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

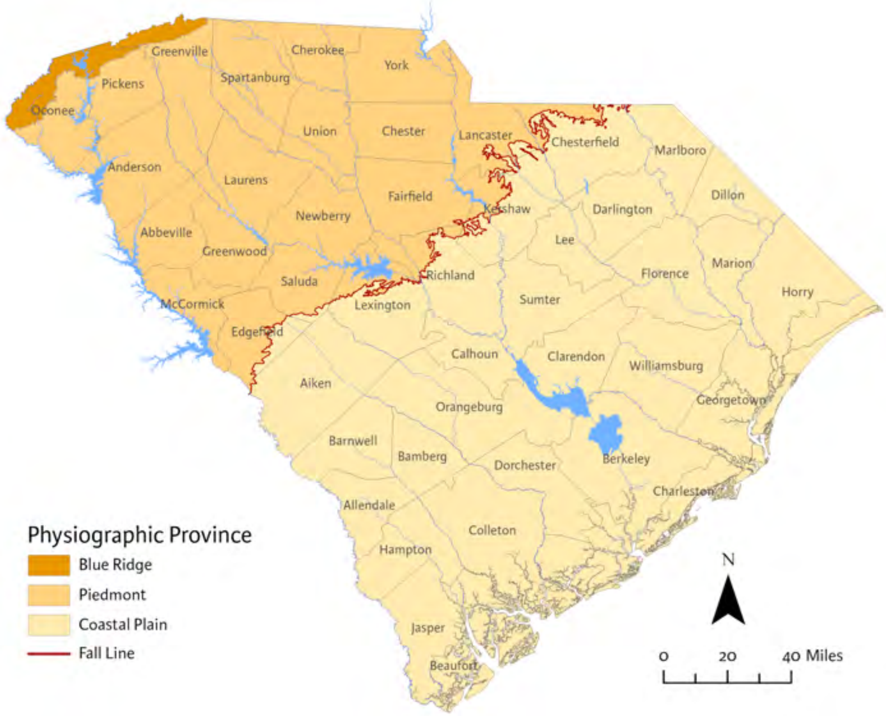


Figure 2-1. Map showing the Blue Ridge, Piedmont, and Coastal Plain physiographic provinces in South Carolina.

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.

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.

