

Minnesota Ground Water Association

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Newsletter

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— MGWA President
Scott Alexander

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President’s Letter

By Scott Alexander, MGWA President

As summer winds down we have time to reflect on many things. On our path through life we often focus on the immediate surroundings without much thought of the larger picture. In contrast, in the world of groundwater we often work at large scales of time and distance neglecting to consider the actual flow path of the water on a day to day basis. For a balanced view of life, or of groundwater flow, we should consider using a variety of scales.

At the recent MGWA spring conference we dealt with several larger scale pictures of groundwater flow. In particular, we examined the interconnection of groundwater with the larger world in many forms. For the fall conference, coming up this November 12th, we will consider the path of water at smaller scales of time and distance. Essentially this can be summarized as “how does the water get through all that rock?” We will hear reports of how our associates are exploring the individual pathways of groundwater flow. We will consider flow in a variety of environments

ranging from traditional porous media flow to high transmissivity fractures all the way up to solutional conduits. Watch your email for more information on the “*Groundwater Flow in Theoretical and Real World Aquifer Systems*” conference.

A number of our friends and colleagues have encountered a discontinuity on their flow path of life. These discontinuities have all too often occurred in the form of job layoffs. In these turbulent waters it is important to offer a community of support. Beyond our mission to support groundwater science the MGWA also works to support groundwater professionals in many fields. Your volunteer board is holding annual dues to the same low rate of \$30 per year. Your membership includes access to our quarterly newsletter so you can keep up with current groundwater events. Our annual spring and fall meetings are designed to provide up-to-date information on groundwater issues to a broad audience but also allow professional geologists to maintain certification at reasonable cost. Our newly

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South-Central Minnesota Groundwater Monitoring and County Geological Atlases

Jim Berg and Scott Pearson, Department of Natural Resources, Waters Division

Do we have enough water? It’s a simple question that we hear often from citizens and legislators. The answer, however, is never simple. Large groundwater appropriators have to prove that their aquifer pumping won’t deprive their neighbors of water or have adverse affects to local ecological resources. But to determine the cumulative effects of many large appropriators over larger areas there is no substitute for a long term record of water levels collected from observation wells that are dedicated to that purpose. Furthermore, we can’t begin to understand and interpret these water levels unless we’ve mapped and characterized the aquifers that we are monitoring. Minnesota has many of these pieces in place, such as the observation wells and maps, for understanding the long term

adequacy of our groundwater resources, but there are many gaps left to fill. The 2008 and 2009 legislatures allocated funding from the Environment and Natural Resources Trust Fund for an aquifer investigation, mapping, and monitoring project in south-central and east-central Minnesota (see Figure 1). The 2008/2009 allocations provide \$4,295,000 for a 4-year project. The allocation is being shared by the Department of Natural Resources Division of Waters (DNR Waters) (\$2,769,000) and the Minnesota Geological Survey (\$1,526,000) to evaluate the Mt. Simon aquifer and produce geologic atlases. The Mt. Simon aquifer is an attractive resource for high-capacity use in a region that would otherwise have limited aquifer choices. This project will give DNR Waters and other water agencies the opportunity to learn more about the

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MGWA Web Page

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Newsletter Deadlines

Issue	Due to Editor
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December '09	11/06/09
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MEMBER NEWS

Tedd Ronning is the Newest Editor on the MGWA Newsletter Team.

During his over 20 years in the environmental arena, **Tedd Ronning** has gained a broad base of experience in the regulatory, consulting, and utility fields. In his current position at Xcel Energy as a Senior Environmental Analyst, Tedd's responsibilities include waste/PCB management, due diligence, and remediation and demolition oversight. While he loves his job, it usually has little to do with geology or groundwater and Tedd is hoping that working on the Newsletter Team will help him get back in touch with those roots. Tedd earned a Bachelor of Science degree in Earth Science from the University of South Dakota, and a Master of Science degree in Geology from Kent State in Ohio. He is a licensed Professional Geologist in Minnesota.



Steve Robertson Leaves Newsletter Team after 13 Years of Service

MGWA President-elect **Steve Robertson** has decided to leave the MGWA newsletter team to allow more time for board activities (and work). He has served on the team since 1996 and has greatly enjoyed working with the group of individuals involved in the newsletter production. Volunteering for the newsletter team is a great way to help out MGWA. To get involved, send an email to editor Norm Mofjeld norman.mofjeld@state.mn.us.

Lab News From Corporate Member Soil Engineering Testing

Soil Engineering Testing, Inc. has purchased several new pieces of lab equipment.

A Direct Simple Shear machine or DSS uses a reinforced membrane and a fixed normal load application to maintain constant volume throughout shearing of the specimen. This creates an undrained state on the specimen. DSS results are often helpful in slope stability problems. The full testing procedure for the direct simple shear is available in the standard ASTM D6528.

A Thermal Resistivity Probe measures soil resistance to heat transport. The soil thermal resistivity is important in determination of cable ratings when burying power cables. This information is commonly used in wind farms. The thermal resistivity probe also reads the thermal conductivity of a soil, which is simply the inverse of the soil's thermal resistivity. Thermal conductivity properties are often needed in construction of geothermal heatpumps.

California Bearing Ratio testing has been added to the list of services and capacity for running CBRs has been increased to 15 specimens. The test is usually run in conjunction with a standard proctor test. The CBR test requires a 4 day soaking period; allow a week for turn-around time.

Fully Automated Stress Path Triaxial Testing. We have two fully automated triaxial load frames that not only allow us to run standard triaxial testing (Consolidated Undrained [CU], Consolidated Drained [CD], and Unconsolidated Undrained [UU]), but also provide Stress Path Testing complete with Ko consolidation. Combining our latest load frame with a constant rate of consolidation test chamber provides our clients with a constant rate of strain consolidation test.

All tests are performed in general accordance with current accepted procedures in the field of soil mechanics laboratory testing. Test are performed by or under direct supervision of a National Institute for Certification in Engineering Technologies-certified technician. Testing services are available for soft bedrock and shallow field testing and sampling equipment are also available.

