South Carolina STATE WATER ASSESSMENT

Second Edition

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South Carolina Department of Natural Resources
Columbia, South Carolina

2009

www.dnr.sc.gov

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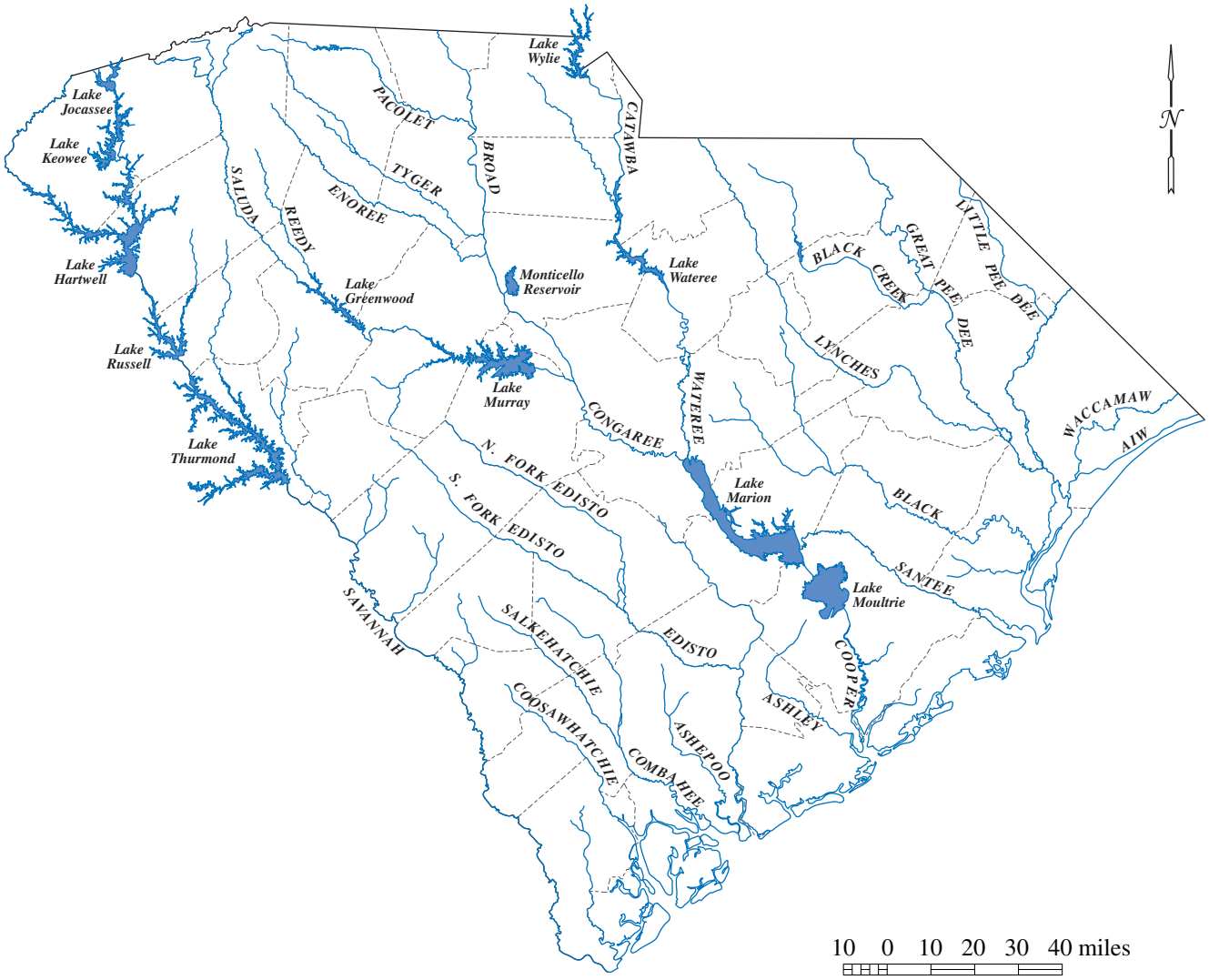
Cover: The crystal clear water of Oconee County's Lake Jocassee is an important water resource for South Carolina's Upstate residents. Cover photo by Philip Jones.



Major rivers and lakes of South Carolina.

Counties of South Carolina.

