THE DANE COUNTY, WISCONSIN GROUNDWATER FLOW MODEL – AN IMPORTANT NEW TOOL FOR WATER-RESOURCE MANAGEMENT

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Jim Krohelski is a supervisory hydrologist with the U.S Geological Survey in Middleton Wisconsin. For the past 20 years, he has worked to increase the understanding of Wisconsin's regional groundwater flow systems through development of groundwater flow models and field studies in the Lower Fox River Valley, Dane and LaCrosse Counties and southeastern Wisconsin. In addition to regional flow systems, his interests include groundwater/surface water interaction. He received an M.S. from the University of Massachusetts - Amherst, and a B.S. from the University of Wisconsin - Stevens Point.

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Abstract

A groundwater flow model can be a powerful scientific tool and an important unifying element for water resource planning and management. In Dane County, WI., the City of Madison and surrounding communities depend completely on groundwater for water supply and pump about 50 MGD from deep wells. Increasing groundwater use over the past century has reduced groundwater levels and diminished baseflow to streams, springs, lakes, and wetlands. Although local water-resource managers have long been aware of some of these adverse effects, they lacked a tool to quantify the complex relationships, explore management options, and illustrate the results for decision making by local politicians and the general public.

A county-wide groundwater flow model has fostered increased understanding of water issues by water-resource managers and local citizens and has provided a basis for several research projects targeting specific water-management issues. The model is being used to simulate the effects of municipal well pumping and to explore management scenarios for future development, such as alternative well siting. The model also provides a basic hydrogeologic framework for more detailed site-specific investigations. The most significant effect of current and possible future municipal water use is a reduction or reversal of groundwater flow to local lakes, streams, and wetlands. Model simulations also show that water produced by municipal wells originates as recharge within the county boundaries, and that county land-use planning is critical to maintaining groundwater quantity and quality.