

Hydrologic Streamflow Conditions for Georgia, 2007

The U.S. Geologic 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 stations throughout Georgia. This network is operated by the USGS GaWSC in cooperation with more than 50 different partners at Federal, State, and local government levels. One of the many benefits of data collected from this monitoring network is that it allows for the analysis of the overall hydrologic condition of streams and lakes of Georgia.

Hydrologic Conditions

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

The 2007 water year was an extremely dry year and was classified by the State climatologist as a “severe” to “exceptional” drought with the most extreme conditions occurring in northern Georgia. Current drought conditions 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 previous drought periods of 1950–1957, 1985–1989, 1999–2002.



Lake Lanier’s historic low occurred during 1981, at an altitude of approximately 1,051 feet. By the end of September 2007, Lake Lanier was at an altitude of 1,058 feet, more than 12 feet below full pool. (Photo by Brian E. McCallum, USGS.)

Streamflow Data

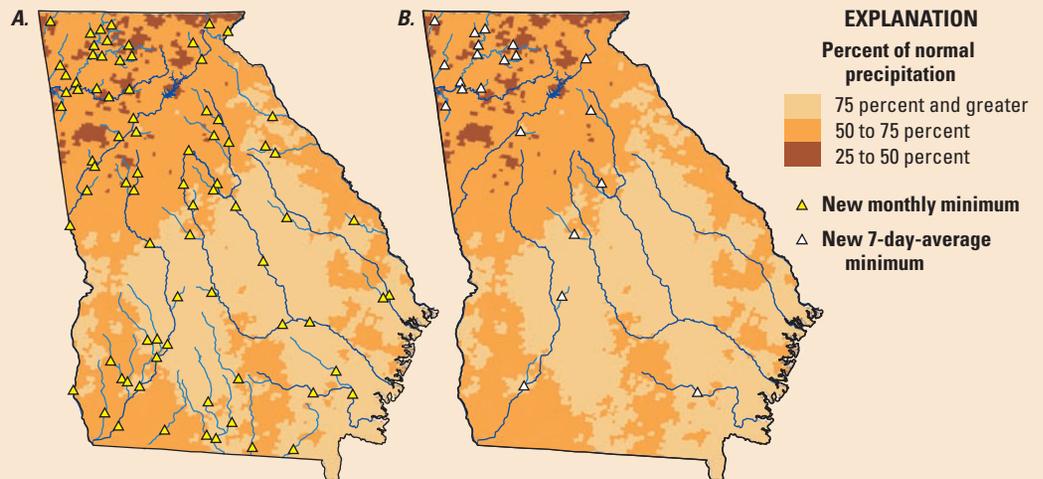
The Annual Data Report (ADR) is a publication of USGS data collected at all real-time gaging stations, measurement-only stations, peak flow stations and water-quality monitoring stations in the State for a given water year. An electronic map interface of the streamflow monitoring network allows users to view and access current and historical data with graphics and photographs. The following figures were developed using daily, monthly, and yearly statistics from the 2007 GaWSC ADR. Electronic ADRs from 1999–2007 can be viewed online at <http://ga.water.usgs.gov/pubswdr.html>

New Historic Minimums

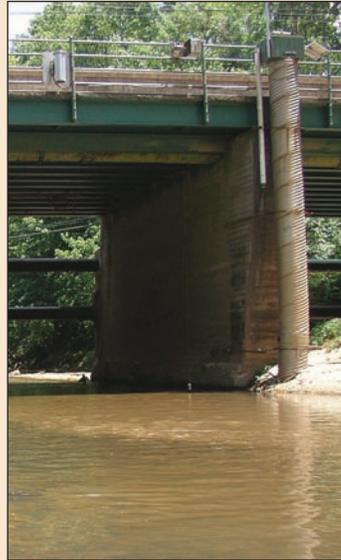
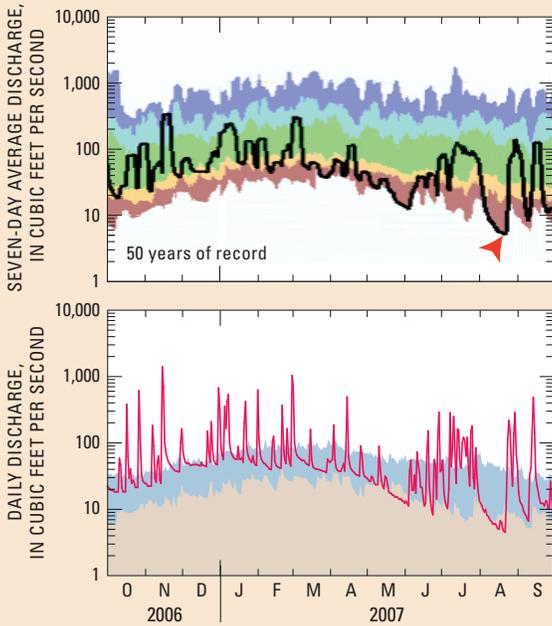
North Georgia received less than 75 percent of normal precipitation (30-year average).

