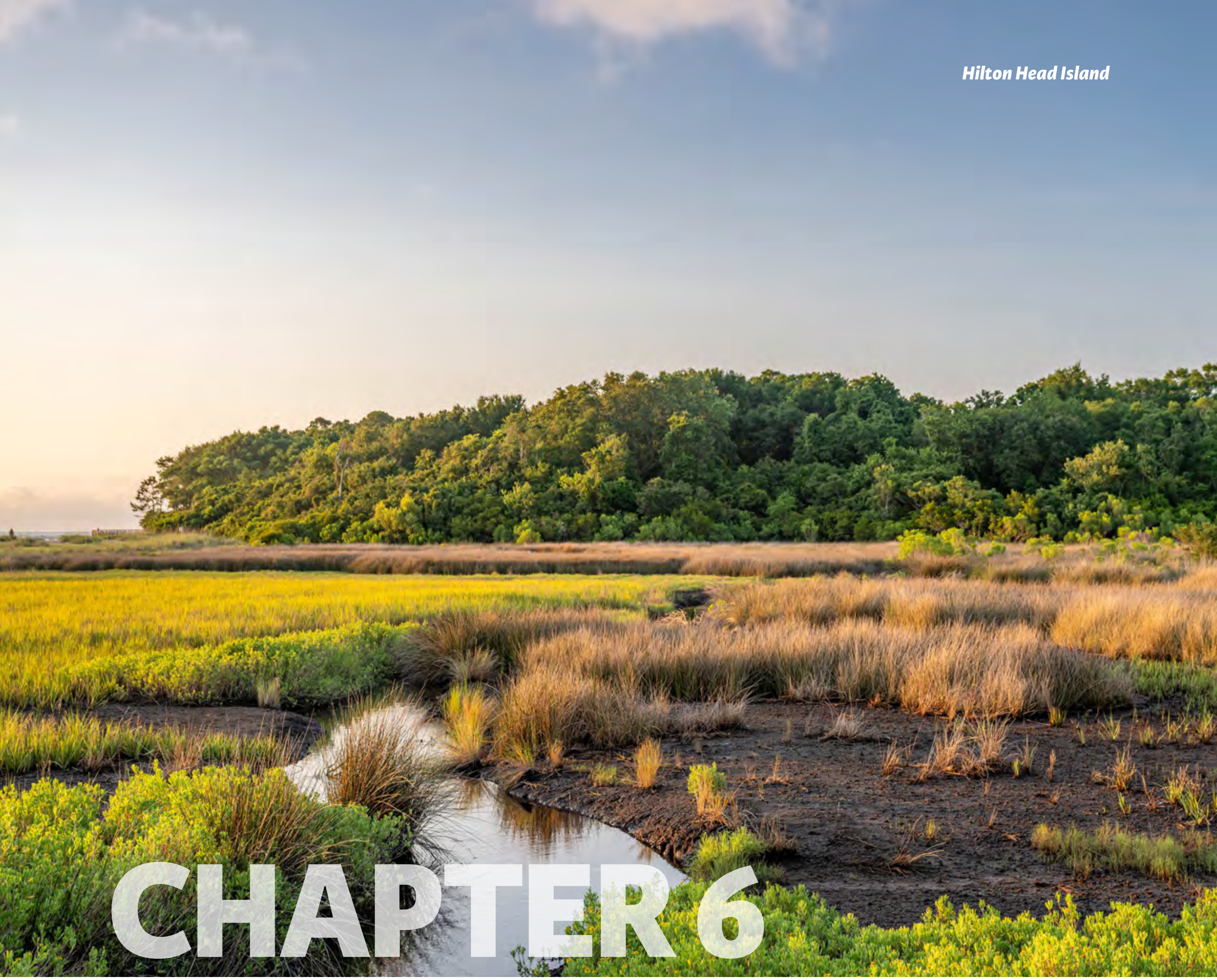


Hilton Head Island

CHAPTER 6

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

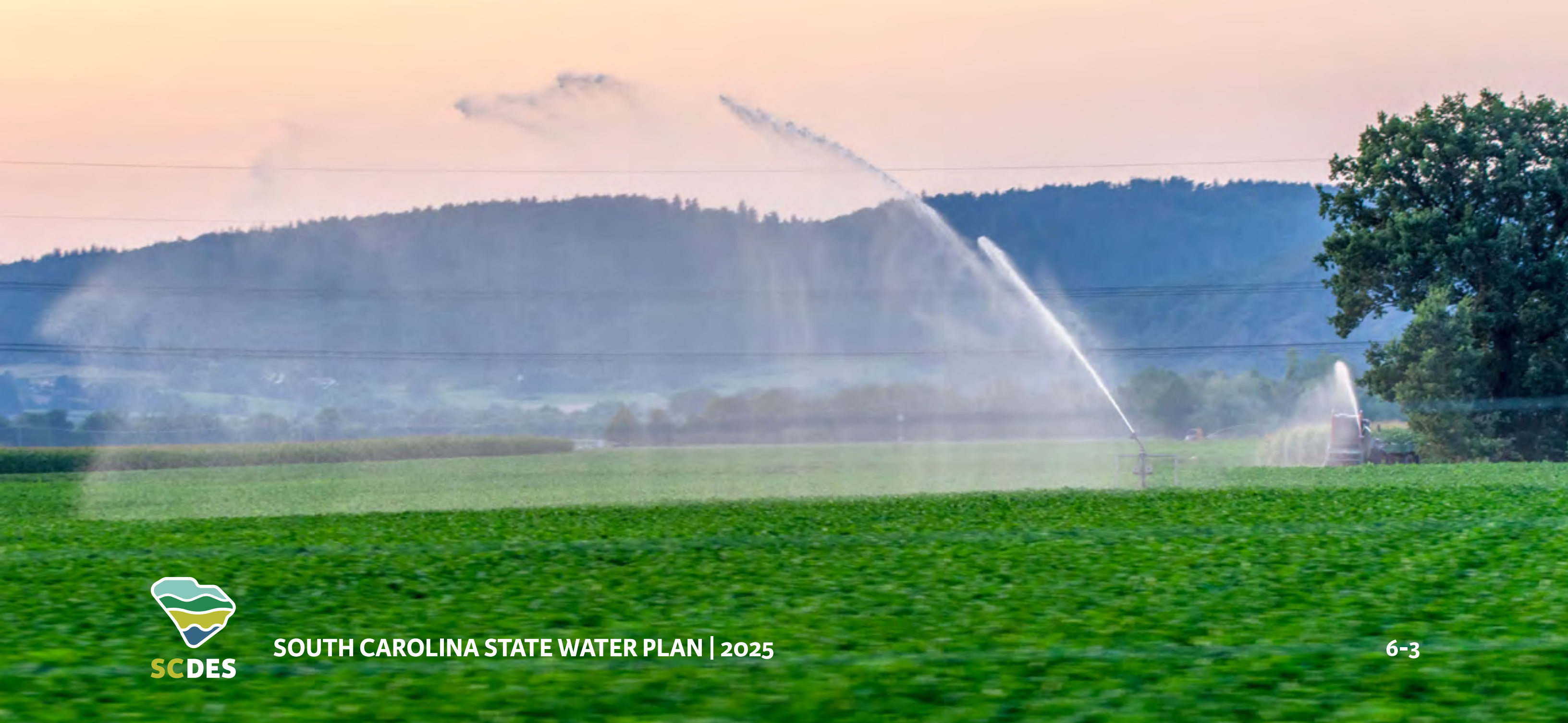
Demand-side management strategies include conservation and water efficiency practices that are seen as best management practices to conserve water resources and reduce pumping and treatment costs. Although the terms “water conservation” and “water efficiency” are often used interchangeably, they have 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.

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.

