

WATER USE IN GEORGIA, 2000; AND TRENDS, 1950–2000

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Abstract. In Georgia, total offstream water use from ground- and surface-water sources was estimated to be 6,490 million gallons per day (Mgal/d) in 2000. Thermoelectric power was the largest category of offstream water use in 2000, estimated to be 3,310 Mgal/d from surface water. Instream water use for hydroelectric power plants in the State of Georgia was estimated to be 31,900 Mgal/d. Withdrawals for irrigation mostly were from ground-water sources, and withdrawals for public supply mostly were from surface-water sources. Offstream water use for 2000 was about 21 percent larger than in 1950.

Statewide, from 1950–2000, water-use trends show the relation between water withdrawals and changes in population and climate. During that 50-year period, the largest category of water withdrawals has been thermoelectric power. Public supply has increased steadily since 1950 along with the State's population.

WATER USE IN GEORGIA, 2000

Water-use estimates for the State of Georgia have been compiled since 1950. The U.S. Geological Survey (USGS) and the Georgia Department of Natural Resources, Environmental Protection Division, Georgia Geologic Survey, entered into a cooperative agreement in 1979 to develop the Georgia Water-Use Program (GWUP). The GWUP collects, compiles, and disseminates water-use data in the State. USGS personnel maintain these data. Since 1980, the GWUP has compiled water-use estimates annually and published a State report every fifth year.

Water-use data are divided into offstream and instream uses. Offstream use is defined as water withdrawn or diverted from a ground- or surface-water source, and transported to the place of use. Offstream water-use categories include public supply, domestic, commercial, industrial, mining, irrigation, livestock, and thermoelectric power. An estimated 6,490 Mgal/d were withdrawn for offstream uses throughout Georgia during 2000. Of the total offstream use, an estimated 5,040 Mgal/d were withdrawn from surface-water

sources (78 percent); and of that amount, 68 percent was for thermoelectric power generation. Ground-water withdrawals were estimated to be 1,450 Mgal/d, mostly for irrigation (51 percent) and industrial uses (20 percent) and public supply (19 percent) (Fig. 1). The largest offstream use (60 Mgal/d or greater) was primarily in counties in which thermoelectric power plants are located. Exceptions include DeKalb, Fulton, and Gwinnett Counties, located in the Metropolitan Atlanta area, where large amounts of water are withdrawn for public supply. Whitfield County also withdrew large amounts for public supply; Early, Richmond, and Wayne Counties withdrew large amounts of water for industrial use; and Decatur, Mitchell, and Seminole Counties withdrew large amounts of water for irrigation.

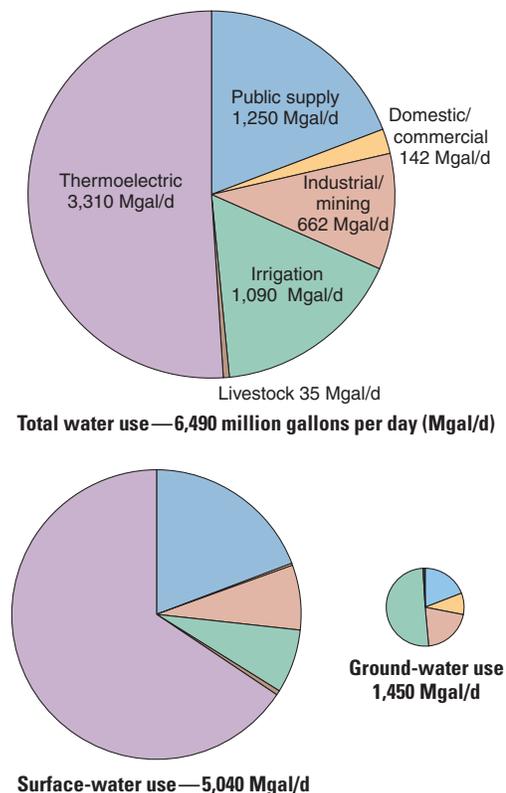


Figure 1. Water use by category and source in Georgia, 2000.

WATER USE BY CATEGORY, 2000

Statewide offstream water use was estimated for 2000 for the following categories: public supply, domestic and commercial, industrial and mining, irrigation, livestock, and thermoelectric power. Instream use for hydroelectric power also was estimated for 2000.

