

Minnesota Ground Water Association

www.mgwa.org

Newsletter

June 2015
Volume 34, Number 2

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MGWA President
Lanya Ross

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President's Letter

In my last letter, I was hoping for a late March snowstorm to give us some recharge. It seemed like a hopeless wish; when I started writing this letter almost the entire state was experiencing drought. But then the rain came, and now parts of the U.S. are recovering from one of the wettest spring months on record. Our field favors adaptability, and I know that we have the tools and the expertise to tackle the challenge. Our 2015 Spring Conference was a good illustration of the thoughtful approaches to water management taken by Minnesota's businesses and groundwater professionals. I would like to thank everyone who attended and/or sponsored this event.

I would particularly like to thank our invited speakers for being such good sports about my goofball conference title: 'Pickles, Beer and Cloud Computing'. I had a blast watching the connections between speakers unfold and hearing the buzz during breaks.

My goal for the conference was to begin with

a big picture look at the issue of groundwater sustainability, focusing on one of Minnesota's oldest and largest water uses: agriculture. Then shift into a more detailed examination of what sustainable groundwater looks like at the individual, day-to-day business decision making scale. What are some of the tradeoffs? What are some tools? After lunch, we talked about the limits of the system we're working in and ended back up in the clouds – talking about one way of combining all these data and the cloud computing that lets us crunch through it. The slides and audio for each presentation are on our website.

As teasers, here are a few things to search for:

- ◆ A calculation of how much water is needed to grow the barley used to make one pint of 'Lawyers, Guns and Money' (Slide 14 in Josh Stamper's presentation)
- ◆ The phrase "highest velocity snack pickle" (slide 6 in Jim Cook's presentation)

— continued on page 3

Help Find Minnesota's Springs

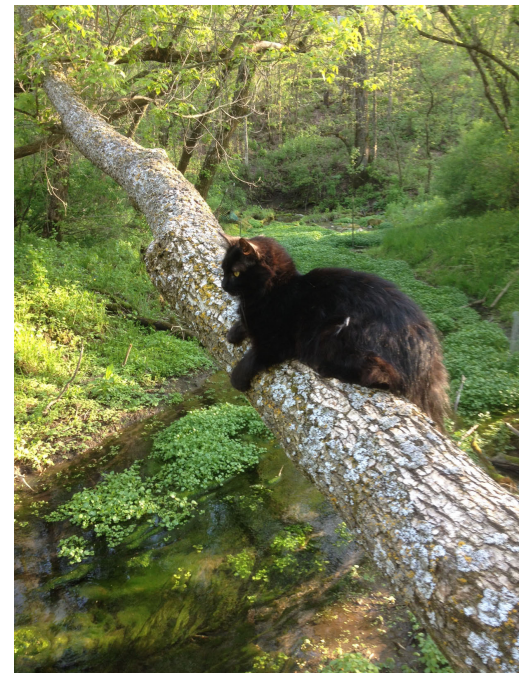
By Greg Brick, Division of Ecological and Water Resources, Minnesota Department of Natural Resources

If you know of springs in your neighborhood or elsewhere, please send us the exact locations (GPS coordinates or a verbal description) and any other information about them, like flow rate, geology, local name, history, and a photo.

The DNR is currently embarked upon a program to locate Minnesota's springs, thanks to funding by the Environment and Natural Resources Trust Fund.

A spring is defined as a focused natural discharge of water flowing from the ground. Some telltale clues are: they usually remain unfrozen in winter, they seem unusually cold in summer, and they are often associated with plants such as watercress and willows. Some springs even appear to "boil" the surface of lakes and streams.

Send to: MNspringinventory.dnr@state.mn.us



Wise Spring on West Beaver Creek, to be added to the Spring Inventory. Photo by John Barry.

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Newsletter Deadlines

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Meagan Harold Joins the DNR

Meagan Harold joined the DNR in March of 2015 as a Hydrogeologist 1, Field Hydrogeologist with the County Geologic Atlas Program. This field season, Meagan primarily will be working on groundwater sample collection in Clay, Houston, and Winona counties, carbon-14 sample collection in Wright and Renville counties, and geophysical data collection in Cass County. Meagan also will be collecting data in groundwater management areas



and assisting other units in the division as much as possible. So far, she has been to Olmsted County for a dye trace and to the Bonanza Valley to install data loggers and lake gauges.

Meagan came to the DNR from the Minnesota Geological Survey after working there for two years as a student in the sediment lab and seven months as a field technician. At the MGS, she was able to spend a lot of time in the field canoeing, drilling soil borings, assisting with rotary sonic core drilling, and driving on the back roads of Minnesota. Meagan spent her first two undergraduate years at the University of Wisconsin-Eau Claire and completed her B.S. in Earth Science (Geology and Hydrogeology) from the University of Minnesota-Twin Cities. While attending the U of M, Meagan attended the U's Hydrogeology Field Camp where she learned hydrogeologic field techniques.

Meagan grew up in Duluth, which she says fueled her love of nature and geology. Her parents never left the shore of Lake Superior without pockets full of rocks. In her spare time, Meagan enjoys being outside as much as possible, whether it's hiking, running, or biking. She also likes to explore the Twin Cities Area with friends in search of the best places to eat and to get that perfect cup of coffee.

Mike MacDonald Joins the MDA

Mike MacDonald recently moved to the MDA pesticide monitoring group where he replaced the recently retired John Hines. The MDA monitoring program collects information on the impacts of agricultural chemicals to water resources in the state. Mike previously was at the DNR for seven years where he coordinated their observation well network and helped review groundwater appropriation permits. Prior to working at the DNR, he worked as a consultant for various environmental consulting firms in Minnesota and Wisconsin. In his spare time he likes to read, garden, bike and tour taprooms (both at once when possible), and travel (which usually involves dragging his wife on geologic side trips).



MEMBER NEWS

Sophia Vaughan joins MPCA

Sophia Vaughan accepted a position as a Hydrologist I in the Environmental Analysis and Groundwater Services Unit at the MPCA. She will be working with the Ambient Groundwater Monitoring Program, aiding in groundwater sampling, data management, watershed reports and other monitoring projects. Sophia started as a student worker at the MPCA in 2012 and enjoyed it so much, she did not want to leave!

Sophia grew up in Grand Rapids, Minnesota but moved to the “cities” after high school. She received her bachelor’s degree in Environmental Science, with a focus in hydrology from the University of Minnesota. She is now finishing her graduate degree in Forest Hydrology and a minor in GIS at University of Minnesota. For her research, she is studying vegetation, geology and livestock management and how they influence soil infiltration and subsurface nutrient transport. Sophia expects to complete her Master’s degree by Fall 2015.

When work, school and research are allowing her some free time, she enjoys the great outdoors: fishing, hunting, and running. She also hopes to be able to improve her golf swing this summer.



President’s Letter, cont.

- ◆ A list of collaborators for the Envision™ program, including the American Public Works Association and the American Society of Civil Engineers (slide 4 of Kathryn Jones’ presentation)
- ◆ Statewide average potential recharge is estimated at 4.9 inches per year (slide 10 of Andrew Streitz’s presentation)
- ◆ An animation of aquifer decline and dead fish (slides 14-19 on Steve Thompson’s presentation)
- ◆ Change over time in estimates of sustainable pumping in the Twin Cities metro area (slide 36 of Anneka Munsell and Evan Christianson’s presentation)

During the conference, we also celebrated the work of two students, Sarah Knutson and Elizabeth Schauldt. We are incredibly proud to support their work through MGWA Foundation student scholarships. Supporting the next generation of groundwater professionals is

a critical part of MGWA’s mission, and your donations and conference sponsorships make this happen.

The topic of education was also addressed through the announcement of our new white paper topic: ‘Minnesota’s Groundwater Education Gap’. Please consider contributing to this or other white papers; learn more on our website.

I’ll end with an important reminder: Mark your calendar for the 2015 Fall Conference/ Sinkhole Conference on October 5-9, 2015 in Rochester, Minnesota! Register before August 1, 2015 for the early bird rate. You can register for the full conference or choose to come for just a day. And don’t forget to check out the short courses and field trips.

