

Minnesota Ground Water Association

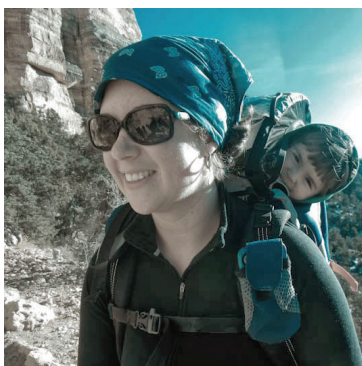
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Newsletter

June 2018
Volume 37, Number 2

Featured:

- ◆ Minnesota Groundwater Tracing Database, Page 9
- ◆ PFCs in Ambient Groundwater, page 10
- ◆ Wright County Geologic Atlas, Part B, page 11



MGWA President
Ellen Considine

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President's Letter

Ellen J. Considine, P.G., DNR

After an unusually long, cold winter, spring has finally arrived. As farmers head out to the fields, hydrologists are working in streams, and road construction has started again. At the DNR we have been refreshing our safety training in preparation for the fieldwork season. I urge everyone to be mindful of safety as they resume fieldwork: protect yourself from ticks and the illnesses they carry by avoiding their habitat where possible and using PPE such as permethrin-treated clothing, DEET, and tick gaiters when avoidance is not possible; put away distractions while you are driving; and take plenty of hydration breaks on hot days. Make sure your summer interns and recent graduates have the guidance and resources they need to stay safe. Everyone deserves to get home whole to their family and friends at the end of the day.

Drain Tile White Paper Report

by Andrew Streitz, MGWA Newsletter Team

The membership team working on the white paper topic, "Drain Tiles and Groundwater Recharge: Understanding the Relations", has finished their work! Both the [report](#) and [executive summary](#) are now available on the MGWA website. This was an interesting and complicated effort, and the final report will undoubtedly become a much-used resource for our membership. The topic workgroup deserves our thanks.

The authors are: Erik Smith, Ph.D., U.S. Geological Survey, lead writer; Timothy Gillette, P.E., Minnesota Board of Water and Soil Resources, chairperson; Kristen Blann, Ph.D., The Nature Conservancy; Mary Coburn, Minnesota Department of Natural Resources; Bryce Hoppie, Ph.D., Minnesota State University, Mankato; and Suzanne Rhees, Minnesota Board of Water and Soil Resources.

Other work group members are: Calvin Alexander, Ph.D., retired University of Minnesota professor; Warren Formo,

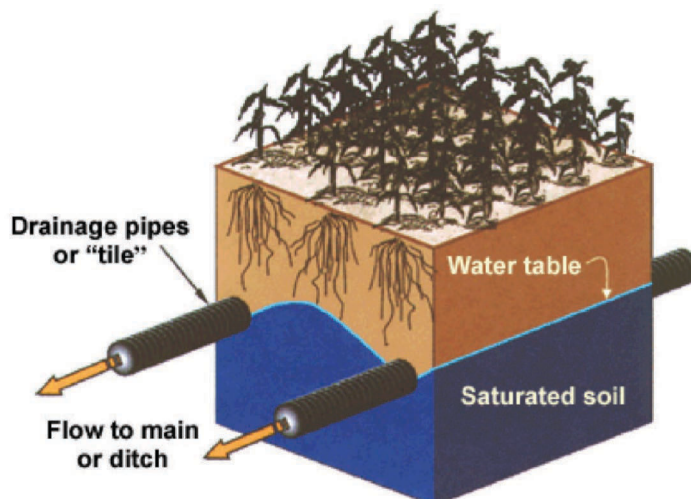
Thanks to everyone who attended the spring MGWA conference, and particular thanks to those who provided feedback. I do read your feedback and think about how to incorporate it at future conferences. We heard that attendees liked the 15-to-20 minute talks, so the fall conference will include more time slots for shorter talks (though we will still have a few keynote longer talks).

The fall conference will be themed around regional groundwater planning. The primary "new thing" for the fall conference is that we are accepting abstracts. If you are interested in giving a 15-to-20 minute talk, please submit an abstract! Directions for submitting abstracts are included in this newsletter and are posted at www.mgwa.org.

Enjoy the summer weather we all so deserve, and please take care in the field and as you travel this summer!

Minnesota Agricultural Water Resource Center; Stephen Lorenz, P.G., consulting geologist; and Mark Morriem, independent tile drainage installer, past president of the Minnesota Land Improvement Contractors (MNLICA).

The white paper committee liaisons are Melinda Erickson, Ph.D., U.S. Geological Survey; and Andrew Streitz, Minnesota Pollution Control Agency. Content authorities include Al Kean, Minnesota Board of Water and Soil Resources; Jeppe Kjaersgaard, Minnesota



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MGWA Web Page

Visit www.mgwa.org for MGWA information between newsletters and to conduct membership and conference transactions.

Newsletter Deadlines

Issue	Due to Editor
September '18	08/03/2018
December '18	11/16/2018
March '19	02/02/2019
June '19	05/03/2019

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MGWA NEWS

Two New MGWA Officers Sought for 2019

The MGWA board needs to fill two officer positions – Treasurer and President-Elect – for 2019. The Treasurer oversees MGWA financial matters and assists with meeting planning. The President-Elect takes a leadership role in the planning of one or more of the MGWA meetings while “learning the ropes” of MGWA leadership. Here’s a chance for you or some-

one you nominate to get in on the front end of ground water resource protection in Minnesota.

The Treasurer serves a two-year term and the President-Elect serves a year before becoming President in 2020, followed by a year as Past-President.

E-mail nominations to the MGWA at office@mgwa.org.

Call for Abstracts

Deadline: September 1, 2018

Minnesota Ground Water Association Fall Conference

November 15, 2018

**University of Minnesota Conference and Continuing Education Center
St Paul, MN**

The conference is now accepting abstracts for 20-minute oral presentations. Abstracts must be no more than 250 words. The preferred topic is regional groundwater planning, though other topics may be given consideration. Special consideration will be given to abstracts which pertain to groundwater planning “failures” or “near-failures.” Abstracts are not required to pertain specifically to Minnesota; case studies from all geographies are welcome.

Directions for submittal:

- ◆ Email your abstract and biography to president@mgwa.org by September 1, 2018.
- ◆ Your abstract (no more than 250 words) must be attached as a document (i.e., not embedded in the body of the email) and named as follows: lastname-firstname_titleofabstract.
- ◆ Your biography (no more than 100 words) must be attached as a document and named as follows: lastname-firstname_bio. Include your full name, title, employer or affiliation, email address, and mailing address.

You will be notified by September 30, 2018 whether your abstract was accepted.



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Guidelines for Submission of Newsletter Articles

The newsletter team appreciates the efforts of article contributors, without whom our newsletter would not be possible. To make the process easier on the author, the newsletter team, and production staff, we have established guidelines we would like authors to follow. For complete list of guidelines, please see the [MGWA web site](#):

- ◆ Submittals should be complete and ready for publication.
- ◆ The text of the article should be submitted as a Microsoft Word document in an attachment to an email.
- ◆ Tables, captions, figures, and graphics should be submitted individually as separate high quality files.
- ◆ A version of the article with embedded tables, figures, and graphics may be submitted as an additional file to indicate the preferred layout of the tables, figures, and graphics within the article.
- ◆ The contributor should include the contributor's name and affiliation on a byline below the title of the article.
- ◆ The contributor should secure permission to print or reprint if applicable and provide the required text to be included with the article.
- ◆ Materials should be submitted before the deadline.

If there is any question about the suitability of a proposed article's content for the MGWA newsletter, it is advisable for the contributor to call the editor before investing significant time in article preparation.

GSA 2019
Combined South-Central, North-Central & Rocky Mountain
Sections Meeting of the Geological Society of America

**Manhattan, Kansas
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ORGANIZING CHAIRS

South-Central Section:
Matthew Kirk | mfkirk@ksu.edu

North-Central Section:
Tina Niemi | niemit@umkc.edu

Rocky Mountain Section:
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MGWA Primary Objectives

- ◆ 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.
- ◆ Disseminate groundwater information.

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MGWA NEWS

MGWA Spring Conference-Recap

Another great conference was held on April 26, 2018, featuring the unusual title, "Where's my flying car? Groundwater past, present, and future." As noted in the conference brochure:

- What were hydrogeologists worried about 30 years ago? What came of those worries? What did they foresee and what couldn't be forecast? Most of all: What can we learn from their experience? As we face the retirement of the baby boomers (the generation that led the cleanup of Superfund sites and made computerized groundwater modeling widely available and accessible), we also risk losing hard-won knowledge and perspective.
- The conference will feature retired and experienced hydrogeologists, sharing their "war stories", alongside modelers and long-range thinkers, sharing their visions of the future. By bringing together past perspective and forward thinking, we hope to gain a deeper understanding of our present concerns and understand how our own work will inform future generations of hydrogeologists.

Over 260 people attended, including 19 students.