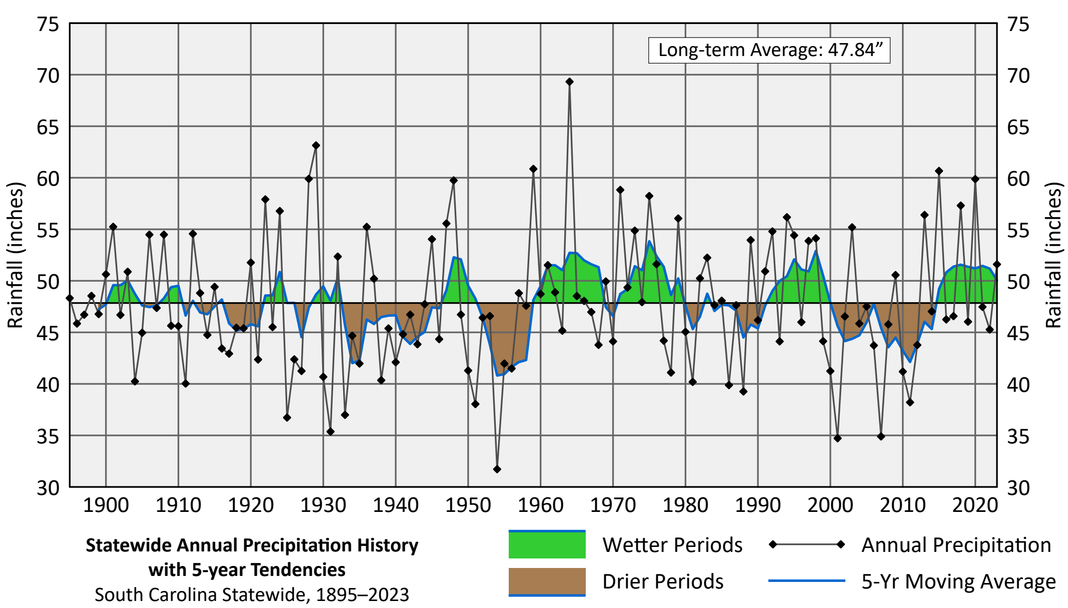


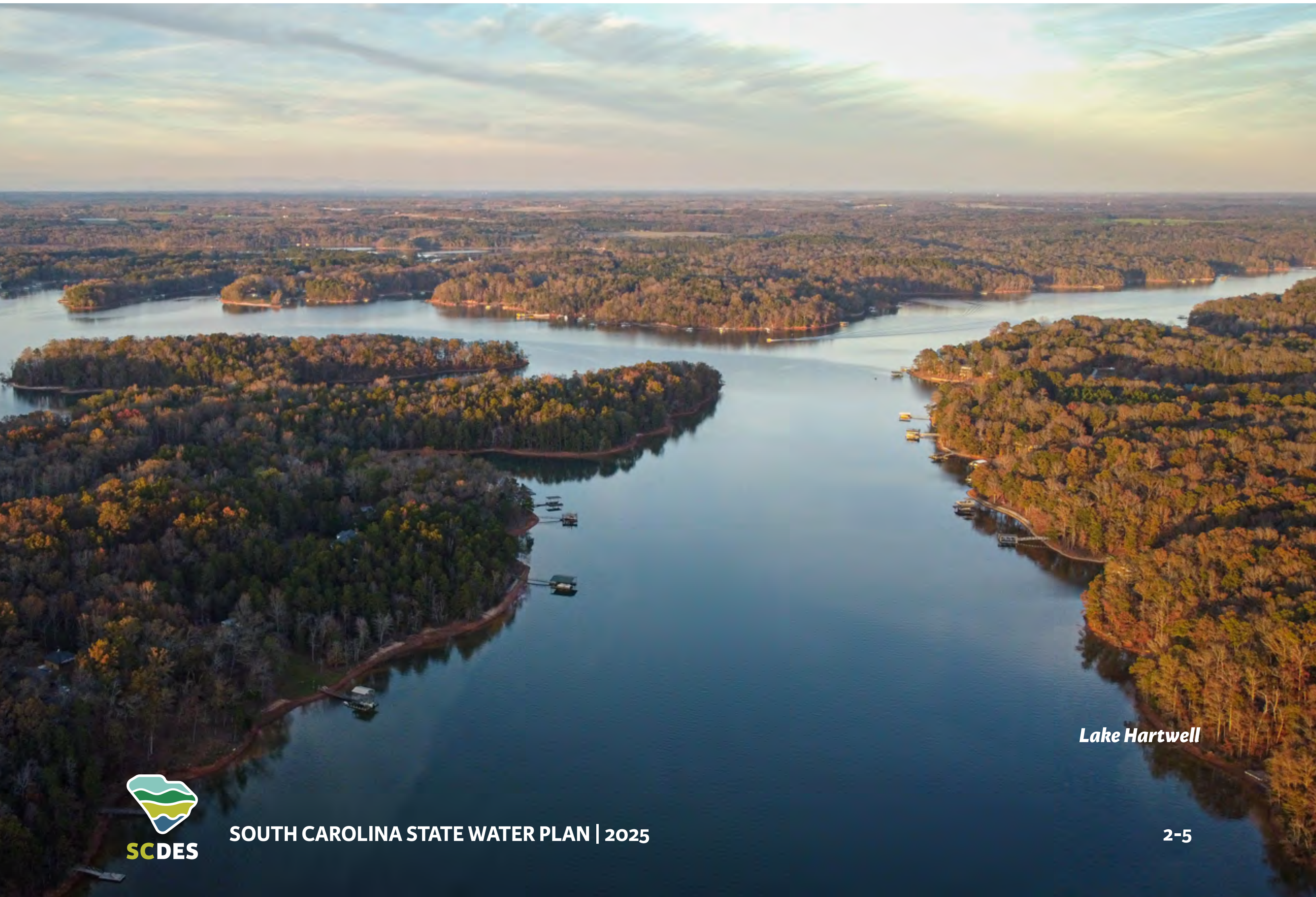
Figure 2-2. Statewide annual precipitation (in inches) for South Carolina, with 10-year averages used to show wetter (green) and drier (brown) periods. *(Data from SCDNR SCO.)*

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.