I wish you the best as this summer unfolds, and I look forward to seeing you in Rochester this fall!



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The primary objectives of the MGWA are:

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

MGWA's Corporate Members

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Links at www.mgwa.org

MEMBER NEWS

Stuart Orlowski Joins the MDA

Stuart recently began work as a hydrogeologist in the Incident Response Unit of MDA. His role is to provide technical support to project managers in the assessment and cleanup of agricultural chemical spills.

Stuart is a St. Paul native who obtained a dual Bachelor's Degree in Geological Engineering and Geology & Geophysics from the University of Wisconsin-Madison in May, 2013. Since then, he has worked at the MGS as a field technician with the County Geologic Atlas program, and later as a field environmental engineer at Terracon Consultants.



First Ever MGWA Social Hour Held

On May 7, 2015 about two dozen MGWA members gathered for a social hour at Saint Paul's Urban Growler. To quote Kelton Barr, "A splendid time was had by all!" This event was the first in what we hope becomes a tradition: to create more opportunities that connect members who may not otherwise cross paths. The next social hour will take place on July 23rd from 4:30 to 6:30 at Caffè Biaggio in St. Paul. If you have a suggestion for future gatherings, contact MGWA treasurer Emily Berquist.



Abbreviations and Acronyms

- ◆ ASTM – American Society for Testing and Materials
- ◆ DNR – Minnesota Department of Natural Resources
- ◆ MDA – Minnesota Department of Agriculture
- ◆ MDH – Minnesota Department of Health
- ◆ MGS – Minnesota Geological Survey
- ◆ MPCA – Minnesota Pollution Control Agency
- ◆ USEPA or EPA – United States Environmental Protection Agency
- ◆ USGS – United States Geological Survey

White Paper Initiative -- Updates

Manganese in MN Groundwaters – the work group is finalizing their white paper. MGWA members will be receiving an email about its completion and how to obtain a copy.

Gaps in MN Groundwater Education – the White Paper Committee is currently reviewing the applications from MGWA members to participate on this work group. The work group will start its efforts this summer. You will be receiving an invitation to contribute your insight and knowledge to this work group by this fall. The final white paper is expected by mid- to late-2016.

Please submit new ideas for topics! You can always send in your ideas for the next topic that is tackled by MGWA. Just fill out the requested information on the topic at http://www.mgwa.org/whitepapers_topics.php and send it to office@mgwa.org.

Help MGWA address the groundwater issues that are of concern!



Peer Engineering Joins Braun Intertec

Braun Intertec, an engineering and environmental consulting and testing firm, has acquired Peer Engineering, a Minnesota-based environmental consulting and engineering firm. “We are focused on creating sustainable growth and making strategic moves to add services that benefit our clients and strengthen our suite of service offerings. This acquisition demonstrates our commitment to environmental consulting and engineering and complements the deep talent we currently have on our team,” says Jon Carlson, CEO of Braun Intertec. “We remain committed to growing sustainably so we may maintain the strong Braun Intertec brand and culture, which have allowed us to grow and prosper for nearly 60 years. Ultimately, our goal with an acquisition like this is to provide great benefit to our clients and employee-owners.”

Founded in 1991, Peer is a privately owned environmental consulting company headquartered in Eden Prairie, Minnesota with an office in Moorhead, Minnesota. The Peer Engineering team brings additional expertise and depth to the environmental services currently offered by Braun Intertec including: Phase I and Phase II Environmental Site Assessments (ESAs), site investigations, Response Action Plan (RAP) preparation and implementation, feasibility and treatability studies, hazardous materials surveys and abatement, and construction-related environmental permitting, monitoring, sampling, testing, remediation and reporting. In addition, it furthers the firm’s capabilities in groundwater, storm water, and wastewater monitoring and compliance.

“This is an excellent opportunity for our entire team. Braun Intertec is a highly respected firm with a strong reputation for delivering quality services that will meet our clients’ needs well,” notes Stephen Jansen, President and CEO of Peer Engineering.

The deal became effective March 7, 2015, and added 23 team members to the Environmental Consulting group at Braun Intertec. For more information about Braun Intertec, visit www.braunintertec.com or chat with Braun on Twitter [@Braunintertec](https://twitter.com/Braunintertec).

Daniel Barrett Joins Braun Intertec

Daniel Barrett has recently joined Braun Intertec as a principal scientist in the Environmental Consulting group where he will leverage both his technical expertise on projects and corporate managerial skills to build client relationships. Dan is a Professional Geologist with more than 25 years of experience advising a wide range of commercial, industrial, and municipal clients.

He provides environmental management solutions to determine compliance with regional and national regulatory guidelines. Prior to joining Braun Intertec, Dan was an Environmental Manager at Target Corporation in Minneapolis, Minnesota.



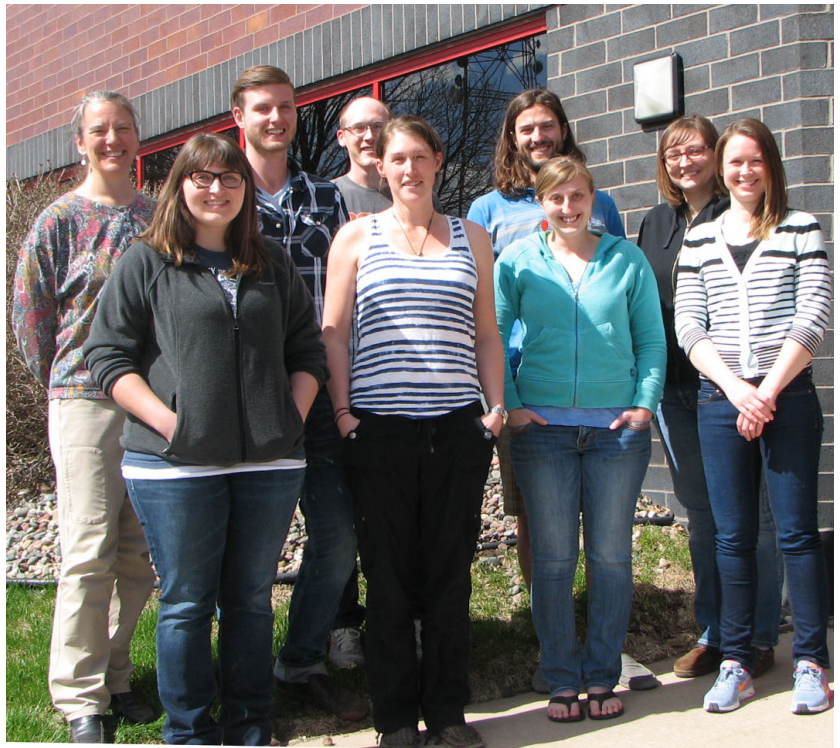
New Staff at the Minnesota Geological Survey

Dale Setterholm, MGS Associate Director

There have been some big changes at the MGS, and not all involving the recent move to a new building. Long time staffers John Mossler (Paleozoic Geology), Howard Hobbs (Quaternary Geology), and Linda McDonald (Accountant) have all retired, while Matt Rantala (GIS) has taken a new job.

Replacing them are ten new staff, pictured in the associated photo. Starting in the back row, moving left to right, they are Jacquie Hamilton (GIS), Kaleb Wagner (Quaternary Geology), Andrew Retzler (Paleozoic Geology), Devin Hougardy (Quaternary Geology), and Amy Radakovich (Precambrian Geology). Front row, left to right, Angela Berthold (Quaternary Geology), Elizabeth Dengler (Quaternary Geology), Margeurite Pettus (County Well Index), and Katie Marshall (Quaternary Geology). Not pictured is Jane Jensen (Accountant).

This leaves the MGS at a relatively high staffing level of almost 30 full time professionals. It consists of a very “seasoned” group, a small mid-career group, and the large complement of new geologists. They are doing their best to transfer the experience and skills of the senior staff to those just beginning their careers.



The Spring MGWA Conference Was a Success!

