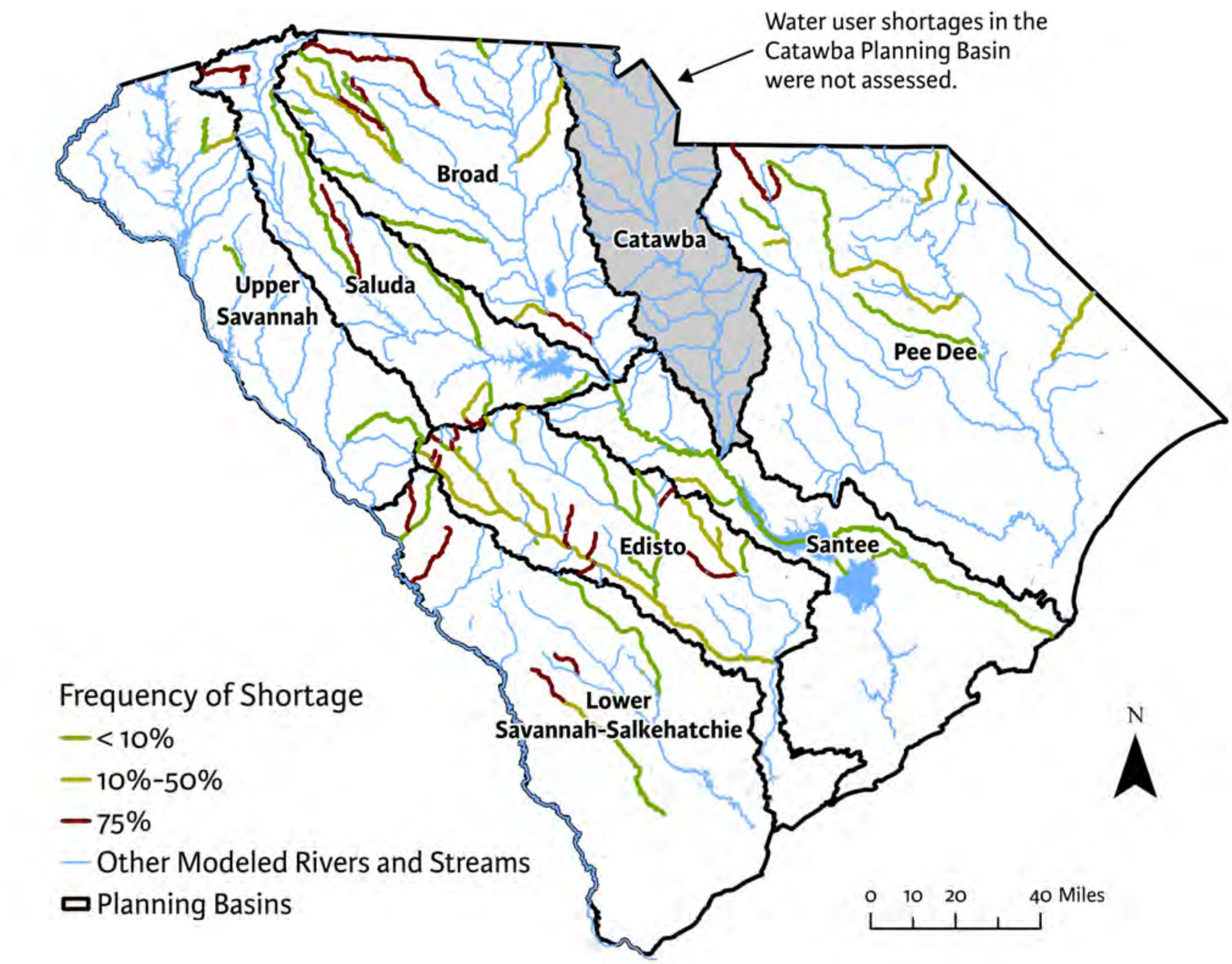


Figure 5-3. Simulated water availability shortages under the P&R Scenario.

5.1.2 Minimum Instream Flow Assessment

As defined in the Surface Water Withdrawal, Permitting, Use, and Reporting regulations (Regulation 61-119), the MIF is the "*flow that provides an adequate supply of water at the surface water withdrawal point to maintain the biological, chemical, and physical integrity of the stream taking into account the needs of downstream users, recreation, and navigation*" (SCDHEC 2012). The South Carolina Surface Water Withdrawal, Permitting, Use, and Reporting Act (Surface Water Act) established the MIF to be 40 percent of the mean annual daily flow for the months of January, February, March, and April; 30 percent of the mean annual daily flow for the months of May, June, and December; and 20 percent of the mean annual daily flow for the months of July through November.

Under the Surface Water Act, surface water withdrawers established after January 1, 2011 must develop a contingency plan for how they will curtail withdrawals and maintain MIFs during low flows. MIF considerations apply only to new surface water users and not existing withdrawers (those established before January 1, 2011), agricultural registrations, or and hydropower stations. Statewide, most permitted surface water users are considered existing. Existing users must only address industry standards for water conservation during periods of low flow.

The River Basin Plans assessed how frequently streamflows fall below MIFs at key river nodes. Modeled flows from daily timestep SWAM simulations were compared to MIFs calculated based on USGS gage records at select locations. The frequency of days below the MIF flow during each month was then calculated for each of the five demand scenarios. **Table 5-1** shows the calculated MIF at two locations (Saluda River near Ware Shoals in the Piedmont region and Salkehatchie River near Miley in the Coastal Plain region), and **Figure 5-4** demonstrates the comparison between MIFs and daily flows at these two locations. MIF comparisons at additional locations are provided in the River Basin Plans. For the Edisto and Pee Dee basins, the MIF comparison was performed as part of the water management strategies assessment but was not assessed for the five planning scenarios.

Table 5-1. Calculated MIF at two select locations.

Gage Name	Gage ID	Period of Record	Mean Annual Daily Flow (cfs)	MIF (cfs)		
				Jan–Apr	May, Jun, and Dec	Jul–Nov
Piedmont Region (Saluda River Basin)						
Saluda River near Ware Shoals[1]	02163500	1939–present	961	384	288	192
Coastal Plain Region (Salkehatchie River Basin)						
Salkehatchie River near Miley[2]	02175500	1951–present	313	125	94	63
Percent of mean annual daily flow for calculating MIF –>				**40%**	**30%**	**20%**

[1] Mean annual daily flow was calculated using streamflow data through the end of water year 2023 (September 30, 2023).
[2] Mean annual daily flow was calculated using streamflow data through the end of water year 2024 (September 30, 2024).

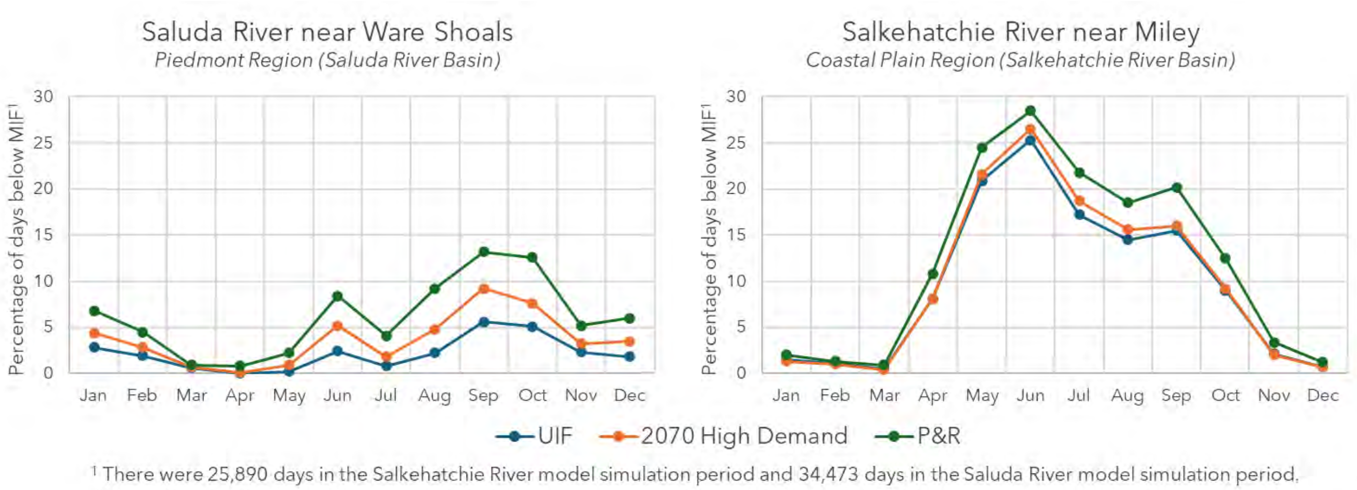


Figure 5-4. Percentage of days below MIF at two select locations.

Key observations include:

- Under UIF conditions (i.e., natural flows), flows drop below MIFs at some point in the year at all sites evaluated by RBCs. This demonstrates that low-flow conditions below MIFs at these locations occur naturally.
- At most sites evaluated by RBCs, there is a modest increase in the percentage of days when flows are below MIFs moving from the Current Use to the 2070 Moderate and 2070 High Demand Scenarios. This is because of the higher surface water withdrawals simulated in those scenarios and can be seen at the two example sites shown in **Figure 5-4**. Exceptions to this occur in locations where upstream wastewater returns increase under increasing demand scenarios, thereby increasing streamflows.
- Along many reaches, there is a relatively large increase in the percentage of days when P&R Scenario flows are below MIFs, compared to the other scenarios. This can be seen in the two examples shown in **Figure 5-4**.

Bushy Park Reservoir

5.1.3 Biological Response Metrics

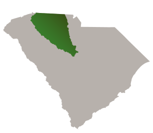
In a collaboration between Clemson, SCDNR, SCDES, The Nature Conservancy, and RTI International, nearly 1,000 fish and aquatic insect samples were combined with mean daily flow and other stream dynamics to create biological response metrics. Biological response metrics, such as species richness (the number of species found at a given site), were developed by Bower et al. (2022) and combined with hydrologic metrics, such as mean daily flow or timing of lowest observed flow, to identify statistically significant relationships between flow characteristics and ecological suitability for fish and macroinvertebrates. These streamflow characteristics could be calculated from the SWAM model simulations to estimate how future demands may impact the ecology of the basin.

The flow-ecology relationships were developed using data from streams and small rivers that are considered wadeable. Because streams of this size comprise most of the surface water in South Carolina, results are broadly applicable statewide. However, the results should not be extrapolated to large rivers or reservoirs. The assessment also was limited to the hydrologic and biological response metrics selected, and the findings do not rule out potential risks for ecological integrity or tolerance related to other flow metrics or other forms of flow changes. Additionally, the flow metrics used to estimate flow-ecology relationships were based on precipitation, temperature, land cover, etc. within a recent period of record. Future changes in these factors will affect the flow-ecology relationships.

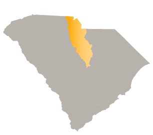
For each of the four future management scenarios, changes in the flow-ecology relationships were quantified and assigned a risk category (high, medium, or low). A summary of the results state-wide is provided below. Additional discussion of these results is provided in Chapter 5 of the River Basin Plans.

Upper Savannah River Basin – SWAM model–simulated flow metrics for all scenarios result in low risk for ecological integrity. Overall, SWAM estimated no significant change in mean daily flow for all scenarios and at all sites assessed. In the Upper Savannah River basin, the vast majority of water use is from reservoirs or the mainstem, where ecological impacts could not be readily evaluated.

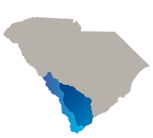
Saluda River Basin – SWAM model–simulated flow metrics for the UIF, Moderate Demand 2070, and High Demand 2070 Scenarios generally result in low risk for ecological integrity and tolerance while the P&R Scenario suggests a moderate to high ecological risk to fish species on the wadeable tributaries of the Saluda River basin. Large changes in mean daily flow for the P&R Scenario and the High Demand 2070 Scenario are predicted to substantially reduce the number of fish species in Rabon Creek.



Broad River Basin – Model–simulated flow metrics for the UIF and Moderate Demand 2070 Scenarios result in low risk for ecological integrity and tolerance. Large changes in mean daily flow for the P&R Scenario and the High Demand 2070 Scenario are predicted to substantially reduce the number of fish species, with five Strategic Nodes predicted to lose more than 20 percent of fish species in the P&R Scenario, and one Strategic Node predicted to lose up to 45 percent of fish species under the High Demand 2070 Scenario. In general, the four future management scenarios examined in this study suggest a moderate to high ecological risk to fish species on the Pacolet and Tyger tributaries of the Broad River basin.



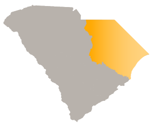
Catawba River Basin - Flow-ecology relationships were thoroughly evaluated during hydro project re-licensing and new flow relationships were established on the mainstem.



Lower Savannah-Salkehatchie River Basin – Biological response metrics were applied at one location, Horse Creek at Clearwater. SWAM model–simulated flow metrics for the UIF, Moderate Demand 2070, and High Demand 2070 Scenarios result in low risk for ecological integrity. However, a large change in mean daily flow for the P&R Scenario is predicted to substantially reduce the number of fish species, resulting in moderate ecological risk.

Edisto River Basin – Modeling generally indicated that flow alterations associated with increasing demand projections would be small, relative to current flow conditions in the primary reaches (North Fork, South Fork, and Four Hole Swamp) and secondary tributaries. Exceptions to this include a medium risk for fish richness on the South Fork Edisto River and a high risk to fish richness in Dean Swamp Creek, both in the P&R Scenario.

Santee River Basin – No biological response metrics were applied because the Santee River Basin is dominated by larger, mostly non-wadeable streams.



Pee Dee River Basin – Generally, changes to mean daily flow, timing of low flow, and frequency of low flow result in low ecological risk at the selected locations under the four management scenarios assessed. The one exception is on Black Creek, where a large change in mean daily flow for the P&R Scenario is predicted to reduce the number of fish species by 35 percent (medium risk category).

5.1.4 Reservoir Safe Yield and Drought Resilience

An important factor in estimating the reliability of current water supply systems against future demand forecasts is the ability of reservoir systems to provide anticipated levels of supply without interruption. The safe yield of a reservoir, or system of reservoirs, is a measure of its long-term reliability. The Planning Framework defines reservoir safe yield as "*the surface water supply for a reservoir or system of reservoirs over the simulated hydrologic period of record.*" Since the surface water supply is the maximum amount of water available for withdrawal 100 percent of the time, the safe yield of a reservoir or system of reservoirs can be thought of as the maximum annual average demand that can be sustained through the period of record without depleting available storage. The Planning Framework stipulates that the drawdown threshold at which safe yield is determined is not necessarily the dead pool level, but the level of the shallowest intake for a water user. Some RBCs also examined safe yield based on dead pool or other elevations that were useful to understand.

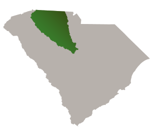
In the Broad, Saluda, Santee, and Upper Savannah River basins, reservoir safe yield was computed for each reservoir or system of reservoirs that provide water to essential water users, including public water supply and power generation. The SWAM model was used to gradually increase hypothetical water demand over the entire period of record until a reservoir, or reservoir system, could no longer satisfy that demand with 100 percent reliability. For any demands upstream of the reservoirs being evaluated, the conservative 2070 High Demand assumptions were applied for the results included in this report. In the Saluda and Upper Savannah Basin, safe yield under the Current Use and P&R Demand scenarios was also evaluated. The analysis was also conducted at a monthly timestep, which does not necessarily account for all operational flexibility of reservoirs. Reservoir operating rules, such as seasonal guide curves, were suspended in some analyses to better balance water supplies across reservoir systems and better quantify physical water availability.

Jefferies Hydroelectric Station

A summary of the results statewide is provided below and in **Table 5-2**. Additional discussion of these results is provided in Chapter 5 of the River Basin Plans.

Upper Savannah River Basin Reservoirs – Because of their pumped storage connection (water is moved into and out of a reservoir for energy production), the safe yield for Bad Creek, Jocassee, and Keowee reservoirs was determined as a system. The Savannah River reservoirs (Lake Hartwell, Lake Russell, and Lake Thurmond) were assessed individually; however, further assessment of the safe yield as a system is warranted. For all reservoirs, the simulated safe yield exceeds the anticipated level of demand in the conservative 2070 High Demand Scenario.

Saluda River Basin Reservoirs – Table Rock and North Saluda Reservoirs (which service Greenville Water), Lake Greenwood (which services Laurens County Water and Sewer Commission [LCWSC] and Greenwood Commission of Public Works [CPW]), and Lake Murray (which services the City of Columbia, West Columbia, Dominion Energy's McMeekin Plant, Newberry County Water & Sewer Authority [NCWSA] and Saluda County Water & Sewer Authority [SCWSA]) were all found to have sufficient supply. For Greenville, the results are conditioned on future supply being available from Lake Keowee. Lake Rabon (which services Laurens CPW) was found to have insufficient supply, though other sources can help make up shortfalls.



Broad River Basin Reservoirs – In most cases, the simulated safe yield exceeds the anticipated level of demand in the conservative 2070 High Demand Scenario, but not in all cases. For example, the water supply reservoirs for the Greer CPW (Lake Robinson and Lake Cunningham) are of sufficient capacity to satisfy the projected 2070 High Demand withdrawals. However, Lakes Whelchel and Gaston Shoals (which supply water to the Cherokee County Board of Public Works, which services Gaffney) were found to not have adequate capacity for the 2070 High Demand Scenario withdrawals. Water supplies for the Spartanburg Water System (Lake Bowen/Reservoir #1 and Lake Blalock) and SJWD (Lake Cooley, North Tyger Reservoir, North Tyger System, Lake Lyman, and Middle Tyger System) were found to be marginally sufficient to meet the projected 2070 High Demand, and further analysis may be prudent.

Santee River Basin Reservoirs – Lakes Marion and Moultrie were analyzed as an interconnected storage system, reflecting their hydraulic and operational dependence. New FERC regulations have stipulated significant downstream flow requirements from both reservoirs. These new regulations impose critical constraints on reservoir operations during the simulated time period. At a monthly timestep, the simulate safe yield of the combined system is 0 MGD, since even without withdrawals, the system cannot satisfy downstream FERC flow requirements all the time. At a daily timestep, the simulated safe yield of the system is approximately 40 MGD, although these results should be used with caution as they are based on exact repetition of daily hydrologic patterns. For these reservoirs, maintaining the FERC required releases during low inflow conditions results in a safe yield that is significantly lower than current and projected demands.

Lake Marion

Table 5-2. Safe yield results for water supply reservoirs under the 2070 High Demand Scenario.

Water Systems Served	Reservoir (Total System)	Safe Yield (MGD)	Sufficiency for 2070 High Demand Scenarios
Cherokee County BPW (Gaffney)	Lake Whelchel	6.8	Insufficient to satisfy 2070 High Demand of approx. 25 MGD (annual average)
	Gaston Shoals	6.0	
	TOTAL SYSTEM	12.8	
Greer CPW	Lake Robinson	26.8	Sufficient to satisfy 2070 High Demand of 22 MGD (average annual)
	Lake Cunningham	12.0	
	TOTAL SYSTEM	**<38.8**	
SJWD	Lake Cooley	3.6	Marginally sufficient to meet 2070 High Demand of 25 MGD (daily analysis suggests that safe yield can provide this reliably). Further analysis may be prudent, given the range of values produced.
	North Tyger Res	4.6	
	North Tyger System	10.2	
	Lake Lyman	11.5	
	Middle Tyger System	13.7	
	TOTAL SYSTEM	**<23.9**	
SWS	Lake Bowen/Reservoir #1	32	Marginally sufficient to meet 2070 High Demand of 62 MGD. Further analysis may be prudent.
	Lake Blalock	30	
	TOTAL SYSTEM	**62**	
Greenville Water	Table Rock	19	Sufficient to satisfy 2070 High Demand of 34 MGD (average annual)
	North Saluda	24	
	TOTAL SYSTEM	**43**	
Laurens CPW	**Lake Rabon**	**1.6**	Insufficient to satisfy 2070 High Demand of 2.4 MGD (average annual)
Greenwood CPW and LCWSC	**Lake Greenwood**	**197**	Sufficient to satisfy 2070 High Demand of 20 MGD (average annual)
City of Columbia, West Columbia, Dominion Energy's McMeekin Plant, NCWSA, and SCWSA	**Lake Murray**	**359**	Sufficient to satisfy 2070 High Demand of 311 MGD (average annual)
N/A	Bad Creek Reservoir	No critical water user withdrawals	
N/A	Lake Jocassee		
Greenville Water, Walhalla, Seneca, and Oconee Nuclear Station	Lake Keowee	419	Sufficient to satisfy 2070 High Demand of 146 MGD (average annual)
Clemson Energy, Anderson Regional JWS, South Anderson Water Supply Intake, and Pioneer Water	Lake Hartwell	Safe yield was assessed for each reservoir and the results presented in the River Basin Plan; however, assessment of the safe yield of the entire system is necessary, given the complex and interdependent operations.	Sufficient to satisfy 2070 High Demand of 82 MGD (average annual)
Mohawk and City of Abbeville	Lake Russell		
McCormick	Lake Thurmond		
	TOTAL SYSTEM		

Table 5-2. Safe yield results for water supply reservoirs under the 2070 High Demand Scenario. (continued)

Water Systems Served	Reservoir (Total System)	Safe Yield (MGD)	Sufficiency for 2070 High Demand Scenarios
Santee Cooper Lake Marion Regional Water System	Lake Marion	Safe yield was assessed as a total system	Insufficient to satisfy 2070 High Demand of 73 MGD (annual average) while still maintaining FERC-required reservoir releases
Santee Cooper Lake Moultrie Regional Water System	Lake Moultrie		
	TOTAL SYSTEM	**0-40** depending on time step used	

Several of the RBCs (Saluda, Upper Savannah, and Santee) elected to explore the impact on water availability in the major reservoirs under more severe drought conditions than have been experienced in the hydrologic record. This "synthetic drought" analysis recognizes that historic hydrology may not represent future conditions, and more severe and/or longer droughts could further stress surface water resources. In general, the simulations performed highlight water supply vulnerabilities, especially in the Savannah River basin, if historical observed drought conditions were to occur in the future with greater frequency and/or duration. While modified reservoir storage operations (i.e., relaxing required minimum releases from reservoirs) could mitigate some of the quantified shortages, this would come at a cost of reduced flows downstream of the major reservoirs in these basins. Additional information summarizing the results of the synthetic drought scenarios can be found in the Saluda, Upper Savannah, and Santee River Basin Plans.

5.1.5 Reaches of Interest

The Planning Framework defines a reach of interest as "*a stream reach defined by the RBC that experiences undesired impacts, environmental or otherwise, determined from current or future water demand scenarios or proposed water management strategies. Such reaches may or may not have identified surface water shortages.*"

The Saluda RBC designated the 14-mile stretch of the Saluda River below Saluda Lake as a reach of interest because of its classification as a hydrologically impaired stream segment. Aquatic life and recreational uses in this stretch have been impaired due to the modified peaking operation schedule of the hydropower facility at Saluda Lake Dam. No other reaches of interest were identified in the state. The Saluda RBC intends to work with SCDES and the operator of the hydropower facility to identify solutions to resolve the hydrologic impairment below the Saluda Lake hydro project.

Saluda Lake Hydroelectric Facility

5.2 Groundwater Availability

As described in Chapter 2.3.2, South Carolina's Coastal Plain is underlain by several major aquifers that serve as important sources of water for more than half of the state. Groundwater usage is concentrated in the Coastal Plain, with limited groundwater use in the Upstate. Because the Lower Savannah-Salkehatchie, Edisto, Santee, and Pee Dee basins cover most of the Coastal Plain, groundwater availability assessments were made only for these four basins. This section summarizes conclusions about groundwater availability in each of the Coastal Plain basins, as well as a general summary about groundwater availability in the Upstate.

Unlike watersheds, aquifers are not defined by topography, river basin, or geopolitical boundaries, and the groundwater they hold is a resource shared by neighboring basins. The deepest and oldest aquifers, the Crouch Branch, McQueen Branch/Charleston, and Gramling, span much of the Coastal Plan and are sources of water for all four planning basins. The shallower aquifers, Upper and Middle Floridan and Gordon, while only present in the central to southwest portion of the state, are important resources to the Edisto and Lower Savannah-Salkehatchie basins. Groundwater users in each of these four basins utilize water from 3 to 6 major aquifers.

Conditions in an aquifer are assessed primarily with water level measurements made in wells. The groundwater level—the depth from land surface to the water level in a well—indicates how much pressure the water in the aquifer is under, which is a function of how much water is stored in the aquifer. Water levels measured continuously in monitoring wells provide information on changing water levels over time and thus indicate changes in aquifer storage over time. Water level data from numerous wells open to one aquifer can be used to produce potentiometric maps, which are contour maps of an aquifer's water levels over a wide area. Potentiometric maps provide "snapshots" of aquifer conditions over the full extent of the aquifer at one moment in time. Areas of relatively significant groundwater level declines are indicated on potentiometric maps by locally lower potentiometric elevations, usually centered near the pumping causing the decline. These potentiometric lows, known as cones of depression, appear on potentiometric maps as concentric loops of contour lines.