The morning started on a quiet note as Chris Elvrum led the membership in light meditation to prepare for the day's presentations. Using music and his voice, he reminded the group to relax and enjoy the coming conference.

Jim Stark then took the stage, and for the first time in many years was not representing the U.S. Geological Survey. Jim retired last year from his old job, but instead of relaxing, has reappeared as the Director of the Minnesota Legislative Water Commission. He shared an old movie made by the USGS fifty years ago, on the Little Plover River (Wisconsin) aquifer test. The video showed a field procedure for

investigating the effects of a pumping test on the river, groundwater, and local ecology and reminded us how much field work has changed over the years. The approach was a mix of sophisticated processes matched with long discarded analogue tools. In this test, USGS staff measured all of the water level measurements by hand using steel tapes. The most startling features of the movie were the near ubiquitous presence of cigarettes, the absence of cell phones, and the large number of men (and only men) available for the multi-day test.

Gretchen Sabel, retired MPCA planner and project manager, gave a nice overview of how the past has fashioned the present, using the Groundwater Protection Act of 1989 as one example. New money made it possible to hire staff to work on the problem of pesticides in public wells, resulting in dramatic drops in concentrations.

Steve Thompson followed, giving the perspective of the recently retired. He worked as a hydrologist and a supervisor at the MPCA, and finished his career in management at the DNR. He described the beginnings of the petroleum remediation program, and the then radical idea that all tanks eventually leaked. Other subjects included risk-based approaches, and his role in the founding of the modern ambient groundwater and watershed pollutant and load monitoring programs.

Ingrid Verhagen of the MPCA gave a wonderful talk on the history of the agency's Closed Landfill Program. She described how this program revolutionized the management of the state's old dumps and landfills. Before this program, the Superfund program was the only mechanism available to clean up these sites, which would have resulted in a legal nightmare for any citizen, business, or school whose garbage found its way into one of these sites.

After the morning break, **Krista Hood** from

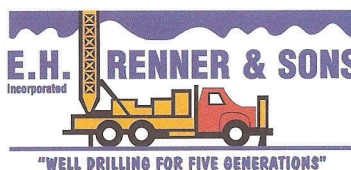
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Abbreviations and Acronyms

- 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

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Spring Conference- Recap, cont.

the USGS Wisconsin Science Center office talked about nitrate in her home state, and how it exceeds drinking water standards in 10 percent of all private wells. She then described the multiple levels of monitoring put in place by the USGS National Water-Quality Assessment Program over the last three decades to track nitrate pollution as well as other groundwater contaminants. One of the key findings from this work in Wisconsin is the strong correlation between nitrate concentrations in the groundwater and fertilizer use.

Amit Pradhananga introduced himself as a social scientist and was excited to talk to the Association about how his field can help us investigate water resources. He described the process he's been using to meet with local government unit (LGU) staff, and determine what they need to protect water resources. Some of his conclusions: local information is required to make effective decisions; community engagement is important, and training is necessary to make it happen; and, money is needed to increase staffing.

Just before lunch, short presentations were made on behalf of the two current MGWA White Paper projects. First, **Erik Smith** of the USGS told the assembled group that the nearly two-year effort on Drain Tile and Groundwater Resources report had just concluded. Erik was the chief author, pulling together the chapters written by the other workgroup members. He described the completed report and let people know that it will be available within a few weeks on the MGWA website. **Carrie Jennings**, who is the Research and Policy Director at the Freshwater So-

ciety, followed next. She is the MGWA White Paper Committee liaison to the latest white paper effort, Stormwater Infiltration and Chloride in Minnesota Groundwater. Carrie described the steps the workgroup has taken since it started in the winter, and gave the membership a overview of the project goals.

Following lunch, there was a short report on the MGWA Foundation. As usual, this year's scholarship winners were announced—Ryan Puzel and Nick Budde. Nick's undergraduate advisor is Dr. Kate Pound, the MGWA President-Elect!

Then came the first round of short talks, the new and popular lightning talks. The talks are always interesting, and there's the guilty pleasure that comes from watching Ellen pull the plug on some speaker who is unable to conclude after a fast five minutes! First to go was Ellen herself to describe the restarting of an old MGWA effort, the education committee. An outgrowth of the recently concluded white paper, Minnesota's Groundwater Education Gap, the newly restarted committee would focus on keeping the momentum behind some of the conclusions of the report. Next was **Brian Bohman** (UM WRS student and Freshwater Society intern) spoke on the Freshwater Society report on groundwater and farmers. **Bill Olsen** of Dakota County went next to suggest that the MDH and MGS change the rules of how to deal with multiple unique numbers for single wells. He was followed by **Mark Toso**, a MPCA hydrologist, to remind the membership that wells often provide misleading information.

Brian Dunnigan and **James Scheider** of Olsson Associates then provided a fast-paced and informative presentation on the history

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Spring Conference- Recap, cont.

very productive part of the Ogallala aquifer; the state's rising groundwater use was hidden because of surface water depletion, and this ended after the state was sued by Kansas; and, now Nebraska appears to have reached a sustainable use of groundwater and surface water.

Kelton Barr (Kelton Barr Consulting) then provided some history on how the state has approached environmental challenges, touching on over-use and groundwater contamination. With rising populations and climate change, he ended with one proposal for increasing access to water resources, that of enhanced groundwater recharge. Using many different datasets he targeted promising areas in the southeast metro.

Tim Gieseke, planner with the DNR, described a new DNR effort to manage the amount of groundwater used in the state called Community-Based Aquifer Management Partnership (CAMP). This new effort brings together all of the public and private users of an aquifer to develop the approach to manage and protect the groundwater.

Chris Elvrum, MDH, described the program Groundwater Restoration and Protection Strategies (GRAPS), using the similar surface water-based program WRAPS to provide context. Run by the MDH, but working with partners throughout state government, he explained why GRAPS are needed, where the project came from and how they work.

The final round of lightning talks started with past president **Evan Christianson** (Barr Engineering) speaking about using models to better understand big scales and gradual change. **Jeff Green** (DNR) described the Minnesota Groundwater Tracing Database, which pulls together half a century of dye tests and other observations in karst country. **Julie Blackburn** (RESPEC) is working on a project associated with Little Rock Creek in Benton County, and displayed an irrigation management assistant that can help a community better use groundwater for watersheds with limited resources. Finally, **Dan Miller** (DNR) gave a succinct overview on the court case involving the DNR at White Bear Lake, and the consequences of the judge's decisions.





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DNR is Awarded Second National Groundwater Monitoring Network Grant

By Tim Quan, DNR

Minnesota Department of Natural Resources (DNR) was awarded a second grant from the USGS for Federal Fiscal Year 2018 to fulfill three of five [USGS National Groundwater Monitoring Network \(NGWMN\) objectives](#). Last year, DNR was awarded a grant to create a web services connection with the National Groundwater Monitoring Network (NGWMN) to provide groundwater site metadata, lithology information and groundwater level data.

For DNR's newest grant award, the USGS NGWMN grant will provide

1. Funding to continue and maintain DNR's web service connection with the NGWMN.
2. Funding to perform well maintenance for 25 wells in Otter Tail County.
3. Funding to drill several new wells to replace older observation wells in targeted locations.

Continue and maintain web service connection with NGWMN

Web services connection is vital to ensuring DNR provides NGWMN with Minnesota groundwater level data. This connection, intended to be a long-term partnership, will enable DNR to furnish the NGWMN with up-to-date groundwater level monitoring data. The NGWMN provides a national overview of groundwater monitoring networks in various states.

USGS funding is provided for the maintenance of 25 Otter Tail County observation wells.

This DNR observation well network in Otter Tail County consists of 25 active wells completed within quaternary glacial materials with construction dates ranging from 1965 to 2015. The current network of wells in Otter Tail differ in age, construction type, and condition. The funds from this portion of the grant will be used to assess the condition of the wells in Otter Tail County with the goal of establishing a protocol to objectively assess well condi-

tion and need for maintenance or replacement for the rest of the DNR observation well network. Understanding the condition of each well in our network is important to delivering high quality data.

The NGWMN will provide funding to support drilling at Oak Glen WMA, Steele County and at Dilworth, Clay County.

The Oak Glen WMA is in Steele county about 5 miles northwest of Blooming Prairie. A new well nest in Oak Glen WMA will consist of 3 wells in 2 of the [USGS principal aquifers of the United States](#) (the Upper Carbonate and Lower Cretaceous). The local aquifers that will be targeted are the Maquoketa-Galena and Quaternary Buried Artesian Aquifers. These wells would provide DNR with baseline groundwater-level data for shallow carbonate aquifers and allow DNR to monitor the connectivity between these aquifers.

Finally, DNR has found [DNR Observation well #14003](#) to be in failing condition. This well is in the buried artesian aquifer in the city of Dilworth, Minnesota just east of the Fargo/Moorhead metropolitan area. Completed in 1906, DNR has measured water levels in this well since 1968. The substantial period of record shows long-term water level changes and it will be important to continue this record. The new well will be installed near the well #14003, most likely within 1 mile and ideally within 0.25 miles, depending on accessibility.

