GROUNDWATER AVAILABILITY IN THE CROUCH BRANCH AND MCQUEEN BRANCH AQUIFERS, CHESTERFIELD COUNTY, SOUTH CAROLINA, 1900–2012

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Chesterfield County is located in the northeastern part of South Carolina along the southern border of North Carolina and is primarily underlain by unconsolidated sediments of Late Cretaceous age and younger of the Atlantic Coastal Plain. Approximately 20 percent of Chesterfield County is in the Piedmont Physiographic Province, and this area of the county is not included in this study. These Atlantic Coastal Plain sediments compose two productive aquifers: the Crouch Branch aquifer that is present at land surface across most of the county and the deeper, semi-confined McQueen Branch aquifer. Most of the potable water supplied to residents of Chesterfield County is produced from the Crouch Branch and McQueen Branch aquifers by a well field located near McBee, South Carolina, in the southwestern part of the county.

The primary purpose of this study was to determine groundwater-flow rates, flow directions, and changes in water budgets over time for the Crouch Branch and McQueen Branch aquifers in the Chesterfield County area. This goal was accomplished by using the U.S. Geological Survey finite-difference MODFLOW groundwater-flow code to construct and calibrate a groundwater-flow model of the Atlantic Coastal Plain of Chesterfield County. The model was created with a uniform grid size of 300 by 300 feet to facilitate a more accurate simulation of groundwater-surface-water interactions.

The calibrated groundwater-flow model was then used to calculate groundwater budgets for the entire study area and for two sub-areas. The sub-areas are the Alligator Rural Water and Sewer Company well field near McBee, South Carolina, and the Carolina Sandhills National Wildlife Refuge acquisition boundary area. For the overall model area, recharge rates vary from 56 to 1,679 million gallons per day (Mgal/d) with a mean of 737 Mgal/d over the simulation period (1900-2012). The simulated water budget for the streams and rivers varies from 653 to 1,127 Mgal/d with a mean of 944 Mgal/d. The simulated "storage-in term" ranges from 0 to 565 Mgal/d with a mean of 276 Mgal/d. The simulated "storage-out term" has a range of 0 to 552 Mgal/d with a mean of 77 Mgal/d. Groundwater budgets for the McBee, South Carolina, area and the Carolina Sandhills National Wildlife Refuge acquisition area had similar results.

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