Current groundwater conditions can be assessed using groundwater-level measurements, but future groundwater conditions and long-term groundwater availability is best predicted using groundwater flow models. Since early in this planning process, the USGS has been working with South Carolina state resource agencies to develop a groundwater flow model for the South Carolina Coastal Plain that will be an update of a previous USGS model published in 2010 (Campbell and Coes 2010). This new Coastal Plain groundwater flow model was intended to serve as the primary assessment tool for evaluating the potential impacts of future groundwater withdrawals on aquifer conditions.

As the first basin to begin planning, the Edisto RBC used an updated USGS Atlantic Coastal Plain Groundwater Model (Campbell and Coes 2010), and the model produced some meaningful results, including the identification of two areas that may experience potential water-level problems in the future. Before groundwater modeling for the Pee Dee basin began, the USGS identified previously unknown problems with the model. Resolution of these problems and subsequent recalibration of the model delayed its completion so much that it was unavailable for use when planning began in the Pee Dee, Lower Savannah-Salkehatchie, and Santee basins. To avoid delaying the release, the Pee Dee, Lower Savannah-Salkehatchie, and Santee River Basin Plans were completed without the use of groundwater modeling.

Because the groundwater model was unavailable to the Pee Dee, Lower Savannah-Salkehatchie, and Santee RBCs, groundwater conditions in these planning basins were evaluated using groundwater-level data, potentiometric aquifer surface contour maps, and current and historical groundwater usage information. The impact of future water demand on aquifer conditions and groundwater availability was estimated based on current groundwater conditions, observed groundwater-level trends, and assumptions about where increased pumping would occur. As such, the groundwater availability assessments for these basins are more generalized than that made for the Edisto basin. Groundwater models for all four Coastal Plain planning basins are expected be available in future planning activities to perform more complete groundwater assessments.

5.2.1 Current and Future Groundwater Shortages

The Planning Framework defines a groundwater shortage as "*a state in which groundwater withdrawals from a specific aquifer violate a groundwater condition applied on that aquifer,*" and a groundwater condition is defined as "*a limitation on the amount of groundwater that can be withdrawn from an aquifer.*" Essentially, a groundwater shortage occurs when pumping results in the groundwater level being lowered to a specific level defined by an RBC.

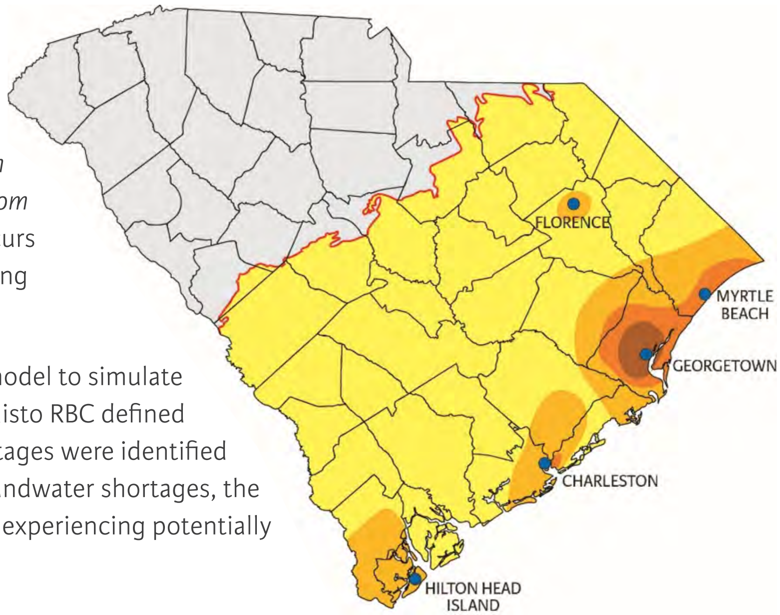


Figure 5-5. Map of South Carolina showing areas of the Coastal Plain that have experienced significant groundwater level declines.

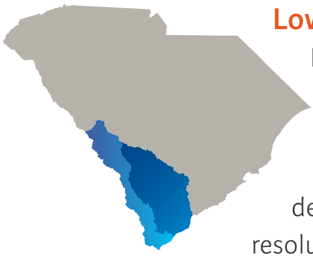
Because only the Edisto RBC used a groundwater model to simulate future groundwater levels, and because only the Edisto RBC defined any groundwater conditions, no groundwater shortages were identified in any other basin. Despite not having defined groundwater shortages, the other Coastal Plain basins all have aquifers that are experiencing potentially problematic groundwater levels.

Groundwater level declines in an aquifer are a normal result of groundwater pumping, and water level declines have been observed in all the Coastal Plain aquifers. Fortunately, because of the depth of the aquifers, the vast amount of water stored in them, and the aquifers' ability to recharge, only a few areas have experienced problems related to lowered groundwater levels, and even in those places, groundwater is still available for use.

Figure 5-5 illustrates where significant, localized groundwater level declines from predevelopment water levels have occurred in the South Carolina Coastal Plain aquifer system. Although these cones of depression occur in different aquifers and have developed at different times, they all occur where groundwater use is concentrated near city centers. During the river basin planning process, these areas were given special attention for evaluation and to highlight water management strategies to mitigate further declines.

Lake Marion

Lower Savannah-Salkehatchie River Basin

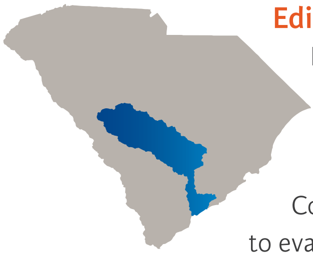


In the Lower Savannah-Salkehatchie Basin, groundwater supplies approximately half the basin's needs. Groundwater is plentiful in the basin, as it is only basin where all the South Carolina Coastal Plain aquifers are present. Groundwater use is greatest for public water supply and agricultural irrigation. For most of the basin, the groundwater evaluation indicated demand has not adversely affected groundwater levels. Additionally, despite lacking good spatial resolution of monitoring wells in certain areas of the basin, the available data suggest that projected future use would not cause shortages. Although not declared a groundwater area of concern by the RBC, the most pressing issue in the basin is the ongoing saltwater intrusion of the Upper Floridan aquifer at Hilton Head caused by the large cone of depression centered at Savannah, Georgia. Because the focus of water planning in this initial phase was on water quantity and potential shortages over the planning horizon, the RBC acknowledged and discussed the topic, but no further assessment was conducted.

Specific observations and conclusions from the groundwater assessment are presented below.

- In the upper part of the basin, the Crouch Branch and McQueen Branch aquifers have experienced minimal declines from predevelopment levels despite decades of groundwater pumping. This demonstrates a pattern of consistent and sufficient recharge to both aquifers. It is likely that no groundwater supply shortages will occur in the upper basin under projected use scenarios.
- Agricultural irrigation is common throughout the basin but is most concentrated in Allendale, Bamberg, and Barnwell Counties in the middle of the basin. Irrigation in this area is projected to continue or increase over the planning horizon. There are too few 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.
- The cone of depression in the Upper Floridan aquifer is well documented and is managed through regulatory measures in both Georgia and South Carolina. Large withdrawals from the aquifer to support the development of Savannah, Georgia and Hilton Head Island caused a large cone of depression at Savannah (approximately 150 feet below predevelopment level). As a result of the cone of depression, water levels declined by about 10 feet across Hilton Head, which allowed saltwater to move into in the freshwater portions of the aquifer. Regulatory action by both states have enabled water levels to have rebound and stabilize, but due to the prevailing groundwater gradient towards the cone, the salt plumes continue to move across Hilton Head Island.
- Water demand for public supply is expected to increase in Beaufort and Jasper Counties over the next several decades. Withdrawal limits enforced on the Upper Floridan aquifer in South Carolina have allowed water levels in that aquifer to stabilize and should be continued; additional demand must therefore be met with more surface water use, expanded aquifer storage and recovery (ASR) programs, and the increased use of groundwater from deeper aquifers. These strategies and others are discussed in Chapter 6.

Coosawhatchie at Hwy 601



Edisto River Basin

In the Edisto River basin, groundwater supplies approximately half of the basin's overall water demand. Groundwater is largely for agricultural irrigation in wells completed the Middle Floridan, Gordan, Crouch Branch and McQueen Branch aquifers. Groundwater withdrawals representing current and future demands were incorporated into the updated USGS Atlantic Coastal Plain Groundwater Model (Campbell and Coes 2010), and simulations were performed to evaluate changes in water levels and discharge to streams and to support development of water budgets. Historical, reported pumping rates were assigned to the wells for the years 1983 to 2020. The groundwater demand projections were applied to the model for the period 2021 through 2070. Since the location of potential future wells that may account for the projected increase in demands over the 50-year planning horizon are unknown, all future demands were assigned to existing wells. The model was run for four planning scenarios: Current Use, Moderate Demand, High Demand, and P&R. More details regarding the application of the groundwater model in the basin can be found in Chapter 4 of the Edisto River Basin Plan.

Despite limitations and uncertainties related to groundwater modeling, the results suggest the following:

- Future drawdown potential is a significant concern in upper portions of the Edisto basin in the Crouch Branch and McQueen Branch aquifers. Efforts to quantify these impacts are discussed in the Edisto River Basin Plan. In all scenarios, groundwater levels were simulated to drop below the top of the Crouch Branch aquifer in the southern half of Calhoun County (**Figure 5-6**), and below the top of the McQueen Branch aquifer in a more limited area of Lexington County.
- The modeled water budgets show a relatively minor reduction in discharge to streams resulting from increased pumping from the deeper aquifers, suggesting that groundwater withdrawals from the deeper Crouch Branch and McQueen Branch aquifers in the central part of the basin do not significantly impact stream baseflow. This is to be expected, given the confined nature of the deeper aquifers. Pumping in the upper part of the basin, where the aquifers are thinner, closer to the surface, and less confined, would be expected to have more impact on stream baseflow.

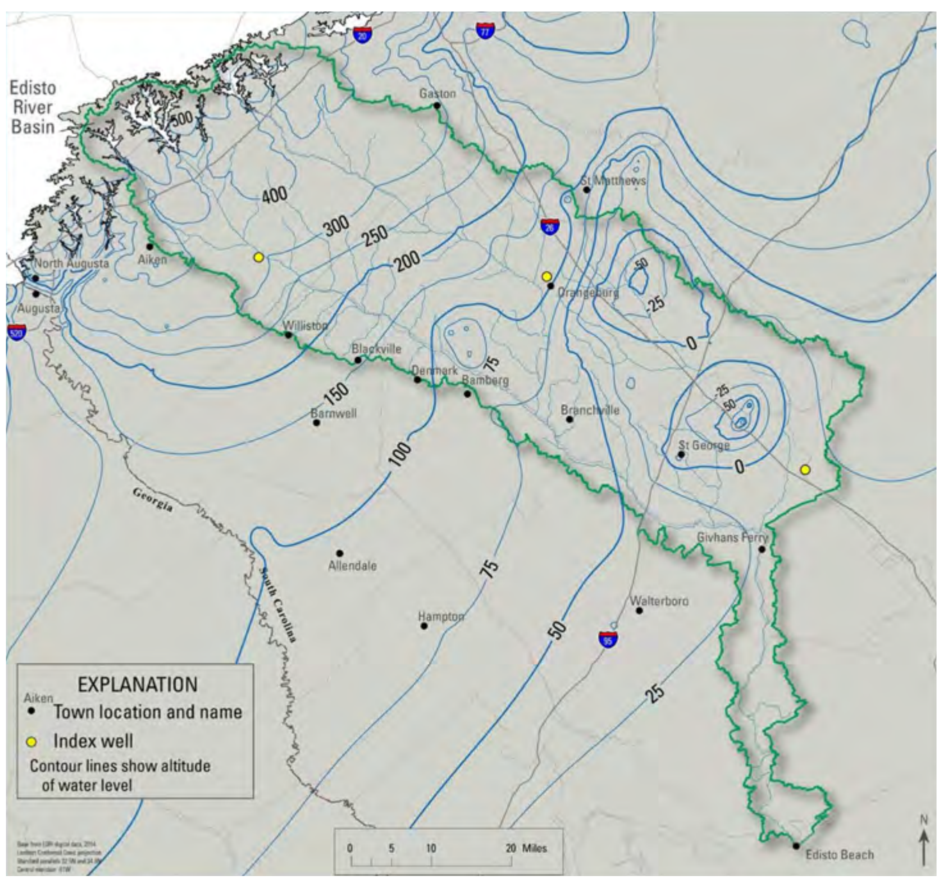
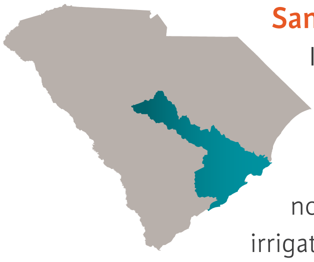


Figure 5-6. Potentiometric map showing simulated Crouch Branch aquifer water levels for the High Demand Scenario in the year 2070. *The cones of depression seen in the central basin prompted the Edisto RBC to classify this area as a groundwater area of concern.*



Santee River Basin

In the Santee Basin, groundwater demand occurs basin-wide, but the demand is overall lower compared to other basins in the Coastal Plain. This, in part, is due to the smaller size of the basin and the presence of significant surface water reservoirs in the basin. The groundwater evaluation showed that for a majority of the basin historical groundwater use has generally not adversely affected groundwater levels. Groundwater use is greatest for agricultural irrigation, public water supply, and industry. In the upper basin (Lexington, Richland, Calhoun, Clarendon, and Orangeburg Counties), most production wells are completed in the Crouch Branch or McQueen Branch aquifers, while in the lower basin (Berkeley, Dorchester, and Charleston Counties), the Gordon, Crouch Branch, and Charleston aquifers are primarily used. Use of the very deep Gramling aquifer, which exists only in the lower part of the basin, is very limited. Although not defined as a groundwater area of concern by the Santee RBC, a notable potentiometric feature is the cone of depression in the Charleston aquifer centered over coastal Charleston County. The cone of depression has been well documented since 2004, when groundwater levels in the Charleston aquifer were more than 200 feet below predevelopment levels.

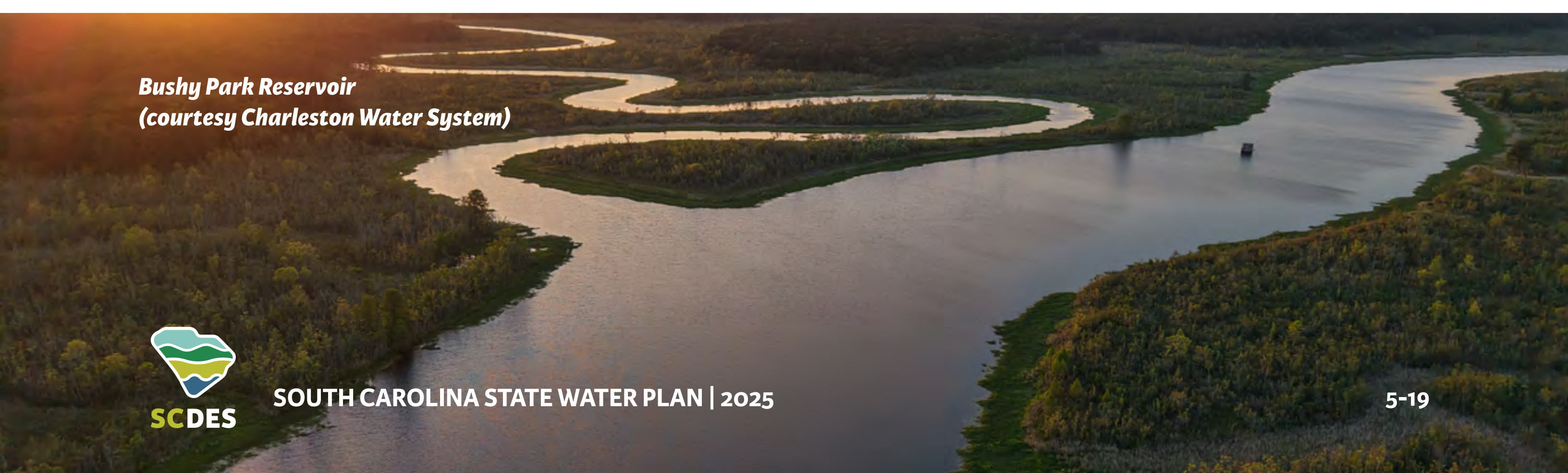
Specific observations and conclusions from the groundwater assessment are presented below.

- Although the Crouch Branch and McQueen Branch aquifers have experienced declines 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, and 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, and irrigation in this area is projected to continue or increase over the planning horizon. There are few monitoring wells in the Crouch Branch and McQueen Branch aquifers to adequately evaluate groundwater trends in this area. Although available data do not indicate significant declines, this basin shares its western boundary with the Edisto basin, where modeling suggests future pumping could bring water levels down to the tops of the aquifers. Modeling and additional monitoring wells are needed to better understand how future pumping may impact aquifer levels in the area.

- As a result of increased surface water use and regulatory measures over the past two decades, the cone of depression in the Charleston aquifer has rebounded about 50 feet and stabilized between 100–150 feet below predevelopment levels (**Figure 5-7**). However, **Figure 5-8** shows a long, steady decline in groundwater levels with periods of stabilization in Berkeley County, several miles inland from the cone center. Water demand projections suggest increased groundwater demand for public supply and industrial sector, and increased withdrawals from the Charleston aquifer could cause the cone to worsen and cause further declines region wide.

- 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.



Bushy Park Reservoir (courtesy Charleston Water System)

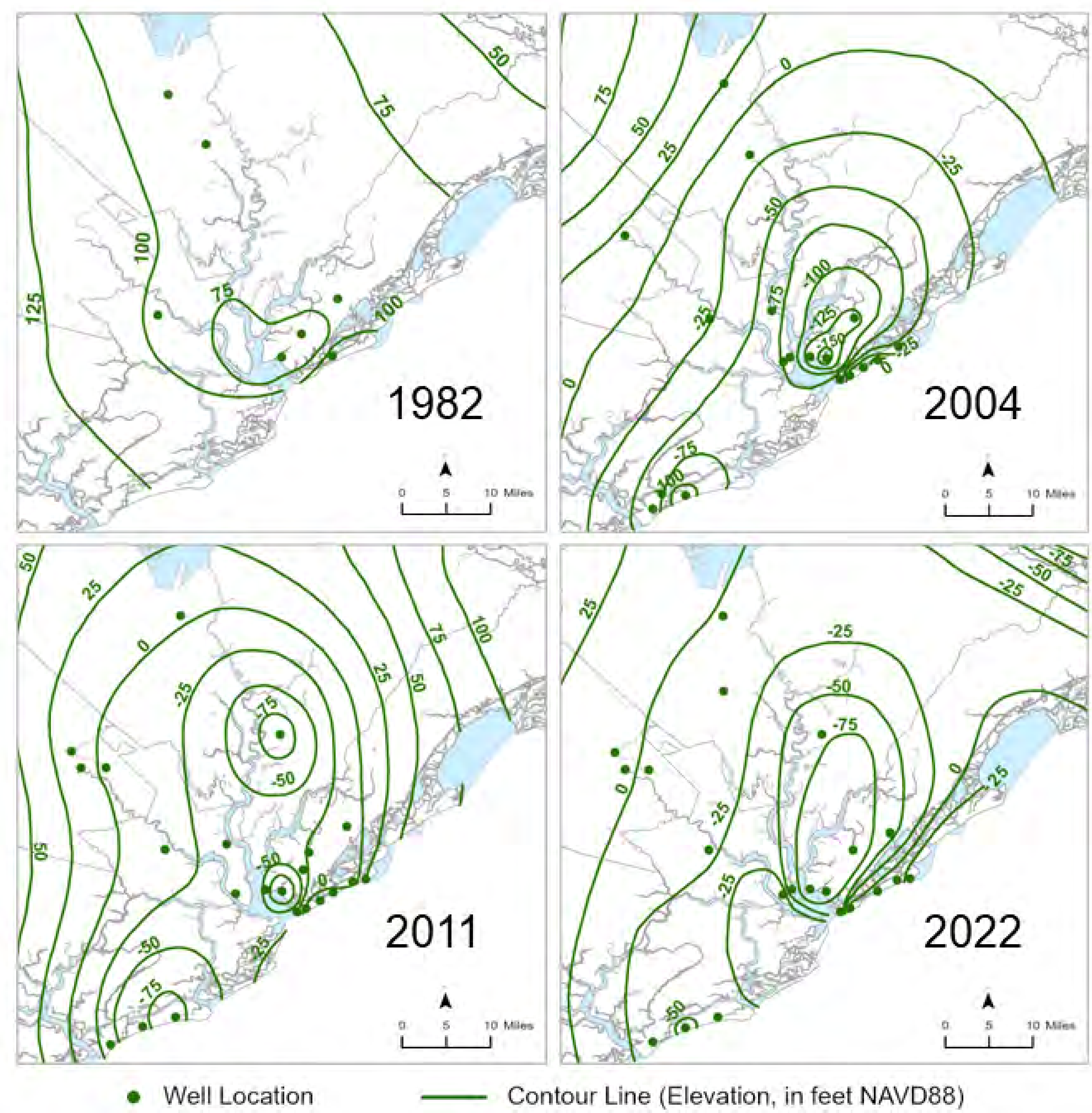


Figure 5-7. Potentiometric water level maps of the Charleston aquifer for the years 1982, 2004, 2011, and 2022.
(Sources: Aucott and Speiran 1984; SCDNR 2008; SCDNR 2013; SCDNR 2023a)

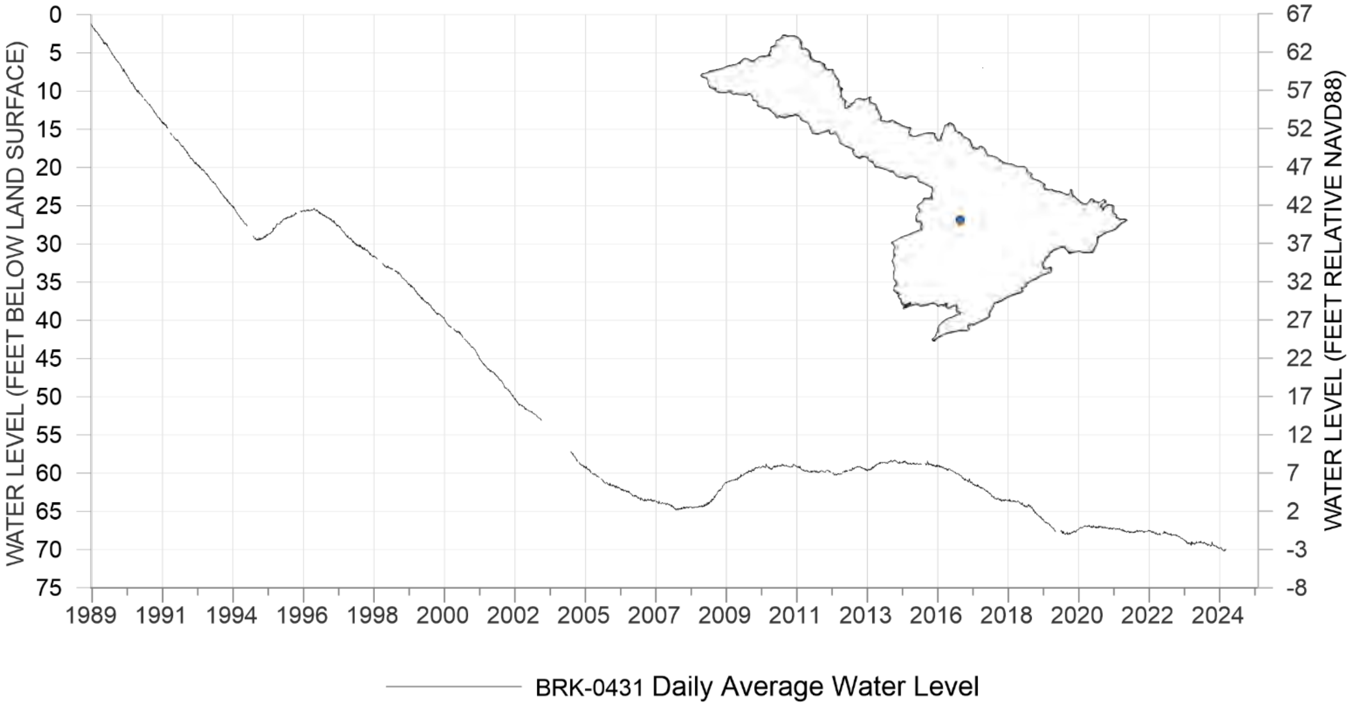
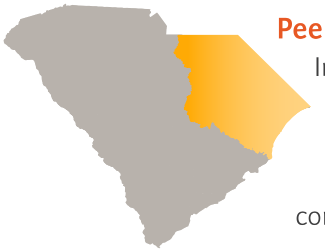


Figure 5-8. Groundwater levels in the Charleston aquifer well BRK-0431/USGS 331022080021801 in Berkeley County.

Charleston



Pee Dee River Basin

In the Pee Dee Basin, groundwater supplies approximately half the basin's needs, primarily from the Crouch Branch and McQueen Branch aquifers. The two largest groundwater uses are water supply and agricultural irrigation. Notable potentiometric features in this basin are the cone of depression in the McQueen Branch aquifer around the City of Florence and the cone of the depression in the Crouch Branch aquifer in Georgetown County.

Specific observations and conclusions from the groundwater assessment are presented below.