Participation in the NGWMN provides visibility for the [DNR's Cooperative Groundwater Monitoring \(CGM\) network](#). With over 2,600 groundwater level monitoring sites, the Minnesota DNR is one of the most comprehensive groundwater monitoring networks participating in the NGWMN. Data provided by the CGM is readily accessible to the public with a hydrograph created for each site, basic well metadata, and all data available for download.

For questions about the DNR Observation Well Program or the Cooperative Groundwater Monitoring website, please contact: Tim Quan (Tim.Quan@state.mn.us, (651)539-2127, Groundwater Level Database Management.



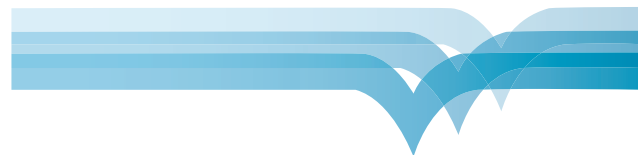
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Minnesota Groundwater Tracing Database (MGTD)

By Wes Rutelonis, DNR

Decades worth of groundwater tracing information is now available through the Minnesota Groundwater Tracing Database (MGTD). This work is largely a collaborative effort between the DNR, the University of Minnesota, local government units, other state agencies, and the local caving community.

Geospatial data for traces include tracer input locations, sampling locations associated with each trace, trace metadata including links to reports and documentation, and inferred groundwater flow vectors and springshed delineations developed by groundwater tracing specialists. Sampling location data is now spatially enabled through direct relationships with the Karst Feature Database (KFD), Minnesota Spring Inventory (MSI), and County Well Index (CWI).

Reports can also be accessed on the webpage, along with other related information such as published articles and papers, maps, summaries, journal proceedings, and presentations.

All the information has been incorporated into a web map application where users can query, select, and view the data and associated reports synchronously alongside KFD, MSI, and CWI (Figure 1). The application includes additional data layers such as bedrock geology, surficial flow routing information, trout stream designations, and high resolution hillshade LiDAR (Figure 2).

The app, reports, and GIS files can be found on the [Minnesota Groundwater Tracing Database webpage](https://mn.gov/groundwater-tracing-database) (County Geologic Atlas program). Other related information can be found at: mndnr.gov/groundwatermapping > Springs, Springsheds, and Karst.

Groundwater tracing has proven to be an effective method for understanding groundwater flow, travel times, and interconnections with surface water. Results have important implications for the protection of sensitive ecosystems and management efforts associated with spill response, water supply planning, and land use planning. This new database provides a framework for accessing the eighty-year history and future of groundwater tracing in Minnesota.

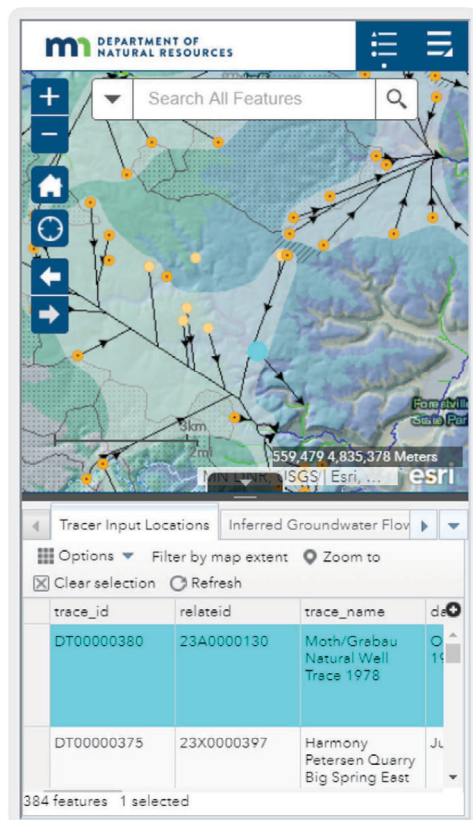


Figure 1. A preview of the MGTD Web Application

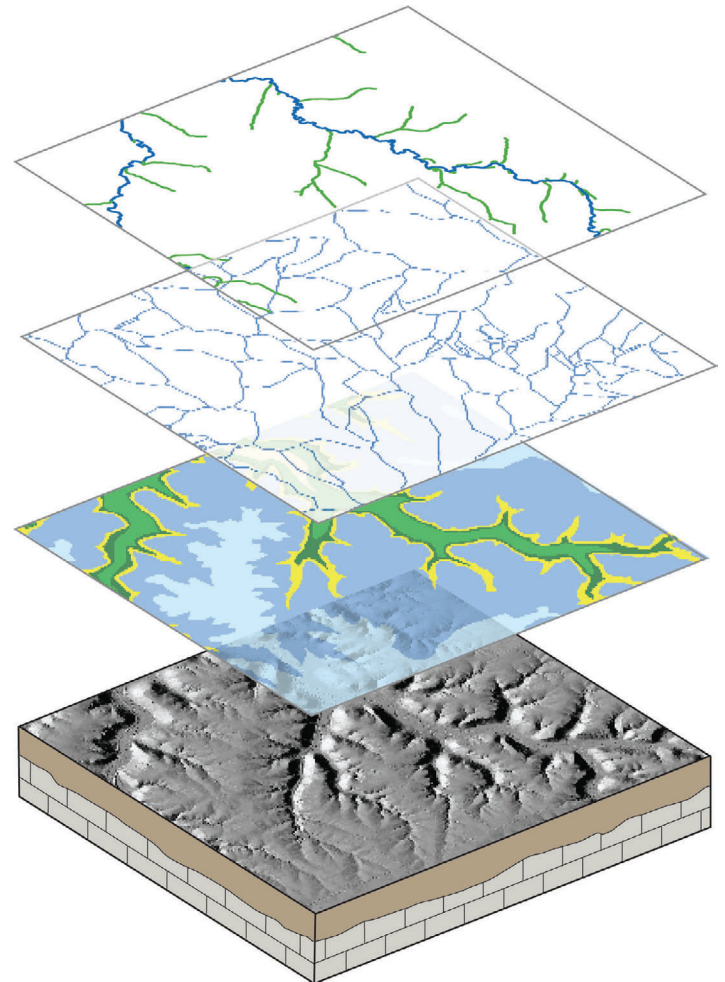


Figure 2. Supplementary Data Layers used in the MGTD Application

MPCA Investigation of PFCs in the Ambient Groundwater

By Sherri Kroening, Research Scientist, MPCA

The MPCA recently reported on its most recent sampling for perfluorochemicals (PFCs) in the state's ambient groundwater. This report, titled "[Perfluorinated Chemicals in Minnesota's Ambient Groundwater, 2013](#)," is available on the MPCA's website. For this study, MPCA staff sampled almost 200 wells in 2013, which mostly were from the agency's Ambient Groundwater Monitoring Network. PFCs are part of a class of more than 3,000 manmade per- and polyfluoroalkyl substances (PFAS) used worldwide to manufacture products that are heat and stain resistant and repel water, including fabric, carpet, paper coatings, floor polish, personal care products, non-stick surfaces, fire-fighting foam, and certain insecticides. The primary difference between PFCs and PFAS is that the former contain as much fluorine in them as chemically possible, while PFAS do not. Several PFCs are more commonly known by their acronyms than their actual chemical names like perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA).

PFAS are of concern because they bioaccumulate and are toxic. Because of their extreme stability, these chemicals are widespread and persistent in the environment and have been found in wildlife and people all over the world. Scientists have studied relatively few of these chemicals in depth, and PFOA and PFOS are the two most studied. The best available science indicates they likely cause several adverse human health effects including developmental problems to fetuses during pregnancy, cancer, liver damage, and immune and thyroid effects. To protect against adverse effects from PFCs in drinking water, the U.S. Environmental Protection Agency set lifetime health advisories for PFOA and PFOS at 70 ng/L in May 2016. One year later, in May 2017, the Minnesota Department of Health updated their human health guidance for PFOA and PFOS. The PFOA health based value (HBV) was lowered to 35 ng/L, and the PFOS HBV was lowered to 27 ng/L. These values protect human health during short time periods such as pregnancy and breastfeeding as well as protect against a lifetime of exposure to these chemicals.

In Minnesota, PFAS are of particular interest because this is one of the few places in the nation where they are manufactured and contamination from these chemicals has affected a large part of Washington County. This contamination comes from the past manufacturing and waste disposal by the 3M Company. 3M manufactured PFOS and PFOA at its Cottage Grove facility in Washington County from the late 1940s until 2002. The PFAS wastes were disposed at four sites in the county, which ultimately resulted in a contamination plume covering over 100 square miles that polluted the groundwater in a large part of the county and affected many municipal and private drinking water wells. PFAS also were discharged for decades to the Mississippi River by the company's wastewater treatment plant in Cottage Grove.

For this study, the MPCA assessed the occurrence and distribution of thirteen PFCs in the ambient groundwater, mainly in the shallow groundwater underlying urban areas across the state. All of the water samples were collected by MPCA staff, who primarily sampled wells from the agency's Ambient Groundwater Monitoring Network.