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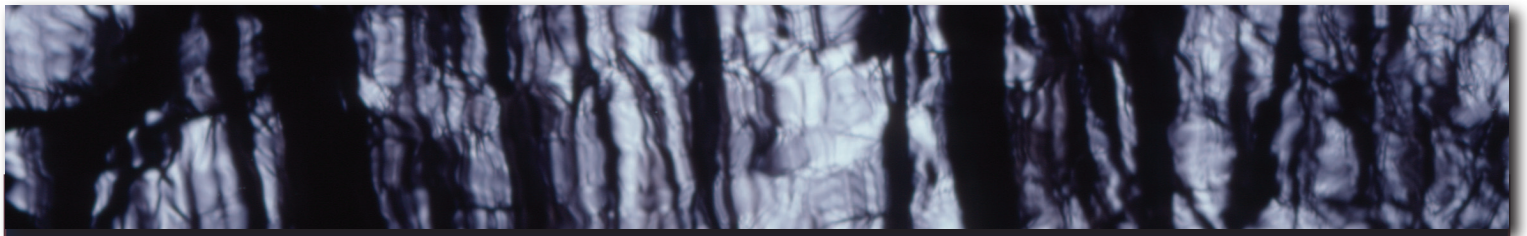

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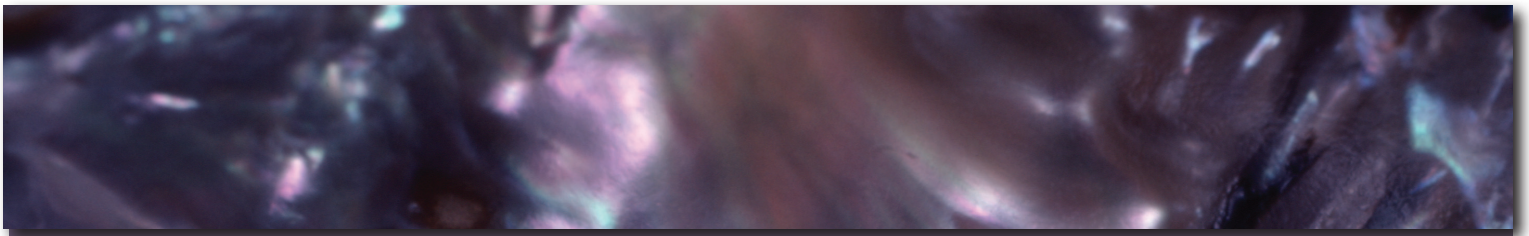

EXECUTIVE SUMMARY

South Carolina possesses nearly 30,000 miles of perennial and intermittent streams, and they discharge an average of 31 billion gallons of water each day to the Atlantic Ocean. Inflow from North Carolina accounts for 38 percent of the total flow, and most this inflow occurs through hydroelectric power facilities that are beyond South Carolina's jurisdiction.

South Carolina has approximately 50,000 lakes, 1,600 of which are 10 or more acres in area and 19 of which are 1,000 acres or more. Their total surface area exceeds 525,000 acres and they impound 15 million acre-feet (4.9 trillion gallons) of water. The largest lakes store water for hydroelectric and thermoelectric power generation. Many lakes are protected and used as sources for public water supplies and crop and golf-course irrigation. Most lakes are valued for recreation and aesthetics.

Ground water is abundant and serves as the water supply for more than three quarters of a million South Carolinians. In the Blue Ridge and Piedmont, the clayey, weathered-bedrock mantle accepts and yields water slowly but stores most of the two provinces' ground water. Shallow, bored wells commonly pump water from the contact zone between the weathered mantle and the bedrock, yielding about 5 gpm (gallons per minute), and are the most vulnerable to drought. Wells drilled into the bedrock obtain water from fractures connected to the weathered-bedrock mantle average about 300 feet in depth, and commonly yield about 20 gpm.

The availability of ground water in the Coastal Plain greatly exceeds that in the Blue Ridge and Piedmont. Six major aquifers are contained in a clay, sand, and limestone wedge that thickens from a featheredge at the Fall Line to 4,000 feet at the southern end of the State. Well yields are adequate for domestic and light-commercial uses nearly everywhere, and wells in the Coastal Plain can pump 1,000 to 3,000 gpm (1.4 to 4.3 million gallons per day) where constructed to obtain the maximum yield.

Water quality is generally good, and most of the State's water is suitable for public-supply, industrial, and irrigation use. Aquatic life is supported in most of the State's lakes, estuaries, and rivers. Recreational use is supported in nearly all of the lakes and estuaries and a majority of the rivers. Ground water typically needs no treatment, although chlorination is required of public-supply systems. Radionuclides are found in bedrock wells in some parts of the upper Piedmont and in some Coastal Plain wells near the Fall Line, but concentrations generally are less than the maximums allowed by drinking-water standards. Dilute seawater occurs in aquifers near the coast, and in some areas it is drawn inland by pumping of the freshwater in major well fields. Of most immediate concern is the lateral and vertical seawater intrusion that threatens the Floridan aquifer in southern South Carolina. This intrusion will contaminate a large part of the State's most productive aquifer during the next 50 years.

