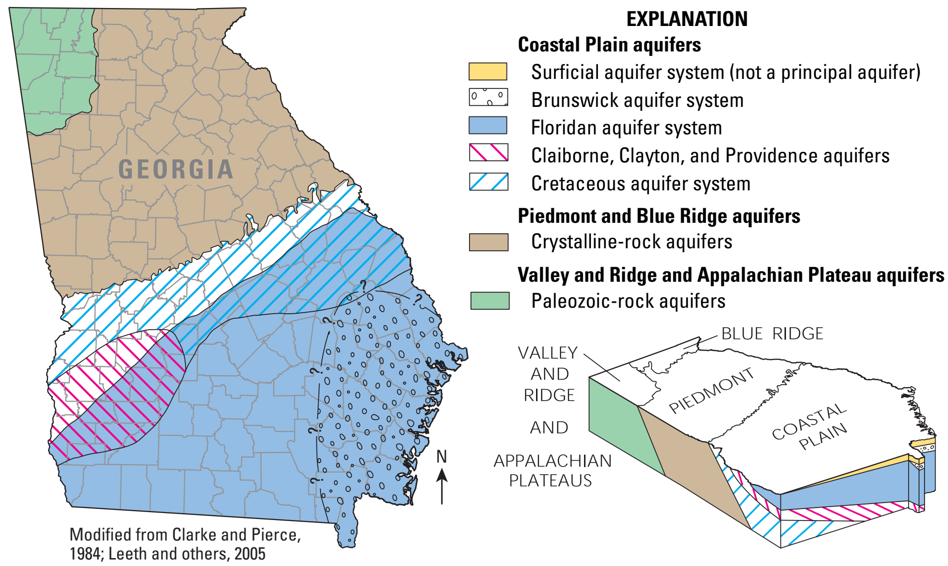
# Georgia's Ground-Water Resources and Monitoring Network, 2008

## Ground-Water Resources

Ground water is an abundant resource in Georgia, providing 1.45 billion gallons per day, or 22 percent, of the total fresh-water used (including thermoelectric) in the State (Fanning, 2003). Contrasting geologic features and landforms of the physiographic provinces of Georgia affect the quantity and quality of ground water throughout the State. Most ground-water withdrawals are in the Coastal Plain in the southern one-half of the State, where aquifers are highly productive. For a more complete discussion of the State's ground-water resources, see Leeth and others (2005).

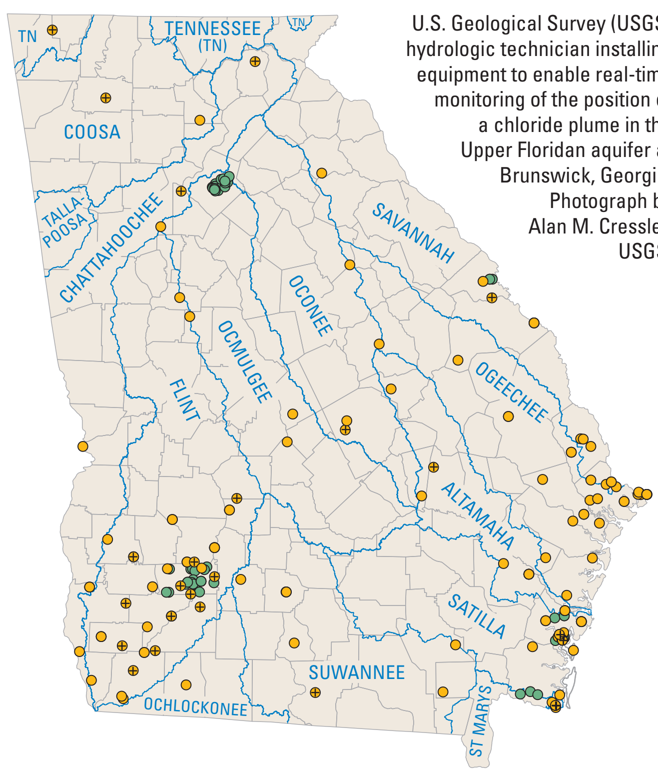



**Principal aquifers of Georgia.** The most productive aquifers are in the Coastal Plain province where thick, permeable sedimentary deposits have formed several layers of aquifers. The surficial aquifer system is present throughout the State and is not shown on the map at left.

## Ground-Water Monitoring Network

Ground-water-level and ground-water-quality data are essential for water-resource assessment and management. Water-level measurements from observation wells are the principal source of information about the hydrologic stresses on aquifers and how these stresses affect ground-water recharge, storage, and discharge. Long-term, systematic measurements of water levels provide essential data needed to evaluate changes in the resource over time; develop ground-water models and forecast trends; and design, implement, and monitor the effectiveness of ground-water management and protection programs (Taylor and Alley, 2001). Ground-water-quality data are necessary to ensure that public water supplies meet health standards; deterioration of ground-water quality may be virtually irreversible, and treatment of contaminated ground water can be expensive (Alley, 1993).

