

## ***Developing and Sharing State-of-the-Art Tools***

### **What's the issue?**

Good groundwater management decisions depend on good information about the state of Wisconsin's groundwater resources. This includes long-term data on groundwater levels and groundwater quality for all regions of the state as well as the tools to predict responses of the current system to changes in pumping rates, climate, and land use change.

One of the challenges of having eight state agencies responsible for some aspect of groundwater protection is that it is possible for similar datasets and tools to be generated and stored in eight different places. At the other extreme, it is possible for one very useful dataset or tool to be generated in one place without being distributed to the other seven and their partners. Each agency works with different sets of data users, such as researchers, well drillers, consultants, or farmers. One of the central functions of the Groundwater Coordinating Council (GCC) is ensuring coordination in both the development and the distribution of state-of-the-art groundwater tools and data.

### **GCC in Action: *Springs Inventory***

[Groundwater springs \[video link\]](#) are special places where the water table reaches the land surface and overflows into streams and wetlands. Springs are critical natural resources since they supply cool, oxygen-rich water for trout and often harbor threatened and endangered species. Springs are also a window into the groundwater below the surface and they can provide a great deal of information about the chemical composition and flow of local groundwater. Springs are often well loved for their scenic beauty at public parks.

Because these special natural resources are vulnerable to groundwater pumping, the Department of Natural Resources (DNR) carefully reviews high capacity well applications involving wells constructed near springs for adverse environmental impacts. There are over 10,000 known springs in Wisconsin and it is not a simple task to determine, given a proposed high capacity well, which nearby springs need to be assessed. Correct information about the location and flow rate of each spring is critically important to have, but existing data come from many sources – some as old as 1905 – with varying levels of quality and accuracy. Springs can also be used as easy sampling points for indicators of groundwater quality.



Pheasant Branch spring in Middleton, WI.  
Photo: WGNHS

In keeping with the stated mission of the GCC to assist in the efficient management and exchange of groundwater data, GCC agencies and researchers have worked together to gather data about Wisconsin's springs into a centralized inventory for Wisconsin. In 2007, the establishment of a statewide springs database (Macholl, 2007) was a major step forward in pulling together data from disparate

sources, but unfortunately it was incomplete for large areas of the state (e.g., northeastern WI) and the accuracy of the information is unknown. New research is currently underway to systematically fill these gaps and improve the accuracy and quality of location and hydrology information. During this project, researchers are also identifying “reference springs” which can be used to identify trends in spring discharge due to climate change and nearby land use management. Accessibility to scientists, water resources managers, and the general public will be greatly enhanced by the inclusion of the springs inventory in the Wisconsin Geological and Natural History (WGNHS) web browser interface, Hydro Data Viewer.

## Other Projects in Other Places

### *Other statewide databases*



Geotechnicians at WGNHS install a new well for the Wisconsin Groundwater Monitoring Network. Photo: Jeff Miller, UW-Madison

The longest-running example of cooperative groundwater data collection is the [Wisconsin Groundwater-Level Monitoring Network](#), which has been operated jointly by the WGNHS and the U.S. Geological Survey (USGS) since 1946. Currently, the network consists of 153 wells that are actively measuring groundwater levels in 53 counties. The consistent, long-term record of groundwater levels is critical to track the impacts of high-capacity well pumping, the response of groundwater levels to droughts, the effects of land use changes in groundwater systems, and the impacts of climate change. Long-term data are also essential for calibration of regional groundwater flow models. Thanks to cooperation between multiple municipal, county, state, and federal agencies, recent network upgrades in 2012-2014 went much further than anticipated. For example, two stations in Kettle Moraine State Forest (Southern Unit) now include an interactive display which allows “citizen scientists” (park visitors) to make flow measurements using staff gages and submit the data via text message. In addition to field truthing official flow measurements, the interactive displays help engage the public and demonstrate the value of the statewide monitoring network.

Another well-established GCC database is the [Groundwater Retrieval Network](#) administered by the DNR. This system reports groundwater quality data that is required or voluntarily reported to the DNR from public and private drinking water supply wells, non-point source priority watershed projects, special groundwater studies, landfill wells, wastewater treatment facilities, and land spreading sites. DNR’s revamped GRN webpage is just one of the data sources from GCC agencies that can be accessed by searching “groundwater” at [www.dnr.wi.gov](http://www.dnr.wi.gov) and clicking the “Look Up” button.

Another source of data is the Department of Health's [Environmental Public Health Tracking](#) program, which pulls data from several sources and combines them into one public portal. The portal is free to use and accessible to everyone. Users can explore environmental health issues such as air quality, water quality, asthma, cancer, and childhood lead poisoning via tables, charts, and maps.

A recent Wisconsin Tracking initiative led to targeted environmental health outreach for the significant proportion of Wisconsinites – two out of every five households – that rely on private wells to supply their water. Until recently, many homeowners were unable to access data on the quality of well water through a centralized database. In response to this need, the [Wisconsin Well Water Quality Viewer](#) was developed and released in 2012 by UW-Stevens Point to provide a portal to display these well water data. While the portal provided rich data for much of the state, subsequent review of the portal's maps revealed data were scarce for several counties – particularly those where labs run by local health departments provided most well testing services. To investigate this issue, the Wisconsin Tracking Program convened stakeholders and the State Laboratory of Hygiene facilitated discussions among UW-Stevens Point and members of the Wisconsin Association of Local Health Departments and Boards. As a result of these efforts, staff from Eau Claire City-County Health Department were able to add their data to the portal and create maps of well water quality in their jurisdiction.

#### *Groundwater flow models*

Groundwater flow models are essential for predicting hydrologic change due pressures such as groundwater pumping, climate, or land use change. The WGNHS regularly partners with the USGS to develop and update groundwater flow models to ensure that management decisions are made using the best possible science. Recent releases include an updated version of the [Dane County model](#) and a new model for the Little Plover River in the Central Sands. These models are relied upon by both public and private practitioners as state-of-the-science products to support sound management of groundwater quality and quantity.

#### **References**

Macholl, J.A. 2007. Inventory of Wisconsin's springs. Wisconsin Geological and Natural History Survey Open-File Report 2007-003. Available at <http://wgnhs.uwex.edu/pubs/wofr200703/>