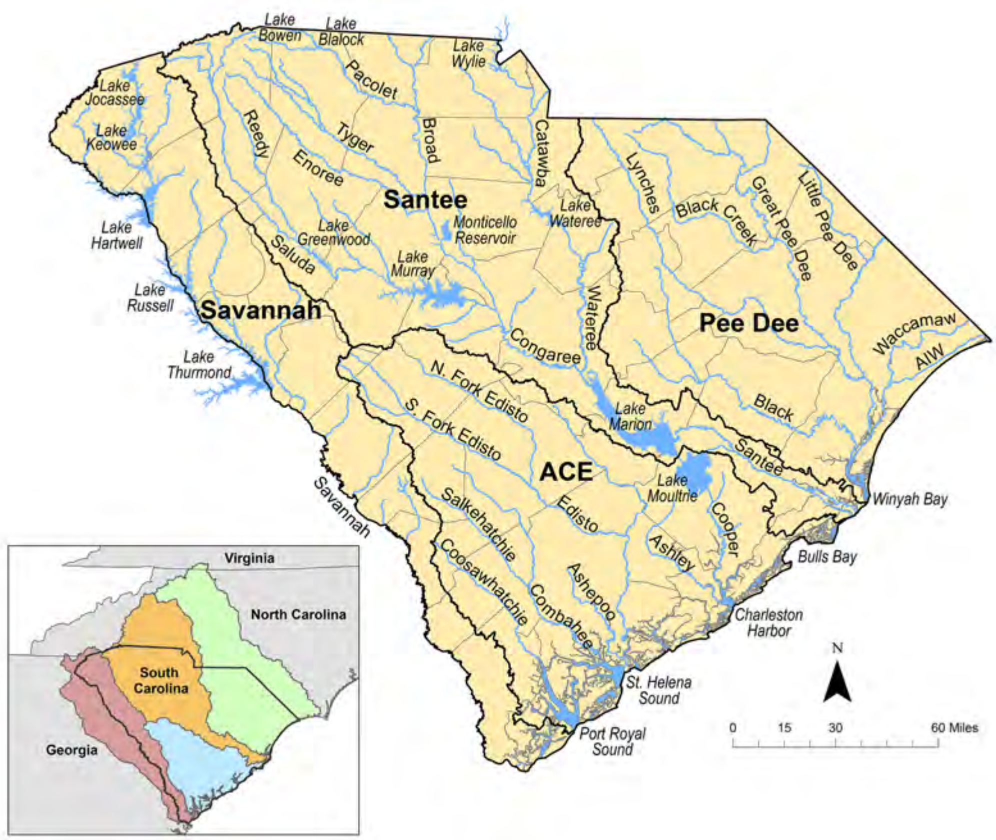


Figure 2-3. Map of South Carolina showing the major rivers, reservoirs, and river basins.

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.

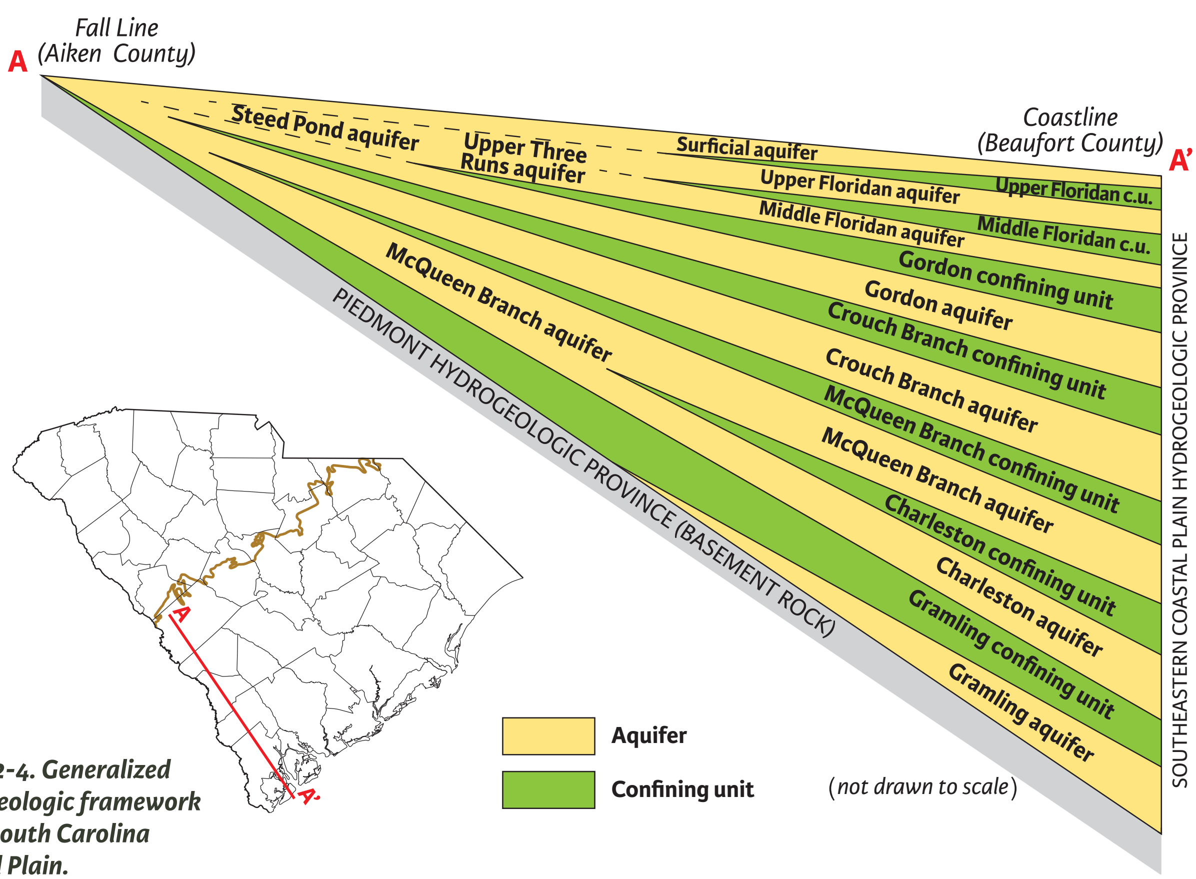


Figure 2-4. Generalized hydrogeologic framework of the South Carolina Coastal Plain.

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.