For over a decade, the MPCA has maintained its Ambient Groundwater Monitoring Network to assess non-agricultural pollution in the state's most vulnerable aquifers, with an emphasis on tracking trends. This monitoring is one of the agency's responsibilities under the Minnesota Groundwater Protection Act. The MPCA put the Ambient Groundwater Monitoring Network in

place in 2004. Prior to this network, the agency conducted a very well-known study of all of the state's principal aquifers called the Baseline Study in the 1990s, which was part of the agency's then Groundwater Monitoring and Assessment Program (GWMAP).

The Ambient Groundwater Monitoring Network differs in several important ways from the Baseline Study. This network focuses on sampling aquifers that are vulnerable to pollution, most notably the surficial sand and gravel aquifers and the Prairie du Chien-Jordan, and a large number of the monitored wells are installed near the water table. MPCA staff sample all of the Ambient Groundwater Monitoring Network wells annually to quantify any changes in groundwater quality over time, and both inorganic and organic contaminants are analyzed. The analyzed chemicals include well-documented contaminants like volatile organic compounds and also includes chemicals of new interest such as PFCs, prescription and non-prescription medications, and detergent metabolites. PFC samples are taken periodically from the network wells, and forty network wells are sampled each year for prescription and non-prescription medications and detergent metabolites.

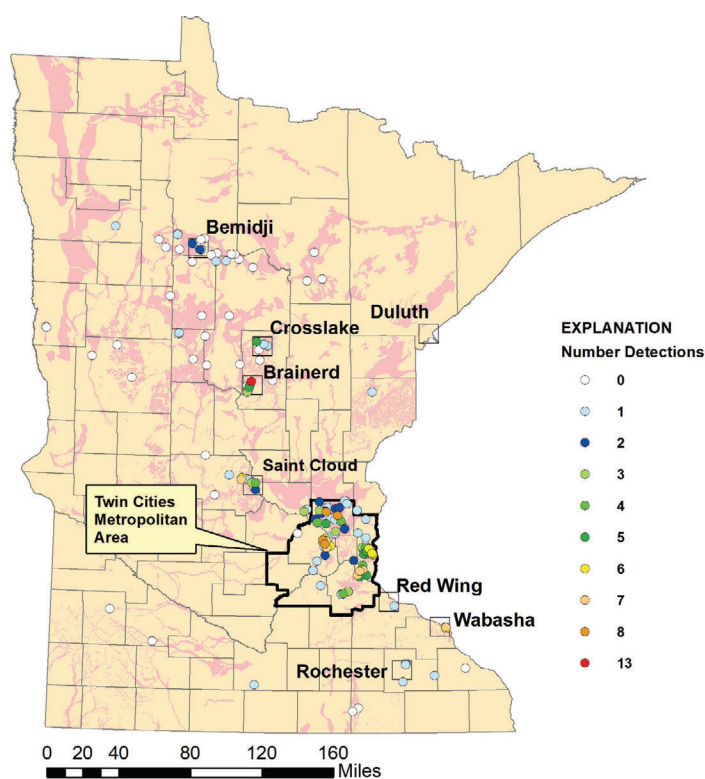


Figure 1. Number of perfluorochemicals detected in Minnesota's ambient groundwater, 2013.

In contrast, the Baseline Study was a one-time groundwater assessment of mainly inorganic contaminants of the state's 14 principal water-supply aquifers. The assessment included aquifers that are naturally protected from human-caused contamination by overlying aquitards composed of clay or shale. Most of the 950 wells sampled for the Baseline Study were domestic water-supply wells. The use of domestic wells, while cost-effective, can

— continued on page 11

Wright County Geologic Atlas, Part B (hydrogeology)

By John Barry, DNR

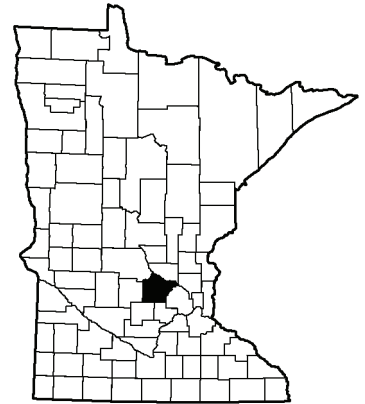
Part B of the Wright County Geologic Atlas was recently published by the DNR. Part B atlases describe a county's hydrogeologic setting, aquifer distribution, pollution sensitivity, groundwater recharge, and subsurface flow within the county. It builds on the geology described in the Part A atlas previously published by the Minnesota Geological Survey.

Wright County is located in south-central Minnesota and is bordered by three river systems. The Clearwater River forms the northwestern border, the Mississippi River forms the northeastern border, and the Crow River forms roughly two-thirds of the eastern border. It has a hummocky terrain with numerous lakes and wetlands. Surface-water flow drains toward three separate subbasin-level surface watersheds which ultimately flow south-east to the Mississippi River basin.

Wright County's surficial geology is dominated by New Ulm Formation sediments that were deposited by glacial ice of the Des Moines Lobe. These sediments are primarily fine grained in texture (clay and silt), which limit recharge and decrease near-surface pollution sensitivity. Coarse-grained sand and gravel deposits in northern Wright County are present along the river valleys and where the Des Moines lobe reworked earlier deposits of the Superior lobe. These deposits facilitate recharge, but also increase near-surface pollution sensitivity.

Underlying the surficial geologic deposits are alternating layers of old sand and gravel and fine-grained deposits from previous glacial advances that are up to 500 feet thick. These saturated sand and gravel deposits provide water to the majority of residential wells in the county. Below the glacial deposits is an assemblage of saturated bedrock units ranging from Mesozoic, Paleozoic, and Mesoproterozoic sedimentary rocks to metamorphic and igneous rocks. In general, the metamorphic and igneous rocks do not have properties conducive for aquifer use, but have limited use where they have endured extended weathering.

Elevated levels of naturally occurring arsenic and manganese are common throughout the county. The northern portion of the county contains elevated levels of nitrate and chloride and other indicators of higher pollution sensitivity.



— continued on page 12

PFCs in the Ambient Groundwater, cont.

complicate detecting any changes in water quality. These wells are privately owned, and it can be difficult to gain access to the well after the property has changed ownership. In addition, many cities have centralized water-supply systems, and there are few remaining domestic wells left to sample in these areas. Finally, domestic wells are installed deep enough in the aquifer to provide clean drinking water. Due to the groundwater's age, there may be a lag of several years before any emerging trends are detected.

MPCA staff sampled almost 200 wells for this study in 2013. These wells typically were not located near known sources of PFC contamination such as landfills or fire-fighting training areas, although a substantial number of the network wells were located in the 100+ square-mile area affected by the 3M contamination in Washington County. All water samples were collected using standard groundwater sampling techniques with a submersible pump outfitted with new polyethylene tubing. The PFC samples were collected unfiltered into bottles provided by SGS AXYS Analytical Services, the laboratory performing the chemical analysis.

This investigation found that PFCs were detected in most of the sampled wells, which again generally represents groundwater underlying urban areas that is vulnerable to human-caused contamination. One or more types of PFCs were detected in over 70 percent of the sampled wells (Figure 1). At least one PFC was measured in the water from 94 percent of the sampled wells in the Twin Cities Metropolitan Area and 10 of the 14 wells sampled in the vicinity of Brainerd. The most-commonly detected PFC was perfluorobutanoic acid (PFBA). This is a PFC that has a short, four-carbon-long perfluorinated chain.

