HYDROLOGIC STREAMFLOW CONDITIONS FOR GEORGIA, 2007

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Abstract. The United States Geological Survey (USGS) Georgia Water Science Center (GaWSC) maintains a long-term hydrologic monitoring network of more than 260 real-time streamflow stations and more than 100 noncontinuous streamflow and water-quality sampling stations throughout Georgia. One of the many benefits of the data collected from this monitoring network is that it allows for the analysis of the overall hydrologic condition of the rivers and streams of Georgia. The following figures were developed using daily, monthly, and yearly statistics from the 2007 Georgia Water Science Center Annual Data Report (ADR). Electronic ADRs from 1999–2007 can be viewed online at *http://ga.water.usgs.gov/pubswdr.html*. The 2007 hydrologic streamflow conditions Fact Sheet can be viewed online at *http://pubs.usgs.gov/fs/2008/3099/*.

HYDROLOGIC CONDITIONS

The hydrologic condition of a stream is determined through statistical analysis of data from the current water year compared to historical data collected at long-term streamflow stations. During the 2007 drought, the USGS GaWSC made significant efforts to verify and document the numerous historic instantaneous low flows at many of the streamflow stations (Fig. 1) and also characterize the 2007 water year streamflow conditions as compared to other historical droughts in Georgia.

The 2007 water year was an extremely dry year and was classified as "severe" to "exceptional" drought with the most extreme conditions occurring in northern Georgia (Fig 1).

The current drought started in the spring of 2006. The 2007 winter season had below normal rainfall and drought conditions continued into the spring, resulting in emergency water conservation efforts by Federal, State and local water authorities. Historically, droughts in Georgia can last between 2 to 5 years. Streamflow data from the 2007 water year indicates this is one of the worst droughts on record as compared to drought periods of 1955, 1988, 2000 and 2002 (Fig. 2).

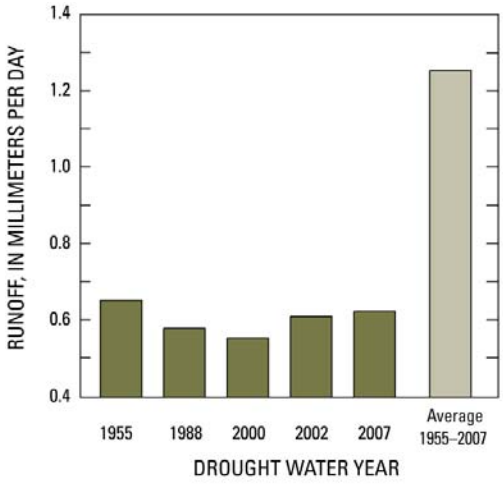

Figure 2. Runoff is average streamflow per unit area, or streamflow yield. Runoff for 2007 was computed from 167 streamflow gages in Georgia. The median runoff average is shown for several drought years. The median runoff for 2007 was one-half of the average of the medians from 1955 to 2007.

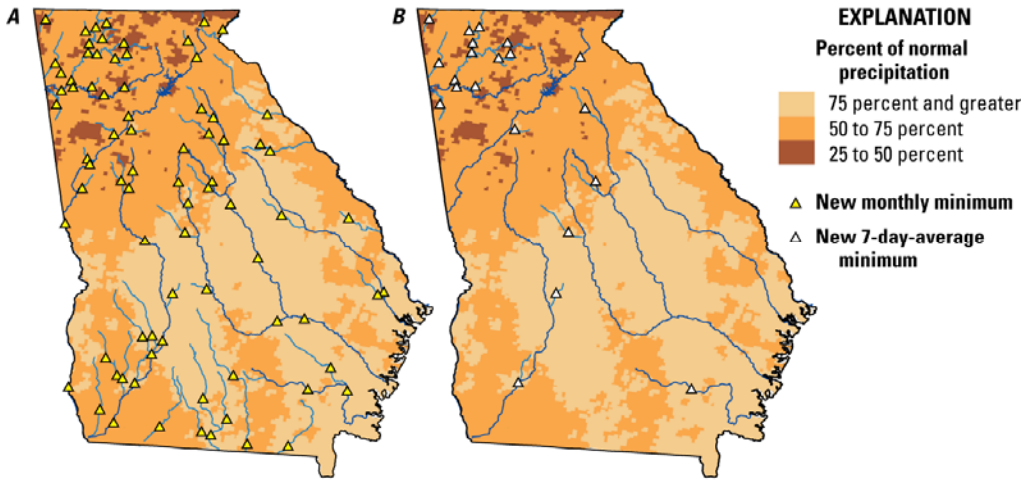

Figure 1. North Georgia received less than 75 percent of normal precipitation (30-year average). *(A)* New record low monthly streamflows occurred at 80 of 101 stations with 20 or more years of record. *(B)* New record low 7-day- average streamflows occurred at 21 of 101 stations with 20 or more years of record.

SEVEN DAY AVERAGE AND DAILY DISCHARGE

Peachtree Creek is highly urbanized with 30 percent impervious area. The daily discharge hydrograph (Fig. 3*A*) shows high peak discharges during storm events due to urbanization.

