



# WATER FACT SHEET

U.S. GEOLOGICAL SURVEY, DEPARTMENT OF THE INTERIOR

## U.S. GEOLOGICAL SURVEY GROUND-WATER STUDIES IN WISCONSIN

### GROUND-WATER ISSUES

Ground-water sources provide about one-half of the water used in Wisconsin, excluding the water used for thermoelectric cooling. Ground-water sources serve about 70 percent of the State's population. All rural-domestic supplies and about 94 percent of the municipalities use ground water. Nearly all irrigation and stock watering are from ground water.

Aquifers in Wisconsin are grouped into three principal types—the sandstone aquifer, the Silurian-dolomite aquifer, and the sand-and-gravel aquifer. The sandstone aquifer underlies the southern two-thirds of the State and includes numerous rock formations, mostly sandstone and dolomite. Water in this aquifer usually is very hard. The Silurian-dolomite aquifer is found only along the area near Lake Michigan where it underlies the sand-and-gravel aquifer. Ground water in the Silurian-dolomite aquifer is the hardest of all ground water in Wisconsin and usually can benefit from softening. The sand-and-gravel aquifer is mostly permeable unconsolidated sediments in stream-valley alluvium and glacial deposits. The glacial deposits cover much of the State's land surface. Water from the sand-and-gravel aquifer is acceptable for nearly all uses.

Changes in land and water use have caused increasing concerns about water supplies, water quality, water-related environmental conditions, and water management. The major ground-water issues in the State are related to:

- Availability,
- Point and nonpoint pollution, and
- Natural water quality.

### U.S. GEOLOGICAL SURVEY PROGRAMS

The U.S. Geological Survey (USGS), established in 1879, is the principal source of scientific and technical expertise in the earth sciences within the Federal government. USGS activities include research and services in the fields of geology, hydrology, and cartography. The mission of the Water Resources Division of the USGS is to develop and disseminate information on the Nation's water resources. The activities of the Water Resources Division in Wisconsin are conducted by scientists, technicians, and support staff in offices in Madison, Merrill, and Rice Lake.

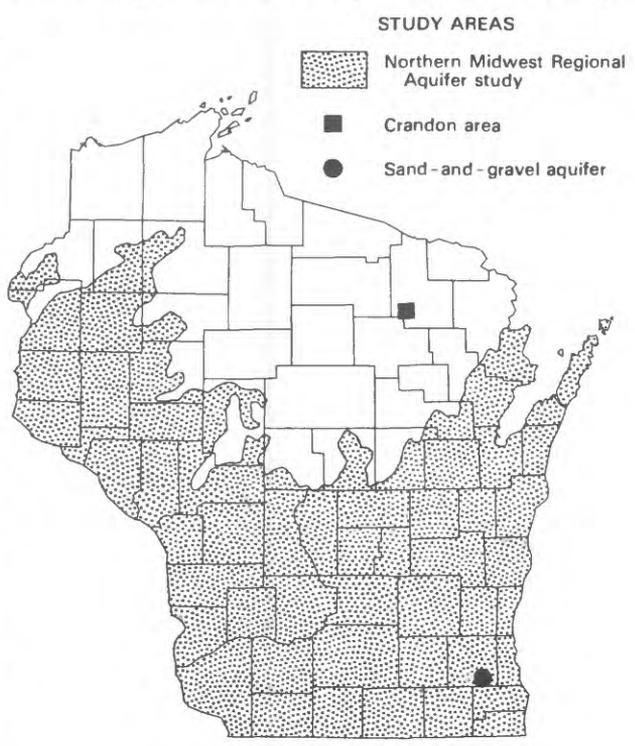
Hydrologic-data stations are maintained at selected locations throughout Wisconsin to record stream discharge and stage, reservoir and lake storage, ground-water levels, well and spring discharge, and the quality of surface and ground water. Water-resources data are stored in the USGS National Water Data

Storage and Retrieval System data base. These data are used by water planners and others involved in making decisions that affect Wisconsin's water resources.

During 1987, the USGS, in cooperation with Federal, State, and local agencies, maintained a network of about 250 observation wells in Wisconsin to monitor fluctuations in water levels. Water-level measurements from wells are used for monitoring ground-water trends; however, they need to be integrated with other investigations to be relevant and useful. Examples of USGS projects that address major ground-water issues in Wisconsin are discussed in the following sections.