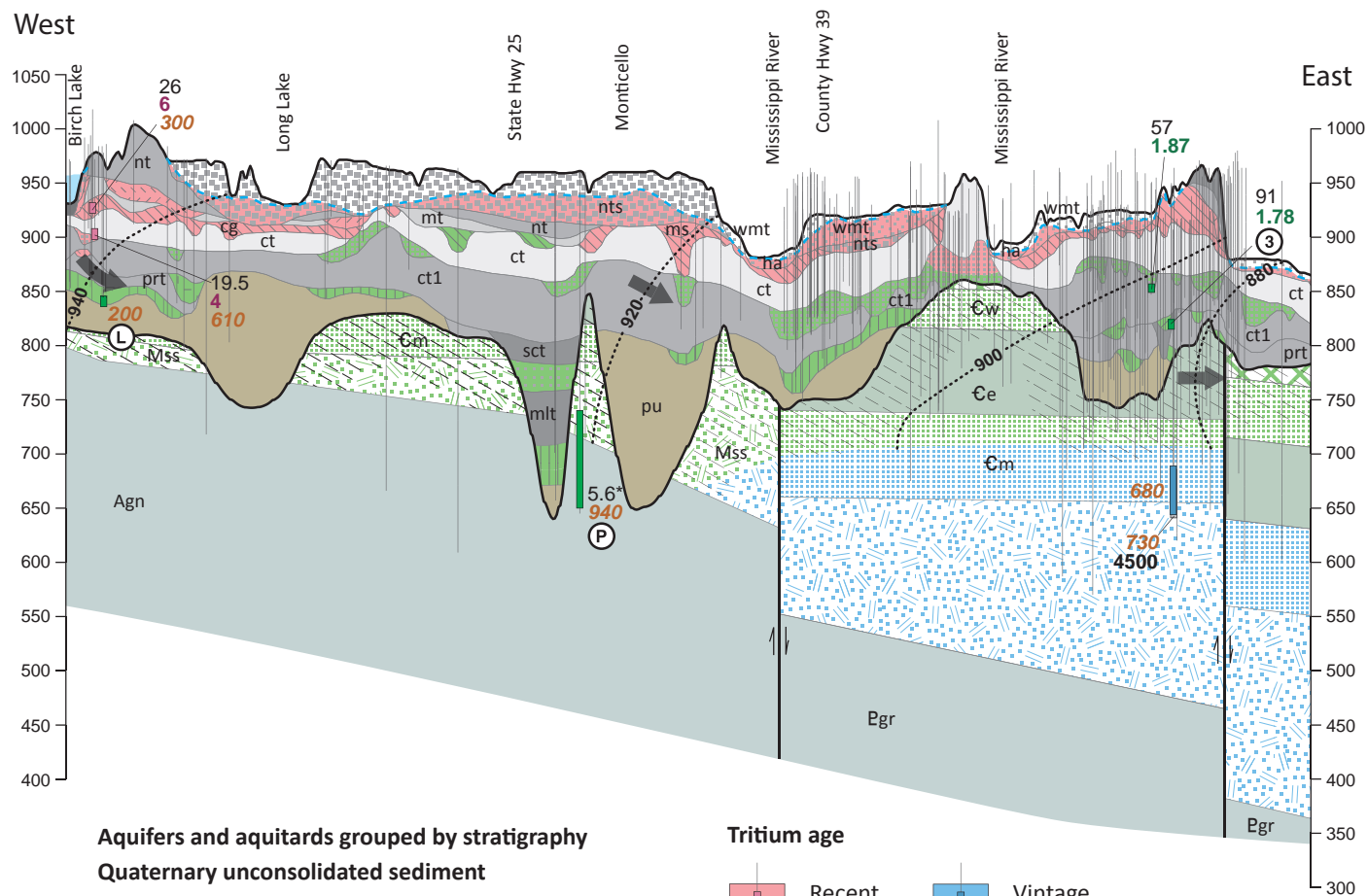
Land use also affected the occurrence and distribution of PFCs in the groundwater. More PFCs were detected in the shallow groundwater underlying urban areas of the state compared to

undeveloped land. The greatest number of PFCs were detected in the water underlying commercial/industrial areas. In contrast, PFCs only were detected in less than one-third of the wells located in undeveloped, forested parts of northern Minnesota.

This investigation found that PFCs in the ambient groundwater in Minnesota generally do not occur at concentrations that adversely affect human health. PFBA generally was measured at the highest concentrations of all the PFCs analyzed in this study, although none exceeded the health risk limit of 7,000 ng/L set in 2011 by the MDH. Eight percent of the sampled wells had concentrations that exceeded the PFOA and PFOS HBVs set by MDH in 2017 or the interim surrogate value for PFHxS of 27 ng/L. Most of the concentrations exceeding these limits were measured in shallow monitoring wells in residential areas. Four of the 50 sampled water-supply wells had a concentrations that exceeded the MDH HBV for PFOA and PFOS, and two of these wells were located near the known industrial PFC contamination in Washington County. It is important to note that the PFC concentrations in the water-supply wells sampled for this study do not necessarily characterize the water that is consumed because all samples for this study were collected from the residence's outside spigot; this water typically is not passed through any in-home water treatment systems that may be present.

The PFCs detected in this investigation of Minnesota's ambient groundwater will remain in the environment for a long time. These compounds are extremely stable and do not break down in either soil or water. As a result, any PFCs transported to the groundwater will remain there until they are naturally transported to streams and lakes by groundwater inflow or pumped up to the land surface. These chemicals also pose a problem if they are transported to streams and lakes because some PFCs such as PFOS bioaccumulate in fish.

Wright County Geologic Atlas, Part B (hydrogeology), cont.



Aquifers and aquitards grouped by stratigraphy

Quaternary unconsolidated sediment

Surficial sand and gravel

includes ha, wmt

Buried aquifers and aquitards

hl*	hs
hbt*	scs
nts	sct*
nt*	mls
ms	mlt*
mt*	prs
cg	prt*
ct*	psu
cg1	pu
ct1*	

Bedrock

Utc	Upper Tunnel City
Wwoc	Wonewoc
Ee	Eau Claire Formation*
Em	Mt. Simon
Mss	Mesoproterozoic
	Precambrian crystalline bedrock (includes Agn, Egr)

*aquitard

Tritium age

Recent	Vintage
Mixed	Well not sampled for tritium.

Symbols and labels

32	Chloride: if shown, concentration is ≥ 5 ppm. (* indicates naturally elevated values)
24	Arsenic: if shown, concentration is ≥ 2 ppb.
180	Manganese: if shown, concentration is ≥ 100 ppb.
9.2	Nitrate: if shown, concentration is ≥ 1 ppm.
5000	Carbon-14 (^{14}C): if shown, estimated groundwater residence time in years.
←	General groundwater flow direction
--- 900 ---	Approximate equipotential contour
---	Water table
↕	Direction of fault movement, arrows indicate relative movement
▨	Enhanced-permeability zone

Groundwater conditions

- ③ Groundwater moves from an overlying buried aquifer to an underlying buried aquifer.
- Ⓛ Groundwater flows laterally.
- Ⓟ Tritium concentrations may be artificially elevated by high capacity pumping.

Groundwater discharge to the Mississippi River and groundwater balances for the Interstate 94 Corridor surficial aquifer, Clearwater to Elk River, Minnesota, 2012–14

Scientific Investigations Report 2017-5114

Prepared in cooperation with the Minnesota Department of Natural Resources

By: Erik A. Smith, David L. Lorenz, Erich W. Kessler, Andrew M. Berg, and Chris A. Sanocki.

The Interstate 94 Corridor has been identified as 1 of 16 Minnesota groundwater areas of concern because of its limited available groundwater resources. The U.S. Geological Survey, in cooperation with the Minnesota Department of Natural Resources, completed six seasonal and annual groundwater balances for parts of the Interstate 94 Corridor surficial aquifer to better understand its long-term (next several decades) sustainability. A high-precision Mississippi River groundwater discharge measurement of 5.23 cubic feet per second per mile was completed at low-flow conditions to better inform these groundwater balances. The recharge calculation methods RISE program and Soil-Water-Balance model were used to inform the groundwater balances. For the RISE-derived recharge estimates, the range was from 3.30 to 11.91 inches per year; for the SWB-derived recharge estimates, the range was from 5.23 to 17.06 inches per year.

Calculated groundwater discharges ranged from 1.45 to 5.06 cubic feet per second per mile, a ratio of 27.7 to 96.4 percent of the measured groundwater discharge. Ratios of groundwater pumping to total recharge ranged from 8.6 to 97.2 percent, with the longer-term groundwater balances ranging from 12.9 to 19 percent. Overall, this study focused on the surficial aquifer system and its interactions with the Mississippi River. During the study period (October 1, 2012, through November 30, 2014), six synoptic measurements, along with continuous groundwater hydrographs, rainfall records, and a compilation of the pertinent irrigation data, establishes the framework for future groundwater modeling efforts. A data summary Figure (16) is presented.

[USGS Publication link to document](#)



ITRC Releases Three PFAS Fact Sheets

The Interstate Technology and Regulatory Council (ITRC) announced the release of its first three technical PFAS fact sheets:

1. History and Use
2. Regulations, Guidance, and Advisories
3. Naming Conventions and Physical and Chemical Properties

The Per- and Polyfluoroalkyl Substances (PFAS) Technical Team is developing a series of fact sheets to summarize the latest science and emerging technologies for per- and polyfluoroalkyl substances. The fact sheets are tailored to the needs of state regulatory program personnel who are tasked with making informed and timely decisions regarding PFAS-impacted sites. The content is also useful to consultants and parties responsible for the release of these contaminants, as well as public and tribal stakeholders. The fact sheets also provide an extensive reference list that will allow readers to get into the details as needed. The fact sheets are living documents and will be updated as more technical and regulatory information becomes available.

The team is also working on an in-depth guidance document which will provide a greater understanding of the technical and regulatory aspects of PFAS, as well as another fact sheet focused on aqueous film-forming foams (AFFF).

You can access the [fact sheets](https://pfas-1.itrcweb.org/) at <https://pfas-1.itrcweb.org/>.

