Montana Bureau of Mines and Geology
Ground-Water Assessment Program
December 2006

Program History

The Legislature established the Ground-Water Assessment Program (85-2-901 et seq.) in 1991 after considering the recommendations of a Ground-Water Task Force organized by the Environmental Quality Council in 1989. Statute specifically requires systematic **Ground-Water Monitoring and Ground-Water Characterization** to improve understanding of Montana's ground-water resources. As part of a mandate to make ground-water information widely available, the Assessment Program includes the **Ground-Water Information Center** (GWIC) database at the Montana Bureau of Mines and Geology (MBMG). The Legislature also created an interagency Steering Committee that selects study areas, addresses the need for better coordination among state, federal, and local government units, and oversees Assessment Program progress.

The Legislature recognized that ground-water information is the key to dealing with the issues shown below and decided to "*systematically assess and monitor the state's ground water and to disseminate the information..." 85-2-902(2) MCA****.***

- "Montana's citizens depend on ground water..."
- "ground-water supplies are threatened..."
- "there is **insufficient information** characterizing..."
- **"ground-water information deficiencies** are hampering..."
- "...focus on preventing ground-water contamination...but **better ground-water information** is required"
- "there is a need for better coordination among those numerous units of state, federal, and local government..."

(85-2-902(1) MCA)

Ground-Water Information Center

Data collected by the Characterization and Monitoring Programs and other ground-water projects are only useful when they become available to data users. Consequently, all data gathered by the Monitoring or Characterization Programs, many other MBMG projects, and projects managed by other agencies are stored in GWIC. Some of the data available through the GWIC website are described in the table to the right.

Some types of data available from the Ground-Water Information Center website are shown below. GWIC staff add new records and update many existing records daily. New well logs are available 2-3 weeks after receipt.

- Construction information for almost 204,200 wells.
- Results from 32,000 water-quality analyses from about 14,350 sites.
- Water-level measurements from more than 11,100 wells for periods as long as 63 years.
- Descriptions of materials encountered in more than 151,725 wells.
- Scanned images of more than 41,000 well logs.
- High-quality data for about 6,500 wells visited by Characterization Program staff

Who are GWIC customers, what do they do with data, and how can they get data?

More than 10,736 registered GWIC customers include people from all parts of Montana and about 1,450 individuals from other states. Out-of-state users are either private citizens who are considering purchasing land in Montana or consultants who have jobs in Montana. When entering the GWIC website, users are asked about who they are and what they plan to do with data that they retrieve. The table below shows who database users are and that they consistently return for more information as their data needs and projects change.

GWIC customers contact the website repeatedly for additional or updated information. Between July 1, 2005 and November 30, 2006, customers logged in almost 70,000 times. The average number of logins each month was 4,900. The data below do not include direct access to GWIC through the thematic mapper at the Natural Resources Information System (NRIS).

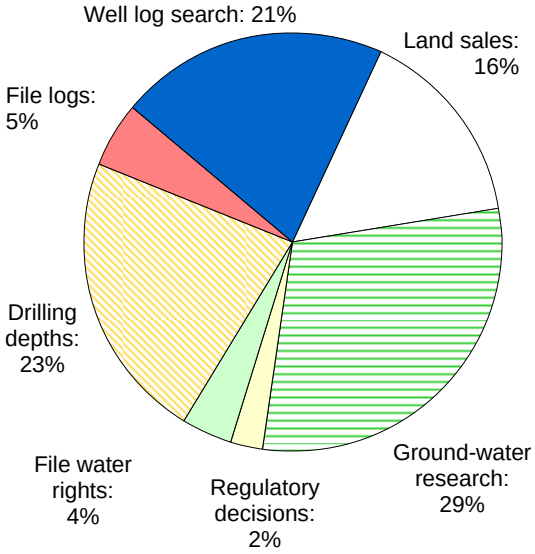
Customer group	Customers in group	Number of log-ins	Return frequency
General public (agriculture, homeowners, landowners, students)	4,782	7,059	1.5
Water well drillers	205	5,039	24.6
Industrial/commercial (real estate agents, businesses)	3,738	20,758	5.6
Consultant/scientists (engineering and technical firms)	1,844	14,231	7.7
Government/scientists (regulators and scientists)	1,782	20,659	12.1

