AN OVERVIEW OF WATER-RESOURCE ISSUES IN THE MIDDLE AND LOWER FLINT RIVER SUBBASINS, SOUTHWEST GEORGIA

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Abstract. The water resources of the Flint River Basin, its tributaries, and the aquifers of the middle and lower subbasins are vitally important to agriculture, industries, and municipalities of southwest Georgia. Population growth and expansion of irrigated agriculture since the 1970s have resulted in increased water use in the Flint River Basin. There is uncertainty as to whether, during periods of drought and lower than average rainfall, flows in the Flint River will be sufficient to meet the growing municipal, industrial, and agricultural demands, while maintaining an ecologically healthy environment. Characterization and monitoring of surface- and ground-water resources, their interconnection, and water quality are important for proper management and development of water resources in this area.

The Flint River Basin is part of the larger Apalachicola-Chattahoochee-Flint (ACF) River Basin located in the western one-third of Georgia (Fig. 1). The Flint River flows from the Atlanta area to the Florida State line; the basin drainage area is about 8,500 square miles. The middle and lower Flint subbasins extend from Macon County, Georgia, south to Lake Seminole in Decatur County, Georgia (Fig. 1). There is little surface-water drainage in the lower subbasin between the city of Albany and Lake Seminole, because the cavernous karst geology provides a subterranean drainage system for runoff. Lake Seminole is a major discharge area for the Upper Floridan aquifer, with many springs discharging into the lake.

Since the early 1900s, several major floods have occurred in the two subbasins. The most severe recent flood occurred during July 1994, when rainfall from Tropical Storm Alberto caused damaging flooding in many southwest Georgia areas.

The Flint River Basin is within the Piedmont and Coastal Plain physiographic provinces (Fig. 1). The middle and lower subbasins are underlain by Cretaceous to Holocene sediments in the Coastal Plain.

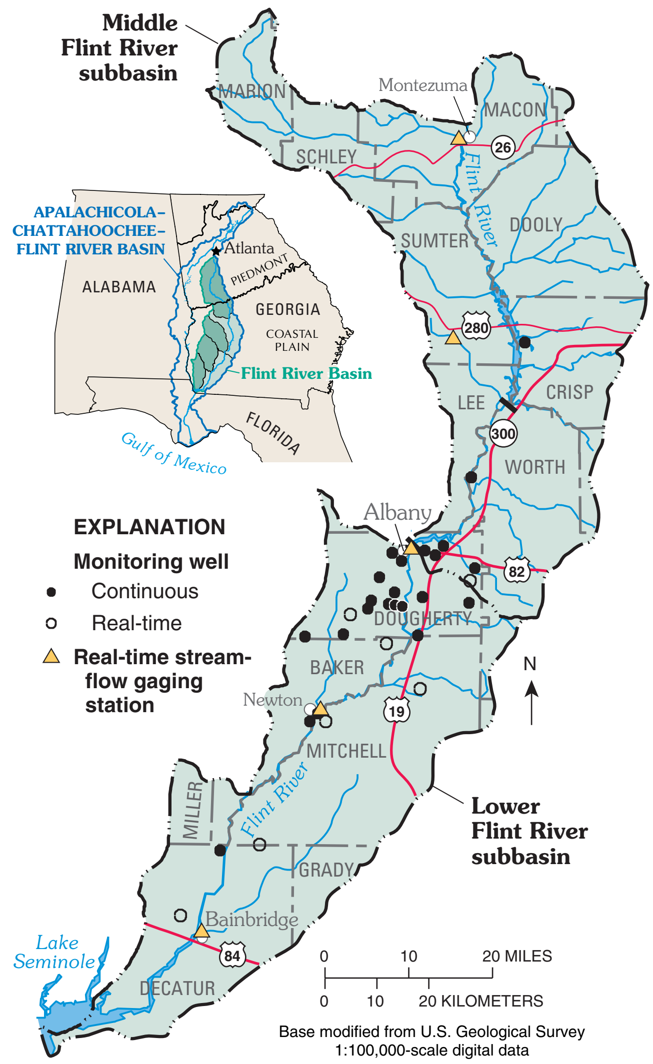

Figure 1. Monitoring wells and streamflow stations in middle and lower Flint River subbasins in Georgia.