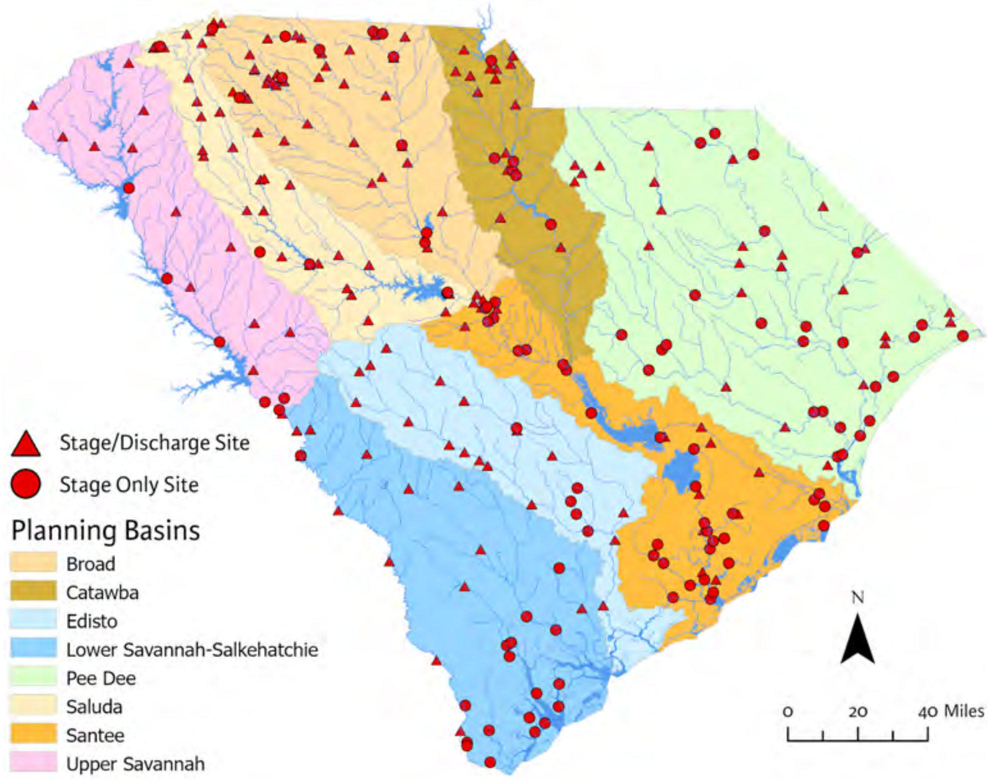


Figure 2-5. Map showing the locations of USGS streamflow and stage-only gages currently operating in South Carolina (as of December 2025).

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.

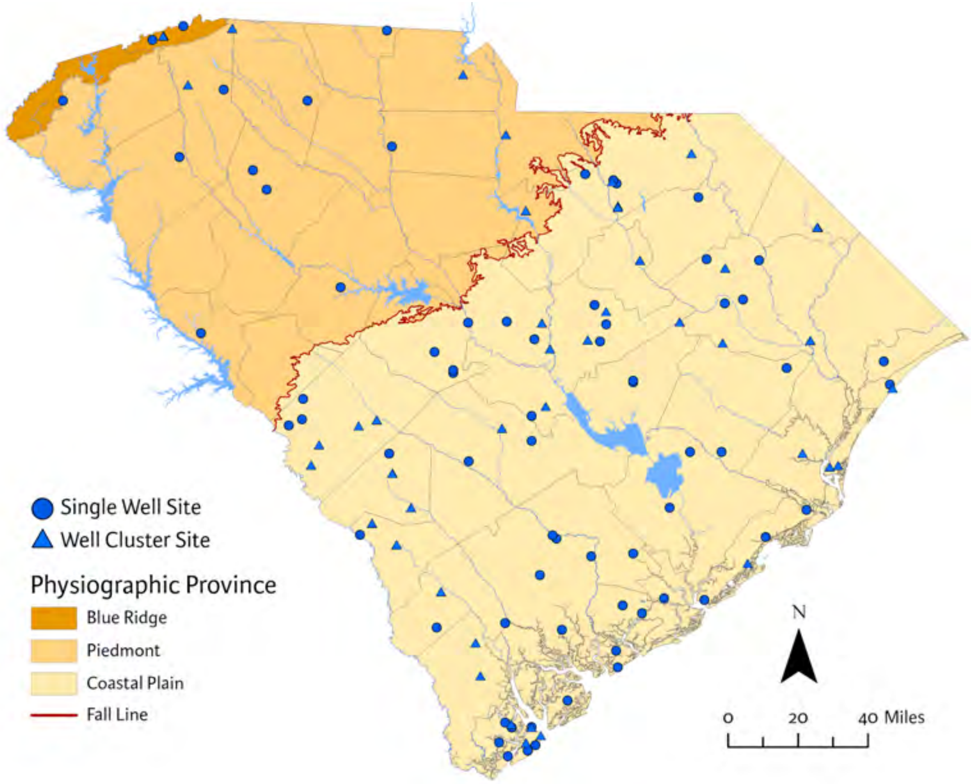


Figure 2-6. Map showing the locations of SCDES and USGS groundwater monitoring wells currently monitored in South Carolina (as of December 2025).