Sherri Kroening - MGWA Newsletter Team

The MGWA Spring Conference, “Pickles, Beer, and Cloud Computing”, was held on April 22nd, 2015 at the University of Minnesota’s Continuing Education and Conference Center. Dr. Otto Strack from the Department of Civil, Environmental, and Geo-Engineering at the University of Minnesota opened the conference by presenting information on aquifer depletion, mainly using information from the USGS, and measures that can be taken to reduce future aquifer depletion. Joshua Stamper, an irrigation extension specialist with the University of Minnesota, discussed the water demand of various crops and how farmers use supplemental irrigation to adapt to crop water demands. The water demand associated with beer brewing was given as one example. About 90 percent of the water used associated with beer brewing is used to cultivate the ingredients, such as hops. James Cook, a food scientist and recently retired Vice President of Technical Services at the Gedney Foods Company, gave examples of how the company has conserved salt use in the plant and water use from its two wells. Omar Ansari, the owner of the Surly Brewing Company, and Richard Manser, a consultant with Barr

Engineering, discussed the challenges associated with locating a new groundwater source for the brewery when it recently moved from Brooklyn Center to Minneapolis. After lunch, Kathryn Jones, a project manager with HDR Inc., presented the Envision™ design tool and ratings system. This tool assesses the sustainability of projects using over 60 criteria. Andrew Streitz, a research scientist with the MPCA, presented information on a new statewide estimates of groundwater recharge based on a soil-water-balance model that was developed in cooperation with the USGS. Steve Thompson gave a presentation on the DNR efforts to ensure that ground and surface water use in the state are sustainable. Anneka Munsell, from the Metropolitan Council, and Evan Christianson, a hydrogeologist with the Barr Engineering Company, ended the conference by discussing how groundwater models are being used to estimate sustainable groundwater use for the Twin Cities region.

For those who missed this opportunity or want to see them again, links to the presentations are available at the following:

http://www.mgwa.org/meetings/2015_spring/spring2015.php

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Celebrating a Landmark Environmental Law: Closed Landfill Program Marks Two Decades of Success

By Ralph Pribble, MPCA

St. Paul, Minn. — Twenty years ago, Minnesota found itself at a pollution crossroads. There were more than 100 closed, state-permitted landfills across the state that had accepted garbage (a.k.a. mixed municipal solid waste), and many of them were contaminating drinking water and generating explosive methane gas.

Some of these landfills threatened the health of people who lived near them. They needed to be cleaned up. The only solution available for doing so was the Superfund program, which had been created in the 1970s to deal with former industrial sites like the infamous Love Canal in New York State.

The problem was, Superfund is a “polluter pays” program — those who caused the contamination were legally responsible for cleaning it up. But at a landfill, the polluters are all of us. Every business and citizen whose garbage was taken to a landfill was potentially responsible under Superfund. Nonetheless, the state had no choice but to name and go after responsible parties to clean up these sites.

And that’s what they did, starting with the larger businesses and waste haulers who took garbage to landfills. The companies sued their insurance companies to recover costs, who in turn sued smaller individual businesses. The situation got so bad that in the Anoka area, insurers for the named responsible parties at the leaking Oak Grove landfill sent letters to small businesses throughout Anoka County demanding that they pay or be sued.

Art Dunn, a retired solid waste manager for the Minnesota Pollution Control Agency (MPCA), recalled, “They went after every local business they could find whose garbage was in that facility, and sent letters to them threatening lawsuits if they did not become part of the solution and pay for the cleanup.”

“That hit main street quite hard and put fear in the hearts of many,” Dunn said. “It resulted in the Legislature standing up and taking notice,” that closed landfills had become a big problem and it was time for a new way to clean them up.

The solution was the Landfill Cleanup Act of 1994. This landmark legislation set in law a radical idea — that landfills are a societal problem for which the state would assume responsibility. The MPCA’s response, the Closed Landfill Program, was the first of its kind in the nation and is still one of the very few to deal with closed landfills in this way.

“The fact the program came together and was able to be passed so quickly, and that it has been so successful, proves it was a good law,” said MPCA Closed Landfill Supervisor Doug Day. “For one thing, it made all those lawsuits go away, so we could really start focusing on cleanups.”

With \$90 million in bond funding provided by the Legislature, the program started cleaning up old, closed landfills that were leaking gas and contaminating groundwater. Some were dug up and moved to other landfills with better controls. At others, eroding caps were repaired and upgraded, gas collection systems were installed and pipes were placed to collect leachate, the liquid from decomposing garbage that can foul groundwater. Major construction projects included the Hopkins Landfill, the Washington County Landfill, the Flying Cloud Landfill in Eden Prairie and the WLSSD Landfill in Duluth.

The Legislature also foresaw the need to fund care of these landfills in perpetuity, and created the Closed Landfill Investment Fund in 1999. The fund was seeded with about \$20 million in transfers and other monies and left to grow until 2020, after which it is intended to serve as a permanent fund for long-term care of closed landfills. The Legislature borrowed from the fund in 2010 but is paying it back with interest.

Today, the MPCA counts 109 landfills in the Closed Landfill Program, with more than 30 owned by the state. Once landfills are closed, they need to be maintained for decades. So with most of the larger construction projects done or under way, the program is turning its attention to long-term management of the sites.

Over the years, the MPCA found that expensive reconstruction projects aren’t always needed. Sometimes it’s more cost-effective to ensure that only appropriate land uses occur on and near these landfills to keep people safe; in other words, keep development away. Since local governments regulate land use, the MPCA encourages them to adopt controls such as zoning and setbacks at or near the sites.

The MPCA also looks to beneficial re-use of some of the land. For example, this winter the state will install large solar arrays at two landfills, one in Washington County and the other near the city of Saint Michael. Eventually the state will sell power to the grid from those and perhaps future solar arrays built at closed landfills.

- ◆ An interactive map of closed landfills across the state is available on the [Closed Landfill Program webpage](#). Click on the green dots for more information on the mapped sites. Note that the application works best using Windows Explorer and may not work with other browsers.
- ◆ Photos of landfill construction activities are available on the [News Center webpage](#).
- ◆ A six-minute video on the Closed Landfill Program is available on the [MPCA’s YouTube channel](#).

FEATURED ARTICLES

Well Sealing Saves a Life

Reprinted with permission from the Minnesota Department of Health, Well Management Section

When employees of Thein Well Company arrived to seal two wells at a farmstead annexed by Camden State Park near Marshall, Minnesota, this past August, they found a surprise in one of the well pits – a young white-tailed deer. Thein’s crew was able to tie a rope around the fawn and lift it out of the well pit. Aside from being a little banged up from trying to escape the pit and undoubtedly suffering from dehydration, the fawn otherwise appeared to be okay. When released, it made a beeline for a nearby



White tail fawn trapped in well pit on farmstead near Marshall, Minnesota. (Photo courtesy of Thein Well Company, Spicer, Minnesota.)

slough. True to the old adage that “no good deed goes unpunished,” in the process of releasing the fawn, Thein’s employee got kicked in the stomach. Fortunately, he suffered only a torn shirt.

While it’s true that it was the well pit and not the well itself that created the hazard illustrated by this story, the fawn undoubtedly would have perished had the well not been scheduled for sealing. This leads to the obvious conclusion that well sealing doesn’t just protect groundwater, well sealing saves lives!

Well pits not only pose an unmistakable physical hazard to wildlife and people, they create hazards that are less conspicuous. Well pits are confined spaces that may contain insufficient oxygen levels or toxic gases that can cause asphyxiation and death. The humid environment causes corrosion and premature failure of electrical components – a situation that can increase the chances of electrical shock. And, of course, well pits can contribute to well contamination if they become flooded.

Minnesota rules regarding well sealing are silent on the issue of filling a well pit. The MDH strongly recommends that when a well in a well pit is permanently sealed, the well owner also have the well pit filled in to eliminate the safety threat posed to humans and animals. A license is not required to fill a well pit or cistern.



Tyler Winther with Thein Well Company, Spicer, Minnesota, releasing fawn back to the wild. (Photo courtesy of Thein Well Company, Spicer, Minnesota.)