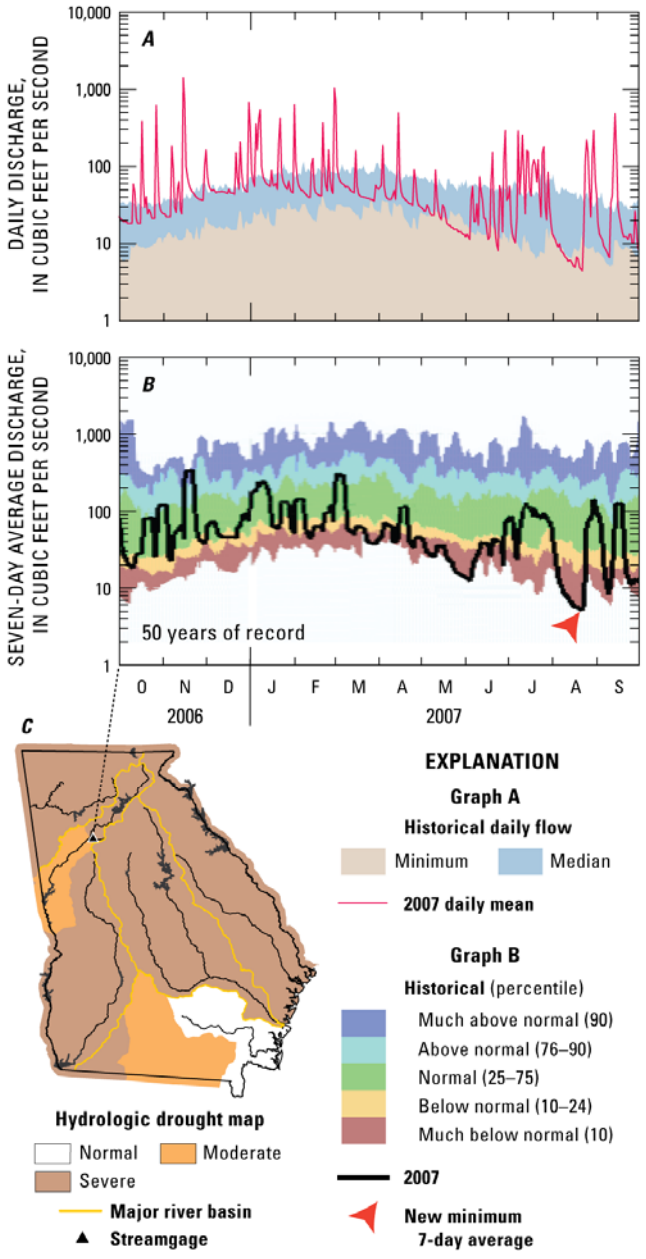

Figure 3. Hydrographs show *(A)* 2007 daily mean streamflow as compared to historical minimum and median streamflow for the entire period of record, in cubic feet per second; and *(B)* the 7-day average for 2007 as compared to historical 7-day averages. Data are categorized in ranges from "much above normal" to "much below normal." Hydrologic drought map *(C)* shows 7-day average streamfow conditions September 20–26, 2007. This map represents conditions in the context of all historical data. (*http://water.usgs.gov/waterwatch/*)

Summer showers did not bring enough relief to overcome several months of "much below normal" stream-flow (Fig 3*B*). A new historic low daily discharge was recorded in August, and runoff was about half of the annual average. Rainfall recorded at the gaging station was about 20 inches less than average annual rainfall for the watershed.

LAKES AND RESERVOIRS

Reservoirs in Georgia are multipurpose lakes that provide flood protection, power generation, water supply, navigation, recreation, and fish and wildlife management. Reservoirs operate at the highest level possible for all these purposes when water levels are close to the top of conservation or "full pool," which may vary from summer to winter. Reservoir levels declined with low streamflow conditions during the 2007 water year, and by August and September some of the major water-supply reservoirs receded towards historic low pool elevations. These reservoirs—most operated by the U.S. Army Corps of Engineers and the Southern Company—had water levels that were among the lowest recorded since the impoundments were constructed. Lake Lanier, for example, experienced 12 percent more outflow than inflow during the 2007 water year (*http://lanier.sam.usace.army.mil/* accessed on June 13, 2008). Lake Lanier's historic low occurred during December 1981, at a pool elevation of 1,052.66 feet. By the end of September 2007, Lake Lanier was at a pool elevation of 1,058 feet, more than 12 feet below full pool (Fig. 4). Precipitation deficits and shortages of surface-water supplies resulted in emergency water-conservation efforts by both State and local authorities, similar to those during the drought of 1986. Sustained droughts in Georgia have further emphasized the necessity for having accurate water-resources information to aid in watershed management, conservation efforts, and reservoir operations.

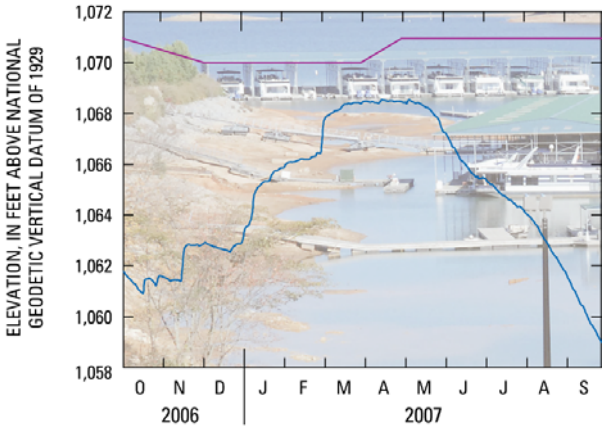

Figure 4. Pool elevation of Lake Sidney Lanier for the 2007 water year.