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.

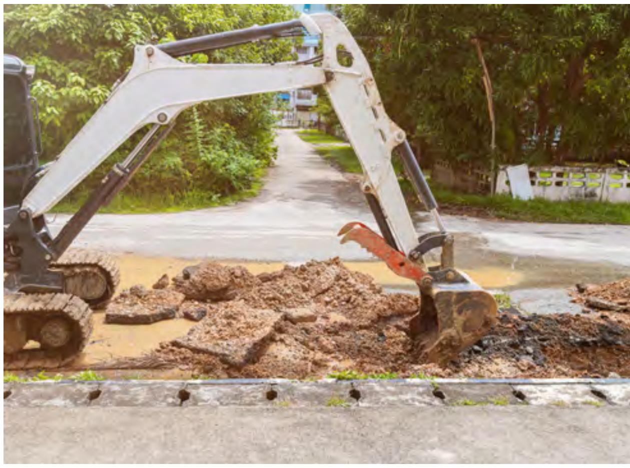
Municipal demand-side water management strategies are summarized on the next page. The RBCs noted that individual utility circumstances (e.g., current operations and programs, utility size, financial means) will dictate which of these strategies are the most desirable to pursue for a given public supplier.



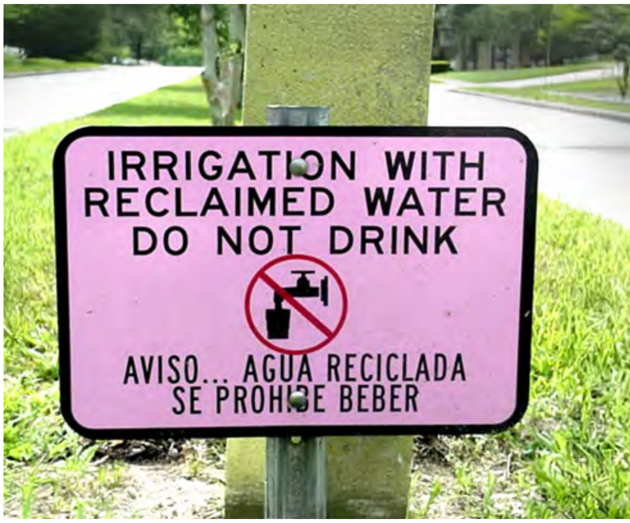
Municipal strategies with support from most RBCs and WaterSC:

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.