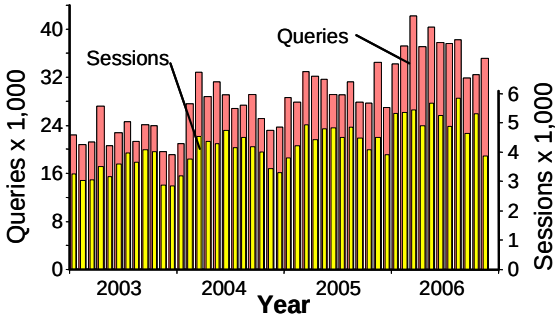
The pie-chart (right) shows how people use GWIC data. About one quarter of requests are from those who need to determine drilling depths. The need for a new well could be related to drought but is often related to residential development. About one fifth of the data is used to support subdivision of land or is needed for property sales. The ground-water research category covers many other uses including research for environmental assessments.

Usage of the GWIC website continues to increase (graph–bottom right). The ability to serve data electronically has resulted in more efficient data processing at GWIC because staff spends less time answering requests. In the 1997-98 biennium GWIC staff serviced about 200 calls each month involving copying and mailing well logs. Because most users now get data directly from the website, staff serviced only about 20 direct calls each month between July 1, 2005 and November 30, 2006. In 2005 GWIC staff began scanning well log documents so that the images could be delivered via the website. Currently there are more than 40,000 images available.

On July 1, 2004 drillers began filing well logs directly with MBMG. MBMG was also allowed to accept electronic copies of the log. In March 2004 MBMG launched “DrillerWeb”, an Internet tool that licensed water well drillers can use to file water well logs. DrillerWeb allows a driller to enter and edit data, print well log reports for their customers, manage their well log data in their own “private” account, and at the same time complete their obligation to the state. By November 2006 more than 4,100 logs had been filed through DrillerWeb.

GWIC data are put to a variety of uses by a diverse customer group.





Usage of GWIC (http://mbmggwic.mtech.edu) now averages about 4,900 sessions and 34,000 queries each month.

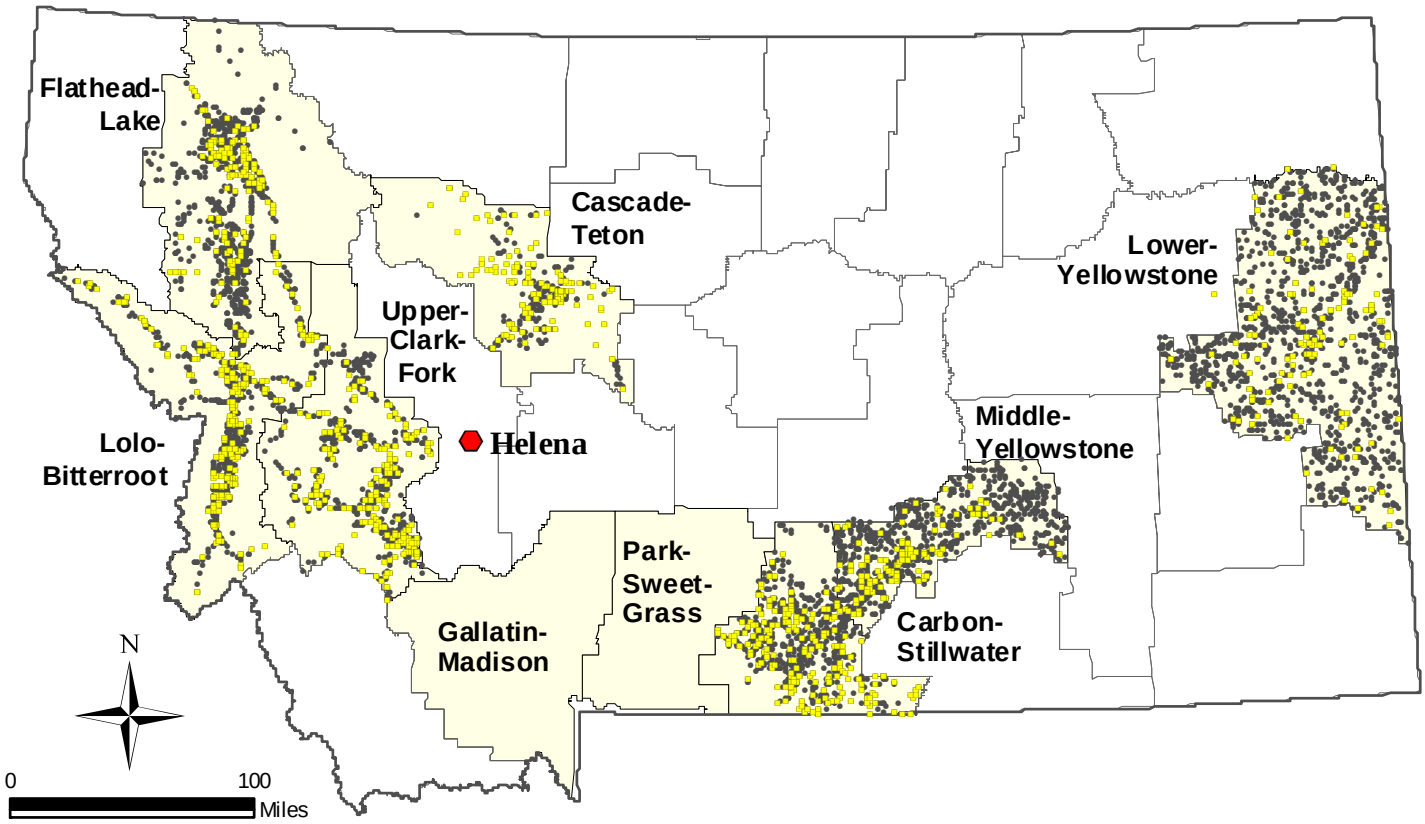
MBMG has released 36 maps describing the hydrogeology of active characterization areas. Characterization Program staff also have visited more than 6,533 wells and high-quality data from those wells are stored in the GWIC database.