President's Letter, cont.

updated website, at www.mgwa.org, provides links to activities of the MGWA and resources around Minnesota and the world; the on-line membership directory offers a who's who of Minnesota groundwater with great networking potential; and, in an increasingly electronic age, we have created a discussion group at www.linkedin.com where members can post questions, potential job opportunities and interact on short time scales.

PROFESSIONAL NEWS

ProSource Technologies Reorganizes

Carlson Professional Services created

MGWA member **Wade Carlson** has informed us that Carlson Professional Services was created through a reorganization of ProSource Technologies, Inc. (ProSource) whereby the environmental, engineering and land surveying services were split off into a new corporation (Carlson) and the right-of-way services remained with ProSource.

Carlson established a new corporate headquarters in Lino Lakes, Minnesota and retained the regional offices in Duluth, Minnesota and Warrenville, Illinois. All staff and resources for environmental, engineering and land surveying services remain the same.

Contact information for the new corporate office is: Carlson Professional Services, Corporate Headquarters, 248 Apollo Drive, Suite 100, Lino Lakes, MN 55014; phone: (763)489-7900

New CPT Rig on the Way to Minnesota

Proud 'father', MGWA member **Herb Garcia** of Minnesota Geoservices, reports:

A three year project to design, finance, and build the finest track-mounted Cone Penetrometer Testing (CPT) rig in the world is now complete. The rig was built by A.P. Van den Berg of the Netherlands and is in the process of loading on the ship, scheduled to arrive in the United States on September 17th.



Here is the nearly completed track rig at the Van den Berg factory. As this picture was taken the factory was setting the pushing and pulling forces and determining what extra frame reinforcement would be necessary. (Picture credit to Minnesota Geoservices)



The rig is complete: we tested all functionality in Holland last week prior to shipment. That means it is ready to work upon arrival, with no "break in" period required. Kudos to the team at Van den Berg, we couldn't be more pleased.

The rig is built on a very low ground pressure (<3 lbs/sq.in) Morooka crawler, it pushes at 15 metric tons, is automated for enhanced production and safety, has rotary capability and automated shear and compression hammers. It is fast (about 9 mph) and can travel on asphalt or concrete surfaces without damaging them. This means we will have very little need to load the rig on a truck for short hauls within a project. It is regulation width and height so no special permits are required for hauling. It has a climate-controlled cab with heat now, and will have air-conditioning by next summer (at least that is the plan).

The Morooka-based CPT rig is loaded at the A.P. Van den Berg factory for shipment to Antwerp, Belgium to load on a ship for the USA. (Picture credit to Johan IJdel)

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The primary objectives of the MGWA are:

- ◆ Promote and encourage scientific and public policy aspects of ground water as an information provider.
- ◆ Protect public health and safety through continuing education for ground water professionals;
- ◆ Establish a common forum for scientists, engineers, planners, educators, attorneys, and other persons concerned with ground water;
- ◆ Educate the general public regarding ground water resources; and
- ◆ Disseminate information on ground water.

MGWA's Corporate Members for 2009

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Soil Engineering Testing, Inc.

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Links at www.mgwa.org

Save the Date!

MGWA's Fall Conference

November 12, 2009

see Page 9

South-Central Minnesota Groundwater Monitoring, cont.

physical and recharge characteristics of this poorly understood but important aquifer. DNR Waters is currently coordinating installation of groundwater level monitoring wells (observation wells) by drilling companies at 13 locations in the southern portion of this investigation area. Drilling in the northern portion of the investigation area will begin in the fall of 2009 to complete well nests at an additional 12 locations. The wells are

completed in the Mt. Simon aquifer and shallower aquifers on public property in the project area to depths of approximately 200 feet to 600 feet. The wells will be sampled for chemical constituents that will help determine the residence time or age of the groundwater in this aquifer. The wells will also be instrumented with equipment to continuously record groundwater levels.

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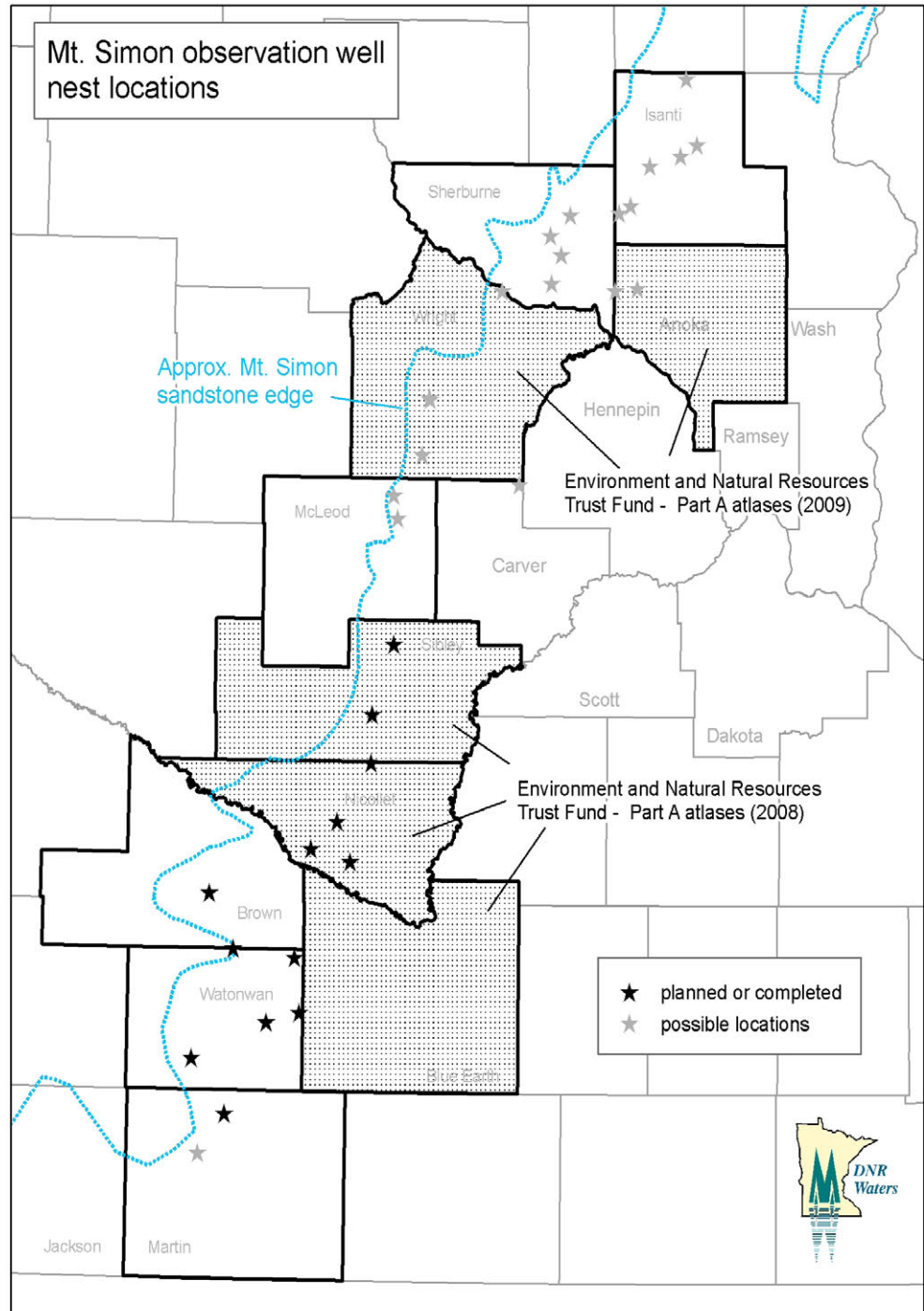