- Water level trends in wells near the recharge areas of the Crouch Branch and McQueen Branch aquifers have generally remained stable over time despite groundwater pumping, indicating consistent and sufficient recharge to both aquifers. It is likely that no groundwater supply shortages will occur in these areas under projected use scenarios.
- Farther away from the recharge zone, moving toward the coast, groundwater levels are declining in both the Crouch Branch and McQueen Branch aquifers at a rate of approximately 1 foot per year. Declines in the Crouch Branch aquifer near Georgetown have been observed at about 2 feet per year.
- The continued growth and expansion of cones of depression in the potentiometric surfaces of the Crouch Branch and McQueen Branch aquifers in Georgetown County has been monitored for years. After the most recent (2022) potentiometric map was created for the Crouch Branch aquifer (**Figure 5-9**), monitoring wells in the area have indicated a rebound in water levels beginning in July 2023 (**Figure 5-10**), which seems to coincide with a water supply well in Georgetown reducing its groundwater use in 2023 and discontinuing it completely in 2024. While the magnitude and duration of this recovery remains to be seen, these preliminary findings suggest the current level of pumping from this aquifer is as much as the aquifer can sustain.
- The deliberate use of both surface and groundwater (termed conjunctive use and further discussed in Chapter 6) in Florence County has resulted in stabilization of groundwater levels in that area. While conjunctive use has been very beneficial for slowing and reversing declining groundwater levels in Florence County, groundwater levels should continue to be monitored to evaluate potential groundwater supply risks that may occur if future uses increase.

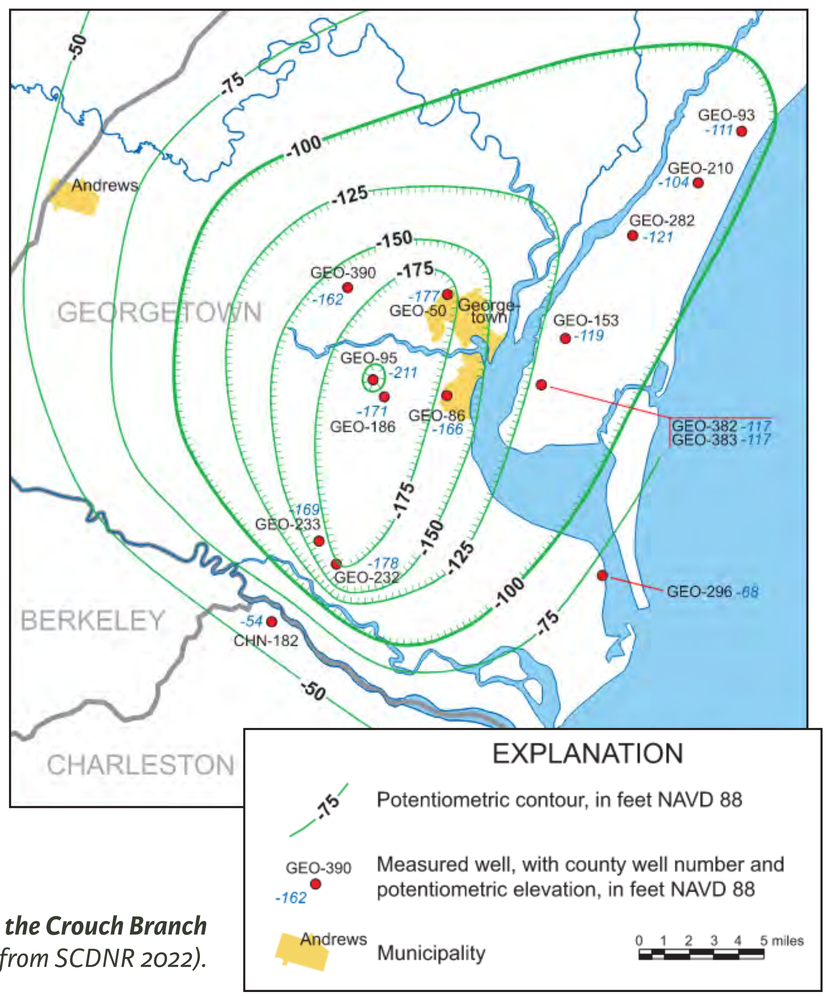


Figure 5-9. 2020 cone of depression in the Crouch Branch aquifer near Georgetown. *(Modified from SCDNR 2022).*

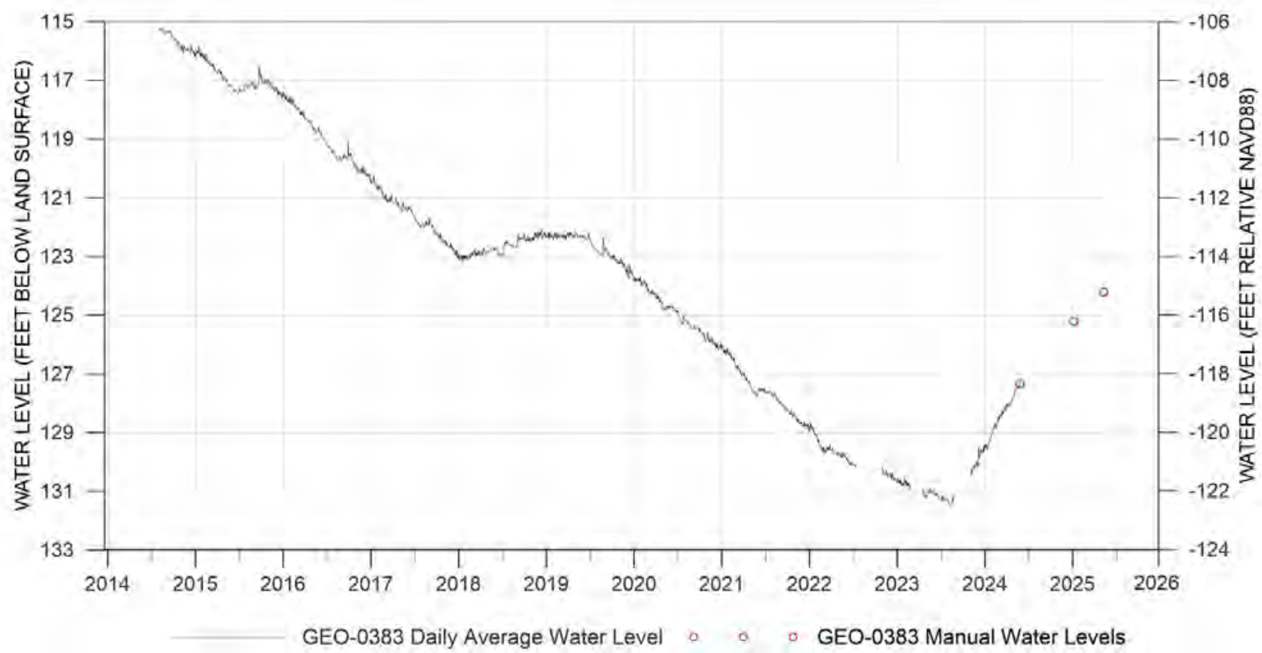
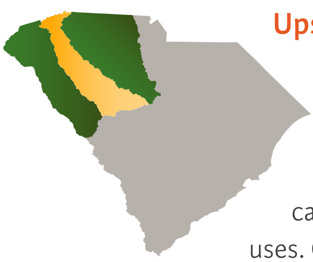


Figure 5-10. Hydrograph showing groundwater levels in the monitoring well GEO-0383, illustrating rebound of water levels in the Crouch Branch aquifer since 2023.



Upstate River Basins (Upper Savannah, Saluda, and Broad River Basins)

The Upper Savannah, Saluda, and Broad River basins are almost entirely within the Piedmont physiographic province, where groundwater occurs in bedrock fractures and in the overlying saprolite. Within the Upstate basins, well yields from fractured rock are reliable but typically low, particularly when compared to Coastal Plain aquifers. Still, Piedmont wells are generally capable of supporting most domestic, private water needs and small irrigation and agricultural uses. Groundwater is the water source for many rural homes in the Piedmont (SCDNR 2023b), especially in areas without access to public water supply systems.

Because of the generally low well yields, groundwater use is mostly limited to domestic wells and small irrigation wells, although some industries and public suppliers rely on wells. Because users of private wells are not required to register or report their withdrawals, the actual number of groundwater users and the volume of groundwater use in the Piedmont is not accurately known.

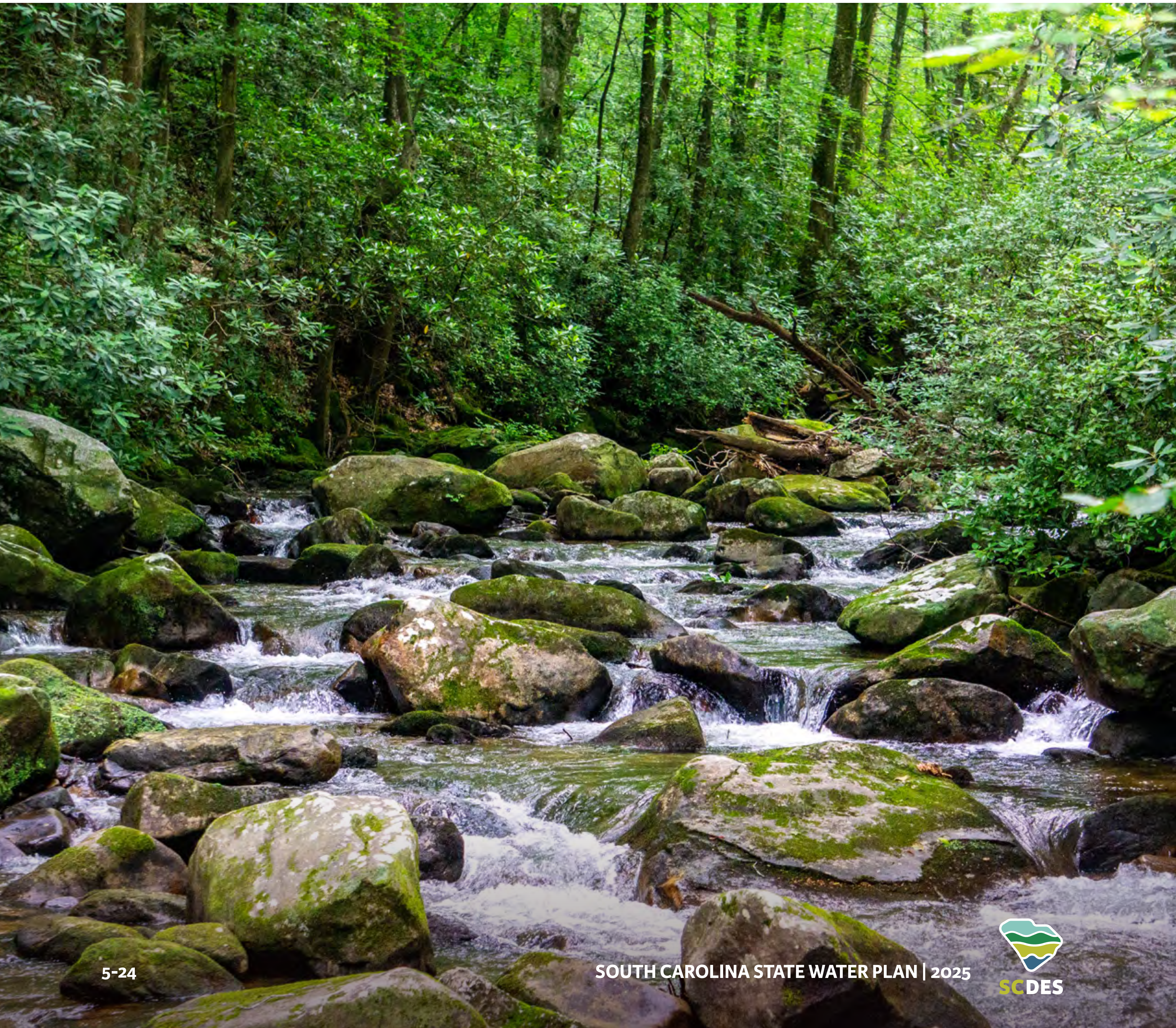
Potentiometric maps have not been drawn for areas northwest of the Fall Line, including the Upper Savannah, Saluda, and Broad River basins. Unlike in the Coastal Plain region, where water levels in the confined aquifers generally slope toward the coast, groundwater levels in the Upstate generally follow topographic patterns. No modeling or other analysis was performed to assess groundwater availability. No areas are known to experience groundwater-level declines due to over-pumping, but during certain drought conditions, some private wells may be vulnerable to lack of water.

5.2.2 Groundwater Areas of Concern

The Planning Framework defines a groundwater area of concern as "*an area in the Coastal Plain, designated by a River Basin Council, where groundwater withdrawals from a specified aquifer are causing or are expected to cause unacceptable impacts to the resource or to the public health and well-being*" (SCDNR 2019a).

The Pee Dee RBC identified areas around Florence County and along the coast in Georgetown and Horry counties as preliminary groundwater areas of concern due to observed cones of depression. The Pee Dee RBC may later classify these areas as groundwater areas of concern if future groundwater modeling indicates a continued worsening of conditions in these areas.

The Edisto RBC designated groundwater areas of concern in three areas where modeling predicted future declines below the top of an aquifer. The Crouch Branch aquifer in Calhoun County, the McQueen Branch aquifer in Lexington County, and a small area in Aiken County near Shaw Creek are designated as groundwater areas of concern, based on the modeling results.



Water Management Strategies

The effective and sustainable use of the state's water resources now and over the next 50 years requires a diverse toolbox of strategies that encourage conservation, minimize waste and loss, maintain or enhance storage, diversify supplies, and allow for the reuse of water where feasible. Water management strategies are especially necessary in the basins where modeling identified potential gaps in supply, but may also be important if the intensity, frequency, or duration of droughts increases beyond that observed over the last century.

This chapter provides an overview of the water management strategies recommended by the River Basin Councils (RBCs) and supported by WaterSC, summarizes their effectiveness and feasibility, and discusses how adaptive management can be used to guide implementation if conditions change from those assumed during the river basin planning process. Additional details of the evaluation and selection of water management strategies can be found in Chapters 6 and 7 of the River Basin Plans.

SUMMARY

Based on the potential for shortages projected by the water availability assessments in each planning basin, the RBCs evaluated and recommended water management strategies to reduce or eliminate shortages or extend existing supply. In most planning basins, the water availability assessment projected limited or no shortages through the 2070 planning horizon. In these cases, the RBCs focused on identifying and selecting demand-side water management strategies, which are best practices to conserve water resources, and supply-side strategies already in place that could be expanded. In basins with projected shortages, the RBCs evaluated the enhancement of existing and/or new supply-side strategies in addition to demand-side strategies.

The RBCs followed a two-step process to evaluate water management strategies. As a first step, the proposed water management strategies were simulated using the available models to assess their effectiveness in eliminating or reducing identified shortages or increasing surface water or groundwater supply. The second step assessed the feasibility of these strategies for implementation. The Planning Framework identifies multiple considerations for determining feasibility, including potential cost and benefits, consistency with state regulations, reliability, environmental and socioeconomic impacts, and potential interstate or interbasin impacts.

The strategies that received the strongest support among the RBCs and which were judged to be the most feasible and effective are listed below. Most of these strategies, and several others, were also identified and recommended by WaterSC. In recommending a toolbox of strategies, the RBCs recognized that the effectiveness and feasibility can vary by location, water use sector, and water user.

Demand-Side Strategies

Strategies that reduce water consumption and improve water use efficiency.

Municipal	Irrigation (Agricultural and Golf Courses)	Industrial and Energy
Public education about water conservation	Water audits and nozzle retrofits	Educating employees about water conservation
Conservation pricing structures	Irrigation scheduling	Water reuse programs
Leak detection and water loss control programs	Irrigation equipment changes	Leak detection and water loss control
Water reuse programs	Crop variety, crop type, and crop conversion	Water-saving equipment and efficient water systems/processes
Drought management plan updates	Soil management	
	Water reuse programs	
	Wetting agents (golf courses)	
	Future technologies	

Supply-Side Strategies

Strategies that increase or optimize the availability of water resources.

May be Applicable to Multiple Water Use Sectors		
Water reuse programs	Conjunctive use of surface water and groundwater	Aquifer storage and recovery (ASR)
Interconnections and regionalization of public water supply systems	Stormwater capture and reuse	Building or expanding reservoirs and small impoundments
Desalination and brackish water treatment	Adjusting reservoir operations and intake elevations	

6.1 Recommended Water Management Strategies

6.1.1 Demand-Side Strategies

> ***The Planning Framework defines a surface water management strategy as any water management strategy proposed to eliminate a surface water shortage, reduce a surface water shortage, or generally increase surface water supply to reduce the probability of future shortages. A groundwater management strategy is any water management strategy proposed to address a RBC-designated groundwater area of concern or groundwater shortage in the Coastal Plain where groundwater withdrawals from a specified aquifer are causing or are expected to cause unacceptable impacts to the resource or to public health and well-being.***

Demand-side management strategies include conservation and water efficiency practices that are seen as best management practices to conserve water resources and reduce pumping and treatment costs. Although the terms "water conservation" and "water efficiency" are often used interchangeably, they have distinct meanings. Water conservation refers to changing behaviors to reduce water consumption, such as limiting irrigation during the hottest hours of the day. Water efficiency refers to reducing water use by making technological changes, such as installing low-flow showerheads.

Each RBC recommended a suite of demand-side water management strategies regardless of the extent of projected water shortages identified in the basin's water availability assessment. WaterSC also identified demand-side strategies its members considered beneficial to water management statewide. This chapter presents strategies identified by the RBCs and WaterSC. The strategies are grouped by use category: municipal, irrigation (agricultural and golf courses), and industrial and energy. The RBCs were given the opportunity to prioritize the recommended strategies; however, most chose not to because of the importance in considering individual water user priorities when determining the most desirable strategies to pursue. The RBCs instead presented the strategies as a toolbox of potential approaches to reduce water demands and conserve water resources.

Appendix B includes tables indicating which planning body supported which strategies. While there was broad consensus on recommending several strategies, some RBCs chose not to include strategies because they were considered already in practice with little additional room for improvement (e.g., incentives for low-flow fixtures, water efficiency standards for new construction), or were less applicable to the conditions in a specific basin. Additional details on recommended strategies can be found in Chapters 6 and 7 of the River Basin Plans.

Municipal demand-side water management strategies are summarized on the next page. The RBCs noted that individual utility circumstances (e.g., current operations and programs, utility size, financial means) will dictate which of these strategies are the most desirable to pursue for a given public supplier.

Municipal strategies with support from most RBCs and WaterSC:

Public Education about Water Conservation — This strategy involves expanding existing or developing new public education programs. Water conservation education could occur through public schools, civic associations, and other community groups, or through outreach from water utilities and local government. The RBCs recognized this strategy as a cornerstone of the demand-side strategies.

Conservation Pricing Structures — Conservation pricing structures increase the unit cost of water as consumption increases. This strategy assumes that consumers will curtail their personal use to avoid paying higher prices.

Leak Detection and Water Loss Control Programs — A water loss control program identifies and quantifies water uses and losses from a water system through a water audit. Once identified, sources of water loss can be reduced or eliminated through leak detection, pipe repair or replacements, and/or changes to standard program operations or standard maintenance protocols. Automated meter reading (AMR) and advanced metering infrastructure (AMI) are technologies that can assist with leak detection. AMR systems allow water utilities to automatically collect water use data from water meters, either by walking or driving by the metered property. AMI systems automatically transmit water use data directly to the utility without requiring an employee to travel to the property. Both technologies reduce the staff time required to read meters and allow utilities to more frequently analyze actual consumption (as opposed to predicted usage based on less-frequent manual meter readings). Higher-than-expected readings then can be noted and flagged as potential leaks.

Water Reuse Programs — Water reuse programs (also known as recycled water or reclaimed water programs) reuse highly treated wastewater for other beneficial purposes such as landscape irrigation, thus reducing demands on surface water and groundwater. A water reuse program can be considered both a demand-side and supply-side strategy. The quality of reclaimed water would need to be matched with the water quality requirements of the end use, and emerging contaminants of concern (e.g., per- and polyfluoroalkyl substances [PFAS], microplastics) would need to be considered.

Drought Management Plan Updates — Public water suppliers were required to develop drought management plans as part of the Drought Response Act of 2000, but were not required to update them. Each drought management plan has a set of measurable triggers indicating when conditions have entered one of three phases of drought, and provides corresponding response actions to reduce demand by a target percentage (see Chapter 8 of the River Basin Plans). Under this strategy, public water suppliers would keep their plans up to date to reflect changes to their system and the availability of water resources in their basin.

Other municipal strategies shared by one or more RBCs or WaterSC members

Landscape Irrigation Program and Codes — Landscape irrigation programs or water-efficient landscaping regulations can encourage or require homeowners to adopt water-efficient landscaping practices. Such practices seek to retain the natural hydrological role of the landscape, promote infiltration to replenish groundwater, preserve existing natural vegetation, and conserve water.

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

Residential Water Audits — Residential water audits involve checking both indoor uses, such as toilets, faucets, and showerheads, and outdoor uses, such as lawn sprinklers. Based on the results of the audit, homeowners may invest in low-flow systems, make leak repairs, and/or adjust certain personal water use behaviors. Homeowners can perform these audits themselves using residential water audit guides, or water utilities may provide free residential water audits to their customers.

Water Efficiency Standards for New Construction — Local ordinances can require that renovations and new construction meet established water efficiency metrics. These ordinances may either be set by the local government or rely on existing water efficiency certification programs, such as Leadership in Energy and Environmental Design (LEED) or the U.S. Environmental Protection Agency's (EPA's) WaterSense.

Incentives for Low-Flow Fixtures — Residents can be incentivized to replace household appliances and fixtures with low-flow alternatives that meet water efficiency standards.

Car Wash Recycling Ordinances — Recycled water systems allow for water used in washing or rinsing to be captured and reused. Ordinances can set a percentage of recycled water to total water used. Typical ordinances require at least 50 percent use of recycled water.

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

Agricultural demand-side water management strategies are summarized below. The RBCs noted that the most appropriate strategy for a given agricultural operation will depend on the size of the operation, the crops grown, current irrigation practices, and the financial resources of the owner/farmer.

Irrigation strategies with support from most RBCs and some WaterSC members

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

Irrigation Scheduling — Irrigation scheduling refers to the process of scheduling when and how much to irrigate crops based on the needs of the crops and climatic/meteorological conditions. The three main types of irrigation scheduling methods include soil water measurement, plant stress sensing, and weather-based methods.

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

Crop Variety, Crop Type, and Crop Conversion — Changing crop type from those that require a relatively large amount of water to those that require less water can save significant amounts of irrigation water. In South Carolina, transitioning away from corn and small grains, such as wheat, rye, oats, and barley, and increasing cotton crops can reduce water use. However, because the choice of crops is market-driven, and certain machinery, infrastructure, and skills are specific to different crops, changing crop type may not be feasible for growers. Conversion programs that offer growers incentives may be necessary.

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

Water Reuse Programs — Water reuse programs, described above under Municipal Demand-Side Strategies, can be used to irrigate certain food crops (depending on the water quality requirements of the crop) and non-food crops (including turfgrass, garden crops, and animal feed). Utility-provided reclaimed water is already used to irrigate golf courses in the state, and while it may be an option for some agricultural operations, using this type of water reuse has limitations and should therefore not be considered a universal recommendation for agricultural irrigation.

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

Future Technologies — As new technologies are developed and commercialized, agricultural water users in the basin should consider how they might apply these technologies to aid in water conservation.

Industrial and energy demand-side water management strategies are briefly summarized below. The RBCs noted that the most appropriate strategy for a given industrial or energy production operation will depend on the type, size, current practices, and financial resources of the facility.

Industrial and energy strategies shared by most RBCs and some WaterSC members

Educating Employees About Water Conservation — Employee education about the importance of water conservation arms employees with knowledge to modify water-intensive habits or address potential leaks in a timely manner.

Water Reuse Programs — Water reuse programs reuse highly treated wastewater for other beneficial purposes, reducing demands on surface water and groundwater. Water can be recycled from a variety of sources and then be treated and reused for beneficial purposes including cooling water for industrial processes and thermoelectric plants.

Leak Detection and Water Loss Control — Similar to residential programs, a water loss control program for industrial or energy water use identifies and quantifies water uses and losses from a system through a water audit. Once identified, sources of water loss can be reduced or eliminated through leak detection, pipe repair or replacements, and/or changes to standard program operations or standard maintenance protocols. Water audits can be conducted internally or by a professional.

Water-Saving Equipment and Efficient Water Systems/Processes — Water-saving equipment, such as high-pressure, low-volume hoses or nozzles for equipment cleaning and process cooling, can reduce water use. Various cooling processes also use different technologies that can limit or reduce water use. Closed-loop cooling systems allow water to be used multiple times, limiting the amount of water that is needed to be withdrawn (World Economic Forum 2024). Air-cooled systems remove heat from equipment through air-conditioning vents and tubes, thereby reducing the amount of water withdrawn (however, this technique is more energy intensive) (Chien 2025).

Other industrial and energy strategies shared by one or more RBCs or WaterSC members

Rebates on Energy-Efficient Appliances — Energy utilities could offer rebates to customers for installing energy-efficient appliances. Reducing household energy use reduces energy demand for the facility, and would reduce the water withdrawals needed for cooling.

Water-Saving Fixtures and Toilets — Installing water-saving fixtures for employee use in a facility can result in water savings for the facility as a whole.