Beginning of the Minnesota Spring Inventory

Greg Brick Ph.D., Minnesota Department of Natural Resources, Ecological and Water Resources Division

Introduction

Past spring inventories have covered certain parts of Minnesota reasonably well, notably, the springs of the Minneapolis-St. Paul metropolitan area (Brick, 1997) and those of the southeastern Minnesota karst (Gao and others, 2005). But hitherto, there has not been a systematic effort to create a uniform inventory for the rest of the state — a much larger, glaciated area. In 2014, State funding was provided for starting work on such a database. Initial work involves compiling existing data, designing a relational database for existing and planned new data, and establishing and testing field protocols.

While there have been numerous other spring inventories around the country over the years, the neighboring state of Wisconsin's has been the most relevant for comparison. The Wisconsin Conservation Department (WCD), from 1956 to 1962, mapped more than 10,000 springs in that state, the core of their present survey (Macholl, 2007). Conservation officers, familiar with their own areas, plotted the springs and recorded other data such as flow rate and water temperature. Some of the points are not well defined or verified, including such features as the proverbial spring-fed lake. Indeed, the word "spring" was not even defined, nor distinguished from a seep. The Wisconsin Geological and Natural History Survey maintains an active research program involving these springs today building on this earlier foundation (Swanson, 2013).

Setting aside for the moment differences from Wisconsin in climate and geology, and judging strictly by proportional area, Minnesota should have about 15,000 springs, all else being equal. Even more than that since only two-thirds of Wisconsin was covered by the WCD survey.

Minnesota's Karst Features Database

The southeastern corner of Minnesota already has an existing spring inventory as part of the Karst Features Database (KFDB) maintained by the Minnesota Geological Survey, which includes (as of March 15, 2015) 2,648 springs. As described by Alexander and Tipping (2002):

"Since the early 1980s, the Minnesota Geological Survey and Department of Geology and Geophysics at the University of Minnesota have been mapping karst features and publishing various versions of their results in the form of 1:100,000 scale County Geologic Atlases. In the mid-1990s, the Minnesota Department of Natural Resources was assigned responsibility for the hydrogeology portions of the County Atlases and is now responsible for the karst mapping.... A karst feature database of southeastern Minnesota has been developed that allows sinkhole and other karst feature distributions to be displayed and analyzed across existing county boundaries in a GIS environment."

Unexpected Trove

The KFDB notwithstanding, Minnesota's equivalent of the WCD spring survey turned out to be elsewhere, in the veritable trove of spring legacy data in the DNR Fisheries records (Division of Fish and Wildlife, Section of Fisheries.) Springs are important for providing proper habitat for trout and other fishes. By the 1940s, stream surveys were conducted for fishable streams, ranging from major trout streams like the Root River to diminutive, unnamed urban creeks and rural ditches. Among these features

there will be found data on springs, including location, flow rate, and temperature, similar to the WCD survey. Duplicates of these forms are archived at the DNR's Central Office, in St. Paul, where they are filed by county, one stream per manila folder. Major rivers straddling multiple counties, such as the Minnesota and Mississippi rivers, have their own folders. (The folder for the Minnesota River valley listed 500 springs where few had been known before.) Streams are further identified by their Kittle code, which identifies the watershed and order of tributaries. The folder also contains a stream management plan, "shocking notes" (the basis of electrofishing population assessments), creel censuses, hand-colored maps, onion-paper correspondence, yellowed newspaper clippings, and so forth. These folders are stored in more than three dozen tightly stuffed drawers of a huge mechanical KARDEX Lektiever (**Figure 1**). While the latest DNR stream surveys are being made available electronically, the vast bulk of spring data can only be manually accessed. Exact numbers are not yet tallied, but the "fishing expedition" likely netted several thousand features.



Figure 1. Spring-hunter's delight. KARDEX mechanical file retrieval system at DNR Fisheries, a trove of legacy spring data. The author is shown with the 1922 Surber linen map of North Shore spring locations, a valuable cartographic find hidden among the old stream surveys.

The Stream Survey is divided into many sections, evaluating the fitness of the stream as fish habitat and recording what species were found there. Section 29 covers "Tributaries and Springs." Spring locations are given in terms of miles from the river mouth. GPS coordinates have become more common in the recent stream surveys. For comparison, the stated accuracy of the original WCD survey is one quarter section (Macholl, 2007).

As stream surveys were examined it was found that separate DNR fisheries field offices had their own traditions of how to fill out the stream surveys. A striking juxtaposition is provided by neighboring Cook and Lake counties, on the North Shore of Lake Superior. Cook County has an abundance of recorded springs, and Lake County, very few. Yet this turned out to be merely a reporting difference, not a real one.

Moreover, the folders will sometimes contain hand sketched maps showing spring locations not mentioned in Section 29, which meant that the entire folder had to be examined (**Figure 2**). Given the reported decline in spring flow with time (Surber,

— continued on page 10

Minnesota Spring Inventory, cont.

1924; Moyle 1947) and the decades over which these files have been amassed, it's possible that the springs were visible at one time but not another. Or perhaps the record reflects climate change or land use changes over the years.

There are some other drawbacks to the stream surveys from the perspective of a geologist. Spring classification is rudimentary in the extreme. Some of the more detail-oriented surveyors adopted a crude trinitarian scheme, dividing them into bank, bed, and cave springs. Apart from general remarks in the report itself, the

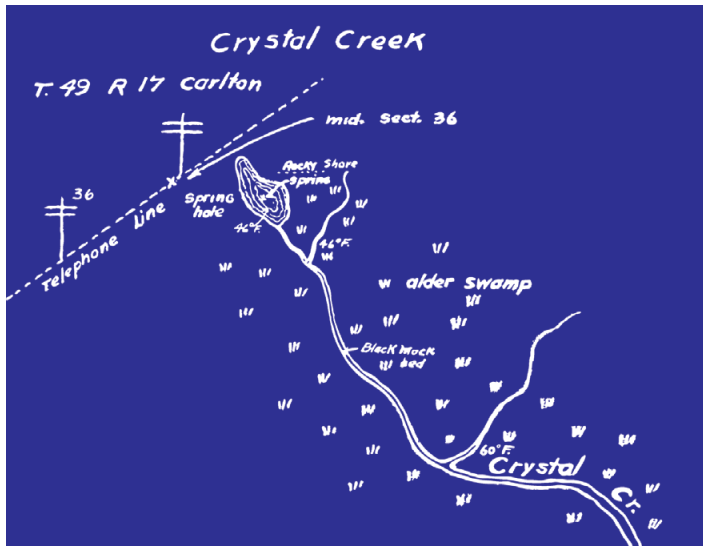


Figure 2. A spring location in Carlton County, as an example of legacy data. From Surber (1925), image processed by Holly Johnson (DNR).

geologic context for any given spring is entirely lacking. The formation name, lithology, and so forth, are not indicated.

The single most valuable find among the DNR stream surveys was a comprehensive 1922 map of the springs of the North Shore, drafted on linen, 5 feet long, by Thaddeus Surber (1871-1949). Surber wrote a report for the North Shore (Surber, 1922) in which he points out some hydrologic paradoxes that will be the subject of a future paper for this newsletter.

Surber is best known for his work as an aquatic biologist in Southeastern Minnesota, where during his Root River survey of 1918 and 1920, he “traveled afoot along its many branches upwards of a thousand miles” (Surber, 1941). Mel Haugstad (1930-2013), a dedicated DNR fisheries manager, hiked the tributaries again, adding further details. The Lanesboro Fish Hatchery, established at Lanesboro, Minnesota in the 1920s, is the repository of Haugstad’s legacy data. In a huge project directed by the Minnesota Pollution Control Agency (MPCA), the paper quadrangles with Haugstad’s detailed annotations are being scanned to make them more widely available (Broberg and Ignatius, 2015).