A large portion of the Coastal Plain in the Flint River Basin is underlain by carbonate rocks, within which a karst terrain—consisting of sinkholes, ephemeral streams, and caverns—has developed. The principal source of water in the lower subbasin and part of the middle subbasin is the Upper Floridan aquifer, consisting of Eocene limestone. Other aquifers—including the Claiborne, Clayton, and Providence, which lie beneath the Upper Floridan—supply water to the middle and part of the lower subbasins. Overlying these principal aquifers are alluvial deposits, soil, and weathered rock that comprise the surficial aquifer, which is not widely used for water supply. Heavy ground-water pumping has resulted in water-level declines in the Clayton and Providence aquifers near Albany; these declines have prompted interest in development of water supplies from the Upper Floridan aquifer. In much of the lower subbasin, center-pivot irrigation systems derive water from the highly productive Upper Floridan aquifer.

Overall, there are few surface- or ground-water quality problems in the area. Nitrate can be a problem in ground water in agricultural areas and in residential areas with private septic tanks, which are common in the middle and lower Flint River subbasins. However, nitrate concentrations in ground water in this area rarely exceed 10 milligrams per liter (mg/L). Concentrations of nitrate greater than 10 mg/L have been detected in one well completed in the Upper Floridan aquifer near Albany, but these concentrations occur only across a small area.

Several major droughts since 1900 have impacted the availability of ground- and surface-water resources in the two subbasins. The most recent drought occurred during 1998–2002 and resulted from 28–50 inches of accumulated rainfall deficit in some southwest Georgia areas (Pam Knox, Assistant Georgia State Climatologist, oral communication with Debbie Warner, 2003).

To help ensure that adequate flows are maintained during periods of drought for protection of the ecosystem, the Georgia Legislature, during 2000, passed the Flint River Drought Protection Act, authorizing compensation to farmers for removing agricultural acreage from irrigation during a severe drought year (Georgia Department of Natural Resources, 2001). The Act provides for the Director of the Georgia Environmental Protection Division (GaEPD) to announce on March 1 of each year, whether or not (based on the best available information) drought conditions will occur during the upcoming summer. If drought conditions are "declared," the Director must determine the number of acres (target acreage) to be taken out of irrigation to protect in-stream flows. The Director then must hold an auction allowing each eligible farmer to bid voluntarily a dollar amount per acre for all of the irrigated acreage within a permit. If the farmer's bid were accepted, the farmer would receive that amount per acre for not irrigating the acres specified in that permit during the remainder of the year. Starting with the lowest, bids are accepted until the target acres have been removed from irrigation (Georgia Department of Natural Resources, 2001; Cummings and others, 2001). To date, the Act has been applied only to surface-water agricultural irrigators in the basin who have permits to pump from streams that flow year-round (perennial streams). A drought was "declared" on March 1, 2001, and again in 2002; and the Act was put into effect on both occasions.

To ensure that adequate water supplies are available in southwest Georgia, GaEPD implemented a moratorium on new water-use permits in the middle and lower subbasins, until scientific investigations (now under way) are completed. The U.S. Geological Survey, in cooperation with GaEPD, is conducting these investigations. These investigations include assessment of ground-water flow, development of a hydrologic budget near Lake Seminole, and development of a transient ground-water flow model for the lower ACF River Basin, which includes the middle and lower Flint subbasins. These investigations were designed to provide insight regarding interaction between ground and surface water and to predict the affects of allowing new withdrawals. In addition to these scientific investigations, the USGS, in cooperation with GaEPD, operates continuous streamflow and ground-water-level monitoring networks in the two subbasins (Fig. 1). Many of the instrumented sites are "real time" and are linked by satellite telemetry (*see* World Wide Web at URL: http://ga.water.usgs.gov/, accessed on February 7, 2003). These data provide water planners with information necessary to manage the area's water resources.

LITERATURE CITED

Cummings, R.G., N.A. Norton, and V.J. Norton. 2001. Enhancing in-stream flows in the Flint River Basin: does Georgia have sufficient policy tools? Water Policy Working Paper Series No. 2001-002, Georgia Water Planning & Policy Centers, 22 p.

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