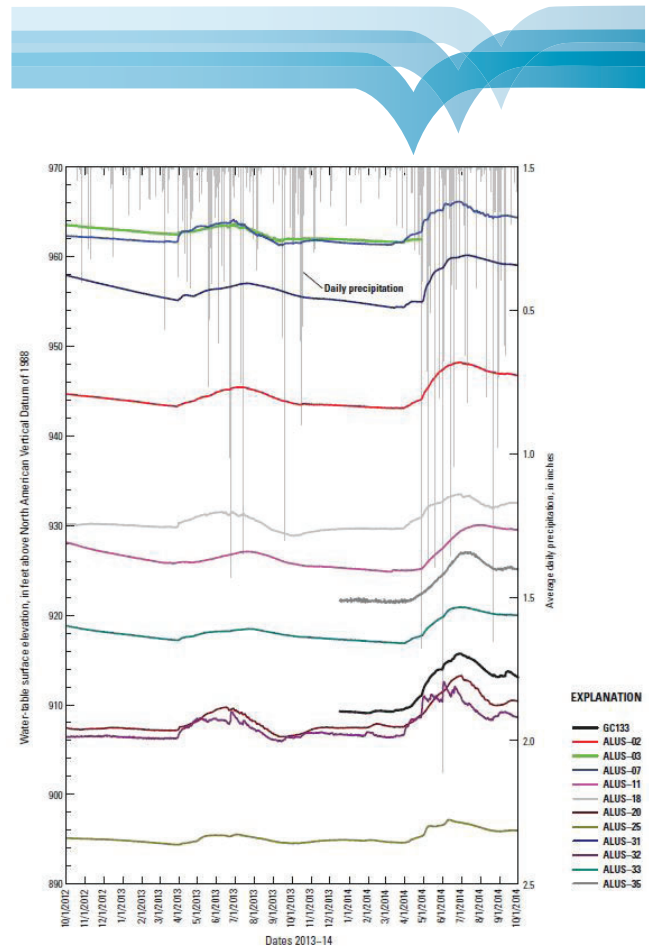


Figure 16. Water table surface elevation, in feet above North American Vertical Datum of 1988, for the 12 continuous groundwater-level records for wells in the Interstate 94 Corridor during water years 2013 and 2014. An average daily precipitation of the 12 collocated precipitation gages also is shown in inches.

Wright County Geologic Atlas, Part B (hydrogeology), cont.

Pollution sensitivity of aquifers varied widely in the county dependent on the depth of the aquifer and the overlying geologic materials. In general, buried aquifers located close to the land surface have higher sensitivities than those located at greater depths. The pollution sensitivity of the bedrock surface is mostly very low, however locations rated high to very high are found in small areas located near river valleys.

Permitted groundwater use is dominated by municipal and public water supply, which accounts for approximately 77 percent of the water used. The majority is extracted from buried sand aquifers. High volume use is centered near large cities, including Albertville, Monticello, and Buffalo. The second highest is crop irrigation (11 percent) which primarily occurs in the northern portion of the county where coarse-textured soils do not readily retain moisture. The third is golf course irrigation (4 percent), which is distributed almost evenly from Quaternary and bedrock aquifers. These three water uses collectively made up 92 percent of the permitted water used in 2015.

Cross Section (Figure 1)

The cross section in Figure 1 represents an area of higher pollution sensitivity in northern Wright County. It is taken from Plate 8, cross section B-B', from a stretch from Birch Lake east through the Mississippi River. Groundwater flow indicated by arrows is both vertically downward and east toward the Mississippi River, the regional groundwater discharge zone. Naturally elevated arsenic and manganese are present along this cross section at a variety of depths, similar to what was found throughout the entire county.

On the western edge of the cross section near Birch Lake, water is shown to have migrated quickly to greater depths because of the higher hydraulic conductivity of the nt and ct tills (medium gray and light gray) at this location. Recent recharge and contamination from human activity was indicated in the cg and cg1 aquifers by recent tritium-age water (pink) and chloride values above background conditions. At the "L" label mixed tritium-age water (green) in the underlying psu aquifer is likely a mixture of recent and vintage water that moved laterally from the west.

Near the center of the cross section between State Hwy 25 and Monticello, high-volume pumping brought mixed tritium-age groundwater (green well symbol) to depths greater than would be found naturally (P label).

East of the Mississippi River, mixed tritium-age water was found in the cg1 and scs aquifers. Human impacts were indicated by elevated nitrate and chloride values. Conversely in this area, a long groundwater flow path that was not influenced by humans was found in a deeper well completed in the Mt. Simon aquifer, indicated by vintage tritium-age and a calculated carbon-14 residence time of 4,500 years.

The [Wright County Geologic Atlas web page](#) contains the downloadable report, plates, and GIS files.

The [DNR County Geologic Atlas website](#) contains other county atlases and groundwater studies.

Short URL: mndnr.gov/groundwatermapping.

AIPG 2018 Annual Conference

September 8-11, 2018

Colorado Springs, Colorado

Plan on attending AIPG's 55th Annual Conference! The field trips will explore the central Rockies/Colorado:

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- ◆ Portland cement plant and adjacent Niobrara Formation quarry
- ◆ upper Arkansas geothermal systems
- ◆ the latest in SW South Park geology
- ◆ Garden of the Gods
- ◆ Florissant Fossil Beds National Monument
- ◆ Wall Mountain Tuff

The technical sessions will cover the full spectrum of geosciences; start thinking about your presentation, short courses on being an expert witness, the use of Rockware's software, and preparing an AIPG/AGI GOLI course. We'll have an Association of Women Geoscientists (AWG) Workshop and Student Career Workshop on Saturday, September 8th. A detailed outline of the full conference is found at: <http://www.aipg.org/2018Conferenceataglance>

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MGWA Foundation Scholarship Winners

By Stephanie Souter, Washington Counter

Undergraduate: Nick Budde

Nick is a senior at St Cloud State University seeking a Bachelor of Science in Hydrology with minors in Geology and Environmental Studies, where Dr. Kate Pound serves as his advisor. He's been a regular attendee of MGWA conferences over the last few years. For his senior research project, he's been working with Bob Tipping at MGS to study stream temperatures in a southeastern Minnesota trout stream. Nick plans to attend graduate school at the University of Minnesota -Duluth (UMD) in the fall, where he will major in geology with a focus on hydrogeology. He will use the scholarship to help offset some of his remaining undergraduate tuition costs and towards graduate school.



Graduate: Ryan Puzel

Ryan is first year master's student at South Dakota School of Mines and Technology (SDSMT). His interest in science began as an undergraduate geology student at UMD, where he also took groundwater courses. During his last semester at UMD he was hired as a field technician at the MGS. At SDSMT, his thesis work will focus on groundwater and surface water interaction along the White River, a tributary to the Missouri River located in south-central South Dakota. He intends to perform detailed analysis of well data and streamflow characteristics as it relates to the local geology and structure in the area. After completion of his master's degree in geology, he hopes to obtain a position as a hydrogeologist with a state agency or consulting firm. Scholarship funding will be used for tuition and research costs associated with his thesis.



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MGWAF BOARD MINUTES

Meeting Date: December 14, 2017

Attending

Scott Alexander, Stephanie Souter, Kara Dennis, Stu Grubb, Lanya Ross

Minutes approval

Lanya had some edits to item 6. Lanya made a motion, Kara seconded. All in favor.

Current finances – Kara

Kara distributed the financial report.

Overall balances:

HOP fund: \$51,658.63

MGWAF : \$221,365.80

\$197,510.50 Endowment Funds

\$17,667.63 Unrestricted funds

Kara suggested compiling a yearly report for reference, including sources of funding for the year. The Board agreed

Debits

\$2,000.00 - Brown-Nicollet - (10/18/2017) - Wells Fargo

\$180.00 - Advisory Fee - (10/31/2017) - Wells Fargo

Credits

\$5,690.21 - Deposit - (10/10/2017) - Transfer from Affinity to Wells Fargo

\$9.19 - Amazon Smile- (11/15/2017) - Wells Fargo

\$1,150.00 - Deposit - (11/21/2017) - Hiway Select Checking

\$180.00 - Deposit - (11/21/2017) - Hiway Select Savings

\$323.00 - Deposit - (11/22/2017) - Wells Fargo

\$5.00 - Deposit - (11/27/2017) - Wells Fargo

\$21.43 - Deposit - (11/28/2017) - Hiway Select Savings

Continued discussion about having MGWA pay the advisory fee from Wells Fargo. Kara will follow up with Jennie.

Meeting with Kent Sward, Wells Fargo Advisors

HOP Funds – can we move it over to WF investment now? Yes, over 50k it can be tracked separately.

Motion to move HOP fund to WF investment fund, in its own account. Stu made a motion, Lanya seconded. All in favor

Liquidity in WF accounts – there is a 2 day settlement, so we could easily get cash out for paying grants, scholarships, other costs.

Follow up item: Kara will follow up with Jennie to discuss closing out Hiway account (unrestricted funds).

Account performance – total earnings to date, \$12,590 (+11%), Very good return.

Current outlook for 2018. They expect some more volatility in the market in 2018.

Review portfolio. The account is managed fairly conservatively, to guard against future market conditions.

New Grant Applications

No new grant applications.

Scholarships

Scholarship is announced, being promoted with members. Stephanie will send a reminder about 2 weeks before the deadline at the end of January.