In addition to DNR Fisheries, another DNR program, the Minnesota Biological Survey, has a database of seepage indicator plants—some of them quite rare—and lists of “rich” (i.e., groundwater-fed) fens, which harbor mud springs. Many of these are located along the “fenland arc” sweeping up the Minnesota River valley and along the edge of Glacial Lake Agassiz towards the Canadian border.

Other prolific sources of legacy spring data turned out to be past publications of the U.S. Geological Survey (USGS), especially

the Water-Supply Papers, such as *Geology and Underground Waters of Southern Minnesota* (Hall, Meinzer, and Fuller, 1911). Minnesota Geological Survey publications were useful, especially the original county geologic reports by Winchell, Upham, and others, from 1872 to 1898, since springs were considered more important in the early days. Here, the most surprising results included the number of cities in drier western Minnesota that were using springs as a municipal water source into the early twentieth century. Many of the standard county histories assembled in the reading room of the Minnesota History Center in St. Paul, have a geology chapter that is often just a reprint of this original geologic report.

The Geographic Names Information System (GNIS), maintained by the USGS, lists 10 named springs for Minnesota quadrangles and many more place names containing the word “spring.” Unfortunately, no simple query in GNIS can extract the much larger number of features simply labeled as springs (without a proper name) on USGS quadrangles. Neighboring Wisconsin has 166 named springs listed in GNIS, perhaps because the mappers there chose to identify more of them by name. Once again, we find an illusory geological “fault line” along political boundaries. These sorts of boundaries bedevil attempts to create multi-state karst inventories.

The National Water Information System (NWIS), also maintained by the USGS, is a large repository of hydrologic legacy data from many sources. It has limited and sporadic coverage for 43 springs in Minnesota: chiefly a cluster in the Upper Minnesota River valley as well as a cluster of salt springs at the Grand Portage Indian Reservation that were apparently supporting various USGS investigations. The U.S. Forest Service has also compiled spring locations, especially in the Boundary Waters Canoe Area. Combining these sources, the big white space on the map outside the Southeast is becoming speckled over with legacy springs (Figure 3).

Conclusions

The most fruitful source of legacy hydrologic data for the Minnesota spring inventory was the DNR Fisheries records. Before hunting for unmapped springs it is important to use such legacy data. Once entered into a GIS-capable database, these locations can help “seed the ground” so that when crews finally do take to the field, they will have known examples to work from. Good baseline and time-series data should also help to evaluate the impact of climate change and land use changes on Minnesota’s springs over time.

The DNR has set up a public webpage devoted to springs, where everyone is encouraged to contribute spring locations: http://www.dnr.state.mn.us/waters/groundwater_section/pilot/springshed.html

Acknowledgements

Funding for this project was provided by the Minnesota Environment and Natural Resources Trust Fund as recommended by the Legislative-Citizen Commission on Minnesota Resources (LCCMR). Thanks to Jeff Green and Holly Johnson for their assistance in generating the map of new spring locations.

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— continued on page 11

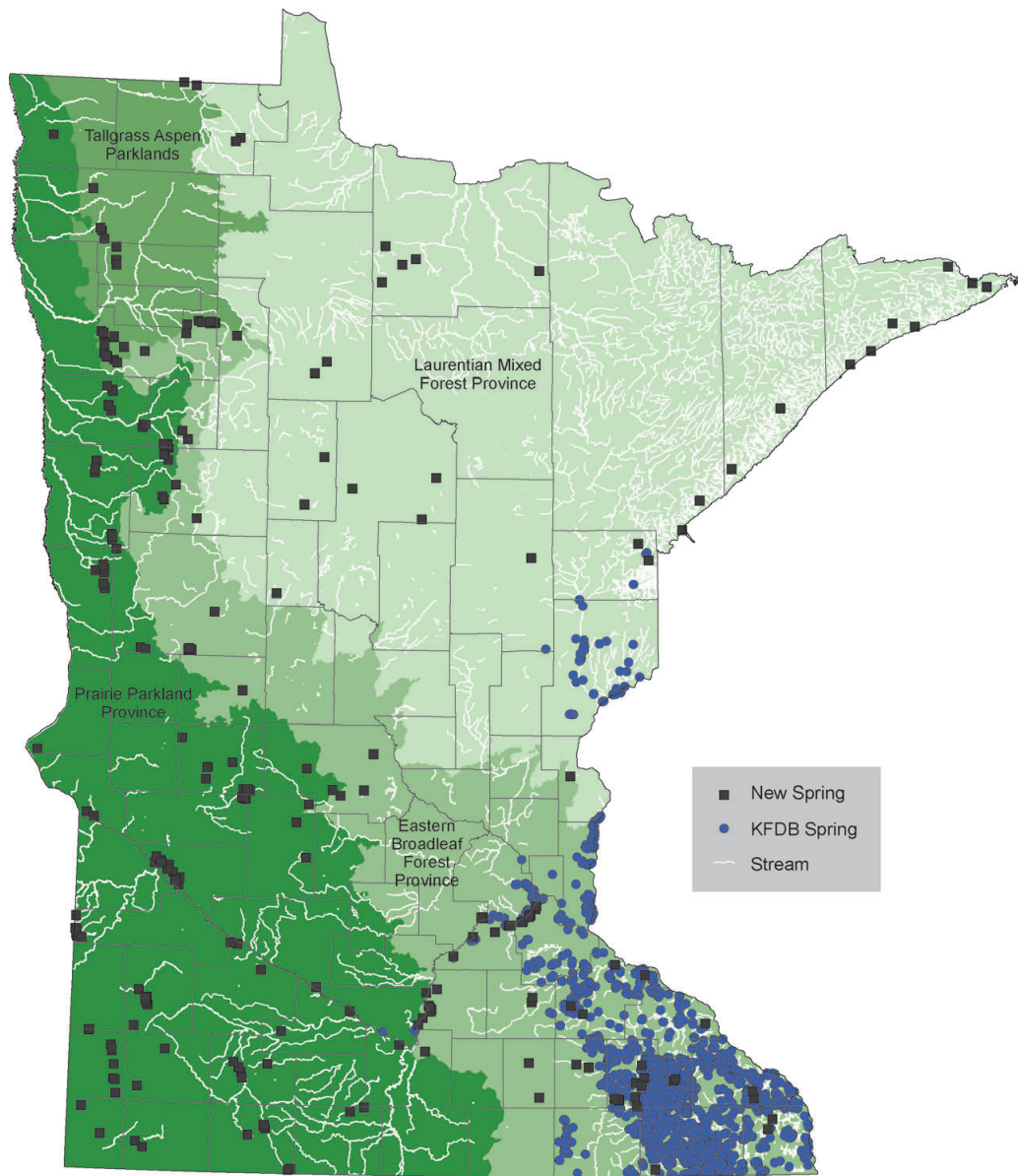


Figure 3. Many new (old) legacy spring locations are beginning to populate the map of Minnesota. The KFDB is heavily focused on southeastern Minnesota.

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Hydraulic Conductivity and Hydrostratigraphy of the Platteville Formation, Twin Cities Metropolitan Area, Minnesota

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Executive Summary

This report synthesizes a large body of data that provide a better understanding of the hydrogeologic characteristics of the Ordovician Platteville Formation in the Twin Cities Metropolitan Area (TCMA). The carbonate-dominated Platteville Formation plays an important role in the TCMA hydrogeologic system by limiting vertical infiltration of relatively recent water to the more commonly utilized aquifers beneath it. Furthermore, it has been impacted by numerous contaminant plumes, which threaten the water quality in domestic wells and the large number (dozens) of springs along the Mississippi River and its tributaries.

A large number of hydraulic conductivity values for the Platteville Formation collected at various scales and interpreted within a hydrostratigraphic context, especially fracture attributes, provides improved understanding and predictability of its hydraulic properties. Like some other hydrogeologic units in the Paleozoic

bedrock of this area, matrix permeability is very low, but secondary pore networks create moderate to very high horizontal hydraulic conductivity sufficient to yield economic quantities of water to wells, and supply springs. The greatly variable and commonly very high hydraulic conductivity, fast flow speeds, and secondary pore observations demonstrate that the Platteville is consistent with the definition of a secondary pore-dominated aquifer. Data from the same collection of sites also supports the traditional classification of the Platteville Formation as an aquitard (confining unit), when considered from a vertical dimension, with discrete stratigraphic intervals serving as key relatively high integrity aquitards. Vertical leakage will be variable, and under certain conditions such as near eroded edges of the formation can be substantial.