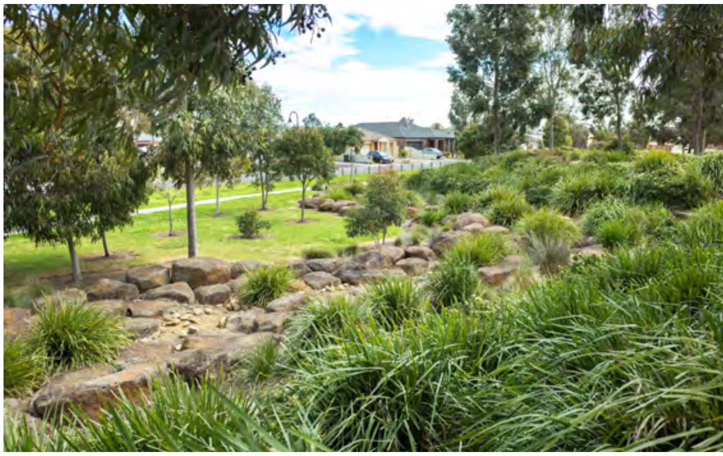
Leak Detection and Water Loss Control Programs — A water loss control program identifies and quantifies water uses and losses from a water system through a water audit. Once identified, sources of water loss can be reduced or eliminated through leak detection, pipe repair or replacements, and/or changes 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.

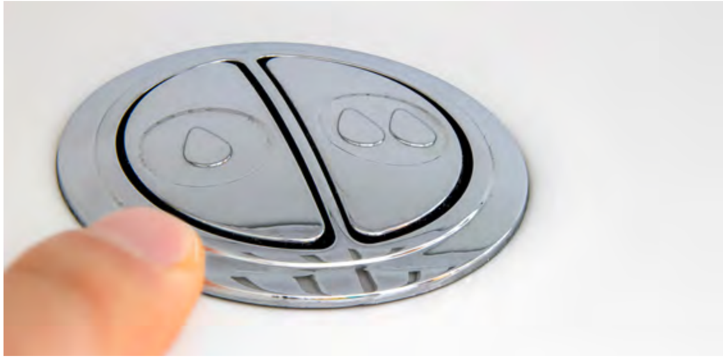
Other municipal strategies shared by one or more RBCs or WaterSC members



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.

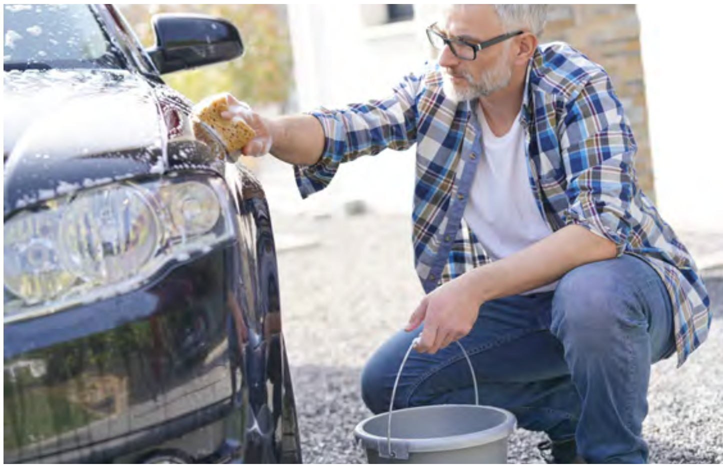
Time-of-Day Watering Limit — A time-of-day watering limit prohibits outdoor watering during the hottest part of the day, usually 10 a.m. to 6 p.m. This practice reduces water loss from evaporation.

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.