- Montana Ground-Water Assessment Atlases 1, 2, and 4. Thirty one maps detailing the hydrogeology of the Lower Yellowstone River Flathead Lake, and Lolo-Bitterroot areas.
- Montana Ground-Water Assessment Atlas 3. Four of seven maps detailing the hydrogeology of the Middle Yellowstone River Area.
- Well-visit data for 310 sites and results from 162 new water-quality analyses for the Cascade-Teton county study area.
- Well-visit data for 915 sites and results from 292 new water-quality analyses for the Upper Clark Fork River Area. One map released.
- Well-visit data for 952 sites and results from 236 new water-quality analyses for the Carbon-Stillwater county study area.

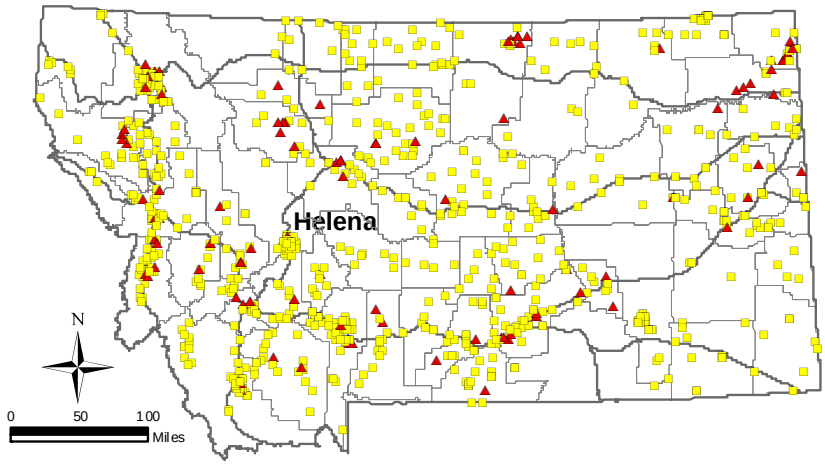
Ground-Water Characterization

At its October 2006 meeting the Ground-Water Assessment Steering Committee, decided to change the naming convention for characterization study areas. The committee decided that any study area consisting of two counties or less would be named after the counties involved. For example, the upcoming Missouri Headwaters study area is now called the Gallatin-Madison Ground-Water Characterization area. Work will begin in the Park-Sweet Grass area once work in the Gallatin-Madison area is completed.