Drought Management Best Practice Collaboration — Although the South Carolina Drought Response Act does not require developing drought management plans for industrial surface water or groundwater users, implementating drought-related best management practices by industries would further extend surface water resources during times of drought at and downstream of industrial surface water withdrawals. While industry actively works to save water (and costs) during drought, sharing information among industrial water users regarding best management practices is often beneficial.

6.1.2 Supply-Side Strategies

The RBCs also considered the need for supply-side strategies that would either develop a new source of supply or expand the capacity or yield of existing supplies. Water availability assessments performed by the Upper Savannah, Saluda, Lower Savannah-Salkehatchie, and Pee Dee RBCs did not indicate a high probability of shortages now or into the future based on projected demands and existing hydrological conditions. The remaining planning basins, which include the Broad, Edisto, and Santee River basins, had low to moderate probabilities of shortage and their respective RBCs chose to consider and evaluate new supply-side strategies.

The Catawba-Wateree Water Management Group (CWWMG) is working to update the Integrated Water Resources Plan for the Catawba River basin which is the 3rd version of a 50 year projection and evaluation of water supply, demand, and resiliency; results are not yet available on the projected probability of shortages or on specific strategies recommended to help alleviate those gaps. However, since the previous Water Supply Master Plan, published in 2014, the CWWMG has developed or is in the process of developing the following, related to water management strategies:

- **Water Audit and Water Loss Management** – Establishment of on-going water audits and reduction of identified potable water losses
- **Quantifying Potential Benefits of Land Conservation on Water Supply** – Assessment of climate change and land use impacts on water supply to determine how they can be mitigated through land conservation efforts
- **Conservation Prioritization Tool for Source Water Protection** – Update to the Catawba Basin Conservation Assessment Tool
- **Raw Water Intake Contingency Plan** – Evaluation of water supply intake contingency opportunities
- **Low Inflow Protocol (LIP) Response Evaluation Project** – Comparison of actual drought response to water savings goals established by the LIP
- **Water Use Efficiency Plan** – Development of goals and prioritization for water use efficiency improvements
- **Safe Yield Research Project** – Collaboration with the Water Research Foundation to enhance the safe yield of the river basin
- **Lakefront Smart Irrigation Study** – Quantification of water withdrawn for irrigation by lakeside properties and identification of conservation strategies

The CWWMG's Water Supply Master Plan also identified a comprehensive action plan to extend the basin's water supply, including revising the low end flow protocol, to accelerate Duke Energy's reduction in hydropower generation as drought stages are implemented.

Waterfront Park in Charleston

Regardless of projected shortages, all RBCs identified existing supply-side water management strategies to continue or expand. The strategies identified by one or more RBCs included:

Water reuse programs — Water reuse programs directly or indirectly use water from wastewater treatment facilities or stormwater for a variety of purposes, both potable and non-potable. Water reuse programs were discussed earlier as a demand-side strategy but can also be considered as a supply strategy to supplement supplies for a variety of purposes, including agricultural and landscaping irrigation, boilers and cooling systems, and toilets. Direct potable reuse involves treating wastewater to drinking water standards, rather than returning treated wastewater to the environment. This approach reduces nutrient loads on waterbodies and provides a safe drinking water source that is less dependent on weather conditions. South Carolina currently has no statutes or regulations related to direct (wastewater treatment to water treatment without an environmental buffer like a lake or river between) or indirect (using an environmental buffer like a lake before drinking water treatment) potable reuse (Payne 2017). A South Carolina Section of the trade association WateReuse was established in December 2021 to advance water reuse programs and regulations in the state.

One example is on Hilton Head Island, where Hilton Head Public Service District has successfully implemented a water reuse program to provide recycled water for golf course irrigation and wetlands nourishment.

Hilton Head Island

Conjunctive use — Conjunctive use is the combination of multiple sources of water to improve the resilience of the overall water supply. Conjunctive use may include the ability of a water user to meet 100 percent of water demands from either surface water or groundwater, or the ability to meet a portion of demands from either source.

Walther Farms in the Edisto River basin is an example of an agricultural water user that can augment or replace a portion of their surface water use with groundwater. While they rely on their surface water source (the South Fork Edisto River) as their primary source, they have installed a well that can meet approximately 20 percent of their total water demand. Diversifying their sources gives them the ability to transfer some withdrawal to groundwater during times of low surface water flow.

Aquifer Storage and Recovery (ASR) — ASR technology allows for storing treated surface water underground during periods of low demand, to be used during peak consumption periods. This approach is especially valuable in areas where water demands or supplies fluctuate greatly. For example, in the Grand Strand area, summer tourists increase water demand well beyond the average daily demand. To provide additional water during these periods, the City of Myrtle Beach implemented an ASR program in the 1990s (SCDNR 2009). Under the program, periodically more surface water is treated than is needed to meet demand when demands are low, and the additional treated water is injected into the aquifer using ASR wells. When demands are high, the injected water is extracted for use. The additional treated water stored underground would have otherwise been discharged to the ocean and lost if not stored for the ASR program.

Interconnections and regionalization of public water supply systems — Regional water systems and utility interconnections may provide additional supply to meet demand; however, the effectiveness of this approach is limited when water shortage is widespread, impacting the entire region and/or all utilities in the area. Establishing infrastructure and agreements for interbasin transfers provides the capability to source water from outside the basin. The two Santee Cooper Regional Water Systems in the Santee River basin, and the Low Country Regional Water System in the Salkehatchie River basin are examples of regional systems.

Stormwater capture and reuse — Stormwater capture and reuse reduces flooding and strain on stormwater collection systems while providing an additional supply of water. Stormwater (precipitation that reaches the ground) tends to require more advanced treatment than rainwater (precipitation that is collected prior to reaching the ground) because of contamination from roads and soil (WateReuse 2023). Coosaw Farms in the Salkehatchie River basin is an example of an agricultural operation that has implemented a system of ponds, canals, pumps, and filters to capture and reuse stormwater runoff on-site for irrigation of crops and freeze protection of the flowers and developing fruit of blueberries.

Reservoirs or small impoundments — Reservoirs and small impoundments add storage to improve resiliency to drought. Hundreds of small impoundments in the Coastal Plain serve this purpose primarily for agricultural water use. Offline reservoirs divert and store water during high flow periods and can release water to augment flows or be directly used to meet off-stream demands during low-flow conditions.

Desalination/brackish water treatment — Desalination treatment removes salt from seawater or brackish groundwater, enabling its use for freshwater applications. Technologies include distillation (boiling seawater and capturing the steam as condensate) and reverse osmosis (removing salt molecules using a semipermeable membrane), which are both energy-intensive methods. Reverse osmosis has been used on Hilton Head Island to treat brackish groundwater that has begun to intrude the Upper Floridian Aquifer (Seacord 2015), and by Mount Pleasant Waterworks to treat brackish groundwater from the Charleston Aquifer.

In the river basins with a higher potential for future shortages, the RBCs identified additional supply-side water management strategies. These strategies would be further evaluated alongside developing needs to assess which would be most advantageous to pursue. Proposed strategies include:

- **Adjusting reservoir operating rules** — Most of the reservoir systems have well-defined operating rules that respond effectively to current and historic hydrologic conditions and demand levels. These rules may need to be adjusted for future conditions to better balance drawdown and recovery patterns; that is, to help avoid situations in which one reservoir in a system is depleted while others are much fuller. Any modifications to reservoir operating rules would be subject to more detailed scrutiny, operational evaluation, and regulatory feasibility assessments.

- **Adding physical reservoir storage** — This can be achieved by modifying existing reservoirs (e.g., raising the dam height of a reservoir) or creating new reservoirs on a local or regional scale. Adding reservoirs increases water supply considerably, but requires significant state, and potentially federal, involvement.

- **Modifying withdrawal sources** — If the current water sources are not adequate to support future needs, additional sources could be used. This could involve constructing a new surface water intake on a different stream, or designating future pumping to less stressed groundwater aquifers. Lowering an existing intake in a reservoir is also an option to increase the amount of storage accessible for water supply needs.

Lake Blalock intake and Dam

6.2 Effectiveness and Feasibility

In accordance with the Planning Framework, the RBCs followed a two-step process to evaluate water management strategies. As a first step, the Planning Framework states that the proposed water management strategies are to be simulated using the available models to assess their effectiveness in eliminating or reducing identified shortages or in increasing surface water or groundwater supply. The second step assesses the feasibility of these strategies for implementation. The Planning Framework identifies multiple considerations for determining feasibility, including potential cost and benefits, consistency with state regulations, reliability, environmental and socioeconomic impacts, and potential interstate or interbasin impacts. This section summarizes this evaluation at a high level. Additional details of assessments by river basin can be found in Chapters 6 and 7 of the River Basin Plans.

6.2.1 Model Evaluation

The RBCs used the Simplified Water Allocation Model (SWAM) to assess the impacts of recommended water management strategies on metrics such as projected surface water shortage or average flow/low flow at strategic locations. The Upper Savannah, Lower Savannah-Salkehatchie, and Saluda RBCs, which had no or low projected probabilities of shortage, did not evaluate the impacts of recommended strategies using the SWAM model. In these instances, the recommended management strategies provide benefits by increasing water supply and helping maintain instream flows that support healthy and diverse aquatic ecosystems. Implementing these strategies also serves to protect against future climate conditions, such as more frequent or severe droughts, and water demands that exceed current projections. Although the Pee Dee River basin also had low projected probability of shortage, the RBC evaluated the impacts of various conservation strategies on flows in the basin. **Table 6-1** summarizes the results of the SWAM model evaluations.

Table 6-1. Model evaluations of water management strategies using the SWAM model.

River Basin	Model Evaluation Performed	Model Results
Broad	Adjusted reservoir operations	Eliminates shortages for four of five public suppliers with projected shortages in the 2070 High Demand Scenario
	Various strategies to address remaining shortage for one public supplier	Strategies with the potential to reduce shortage: optimize existing supply, raise dam height, interconnection, new local reservoir Strategies with the potential to eliminate shortage: 2 billion gallon (BG) quarry, new river intake, new 4 BG regional reservoir
Edisto	Various combinations of municipal, agricultural, and industrial conservation and conjunctive use	Minor reductions in total mean annual shortage from 1.6 MGD to 1.4–1.5 MGD, depending on the scenario Minor increases in low flows
Santee	Water conservation, lowering of reservoir intake elevations, and adjusted reservoir operations including reduced releases from dams	Water conservation reduces but does not eliminate shortages Lowering intake elevations and reducing releases eliminates most projected municipal shortages
Pee Dee	Various combinations of drought management plans, municipal conservation, agricultural conservation, and conjunctive use	No significant shortages to address Minor changes in average and low flow statistics Some reductions in flows because of reduced discharges from municipal conservation

The Edisto RBC also used a USGS groundwater model to evaluate the impacts of irrigation efficiency, the relocation of future pumping demand, and combinations of the two. The groundwater model suggested these practices separately, and more so when combined, would reduce the extent and severity of groundwater level declines in the Crouch Branch aquifer but not eliminate the problem of simulated head falling below the top of the aquifer. The strategies had minimal impact on groundwater level declines in the McQueen Branch aquifer.

6.2.2 Feasibility Assessment

The RBCs also evaluated the feasibility of the recommended strategies considering supply benefit, cost, and implementability; **Table 6-2** summarizes these criteria. **Table 6-3** summarizes the assessment for demand-side strategies, and **Table 6-4** summarizes the assessment for supply-side strategies. The evaluation does not identify the most preferable strategies, as those depend on the individual user; however, water users may find the evaluation useful in determining which strategies to pursue. Additional details on the cost-benefit of each strategy can be found in Chapter 6 of the River Basin Plans.

Table 6-2. General criteria used to characterize the water management strategies.

Supply Benefit		Cost		Implementability	
💧	Localized or marginal	**$**	Limited capital costs ($1M or less) (for municipalities and industry); least expensive for agriculture	**High**	Easy, common, minimal new concepts and practices
💧💧	Hundreds of thousands or millions of gallons per day	**$$**	$10M order-of-magnitude cost (for municipalities and industry); significant expense for agriculture	**Medium**	May have been done locally but not at a statewide scale; will take formal planning and permitting time
💧💧💧	Tens of millions of gallons per day	**$$$**	$100M order-of-magnitude (for municipalities and industry); most expensive for agriculture	**Low**	Not common or does not have a precedent in South Carolina; new regulatory or permitting considerations

Coosaw Farms (courtesy Brad O'Neal)

Table 6-3. Demand-side water management strategy feasibility evaluation.

Sector	Strategy	Supply Benefit	Cost	Implementability
Municipal	*Public Education about Water Conservation	💧💧💧	$	High
Municipal	*Conservation Pricing Structures	💧💧💧	$	High
Municipal	*Leak Detection and Water Loss Control, including AMI/AMR	💧💧💧	$$	High
Municipal	*Water Reuse Programs	💧💧	$$	Low
Municipal	*Drought Management Plans Updates	💧💧💧	$	High
Municipal	Landscape Irrigation Program and Codes	💧💧	$	Medium
Municipal	Time-of-Day Watering Limit	💧💧	$	High
Municipal	Residential Water Audits	💧	$	Medium
Municipal	Water Efficiency Standards for New Construction	💧💧💧	$	High
Municipal	Incentives for Low-Flow Fixtures	💧💧	$	High
Municipal	Car Wash Recycling Ordinances	💧	$	High
Municipal	Water Waste Ordinance	💧	$	High
Agricultural	*Water Audits and Nozzle Retrofits	💧💧	$	High
Agricultural	*Irrigation Scheduling	💧💧	$$	Medium
Agricultural	*Irrigation Equipment Changes	💧💧	$$$	Medium
Agricultural	*Crop Variety, Crop Type, and Crop Conversion	💧	$$$	Low
Agricultural	*Soil Management	💧💧	$$	High
Agricultural	*Water Reuse Programs	💧💧	$$$	Medium
Agricultural	*Future Technologies	💧💧	$$	Medium
Golf Courses	*Wetting Agents	💧	$$	High
Industrial and Energy	*Educating Employees About Water Conservation	💧💧	$	High
Industrial and Energy	*Water Reuse Programs	💧💧	$$	High
Industrial and Energy	*Leak Detection and Water Loss Control	💧	$	High
Industrial and Energy	*Water-Saving Equipment and Efficient Water Systems/Processes	💧💧	$$	High
Energy	Rebates on Energy-Efficient Appliances	💧	$	High
Industrial and Energy	Water-Saving Fixtures and Toilets	💧	$	High
Industrial and Energy	Drought Management Best Practice Collaboration	💧💧	$$	High

**Represents strategies recommended by most or all RBCs.*

Table 6-4. Supply-side water management strategy feasibility evaluation.

Sector	Strategy	Supply Benefit	Cost	Implementability
All	Conjunctive Use of Surface Water and Groundwater	💧💧	$$	Medium
Public Supply	ASR	💧💧💧	$$$	Medium
All	Stormwater Capture and Reuse	💧	$$	Medium
Public Supply and Thermoelectric	Building or Expanding Reservoirs and Small Impoundments	💧💧💧	$-$$$	Low
Public Supply	Interconnections and Regionalization of Public Water Supply Systems	💧💧	$-$$	High
All	Desalination and Brackish Water Treatment	💧💧💧	$$$	Medium
Public Supply and Thermoelectric	Adjusting Reservoir Operations and Intake Elevations	💧💧	$-$$	High

Irrigation Pond in the Broad River Basin

6.3 Adaptive Management/Planning

Adaptive management is a flexible framework used to implement strategies in a structured way as the future unfolds, reacting to changing conditions and improved knowledge. Although many river basins do not have projected shortages based on current forecasts of demand and existing hydrologic conditions, strategies may become more important as conditions change. Key uncertainties that may impact the selection of water management strategies include:

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

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

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

Emerging contaminants including PFAS – Adaptive management allows for incorporating new scientific findings and regulatory changes into water quality management practices. By continuously updating treatment processes and monitoring programs, planners and engineers can better address the technical, financial, and human health risks posed by emerging contaminants and ensure the safety of water supplies.

Future land use patterns – Land use changes (and related impacts on water supplies) should be continuously assessed. This could be accomplished through studying the counties' land use plans.

Extreme flood events – Adaptive management could involve using hydrological models and real-time data to predict and respond to flood risks. This approach enables planners and engineers to implement adaptive flood management strategies, such as dynamic reservoir operations and floodplain management, to mitigate the impacts of floods.

Modeling and data gaps – Adaptive management addresses modeling and data gaps by continuously updating models with new data and refining them based on observed outcomes. This iterative process helps improve the accuracy of water resource models and ensures they remain relevant and reliable.

Cotton Field in the Edisto River Basin

Adaptive management recognizes the myriad of uncertainties that exist during water planning while acknowledging that decisions must be made with the best available information at the present. Water planning in South Carolina uses a 50-year planning horizon and sets specific triggers when the river basin plans will be revisited (every 5 years), new information assessed, and recommendations adjusted.

Water supply planning often involves developing an adaptive implementation schedule with near-term, mid-term, and long-term strategies. The near-term strategies are those that may meet an immediate need or provide a benefit in a variety of uncertain futures, sometimes called “no regret” projects. In this State Water Plan, many of the demand-side strategies may fall under this category, as they represent best practices to conserve available supplies. Each withdrawer would determine which of the recommended water management strategies are most applicable, affordable, and advantageous for their operation based on current conditions. If additional strategies become necessary in the future, they would select from the remaining demand-side options or explore the supply-side options.

Mid-term and long-term strategies may be those that look promising now but are not immediately needed. These strategies may have associated near-term actions like pursuing a feasibility study, which would provide additional information for the future whether a strategy is truly viable.

An example of this approach can be found in the Broad River Basin Plan, which presents a strategy of near-term, mid-term, and long-term actions for the public supplier with projected shortages. In the Broad River basin, surface water availability assessments projected five water suppliers and three golf courses to have shortages by 2070 in the High Demand Scenario, in addition to a proposed nuclear station (projected to come online in 2035). Adjustment of reservoir operations may eliminate shortages for four of the five water suppliers, and a proposed offline storage pond may eliminate shortages for the proposed nuclear station. Approaches to alleviate the remaining projected shortages for a public supplier were evaluated by the RBC with input from the public supplier. In the near-term, the supplier will pursue initial activities to reduce demand, extend their existing supply, and undertake feasibility studies for new supplies. At the mid-term trigger, they would assess the outcome of those initial activities, assess demand projections and supply gap projections, and determine which actions to take next. The outcome of these following actions would be assessed at the next, long-term trigger point, at which time subsequent strategies would be identified.

Hilton Head Island

CHAPTER 7

WaterSC

WaterSC Recommendations

In October 2024, WaterSC began a series of monthly, facilitated meetings to advise SCDES on comprehensive water resources policy and to develop consensus-based recommendations. From October 2024 and through the development of this State Water Plan, the Working Group heard from specialists; participated in listening sessions; and shared their different ideas, perspectives, and experiences on a variety of topics, including:

- State of surface water and groundwater in South Carolina
- Surface water law
- Managing water resources with conjunctive use
- Interbasin transfers and multi-state water management considerations
- Surface water case studies and experiences
- Drought monitoring and response in South Carolina
- Water reuse
- Perspectives from the Councils of Government
- RBC recommendations and themes
- State of groundwater in South Carolina
- Conservation practices and water management strategies
- River basin and historic state planning

While the monthly meetings of WaterSC provided the hub for collaborative dialogue, WaterSC members or their designees also provided opportunities for sector-focused stakeholder engagement between meetings by hosting stakeholder forums. The forums connected existing organizations and other sector-specific stakeholders, offering open pathways for expanded input and involvement that was shared back with the full Working Group. Statewide listening sessions were also held to connect with a broader range of community leaders and others with interests in the state's water resources.

In August 2025, building on the knowledge, perspectives, and ideas generated from previous meetings, stakeholder forums, and listening sessions, WaterSC members participated in a 2-day retreat to begin the process of identifying recommendations to improve water planning and drought response, address data gaps and fill information needs, and suggest new or revised water resources policies. Their consensus-based recommendations developed during the retreat and in subsequent meetings are listed on the pages that follow, by topic. Each WaterSC recommendation is in **bold text** and some include additional, supporting information.

Continued Support for Water Planning

The State of South Carolina should continue the WaterSC Working Group beyond the State Water Plan updating process and should continue to support ongoing state water planning. The Working Group recognized that, faced with ever-increasing demands on the state's water resources and the uncertainty of future conditions, continued water planning is necessary to support the state's strong economy and rapidly expanding population growth, while ensuring adequate water remains for all uses.

SCDES should request and encourage the Legislature to continue funding for state water planning activities, including planning, administration, data collection, and research and grants for the implementation of water projects. Additional investment is required to continue the monitoring, planning, and technical studies, and to implement strategies that provide access to and protect water resources.

SCDES should also pursue additional funding sources or opportunities from both public and private sectors. Both federal and private programs exist that support the effective planning and management of water resources (see Chapter 8). Leveraging the funding offered by these programs will be critical to effectively implement the recommendations and strategies.

Interstate Water Management

The State of South Carolina should increase coordination with Georgia and North Carolina on inter-state water management strategies and shared water resources. Recognizing that South Carolina's Broad, Catawba, and Pee Dee River basins originate in North Carolina, and the Savannah River basin is shared with Georgia, collaborative management of these shared water resources is essential to avoid conflict and the potential for costly litigation associated with conflict resolution. Collaboration and mutual planning are necessary to avoid or mitigate potential impacts from interbasin transfers, new large withdrawals, and other factors that may affect the availability of water for use in South Carolina.

Education and Outreach

SCDES should develop and implement an intentional education and outreach communication plan on efficiency of water usage throughout the state. WaterSC recognizes the importance of implementing strategies focused on water conservation and efficiency. Extending supplies by lowering demands is a hallmark of effective water management, and communicating that message through education and outreach is the first step in advancing that strategy.

Drought Response

Strengthen the Drought Response Program. In recognizing the importance of preparing for drought, SCDNR should understand improvements and actions that could be taken under the existing statutory and regulatory authority. This may lead to consideration of potential regulatory recommended changes, if needed:

- **Review of Drought Response Committee structure and membership for adequate representation;**
- **Recommended actions to make drought response more effective, including triggers, indicators and actions; and**
- **Providing support to assist in updating and implementing the required/local water system Drought Response Plans to be more effective.**

Water Reuse

WaterSC supports beneficial water reuse and robustly pursuing the concept where feasible and appropriate. Expansion of water reuse programs in South Carolina may help support growth, attract industry, lessen irrigation demands on existing sources, and reduce potential impacts of wastewater discharges to surface water. New regulatory programs may be needed to implement and expand water reuse in the state.

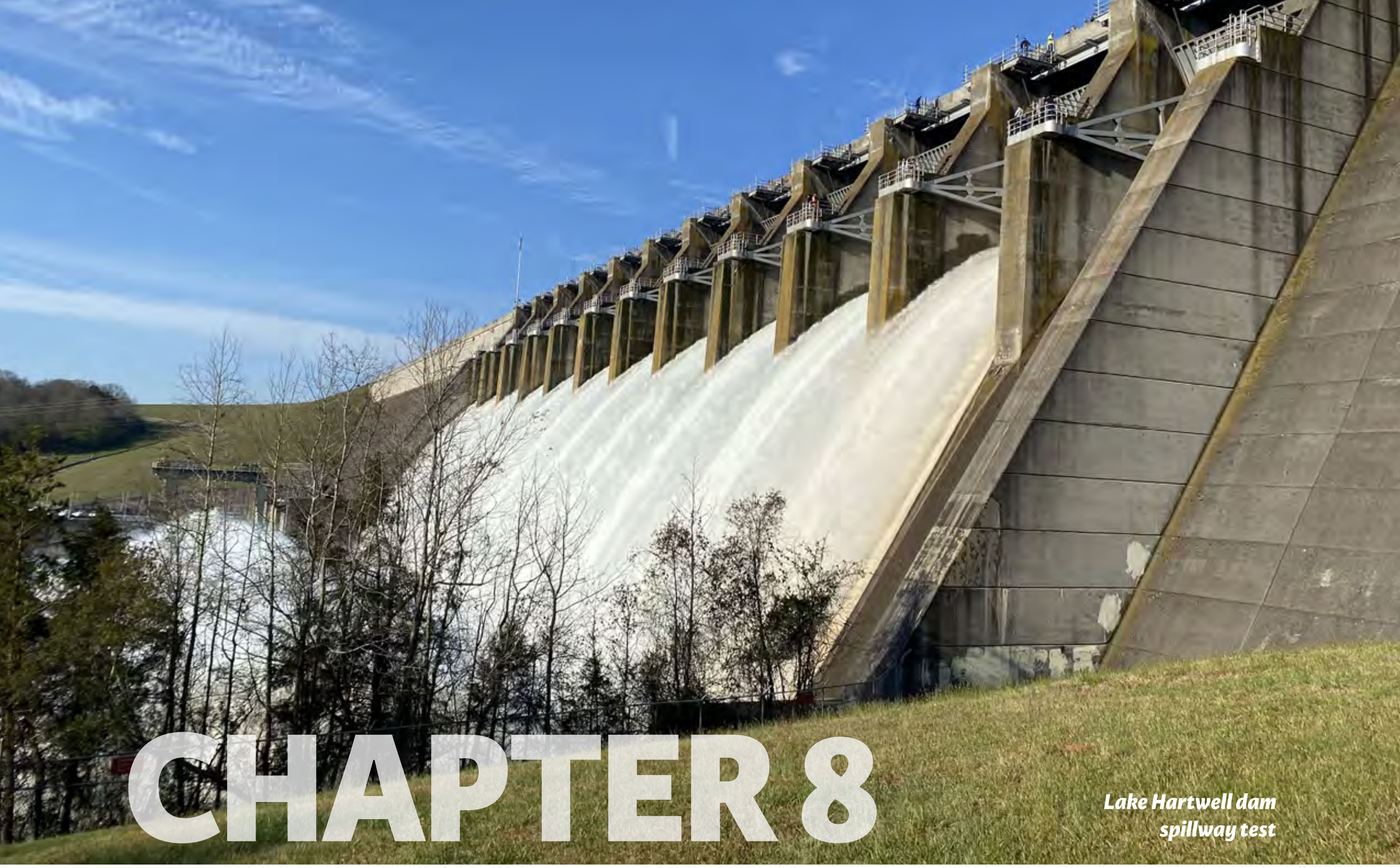
Water Quality and Quantity

Recognize the essential connections between water quality and water quantity for making better decisions for the future of water planning in our state.