Figure 1. Map showing the locations of planned or completed Mt. Simon well nest locations, possible locations, and atlases supported by the Environment and Natural Resources Trust Fund.

Soil Survey Data Used to Map Sensitive Surficial Aquifers

By Kim Steffen, Natural Resources Conservation Service

The Natural Resources Conservation Service (NRCS) Web Soil Survey (WSS) provides soil data produced by the National Cooperative Soil Survey. NRCS has soil maps and soil data available online for more than 95 percent of the nation's counties. There are currently 83 Minnesota soil survey areas (counties) available on the WSS. The site is updated and maintained online as the single authoritative source of soil survey information. The NRCS Web Soil Survey provides users with the most current soil survey information. You can create an online area of interest (AOI) and generate a soil map for the AOI. You can digitize an AOI from 0.1 acre up to 10,000 acres, or you can set your AOI for an entire county and run soil interpretations and other soil reports for your AOI.

The Minnesota counties available on the WSS include an aquifer assessment tool. The tool uses soil properties to predict the presence of a sensitive surficial aquifer.

The "Aquifer Assessment (MN)" was developed for the Minnesota Pollution Control Agency. It is used for the preliminary evaluation of large individual sewage treatment systems to predict aquifer vulnerability and the potential risk of nitrogen impacting the aquifer. The tool predicts the presence or absence of a protective layer above an aquifer and the risk of nitrate movement through the soil into a possible surficial aquifer.

MN statute 103H.005 provides a definition of "sensitive area." Soils are considered sensitive to the impact of nitrogen on an aquifer if they

contain coarse United States Department of Agriculture (USDA) textures in the bottom horizon, if they have bedrock within the profile, or if they are organic (Histosols). The "Aquifer Assessment (MN)" sensitivity rating and the Class V sensitivity rating of the Minnesota Department of Health are used in the Minnesota Pollution Control Agency's Level I Nitrogen Impacts to Aquifers Determination Worksheet. The NRCS also uses the aquifer assessment sensitivity rating for nutrient management planning in Minnesota.

There are likely many more applications of this soil interpretation for

evaluating environmental resources. In Minnesota, the few soil data elements selected to predict a surficial aquifer give some surprisingly good results. Minnesota has a significant number of glacial outwash deposits. These areas typically have a surficial aquifer. Central and northern Minnesota also have large deposits of organic soils (peat lands) that are surficial aquifers. Shallow soils that overlie bedrock can also be conduits to an aquifer. When the "Aquifer Assessment (MN)" is used, the interpretive output should be considered at a regional level. Figure 1 shows a large block of red where the sandy and gravelly glacial outwash deposits occur and a high potential of a sensitive surficial aquifer in that area. There are also isolated small map units of organic soils that appear as "sensitive" (red) that would not be considered a regional surficial aquifer. Some interpretation of the soil map units is required to use this tool.

The Web Soil Survey also provides Geographic Information System (GIS) applications. You can create multiple thematic map interpretations and soil reports, save them to your shopping cart (free), and create your own custom soil survey report (in PDF format) to print or download at a later date. A new feature recently released on the Web Soil Survey for GIS users is the ability to save and package your AOI as a shape file, and an Access template is automatically populated with the tabular data (soils data attributes) for your AOI. GIS users can download their projects from the Web Soil Survey to their workspace. Visit websoilsurvey.nrcs.usda.gov/app/ and explore the resource of online soil survey information.