Public-supply use is water withdrawn by public and private water suppliers and delivered to users. Public suppliers provide water for various uses, including domestic, commercial, industrial, and public water use. Estimated use for public supply during 2000 was 1,250 Mgal/d, of which surface-water withdrawal accounted for about 78 percent (968 Mgal/d), and ground-water withdrawal accounted for about 22 percent (278 Mgal/d). The largest public suppliers are located in counties in the Metropolitan Atlanta area in northern Georgia (Fig. 2A). This area has the largest population in the State, and surface water is the principal water source. Public supply water use accounted for 19 percent of the total water use in Georgia.

Industrial use includes water for industrial and mining purposes—such as fabrication, processing, washing, and cooling—and mine dewatering and ore processing. Industrial water is obtained from public supply or is self-supplied in Georgia. Major industrial users in the State include paper, chemical production, textile, stone and clay, and mining and mineral processing. Industries in Georgia used approximately 662 Mgal/d of water during 2000 (including 10 Mgal/d for mining use). The largest industrial water users in Georgia are pulp and paper mills (concentrated along the coast), textile industries (concentrated in northwestern Georgia), chemical manufacturers, and mining and mineral industries (Fig. 2B).

Agriculture water use includes water for irrigation, livestock, horses, and catfish farming. Estimated agricultural water use during 2000, including water for irrigation and livestock use, totaled 1,130 Mgal/d (1,090 Mgal/d for irrigation and 35 Mgal/d for livestock). The highest rate of irrigation occurs in the Coastal Plain physiographic province, with the largest use in the southwestern part of the State (Fig. 2C). Ground water is the source of about 67 percent of irrigation use.

Thermoelectric-power water use is water used in the generation of thermoelectric power, most of which is used for cooling purposes. Thermoelectric-power water use in Georgia (Fig. 2D) includes 17 plants that operate using fossil fuels (such as oil, coal, or natural gas) and 2 nuclear-powered plants. All thermoelectric-power water use in Georgia is self-supplied. Thermoelectric-power water use was estimated to be 3,310 Mgal/d in 2000, which is nearly 51 percent of total offstream use.

Hydroelectric-power water use is an instream use of water for the generation of electricity at facilities where falling water drives turbine generators. Instream use occurs within a stream channel for such purposes as hydroelectric power generation, navigation, water-quality improvement, fish propagation, and recreation. In Georgia, the only instream use estimated is hydroelectric power generation (Fig. 3). Generating hydroelectric power requires significant amounts of water. During 2000, an estimated 31,900 Mgal/d was used instream to generate hydroelectric power.

TRENDS IN WATER USE, 1950–2000

Wise management of water resources is needed to ensure availability of water for various uses throughout the State. Water-use data are integral to the design and plan of water projects. Water-use data can show trends over time and help identify and plan for potential water-resources problems. Knowledge of the amount of ground- and surface-water used can be helpful in planning for the growth of cities and the development of new industries.

Since 1980, the Georgia Water-Use Program has compiled statewide water-use estimates annually and published data reports by category at 5-year intervals. National water-use compilations began during 1950; but during the period 1950–2000, the categories used for water-use estimates were not always comparable. Category definitions and estimation techniques have been the most consistent since 1980 because of the efforts of the USGS National Water-Use Information Program.

In Georgia, water-use data can be evaluated for 1950–2000 to show water-use patterns. In 1950, total offstream water use was estimated at 1,760 Mgal/d, 19 percent from ground-water sources and 81 percent from surface-water sources. Total withdrawals increased during 1950–80, but decreased during 1980–90. However, from 1990 to 2000 total withdrawals increased to 6,490 Mgal/d. Since 1950 surface water consistently has been the principal water supply in the State (Fig. 4). Offstream water use for 2000 is about 21 percent larger than in 1950.

During 1950–2000, public-supply use in Georgia has increased continually. This trend is a result of the increase in population from 3.4 to 8.2 million (MacKichan, 1951; Fanning, 2003) during 1950–2000 and the growth of public-supply systems to serve a larger percentage of the population. During 1950, only 56 percent of the population was served by public-supply systems; this percentage increased to 82 percent in 2000. Surface water has been the principal source for public-supply use during the 50-year period (Fig. 5A).