Water Permitting

The State of South Carolina has the obligation to ensure waters of the state are used responsibly and the health of these waters is adequately maintained for residents. To the extent SCDES has the authority to apply judgment, it should utilize this authority and where it does not, SCDES should seek legislative authority to fulfill this responsibility, including a periodic review of water permits and registrations.

Strawberry Hill Cooley Farm



Lake Hartwell dam spillway test

River Basin Council Recommendations

During the development of their River Basin Plans, the River Basin Councils (RBCs) considered four principal categories of recommendations as outlined in the existing Planning Framework developed by the Planning Process Advisory Committee and SCDNR. Following the formation of SCDES, this process continued as the final two RBCs, the Lower Savannah-Salkehatchie and Santee, met to discuss and develop recommendations. The categories included:

- **Planning Process Recommendations:** Ways in which the planning process can evolve or improve in future years.
- **Technical Recommendations:** Activities that can help improve technical confidence in water data, tools, projections, or plausible scenarios.
- **Policy, Regulatory, and Legislative Recommendations:** Suggested improvements to state policies, water laws, or regulations.
- **Drought Management Recommendations:** Recommendations intended to improve how local and state organizations plan, mitigate, and respond to drought. These are presented in Chapter 3.

The RBC recommendations presented in this chapter constitute recommendations that garnered either full consensus or majority support from individual RBCs. Their collective recommendations, along with those of WaterSC, served as a guide for the development of SCDES's next steps and considerations presented in Chapter 9 and will continue to serve as a guide to sustain water planning efforts into the future resulting in improved water resource management and increased resilience.

SUMMARY

The RBCs planning process recommendations emphasized the need for more inclusive and representative RBC membership, better communication among councils and agencies, sustained funding from the legislature, and stronger public outreach. They also advocated for formalizing the implementation of River Basin Plans and increasing engagement with stakeholders, including legislative delegations and regional councils.

On the technical front, the RBCs identified critical data gaps and called for expanded monitoring networks, improved modeling tools, and targeted technical studies. These included recommendations to integrate water quality analysis into the planning process, incorporate climate projections into water models, complete groundwater modeling efforts, and study the impacts of land use changes and sedimentation. The RBCs also stressed the importance of aligning water planning with other state and local resilience and hazard mitigation plans.

The RBCs developed numerous policy, legislative, and regulatory recommendations, which included applying reasonable use criteria to all surface water withdrawals, improving the enforceability of water laws, and establishing grant programs to support plan implementation. The RBCs also recommended enhancing water education efforts and revising regulations to better protect instream flows and water quality. Several region- specific suggestions were made, such as developing riparian buffer ordinances and coordinating with neighboring states on shared water resources.

The RBC's recommendations reflect a unified vision for advancing water resource management in South Carolina—one that is inclusive, data-driven, and responsive to both current and future challenges.

Lake Moultrie

8.1 Planning Process Recommendations

During the development of the River Basin Plans, the RBCs participated in facilitated discussions to identify any deficiencies in the river basin planning process and develop recommendations to improve or enhance the process. RBCs identified and considered planning process recommendations that included:

- Changes to RBC membership, bylaws, meeting schedules, or procedures.
- Ideas to improve communication among the RBCs and other groups.
- Identifying funding needs and sources of funding.
- Improvements to the public outreach process.
- Formalizing the River Basin Plan implementation process.

Because the Saluda, Upper Savannah, Lower Savannah-Salkehatchie, and Santee RBCs finalized their River Basin Plans in 2025, they had the opportunity to include recommendations that arose during the WaterSC sessions related to updating the State Water Plan. The full list of the RBC's planning process recommendations is included in Table C-1 of Appendix C. The recommendations in this section and in Appendix C may be used to help guide future water planning efforts in South Carolina. The Catawba-Wateree Water Management Group (CWWMG) did not explicitly consider or develop planning process recommendations as part of developing their Integrated Water Resources Plan (IWRP).

Planning Process Recommendations with Strong RBC Support

The planning process recommendations summarized in **Table 8-1** garnered consensus support from three or more RBCs, and should be considered for prioritizing planning process improvements in future phases.

Table 8-1. Planning process recommendations with strong RBC support. *(The number in parentheses reflects the number of RBCs making the recommendation.)*

TOPIC	RECOMMENDATION
Membership, Bylaws, Meeting Schedules, and Preferences	SCDES should review **RBC membership** regularly to make sure all interest categories are adequately represented. (5)
Communication	SCDES should coordinate regular, **statewide meetings of RBCs** and state agencies. (6)
Funding	The state legislature should continue **to fund state water planning activities**, including river basin planning. (5)
Public Outreach	The RBCs should support public outreach and education to increase awareness within the general public by **coordinating with groups that have existing education and outreach efforts focused on water conservation**, such as Clemson University and South Carolina State Extension Services. (4)
	RBC members should **present observations and outcomes of the river basin planning process** to committees, boards, professional organizations, economic development groups, and others. (3)

Other Planning Process Recommendations

Table 8-2 includes examples of additional planning process recommendations made by one or more RBCs that offer insight into potential improvements to the planning process. The full list of planning process recommendations made by each RBC is included in Table C-1 of Appendix C and can be found in Chapter 9 of each River Basin Plan.

Table 8-2. Representative examples of other RBC planning process recommendations. *(The number in parentheses reflects the number of RBCs making the recommendation.)*

Topic	Recommendation
Membership, Bylaws, Meeting Schedules, and Preferences	Incorporate into the RBC bylaws a **preference for in-person attendance with a hybrid option as needed**, recognizing that it is not always feasible to travel to monthly meetings. (1)
	The RBCs (in conjunction with SCDES) should **develop guidance and guidelines for processes to replace RBC members** if current members resign, and to adjust member terms if necessary. They should develop best practices for recruiting new members. (1)
Communication	RBC members should **communicate with legislative delegations** throughout the river basin planning process to promote their familiarity with the process and its goals and to generate buy-in on its recommendations. (2)
	The Savannah RBCs, with the support of SCDES, should **coordinate and communicate with the Coastal Georgia Regional Council**. (1)
Funding	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. (1)
	SCDES should **designate staff** to continue to coordinate and support ongoing RBC activities. (2)
Public Outreach	**Public relations and communication strategies** should be developed to educate the public on who the RBCs are, what they do, and the benefits of participation. Strategies should focus on the role of RBCs in planning and implementation. (1)
Implementation Process	SCDES should form an Upstate **Interbasin River Council** (IRC). (1)
	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. (1)

Charleston

8.2 Technical Recommendations

The RBCs developed recommendations that address data gaps or information needs during the river basin planning process. Examples of this type of recommendation include:

- Model improvement (accuracy or functionality).
- Need for additional models to address specific issues.
- Need for more data (e.g., flow from stream gages; water levels from monitoring wells; precipitation, temperature, soil moisture from weather stations).
- Improved data or estimates (e.g., water use data, population data/estimates, water demand estimates, land use data).
- Improve public access to online data and information.
- Recommendations for technical studies to improve knowledge of specific issues.
- Improved instream flow requirement information.

The full list of the RBCs' technical recommendations is included in Table C-2 of Appendix C. The recommendations in this section and in Appendix C may be considered to help guide future water planning efforts in South Carolina.

Technical Recommendations with Strong RBC Support

The technical recommendations summarized in **Table 8-3** garnered consensus support from three or more RBCs and should receive priority consideration. Technical recommendations developed by the CWWMG as part of their IWRP development were not finalized prior to the development of the State Water Plan and are therefore not included.

Table 8-3. RBC technical recommendations with strong support. *(The number in parentheses reflects the number of RBCs making the recommendation.)*

TOPIC	RECOMMENDATION
Water Quality Planning	Address **water quality**, including bacteria, nutrients, and sedimentation, in future RBC planning efforts. (7)
Need for Additional Data	Fund and establish an **automated monitoring network of weather and climate monitoring stations** (also called a mesoscale network). (5)
	Support continued efforts to maintain and expand **streamflow gages**. The RBCs recognize that comprehensive, reliable, and long-term hydrologic data are critical to water planning and management. (5)
Modeling Tools and Efforts	Incorporate **future climate projections** into modeling analyses. (4)
	Complete the **groundwater model** developed by the U.S. Geological Survey (USGS). (3)
Technical Studies	Incorporate **lessons learned from other basins** in future River Basin Plan updates. (3)
	Continue to evaluate and discuss **ecological flow standards** and flow-ecology relationships. (3)
	Study the **impacts of land use changes** on water resources. (5)

Other Technical Recommendations

Table 8-4 includes examples of additional technical recommendations made by one or two RBCs. The full list of technical recommendations made by each RBC are included Table C-2 of Appendix C and can be found in Chapter 9 of each River Basin Plan.

Table 8-4. Examples of other RBC technical recommendations. *(The number in parentheses reflects the number of RBCs making the recommendation.)*

Topic	Recommendation
Need for Additional Data	SCDES should work with USGS and other partners (e.g., property owners, well owners, stakeholders representing Capacity Use Areas [CUAs]) to **enhance groundwater monitoring capabilities** in areas where model simulations indicate the potential for water levels to drop below the top of the aquifer. (2)
	Compile the **data obtained from established credible systems** in alignment with RBC goals for use across the state before creating new systems, databases, or monitoring stations. (1)
Modeling Tools and Efforts	SCDES and USGS should develop a **regional groundwater model(s)** covering potential Groundwater Areas of Concern and use them to further calibrate to local land conditions, including seasonal drawdowns, and evaluate seasonal drawdowns through the planning horizon under each planning scenario. (1)
	Surface water modeling should incorporate scenarios that further examine **future uncertainties**, such as changes in rainfall and hydrology, alternative population growth scenarios, and the potential impacts of future development on runoff. (2)
Technical Studies	The RBCs should identify the **financial impacts of increased sedimentation** on reservoirs and water resources and communicate the results 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. (2)
	RBCs should identify potential “pinch points” where current and projected low flows may lower the **assimilative capacity** of the streams. Strategies may need to be identified to mitigate low flows at these potential pinch points. (1)
	SCDES should perform studies and analyses in support of a **recycled water statute** in South Carolina. (2)
Technical Training	SCDES should develop and provide a **handout** of groundwater and surface water concepts to establish a common knowledge base among RBC members. (1)
	USGS and/or SCDES should offer additional **demonstration and discussion of the groundwater model,** focusing on input parameters and the sensitivity of results to various parameters. (1)
Alignment with Other Water-Related Planning Efforts	As part of the comprehensive planning process, **each local government should 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. (2)
	The River Basin Plans should be used as tools for **local comprehensive plans** and economic development. (1)

8.3 Policy, Regulatory, and Legislative Recommendations

The Planning Framework provided the RBCs the opportunity to develop recommendations for new or revised policies, legislation, and regulations regarding the state's water resources. The RBCs thoughtfully discussed and debated a variety of ideas to improve the management of water resources through changes to policies, regulations, and water law.

Recommendations with Strong RBC Support

Table 8-5 summarizes the common policy, regulatory, and legislative recommendations discussed and adopted by at least four of the RBCs. Additional details are included in Table C-3 of Appendix C and can be found in Chapter 9 of each River Basin Plan.

Table 8-5. RBC policy, regulatory, and legislative recommendations with strong support. *(The number in parentheses reflects the number of RBCs making the recommendation.)*

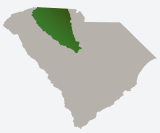
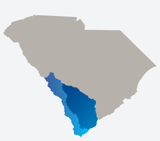
TOPIC	RECOMMENDATION*
Reasonable Use Criteria	The South Carolina Surface Water Withdrawal, Permitting, Use, and Reporting Act should allow for **reasonable use criteria to be applied to all surface water withdrawals**, like those that currently exist for groundwater withdrawals. (7)
Improve Effectiveness of Water Laws	Improve current laws that allow for water use regulation so they are **enforceable and effective**. The current water law, which grandfathers most water users, needs to be improved to support the effective management of the state's water resources. (6)
Planning, Implementation, and Funding	The South Carolina Legislature should **authorize recurring funding for state water planning** activities, including river basin planning. Currently, nearly all funding for river basin planning comes from the legislature. (5)
	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. One example is Georgia's Regional Water Plan Seed Grant Program, which supports and incentivizes local governments and other water users as they undertake their regional water plan implementation responsibilities. (6)
Permits and Registrations	Water law and implementing regulations should not distinguish between registrations and permits. **All water users that withdraw above the identified threshold should be required to apply for a water withdrawal permit.** Current law allows for agricultural surface water users and all groundwater users withdrawing water outside of CUAs to register their water use rather than apply for permits. (4)
Regulatory Alignment with State Water Plan	The water withdrawal permitting process should specifically assess the permit application's **alignment with the River Basin Plan and/or the legislatively approved State Water Plan**. (4)
Water Education	The state should support and fund RBC-led and **statewide water education programs** that include all sectors of water use, and promote the types of water management strategies recommended in River Basin Plans. (5)

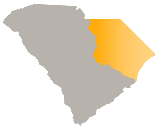
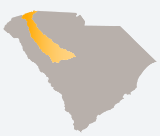
** Some RBCs developed variations of these recommendations but maintained similar intent. In several instances, the recommendations were approved by a simple majority, not a consensus. Table C-3 in Appendix C provides further detail.*

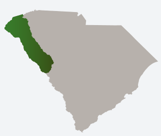
Additional Policy, Regulatory, and Legislative and Recommendations

In addition to the recommendations presented in **Table 8-5**, the RBCs also discussed and developed additional policy, regulatory, and legislative recommendations. Examples of these recommendations are presented in **Table 8-6**, organized by RBC. Some of these are regionally relevant while others apply statewide. Additional justification for these recommendations, and in some cases, their prioritization, can be found in Chapter 9 of each River Basin Plan.

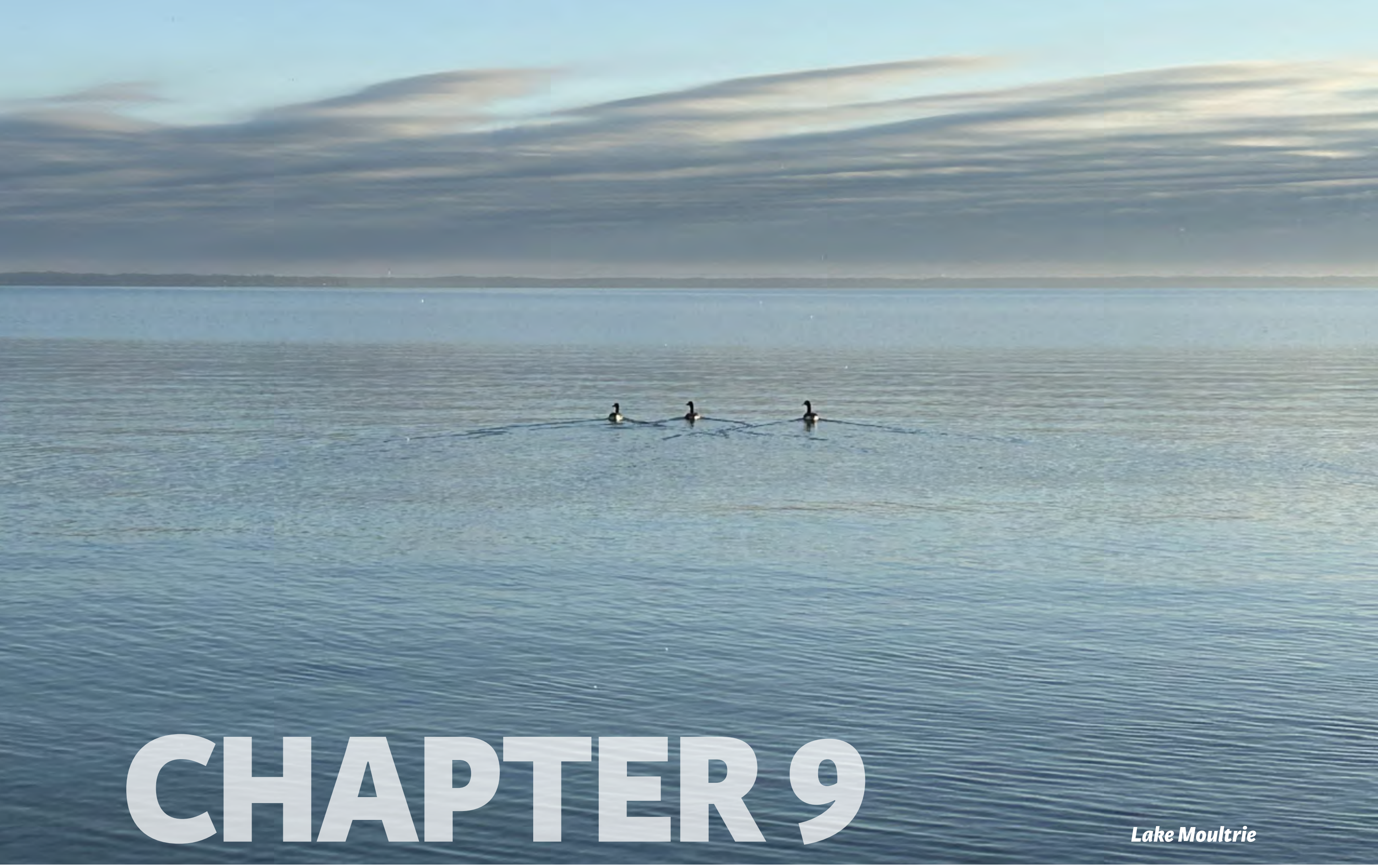
Table 8-6. Examples of other RBC policy, regulatory, and legislative recommendations.

RBC	Recommendation
Broad 	**The Broad RBC (or other water planning body) should develop a model riparian buffer ordinance for local jurisdictions to consider.** Such an ordinance would need to consider to what size of stream the ordinance applies, and how that is determined.
Edisto 	**The South Carolina Surface Water Withdrawal, Permitting, Use, and Reporting Act regulations should use 80 percent of median annual daily flows instead of 80 percent of mean annual daily flows (MADFs) to determine safe yield at a withdrawal point.** This recommendation, which was approved by a majority of the Edisto RBC members, recognizes that median of a non-normally distributed flow series is more reflective of both typical conditions in a stream and typical availability. The use of the mean to describe available water may result in an overallocation of water under normal conditions, which may lead both to future shortages and an increased frequency of flows below the designated minimum instream flow. This recommendation was shared by the Santee RBC.
	A user's actual water use and water needs, accounting for growth, should be periodically reviewed to prevent locking up water that is not needed. This recommendation, which was approved by a majority of the Edisto RBC members, recognizes that existing regulations that only allow for applying reasonable use criteria for groundwater withdrawals and new, non-agricultural surface water withdrawals have resulted in an overallocation of water (on paper) to permittees or registrants that will never use the quantity of water allocated to them. This may prevent new growth in the basin.
Lower Savannah/ Salkehatchie 	**Recognizing that the resources of the Savannah River Basin are finite and shared between South Carolina and Georgia, the Governor of South Carolina should communicate with the Governor of Georgia to establish a coordinated, state-level planning and water management process for the Savannah River Basin and the states' shared groundwater aquifers.** The RBC noted the significance of this recommendation, given the impacts of Georgia's growing demands and the potential impacts to South Carolina's water users and the overall health of the basin.
	The South Carolina Legislature should support matching or incentivizing County Green Space Sales and Use Tax programs to establish balance among water and land uses (e.g., agricultural, residential, industrial, recreational, instream requirements). The County Green Space Tax, passed by legislation in 2022, can be used within a county area for preservation procurements. The tax, if approved by county resident voters, may be up to 1 percent. Preservation of open space is one approach to maintain balance between growth, which is important to economic development of the state, and the character of the basin that draws growth. Governor Henry McMaster has set the goal to conserve 10 million acres across South Carolina.
	Towns and counties should develop stormwater design manuals that promote responsible development, protect water resources, and prioritize redevelopment over new development. The Southern Low Country Design Manual, which was developed with stakeholder representatives from the region's jurisdictions, is one example of a post-construction stormwater management design manual developed that can be considered for adoption at a regional level.

RBC	Recommendation
Pee Dee 	**A joint compact or water management group should be established and funded that would focus on segments of the Yadkin-Pee Dee River basin that span North Carolina and South Carolina.** The RBC recognized that many of the same water resources are shared by both states and effective management must cross state lines.
	Coastal community and tidal issues should be analyzed and considered in river basin planning. This type of analysis was not part of the initial round of river basin planning.
	Support the protection of habitat in perpetuity, particularly in the riparian corridors of the Pee Dee River basin. Priority sites contributing significantly to water quantity or quality, and/or having the potential to enhance water quality, should be identified, and, where possible, protected by voluntary or purchased conservation easements or fee-title acquisition.
Saluda 	**SCDNR/SCDES should review the science behind minimum instream flow (MIF) standards to ensure they are based on best available science to adequately protect designated uses and recognize regional differences.** SCDNR/SCDES should routinely review the MIF methodology because best practices for determining MIF may change in the future.
	Regulation 61-119, Surface Water Withdrawal, Permitting, Use, and Reporting, should be reviewed to ensure consistency with the South Carolina Surface Water Withdrawal, Permitting, Use, and Reporting Act, including a review of the existing definition of safe yield in the implementing regulations. Safe yield should be redefined to be consistent with the law and be protective of MIF requirements that safeguard the integrity and designated uses of state waters. For example, Regulation 61-119 states that for stream segments not impacted by impoundment, safe yield is calculated at the point of withdrawal as 80 percent of the MADF. Since MIF is calculated as 20, 30, or 40 percent of the MADF, depending on the month, by definition, in months where MIF is 30 or 40 percent of MADF, MIF will not be achieved if the full safe yield is withdrawn.
	State and local governments should 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. The following are RBC-recommended best management practices: • Protecting riparian buffers • Protecting open spaces • Strengthening stormwater regulations to minimize stormwater runoff volume from construction sites • Incentivizing green infrastructure in development designs • Allocating local funding sources for land conservation

RBC	Recommendation
Santee 	**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.** Infiltration helps replenish groundwater aquifers, remove pollutants, and minimize erosion that causes sediment to appear in streams. Sedimentation is considered a threat to the water resources of the Santee River basin. Small impoundments (i.e., farm ponds) can become filled with sediment and lose their ability to store enough water to maintain irrigation during dry periods. Sediment loading also impacts water quality and habitats. The RBC encourages local governments and land managers to identify solutions specific to their needs and location.
	Review periods for groundwater and surface water permit renewal should be reevaluated to facilitate long-term planning efforts; support bond issuance; protect withdrawers' investments in infrastructure; and protect the biological, physical, and chemical integrity of the source. Existing regulations should be amended to align users' renewal periods and permit requirements for surface water and groundwater withdrawals as much as reasonably possible. Review periods of at least 10 years, and potentially up to 20 years, should be considered.
	SCDES should require high-use industrial water users (those who use greater than 3 million gallons per month) purchasing from a municipal supply to report their monthly water usage, aligning with existing SCDES water use reporting requirements. To support effective management of the resource, more transparency in water use is needed for large water users that purchase from water utilities.
Upper Savannah 	**Increase coordination and planning with the Georgia Environmental Protection Division on Savannah River water resources issues.** Through collaboration and planning, Georgia and South Carolina have generally avoided interstate water disputes with each other. Increased coordination between the Upper Savannah RBC, the Lower Savannah-Salkehatchie RBC, the Coastal Georgia Council, and the Savannah-Upper Ogeechee Council would help continue that trend and better leverage the planning and technical analyses that both states have completed over the past decade.
	Identify and prioritize properties for conservation to protect quantity and quality of water. The state and local governments should develop and fund county conservation and mitigation banks and collaborate with South Carolina Conservation Bank and Land Trusts to conserve priority properties.
	The state should request for and cost-share in the completion of Phase 2 of the USACE Comprehensive Study and Drought Plan Update.

Santee River


Lake Moultrie

CHAPTER 9

Next Steps and Considerations

This chapter outlines considerations for state leadership as to the state's water policy, interstate planning and coordination, and SCDES's next steps to sustain water planning efforts into the future and improve water resource management and resilience.

In accordance with SCDES's duty under law to advise and assist the Governor and the General Assembly in formulating and establishing a comprehensive water resources policy for the state, including coordination of policies and activities among the state departments and agencies, SCDES has provided recommendations from stakeholders in the preceding chapters and suggests policy review by state leadership and a strategy for interstate collaboration.