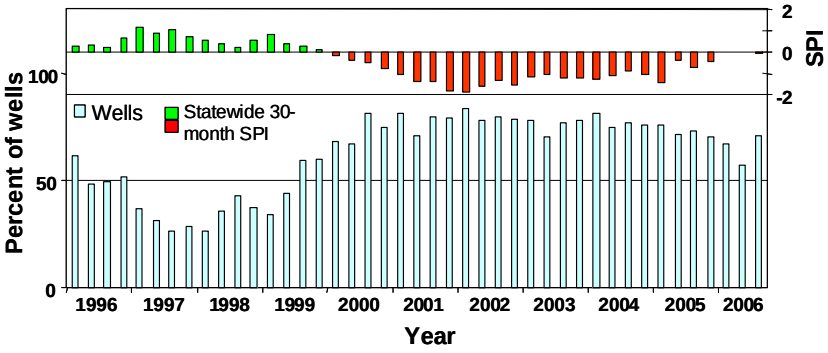
All 7 maps for the Middle Yellowstone River Area atlas are in review or released. The 10 maps for the Lolo-Bitterroot area are released and the atlas manuscript is in preparation. Data collection is complete in the Upper Clark Fork River and the Carbon-Stillwater study areas. Characterization Program maps are available through MBMG publications and the GWIC website. Since July 2005, 991 maps have been delivered by the website. Field work is ongoing in the Cascade-Teton Characterization area and work will begin in the Gallatin-Madison study area in spring 2008.



The locations for more than 6,533 visited wells (dots) and 1,405 samples (yellow squares) collected by Characterization Program staff are shown above. The Gallatin-Madison and Park-Sweet Grass characterization areas have been selected by the Ground-Water Assessment Steering Committee for future work. Field work is ongoing in the Cascade-Teton characterization area and will begin in the Gallatin-Madison area in spring 2008.



Quarterly water-level data from about 900 wells help people understand how the ground-water resource responds to climatic and other factors. Additionally, 100 water-level recorders (triangles) provide continuous or hourly data. Water-level data are available from the Ground-Water Information Center database.



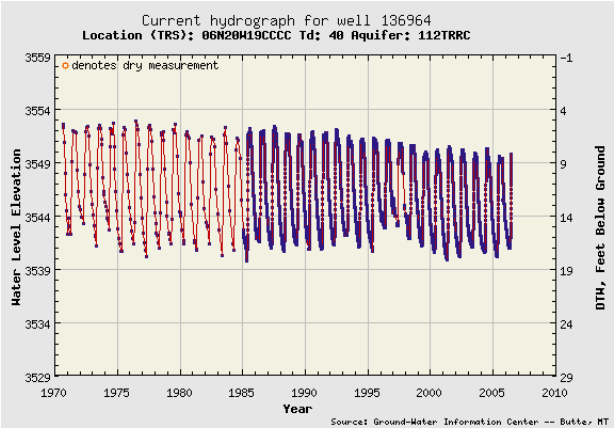
Water-level measurements show that about 75 percent of climate-sensitive network wells were below their seasonal averages in response to the recent dry period. The 30-month Standardized Precipitation Index (a drought index) has been negative (dry) since early 2000.

The Monitoring Program also creates long-term records of water quality and collects about 100 samples annually. The water samples provide new water-quality information extending periods of record in wells that have not been sampled for more than 10 years. One parameter of recent interest is tritium. Water with elevated tritium concentrations may be less than 50 years old, possibly identifying aquifers susceptible to contamination.

Water-level Monitoring

The Ground-Water Monitoring Program measures water levels in 899 wells each quarter. Long-term records of water-levels in wells are like long-term records of stream flow and provide information about how ground water responds to seasonal and climatic changes. Water levels in wells also can respond to other factors such as increased withdrawals due to population growth, or from land use change.

Information from the Ground-Water Monitoring Program helps people understand the impact of drought on water levels in wells. The chart below left shows that between 2000 and 2002 water levels in about 75 percent of 300 wells were below their seasonal averages. In late 2003 the percentage of water levels below their averages began to decrease as the climate became wetter in 2004-2006. Detailed analysis of the data often provides clues to why water levels have changed. A report describing where and how much water-levels have changed is available from the GWIC website. Since July 2005, more than 5,600 copies have been downloaded. Water levels can also show the connection between surface and ground water. The hydrograph below shows that water levels in a shallow well 0.5 mile east of the Bitterroot River are strongly influenced by irrigation.



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