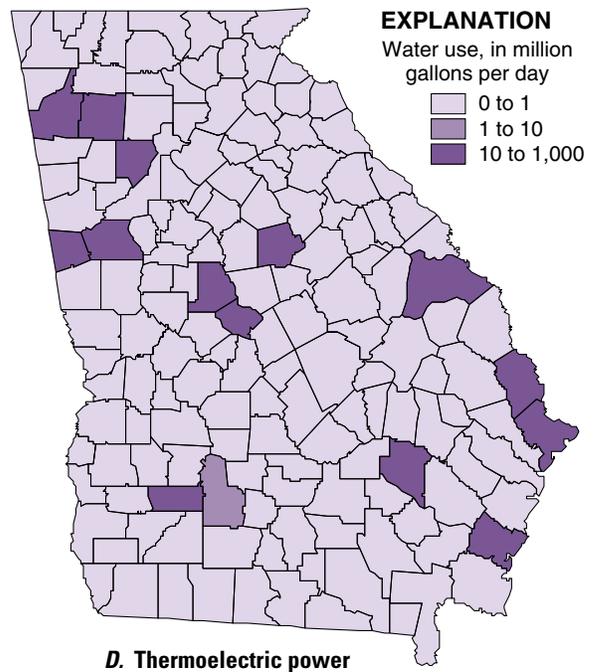
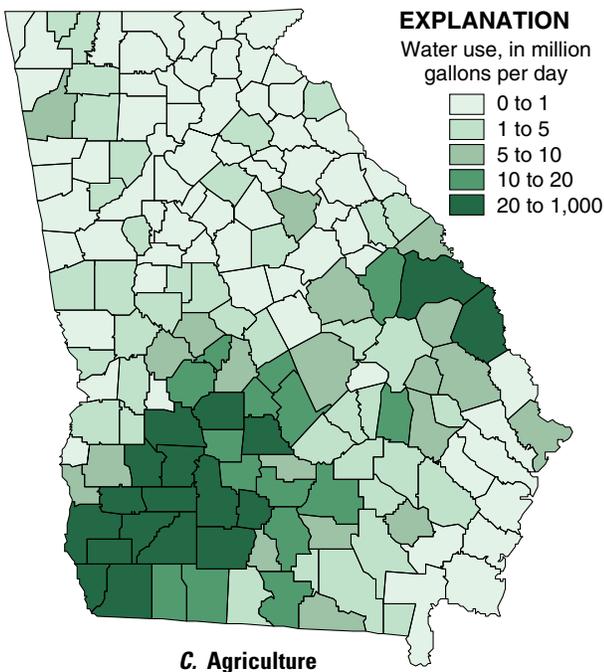
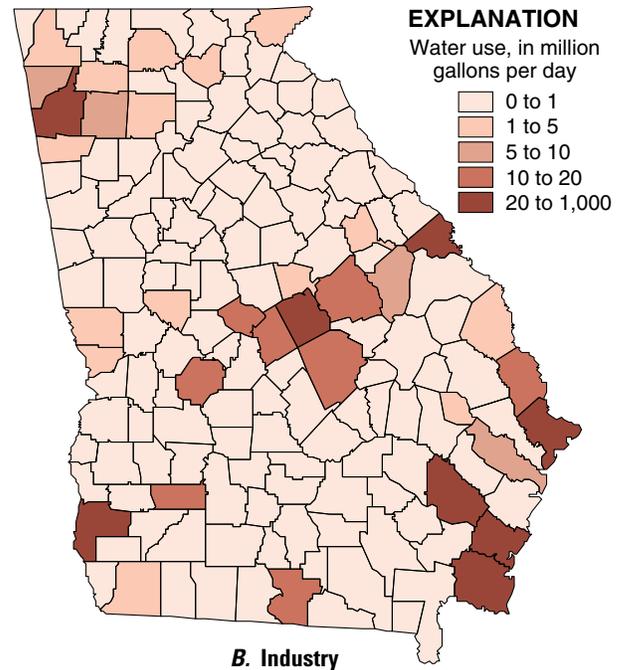
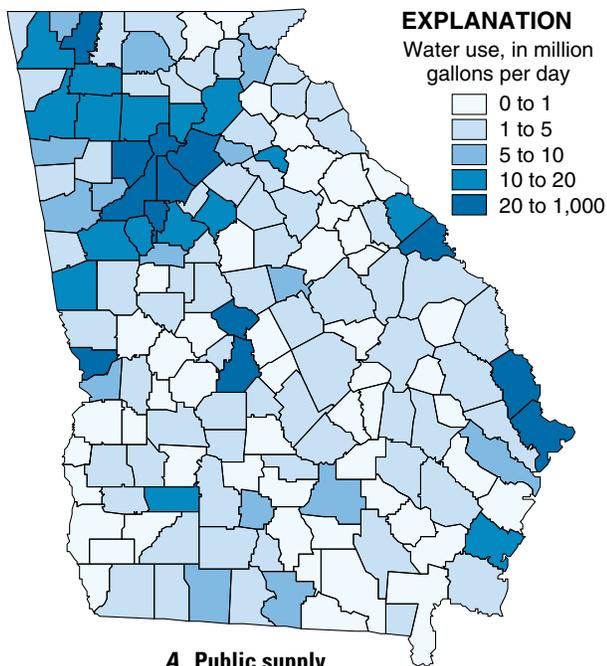


Figure 2. Water use by county in Georgia, 2000, for (A) public supply, (B) industry, (C) agriculture, and (D) thermoelectric power.