The planning process will use an adaptive management approach to address societal, economic, and technological changes or challenges as they arise including any changes in water resource availability. An adaptive management approach is one that responds to changing conditions in an efficient and timely manner and can be updated as needed to respond to rapid changes in the water use and water availability landscape. To implement an adaptive plan, continuing and consistent stakeholder engagement and river basin conditions monitoring will be needed. As waters of the state are a shared resource with shared responsibility, there are roles for all stakeholders and South Carolinians to be a part of this State Water Plan in implementing water resources management and best practices.

To implement the water management strategies and recommendations identified in this State Water Plan, funding from both public and private sources is also essential. Without reliable financial resources, even well-designed strategies risk being delayed, scaled back, or abandoned, undermining the shared vision for sustainably managed water resources that balance human and ecological needs.

SUMMARY

Prior to 2024, SCDNR was responsible for water planning in South Carolina, and SCDES was responsible for the regulation of surface water and groundwater use. As part of restructuring under Act 60 of 2023, the state water planning function was moved to SCDES. As a result of restructuring, SCDES has been able to consider the overall management of the water resource and associated laws in preparing the State Water Plan. SCDES has identified the need for policy review.

Regarding water planning, South Carolina's strategy emphasizes adaptive management to ensure long-term resilience and sustainability of the state's water resources. This approach involves continuous stakeholder engagement, regular updates to planning frameworks, and flexible responses to changing environmental, societal, and technological conditions. RBCs and WaterSC play central roles in implementing the strategies and actions identified in the River Basin Plans, coordinating across regions, and advising SCDES on policy and technical matters. Regular meetings and statewide summits are proposed to foster collaboration and transparency.

Public education and outreach are key priorities. A comprehensive communication plan will raise awareness about water conservation, planning efforts, and the importance of stakeholder involvement. Targeted outreach to government agencies, community organizations, businesses, and the legislature will help align policy and funding with water management goals.

Interstate coordination is critical for river basins and groundwater aquifers shared with Georgia and North Carolina. The plan calls for formalizing data sharing, routine collaboration, and high-level discussions to address cross-boundary water challenges. Successful regional models provide examples for future partnerships.

Robust data collection and modeling are foundational to informed decision-making. The strategy includes expanding surface water, groundwater, and climate monitoring networks; updating groundwater models; and developing tools to assess ecological flows, sedimentation impacts, and coastal water dynamics.

Additional considerations include addressing uncertainties in future water demand, incorporating hydrologic variability into planning scenarios, evaluating water reuse policies, and integrating water quality concerns. These efforts aim to create a comprehensive, forward-looking framework for managing South Carolina's water resources effectively.

Implementing the next steps and considerations is essential to ensuring the sustainability and resilience of South Carolina's water resources, but doing so will require strategic and dedicated funding. From expanding monitoring networks and updating groundwater models, to hosting statewide summits and enhancing public outreach, each state initiative requires financial resources to support staffing, data infrastructure, stakeholder engagement, and technical analysis. Without adequate funding, the state's water resource planning and management may stall, undermining the ability to respond to evolving water challenges.

Jefferies Hydroelectric Station (courtesy Santee Cooper)

9.1 WATER POLICY

The policy of the General Assembly is paramount in planning and management related to the state's water resources. In fact, one of the state's duties – through SCDES – is to provide recommendations to the General Assembly to implement the policy declared in the South Carolina Water Resources Planning and Coordination Act, S.C. Code Sec. 49-3-10, et seq. (Planning Act). See Jowers v. SCDHEC, 423 S.C. 343 (citing S.C. Code 49-3-40(a)(6)). Additionally, the Planning Act directs SCDES to recommend to the General Assembly any changes required to implement the policy declared in the Planning Act.

SCDES is also charged with implementing the South Carolina Surface Water Withdrawal, Permitting, Use, and Reporting Act, S.C. Code Sec. 49-4-10, et seq. (Surface Water Act), and the Groundwater Use and Reporting Act, S.C. Code Sec. 49-5-10 et seq. (Groundwater Act). The Surface Water Act provides for the issuance of permits and agricultural registrations to surface water withdrawers. The Groundwater Act provides for the issuance of permits to groundwater withdrawers in designated capacity use areas.

History of State Water Policy

The South Carolina legislature took decisive action in 1967 to protect and manage the state's water resources when it passed the Planning Act. The General Assembly found that the state had no well-established plan for distribution and use of our water, and for long range development of water resources to their fullest potential (S.C. Act 61 of 1967). The findings of the General Assembly at that time are instructive as to the state's water policy. The General Assembly found:

- With the ever-increasing demand being made for more and more clean, fresh, pure water, means must be found for making the maximum beneficial use of this natural resource in order that all segments of our rapidly growing society may be amply supplied.
- Planning and policymaking further should encompass long range plans for which water quality management and all conceivable beneficial uses to which the waters of the State may be put in the foreseeable future.
- Proper utilization and control of the water resources of the state can be best achieved through a coordinated, integrated state water resources policy, through plans and programs for the development of such water resources and through other activities designed to encourage, promote and secure the maximum beneficial use and control of such water resources.

In 1969, the Groundwater Act was passed and provides the following legislative declaration of policy:

> "...the general welfare and public interest require that the groundwater resources of the State be put to beneficial use to the fullest extent to which they are capable, subject to reasonable regulation, in order to conserve and protect these resources, prevent waste, and to provide and maintain conditions which are conducive to the development and use of water resources (S.C. Code Sec. 49-5-20)."

In 1982, the South Carolina Water Use Reporting and Coordination Act (Reporting Act) was passed. S.C. Act 282 of 1982. The Act provided, "The General Assembly declares the basic state policy in the implementation of this act to be to establish an accurate inventory of water use in the State in furtherance of an integrated state water resources policy mandated by the [Planning Act]."

In 2010, the Surface Water Act replaced the Reporting Act and went beyond establishing inventory to include permitting and registration requirements. While the Surface Water Act provides the Department authority to promulgate regulations necessary to implement the policies and purposes of the Act, there is no policy stated in the Act.

Current Surface Water and Groundwater Policy

The Planning Act and Groundwater Act contemplate beneficial use of the entire water resource; however, the Surface Water Act is silent as to policy. The Surface Water Act provides prescriptive requirements for the issuance of permits and agricultural registrations. As highlighted in the WaterSC recommendations, SCDES needs to maximize its existing authority to allocate available water to new users and to put surface water to its most beneficial use, and seek legislative authority to fulfill the responsibility where needed.

A coordinated, integrated approach to water planning and use is necessary because groundwater and surface water are inextricably connected. Surface water serves as the water "bank" during times of plentiful rainfall. Groundwater can be used when surface waters recede due to drought. In times of rain, surface waters can be used while groundwaters recharge. A consistent, comprehensive approach to water planning and use would allow the state to provide more flexibility to users as they manage water use in times of plentiful rainfall and in times of drought.

Summary

As contemplated in the Planning Act, the state must utilize its water resources to their full potential. As such, the policies of the implementing acts governing management of surface water and groundwater in South Carolina should be reviewed by the General Assembly and, if appropriate, revised to allow a consistent, integrated approach to water planning and use in South Carolina.

Water tank in the Santee River basin

9.2 Interstate Planning and Coordination

The Upper and Lower Savannah, Broad, Catawba, and Pee Dee Basins all share watershed area with either North Carolina or Georgia. More effective and consistent ways of planning and managing these shared water resources will be explored through improved interstate coordination and collaboration.

Historically, collaboration on water resource management between Georgia and South Carolina has been limited. There has been coordination on the Savannah River and shared use of groundwater resources in the Savannah and Hilton Head area. Recently, South Carolina has participated in some of Georgia's regional water planning activities, and information from Georgia has been used by the Upper and Lower Savannah RBCs in formulating their plans. North Carolina and South Carolina have a more consistent history of sharing information and collaborating on interstate issues, citing the CWWMG as an example of effective management collaboration and strategic thinking. North Carolina and South Carolina routinely exchange information, but no formal framework exists with either Georgia or North Carolina to resolve disputes, share data more routinely, or participate jointly in water management decisions.

Improve and Sustain Interstate Collaboration

South Carolina will seek ways to improve and sustain engagement with North Carolina and Georgia on interstate water management strategies. Communication and cooperation must continue and be improved, to include routine sharing of water use data. Coordinated discussions of hydrologic models or decision-making tools should take place routinely. Formal discussion at the legislative or executive level of state governments should also be considered.

SCDES will lead an effort to better organize routine coordination and collaboration with both Georgia and North Carolina, with the support of the relevant RBCs. This collaboration can use the CWWMG and the YPDWMG as examples, in which organized, funded groups address the concurrent needs of river basins in both North Carolina and South Carolina. Cross-boundary collaboration may also include engaging regularly with Georgia's Regional Councils, the Georgia equivalent of an RBC, with respect to regional water planning, especially in the Upper Savannah and Lower Savannah-Salkehatchie River basins.

Savannah River

9.3 Next Steps and Considerations

Building on River Basin Council (RBC) and WaterSC management strategies and recommendations (discussed in Chapter 7 and Appendix C), SCDES next steps and considerations are organized around the following overarching themes, as summarized in **Table 9-1** and discussed in the subsections that follow:

- Continuous water planning
- Intentional education and outreach
- Enhanced data collection and modeling
- Other planning considerations
- Funding for River Basin Plan implementation

These activities are split into "next steps," which represent steps for which SCDES has committed funding, and "considerations," which represent opportunities to expand existing or begin new technical and planning activities. The considerations require additional definition of scope and funding allocation.

Table 9-1. Summary of SCDES Next Planning Steps and Considerations*

Next Steps		Considerations		
Continuous Water Planning	Intentional Education and Outreach	Enhanced Data Collection and Modeling	Other Planning Considerations	Funding for River Basin Plan Implementation
RBCs and Inter-Basin Councils	Education and Outreach Plan and Goals	Expand Monitoring Networks	Hydrologic Variability	Federal Funding
WaterSC Continuation	State Water Plan Awareness	Expand Ecological Flow Relationships	Water Reuse	Private Funding
State Water Summit	Public Outreach	Other Models	Water Quality	State/Grant Funding
Updates of River Basin Plans and State Water Plan	Legislative Outreach			

****Each entry in this table is discussed below in organized subsections.***

Lower Savannah-Salkehatchie RBC

9.3.1 Continuous Water Planning

As South Carolina continues to grow and thrive, the state's needs for water are evolving. Continuous water planning is necessary to keep up with these growing water needs and ensure the reliability, resilience, sustainability, and sufficiency of the state's water resources for all existing and future uses. To this end, SCDES proposes the following actions to continue statewide water planning and support implementing key stakeholder recommendations made to date.

WaterSC Working Group

As the WaterSC working group concludes its efforts advising on this State Water Plan, SCDES will continue to convene WaterSC as a diverse statewide stakeholder advisory group. They will meet as needed to collaborate and advise on evolving needs, SCDES water planning efforts, and the RBC activities.

River Basin and Interbasin River Councils

RBCs will retain their broad composition and have a continuous long-term role in water planning and implementing recommendations. These groups will continue to meet periodically to pursue River Basin Plan implementation activities and discuss evolving needs. With the updated State Water Plan, SCDES will assist with coordinating and facilitating RBC meetings. Frequency of meetings will be flexible and adaptable to meet needs.

SCDES will initially focus these meetings on the following activities and adapt as necessary:

- Review and prioritize objectives and implementation activities in each River Basin Plan.
- Explore funding for implementation and assign responsibilities to manage activities.
- Coordinate with other RBCs who are implementing or advocating for similar initiatives, policies, and/or funding.
- Consider the formation of Interbasin River Councils (IRCs) to increase collaboration between RBCs. If IRCs are formed, decide how often they will meet and specify discussion topics to be explored, as well as define roles and responsibilities that complement, or are distinct from, those of the individual RBCs. Improving communication on issues common to multiple basins will be the focus of the IRCs.
- Review membership and bylaws and consider any beneficial updates or revisions.

Based on the experiences and influence of other organized river basin groups, such as the Catawba-Wateree Water Management Group (CWWMG) and the Yadkin-Pee Dee Water Management Group (YPDWMG), SCDES and some or all the RBCs may consider more formal charters and funding mechanisms in the future.

Saluda RBC at the LCWSC
Lake Greenwood Water Treatment Plant

These meetings will initially focus on the following activities and be adapted as needed:

- Consider service timeframes for members.
- Formalizing WaterSC bylaws and charter.
- Support SCDES in reviewing the Planning Framework for overall sufficiency, and recommend amendments or revisions as needed.
- Receive updates and discuss implementation of the State Water Plan and River Basin Plans.
- Continue advising and assisting SCDES regarding water policy and current issues.

Backed by the planning to date, and based on continued engagement with the South Carolina Legislature, SCDES will continue to seek opportunities to discuss or suggest potential changes in South Carolina water policy, laws, and/or regulations that could help achieve broadly agreeable goals for the state's water resource management. SCDES expects that opportunities may arise from review and discussion of the RBC and WaterSC recommendations summarized in Chapter 7.

Water Summit

SCDES will host an annual or biannual water summit of RBCs, WaterSC, and the water resource stakeholders. This water summit will bring together the many stakeholders of South Carolina's water resources to discuss yearly accomplishments, issues of concern, changes in priorities, and collaboration in implementing common goals around water planning and water resource management.

WaterSC

River Basin Plan and State Water Plan Updates

With guidance from the RBCs and WaterSC, SCDES will develop a flexible schedule for updating the River Basin Plans and the State Water Plan. In addition, the Planning Framework will have an associated schedule by which it is reviewed and updated to remain current with the needs of the state, to reflect successes of the planning process, and address evolving conditions of its water resources. These updates will require a long-term funding commitment, staff commitments from SCDES, and continued volunteer support from stakeholders.

River Basin and State Water Plan updates will involve:

- Regular meetings of the RBCs and WaterSC.
- Update of water demand projections. Future demand projections will incorporate more recent population projections from the South Carolina Office of Revenue and Fiscal Affairs than were available during the RBC planning process. More recent projections may estimate considerably higher population growth in some counties. The updated demand projections will also consider the recent growth in demand for energy production and data center development.
- Update and application of the Simplified Water Allocation Model (SWAM) for analyzing planning scenarios.
- Application of the Coastal Plain groundwater models for analysis of planning scenarios.

The original intent of the Planning Framework was to supplement surface water modeling with groundwater modeling in the Edisto, Lower Savannah-Salkehatchie, Pee Dee, and Santee River basins. While this was accomplished for the Edisto River basin, the U.S. Geological Survey (USGS) groundwater modeling effort for the remaining Coastal Plain basins was paused because of model development and calibration issues that could not be resolved within the planning timeline. Continual funding and support will be considered for groundwater model development and its use by the RBCs to assess future groundwater availability and update their River Basin Plans.

SCDES will also evaluate its technical role in future iterations of the plans and Planning Framework. Specifically, SCDES will review its roles in developing demand projections, performing groundwater and surface water modeling, coordinating ecological flow assessments, water quality, and participating in other technical work that may expand the planning envelope in accordance with RBC and WaterSC recommendations.

Lake Blalock

9.3.2 Intentional Education and Outreach

The public and stakeholders will be made aware of water planning activities and be educated on South Carolina's water resources, efficient water use, and conservation practices. This section outlines SCDES's planned goals and activities to provide public awareness, education, and opportunities for involvement in water planning.

Education and Outreach Plan and Goals

SCDES will develop and implement an education and outreach communication plan and engage with all stakeholders involved in water planning in South Carolina. SCDES will collaborate with other organizations already engaged in this type of outreach at local, regional, and statewide levels. The goals of the education and outreach plan are as follows:

1. **The public obtains a general understanding of water resources and their availability and use throughout the state and sees value in water planning.** SCDES will ensure that planning activities are transparent and accessible to the public, and that opportunities for public participation are integrated throughout stakeholder processes.
2. **Water conservation during normal and drought conditions is understood and resources are available to promote efficient use of water.** SCDES will promote the public's understanding of how water is used in the state, the need for water conservation during drought, and the actions individuals, households, and businesses can take to conserve water.
3. **The public and water planning stakeholders are engaged and aware of ongoing water planning activities and plans.** SCDES will conduct targeted outreach to stakeholders including other state agencies, county and municipal governments, councils of governments, businesses, watershed organizations, and conservation groups to raise awareness about the State Water Plan and the importance of the planning process.
4. **The state legislature is engaged and updated on water planning activities.** SCDES will identify opportunities to improve engagement with the legislature so that water planning activities and actions can be routinely evaluated.

State Water Plan Awareness

To increase awareness, targeted outreach to stakeholders will include the following strategies:

1. **Develop appropriate communication plans for important announcements related to the State Water Plan.** These announcement-specific communication plans may include any or all the following communication strategies: media release, press conference, social media announcements, Spotlight posts, billboards, commercials, and others.
2. **Deliver presentations at strategic stakeholder events and conferences.**
3. **Develop a social media toolkit with graphics and suggested text promoting the State Water Plan.**

Public Outreach

SCDES will collaborate with other organizations at local, regional, and statewide levels to promote the public's understanding of how water is used in the state, the need for water conservation during normal and drought conditions, and the actions individuals, households, and businesses can take to conserve water. In collaboration with these public education partners, SCDES may conduct a needs assessment to identify what types of public education are currently available, and where there are gaps in educational content or delivery. Then, SCDES will work with partners to develop and implement strategies to promote public education on these topics. Progress toward this goal will be evaluated annually, and the strategy can be modified as needed for effectiveness.

Legislative Engagement

SCDES will identify opportunities to collaborate with legislative committees and representatives regularly. This may include the Water Resources Legislative Committee (previously referred to as the Surface Water Study Committee). The goal of this engagement is to assist in developing water planning priorities, identify funding opportunities, and understand how water needs can be addressed most effectively and fairly across the state.

9.3.3 Enhanced Data Collection and Modeling

Water planning relies on sufficient data and decision-making tools (e.g., hydrologic models) to make informed planning decisions. To that end, the actions that follow will be considered.

Monitoring Networks

Water planning and decision-making requires reliable data to quantify the condition and availability of water resources. Comprehensive, reliable, long-term monitoring efforts provide critical data to make informed decisions. To that end, all options will be considered to allow the following monitoring networks to be expanded:

- **Statewide Surface Water Monitoring Network** - Surface water monitoring includes measuring stream discharge and river and reservoir stage. Although the state's surface water monitoring network has significantly expanded since the publication of the *South Carolina State Water Plan Second Edition* (2004 Plan), data gaps remain.
- **Statewide Groundwater Monitoring Network** - Groundwater monitoring includes measuring groundwater levels in all aquifers across the state. Although the state's groundwater monitoring network has significantly expanded since the publication of the 2004 Plan, data gaps remain.
- **Statewide Weather/Climate Monitoring Network** - An automated environmental monitoring network of weather and climate stations should be developed, with the goal of installing at least one complete weather station in each county.

Funding options for enhanced data collection may include additional recurring state appropriations, expanding public-private partnerships, and increasing collaboration among state and federal agencies.

Streamflow Gage on the Coosawhatchie River (Courtesy Kari Foy)

Ecological Flow Relationships

The state will consider further supporting and expanding collection of fish and macroinvertebrate data to improve the evaluation of ecological flow relationships. Ecological flow relationships offer a quantitative method to evaluate the impact of varied hydrology on riverine ecosystems. Expanding data collection will aid in characterizing stream types in which the relationship between streamflow and ecology is currently not well known.

Other Models

The state will consider developing a hydrologic model capable of evaluating the impacts (economic and physical) of sedimentation on reservoirs and streams to be used during future iterations of water planning. Such a model can be used to predict the effectiveness of proposed land use management strategies in mitigating the negative impacts of sedimentation. For example, a WaterFALL® model developed by Research Triangle Institute (RTI) was used by the CWWMG to evaluate the impacts of sedimentation in the Catawba-Wateree basin, fulfilling one component of their Integrated Water Resources Plan. Such models can also be used to evaluate the impacts of future land use change on sedimentation and water quantity in general and can be used to prioritize land for the conservation and protection of water resources.

Surface water modeling may need to be extended to and include coastal tidal areas. Because the SWAM model does not include users in tidal areas, new modeling tools or decision support systems are needed to better assess surface water availability in the coastal regions of the Edisto, Lower Savannah-Salkehatchie, Pee Dee, and Santee River basins. This is especially important considering the amount of growth expected in coastal areas, and because of ongoing concerns regarding saltwater intrusion.

9.3.4 Other Planning Considerations

This process, focused on water quantity, did not have the breadth to cover topics such as water quality, saltwater intrusion, water reuse, and more. As such, these topics will be evaluated further for their potential impacts on water resources.

Hydrologic Variability

Although some RBCs examined the possibility of more severe future droughts, this has not been an explicit requirement in the Planning Framework. A major assumption incorporated into the water availability assessments completed by the RBCs is that South Carolina's future hydrologic conditions will be identical to its historic hydrologic conditions, as determined for the period of record of USGS streamflow gages. However, historical evidence suggests South Carolina has experienced much more severe droughts than have occurred in the past 100 years (Pederson et al 2012; Cook et al 2016). SCDES may incorporate different assumptions or scenarios about future hydrologic and climatological conditions in future planning efforts to evaluate the potential impacts of hydrologic variability and more severe droughts on future water availability.

Columbia Canal

Water Reuse

The state will continue to evaluate water reuse policy in South Carolina and may consider new regulatory programs necessary to implement this policy. The state will continue to participate with the WateReuse Association to evaluate laws, policy, funding, and public acceptance of water reuse. Collaboration with utilities, businesses, government agencies, and nongovernmental organizations on using water reuse should continue. Lessons learned from other states will be gathered and used to help guide future policy and planning efforts.

Water Quality Considerations

Water quantity is not the only consideration for water planning; water must also be of adequate quality for beneficial use. Future iterations of river basin planning should incorporate the water quality issues experienced throughout the state. Priority topics to address include sedimentation, saltwater intrusion, aquatic health, and source water protection.

In addition to directly incorporating water quality into future planning activities, SCDES' Bureau of Water has outlined some projects they may consider in the coming years.

These projects may include the following:

- In partnership with the South Carolina Department of Natural Resources, review and evaluate the South Carolina Estuarine and Coastal Assessment Program.
- Coordinate the efforts of the river basin planning process in consultation with the nonpoint source watershed program.
- Review the baseline ambient surface water monitoring program to consider additional locations to address specific and evolving needs.
- Temporarily reinstate the ambient groundwater quality monitoring program to update the dataset.
- Increase the number of locations and parameters of macroinvertebrate and fish monitoring.

Lake Murray Dam spillway gates

9.3.5 Funding

SCDES is committed to working with all water resource stakeholders to identify funding opportunities for continued water planning and implementation of strategies and recommendations. All options for funding should be explored including federal, private, state, grant opportunities, and public-private partnerships.

Federal Funding

Existing federal funding sources may be leveraged to promote implementation. These sources offer 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 also be available. Numerous organizations offer 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, and other programs provide aid to farm operations that implement water conservation measures. A summary of these programs is provided in Table 1 of Appendix D.

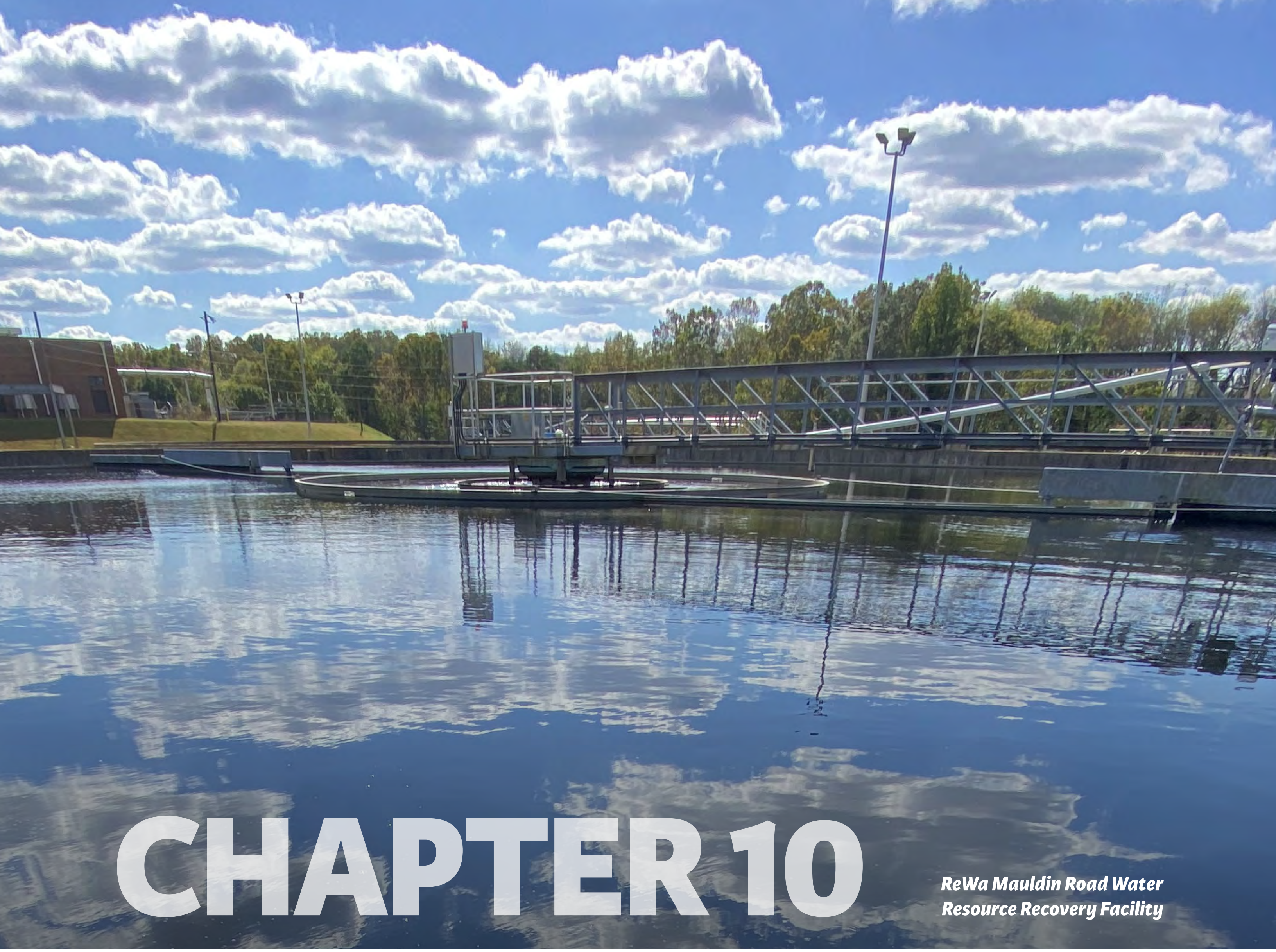
Private Funding

Private funding options may offer unique opportunities to implement certain water management strategies identified in the River Basin Plans. For example, water replenishment programs offered by corporations aim to restore more water to the environment than they consume, especially in areas where their operations use water. Other foundations and non-profits may also have grant funding opportunities to explore. There may also be opportunities for private entities to leverage public funds in public-private partnerships.