South Carolina's population surpassed 4 million in the year 2000, following a 21-percent increase during the preceding 20 years. The population increase was accompanied by greater prosperity, shifts in the way water is used, and increases in per capita water use and in total water demand. The greatest use of water in South Carolina goes toward the generation of electricity. Instream water use by hydroelectric power plants averaged 49,100 mgd (million gallons per day) in 2006, while offstream water use by thermoelectric power plants averaged 5,760 mgd. A 60-percent decrease in water use for hydroelectric power generation occurred during the 1998–2002 drought. Public-supply use increased from 380 mgd in 1980 to 620 mgd in 2006, mainly owing to the population increase and water-system expansions into areas previously supplied by private wells. Per capita household use also increased during this time, partly because of increased landscape irrigation. Industrial water use averaged 409 mgd in 2006, agricultural irrigation averaged 80 mgd, and golf-course irrigation averaged 35 mgd. Aquaculture, a relatively new business in South Carolina, used an average of 0.9 mgd in 2006.

One of the most significant changes in water use during the last two decades has been the conversion from ground-water sources to surface-water sources by many Coastal Plain communities. Public supply systems in coastal Horry County were the first of these. Faced with the prospect of dewatering their aquifers because of overpumping, both the city of Myrtle Beach and the Grand Strand Water and Sewer Authority converted from deep wells to streams in the late 1980's. Utilities maintain standby wells, but most Horry County water systems now rely on surface water.

Saltwater intrusion, caused by ground-water withdrawals in southern Beaufort County and Chatham County, Georgia, led to mandated pumping reductions from Floridan-aquifer wells in 2004. The Savannah River supplemented wells as a water source for Hilton Head Island and subsequently replaced domestic and public-supply wells in large parts of Beaufort and Jasper Counties.

Water-level declines in the Cretaceous aquifers of northern Florence County led to construction of a surface-water treatment plant in 2003. The county's public-supply demand averaged 13 mgd (million gallons per day) in 2008, and nearly a third of that demand was met by withdrawals from the Great Pee Dee River. Average ground-water levels at Florence recovered 35 feet by the middle of 2005.

Over the past 25 years, the efforts of government agencies and citizens have resulted in protection of many streams in South Carolina. Whereas only 5 miles of stream were protected under the Scenic Rivers Act in 1983, 399 miles were protected by 2008. During the 1990's, the Department of Natural Resources (DNR) River Conservation Program and local citizens created a database and advocacy organization for conservation and planning in the 2-million acre ACE (Ashley-Cooper-Edisto) basin; a similar process was applied to the Reedy River watershed in Greenville and Laurens Counties and completed in 2002.

By 2008, DNR completed ground-water reports for all of the Coastal Plain and Fall Line counties, and computer models were developed by the U.S. Geological Survey (USGS) and DNR to predict the effects of pumping from the principal Coastal Plain aquifers. Legislation passed in 1985 required well-construction reports to be filed with the Department of Health and Environmental Control (DHEC); by 1995, DHEC was receiving 10,000 new well records each year. Most of the hydrogeologic information summarized in this assessment is extracted from regional studies published by DNR, DHEC, and USGS since the mid-1980's and from many of the thousands of well reports submitted to DHEC in the past 20 years. The DHEC ground-water-quality monitoring network increased six-fold between 1987 and 2003, and USGS and DNR ground-water-level monitoring more than doubled during that same period.

During much of the past decade, severe droughts in the Southeast decreased the availability of surface water and intensified interstate competition for shared water resources. Some conflicts were resolved with beneficial, cooperative solutions, while other conflicts remain unresolved. The 1998–2002 drought reduced streamflows to the point that public-supply systems in the Great Pee Dee River basin faced water shortages, which prompted months of negotiations by State and local officials, the Federal government, and operators of hydroelectric facilities in North Carolina that led to agreements about reservoir releases and guaranteed minimum instream flows. During the severe droughts that occurred in 1998–2002 and 2007–2008, agencies from South Carolina and Georgia worked together, along with the Corps of Engineers and other stakeholders, to develop more effective drought management plans for the Savannah River basin. Although the Savannah lakes reached record low levels in 2008, the cooperative efforts of both States helped to minimize the damage caused by these severe droughts.

In recent years, the governments of South Carolina and Georgia had markedly different perspectives regarding saltwater-intrusion management and Savannah River wasteload allocations. In 2005, each state formed a Governor's Savannah River Committee to take the lead in negotiating solutions to these problems, and although agreements have yet to be reached, both states continue to work toward agreeable solutions. Another interstate water conflict developed in 2006 when South Carolina objected to North Carolina's decision to allow the transfer of 10 mgd from the Catawba River basin to the Pee Dee River basin by water suppliers near the city of Charlotte. In 2007, South Carolina filed suit against North Carolina in the U.S. Supreme Court to prevent this interbasin transfer; the issue remained unresolved by the end of 2009.