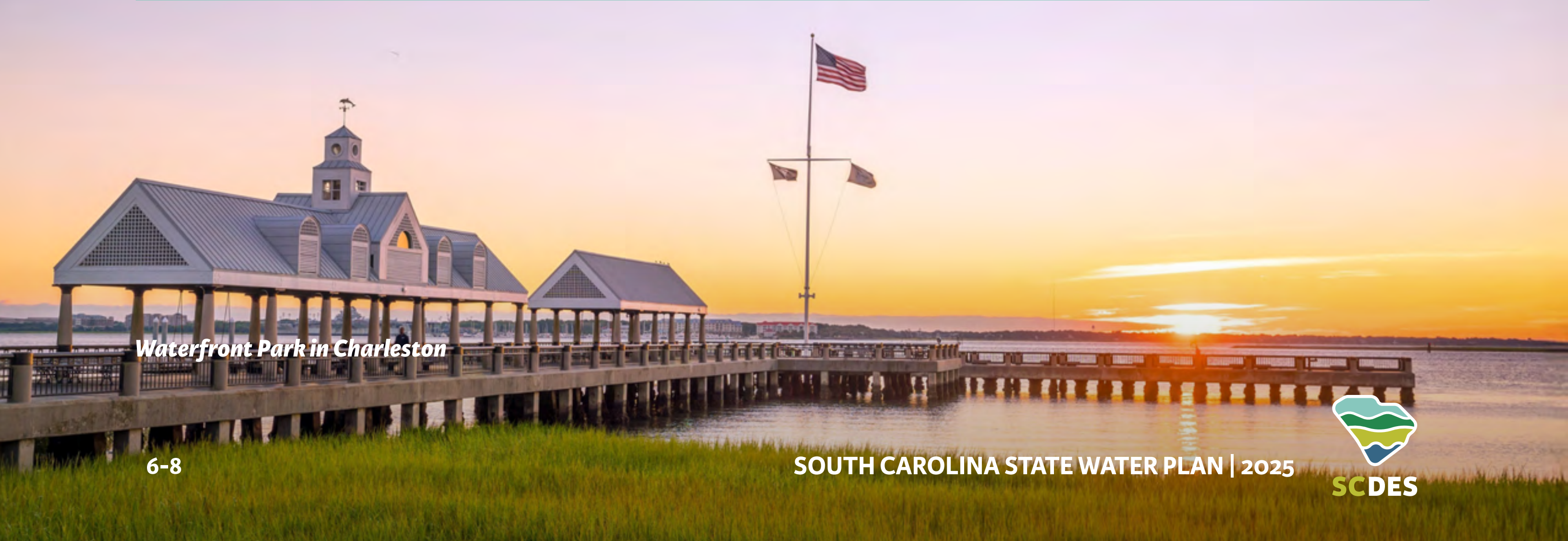
6.1.2 Supply-Side Strategies

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.

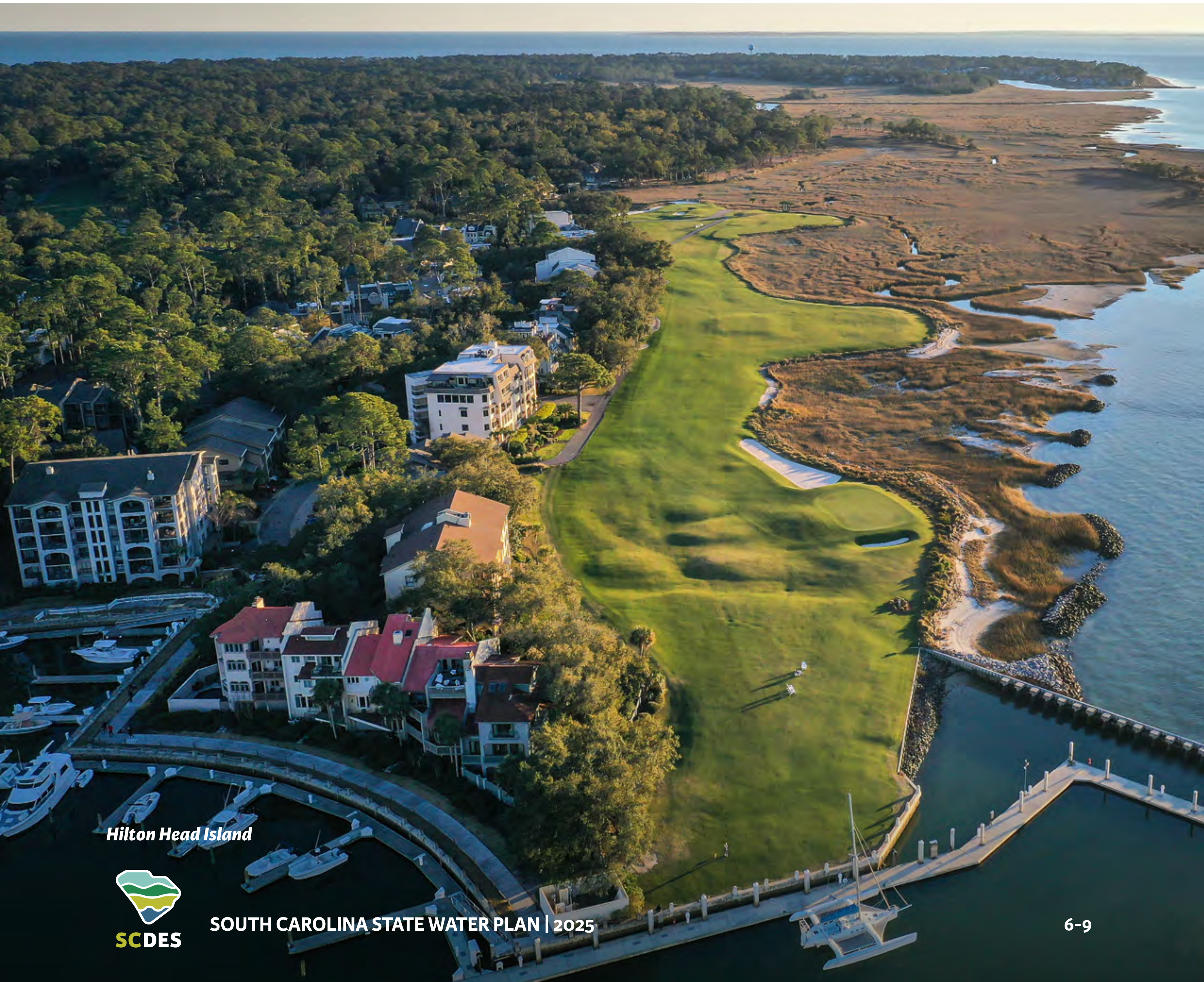


Waterfront Park in Charleston

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.