State Funding and Support of Grant Opportunities

South Carolina legislature could also consider developing a dedicated funding source for implementing water management strategies. Numerous other states have developed funding programs, which serve as examples. Examples of other states' water funding programs are summarized in Appendix D.

Broad River
(courtesy Bill Stangler)



CHAPTER 10

ReWa Mauldin Road Water Resource Recovery Facility

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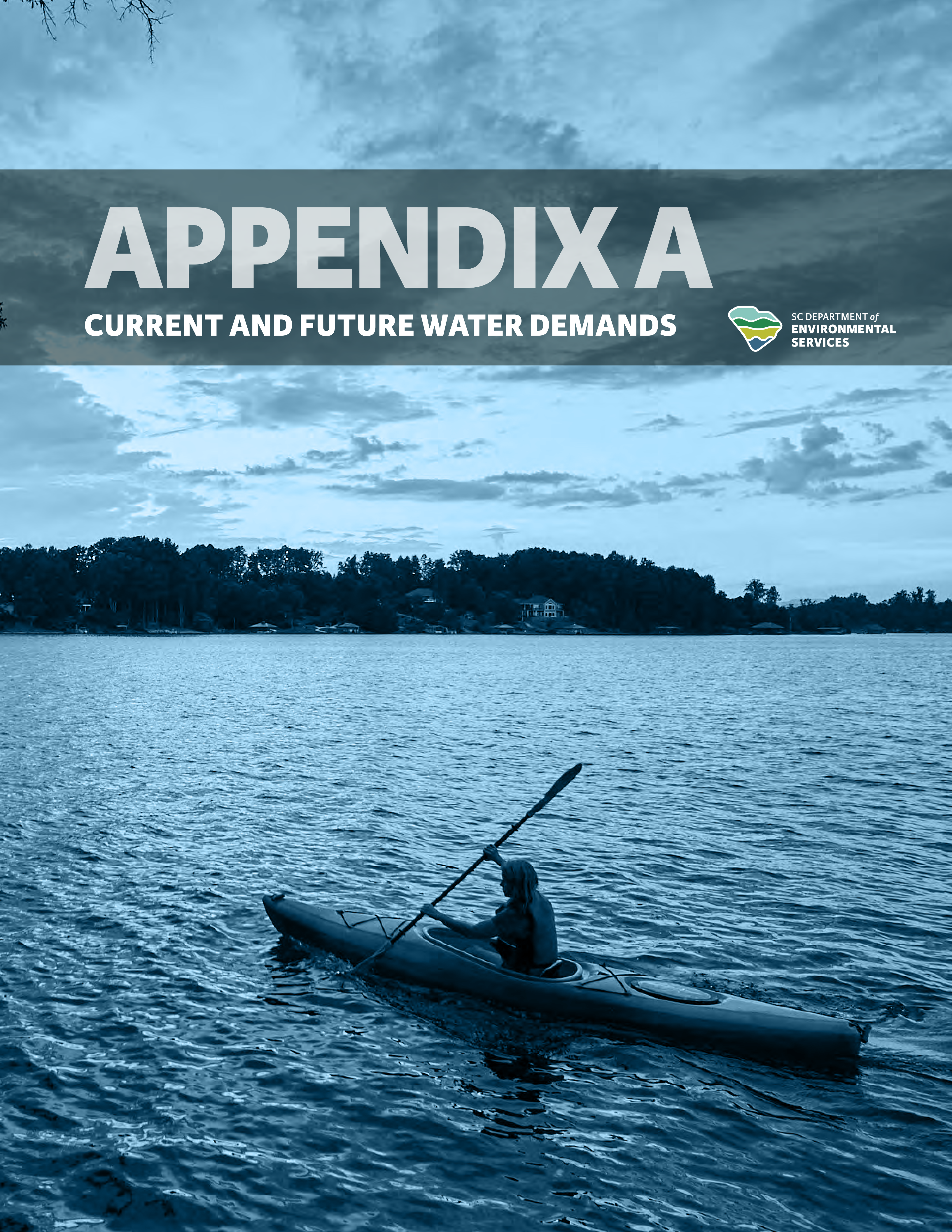
APPENDIX A

CURRENT AND FUTURE WATER DEMANDS

SC DEPARTMENT *of*
ENVIRONMENTAL SERVICES



Appendix A. Current and Future Water Demands

Table A-1. Water Use, including hydroelectric power, for basins with hydroelectric use.

Basin	Withdrawal (mgd)
Upper Savannah	30,515
Saluda	3,551
Broad	9,239
Catawba	14,301
Santee	4,095
Total	61,701

Table A-2. Current demand by water use category and basin.

Basin	Thermoelectric	Public Supply	Manufacturing	Agriculture	Other	Total
Upper Savannah	2,650	60	7.0	0.27	1.2	2,719
Saluda	126	116	26	2.3	0.63	272
Broad	666	96	3.4	0.27	0.91	767
Catawba	136	60	63	3.3	2.5	265
Lower Savannah-Salkehatchie	93	79	24	36	6.0	238
Edisto	3.9	59	2	73	0.68	139
Santee	374	84	72	15	4.0	549
Pee Dee	704	128	87	40	6.8	966
Total	4,753	683	284	171	23	5,913

Table A-3. Current demand by source and by basin in MGD, excluding thermoelectric demand.

Basin	Surface Water	Groundwater	Total
Upper Savannah	68	0.36	68
Saluda	145	0.25	145
Broad	100	0.63	101
Catawba	122	6.6	128
Lower Savannah-Salkehatchie	70	75	145
Edisto	70	65	135
Santee	145	30	175
Pee Dee	144	117	262
Total	865	296	1,160

Table A-4. Surface water P&R amounts by basin, with portion currently withdrawn.

Basin	P&R Amount	Current Withdrawal
Upper Savannah	3,498	2,718
Saluda	1,096	271
Broad	1,541	766
Catawba	801	258
Lower Savannah-Salkehatchie	1,472	163
Edisto	749	70
Santee	1,688	518
Pee Dee	1,465	848
Total	12,310	5,612

Table A-5. Groundwater P&R[1] amounts by basin, with portion currently withdrawn.

Basin	P&R Amount	Current Withdrawal
Upper Savannah	0.36	0.36
Saluda	0.54	0.25
Broad	0.67	0.63
Catawba	11	6.6
Lower Savannah-Salkehatchie	152	75
Edisto	127	69
Santee	62	30
Pee Dee	202	118
Total	556	301

[1]Only the planning basins in the Coastal Plain are shown since nearly all groundwater use in the Upstate basins is registered, not permitted, and groundwater registrations, unlike surface water registrations, do not include an amount.

Table A-6. Statewide demand projections by water use category and source.

Water Use Category	Demand Scenario	Projection Year	Groundwater	Surface Water	Total
Thermoelectric	Moderate	2025	2.0	4,878	4,880
		2070	2.1	4,411	4,413
	High	2025	2.3	5,597	5,599
		2070	2.7	4,908	4,911
Public Supply	Moderate	2025	113	596	709
		2070	132	969	1,101
	High	2025	147	696	843
		2070	249	1,485	1,734
Manufacturing	Moderate	2025	25	268	293
		2070	40	409	449
	High	2025	38	354	392
		2070	88	776	864
Agriculture	Moderate	2025	128	27	156
		2070	171	36	208
	High	2025	228	39	267
		2070	314	55	369
Other	Moderate	2025	8.5	11	19
		2070	8.5	11	19
	High	2025	19	21	41
		2070	19	22	41
Total	Moderate	2025	277	5,780	6,058
		2070	354	5,836	6,190
	High	2025	434	6,707	7,142
		2070	674	7,245	7,919

Table A-7. Moderate Demand Scenario projections by basin and source.

Basin	Projection Year	Groundwater	Surface Water	Total
Upper Savannah	2025	0.40	2,675	2,676
	2070	0.40	2,740	2,740
Saluda	2025	0.49	307	308
	2070	0.49	348	348
Broad	2025	0.76	845	845
	2070	0.76	932	932
Catawba	2025	6.9	258	265
	2070	8.4	215	223
Lower Savannah-Salkehatchie	2025	75	157	232
	2070	91	170	261
Edisto	2025	65	92	158
	2070	88	146	234
Santee	2025	26	553	579
	2070	36	303	339
Pee Dee	2025	102	893	995
	2070	129	984	1,113
Total	2025	277	5,780	6,058
	2070	354	5,836	6,190

Table A-8. High Demand Scenario projections by basin and source.

Basin	Projection Year	Groundwater	Surface Water	Total
Upper Savannah	2025	0.40	2,927	2,927
	2070	0.40	3,041	3,042
Saluda	2025	0.49	327	328
	2070	0.49	426	427
Broad	2025	0.76	952	953
	2070	0.76	1,112	1,113
Catawba	2025	11	331	342
	2070	18	333	351
Lower Savannah-Salkehatchie	2025	119	236	355
	2070	169	291	459
Edisto	2025	67	109	175
	2070	96	207	303
Santee	2025	58	792	850
	2070	93	503	596
Pee Dee	2025	178	1,033	1,210
	2070	296	1,332	1,628
Total	2025	434	6,707	7,142
	2070	674	7,245	7,919

Table A-9. Moderate Demand Scenario projections by basin and water use category.

Basin	Projection Year	Thermoelectric	Public Supply	Manufacturing	Agriculture	Other	Total
Upper Savannah	2025	2,609	58	7.3	0.26	1.1	2,676
	2070	2,609	119	11	0.32	1.1	2,740
Saluda	2025	171	108	26	2.5	0.59	308
	2070	171	117	56	3.2	0.59	348
Broad	2025	739	101	3.6	0.27	1.0	845
	2070	775	150	5.7	0.27	1.0	932
Catawba	2025	139	55	67	2.4	1.7	265
	2070	11	130	77	3.4	1.7	223
Lower Savannah-Salkehatchie	2025	90	80	23	35	3.9	232
	2070	90	95	25	46	3.9	261
Edisto	2025	4.7	75	2.4	76	0.22	158
	2070	6.4	121	4.7	101	0.22	234
Santee	2025	403	92	69	10	4.0	579
	2070	26	161	134	14	4.0	339
Pee Dee	2025	724	141	95	29	6.5	995
	2070	724	208	136	39	6.6	1,113
Total	2025	4,880	709	293	156	19	6,058
	2070	4,413	1,101	449	208	19	6,190

Table A-10. High Demand Scenario projections by basin and water use category.

Basin	Projection Year	Thermoelectric	Public Supply	Manufacturing	Agriculture	Other	Total
Upper Savannah	2025	2,849	63	13	0.41	2.3	2,927
	2070	2,849	170	20	0.53	2.3	3,042
Saluda	2025	171	116	36	3.4	1.2	328
	2070	171	158	92	4.5	1.2	427
Broad	2025	819	126	4.8	0.30	1.9	953
	2070	855	244	12	0.30	1.9	1,113
Catawba	2025	178	71	87	4.5	2.5	342
	2070	17	203	122	6.8	2.9	351
Lower Savannah-Salkehatchie	2025	151	100	29	66	9.1	355
	2070	151	154	56	90	9.1	459
Edisto	2025	6.0	83	3.7	82	0.25	175
	2070	11	171	7.2	114	0.25	303
Santee	2025	599	110	99	35	7.5	850
	2070	31	259	250	49	7.5	596
Pee Dee	2025	827	173	119	76	16	1,210
	2070	827	376	304	105	16	1,628
Total	2025	5,599	843	392	267	41	7,142
	2070	4,911	1,734	864	369	41	7,919

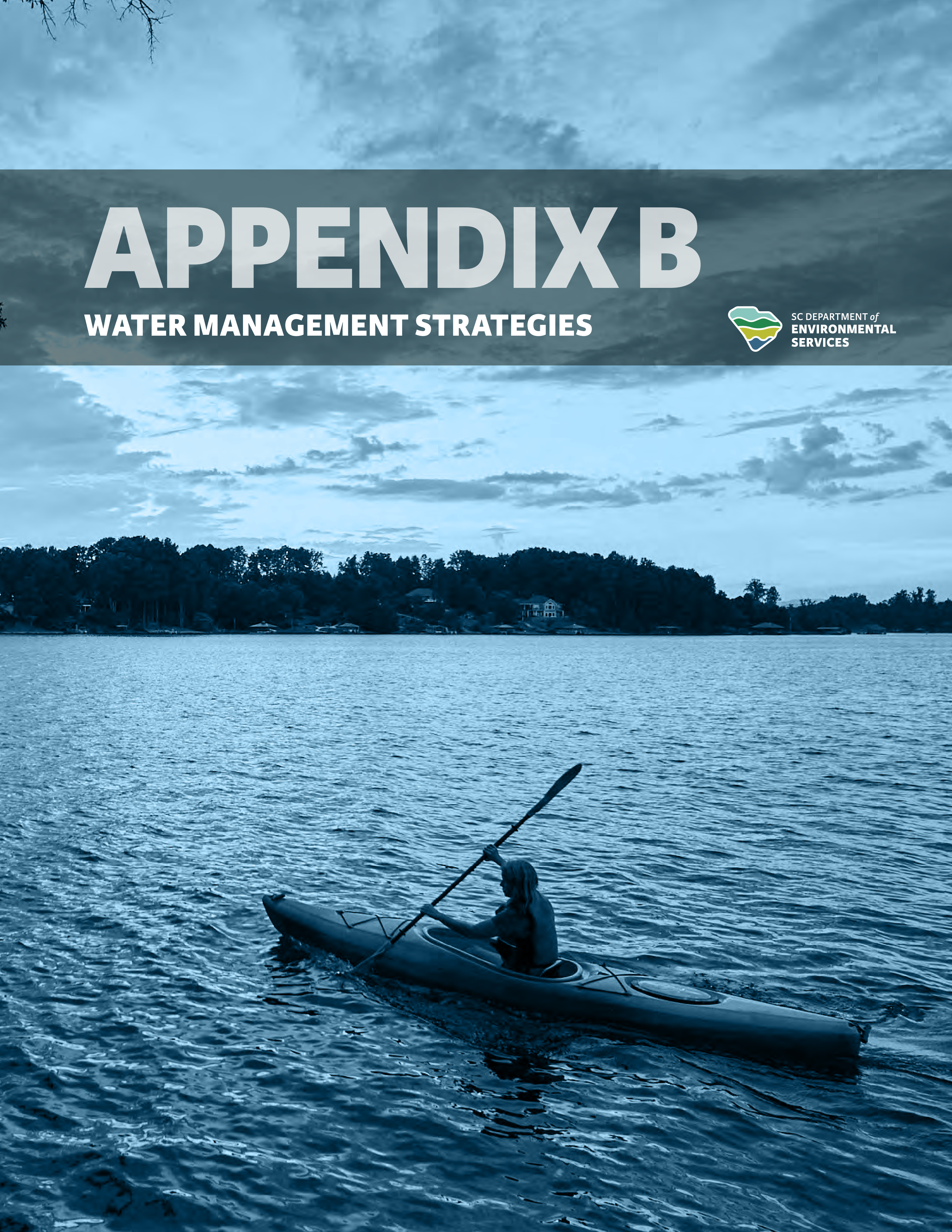
Table A-11. Permitted and registered amounts by basin compared to the projected 2070 withdrawal in the High Demand Scenario and current water use.

Basin	Current Withdrawal	2070 High Demand	P&R Amount
Upper Savannah	2,719	3,042	3,498
Saluda	272	427	1,096
Broad	767	1,113	1,542
Catawba	265	351	813
Lower Savannah-Salkehatchie	238	459	1,624
Edisto	139	303	876
Santee	549	596	1,750
Pee Dee	966	1,628	1,667
Total	5,913	7,919	12,866

APPENDIX B

WATER MANAGEMENT STRATEGIES

SC DEPARTMENT *of* ENVIRONMENTAL SERVICES



Appendix B. Water Management Strategies

Table B-1. Municipal demand-side management strategies recommended by the RBCs and WaterSC.

Strategy	WaterSC[1]	Upper Savannah[2]	Saluda	Broad	Catawba[3]	Lower Savannah-Salkehatchie	Edisto	Santee	Pee Dee[4]
Public Education about Water Conservation	X	X (1)	X	X		X	X	X	X
Conservation Pricing Structures	X	X (2)	X	X		X	X	X	X
Leak Detection and Water Loss Control, including AMI/AMR	X	X (2)	X	X	X	X	X	X	X
Recycled Water Programs	X	X	X	X		X	X	X	X
Update Drought Management Plans		X	X	X		X		X	X
Landscape Irrigation Program and Codes		X	X	X		X	X	X	X
Time-of-day Watering Limit		X	X	X		X	X	X	X
Residential Water Audits	X	X	X	X			X	X	
Water Efficiency Standards for New Construction		X		X			X		X
Incentives for Low Flow Fixtures	X						X		X
Car Wash Recycling Ordinances				X			X		
Water Waste Ordinance						X	X		

[1] WaterSC also recommended smart meters, low impact development (LID), strengthened building codes, separate meters for irrigation, drought management strategies, and tourism impact tax.

[2] The Upper Savannah RBC prioritized strategies as first priority, second priority, or remaining toolbox of strategies.

[3] Catawba strategies are from the CWWMG 2014 Water Supply Master Plan.

[4] The Pee Dee RBC ranked strategies across municipal, agricultural, and industrial strategies using three different approaches. Only those strategies ranked are included in this table. See the Pee Dee River Basin Plan for more details.

Table B-2. Irrigation (agriculture and golf courses) demand-side management strategies recommended by the RBCs and WaterSC.

Strategy	WaterSC[1]	Upper Savannah	Saluda	Broad	Catawba	Lower Savannah-Salkehatchie	Edisto[2]	Santee	Pee Dee[3]
Water Audits and Nozzle Retrofits	X	X	X	X		X	X (1)	X	X
Irrigation Scheduling/ Smart Irrigation Systems/Moisture Sensors		X	X	X		X	X (4)	X	X
Irrigation Equipment Changes		X	X	X		X	X (2)	X	X[4]
Crop Variety, Crop Type, and Crop Conversion		X	X	X		X	X (5)	X	X
Soil Management (Cover Cropping, Conservation Tillage)	X	X	X	X		X	X (3)	X	X
Recycled Water Programs						X			
Wetting Agents (golf courses)						X		X	
Future Technologies			X			X	X	X	

[1] WaterSC also recommended prescribed burns, BMPs for water quality, and more coordination on research with academia and industry.

[2] The Edisto RBC prioritized agricultural strategies (as shown in parentheses, with 1 being highest priority) to reflect what may be preferred under typical conditions. The RBC recognized that the most appropriate strategy for a given agricultural operation will depend on the size of the operation, crops grown, current irrigation practices, and financial resources of the owner/farmer.

[3] The Pee Dee RBC ranked strategies across municipal, agricultural/irrigation, and industrial strategies using three different approaches. Only those strategies ranked are included in this table. See the Pee Dee River Basin Plan for more details.

[4] The Pee Dee RBC recommended drop/trickle irrigation explicitly.

Table B-3. Industrial demand-side management recommended by the RBCs[2] and WaterSC.

Strategy	WaterSC[2]	Upper Savannah	Catawba	Lower Savannah-Salkehatchie	Santee	Pee Dee[3]
Educating Employees About Water Conservation		X		X	X	
Water Reuse and Recycling	X	X		X	X	X
Water Audits		X		X	X	
Water Saving Equipment and Efficient Water Systems/Processes	X	X		X	X	X
Rebates on Energy-Efficient Appliances		X		X	X	
Water Saving Fixtures and Toilets		X		X	X	
Water Loss Control and Routine Maintenance						X
Drought Management Best Practice Collaboration						X
Switch to combined-cycle natural gas						X

[1] The Edisto, Broad, and Saluda RBCs did not explicitly discuss industrial demand-side management strategies.

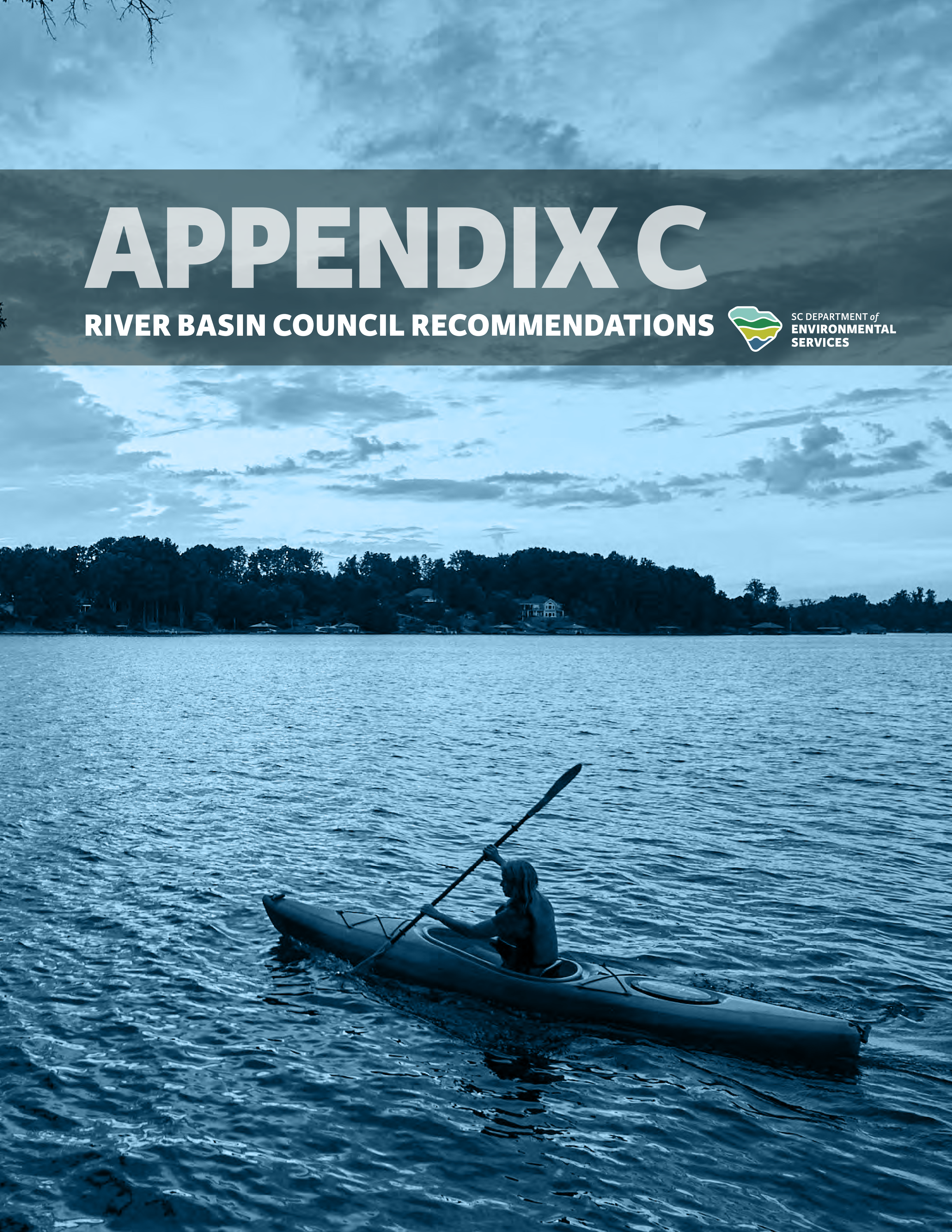
[2] WaterSC also recommended closed-loop cooling, conjunctive use, process optimization, air cooled condensers, natural gas (rather than coal), and renewable energy.

[3] The Pee Dee RBC ranked strategies across municipal, agricultural, and industrial strategies using three different approaches. Only those strategies ranked are included in this table. See the Pee Dee River Basin Plan for more details.