Industrial water-use estimates for 1950 and 1955 are not available because industrial use included thermoelectric and commercial use for those years. However, during 1980–2000, industrial water use remained steady (Fig. 5B).

The trend in agricultural water use is dominated by the growth of irrigation, which constitutes 99 percent of

2000 use. Irrigation water use increased rapidly between 1975 and 1980 because of the introduction of the center-pivot irrigation system. During 1980, irrigation water use was nearly 580 Mgal/d, a 12-fold increase since 1950. Irrigation water use declined between 1980 and 1990, and increased between 1995 and 2000. Estimated

irrigation use was nearly 35 percent larger for 2000 than for 1995 (Fig. 5C). The increase in 2000 was largely because of increased irrigation demands resulting from the prolonged drought that began during 1998 (Georgia Department of Natural Resources, 2000). Livestock water use has remained steady during the same period.

Thermoelectric-power water use is the largest water-use category in Georgia. Major changes in thermoelectric use are caused by new power plants being brought online, or old ones being retired. Although use peaked during 1980 and declined through 1985, thermoelectric-power water use has been increasing since 1990 (Fig. 5D).

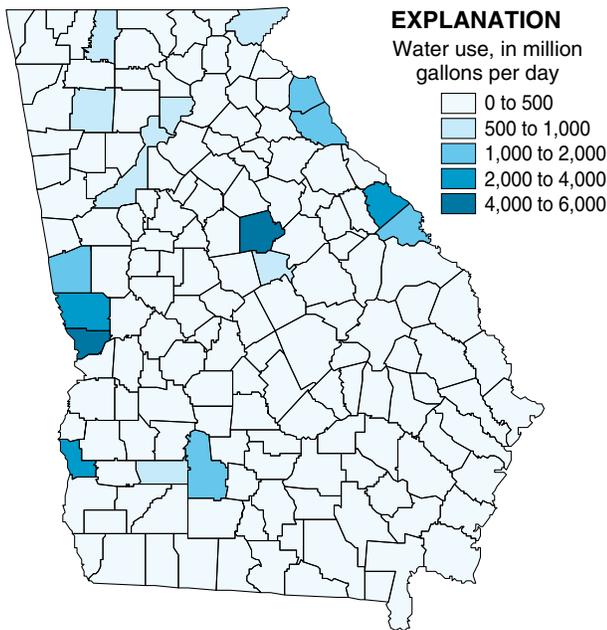


Figure 3. Water use by county in Georgia, 2000, for hydroelectric power.

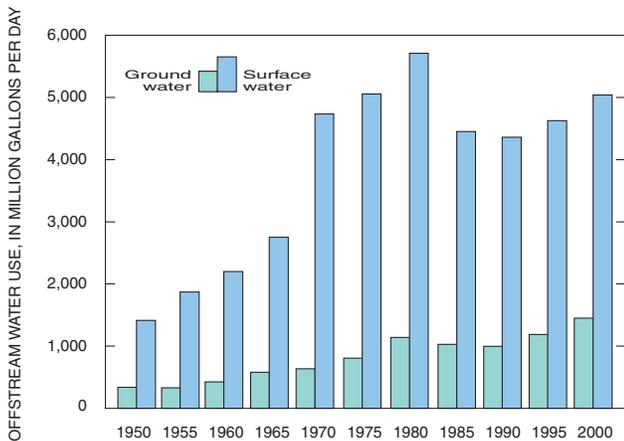
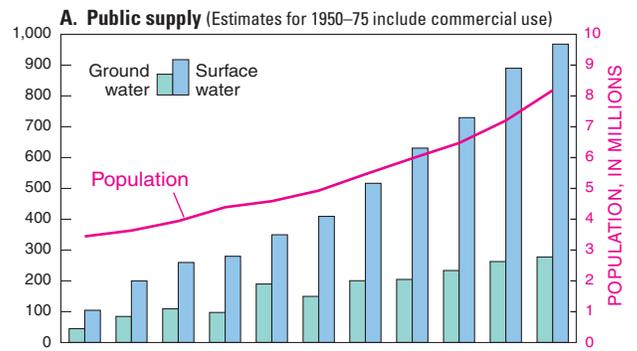
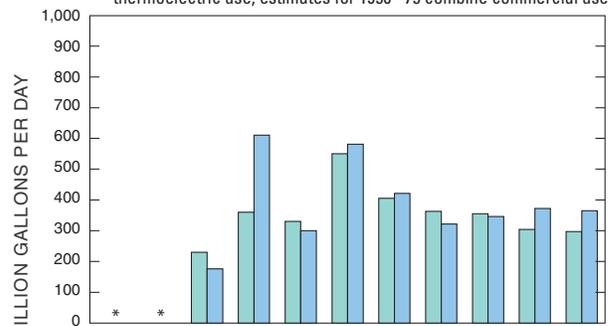