(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.

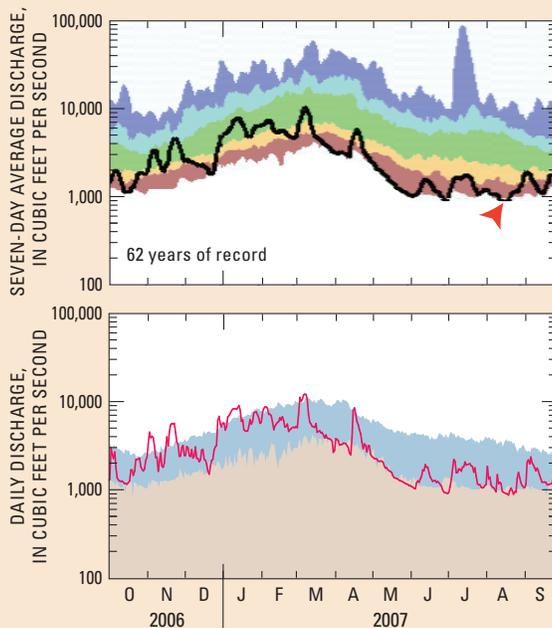


Peachtree Creek at Atlanta



Peachtree Creek is highly urbanized with 30 percent impervious area. The daily discharge hydrograph shows high peak discharges during storm events due to urbanization. Summer showers did not bring enough relief to overcome several months of “much below normal” streamflow. 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. (Photo by Christopher A. Smith, USGS.)

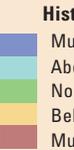
Flint River near Newton



The Flint River joins the Chattahoochee River at Lake Seminole in southwestern Georgia to form the Apalachicola River. “Much below normal” streamflow was observed from March 2007 to September 2007. New historic low daily discharge was recorded in May and August, and runoff was about half of the annual average. Rainfall recorded at the gaging station was about 15 inches less than average annual rainfall for the watershed. (Photo by Brian E. McCallum, USGS.)

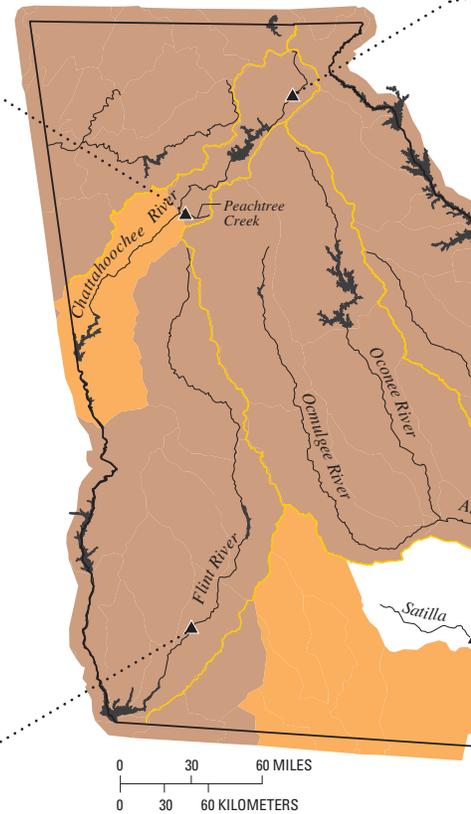
Hydrographs: Seven-Day Average

Hydrographs show 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.”



Hydrographs: Daily Discharge

Hydrographs shows 2007 daily mean streamflow as compared to historical minimum and median streamflow for the entire period of record, in cubic feet per second.



Runoff

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.

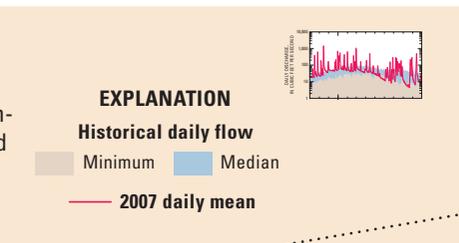
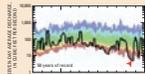
Discharge

EXPLANATION

- Historical (percentile)
- 100 (much above normal)
- 90 (much above normal)
- 76-90 (above normal)
- 25-75 (normal)
- 10-24 (low normal)
- 10 (much below normal)

— 2007

▲ New minimum 7-day average



Hydrologic Drought Map— Seven-day average streamflow conditions September 20–26, 2007

This map represents conditions in the context of all historical data.