APPENDIX C

RIVER BASIN COUNCIL RECOMMENDATIONS

SC DEPARTMENT *of* ENVIRONMENTAL SERVICES



Appendix C. River Basin Council Recommendations

Table C-1. RBC Planning Process Recommendations.

Topic	Recommendation	Upper Sav.	Saluda	Broad	Catawba	Lower Sav.-Salk	Edisto	Santee	Pee Dee
Membership, Bylaws, Meeting Schedules and Preferences	Diversify/rotate meeting locations.						■		■
	Review RBC membership regularly to make sure all interest categories are adequately represented.	■	■	■		■		■	
	Conduct an initial get-to-know-you meeting to introduce and promote trust among RBC members.						■		
	Establish attendance requirements.						■		
	Incorporate into the RBC bylaws a preference for in-person attendance with a hybrid option as needed, recognizing that it is not always feasible to travel to monthly meetings.						■		
	Send the previous meeting's summary just before the next meeting or briefly review past outcomes at the start of each meeting, time permitting.						■		
	Accomplish the goals of the river basin planning process in fewer meetings, if possible.						■		
	RBCs and their Planning Teams should consider regularly polling the RBC members to identify if adjustments to meeting times, locations, and dates would allow for easier and/or more member attendance and/or increased in-person attendance.			■					
	Where appropriate and allowed, experts who present technical information to the RBCs should offer proposed recommendations for RBC consideration.			■					
	The RBCs (in conjunction with SCDES) should develop guidance and guidelines for processes to replace RBC members if current members resign, and to adjust member terms if necessary. They should develop best practices for recruiting new members.			■					
	Include more field trips, if possible.			■					

Table C-1. RBC Planning Process Recommendations (cont.)

Topic	Recommendation	Upper Sav.	Saluda	Broad	Catawba	Lower Sav.-Salk	Edisto	Santee	Pee Dee
Communication	Coordinate regular state-wide meetings of RBCs and State agencies.	■	■	■		■		■	■
	In the Savannah River Basin, the RBCs should attempt to increase engagement with USACE Planning and Operations Divisions.	■				■			
	RBC members should communicate with legislative delegations throughout the river basin planning process to promote their familiarity with the process and its goals and to generate buy-in on its recommendations.					■	■		
	The Edisto and Santee RBCs should coordinate and participate in future monitoring, planning, modeling, and other activities focused on the Calhoun County Groundwater Area of Concern, which extends into both basins.						■		
	RBCs should communicate through SCDES to the stakeholders that participated in the development of Groundwater Management Plans and the establishment of Capacity Use Areas.						■		
	RBCs should communicate with the Drought Response Committee as described in Chapter 8.2.2.						■		
	RBCs should consider developing and executing a communication plan early in the initial 2-year planning process and conducting education and outreach prior to completion of the River Basin Plan.			■					
	RBCs should hold additional public meetings to enhance public engagement.		■						
	During 2025, the RBCs should initiate and coordinate discussions with SCDES to begin the process of updating the State Water Plan.	■							
	The Savannah RBCs, with the support of SCDES, should coordinate and communicate with the Coastal Georgia Regional Council.					■			
Funding	The legislature should continue to fund state water planning activities, including river basin planning.	■		■		■	■		■
	SCDES should designate staff to continue to coordinate and support ongoing RBC activities.					■		■	
	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.	■							

Table C-1. RBC Planning Process Recommendations (cont.)

Topic	Recommendation	Upper Sav.	Saluda	Broad	Catawba	Lower Sav.-Salk	Edisto	Santee	Pee Dee
Public Outreach	RBC members should be encouraged to present observations and outcomes of the river basin planning process.						■	■	■
	The RBCs should establish a social media presence to engage with the public and describe the river basin planning process.						■		■
	RBC members representing municipalities should consider including inserts in mailings to inform their customers of RBC activities.						■		
	Public relations and communication strategies should be developed to educate the public on who the RBCs are, what they do, and the benefits of participation. Strategies should focus on both the role of the RBCs in planning and in implementation.								■
	The RBCs should support public outreach and education to increase awareness within the general public by coordinating with groups that have existing education and outreach efforts focused on water conservation, such as Clemson University and South Carolina State Extension Services.	■	■			■	■		
Implementation Process	The RBCs should conduct quarterly meetings immediately following the release of the River Basin Plan to facilitate implementation and seek funding sources.						■		
	SCDES and/or RBC facilitators should offer new RBC member orientation to introduce basin concerns, strategies, and implementation plans.						■		
	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.	■							
	SCDES should form an Upstate Interbasin River Council (IRC).		■						
	WaterSC should consider recommendations from the RBCs.					■			

Table C-2. RBC Technical Recommendations.

Topic	Recommendation	Upper Sav.	Saluda	Broad	Catawba	Lower Sav.-Salk	Edisto	Santee	Pee Dee
Water Quality Planning	Future RBC planning efforts should address **water quality.**	■	■	■		■	■	■	■
Need for Additional Data	Fund and establish an **automated monitoring network of weather and climate monitoring stations** (also called a mesoscale network).	■	■	■		■		■	
	Support continued efforts to maintain and expand **streamflow gages**. The RBCs recognize that comprehensive, reliable, and long-term hydrologic data are critical to water planning and management.	■	■	■		■		■	
	Establish an **online library** of, or a catalog of links to, technical information that will enhance RBCs' technical understanding of water resources concepts and issues.		■	■					
	SCDES should work with the USGS and other partners (e.g., property owners, well owners, and stakeholders representing Capacity Use Areas) to **enhance groundwater monitoring capabilities** in areas where model simulations indicate potential for water levels to drop below the top of the aquifer.						■	■	
	Develop more and/or **higher quality data** to inform better decision making.								■
	SCDES should explore expansion of the **ambient water quality monitoring** network.		■						
	State agencies and partners should collect and organize **existing water quality data.**		■						
	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.	■							

Table C-2. RBC Technical Recommendations (cont.)

Topic	Recommendation	Upper Sav.	Saluda	Broad	Catawba	Lower Sav.-Salk	Edisto	Santee	Pee Dee
Modeling Tools and Efforts	Incorporate **future climate projections** into modeling analyses.			X			X	X	X
	Complete the **groundwater model** developed by the USGS					X		X	X
	Surface water modeling should incorporate scenarios that further examine **future uncertainties**, such as changes in rainfall and hydrology, alternative population growth scenarios, and potential impacts of future development on runoff.		X			X			
	SCDES and USGS should carve out a **regional groundwater model(s)** covering potential Groundwater Areas of Concern and (1) further calibrate the model to local land conditions, including seasonal drawdowns, and (2) evaluate seasonal drawdowns through the planning horizon under each planning scenario.						X		
	Surface water modeling should extend to **coastal areas.**								X
	Improved calibration efforts: Additional surface water gaging stations should be installed in **headwater areas** to better understand flow conditions and improve future model calibration.								X
	Future SWAM modeling should incorporate flow **monitoring data collected at the county level** to validate flows.		X						
	RBCs should coordinate with SCDES to identify and **define data gaps** and possible avenues for filling gaps in future phases (or in preparation for future planning phases).		X						
	A groundwater model should be used to analyze and predict **chloride levels** in the Upper Floridan and Middle Floridan aquifers in Beaufort County.					X			
	Funding should be provided to SCDES to add **deeper aquifer monitoring** wells in the central part of the basin, such as Colleton, Bamberg, and Hampton counties.					X			
	Coordinate with Georgia on the use and impacts to the shared groundwater resources, perhaps with the Coastal Georgia Regional Council. Projected groundwater use in Georgia should be considered in future groundwater modeling scenarios and analysis.					X			

Table C-2. RBC Technical Recommendations (cont.)

Topic	Recommendation	Upper Sav.	Saluda	Broad	Catawba	Lower Sav.-Salk	Edisto	Santee	Pee Dee
Technical Studies	Incorporate **lessons learned from other basins** in future River Basin Plan updates.	X		X			X		X
	Continue to evaluate and discuss **ecological flow standards** and flow-ecology relationships.	X	X	X					
	Explore the potential **impacts of private and community/commercial wells** and how they may affect surface water.	X	X						
	The RBC should identify the **financial impacts of increased sedimentation** on reservoirs and water resources and communicate the results 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.	X		X					
	The state should request for and cost-share in the completion of Phase 2 of the **USACE Comprehensive Study and Drought Plan Update**.	X				X			
	Study the **impacts of land use changes** on water resources.	X		X			X	X	X
	Study the relationship between the duration of drawdown below the top of aquifer and negative impacts such as compaction and **reduced aquifer yield**.						X		
	RBCs should identify potential pinch points where current and projected low flows may lower the **assimilative capacity** of the streams. Strategies may need to be identified to mitigate low flows at these potential pinch points.			X					
	Further investigate and potential piloting of low-tech, process-based approaches to **stream restoration**.			X					
	Improve the understanding of **land use and land protection** by studying and developing a strategy for additional land protection.								X
	More **Doppler radar capabilities** should be created to help with storm prediction and data collection.								X
	The drivers of **unsustainable groundwater withdrawals** (i.e. cones of depression), such as water demands, local aquifer conditions, and groundwater well spacing and pumping rates should be more thoroughly understood to better inform groundwater management strategies.								X
	SCDES should perform studies and analyses in support of a **recycled water statute** in South Carolina.					X		X	
	Future focus on **flooding**, which poses an important water-related risk that not only threatens life and property but can also impact the ability to provide reliable water supplies when and after a flood occurs.								X
	Identify and prioritize **properties for conservation** to protect quantity and quality of water. The state and local governments should develop and fund county conservation and mitigation banks and collaborate with South Carolina Conservation Bank and Land Trusts to conserve priority properties.	X							

Table C-2. RBC Technical Recommendations (cont.)

Topic	Recommendation	Upper Sav.	Saluda	Broad	Catawba	Lower Sav.-Salk	Edisto	Santee	Pee Dee
Technical Training	Develop and provide a **handout** of groundwater and surface water concepts to establish a common knowledge base among RBC members.						■		
	The USGS and/or SCDES should offer additional **demonstration and discussion of the groundwater model** focusing on input parameters and sensitivity of results to various parameters.						■		
	Offer and organize additional **field trips** to better understand various water users' withdrawal needs and water management strategies.						■		
	The RBC endeavors to learn more about the Pinewood site including the regulation, consent orders, controls, and monitoring in place.							■	
Alignment with Other Water-Related Planning Efforts	For river basins with state or federal specially designated streams (e.g., National Wild and Scenic Rivers or State Scenic Rivers), the RBCs should assess **alignment between the River Basin Plan and the management plan associated with the special designation.**		■	■					
	As part of the comprehensive planning process, **each local government should 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.		■						
	The RBC Plans should be used as a tool for **local comprehensive plans** and economic development.		■						
Protecting Water Resources	**Reduce sediment loading to reservoirs** through various methods, including streambank restoration, riparian buffers, and green infrastructure.	■	■						
	Encourage the **building permitting process** where applicable to require developers work with water/wastewater utilities to ensure adequate availability/capacity. The RBC also encourages local governments, developers, and others to use this River Basin Plan as a guide to help inform decisions on growth and development, based on water resource availability.	■				■			
	The Saluda RBC should work to **remove the Saluda River hydrologic impairment (4C)** below the Saluda Lake hydro project.		■						

Table C-3. RBC Policy, Regulatory, and Legislative Recommendations.

Topic	Recommendation *Note that some RBCs have slightly different language but similar intent.*	Strength of Consensus *(see legend below)*							
		Upper Sav.	Saluda	Broad	Catawba Wateree Water Mgt. Group	Lower Sav.-Salk	Edisto	Santee	Pee Dee
Reasonable Use Criteria	The South Carolina Surface Water Withdrawal, Permitting, Use, and Reporting Act should allow for reasonable use criteria to be applied to all (new[1]) surface water withdrawals, like those that currently exist for groundwater withdrawals	RBC Consensus	RBC Majority Approval	RBC Consensus	RBC Consensus	RBC Consensus	RBC Majority Approval	RBC Consensus	RBC Consensus
Improve effectiveness of water laws	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.	RBC Consensus	RBC Majority Approval	RBC Consensus	RBC Consensus	RBC Consensus		RBC Consensus	
Planning, Implementation, and Funding	The South Carolina Legislature authorize recurring funding for state water planning activities, including river basin planning. Currently, nearly all the funding for the river basin planning process has come from the legislature.	RBC Consensus			RBC Consensus	RBC Consensus		RBC Consensus	RBC Consensus
	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. One example is Georgia's Regional Water Plan Seed Grant Program which supports and incentivizes local governments and other water users as they undertake their Regional Water Plan implementation responsibilities.	RBC Consensus	RBC Consensus		RBC Consensus	RBC Consensus		RBC Consensus	RBC Consensus
Permits and Registrations	Water law and implementing regulations should not distinguish between registrations and permits. All water users that withdraw above the identified threshold should be required to apply for a water withdrawal permit. Current law allows for agricultural surface water users and all groundwater users withdrawing water outside of CUAs to register their water use rather than apply for permits.			RBC Consensus	RBC Consensus		RBC Majority Approval	RBC Consensus	
Regulatory Alignment with State Water Plan	The water withdrawal permitting process should specifically assess the permit application's alignment with the River Basin Plan (Broad RBC rec) or the legislatively approved State Water Plan (Lower Sav-Salk RBC rec)	RBC Consensus		RBC Consensus	RBC Consensus	RBC Consensus			
Water Education	The State should support and fund RBC-led and statewide water education programs that include all sectors of water use and promote the types of water management strategies recommended in River Basin Plans.	RBC Consensus	RBC Consensus		RBC Consensus			RBC Consensus	RBC Consensus

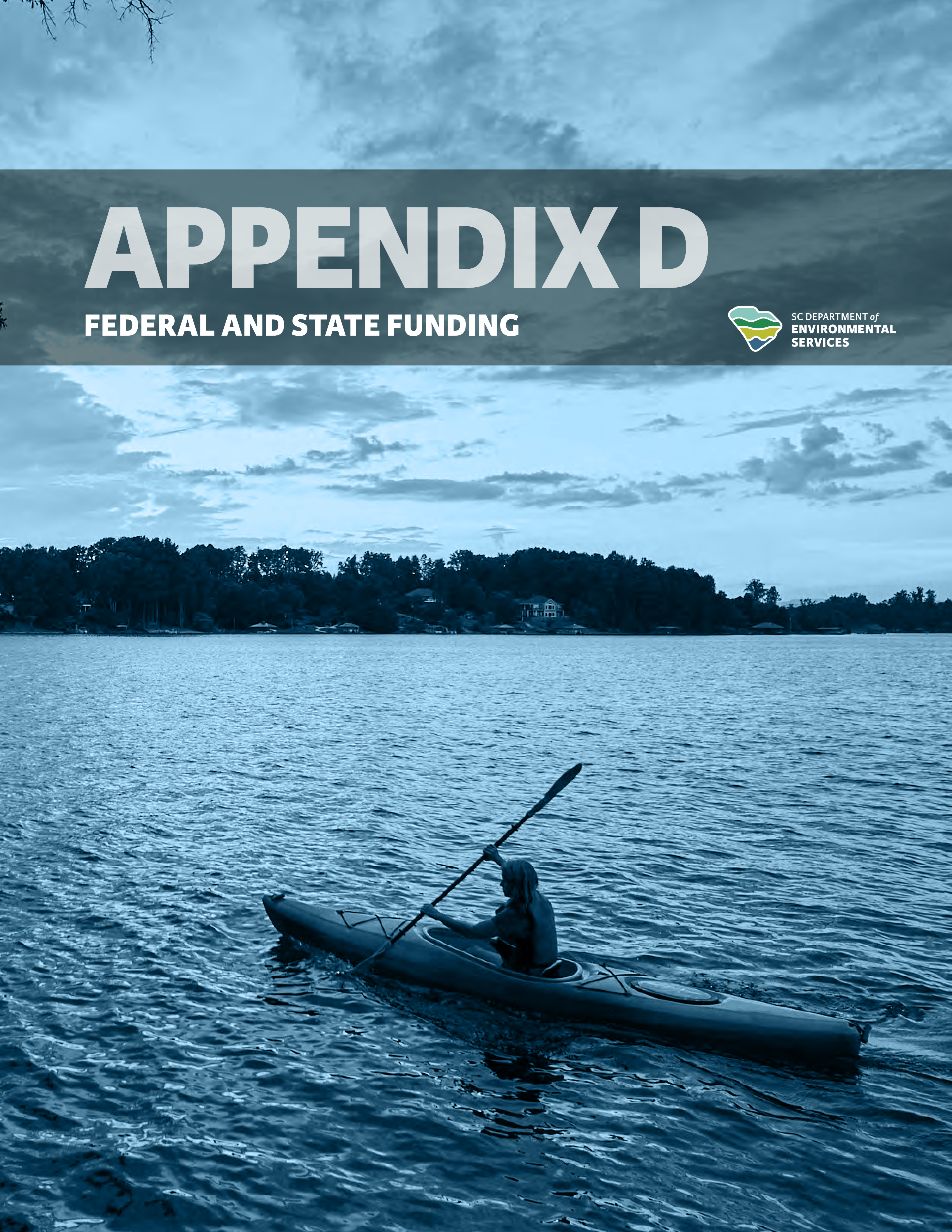
[1] *The Upper Savannah RBC's recommendation specified "new" surface water withdrawals.*

Color Code Legend: *RBC Consensus* | *RBC Majority Approval* | *Not Approved or Not Significantly Discussed*

APPENDIX D

FEDERAL AND STATE FUNDING

SC DEPARTMENT *of* **ENVIRONMENTAL SERVICES**



Appendix D. Federal and State Funding

Federal Funding

Existing federal funding sources may be leveraged to promote implementation. For example, the U.S. Environmental Protection Agency's (EPA's) Water Infrastructure Finance and Innovation 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 1** summarizes the federal funding sources available for public water suppliers at the time this Plan was prepared in October 2025.

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 that implement water 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 2** summarizes these and the other existing USDA funding sources available at the time this Plan was prepared in October 2025.

Table 1. Federal funding sources for water utilities.

Agency	Program	Grant/Loan Funds Available	Description
U.S. Economic Development Administration (EDA)	U.S. EDA Grants	No limit (subject to federal appropriation)	EDA's Public Works Program and Economic Adjustment Assistance Program aids distressed communities by providing funding for existing physical infrastructure improvements and expansions.
EPA	Water Infrastructure Finance and Information Act	Up to 49% of eligible project costs (minimum project size is $20 million for large communities and $5 million for small communities)	A federal credit program administered by EPA for eligible water and wastewater infrastructure projects, including drought prevention, reduction, and mitigation.
USDA Rural Development	Section 502 Direct Loan Program	Loans based on individual county mortgage limits	Loans are available for wells and water connections in rural communities. Availability is based on community income.
USDA Rural Utilities Service	National Rural Water Association Revolving Loan Fund	$100,000 or 75% of the total project	Provides loans for pre-development costs associated with water and wastewater projects and for existing systems in need of small-scale capital improvements.

Table 1. Federal funding sources for water utilities (continued).

Agency	Program	Grant/Loan Funds Available	Description
USDA Rural Development	Emergency Community Water Assistance Grants	Up to $100,000 or $1,000,000 depending on the type of project	Offers grants to rural areas and towns with populations of 10,000 or less to construct water extensions; repair breaks or leaks; address maintenance necessary to replenish the water supply; or construct a water source, intake, or treatment facility.
FEMA	HMGP	Variable	Provides funds to states, territories, tribal governments, and communities for hazard mitigation planning and the implementation of mitigation projects following a presidentially declared disaster event.
U.S. Army Corps of Engineers (USACE)	Planning Assistance to States	Variable-funding is 50% federal and 50% nonfederal	USACE can provide states, local governments, and other nonfederal entities assistance developing comprehensive plans for the development, use, and conservation of water resources.
SCDES, South Carolina Rural Infrastructure Authority	Drinking Water State Revolving Fund	Congress appropriates funding for the Drinking Water State Revolving Fund that is then awarded to states by EPA based on results of the most recent Drinking Water Infrastructure Needs Survey and Assessment	This program is a federal-state partnership aimed at ensuring that communities have safe drinking water by providing low-interest loans and grants to eligible recipients for drinking water infrastructure projects.
SCDES, South Carolina Rural Infrastructure Authority	Clean Water State Revolving Fund	Congress appropriates funding for the Clean Water State Revolving Fund that is the awarded to states by EPA.	This program is a federal-state partnership that provides funding for water quality infrastructure projects including wastewater treatment facilities, nonpoint source pollution control, stormwater runoff mitigation, and water reuse.

Table 2. USDA assistance programs for agricultural operations and rural communities.

Agency	Program	Description
Risk Management Agency (RMA)	Crop Insurance	Provides indemnity payments to growers who purchased crop insurance for production and quality losses related to drought, including losses from an inability to plant caused by an insured cause of loss.
RMA	Pasture, Rangeland, and Forage Program	Offers farmers and ranchers financial support to replace lost income from forage losses caused by lower-than-average rainfall.
Farm Service Agency (FSA)	Conservation Reserve Program Haying and Grazing	Provides for emergency haying and grazing on certain Conservation Reserve Program practices in a county designated as D2 (severe drought) or higher on the United States Drought Monitor, or in a county where there is at least a 40% loss in forage production.
FSA	Emergency Assistance for Livestock, Honeybees, and Farm-Raised Fish Program	Provides assistance to eligible owners of livestock and producers of honeybees and farm-raised fish for losses.
FSA	Emergency Conservation Program	Provides funding and technical assistance for farmers and ranchers to restore farmland damaged by natural disasters and for emergency water conservation measures in severe droughts.
FSA	Emergency Forest Restoration Program	Provides funding to restore privately owned forests damaged by natural disasters. Assistance helps landowners carry out emergency measures to restore forest health on land damaged by drought disasters.
FSA	Farm Loans	Provides emergency and operating loans to help producers recover from production and physical losses from natural disasters and can pay for farm operating and family living expenses.
FSA	Livestock Forage Disaster Program	Offers financial support to livestock producers who experience grazing losses owing to qualifying drought conditions or fire on federally managed lands. Payments compensate for lost grazing opportunities and additional feed costs incurred because of the disaster.
Natural Resources Conservation Service (NRCS)	EQIP	Provides agricultural producers with financial resources and assistance to plan and implement improvements on the land in support of disaster recovery and repair and to help mitigate loss from future natural disasters. Assistance may also be available for emergency animal mortality disposal from natural disasters.
NRCS	Emergency Watershed Program (Recovery)	Offers vital recovery options for local communities to help people reduce hazards to life and property caused by droughts.
Rural Development	Emergency Community Water Assistance Grants	Offers grants to rural areas and towns with populations of 10,000 or less to construct waterline extensions; repair breaks or leaks; address maintenance necessary to replenish the water supply; or construct a water source, intake, or treatment facility.

State Funding and Support of Grant Opportunities

South Carolina legislature could also consider developing a dedicated funding source for implementing water management strategies. Numerous other states have developed funding programs, which serve as examples. The state water funding programs described below range from minimally funded programs intended to incentivize implementation, such as Georgia's Regional Water Seed Grant Program, to robustly funded, multi-purpose grant and loan programs administered by the Colorado Water Conservation Board (CWCB).

Georgia

The Georgia Regional Water Seed Grant Program is a state-funded initiative designed to support and incentivize local governments and water users in implementing Regional Water Plans. Administered by the Georgia Environmental Protection Division, the program offers grants of up to $75,000 for projects that address the water management practices recommended in their regional plans. Eligible applicants include local and state government units, school systems, universities, and regional commissions. To qualify, applicants must attend a pre-application meeting and submit proposals endorsed by a Water Planning Council representative. Projects must be completed within 30 months, and recipients are required to provide a minimum 40 percent match, with at least 10 percent in cash. The program aims to enhance water resource management across Georgia by funding practical, locally-driven solutions.

Missouri

The Missouri Multi-Purpose Water Resources Fund is a statewide financial assistance program administered by the Missouri Department of Natural Resources. The fund, which currently has a $125 million balance and receives quarterly deposits of $7.5 million, supports the planning, design, construction, and renovation of public water supply, treatment, and transmission facilities. It is specifically aimed at projects that ensure long-term, reliable water access, particularly in areas with demonstrated need. The program emphasizes leveraging state funds with federal and other sources, and encourages sustainable, scalable solutions that can reinvest in the fund over time. Eligible applicants include political subdivisions and wholesale water supply districts, which must submit a comprehensive water resource development plan for approval. Funding is typically provided on a reimbursement basis for completed project tasks.

Colorado

Established to guide water policy and ensure sustainable water use for future generations, the CWCB offers a variety of financial assistance options including loans and grants for water-related projects. Funded projects include infrastructure development, conservation initiatives, public outreach, and emergency drought response. The CWCB's funding programs include Water Project Loans, Water Plan Grants, Water Supply Reserve Fund Grants, and specialized initiatives like the Turf Replacement Program and Public Education and Outreach Grants. Recent legislative actions have allocated hundreds of millions of dollars to support statewide water infrastructure, drought planning, watershed restoration, and innovative forecasting. For example, in 2024, $220 million was allocated, including $165 million in loan funds and $23 million in Water Plan Grants supported by sports betting tax revenue. In 2025, approximately $67 million was earmarked for similar efforts, reinforcing Colorado's commitment to a resilient and sustainable water future.





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