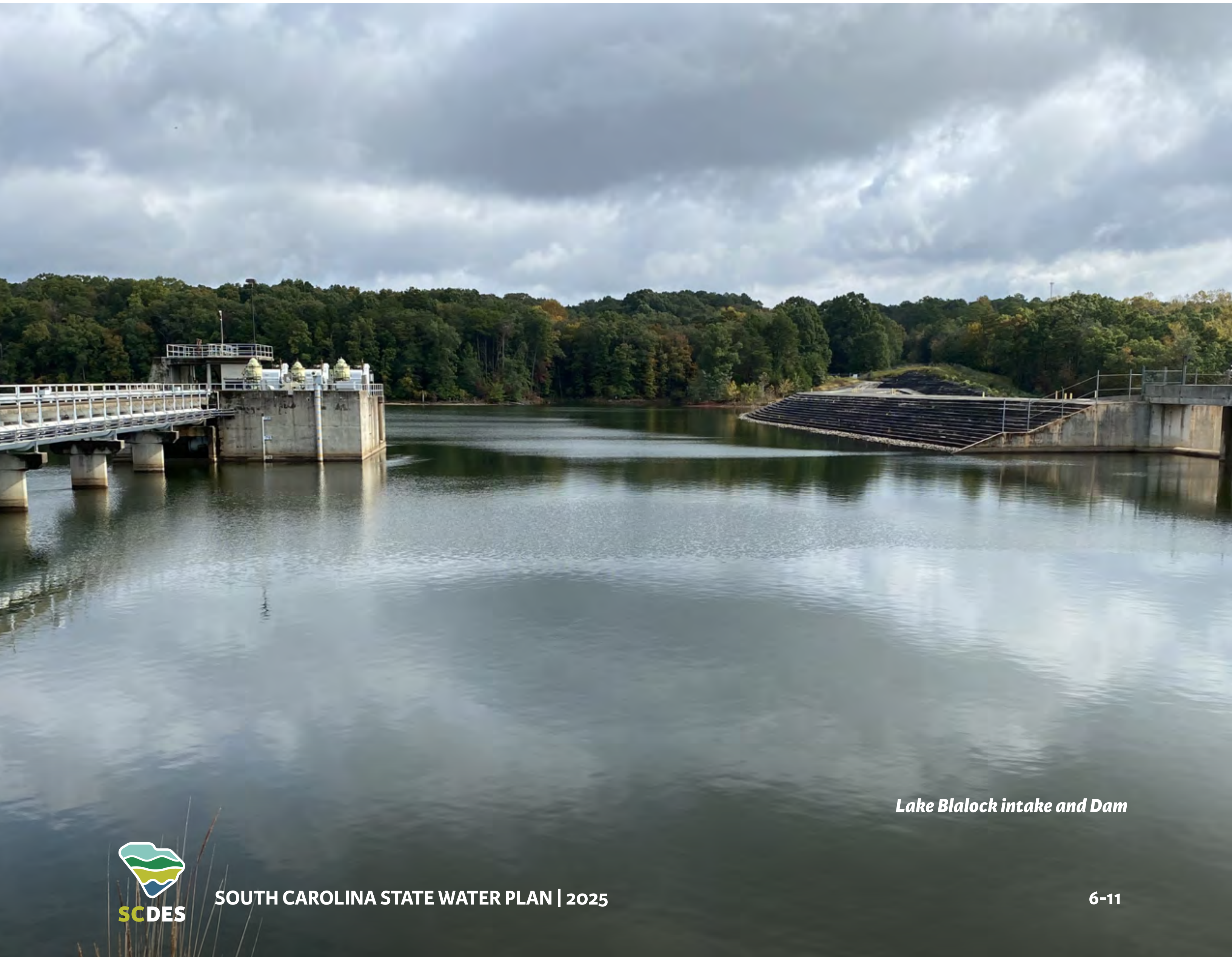
Desalination/brackish water treatment — Desalination treatment removes salt from seawater or brackish groundwater, enabling its use for freshwater applications. Technologies include distillation (boiling seawater and capturing the steam as condensate) and reverse osmosis (removing salt molecules using 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