Hydraulic conductivity data are synthesized and interpreted across a range of scales, with the recognition of variable user needs. For example, generalized bulk hydraulic conductivity for parts of the Platteville Formation may be useful for modeling water budgets through relatively large areas. In contrast, more site-specific needs such as development of remediation strategies and prediction of flow paths may be facilitated by considering the large range in hydraulic conductivity, measured at a number of scales, and by recognizing the location of fast-flow secondary pore networks as well as key aquitards.

The full MGS report is available on-line at <http://hdl.handle.net/11299/171967>

Spring Showers and Snowmelt: The State of Minnesota's Groundwater

USGS Newsroom, May 13, 2015

New research can help water resource managers quantify critical groundwater resources and assess the sustainability of long-term water use in Minnesota.

U.S. Geological Survey scientists recently estimated annual rates of potential recharge, or the natural replenishment of groundwater, over 15 years across Minnesota. According to the study, the statewide mean annual potential recharge rate from 1996–2010 was 4.9 inches per year (in/yr). Recharge rates increased from west to east across the state and April generally had the highest potential recharge.

Improved estimates of recharge are necessary because approximately 75 percent of drinking water and 90 percent of agricultural irrigation water in Minnesota are supplied from groundwater.

“Resource managers in Minnesota can use this study to help inform water use or water conservation guidelines throughout the state,” said USGS scientist and lead author of the report, Erik Smith.

To maintain a stable supply of groundwater, recharge rates must be high enough to compensate for water that is lost to streams, lakes and other surface-water bodies, or removed for uses such as agriculture. The scientists used data about daily precipitation, minimum and maximum daily temperatures, land cover and soil to model Minnesota’s recharge rates.

During the study period, mean annual potential recharge estimates across Minnesota ranged from less than 0.1 to 17.8 in/yr. Other findings include:

- ◆ The highest annual mean recharge estimate across the state was in 2010 at 7 inches, and the lowest mean recharge estimate was 1.3 inches in 2003.
- ◆ Some of the lowest potential recharge rates were in the Red River of the North Basin in northwestern Minnesota, generally between 1 and 1.5 in/yr.
- ◆ The highest potential recharge rates were in northeastern Minnesota and the Anoka Sand Plain in central Minnesota.
- ◆ Eighty-eight percent of the mean annual potential recharge rates were between 2 and 8 in/yr.
- ◆ April had the greatest monthly mean at 30 percent of the yearly recharge.

The USGS partnered with the Minnesota Pollution Control Agency on the new study.

For more information on groundwater in Minnesota, visit the USGS Minnesota Water Science Center website at: mn.water.usgs.gov.

Project report: pubs.usgs.gov/sir/2015/5038/

Datasets: <https://gisdata.mn.gov/dataset/geos-gw-recharge-1996-2010-mean>

Minnesota Ramps up Search for Arsenic in Wells

A recent feature on Minnesota Public Radio featured MGWA’s own Emily Berquist and now retired Mike Convery.

<http://www.mprnews.org/story/2015/03/26/ground-level-beneath-the-surface-arsenic>



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MGWA Foundation Scholarship Awarded

At the April 22nd MGWA Spring Conference, the MGWA Board and MGWA Foundation Board presented two student scholarships. There were 13 candidates for the scholarship this year, which is considerably more than in previous years. There were a number of very excellent candidates and the scholarship committee of Cathy Villas-Horns, Jim Lundy, Joy Loughry, and Amanda Strommer found it to be a difficult decision. This is the third year that the scholarships have been awarded and this year's recipients of \$1000 scholarships went to Elisabeth Schlaudt and Sarah Knutson.

Elisabeth Schlaudt is a graduate student at the University of Wisconsin Madison. She is pursuing a Master of Science degree in Geoscience and Water Resources Management and expects to complete her degree in the spring of 2017. She earned a Bachelor of Science degree from Furman University in South Carolina in Earth and Environmental Sciences. Elisabeth is interested in combining water resources management and contaminant hydrogeology. Her research for her combined major involves gathering data and performing groundwater modeling to determine the optimal buffer placement and widths around lakes to mitigate nutrient loading and restore habitat. Elisabeth is very interested in bridging the gap between scientists and policymakers. Eventually she hopes to do field research with the USGS or a research institute and provide hydrogeologic data and analysis to policymakers.

Sarah Knutson is an undergraduate student at the University of Wisconsin Eau Claire. She is pursuing a Bachelor of Science degree in Hydrogeology and Water Chemistry and expects to complete her degree in May 2016. Sarah is on a research team studying the effects of road salt on the water quality of Eau Claire's surface water and groundwater. She also has worked on a project using ground penetrating radar to estimate saturated

hydraulic conductivity, and she will be completing an internship at Barr Engineering this summer. Her career goals include Brownfield remediation and community development. Sarah also intends to pursue a Master of Science degree in Hydrogeology.

Both Elisabeth and Sarah were able to attend the Spring Conference and thanked MGWA and the Foundation for the scholarships. Congratulations Elisabeth and Sarah!

The Water Wars, by Cameron Stracher

Book Review by Stephen Thompson

For those of you who were not at the MGWA conference, here is a short recap.

"The Water Wars" is a young adult novel written in 2014 by Cameron Stracher. The novel paints a picture of a future dystopian landscape where the earth is bereft of fresh water, which causes the United States to breakup into eight superstates, which are constantly at war with each other over water. One of those superstates is Minnesota, which still has water, dams its rivers leaving the state, and guards its borders.

Life in this world has become harsh and dry with no green lawns or swimming pools, only synthetic food to eat, and dry chemical washes for bathing. In the story, Vera and her older brother Will befriend a strange boy named Kai, who has an amazing ability to find water. Various groups keep trying to kidnap Kai because of his ability to divine water by smelling (this includes deep artesian aquifers). Kai is kidnapped and Vera and Will spend the rest of the book trying to rescue him. The reader must suspend their sense of plausibility to make it through the book.

In the same way that doctors and criminal investigators might be irritated with medical and CSI television shows, hydrologists will find fault with aspects of this book. The book continues to feed a common public misconception that groundwater is a mystical resource that relies on supernatural skills to understand and find.



Sarah Knutson and Elisabeth Schlaudt were in attendance at the MGWA Spring Conference to receive their scholarships

MGWAF BOARD MINUTES

MGWA Foundation Minutes

February 12, 2015

Members Present: Scott Alexander, Cathy von Euw, Eric Mohring, Stu Grubb, Bob Tipping (MGWA), Cathy Villas-Horns (via conference call), and Amanda Strommer (via conference call). MGWA Management Present: Jennie Leete and Sean Hunt.

Bob is present to distribute and discuss the running list for exhibitors at the conferences. The list was also added to the google docs folder in MGWA conferences folder. Titled 'exhibitors.'

Agenda items: Current Business, Future Business. Scott asked for additional items. Since Bob was there for the topic related to vendors at the conference the agenda item was moved up.

Current Business: Review and approve minutes from joint January 7 meeting.

Avery was temporarily appointed secretary. Scott had MGWA minutes from their January 7, 2015 meeting. Posted in google docs.

Setting up a committee to promote vendors at conferences.

Bob explained that MGWA charges exhibitors a fee to set up a booth at MGWA conferences. The funds are first used to support a \$50 conference fee reduction for as many of the students in attendance at the conference as possible and then any excess is provided to MGWAF. This is an ongoing fundraiser for MGWAF and Bob had managed it while he was on the MGWAF board.

With an average of 4 exhibitors at \$500/ea, this fundraiser is definitely worth the effort. Bob suggests that the new coordinator stay on top of the schedule and guide development of a exhibitor information section on each conference page on the MGWA website. An exhibitor contract form detailing ground rules, process, and payment details has already been developed. It is now the Foundation's responsibility to recruit someone to step up and steer this effort. Bob has spent about 8-10 hours per conference. Tasks include sending out emails to potential exhibitors then calling them to discuss interest. There have been repeat vendors, and they plus any prospective candidates should be notified of upcoming conferences as early as possible.