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.

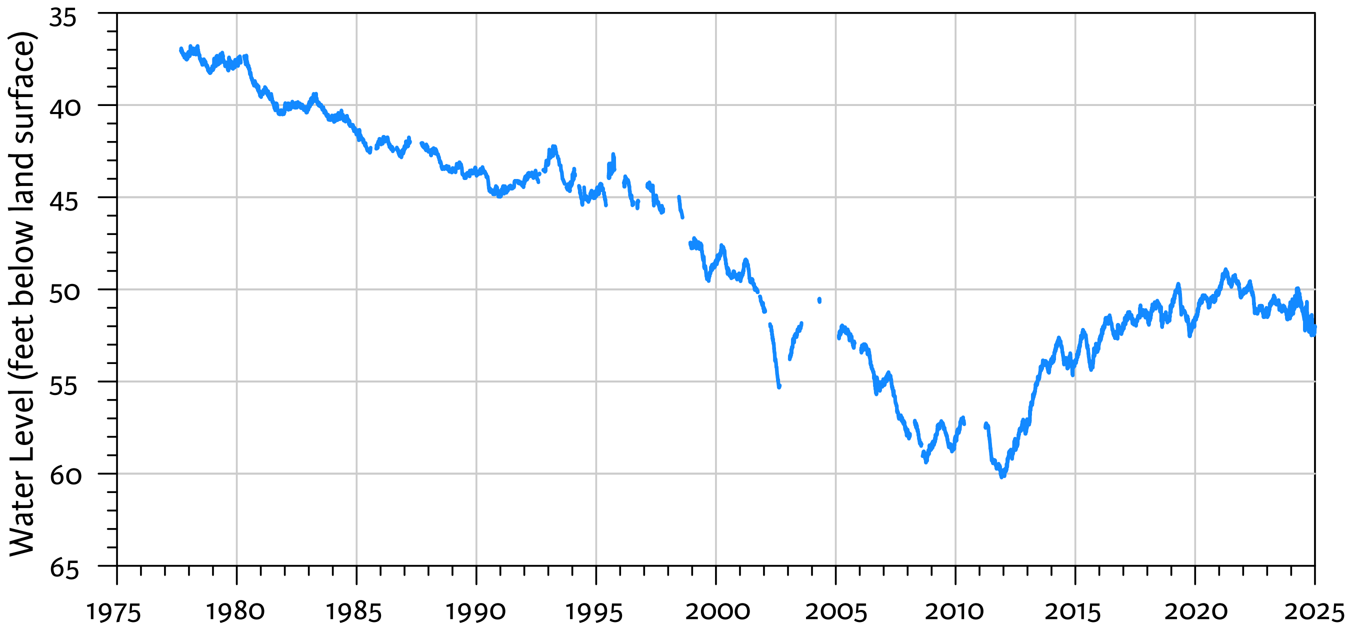
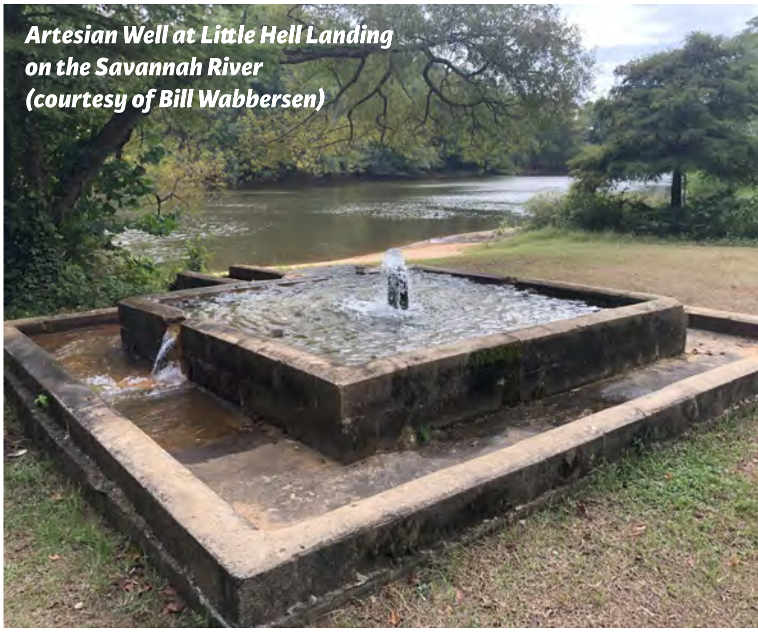


Figure 2-7. Hydrograph showing groundwater levels measured for more than 40 years in a monitoring well in Colleton County. *Declining water levels indicate less water is being stored in the aquifer, whereas rising groundwater levels indicate the aquifer is being recharged.*

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.