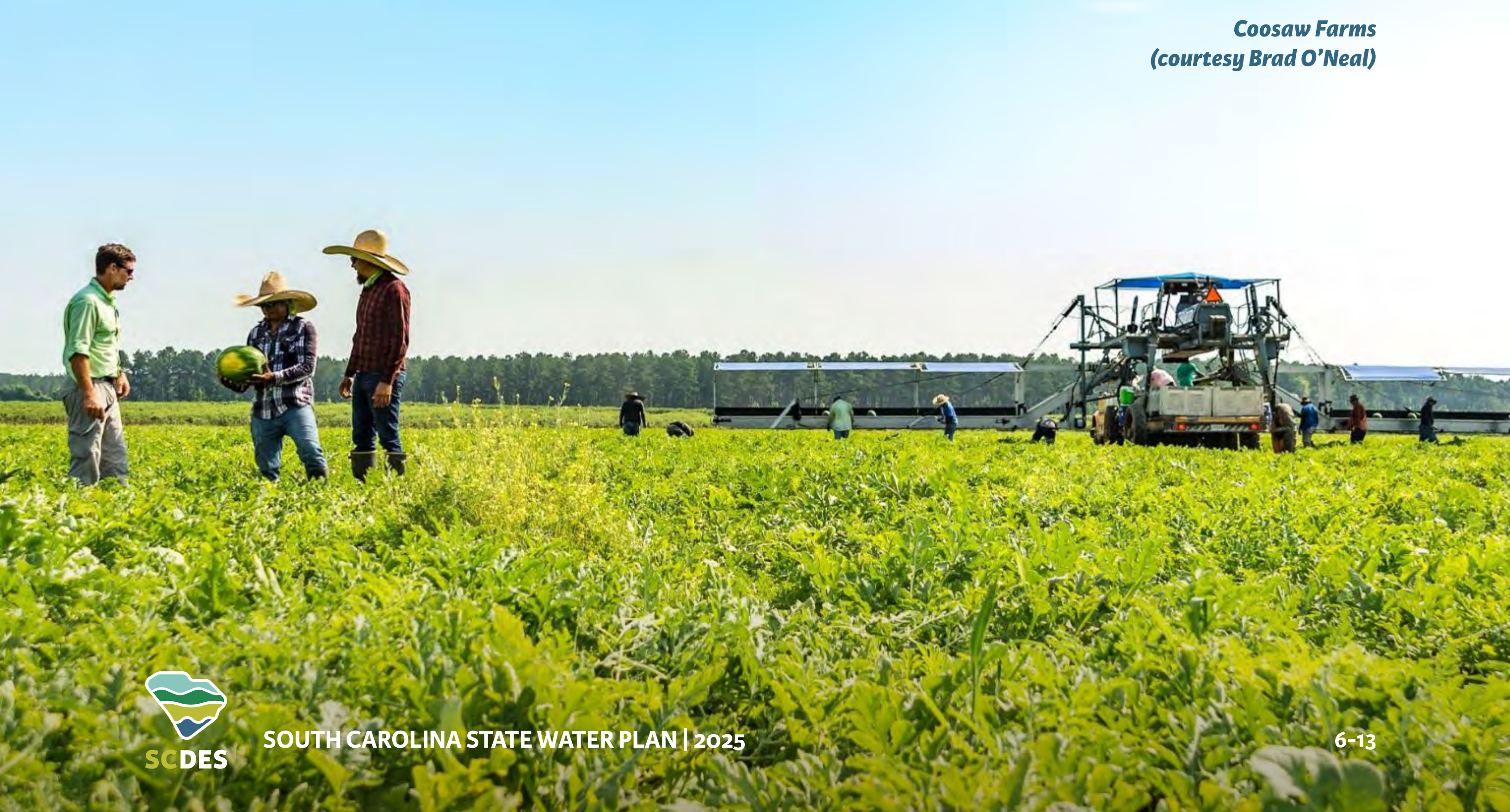
The Edisto RBC also used a USGS groundwater model to evaluate the impacts of irrigation efficiency, the relocation of future pumping demand, and combinations of the two. The groundwater model suggested these practices separately, and more so when combined, would reduce the extent and severity of groundwater 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)