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and federal income tax
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MGWA BOARD MINUTES

MGWA Board of Directors Regular Meetings

Meeting Date: Tuesday, January 16, 2018

Attendance:

Ellen Considine, President; Evan Christianson, Past-President; Kate Pound, President-Elect; Anneka Munsell, Treasurer; Andrew Retzler, Secretary; Sean Hunt, WRI; Jeanette Leete, WRI; Sharon Kroening, MGWA Newsletter; John Clark, MGWA Representative-State Mapping Advisory Committee

Past Minutes:

Approved.

Reports:

Newsletter

- ◆ The Newsletter team will meet at the end of the month and start work on the March issue. The Newsletter team needs to contact a few authors on technical articles that may be included. Considine will need to provide the President's Letter and Spring Conference notice to the Newsletter Team sometime early February.
- ◆ Kroening will ask for feedback regarding the use of the new pre-formatted Newsletter template.

Treasury

- ◆ Munsell was unable to provide an updated Treasury Report for this meeting. She will email the Board an updated Treasury Report before the next Board meeting.

WRI

- ◆ Hunt does not have updated membership numbers as of this time.
- ◆ Hunt reported that the completed December Newsletter was emailed to membership and placed on the web page.
- ◆ Ballots for the MGWA Board elections were sent out and received back.
- ◆ Hunt and Considine would still like to send out a notice to membership regarding the Conference Planning Committee.

Web Page

- ◆ Hunt did some minor web page updates and needs to update the new officer contact information.
- ◆ Hunt received the approved Fall Conference presentation from Tim Cowdery and added it to the meeting page.

MGWAF

- ◆ Christianson has now become the new MGWA Liaison for MGWAF. Christianson reported that MGWAF has not met since last Board meeting.
- ◆ MGWAF scholarships are out and awaiting applicants.

Stormwater/Infiltration White Paper

- ◆ Kroening reported about 10-15 people from various agencies were at the White Paper Workgroup's first meeting.
- ◆ The Workgroup's first month will involve setting up the Google Drive space and gathering everyone's email addresses and pertinent reports they may have on the White Paper subject.
- ◆ Kroening stated that the Stormwater White Paper would likely focus more on chlorides.
- ◆ A White Paper scope has been drafted. Kroening will ask Mike Trojan to pass the scope onto the MGWA Board to read and approve.

Old Business:

Election Results

- ◆ Munsell motioned to approve the election results for President-Elect and Secretary. Christianson seconded—motion passed.

Update from State Mapping Advisory Committee

- ◆ Clark represented MGWA on the State Mapping Advisory Committee (SMAC) and gave a brief overview to the Board on what the committee does and their role in this year's funding request. Clark volunteered to be the Chair for the SMAC Panel. Clark read the SMAC letter aloud to the Board that was sent out to the federal reviewing committee.
- ◆ Clark reported that the MGS submitted five mapping proposals and that SMAC eliminated one of them from the final proposal. SMAC and MGS have not received word yet on the status of the proposal.
- ◆ Clark asked the Board to think about whether MGWA would be interested in laying out a set of priorities to consider when reviewing the various proposed mapping projects.
- ◆ Clark will draft a short summary of his role on the SMAC for the Newsletter by early February.

Officer Summaries for Annual Report

- ◆ Munsell does not have a summary until the updated Treasury Report is done.
- ◆ Munsell will take on the role of putting together the Annual Report for the Newsletter. Annual Report will likely focus on conference costs and profit and membership costs and Social Hours. Leete said the Annual Report should satisfy the requirements of our non-profit organization status, including a mention about our annual public posting of our 990 reports.

The MGWA Board meets once a month, currently over lunch, at 11:30 on the third Tuesday in the meeting room at Fresh Grounds on W 7th Street in St. Paul (entrance in back of the building).

Members are welcome to attend and observe

MGWA BOARD MINUTES

MGWA Minutes, cont.

Operations Manual Update

- ◆ Munsell added and revised the Members' Rights section and the Treasurer section.
- ◆ Munsell suggested an opt-out portion for members' information being posted on the Membership Directory. Hunt will look into adding an opt-out option and discuss at the next Board meeting.
- ◆ Retzler discussed his Secretary updates to the Operations Manual. Retzler will wait to compile a Google calendar once the rest of the Manual has been revised.
- ◆ The Newsletter Team's operations will be an appendix to the Operations Manual. Kroening will consult with the Newsletter Team on this.
- ◆ Considine will continue to work on her revisions.
- ◆ Retzler volunteered to compile all of the revisions from the Board into a new Operations Manual for the Board to review.
- ◆ Pound asked whether a Sexual Harassment section is currently in the Operations Manual. A Sexual Harassment section does not currently exist, but the Board agrees this should be added. Pound will draft a Sexual Harassment section for the Operations Manual and add it to the Google Drive folder.

Spring Conference Ideas

- ◆ Munsell found someone from Hamline University to lead an Ethics training session in coordination with the Spring Conference. Considine will have Hunt send an email to membership gauging their interest for an Ethics training session. The survey will also include possible dates and times in coordination with the Spring Conference.
- ◆ Considine will have Hunt send an email to membership regarding interest in a Conference Planning Committee. Kroening said this notice could also be placed in the Newsletter in the future if we continue to use the Committee.
- ◆ Considine discussed her topic concept for the Spring Conference, meant to focus on the past, present, and future concerns related to groundwater. Munsell suggested adding an interactive portion to the conference with this topic in mind. Clark shared with the Board a similar past, present, and future concept that was taken at his place of work and how it was very helpful and interesting.

Action Items:

- ◆ Considine will provide a President's Letter and Spring Conference notice to the Newsletter Team for the March issue by early February.
- ◆ Kroening will ask for feedback regarding the use of the new pre-formatted Newsletter template for next meeting.
- ◆ Munsell will email the Board an updated Treasury Report before the next Board meeting.
- ◆ Considine will provide Hunt with notices to send out to membership, including: Volunteering for the Conference Planning Committee. Membership interest in an Ethics training session (with possible dates and times listed) in coordination with the Spring Conference.
- ◆ Christianson will notify the MGWAF Board that he is the new MGWA Liaison.
- ◆ Kroening will ask Mike Trojan to email the White Paper scope to Considine to pass along to the Board for review and approval at the next meeting.
- ◆ Clark will draft a short summary of his role on the SMAC for the Newsletter by early February.
- ◆ Munsell will put together the Annual Report for the Newsletter.
- ◆ Hunt will explore the possibility of adding an opt-out option for members to keep their information private from the Membership Directory.
- ◆ Kroening will consult with the Newsletter Team about a Newsletter appendix to be added to the MGWA Operations Manual.
- ◆ Retzler will compile all of the Operations Manual revisions once completed.
- ◆ Pound will draft a Sexual Harassment section for the Operations Manual.

Next Meeting: Tuesday, February 20, 2018

- ◆ 11:30am – 1:00pm at Fresh Grounds Café, 1362 West 7th Street, St. Paul, MN

Meeting Date: Tuesday, February 20, 2018

Attendance:

Ellen Considine, President; Evan Christianson, Past-President; Kate Pound, President-Elect; Anneka Munsell, Treasurer; Andrew Retzler, Secretary; Sean Hunt, WRI; Jeanette Leete, WRI; Sharon Kroening, MGWA Newsletter; Jeff Stoner (MGWA Member Guest); Cathy Udem (MGWA Member Guest)

Past Minutes:

Approved.

Reports:

Treasury

- ◆ Munsell updated the Board on the Treasury Report. The numbers as reported include a total income for the period of January 1, 2018 to February 11, 2018 of \$14,610.84; net income for this period of \$14, 538.39; total assets for this period of \$100,858.36.

MGWA 2018 Membership Dues

Sustaining Member	\$65
Professional Member:	\$45
Retired Member	\$25
Full-time Student Member	\$20
Newsletter (printed and mailed)	\$20

Membership dues rates were revised at the July 1, 2015 meeting of the MGWA Board.

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MGWA BOARD MINUTES

MGWA Minutes, cont.

Newsletter

- ◆ Kroening stated that the Newsletter Team is about ready to transfer the next Newsletter over to Management for final copy-editing. This issue, among other things, will contain several technical articles, updates about Board members, and updates about recent promotions.

WRI

- ◆ Hunt shared the membership numbers with the Board. Members in the database: 1552; Total Paid Members: 428; Members by category: 3 Student, 39 Retired, 360 Professional, and 26 Sustaining.
- ◆ Hunt recently worked on processing membership renewals.
- ◆ Leete is working on tax information and is preparing the old laptop for use by Munsell.

Web Page

- ◆ Hunt sent out proposed notices from last meeting to membership.

MGWAF

- ◆ Christianson has no updates. The MGWAF Board meeting is in March.