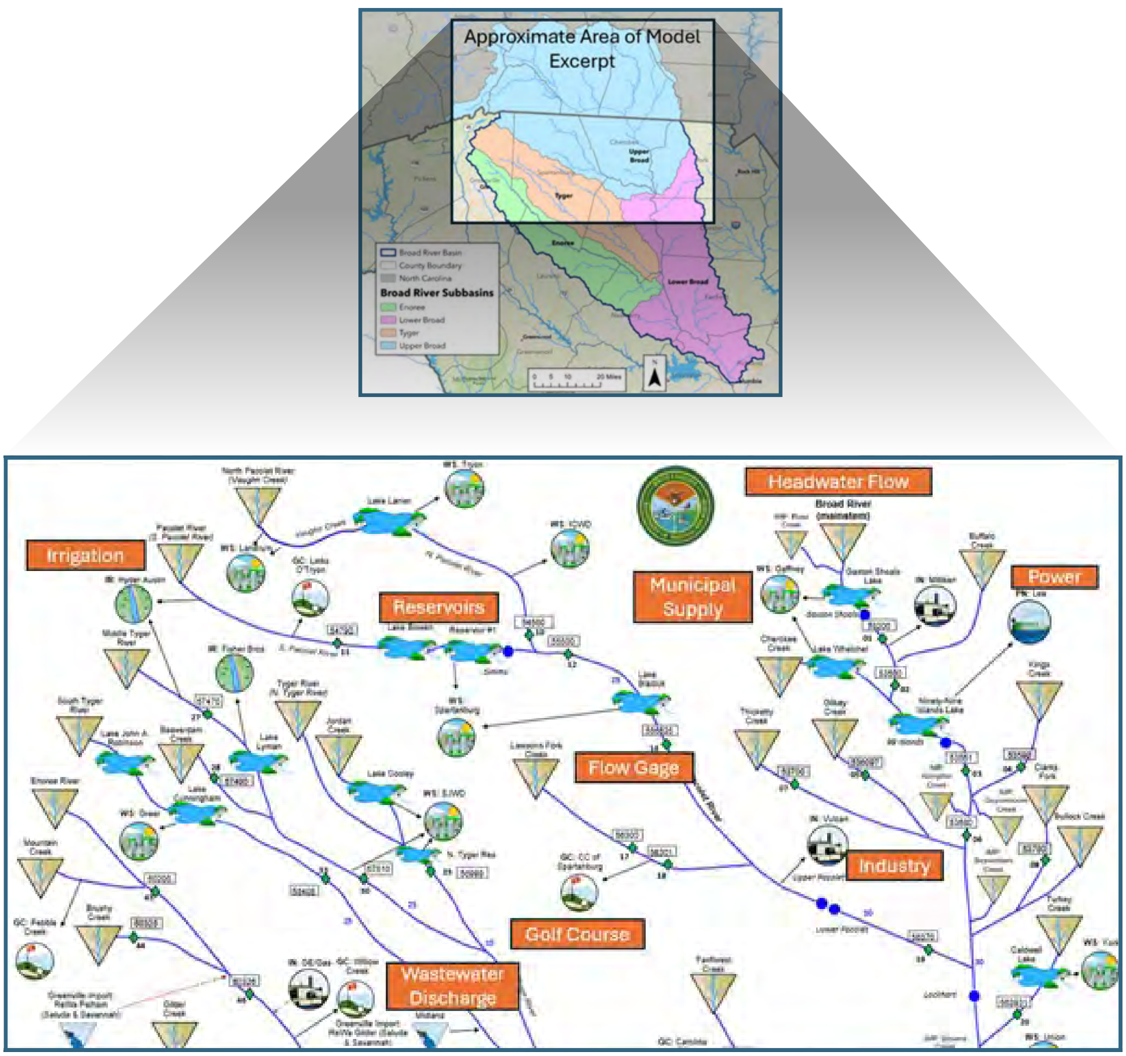


Figure 2-8. Excerpt of the Broad River basin SWAM model, illustrating key model elements. *Orange boxes highlight different types of elements in the SWAM model.*

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.