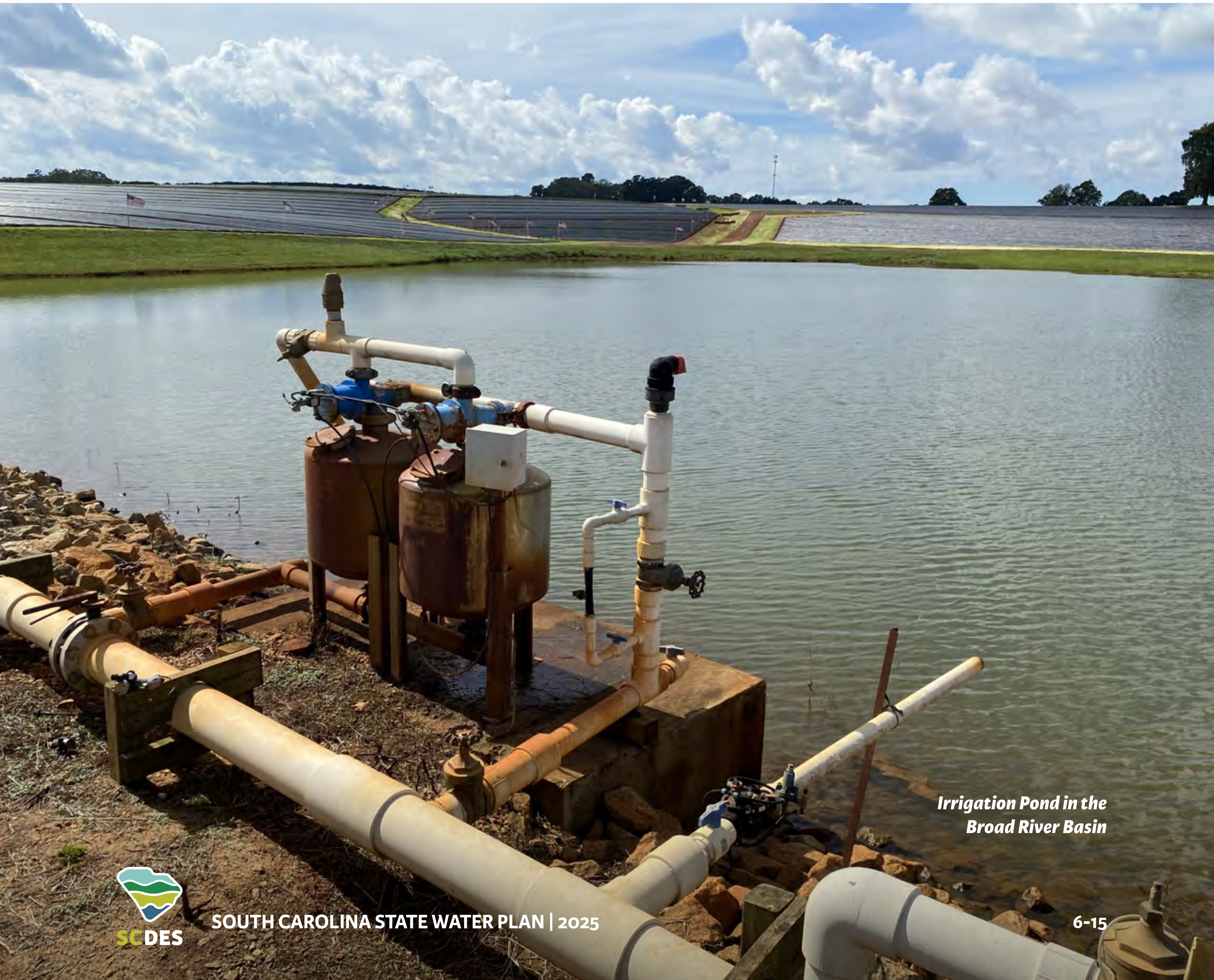
Table 6-3. Demand-side water management strategy feasibility evaluation.

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.

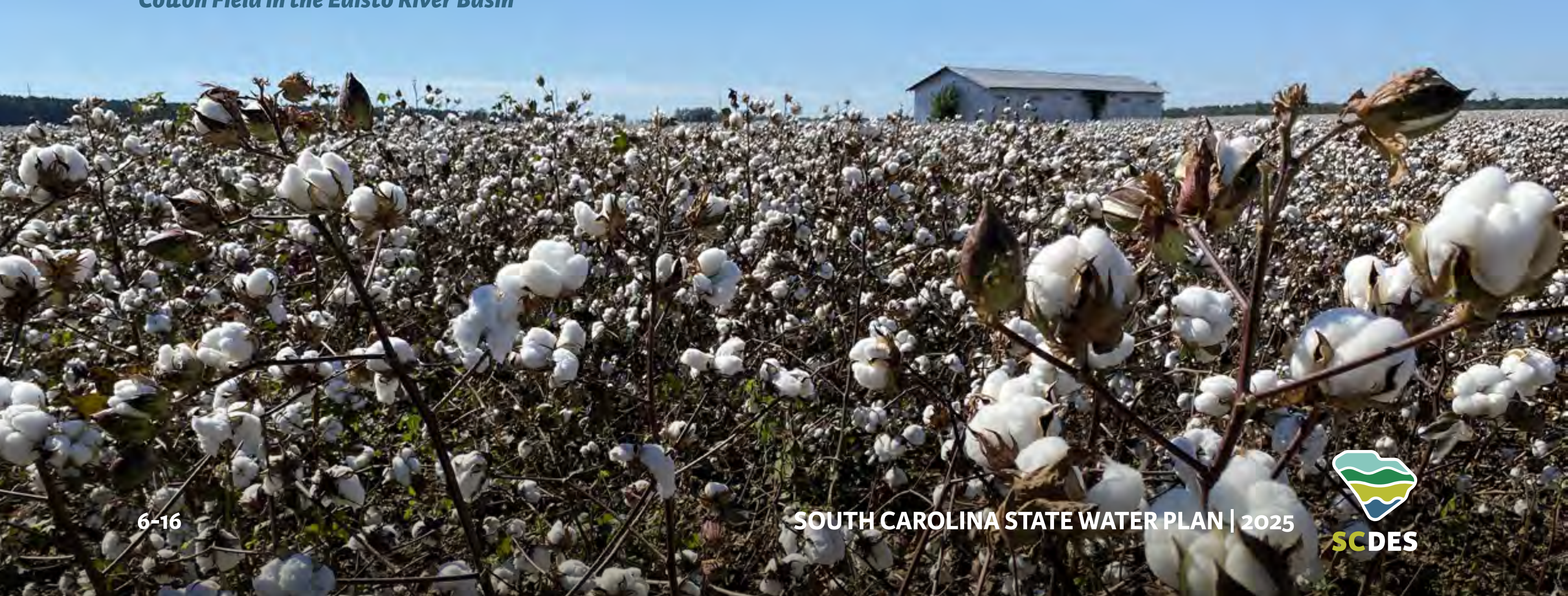
Emerging contaminants including PFAS – Adaptive management allows for incorporating new scientific findings and regulatory changes into water quality management practices. By continuously updating treatment processes and monitoring programs, planners and engineers can better address the technical, financial, 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