A committee of Bob Tipping, Cathy von Euw and Stu Grubb was formed. It can recruit others from the membership to help. It would be helpful to have representation from the private sector. They will establish procedure and timeline for the spring conference on April 22nd holding their first meeting next week.

Review past years finances: Cathy von Euw sent a financial summary compiled since September 2013. Total assets of the Foundation, including the scholarship fund and unrestricted funds are \$132,252.56 as of 2/9/15. There was interest of almost \$6,000 since the last reporting period. Recent debits include \$1,000 to Brown-Nicollet Childrens Water Festival and \$2,000 to the Metro Childrens Water Festival. Blake Lea and Jennifer Bednar were the 2014 scholarship winners. There have been numerous donations. The assets in the Hans-Olaf Pfannkuch Fund total \$28,289.61 and are dedicated to field camp scholarships. There have been no expenses but there have been donations. Interest received is only \$51.27. Cathy von Euw discussed the interest rate percentages. This account used to earn 0.5 % but now that the fund has gone over \$25,000 the interest rate has gone down to 0.1%.

MGWAF unrestricted funds will be moved to Hiway Federal Credit Union as dicussed at the joint January meeting. MGWA management has what is needed to move the funds. MGWAF board accepted the financial report.

New Business: 2015 Metro Children's Water Festival.

The MGWAF board had previously voted to approve the 2014 proposal at the January meeting. Those funds are on the way to Carver County. The 2015 proposal has been received. Eric made a motion to fund the 2015 Metro Children's Water Festival as requested at \$2,000. Cathy von Euw seconded; all in favor; motion approved.

Offering a field camp scholarship for 2015.

Background: Funds donated to honor Hans Olaf Pfannkuch and Calvin Alexander are dedicated to providing scholarships to attend Hydro Field Camp in Minnesota or in the surrounding states and provinces. MGWAF is the fiscal agent instead of the University of Minnesota Foundation because it was feared that they would not honor restrictions on the use of the funds. The whole point of an endowment is to grow interest so the interest can fund a scholarship. Because interest is so low, the fund cannot afford a scholarship. None-the-less, MGWA has provided a total of \$2,000 to fund 2 field camp scholarships in hopes that publicity surrounding the awarding of the scholarships will raise awareness of the fund and bring in additional donations. Announcements about the MGWAF field camp scholarships should be directed at MGWA members and Geology Departments across Minnesota and adjoining states and provinces. The first step will be to set up the process: form a committee, set criteria for selection and decide on application deadlines and process.

At this time there is not another field camp in or around Minnesota, so we would be providing a scholarship to the U of MN Hydro Field Camp.

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MGWAF BOARD MINUTES

MGWAF Board Meeting Minutes, cont.

The MGWAF board needs details from Olaf, Calvin and Scott Alexander of how they envision the scholarship would work. It is assumed that the structure could be similar to the existing scholarship. Scott will outline a structure and get back to this board with a meeting or via email. Cathy Villas Horns will send the criteria form for the current scholarship to Scott as an example.

Future business:

Discuss investment possibilities because the current CD matures in August 2016.

Future interest rates are not looking very good. Current rates are locked in until 2016. Because MGWAF currently has more than \$21,000 to cover anticipated scholarships and grants, it was suggested that the treasurer instruct the bank to keep the interest in the CD account to earn compound interest. Cathy von Euw moved to keep interest in the CD, Eric seconded; all in favor; motion approved.

MGWA Student Scholarship.

Cathy Villas-Horns reported that there are 12 applicants this year which is the most we've ever had. The scholarship subcommittee has a meeting on February 23rd to discuss the candidates. The plan is to announce the winner at the MGWA Spring conference. Last year the MGWAF offered two scholarships – one to a graduate student and one to an undergraduate student.

Cathy Villas-Horns will be transitioning off the MGWAF board. She will see if the current scholarship subcommittee members (Cathy Villas-Horns, Jim Lundy, Joy Loughry, and Amanda Strommer). Cathy Villas-Horns is willing to stay on the scholarship committee and Amanda will take over Cathy's role as the lead of the committee.

MGWAF Board Leadership.

Discussion of board positions - who is looking at retiring and who might be potential new candidates. We could publicize the need for board members or openly advertise at conferences, etc. Individual recruitment seems to work well and there are a variety of committees that the MGWA membership could be involved with. MGWAF directors are appointed by the MGWA board after recommendation by MGWAF. The terms are two years and the MGWAF board could have between 5-10 directors. We agreed to ask the present scholarship recipients serve on the scholarship committee. Cathy Villas-Horns will contact them and extend the invitation to be on the scholarship committee.

New Fundraising Opportunity

Sean mentioned that MGWAF is signed up with the Amazon Smile Foundation. Purchases on Amazon can provide 0.5% of the purchase price. MGWAF receives a check quarterly and there is no cost to the Foundation except promoting the Amazon Smile site, which must be done electronically and which could be sent out with some other MGWA email items. Additional information at:

<http://www.mgwa.org/foundation/index.php> <https://smile.amazon.com/ch/91-2033113>

Wrap-Up:

Eric went over the list of things the MGWA and MGWAF boards wanted to accomplish and it looks like everything is on track.

Stu stated that a standard sustainable rate for other non-profits is they should expect to give out 5% of total on an annual basis. For the long term MGWAF needs to consider managing things differently. An idea would be to connect with a financial advisor that works with non-profits to maximize investment returns. The other option is try to do it ourselves or, because we may not be a large enough fund, check on consortiums forming where they bring together 4-5 similar groups and pool resources to invest a larger piece that can get into attractive investments that have safety. Stu suggested to look into other options and bring that to the next meeting.

The MGWA Foundation is a 501(c)3 charitable organization. Donations to the Foundation are deductible on your state and federal income tax returns.



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MGWA BOARD MINUTES

Minnesota Ground Water Association Board Meeting Minutes

Meeting Date: **March 04, 2015**

Location: Fresh Grounds Café 1362 West 7th Street, St. Paul, MN
Attendance: Lanya Ross, President; Eric Mohring, Past President; Ole Olmanson, President-Elect; Avery Cota-Guertin, Secretary; Emily Berquist, Treasurer; Sean Hunt, WRI; Jeanette Leete, WRI; Kelton Barr
Past Minutes: Approved as amended.
Treasury: Berquist provided the Board with copies of the financial report. Total income for the period of January 1, 2015- March 1, 2015 is \$15,270; total assets as of January 31, 2015 are \$116,792. Net income for the period of January 1, 2015- March 1, 2015 is \$2,434.
Newsletter: Nothing new.
Web Page: The 2015 Spring Conference web page is up and registration is being processed. A draft of the 2015 Fall Sinkhole Conference web abstract registration was completed. Employment opportunity updates were posted to the web page. A link is posted to the MGWAF web page for AmazonSmile. If someone wanting to make an online purchase clicks on this AmazonSmile link then 0.5% of their purchase will be donated to MGWAF scholarship fund. Hunt will correct the exhibitors' hyperlink so that works correctly on the website.
WRI Report: WRI sent the agreed upon money to the Children's Water Festival. WRI reported straightening up finances and completed checkbook balancing. Hunt sent membership renewal reminders to members. WRI is working to send 2015 Spring Conference flyers to members shortly. WRI is working to update the MGWA Operational Manual. Last year WRI asked the Board for money to purchase a new printer. WRI identified the printer issue as a network connectivity problem and bought a part to fix it; thus, a new printer was not needed at this time.
Old Business: MGWAF. The Foundation Board meeting was held in February; Mohring reported that the meeting was productive and the Board is moving forward. Applications are being reviewed for scholarships. Scholarship recipients will be awarded at the 2015 Spring Conference.
2015 Spring Conference. Ross requested presenter bios and presentation descriptions for the 2015 Spring Conference. Barr reported that the MDH will not be granting 6 credit hours (2 credit hours above the 4 credit hours normally granted) towards well driller's licensure for this conference.
2015 Fall Conference. A draft registration is in place for the alternative path for abstract submittal. Barr described to the Board the precedent set by including abstracts without papers into the conference. The Board discussed having the alternative path for abstract online submittal ready by the 2015 Spring Conference. Hunt will send notification emails to members and other organizations. A second field trip was added to the conference. Hunt updated the Sinkhole web page.
White Paper Initiative. Barr presented the Board with the scoping document for the next white paper topic. Mohring motions to approve the proposed scoping document. Motion prevails.
New Business
Ethics requirements. Ross described the requirements for a professional licensure and potential training opportunities for the ethics requirement. Ross suggested including a survey form at the conference to gather ideas as to where to meet the ethics requirements for the professional licensure. Barr suggested combining with other organizations to offer training opportunities.
Social events/Field Trips. Ross asked for distribution of membership to better plan for social events outside of the Spring and Fall Conferences. Berquist suggested offering a reoccurring happy hour at differing locations in the metro, possibly along the lightrail. Barr discussed with the Board where AIPG meets. Leete suggested offering fieldtrips again. Hunt will publish old field trip guides to the website. The field trip needs to include at least one stop where groundwater is a topic, and then MGWA may sponsor the field trip. Ross asked for social event leaders, field trip and or happy hour planning.

