Oral Presentation

Investigation of Flow Losses in the Cape Fear River between B. Everett Jordan Lake and Lillington, North Carolina

Presenter: J. Curtis Weaver, Hydrologist, USGS North Carolina Water Science Center, 3916 Sunset Ridge Rd, Raleigh, NC 27607; tel. (919) 571-4043 jcweaver@usgs.gov

The U.S Army Corps of Engineers is required to meet a target flow of 600 cubic feet per second during normal flow conditions measured at a long-term gaging station on the Cape Fear River at Lillington (USGS Station 02102500) in Harnett County, about 25 miles downstream from B. Everett Jordan Lake dam. Inspection of previous years' record indicates that streamflows measured on some days at the Lillington gage are less than the sum of the upstream flow releases from Jordan Dam and measured streamflows at another long-term gaging station on the Deep River at Moncure (USGS Station 02102000) in Chatham County. The U.S. Geological Survey is investigating the hydrology of the Cape Fear River reach between B. Everett Jordan Lake and Lillington to understand possible causes of these flow losses.

Flow losses in a river reach can be categorized into one of two types: real or apparent. Real losses are based on consumptive use somewhere within the intervening drainage area or presence of a losing reach due to natural factors (underlying geology). Apparent losses are reflective of flow dynamics that occur primarily as a result of diversion through a canal adjacent to the Cape Fear River, storage or flow regulations caused by the dams, and/or measurement error at observation points.

Data collected during the study has included synoptic discharge measurements at 25 locations and continuous discharge and stage records at gages downstream of Jordan Dam and at Buckhorn Dam, respectively. Groundwater data has been collected via operation of two piezometer transects (to examine head differences between groundwater and river level), completion of a magnetometer survey to assess possible diabase dikes (underlying geologic features), and distributed temperature survey using fiber-optic technology in a 500-meter reach of the Cape Fear River near Raven Rock State Park. Ratings analyses for the two long-term gaging stations as well as evaluation of flow and water-use patterns also are being completed as part of the investigation.