Only stations having at least 30 years of record are used.

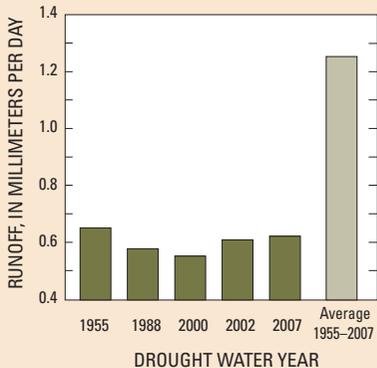
(<http://water.usgs.gov/waterwatch/>)



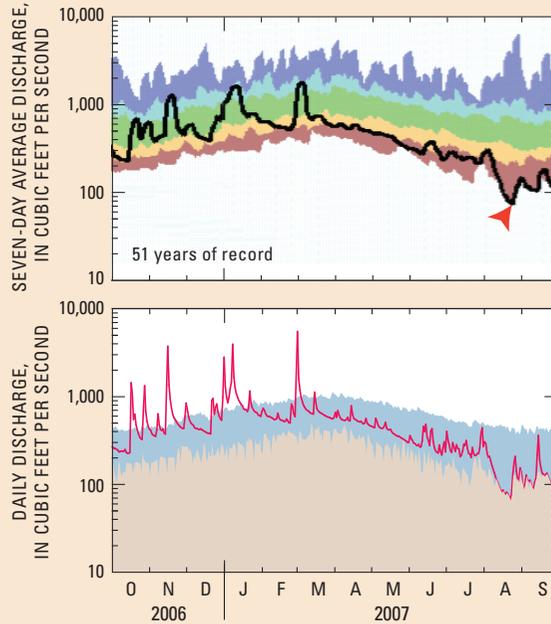
EXPLANATION

Hydrologic drought

- Normal
- Moderate
- Severe
- Major river basin
- Streamgage

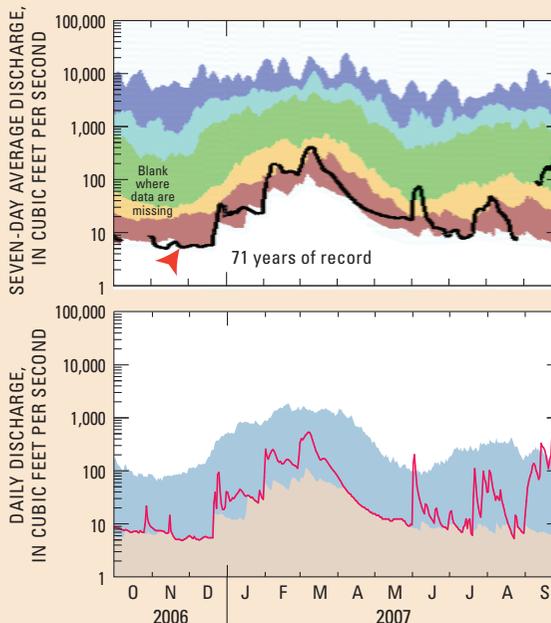


Chattahoochee River near Cornelia



The Chattahoochee River is the primary inflow for Lake Sydney Lanier in North Georgia. “Much below normal” streamflow was observed from March 2007 to September 2007. New historic low daily discharge was recorded in August and September, and runoff was about two-thirds of the annual average. Rainfall recorded at the gaging station was about 28 inches less than average annual rainfall for the watershed. (Photo by Christopher A. Smith, USGS.)

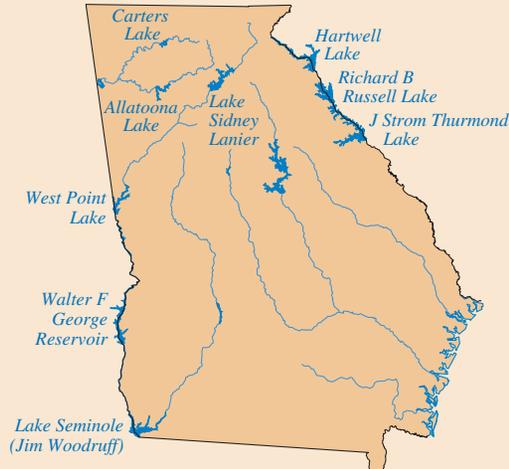
Satilla River near Waycross



The Satilla River is located in the southeastern coastal plain of Georgia. “Much below normal” streamflow was observed from October 2006 to August 2007. New historic low daily discharge was recorded in November, December, January, April, and May, and runoff was about 90 percent lower than the annual average. Rainfall recorded at the gaging station was about 10 inches less than average annual rainfall for the watershed. (Photo by Gregory B. Donley, USGS.)

