



United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Water Resources Discipline
8505 Research Way
Middleton, WI 53562-3586
Phone: (608) 828-9901
Fax: (608) 821-3817
<http://wi.water.usgs.gov>

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MEMORANDUM

To: John Stolzenberg, Chief of Research Services, Wisconsin Legislative Council

From: Daniel Feinstein, USGS

Subject: Summary fact sheet on findings of regional groundwater model for Southeastern Wisconsin

The attached sheet summarizes on one page the findings with respect to sources of water to deep pumping wells in southeastern Wisconsin in the context of issues raised by the proposed Great Lakes Compact. The findings are based on modeling work conducted jointly by the Wisconsin Geological and Natural History Survey, University of Wisconsin-Extension and the U.S. Geological Survey under the auspices of the Southeastern Wisconsin Regional Planning Commission. The summary sheet is a companion to the presentations that Ken Bradbury and I will give to the legislative council on October 4th, 2006 and can be distributed freely.

Sources of Water to Deep Wells in Southeastern Wisconsin

The regional model of groundwater flow in southeastern Wisconsin* provides important information on the sources of water to shallow and deep pumping wells. This summary sheet presents some of the findings with respect to the sources of water to deep wells that are open to the sandstone aquifer.

Discharge

How much of the water currently pumped from deep wells in the SEWRPC seven-county area was originally Lake Michigan water?

None.

How much of the deep ground water in the SEWRPC seven-county area would flow toward Lake Michigan without pumping?

All ground water east of the pre-pumping (pre-1900) deep ground-water divide flowed toward Lake Michigan. Except for northwest Waukesha County and western Walworth County, all of the SEWRPC seven-county area lies east of this original pre-pumping divide. The current divide now lies about 10 miles to the west of the original location and is the boundary of a deep regional flow system that flows toward deep pumping wells instead of Lake Michigan.

Replenishment

Under pre-pumping conditions (pre-1900) only about 2.8 mgd of deep groundwater flowed from west to east under the Lake Michigan coastline of Ozaukee, Milwaukee, Racine, and Kenosha Counties. But the pumping from SEWI deep wells is 33 mgd, more than 10 times as much as the original deep flow. So it is not enough to talk about the flow of deep groundwater to Lake Michigan before pumping started. It is also necessary to talk about all the new water that is flowing toward the deep wells now. *Where is it coming from?*

How much of the water that flows toward pumping centers in the SEWRPC 7-county area to replenish water from deep pumping originates in Lake Michigan itself?

Very little comes from Lake Michigan. About 4% (1.3 mgd) of the water flowing toward pumping centers to replenish water withdrawn from the deep sandstone aquifer originates in the lake.

How much of the water that flows toward pumping centers in the SEWRPC seven-county area to replenish water from deep pumping is from anywhere in the entire Lake Michigan Basin (i.e., including all areas where rain and snowmelt move overland into streams that flow into Lake Michigan), as opposed to the Mississippi Basin (areas where overland flow is toward rivers that are tributary to the Mississippi)?

Most of the water replenishing water withdrawn from deep wells originates in the Mississippi River Basin. About 30% of 33 mgd, or about 10 mgd, is water that once flowed toward streams in the Lake Michigan Basin but now flows downward toward deep wells.

* The model was constructed by the Wisconsin Geological and Natural History Survey, University of Wisconsin-Extension, and by the U.S. Geological Survey and was funded by the Southeastern Wisconsin Regional Planning Commission through stakeholder contributions. More information on the model findings is available at the website <http://wi.water.usgs.gov/glpf/>