

Simulation of Water Use Increases and Potential Climate Change on the Ground-Water Availability of Southeastern New Hampshire

*Thomas J. Mack, P.G., P.H.
US Geological Survey
tjmack@usgs.gov
Pembroke, New Hampshire, USA*

ABSTRACT

The State of New Hampshire and the U.S. Geological Survey have investigated the availability of ground-water resources in a 160-square mile area of coastal New Hampshire. Population growth, increasing water demand, and potential climate change have prompted concern for the sustainability of the region's ground-water resources. The study area is underlain by a fractured-crystalline bedrock-aquifer system and water use is expected to increase by 30 percent over the next 20 years. A ground-water flow model was developed that incorporates detailed water-use information and used inverse techniques, with observations of head and discharge, to estimate bedrock-aquifer properties, seasonal recharge, and parameter sensitivities. Simulations indicated that increasing water use, in addition to potential increases in sewered areas, will result in decreases in water availability. Rising temperatures, associated with predicted climate change, will likely shift the spring recharge period 2 to 4 weeks earlier in the year. This shift in peak recharge may reduce the ground-water availability in the summer months and, together with longer periods of evapotranspiration in the spring and fall, ultimately reduce the annual total recharge. The impacts of increasing water use and potential climate change may negatively affect ground-water levels and baseflows to streams in the future.

Presented at MODFLOW and More: Ground Water and Public Policy, International Ground Water Modeling Center, Golden, Co., May 19-21, 2008