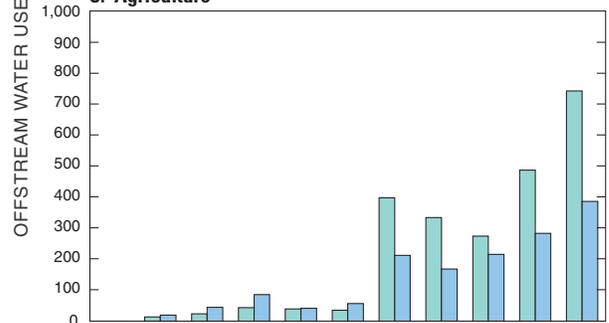
Figure 4. Total offstream water use for all categories in Georgia, 1950–2000.



B. Industrial (*Estimates for 1950 and 1955 combine industrial and thermoelectric use; estimates for 1950–75 combine commercial use)



C. Agriculture



D. Thermoelectric power (*Estimates for 1950 and 1955 combine industrial and thermoelectric use)

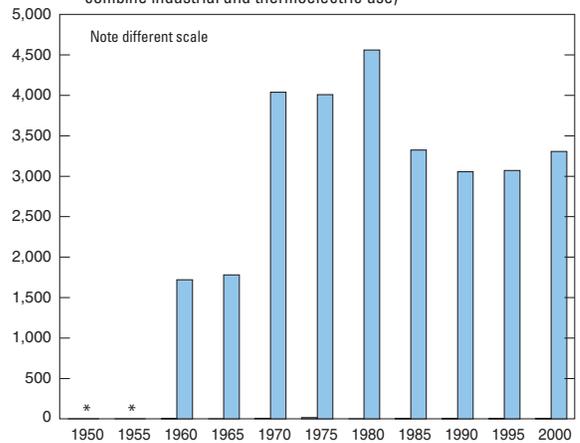


Figure 5. Water use in Georgia, 1950–2000, for (A) public supply; (B) industrial; (C) agriculture; and (D) thermoelectric power.

Hydroelectric-power water use is an instream use and is the only instream use estimated by the GWUP in Georgia. During 1985–1995, hydroelectric-power water use increased. However, because hydroelectric-power water use is dependent on the availability of surface-water flow, low-flow conditions related to drought during 1995–2000 resulted in a 19,000 Mgal/d decrease in usage from 1995 (Fig. 6).

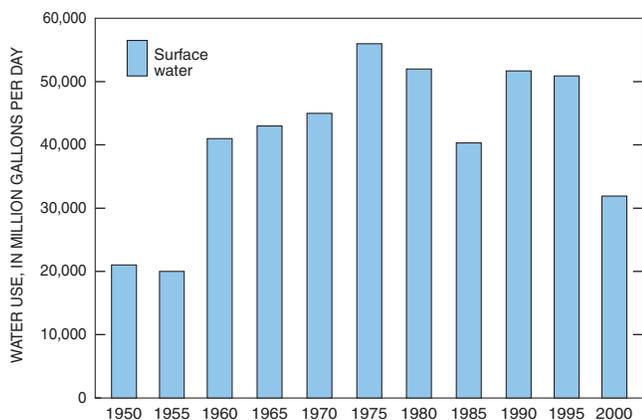


Figure 6. Hydroelectric-power water use in Georgia, 1950–2000 (note different scale than figures 4 and 5).

For additional water-use data, please contact the U.S. Geological Survey, Georgia Water-Use Program, Suite 130, Peachtree Business Center, 3039 Amwiler Road, Atlanta, GA 30360-2824.

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