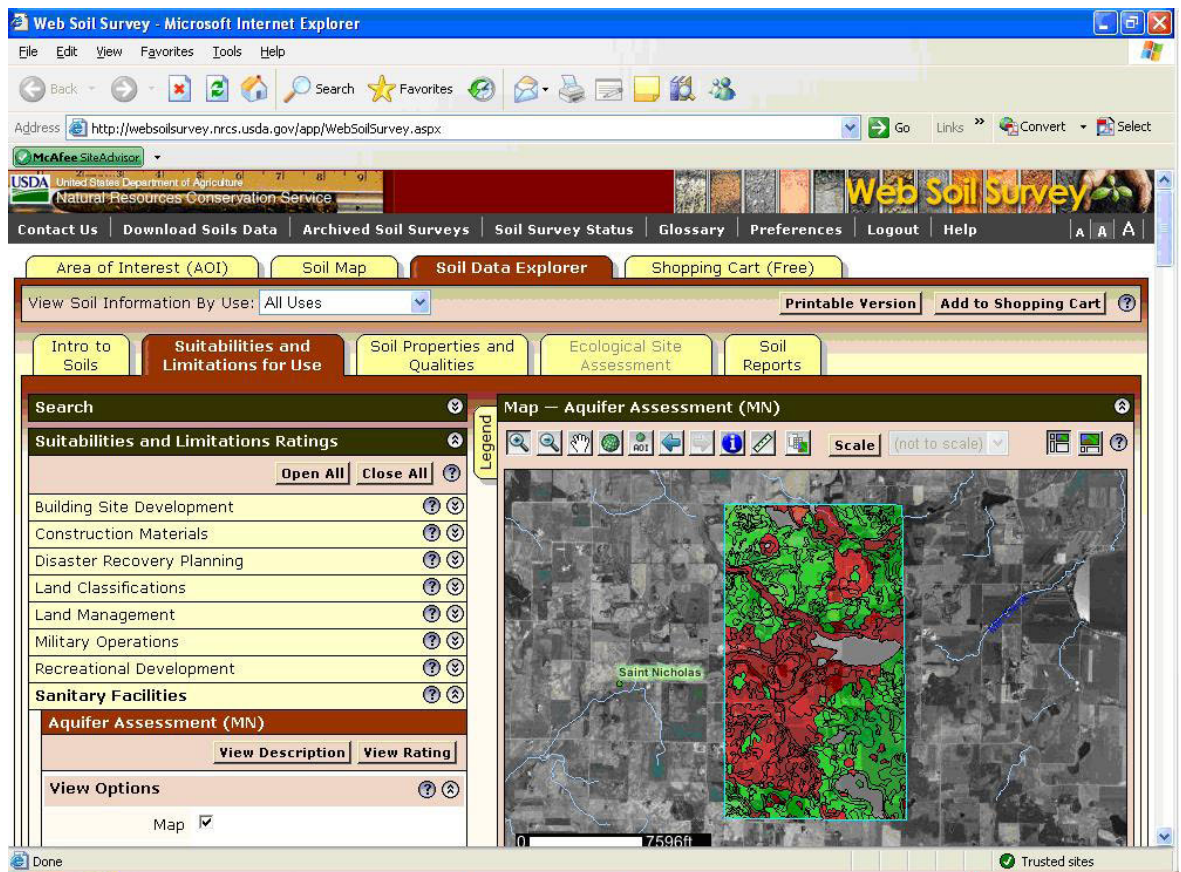


Figure 1. Aquifer Assessment (MN)— Summary by Rating Value

Ground Water a Winner in 2009 Minnesota Legislative Session

The fruits of the Clean Water Legacy Act (CWLA) of 2006 and the Clean Water Fund, created after Minnesota voters approved the Clean Water, Wildlife, Cultural Heritage and Natural Areas Amendment in November 2008, finally came together June 2, 2009 when Governor Pawlenty signed the bill which appropriates money to the State's various water agencies to protect and restore Minnesota's ground and surface water quality. On July 1, 2009, the sales and use tax increased by three-eighths of one percent on taxable sales, with 33 percent of the funds dedicated to protect, enhance and restore water quality in lakes, rivers, streams and groundwater, with at least five percent of the fund targeted to protect drinking water sources. The following summary focuses on those appropriations most closely related to groundwater and its protection.

As part of the package, the Minnesota Pollution Control Agency (MPCA) received \$51.4 million for the Fiscal Year 2010-11 biennium to protect and restore Minnesota's water quality. The MPCA helps protect the State's waters by monitoring their quality, setting standards and controlling what may go into them as required by the federal Clean Water Act (CWA). The act requires states to:

- ◆ Assess their waters to identify water quality impairments;
- ◆ List those waters that do not meet standards;
- ◆ Identify pollutant sources and reductions needed by establishing Total Maximum Daily Loads (TMDLs); and
- ◆ Implement restoration and protection activities.

The MPCA works with local partners and other state agencies

whose responsibilities are to assess and protect the State's water resources.

A partial list of line item appropriations to MPCA for the FY 2010-11 biennium which have the most potential to involve the State's ground water include:

- ◆ Assessment and monitoring of water supplies for endocrine disruptors, \$15 million;
- ◆ TMDL development, data base and rules, \$18 million;
- ◆ Drinking water protection, \$2.25 million;
- ◆ Clean water partnership grants, \$2.5 million;
- ◆ Groundwater monitoring (including ambient program development), \$5 million.

The Department of Natural Resources (DNR) received funding to continue support of water quantity and quality assessments for the FY 2010-11 biennium, including:

- ◆ \$3.7 million for stream flow monitoring, watershed delineation, and drainage system modeling; coordination of hydrologic and hydraulic input for TMDL development; assessment of lake indicators of biotic integrity and assessment of mercury in fish; and support for lake and stream surveys to help identify impaired waters;
- ◆ \$1.125 million to provide for drinking water protection by determining protection thresholds and developing a state-wide plan for groundwater monitoring;
- ◆ \$2.1 million for ecological, biological and hydrological technical assistance for TMDL development and development of web-based tools for assessing watersheds in implementation and restoration planning;
- ◆ \$5.6 million for collection of high-resolution digital elevation data (LiDAR imagery);
- ◆ \$1 million for acceleration of the County Geologic Atlas program.

The Minnesota Department of Health (MDH) was successful in obtaining funding for additional Source Water Protection (SWP) activities in the Drinking Water Protection (DWP) Section, Environmental Health Division, as well as to create a center for drinking water contaminants of emerging concern (CEC) in the Environmental Assessment and Surveillance Section. Specific funding for the FY 2010-11 biennium include:

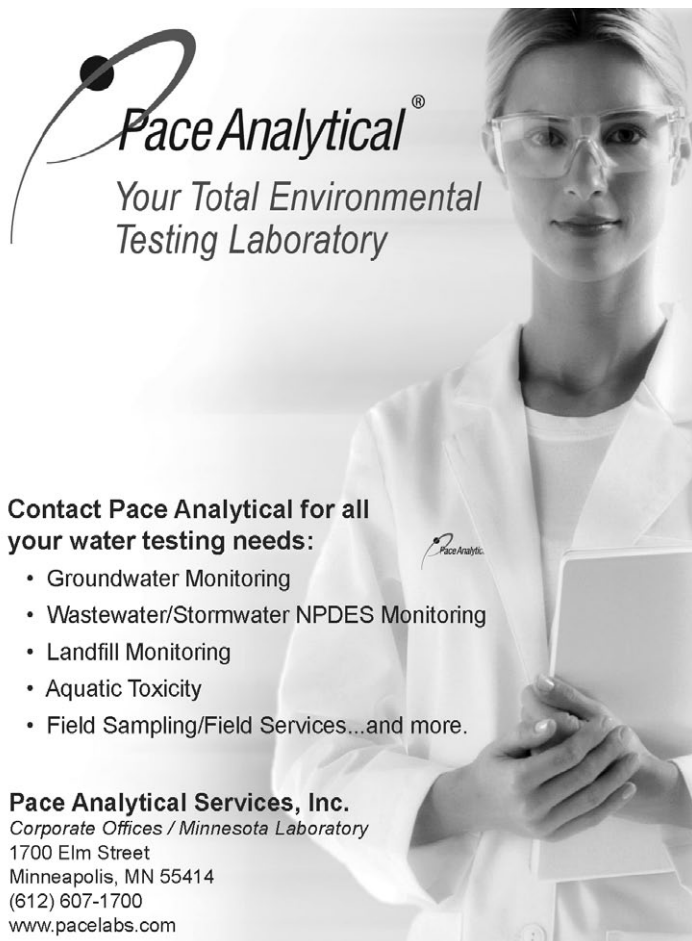
- ◆ \$1.335 million for initiation and development of the CEC;
- ◆ \$2.415 million to accelerate development and implementation of wellhead protection plans and to provide grants to local governments for these activities;

The MDH has proposed to the legislature that these activities continue for at least ten years. These activities will also provide a basis for additional coordination with other state agencies involved in protection and restoration of Minnesota's water resources.

Other state water agencies received significant funding to protect groundwater as well. The Board of Water and Soil Resources received FY 2010-11 funding of \$38.3 million to restore and enhance the hydrologic condition of watersheds, including groundwater. Some of the funds are specifically directed to achieve such results as increasing infiltration for groundwater recharge; protecting groundwater and drinking water; increasing protection of vulnerable wellhead protection areas; and other projects to protect groundwater from degradation.

At the University of Minnesota, the Minnesota Geological

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Minnesota Receives \$727,600 in Economic Recovery Funds to Improve Water Quality

In an effort to improve water quality, the U. S. Environmental Protection Agency has awarded the Minnesota Pollution Control Agency (MPCA) nearly \$730,000 under the American Recovery and Reinvestment Act of 2009 (the economic stimulus bill). A total of \$39 million will be awarded nationally to states for water quality management planning grants that will maintain and create jobs to help prevent water pollution and protect human health and the environment.

These grants are intended support a broad range of activities to help protect surface water and groundwater, including setting standards, monitoring water quality, developing plans to restore polluted water, and identifying ways to prevent pollution of healthy waters. In Minnesota, about 40 percent of the stimulus package will be made available as pass-through grants to regional planners, while the rest will go toward improving the MPCA's own planning efforts on behalf of clean water. As with other programs funded by the stimulus bill, this funding is in addition to annual appropriations.

Groundwater a Winner, cont.

Survey (MGS) received \$305,000 for FY 2011 to support acceleration of the County Geologic Atlas program. The Water Resources Center received \$750,000 for FY 2010 to create a 25-year sustainable water management framework to protect, conserve and enhance the quality and quantity of Minnesota's surface waters and groundwater.

To support the implementation of the Twin Cities Metropolitan Area master water supply plan, the Metropolitan Council received \$400,000 for FY 2010.

This summary does not include all details of funding from the Clean Water Fund. For further information, please see the complete legislation, Minnesota 2009 Session Laws, Chapter 172.

— submitted by Tom Clark and Jan Falteisek, Newsletter Team

South-Central Minnesota Groundwater Monitoring, cont.

These data will help determine aquifer recharge characteristics and potential limitations for future use. DNR Waters also will develop a guidance document for developing and maintaining statewide monitoring of groundwater levels. The 2008 allocation enabled the MGS to initiate Part A geologic atlases for the Blue Earth, Nicollet, Sibley County area. The 2009 allocation will enable the MGS to initiate Part A geologic atlases in Anoka and Wright counties. These atlases will describe the location, size, and boundaries of aquifers. This effort will also establish digital locations and geologic interpretations for wells and enter the information into the state's well record database (County Well Index) for these counties. Part A atlases create the basic geologic and database framework for subsequent DNR Waters Part B hydrogeologic evaluations that focus on groundwater flow directions, aquifer recharge/discharge characteristics, and pollution sensitivity. This project will create both short- and long-term benefits for the people and natural resources of the region. The information generated by this project will be immediately useful to water management scientists, planners, drillers, consultants, industrial users, and municipal officials for understanding and assessing local groundwater conditions for protection and wise use.

LCCMR Continues Funding for Groundwater and Springshed Projects

The 2009 Legislative-Citizen Commission on Minnesota Resources (LCCMR) recommendations were adopted by the legislature on May 17, 2009. On May 22, the Governor signed the bill into law (M.L. 2009, Chapter 143), with the exception of two projects that were line-item vetoed. \$25.7 million, primarily from Minnesota's Environment and Natural Resources Trust Fund, was appropriated to 63 individual projects around the state. For the complete list of 2009-funded projects click on "2009 LCCMR Summary and List of Appropriations".

Two joint projects, previously funded were continued with the 2009 funding. One is the County Geologic Atlas and South-Central Minnesota Groundwater project, currently underway by the Department of Natural Resources and the Minnesota Geological Survey. This project includes acceleration of County Geologic Atlases and installation of Mt. Simon monitoring wells in the south-central and central part of the state. These joint projects received \$2,695,000 to continue work through 2012.

The other joint project continued is the Springshed Mapping for Trout Stream Management project underway by the Department of Natural Resources and the University of Minnesota. The project will continue mapping springs and springsheds in southeast Minnesota. This joint project will also emphasize map production and making up-to-date springshed maps and karst features information more easily available online. These joint projects received \$500,000 to continue work through 2011.

For more specific information, please see the work plans posted on the [LCCMR web site](#).