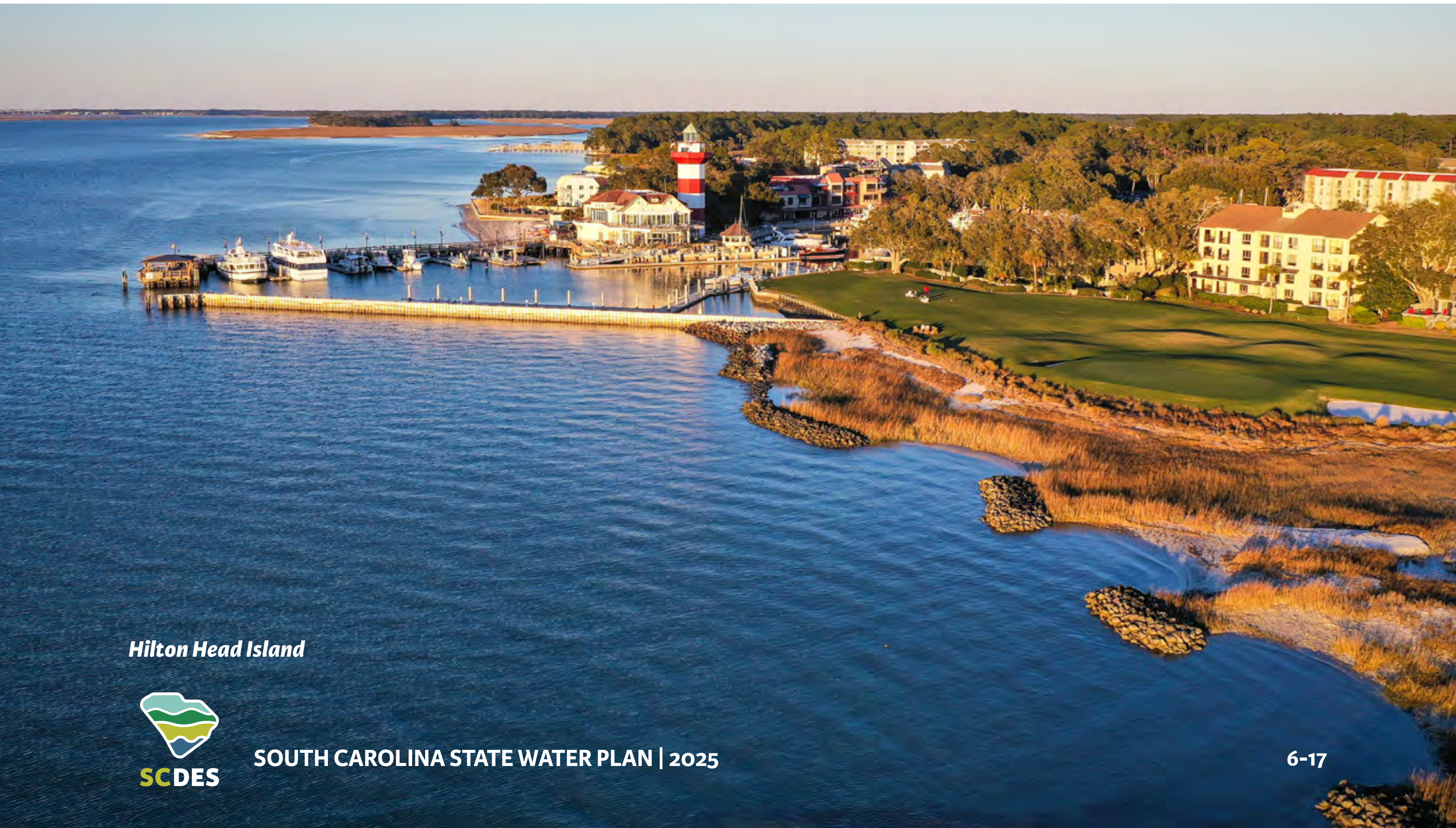


Adaptive management recognizes the myriad of uncertainties that exist during water planning while acknowledging that decisions must be made with the best available information at the present. Water planning in South Carolina uses a 50-year planning horizon and sets specific triggers when the river basin 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