The *South Carolina State Water Assessment* provides an overview of and a general reference for the quantity, quality, availability, and use of water in South Carolina. Nine chapters address general and specific topics and water-resource conditions in the State's 15 subbasins:

1. Perspective: State demography, climate, natural resources, hydrology, and geology

2. Water Law: case law, State and Federal enabling legislation, legal shortcomings, and references

3. Water Resources: regulatory programs; water monitoring; state of knowledge; factors affecting surface-water availability and quality; and ground-water distribution, well yields, and chemistry

4. Water Use: year 2006 water-use data, by water-use category, with a comparison of water use in the 15 subbasins

5. Pee Dee River Basin: surface-water hydrology, development, and quality; ground-water availability, quality, and problems; and water use in the Great Pee Dee, Lynches, Little Pee Dee, Black, and Waccamaw River subbasins

6. Santee River Basin: surface-water hydrology, development, and quality; ground-water availability, quality, and problems; and water use in the Broad, Saluda, Catawba-Wateree, Congaree, and Santee River subbasins

7. ACE River Basin: surface-water hydrology, development, and quality; ground-water availability, quality, and problems; and water use in the Ashley-Cooper, Edisto, and Combahee-Coosawhatchie River subbasins

8. Savannah River Basin: surface-water hydrology, development, and quality; ground-water availability, quality, and problems; and water use in the upper and lower Savannah River subbasins

9. Special Topics: hydroelectric power; FERC relicensing; instream flow needs; navigation; river conservation; aquatic nuisances; water recreation; sedimentation in surface waters; unique wetland areas; coastal concerns; saltwater contamination; aquifer storage and recovery; water conservation; interbasin transfers; drought management and mitigation; and flooding.

ACKNOWLEDGMENTS

The 2009 *South Carolina State Water Assessment* contains a large amount of information and is the result of efforts by specialists and natural-resource professionals of the S.C. Department of Natural Resources (DNR) and other state, federal, and private agencies. Their contributions include statistical data and analyses, revisions to sections from the 1983 *Water Assessment*, and authorship of new chapters and subchapters.

The editors wish to thank several DNR hydrologists for their help: Brenda L. Hockensmith, P.G., provided descriptions of Coastal Plain hydrogeology, ground-water quality, and potentiometric mapping; H. Lee Mitchell, P.G., provided descriptions of Piedmont hydrogeology and ground-water quality; and Masaaki Kiuchi, Ph.D., assisted in describing surface-water hydrology. The editors are also grateful for the assistance of other DNR staff: Marc Cribb, Richard Lacy, D. Breck Carmichael, and Richard Scharf updated the overviews of land use, forestry, fish and wildlife, and soils; Hope Mizzell, Ph.D., Milton Brown, and D. Wes Tyler contributed to the description of South Carolina's climate; and Paul Nystrom, P.G., of the S.C. Geological Survey, provided descriptions of South Carolina's mineral resources and geology. The editors are especially grateful to Joseph A. Gellici for his preparation of the *Water Use* chapter and to Ann Nolte for her editorial review of the entire *Assessment*.

The editors wish to thank everyone outside the DNR who helped make this report possible. T.W. Cooney, C.L. Sanders, and T.H. Lanier of the U.S. Geological Survey, South Carolina District, helped prepare the streamflow statistics and duration hydrographs. Alex Butler, Braxton Davis, Rheta Geddings, Rick Nuzum, Jill Stewart, and Camille Ransom, III, of the S.C. Department of Health and Environmental Control provided information on water use, coastal concerns, surface-water sedimentation, and saltwater intrusion. M. McMullen Taylor, attorney with the law firm of McAngus Goudelock & Courie, LLC, Columbia, S.C., prepared the *Water Law* chapter. Dr. Nadim Aziz of Clemson University assisted in preparing the *Sedimentation in Surface Waters* section of the *Special Topics* chapter.

The *Special Topics* chapter, in particular, was a collaborative effort involving many contributors from DNR's Land, Water and Conservation Division. The editors are especially grateful to Hydrologist Joseph A. Gellici for his work on the *Hydroelectric Power*, *Aquifer Storage and Recovery*, *Water Conservation*, and *Interbasin Transfers* sections; to Hydrologist Scott Harder for his help on the *FERC Relicensing*, *Instream Flow Needs*, *Water Recreation*, *Unique Wetland Areas*, and *Water Conservation* sections; to Chris Page, Aquatic Plant Program Manager, and Steven J. de Kozlowski, Assistant Deputy Director, for their help with the *Aquatic Nuisances* section; to Bill Marshall and Mary Crockett of the DNR Scenic Rivers Program for their help with the *River Conservation* and *Water Recreation* sections; and to Lisa Jones, Flood Mitigation Program Coordinator, for her help in preparing the *Flooding* section.