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USGS Releases Report on Carbonate Aquifers

The U.S. Geological Survey (USGS) has released a report discussing the factors affecting water quality in selected carbonate aquifers in the United States. To prepare the report, USGS scientists sampled 151 chemical constituents or physical properties in about 1,000 wells and springs across 20 mainly eastern and central states. The majority of the wells sampled are used as drinking water sources, either for domestic or public supply. Carbonate aquifers in Minnesota were not included in the study. The complete report can be found at: water.usgs.gov/nawqa/pubs/carbonate/



USGS Report on Chloride in Groundwater and Surface Water in Areas Underlain by the Glacial Aquifer System

by John Mullaney, Dave Lorenz, and Allan Arnston

A study of chloride in groundwater and surface water was conducted for the glacial aquifer system of the northern United States in forested, agricultural, and urban areas by analyzing data collected for the National Water-Quality Assessment program from 1991 to 2004. Groundwater-quality data from a sampling of 1,329 wells in 19 states were analyzed. Chloride concentrations were greater than the secondary maximum contaminant level established by the U.S. Environmental Protection Agency of 250 milligrams per liter in 2.5 percent of samples from 797 shallow monitoring wells and in 1.7 percent of samples from 532 drinking-water supply wells. Water samples from shallow monitoring wells in urban areas had the largest concentration of chloride, followed by water samples from agricultural and forested areas (medians of 46, 12, and 2.9 milligrams per liter, respectively).

An analysis of chloride:bromide ratios, by mass, and chloride concentrations compared to binary mixing curves for dilute groundwater, halite, sewage and animal waste, potassium chloride fertilizer, basin brines, seawater, and landfill leachate in samples from monitoring wells indicated multiple sources of chloride in samples from wells in urban areas and agricultural areas. Water from shallow monitoring wells in urban areas had the largest chloride:bromide ratio, and samples with chloride:bromide ratios greater than 1,000, and chloride concentrations greater than 100 milligrams per liter, were dominated by halite; however, the samples commonly contained mixtures that indicated input from sewage or animal waste. Chloride:bromide ratios were significantly larger in samples from public supply drinking-water wells than from private drinking-water wells, and ratios were significantly larger in all drinking-water wells in eastern and central regions of the glacial aquifer system than in west-central and western regions of the glacial aquifer system.

Surface-water-quality data collected regularly during varying time periods from 1991–2004 from 100 basins dominated by

Two New MGWA Officers Sought for 2010

The MGWA membership needs to fill two officer positions—Secretary and President-Elect—for the year 2010. The **Secretary** keeps the minutes of all MGWA board meetings and is the custodian of the Association's official paperwork. He or she also assists with conference planning.

The **President-Elect** takes a leadership role in planning one or more of the MGWA meetings while “learning the ropes” of MGWA leadership. Here's a chance for you or someone you nominate to get in on the front end of ground water resource protection in Minnesota.

The **Secretary** serves a two-year term, and the President-Elect serves a year before becoming President in 2011, followed by a year as past-president. The Past-President also serves on the MGWA Foundation board. Send your nominations by November 1 to MGWA, 4779 126th St. North, White Bear Lake, MN 55110-5910, or by e-mail to: office@mgwa.org.

forested, agricultural, or urban land in 15 states were analyzed to determine maximum measured chloride concentrations. Samples from 15 sites in east, central, and west-central areas, collected primarily in winter, had chloride concentrations higher than the U.S. Environmental Protection Agency recommended chronic criterion concentration for aquatic life of 230 milligrams per liter. Concentrations of chloride in base-flow samples were predictive of maximum measured chloride concentrations, indicating that inputs of chloride from groundwater and (or) point-source wastewater discharges increase the likelihood of samples exceeding the recommended chronic aquatic criterion. Multiple linear regression analyses showed that the density of major roads, potential evapotranspiration, and the percent of annual runoff from saturated overland flow were significant factors in describing the range of maximum measured chloride concentrations in the basins studied.

Chloride loads and yields were determined at 95 surface-water monitoring stations draining basins dominated by forested, agricultural, or urban land. Annual chloride yield was largest in the urban basins (median of 88 tons per square mile), and smallest in the forested basins (median of 6.4 tons per square mile). The median chloride yield in the agricultural basins was 15.4 tons per square mile. Multiple linear regression analyses showed the density of highways (roads in U.S. Highway system), the number of major wastewater discharges in the basin, potential evapotranspiration, and urban minus agricultural land were significant factors in describing the range of average annual chloride yields. Upward trends in chloride loads were apparent at several urban basins for which additional long-term data were available. Increases in chloride loads over time may be related to a variety of factors, including increases in road area and consequent deicing, increases in wastewater and septic-system discharges, recycling of chloride from drinking water, and leachate from landfills and salt storage areas.

The report is available at: pubs.usgs.gov/sir/2009/5086/

Groundwater Flow in Theoretical and Real World Aquifer Systems

Minnesota Ground Water Association Spring Meeting
Continuing Education Conference Center
St. Paul Campus, University of Minnesota
November 12, 2009

Our understanding of groundwater flow has evolved from classical Darcian flow through porous media to fracture flow in bedrock to conduit systems in karst. Morning talks will review our current understanding of porous media flow and aquifer properties and introduce the concept of hydrostratigraphy. Afternoon talks will present current examples of dual and triple porosity aquifers including fractured, carbonate and karst aquifers. The conference will start at 8:00am and run through 4:30pm.

Tentative Agenda

Start 8:00am	Scott C. Alexander	MGWA President	Introduction
	Porous Media Flow		
	Martin Saar	UM Geology & Geophysics	Porous Media Flow Theory and Application
	Break		
	Hydrostratigraphy		
	Bruce Bloomgren	Minnesota Geological Survey	CWI: Historical Overview
	Bruce Olsen	Minnesota Dept. of Health	CWI: Existing Systems and Future Goals
	Todd Kincaid	H2H Associates Tallahassee, FL	The View from Inside an Aquifer
	MGWA and MGWA Foundation Business		
12:00-1:00	Lunch		
	Hydrostratigraphy		
	Tony Runkel Bob Tipping	Minnesota Geological Survey	Hydrostratigraphic Analysis and Heterogeneous Flow
	Break		
	Carbonate Aquifers		
	Kelton Barr	Braun Intertec	Hydraulic Transport in Heterogeneous Aquifers
End 4:30pm	Dan Doctor	USGS Reston, VA	Combining Chemical, Isotopic, and Discharge Data to Understand Karst Aquifers