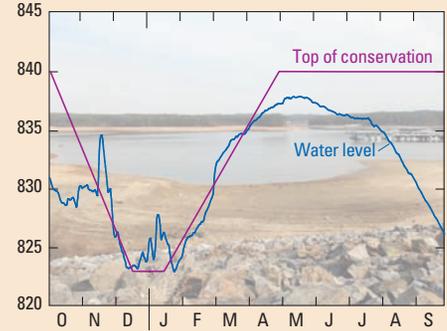
Lakes and Reservoirs

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. 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.

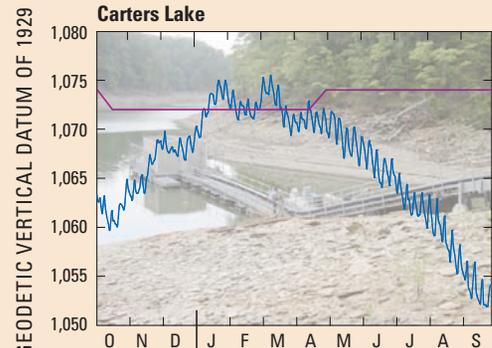


Reservoir	Full pool elevation		Lowest observed pool elevation during water year 2007
	Winter	Summer	
Feet above National Geodetic Vertical Datum of 1929			
Apalachicola–Chattahoochee–Flint River Basin			
Lanier Sidney Lanier	1070.0	1,071.0	1,058.84
West Point Lake	628.0	635.0	623.36
Walter F. George Reservoir	188.0	190.0	184.90
Lake Seminole	77.5	77.5	75.78
Alabama–Coosa–Tallapoosa River Basin			
Allatoona Lake	823.0	840.0	822.92
Carters Lake	1072.0	1,074.0	1,051.80
Savannah River Basin			
Hartwell Lake	656.0	660.0	651.66
Richard B. Russell Lake	475.0	475.0	472.63
J. Strom Thurmond Lake	326.0	330.0	320.30

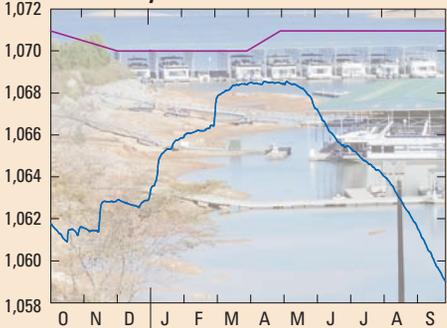
Lake Allatoona



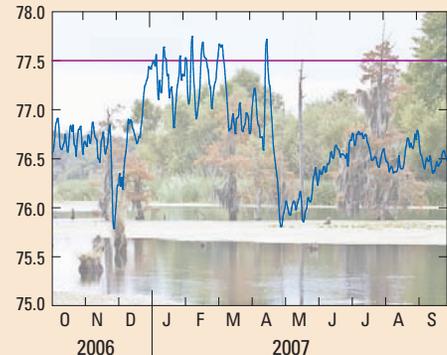
Carters Lake



Lake Sidney Lanier



Lake Seminole



References

- Precipitation maps modified from National Oceanic and Atmospheric Administration, accessed on June 2, 2008, at http://water.weather.gov/index.php?layer%5B%5D=0&layer%5B%5D=1&layer%5B%5D=3&layer%5B%5D=4&timetype=YM&loctype=STATE&units=engl&timeframe=current&timeYYYY=2007&timeMM=13&timeDD=1&product=per_normal&loc=stateGA
- Seven-day-hydrograph data from U.S. Geological Survey, accessed on August 1, 2008, at http://water.usgs.gov/waterwatch/?m=sitedur&r=ga&w=pa07d_dry%2Cmap
- Hydrologic drought map from U.S. Geological Survey, accessed on September 27, 2007, at <http://water.usgs.gov/waterwatch/?m=dryw&r=ga>
- Runoff data from U.S. Geological Survey, accessed on August 1, 2008, at <http://water.usgs.gov/waterwatch/?m=statesum&r=ga&w=statesum%2Cmedian>
- Reservoir data from U.S. Army Corps of Engineers, accessed on June 13, 2008, at <http://water.sam.usace.army.mil/>

by Andrew E. Knaak and John K. Joiner

Design and layout by Bonnie J. Turcott and Garyl J. Wipperfurth

For more information contact:
 Director, USGS Georgia Water Science Center
 3039 Amwiler Road, Suite 130
 Atlanta, Georgia 30360
 770-903-9100

Or visit the following Web sites:
<http://ga.water.usgs.gov>
<http://www.usgs.gov>