

Streamflow information during droughts and its relation to water supply in North Carolina

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North Carolina has been plagued by droughts in the 21st century. In August 2002, all of North Carolina was classified in drought with about 34% of the state categorized in exceptional drought. In August 2008, the majority of the state is once again classified in drought conditions, with much of the western portion of North Carolina categorized as exceptional (<http://drought.unl.edu/dm/archive.html>). On August 12, 2008 the French Broad River at Asheville recorded the lowest streamflow ever at this site, operational since October 1895. To facilitate evaluation of hydrologic conditions the U.S. Geological Survey (USGS) monitors and reports streamflow and ground-water conditions at approximately 275 streamgaging stations and 60 observation wells across North Carolina (<http://nc.water.usgs.gov/info/h2o.html>). During droughts and floods, the availability of real-time hydrologic data at selected sites provides immediate access to understanding current conditions (<http://water.usgs.gov/waterwatch/>). The availability of this information in real-time manner has come to be regarded as essential to state and local officials responsible for implementing responses to natural hazards. As the drought conditions of 2007-08 have deepened in North Carolina during summer 2008, concerns about water supply have increased for state and local officials seeking to best manage current supplies and to preserve or increase future availability. As of August 2008, a total of 346 of 641 of public water supply systems (nearly 54 percent) in North Carolina are on voluntary or mandatory water conservation (http://www.ncwater.org/Drought_Monitoring/reporting/displaystate.php), which affect the water use of 5.2 million residents (about 77 percent of those served by public water systems). The most common or perhaps bottom-line question from many people affected by drought conditions is, "What does this drought mean for me?" One of the primary effects arising from droughts is the availability of water supply. Whether it's a farmer needing water for crop production, an industry trying to adjust water use for the manufacture of products, or a resident in a suburban community meeting his household needs, the availability of water generally becomes the foremost issue of concern. The availability of real-time streamflow data is critical for understanding current conditions during droughts. For example, the provisional daily mean discharge at USGS Station 02085500, Flat River at Bahama in Durham County, for July 31, 2008 is 0.35 cubic foot per second (cfs), equivalent to 0.54 million gallons per day (Mgal/d). On the same date, the City of Durham reports that about 6.4 Mgal were withdrawn from Lake Michie, an impoundment of the Flat River downstream of the Bahama streamgaging station, meaning that flows at the upstream site were about 8 percent of the withdrawn amount. Although the storage available in Lake Michie serves the purpose of augmenting available water for supply, it quickly becomes clear that such trends cannot be maintained by communities during periods of extended low streamflow rates. During July 2008, the median percentage of streamflows to withdrawal amounts was 82 percent, meaning that more water was coming from storage in the lake rather than inflow. This example serves to highlight the relationship between streamflow and water use or availability.