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IMPORTANT NOTICES

Water Use Fee Changes

Holders of water appropriation permits issued by the Department of Natural Resources (DNR) must submit an annual report of water use along with a water use permit-processing fee. The fee is based on the volume appropriated. As part of efforts to balance the budget, Minnesota Statutes were amended by the legislature in 2009 to increase certain water use fees. The new fees are payable for all water use in 2009 and must be paid in 2010 with the 2009 annual report of water use. The new fees are expected to generate approximately \$500,000 per year. The new fee schedule may be found on DNR Waters appropriations permit water use fee rates web page: www.dnr.state.mn.us/waters/watermgmt_section/appropriations/feerates.html. Beginning 2009, changes to the upper limit for water use processing fees other than once-through cooling systems are as follows:

- ◆ \$60,000 per year for an entity holding three or fewer permits (previously \$50,000 per year);
- ◆ \$90,000 per year for an entity holding four or five permits (previously \$70,000 per year);
- ◆ \$300,000 per year for an entity holding more than five permits (previously \$250,000 per year).

In addition, the surcharge fee for water used during June, July, and August that exceeds the volume used in January has been increased to \$30 per million gallons (previously \$20 per million gallons). These fees are paid by all large water users and are deposited in the State General Fund. The General Fund supports DNR water resource management programs including water

use permitting, stream and lake gaging, groundwater level monitoring, aquifer tests, well interference investigations, and technical studies of ground and surface water resources.

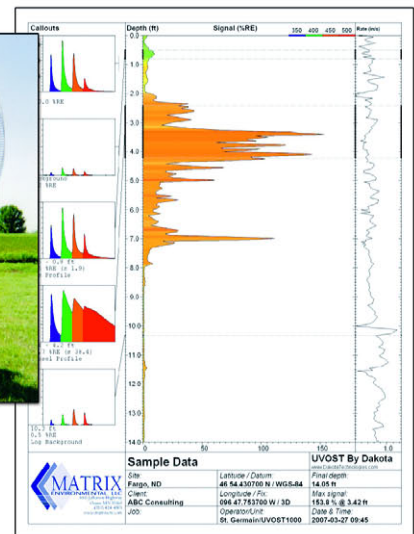
e-File Well Disclosure Certificate

A well disclosure certificate is required at closing whenever a property is sold and there are one or more wells on the property. The certificate indicates the location, number, and status of all wells on the property. The certificate is filed with the County Recorder with the deed. County Recorders forward certificates to the Minnesota Department of Health (MDH). To date, the MDH has received about 450,000 well disclosure certificates. Effective July 1, 2009, the MDH, Well Management Section, is now accepting Well Disclosure Certificates filed electronically (on-line). The availability of this service reflects nearly two years of effort by county recorders and MDH staff in the design, development, and testing of *e-File Well Disclosure Certificate (e-WDC)*. For filers, the MDH Web site includes a checklist "What You Need to Know Before You Begin" and a more detailed publication (user manual) on filing instructions. The checklist identifies the information needed to complete the *e-WDC*. There is a separate user manual for county recorders for their activities. MDH will continue to accept paper Well Disclosure Certificates as they have been filed since 1990. The *e-WDC* is simply another option for filing. The MDH Web site for well disclosure is: www.health.state.mn.us/divs/eh/wells/disclosures/index.html. If you have any questions on well disclosure, please contact Kathy Dunaway at (651)201-4587, Norm Mofjeld at 651/201-4593, or Mike Convery (651)201-4586.



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UPCOMING EVENTS

Minnesota Water Resources Conference

October 26-27, 2009

RiverCentre, Saint Paul, Minnesota

www.wrc.umn.edu/waterconf

The *Minnesota Water Resources Conference* presents innovative and practical water resource management techniques and highlights research about Minnesota's water resources.

Day One:

Plenary Session – Water Sustainability

Professor Jerry Schnoor, University of Iowa

Luncheon Presentation – Wetland Drainage and Restoration

Dr. Rex Johnson, United States Fish and Wildlife Service

Day Two:

Plenary Session – National Water-Quality Assessment Program

Dr. Paul Capel, United States Geological Survey, and University of Minnesota

Luncheon Presentation

Congresswoman Betty McCollum, Minnesota District 4

Conference Topic Areas Include:

- Agricultural Water Issues
 - Drainage / Water Consumption / Reuse
 - Water Quality / Water Quantity
- Surface Water Management
 - BMP Research / Design / Implementation
 - Floodplain Management / Mapping
 - Hydraulic Design
 - Inflow & Infiltration
 - Operation and Maintenance
 - TMDLs
- Lakes, Rivers, Streams and Wetlands
 - Research / Rehabilitation / Restoration
 - Shoreland and Zoning Issues
- Policy, Education and Citizen Involvement
- Water Resource Sustainability Initiatives
 - Climate Change / Hydrologic Extremes
 - Emerging Contaminants
 - Surface and Groundwater Interaction
 - Water Supply / Scarcity / Reuse / Threats

The conference provides an opportunity to address: 1) **best practices** discovered in the **design and application** of water resource management techniques, 2) implications of **water policy** decisions, and 3) **research** into **current and emerging issues**. The conference facilitates interaction among water resources professionals including resource managers, researchers, local, state and federal agency staff, consultants, practicing engineers, as well as students in the field.

For questions please contact:

Sara Van Essendelft, 612-624-3708 or via email at cceconf5@umn.edu

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FOUNDATION MINUTES

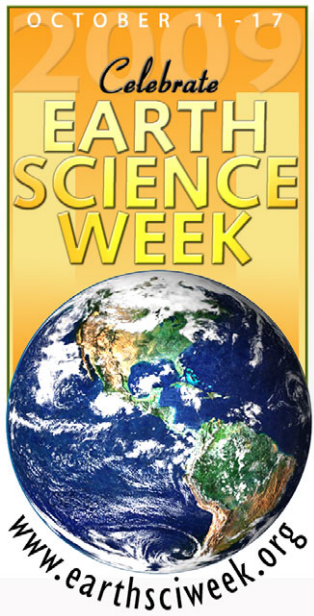
Minnesota Ground Water Association Foundation Board Meeting Minutes