The U.S. Geological Survey (USGS) ground-water network for Georgia currently consists of 175 wells in which ground-water levels are continuously monitored. Most of the wells are located in the Coastal Plain in the southern part of the State where ground-water pumping stress is high. In particular, there are large concentrations of wells in coastal



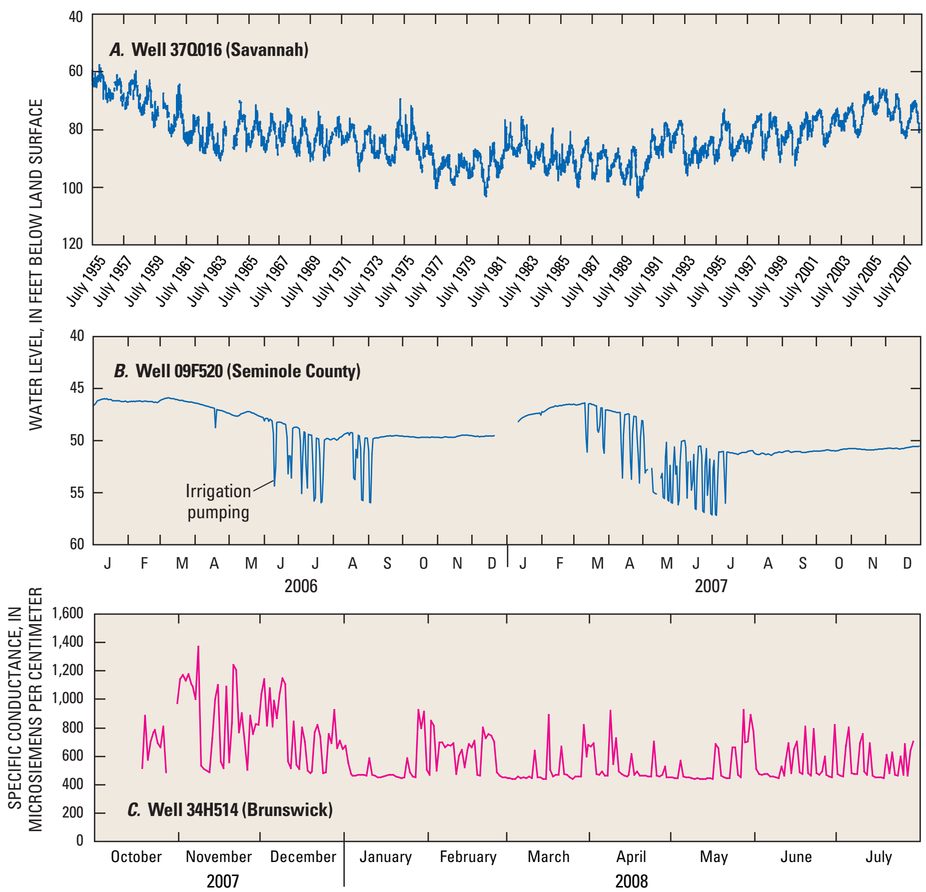

U.S. Geological Survey (USGS) hydrologic technician installing equipment to enable real-time monitoring of the position of a chloride plume in the Upper Floridan aquifer at Brunswick, Georgia. Photograph by Alan M. Cressler, USGS.

**USGS ground-water monitoring network for Georgia.** Ground-water levels are monitored continuously in 175 wells statewide, of which 29 transmit data in real time via satellite and posted on the World Wide Web at *http://waterdata.usgs.gov/ga/nwis/current/?type=gw.* A greater concentration of wells occurs in the Coastal Plain where there are several layers of aquifers and in coastal and southwestern Georgia areas, which are areas with specific ground-water issues.

and southwestern Georgia areas, where there are issues related to ground-water pumping—saltwater intrusion along the coast, and diminished streamflow in southwestern Georgia due to irrigation pumping. Three coastal wells monitor specific conductance in real time to track position of the chloride plume at Brunswick, Georgia.

## Ground-Water Levels

Water levels in aquifers in Georgia typically follow a cyclic pattern of seasonal fluctuation. Rising water levels occur during winter and spring because of greater recharge from precipitation and less evapotranspiration and pumping; declining water levels occur during summer and fall because of less recharge and greater evapotranspiration and pumping (Leeth and others, 2005). The magnitude of fluctuations can vary greatly from season to season and from year to year in response to varying climatic conditions. Ground-water pumping is the most significant human activity that affects the amount of ground water in storage and the rate of discharge from an aquifer (Taylor and Alley, 2001). As ground-water storage is depleted within the radius of influence of pumping, water levels in the aquifer decline, forming a cone of depression around the well. In areas having a high concentration of wells, multiple cones of depression can form and produce water-level declines across a large area. These declines may alter ground-water flow directions, reduce flow to streams, capture water from a stream or adjacent aquifer, or alter ground-water quality.




**Ground-water monitoring of the Upper Floridan aquifer** in selected wells demonstrates the effectiveness of water-management practices. *(A)* Decreased pumping in coastal Georgia resulting in water-level recovery in a well at Savannah. By June 2008, water levels had recovered to within 16 feet of the level originally recorded in the well during 1955. *(B)* A monitoring well in Seminole County, southwestern Georgia, shows the effect of irrigation pumping on ground-water levels. Sharp downward spikes on the graph indicate when nearby irrigation pumps are in operation, lowering ground-water levels. Data from the monitoring network can be used as an independent verification of irrigation practices in the State. *(C)* Specific conductance—a surrogate for chloride concentration—is monitored in real time at a Brunswick well in coastal Georgia to provide an indication of possible lateral movement of a chloride plume.

## Outlook

The USGS ground-water monitoring network for Georgia is operated by the USGS and funded through the Cooperative Water Program—a joint funding mechanism between the USGS and State and local agencies. Funding for this program is renewable on an annual basis and is, thus, subject to reductions resulting from changes in Federal, State, and local governmental appropriations. Stable funding sources are essential to ensure continuity of data collection.

The network has a larger number of wells in the Coastal Plain where multiple layers of aquifers occur and pumping stress on these aquifers is high. There are gaps in the network coverage across the State. In particular, there are few wells in the south-central part of the Coastal Plain and in the northern one-half of the State. As ground-water resources in these areas are used increasingly, expanded ground-water monitoring will enable proper management of water resources.

## References Cited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**For more information on Georgia's ground-water resources and monitoring network**

Visit the USGS Georgia Water Science Center Web site at *http://ga.water.usgs.gov/*


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