Meeting Date: **April 01, 2015**

Location: Fresh Grounds Café, 1362 West 7th Street, St. Paul, MN
Attendance: Lanya Ross, President; Eric Mohring, Past President; Ole Olmanson, President-Elect; Avery Cota-Guertin, Secretary; Emily Berquist, Treasurer; Sean Hunt, WRI
Past Minutes: Approved as amended.
Treasury: Berquist provided the Board with copies of the financial report. Total income for the period of January 1, 2015- March 29, 2015 is \$40,494; total assets as of January 31, 2015 are \$123,850. Net income for the period of January 1, 2015- March 29, 2015 is \$22,174. Hunt reported that money is coming in from conference registration and membership dues.
Newsletter: Hunt reported that the electronic newsletter was sent out to the membership. Paper copies of the newsletter will be sent out soon.
WRI Report: Conference brochure produced and mailed, work on operational manual continues,

MGWA Newsletter June 2015

MGWA 2015 Membership Dues

Professional Rate:	\$35
Full-time Student Rate:	\$15
Newsletter (printed and mailed)	\$20

Membership dues rates were revised at the October 1, 2010 meeting of the MGWA Board. They remain unchanged.

MGWA BOARD MINUTES

MGWA Board Meeting Minutes, cont.

The MGWA Board meets once a month, currently over lunch, on the first Wednesday at Fresh Grounds on 7th in St. Paul.

Members are welcome to attend and observe

bank statements received and reconciled for MGWA and MGWAF, Sinkhole Conference Exhibitor Form revised, newsletter layout, conference registrations recorded and financials kept current.

Old Business: 2015 Spring Conference. Ross reported that all speakers are committed and has received most of the conference bios and presentation descriptions. Hunt will send a reminder notification to membership regarding the pre-registration deadline. Ross discussed with the Board having a water bar at the conference and suggested locations for possible water samples. The Board discussed the budget for speaker gifts.

Ethics requirements. Ross suggested a web page outlining how to maintain licensure. The Board discussed how to present information for licensure requirement opportunities to MGWA members. Hunt will work with Ross to develop material for the information to be displayed on the licensure requirements. The Board discussed a possible survey to assess how members are fulfilling the ethics requirement.

Social events. Berquist suggested that the first social event could be held at Surly's; will look into the possibility of reserving space.

2015 Fall Conference. The web page was updated. The deadline for online abstract submittal is May 11, 2015. Ross will get language to Hunt for the online abstract submittal announcement to MGWA members.

White Paper Initiative. Nothing new.

New Business: Google drive demo. Hunt described how to access the Google drive to share documents.

Meeting Date: Wednesday, May 6, 2015

Location: Fresh Grounds Café, 1362 West 7th Street, St. Paul, MN

Attendance: Eric Mohring, Past President; Ole Olmanson, President-Elect; Avery Cota-Guertin, Secretary; Emily Berquist, Treasurer; Tedd Ronning, Newsletter Editor; Jeanette Leete, WRI; Kelton Barr

Past Minutes: Approved.

Treasury: Berquist provided the Board with copies of the financial report. Total income for the period of January 1, 2015- May 3, 2015 is \$71,639; total assets are \$151,942. Net income for the period of January 1, 2015- May 3, 2015 is \$32, 181.

Newsletter: Ronning reported that the newsletter is in progress and emphasized the need for technical articles to include in the newsletters. Barr and Ronning discussed a potential technical article; Ronning will follow up with Ross. Barr requested revamping of the white paper initiative in the newsletter to draw more attention. Olmanson discussed with the Board the installation of a pair of wells by Minnesota State University, Mankato to be used as a teaching tool. Barr suggested that Olmanson write a small article regarding this activity for the newsletter.

Web Page: Leete will touch base with Hunt regarding email reminders to members.

WRI Report: Leete is working on putting away conference materials from the Spring 2015 Conference. Leete discussed with the Board printing paper directories for members. Currently, only four paper directories are requested by members. Mohring motions to cease printing of the paper directory and to remove the printed directory option from the membership renewal form. Motion prevails. With the removal of the printed directory from the membership renewal form, space is available to add retirees to the form. Leete recommends that dues for retirees be equivalent to students or intermediate between professional and student. A final decision is needed by the Board before August 2015 regarding retiree dues. Mohring requested that Leete provide the Board with a cost analysis of proposed membership dues. Mohring motions to approve the concept of a reduced retiree dues rate dependent on the outcome of Leete's cost analysis. Motion prevails.

Old Business: 2015 Spring Conference. Olmanson discussed with the Board thoughts on the Spring 2015 Conference and Water Bar. Mohring thought that the Water Bar was a good catalyst for conversation. Barr asked the Board to discuss how poster submittals are advertised.

Social Event. The first social event will be at the Urban Growler from 4:30 – 6:30 pm on May 7, 2015. Berquist reserved two tables for the event and will have a sign to direct attendees. Barr suggested that a reminder be sent out to the local geology departments.

2015 Fall Conference. Barr reported that May 11, 2015 is the deadline for submitting abstracts. Mohring motions to ask for a two week extension on the deadline for abstract submittal. Motion prevails. Barr will ask during the next conference call on May 11, 2015 to extend the abstract submittal deadline.

White Paper Initiative. The Board discusses the second White Paper topic: Education Gaps in Groundwater. Bruce Olsen will head the White Paper work group and thus, will need to step down from the White Paper Committee. Jeff Stoner has also requested to step down from the White Paper Committee to serve on the White

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MGWA BOARD MINUTES

MGWA Board Meeting Minutes, cont.

Paper work group. Barr presented the Board with replacements for the White Paper Committee. Mohring motions to approve the suggested White Paper Committee members (Mindy Erickson and Andrew Streitz). Motion prevails. Barr asked that Hunt send an email to members asking for volunteers for the White Paper work group.

Ethics Requirement. The Board discussed opportunities for fulfilling the licensure ethics requirement.

New Business:

NGWA Reception. Ross and Olmanson received an invitation to the NGWA Reception and Board meeting; Ross and Olmanson are planning to attend.

Membership Survey. Barr discussed the member survey and suggested the addition of questions regarding education. It was suggested that EQB's survey questions be included in the member survey; Ross may follow-up with EQB to discuss what EQB wants to include in their survey. If EQB's questions are different from what the Board wants to send members, the Board could send a separate member survey later.

Valley Oak Request. Mohring discussed with the Board receiving an email requesting for technical assistance.

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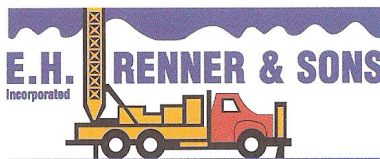
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