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## News Release

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# A "Ground-Water Budget" for Frederick County

How much high-quality ground water is available in Frederick County, Virginia? What will happen to ground-water levels and streamflow when more and more water is pumped to supply the increasing population? How does the karst geology affect the area's streams and ground water?

Since 2000, the USGS has been working with Frederick County to find answers to these questions.

Previously, the only scientific guidance on ground-water resources available to county managers and planners was an estimate of annual ground-water recharge (precipitation that percolates down through the ground to the water table). That estimate was about 8 inches per year for the entire Valley and Ridge region. More useful for local ground-water management, however, is a range of expected values, particularly for periods of drought, that is specific to the water-supply aquifer. In Frederick County, the carbonate aquifer system of the northern Shenandoah Valley is a main source of water.

The USGS study provided new recharge estimates for the carbonate aquifer system for 2001-02, the end of an extended drought period; the estimates ranged from 3 to 5 inches. USGS also calculated "water budgets" for the Cedar Creek and Opequon Creek watersheds. (Water budgets are estimates of how much precipitation evaporates or is taken up by plants (evapotranspiration), and how much goes to streams or enters ground-water storage. In 2001 in Cedar Creek watershed, most (26 inches) of the below-normal annual rainfall of 33 inches went to evapotranspiration, and ground-water storage decreased by almost 2 inches over the year. In 2002, when rainfall was above normal at 41 inches, evapotranspiration accounted for 31 inches, and ground-water storage increased only about an inch over the year.

These and other estimates from the ongoing USGS study provide managers and planners with values that may be expected during prolonged drought conditions in the region. George Harlow, principal USGS scientist on the study, credited the study's success to the cooperation of many citizens and officials in the region, and also to cooperation among USGS scientists. "This is the first study in the Valley where hydrologists worked closely with geologists. We quickly recognized that we needed to understand the geology to understand the ground-water-flow system in the area," Harlow said.

*Hydrogeology and Ground-Water Availability in the Carbonate Aquifer System of Frederick County, Virginia*, USGS Scientific Investigations Report 2005-5161 by George E. Harlow, Jr., and others, can be obtained by calling 1-888-ASK-USGS or by visiting <http://pubs.water.usgs.gov/sir20055161/>.

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