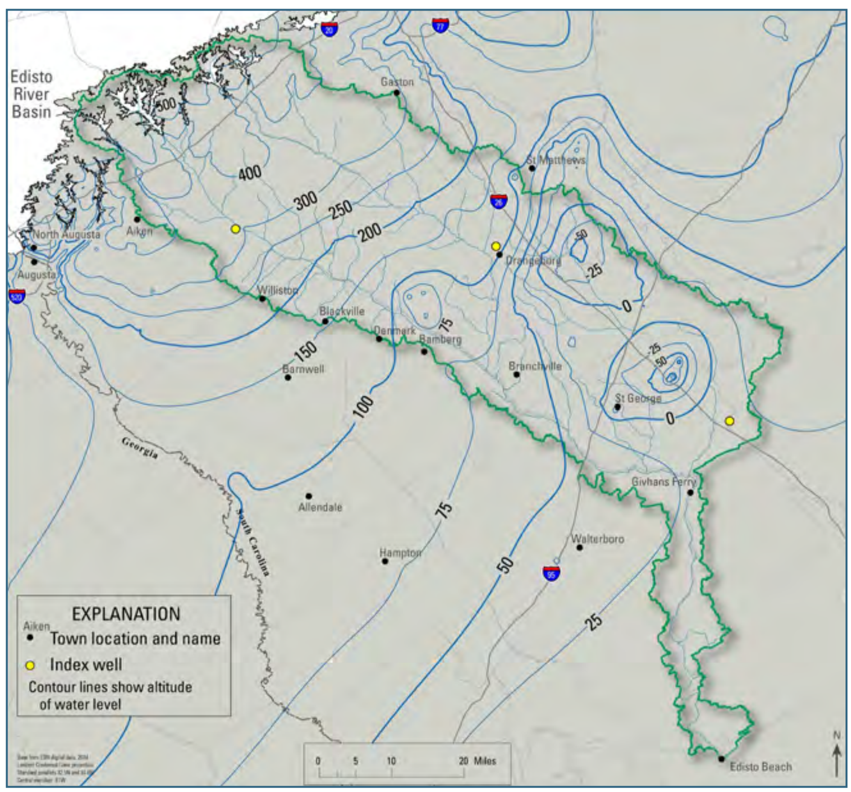


Figure 2-9. Potentiometric map showing simulated groundwater levels in the Crouch Branch aquifer produced by the Coastal Plain groundwater model used for planning in the Edisto basin.

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.

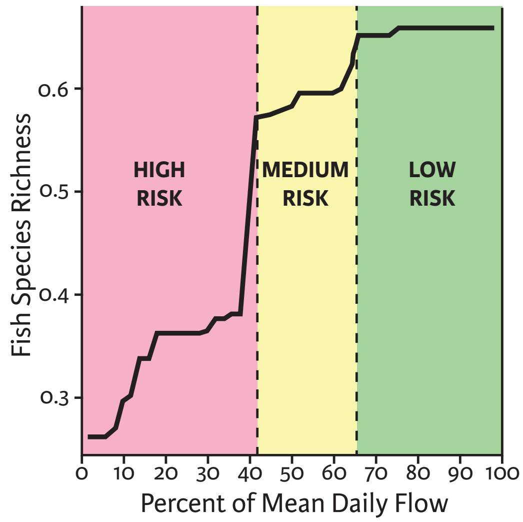


Figure 2-10. Example of the conversion of changes in biological metrics into risk. *This example compares decreased streamflow (compared to mean daily flow) to changes in fish species richness.*

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.

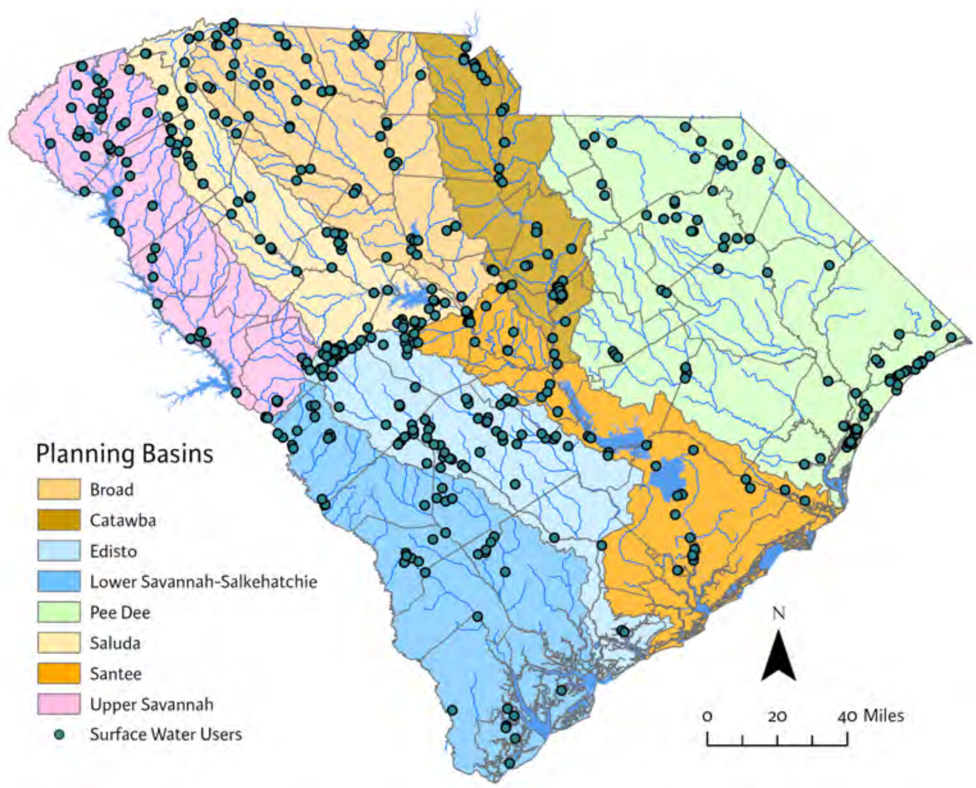


Figure 2-11. Map showing the locations of currently permitted and registered surface water users in South Carolina.

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."