- Meeting Date:** Wednesday, June 17, 2009
Location: Metro 94 Building, 455 Etna Street, St. Paul
From: Cathy Villas-Horns (Secretary)
Members Present: Gilbert Gabanski, Chris Elvrum, David Liverseed, Amanda Strommer, Stu Grubb and Cathy Villas-Horns. MGWA Management Present: Jennie Leete and Sean Hunt
Minutes: The meeting minutes for the March 11, 2009 meeting were unanimously approved on May 14, 2009 and provided via e-mail to the MGWAF Board and the MGWA Newsletter staff.
Treasurer's Report: Foundation balance to date is \$84,447.42. Interest in the amount of \$829.37 was accrued since 3-11-09 and was swept into the endowment, which now totals \$74,455.31. The \$1,000 grant to the University of WI River Falls field trip was debited during this period. The 29-month Odyssey CD matured in May. This CD has a current value of \$67,885.01. Dave presented several options for this account. One option is a money market account with an interest rate of just under 1%. Another option is a 60-month step up CD which has an interest rate of just under 2% for the first year, approximately 2.25% for the second year and slightly increasing rates each year thereafter. Money from this CD could be pulled out without penalty after three (3) years. A third option is a standard CD; the highest rate currently offered is 2.5% for a 60-month CD. These are all Affinity products. After some discussion of the options, Dave was asked to do additional research on products available outside of Affinity and to send information to the committee by July 1.
New Business: Grant requests – A grant request was received for \$2,000 for the 2009 Metro Children's Water Festival on the new form. In past years the MGWAF had granted \$1,000 each year to the Children's Water Festival. Dave moved that MGWAF provide a grant for \$1,500. Stu seconded the motion. Motion passed.
Envirothon – Discussion of message received from Mike Trojan on high school science event, with a partial ground water focus for the next school year. Cathy will forward the message to the committee for their review. The request may eventually be routed to the membership of the MGWA for volunteers to help with the Envirothon.
Science fairs – Some discussion of the MGWA offering awards at local science fairs.
Old Business: MGWA Board Meeting report – Stu mentioned that the new websites were up and running for both MGWA and MGWAF. Sean and Amanda noted that they are working on the MGWAF webpage and educational links.
Grant requests – A grant request was received for \$1,000 from the University
Scholarship discussion – It was decided to offer a scholarship when the \$100,000 endowment goal is reached, which is expected to occur within the next few years.
SMM ground water exhibit – The well was tested by the MDH this spring for bacteria and nitrate; nothing was detected. Gil will be meeting with SMM staff over the next few weeks.
Addendum: At the MGWAF board meeting on June 17, 2009, David Liverseed was asked to research investment options and to send information to the committee by July 1. On June 30, 2009 David provided via e-mail information on investment options for the 29-month Odyssey CD which had matured in May. David recommended the 60-month Step-Up CD which has an interest rate of 1.75% for the first year, 2.25% for the second year and increasing interest rates each year thereafter. Money from this CD could be pulled out without penalty after three (3) years. On July 7, 2009 Gil moved that the board reinvest the money (\$67, 855.01) from the CD which matured in May into the Step-Up Certificate, referred to by Dave as Option 2. Stu seconded the motion. Motion passed. All communication and voting was conducted with e-mail.
Next Meeting: The next meeting will be Tuesday, September 15 at 11:30 AM at the Metro 94 building. Chris will make the arrangements. The last 2009 MGWAF board meeting is scheduled for December 8.



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MGWA BOARD MINUTES

Minnesota Ground Water Association Board Meeting Minutes

Meeting Date: April 24, 2009
Location: Fresh Grounds Coffee Shop, 1362 West 7th Street, St. Paul, Minnesota
Attending: Scott Alexander, President; Stu Grubb, Past President; Steve Robertson, President-Elect; Craig Kurtz, Treasurer
Past Minutes: March minutes approved.
Treasury: Audit report for 2008 distributed. Cash on hand is approximately \$37,000.
Newsletter: Still searching for new Newsletter editor. March issue is out.
Web Page: Examples of new web pages were distributed. Questions were raised about timeline for completion – will need to check with WRI.
WRI Report: Submitted e-mail report. Need to contact corporate members that have not renewed. Board met two weeks ago. Endowment continues to grow. When endowment hits 100k will establish formal scholarships. Water exhibit at the Science Museum open.
MGWAF Report: Past President indicated survey will not happen before conference.
Old Business: Spring Meeting: May 7, 2009. Approximately 70 registrations to date. Speakers confirmed. President working out bios, agenda, etc in conjunction with WRI.
New Business: Ground Water vs. Groundwater: Discussion of new USGS memo on the single word usage.

Meeting Date: June 26, 2009
Location: Fresh Grounds Coffee Shop, 1362 West 7th Street, St. Paul, Minnesota
Attending: Scott Alexander, President; Steve Robertson, President-Elect; Craig Kurtz, Treasurer; Norm Mofjeld, Newsletter Editor, Tedd Ronning, Newsletter Editor-designate; Sean Hunt, WRI.
Past Minutes: April minutes not available.
Treasury: Reviewed balance sheet. Profit/Loss statement for 2008 nearly complete. Indicates income of \$18, 826. \$10,000 to be held to cover expenses associated with new web site. Disposition of remainder to be discussed next meeting. Spring conference a financial success with about 190 attendees.
Newsletter: Newsletter Editor introduced Editor-designate (Tedd Ronning). He will transition into position over the rest of the year. June issue should be out soon. Work underway on September issue.
Web Page: New web site rolled out in late May. Right now the site content is static. WRI needs to work out the process of editing with the project consultant.
WRI Report: Membership hovering around 576 as of mid June.
MGWAF Report: Endowment CDs are coming due. Rates are down – so expected returns expected to decline in near future. Foundation committee is looking at alternatives.
Old Business: Survey on ground water sustainability tabled until next meeting.
New Business: Field trip: President-elect initiated discussion about prospect of holding fall field trip. Ideas offered to explore. No decision.
Fall conference: November 12. President is working on the topic and has started contacting speakers.
Next Meeting: August 7, 2009 (Treasurer to check on room availability), at 11:30 at Fresh Grounds at 1362 West 7th Street, St. Paul, Minnesota. Meeting adjourned.

The MGWA Board of Directors meets once a month.

All members are welcome to attend and observe.



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