### Northern Midwest Regional Aquifer Study

Increasing pumpage of ground water from the sandstone aquifer in eastern Wisconsin has caused large declines in water levels. Ground-water pumpage around Milwaukee and Waukesha Counties in southeastern Wisconsin has created an extensive cone of depression. Since pumping began, water levels have declined more than 100 feet throughout a large area. This cone of depression has merged with the cone of depression around the Chicago



area, where water levels have declined more than 850 feet. The merger of the two cones of depression has caused problems between the States of Wisconsin and Illinois relating to well interference and rights to the water. The USGS is conducting a regional study of the sandstone-aquifer system (including the Silurian dolomite) in Wisconsin, Illinois, Iowa, Indiana, Minnesota, and Missouri. Two principal objectives of the project are to describe the geologic and hydrologic characteristics of the aquifer system, and to estimate the effects of continued pumping and future pumping on the aquifer by use of a computer model. The effects of pumping on the aquifer system will be studied in detail in the Milwaukee-Chicago area. In Wisconsin, results of the study in the Milwaukee-Chicago area will be used by the Waukesha Water Utility Commission (WWUC) and the Southeastern Wisconsin Regional Planning Commission (SWRPC) to plan for alternate sources of water and more effective spacing of deep wells in the sandstone aquifer.

### Hydrology of the Crandon Area

Exploratory drilling in the Crandon area of northern Wisconsin has outlined the ninth largest zinc-lead sulfide ore deposit in the world. Mining and milling of the ore might have severe adverse effects on both ground and surface water in the surrounding area. Uncontrolled mining and milling could have serious effects on the water resources of the nearby Mole Lake Indian Reservation. This, in turn, could adversely affect the growing and harvesting of wild rice from Mole Lake owing to the probable deterioration of lake-water quality. The USGS and the Wisconsin Department of Natural Resources (DNR) entered into a cost-sharing agreement to study the hydrology of the area with the use of a computer model. The DNR will use the results of the study to assist mine developers with plans for operation that will cause minimal environmental problems.

### Sand-and-Gravel Aquifer, Southeastern Wisconsin

The sandstone aquifer in southeastern Wisconsin generally contains water that has naturally-occurring radium levels that exceed standards set by the DNR. Although this water has been used for drinking purposes for years, apparently without adverse effect, the potential health hazard cannot be entirely disregarded. The USGS, in cooperation with the WWUC, is studying ground-water availability and quality in southeastern Wisconsin. A buried valley in the bedrock is believed to contain sufficient ground water to allow reduction of pumping from the sandstone aquifer in the area. Also, any water pumped from the sand-and-gravel aquifer would not contain the objectionable levels of radium found in the sandstone aquifer. The USGS will develop a computer model of about 140 square miles of the aquifer system. The results of the study can be used by the WWUC and the SWRPC to plan redistribution of pumping between the sandstone aquifer and the sand-and-gravel aquifer, possibly slowing the water-level declines in and around the Milwaukee-Waukesha area. Water from the sand-and-gravel aquifer might also be mixed with water from the sandstone aquifer to reduce radium concentrations to more acceptable levels.

## GROUND-WATER MANAGEMENT

The principal agencies involved with the management of ground water in Wisconsin are listed below.

Wisconsin Department of Agriculture, Trade, and Consumer Protection  
Wisconsin Department of Health and Social Services  
Wisconsin Department of Industry, Labor, and Human Relations  
Wisconsin Department of Natural Resources  
    Bureau of Water Resources Management  
    Bureau of Water Supply  
    Bureau of Wastewater Management  
    Bureau of Solid and Hazardous Waste Management

During 1987, the Water Resources Division of the USGS conducted 21 studies in the State that dealt with ground water. These projects were conducted in cooperation with the following 14 Federal, State, and local agencies:

Bad River Tribal Council  
Delavan Sanitary District  
Forest County Potawatomi Community  
Lac du Flambeau Band of Lake Superior Chippewa Indians  
Menominee Indian Tribe of Wisconsin  
Oneida Tribe of Indians of Wisconsin  
St. Croix Tribal Council  
Stockbridge-Munsee Tribal Council  
U.S. National Park Service  
Vilas County Board of Commissioners  
Waukesha Water Utility Commission  
Wisconsin Department of Natural Resources  
Wisconsin Geological and Natural History Survey  
Wood County

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For further information on technical reports and data related to ground water in Wisconsin, contact:

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