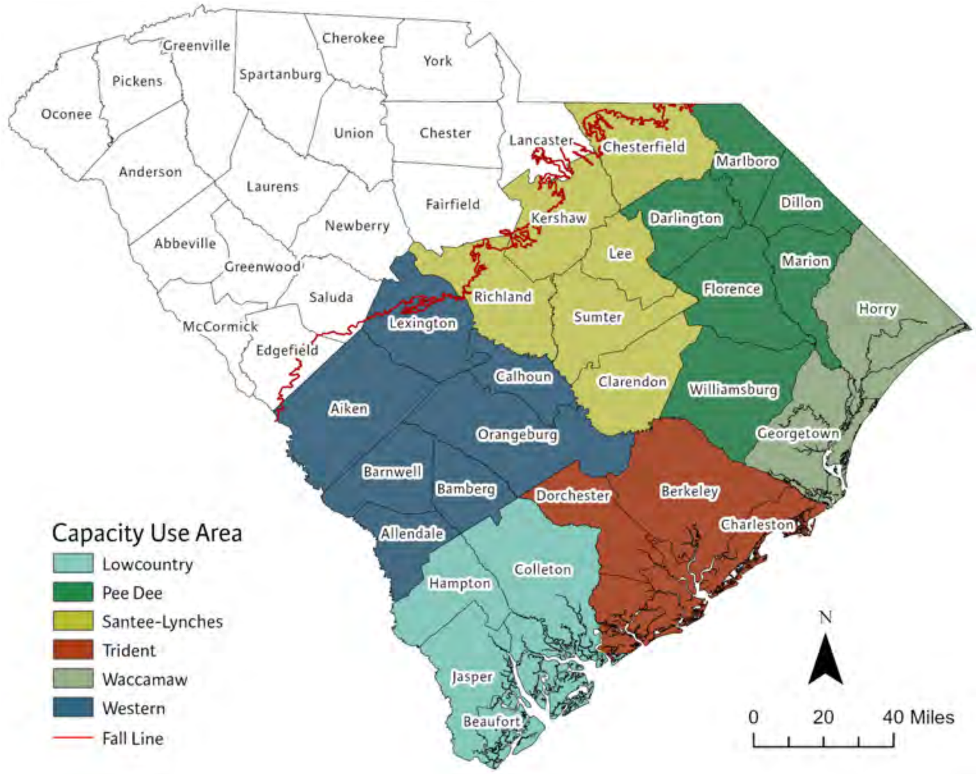


Figure 2-12. Map showing the designated Capacity Use Areas in South Carolina.

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

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.

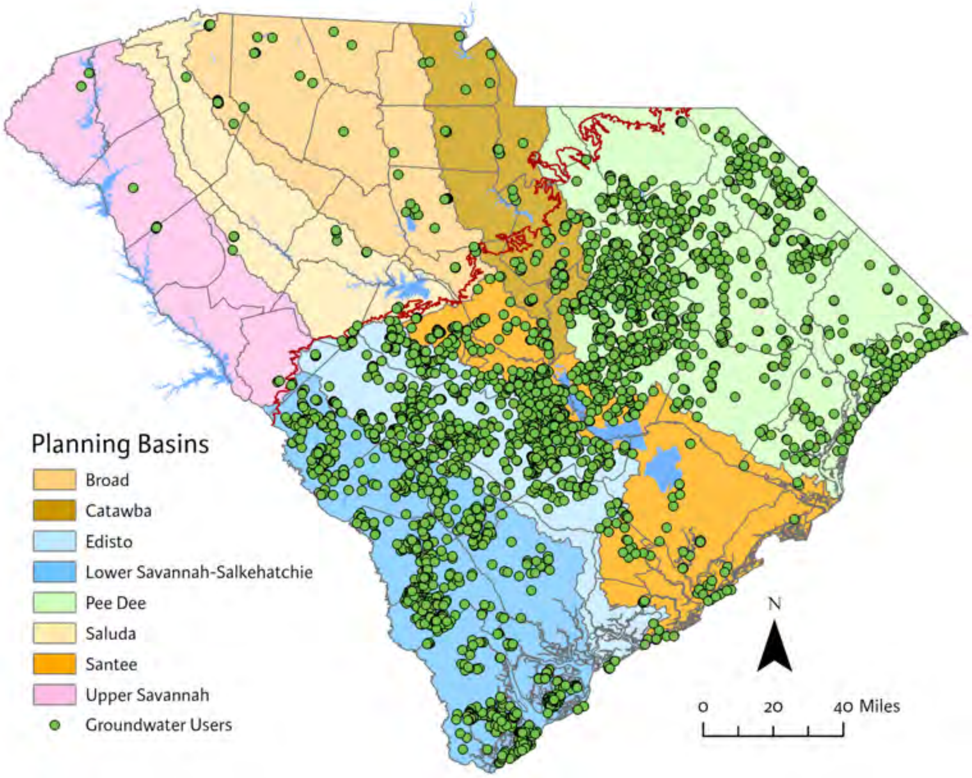


Figure 2-13. Map showing the locations of currently permitted and registered groundwater users in South Carolina.

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