

The Geology and Ground-Water Resources in Crow Wing County

The Crow Wing County Geologic Atlas is a systematic study of the county's geology and ground water. Geologic studies (Part A) were published by the Minnesota Geological Survey (MGS) in 2004. Ground-water studies (Part B) by the Minnesota Department of Natural Resources, Division of Waters (DNR Waters), will be published in summer 2007. See page 2 to order an atlas or obtain more information.

What Are the Results to Date in Crow Wing County?

Water sample chemistry reports have been mailed to the owners of 74 wells that were sampled in 2005. Elevated arsenic concentrations were found in some wells (three of 74 wells). The health risk limit for nitrate identified by the Minnesota Department of Health is 10 milligrams per liter. Only one of the sampled wells had a nitrate value above the limit.

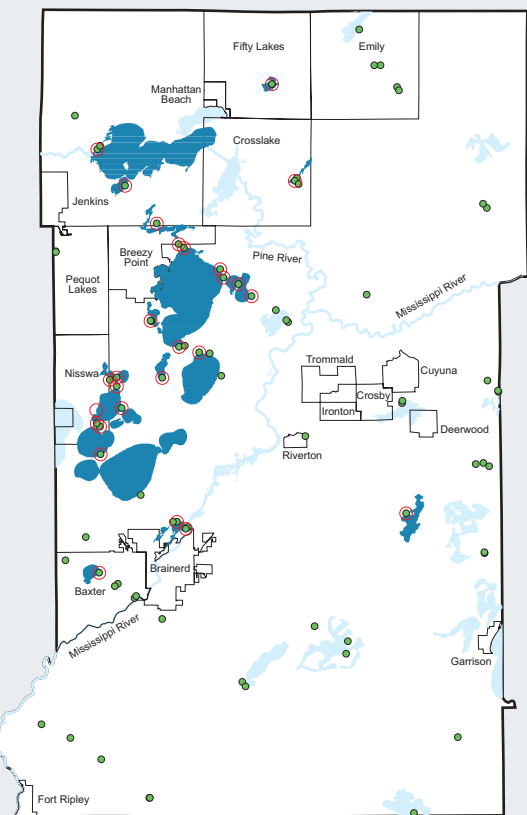
A preliminary map of the water table, which shows ground-water flow, is completed. Using the database of available well logs, DNR staff created 75 cross sections spaced 1 kilometer apart to map subsurface aquifers. Mapping of these buried aquifers is nearing completion.

Water samples from 70 wells were analyzed for tritium. These data showed that 31 samples (44 percent of the total) were more than 50 years old, 25 samples (36 percent) were less than 50 years old, and the remaining 14 samples (20 percent) contained a mixture of younger and older waters. Younger, more recently recharged water is more sensitive to pollution than older water. Water less than 50 years old was most common to a depth of about 100 feet but was found in samples from wells as deep as 200 feet.

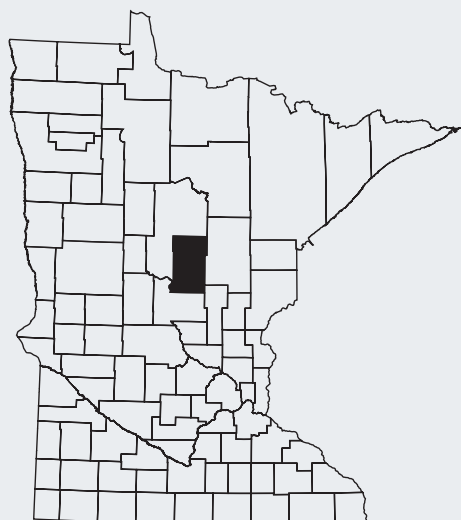
Thirty Lakes Watershed District provided funds for additional stable isotope and general chemistry sample analysis. With these funds, 31 additional lake water samples and 10 additional ground-water samples were collected for analysis. The stable isotopes of oxygen and hydrogen will be used to determine whether the ground water was directly recharged from precipitation or resided in surface water (such as a lake) for some time prior to entering ground water.

Ten carbon-14 samples were collected from deep wells where no tritium was found. The carbon-14 age data indicate that the ground-water residence times for the sampled wells varied from 300 to 8000 years. This is consistent with age dates for glacial aquifers in other Minnesota counties.

Publication is scheduled for July 2007.



The green dots represent ground-water samples collected for general chemistry from 81 wells. Twenty-one lakes (dark blue) and 27 wells (red circles) had samples analyzed for the stable isotopes of oxygen and hydrogen.



Location diagram



The wellhead in the foreground and the lake in the background show that ground water and surface water are never far apart in Crow Wing County.

UPDATE
Crow Wing County Geologic Atlas
Part B—Hydrogeology and Sensitivity to Pollution
Minnesota Department of Natural Resources
December 2006

SUMMARY

Minnesota Department of Natural Resources staff began work in May 2005 to prepare Part B, Hydrogeology and Pollution Sensitivity of the Crow Wing County Geologic Atlas. The report will be published in summer 2007. Part A, Geology, was published by the Minnesota Geological Survey in 2004.

WORK REMAINING

TENTATIVE SCHEDULE

Data Collection

- | | |
|---|------------------------|
| <ul style="list-style-type: none">• Sampling of selected wells and surface waters• Water-level measurements in sampled wells | Completed
Completed |
|---|------------------------|

Report: Four map sheets compiled at 1:100,000 scale Summer 2007

- Water-table and buried aquifer hydrogeology
- Hydrogeologic cross sections
- Sensitivity to pollution
- Ground-water interaction with lakes

Publication

- | | |
|--|---|
| <ul style="list-style-type: none">• 1400 copies (1000 copies to county)• Data CD• Map and data files to county | Summer 2007
Summer 2007
Summer 2007 |
|--|---|

Training Workshop

Fall 2007 (tentative)

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PURPOSE OF THE ATLAS

The maps, databases, and other information in an atlas are used by counties and other levels of government in planning and environmental protection efforts. Atlases support good decision making for permit applications, land management planning, and the use and protection of natural resources. Atlases are used by businesses and the public.

OBTAINING A REPORT OR MORE INFORMATION

Part A - Geology
Minnesota Geological Survey
2642 University Avenue
St. Paul, MN 55114-1057
(612) 627-4780
<http://www.geo.umn.edu/mgs>

Part B - Ground Water and Pollution Sensitivity
DNR Waters
500 Lafayette Road
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