Other Business:

Stormwater/Infiltration White Paper Scope

- ◆ The Board reviewed the proposed scope for the Stormwater/Infiltration White Paper that was shared via email. Christianson commented that the scope describes a number of unknown areas in the study of chlorides and stormwater infiltration, but needs to provide detail on ways to address these unknowns in the future. The Board discussed changing the overall message of the scope to truly focus just on chlorides. Retzler suggested the White Paper Group explicitly mention chlorides in their listed objectives. Christianson motioned to approve the Stormwater/Infiltration White Paper Scope with the Board's clarifications; Munsell seconded; motion passed.
- ◆ Kroening said she received an email from Andrew Streitz mentioning that the Drain Tile White Paper is ready to be approved by the USGS office.

Education Committee

- ◆ Jeff Stoner and Cathy Udem, both members who participated in the Groundwater Education Gap White Paper, discussed with the Board their ideas on resurrecting the MGWA Education Committee. Udem would like to chair said committee, and several draft outlines regarding the purpose and structure of the newly envisioned committee were shared with the Board. The Board discussed these ideas with general approval, and liked the idea of trying to develop groundwater-focused lesson plans for educators. The Board felt that the details regarding how the committee is structured and what its' focus would be should wait to be decided by the members who participate. Munsell motioned to approve the rejuvenation of the MGWA Education Committee; Pound seconded; motion passed. The Board plans to read and approve a scope and a limited budget prior to the upcoming Spring Conference. Stoner would like to have a lunch meeting for members interested in participating during the Spring Conference.

Spring Conference Planning

- ◆ Considine shared with the Board her ideas on the final title for the conference.
- ◆ Considine received only a small amount of interest regarding the Conference Planning Committee, but still plans to utilize the committee for both the Spring and Fall Conferences.
- ◆ Considine plans to have a panel and lightning talks at the conference.
- ◆ The Board discussed the results of the ethics training survey sent out to membership — ultimately deciding to postpone incorporating ethics training into the Spring Conference, especially due to other similar ethics training courses already scheduled by other organizations.

Action Items:

- ◆ Considine will email the Board the proposed scope for the Education Committee. The Board will review this document and decide whether to approve (along with a limited, starting budget) at the March Board meeting.
- ◆ Considine will continue to work with the Conference Planning Committee to plan the details of the Spring Conference.
- ◆ Christianson and Considine will continue their work revising their respective sections of the Operations Manual.

Meeting Date: Tuesday, March 20, 2018

Attendance:

Ellen Considine, President; Evan Christianson, Past-President; Kate Pound, President-Elect; Anneka Munsell, Treasurer; Andrew Retzler, Secretary; Sean Hunt, WRI; Jeanette Leete, WRI; Andrew Streitz, MGWA Newsletter.

Past Minutes:

Approved.

Reports

Treasury:

- ◆ Munsell updated the Board on the Treasury Report. The numbers as reported include a total

MGWA Newsletter June 2018

Save These Dates

MGWA Conferences

11/15/2018

04/25/2019

11/12/2019

MGWA BOARD MINUTES

MGWA Minutes, cont.

income for the period of January 1, 2018 to March 20, 2018 of \$15,126.58; net income for this period of \$13,243.06; total assets for this period of \$100,933.03.

Newsletter:

- ◆ Streitz reported that the 2018 March Newsletter has been compiled and formatted using Ruth's stylesheet.
- ◆ Munsell asked about including a call for Board member nominations in this next Newsletter. The Board agreed that it would be best to notify membership earlier than we have in the past, and that this item can be included in the 2018 June Newsletter.
- ◆ Pound suggested adding an item about the reestablishment of the MGWA Education Committee in the 2018 June Newsletter.

WRI:

- ◆ Leete moved prepaid dues from 2017 to 2018 while also working on a number of other minor financial tasks.

Web Page:

- ◆ Hunt had no updates.
- ◆ Considine asked about having a standalone President's email address for MGWA. The Board agreed this would be beneficial, and Hunt said he will set one up.
- ◆ Streitz asked about White Paper access on our website and MGWA's policies/procedures for White Paper publications on the web. Streitz will have the White Paper Committee compile their ideas on White Paper publication policies/procedures to pass along to the Board.
- ◆ Christianson recommended pulling the Executive Summary of each White Paper out of its' respective document and placed as content on our web page. This would make the valuable text of the Executive Summaries searchable on our page and in the larger context of search engines. The Board agreed, and will consider this and other ways to improve the use of White Paper content on our web page in the future.

MGWAF:

- ◆ Christianson had no updates. The MGWAF Board meeting takes places Thursday, March 22.
- ◆ Leete withdrew money from the Affinity account because MGWAF wants to invest it into the Wells Fargo account as they work to consolidate accounts.

Social Coordinator:

- ◆ Berquist scheduled the next MGWA Social Hour for April 5th at Groveland Tap. A Facebook event has already been created. Berquist will work with Hunt to send out an invite via email to membership.

Other Business:

Education Committee Preliminary Charter:

- ◆ The Board reviewed and discussed a preliminary charter for the soon-to-be reestablished Education Committee.
- ◆ A summary of the Board's recommendations follow. The number of formal titles on the committee could be reduced and the structure proposed in regards to how they interact with the Board seems excessive. The Board would like the committee to be more organic, appointing the chair and possibly co-chair while all other committee member duties are then decided by those appointed chairs. A minimum of only 3 members would be appropriate. The time commitment for each member as currently outlined is too much. Members sitting in more formal roles of the committee should have a 2-year commitment, staggered. Other members should be able take part freely as they see fit. There should be a general expectation that outgoing members seek out a replacement prior to leaving. The committee needs to maintain communication with MGWA, MGWAF, and all other affiliates, but possibly through one individual instead of several liaisons for each respective group. The committee could have a 2-year plan with an annual budget, but a 2-year budget is not feasible with the current budget timeline of MGWA.
- ◆ The Board discussed plans for a conservative starting budget. Hunt suggested they have a small starting budget and then make funding requests to the Board when specific need arises. Leete mentioned that historically it makes sense for their money to come from MGWAF, and gave examples of other outreach/education-related expenses paid for by MGWAF. Considine will notify the Education Committee with a conservative range of what they can expect for a starting budget, giving examples of the other outreach/education-related expenses mentioned by Leete.

White Paper #3 Update:

- ◆ Streitz reported that the draft Drain Tile White Paper has been completed. The Board will have two will assemble their review comments and upload them to Google Drive.
- ◆ Streitz would like to have an email announcement sent out to membership once complete, a section in the 2018 June Newsletter regarding the paper, and 15-min spot at the Spring Conference to advertise the work. Streitz will give the Executive Summary to Hunt within a week before the conference to print and include in conference packets in April.
- ◆ Streitz requested approval for MGWA to fund a dinner for the White Paper #3 Workgroup, White Paper Committee, and any interested Board members. The Board approved under the general capping guideline of \$500 for the event.

MGWA Fall Conference

Abstracts Due

09/01/2018

MGWA BOARD MINUTES

MGWA Minutes, cont.

Preliminary Theme for the MGWA Fall Conference

“Regional Groundwater Planning: Successes, Near-Misses and Failures”

2018 Spring Conference:

- ◆ Considine shared her draft of the conference schedule with the Board.
- ◆ Considine plans to assemble titles, abstracts, and an overall brief summary of the conference topic to send to Hunt for the web page and packet information.
- ◆ Hunt and Leete will review the finances and set conference registration prices.
- ◆ The Board discussed registration costs for presenters, with agreement that presenters should not be expected to pay the registration fee. Considine will inform presenters of this, and the steps involved in still registering through our web page, once the conference page is up. Presenters will likely have to add a note in the comments section during the online registration process.
- ◆ The Board discussed ways to improve student participation and the student mentor process. Considine and Pound suggested engaging members the morning of as they arrive to ask if they would like to participate as a student mentor. Pound suggested having a separate table near the sign-in tables for both students and mentors to gather and engage. Hunt said they can work this into the format. Considine will work on mentor guidelines that can be added to the conference page. Pound will draft new guidelines and information regarding the poster abstract submission process for the conference web page, as she has noticed students are often confused about what is being asked and how to go about submitting.

Action Items:

- ◆ Hunt will set up a standalone MGWA President’s email address for Considine’s use.
- ◆ Streitz will have the White Paper Committee compile their ideas on White Paper publication policies/procedures, specifically digital access on the MGWA web page, to pass along to the Board.
- ◆ Berquist will work with Hunt to email out a MGWA Social Hour invite to membership.
- ◆ Considine will pass along the Board’s recommendations on the Education Committee preliminary charter, as well as provide them with a conservative budget range as a guideline for starting the committee.
- ◆ The Board will have two weeks to review White Paper #3, compile their comments, and submit them to Google Drive.
- ◆ Considine will add a 15-min presenter spot to the Spring Conference schedule for the White Paper #3.
- ◆ Streitz will plan/organize a celebration dinner for the White Paper #3 Workgroup, White Paper Committee, and any interested Board members under a general budget-capping guideline of \$500.
- ◆ Considine will assemble talk title, abstracts, and an overall brief summary of the conference topic and send to Hunt for web page and other uses.
- ◆ Hunt and Leete will review the finances and set conference registration prices.
- ◆ Considine will inform presenters that they do not need to pay registration, and provide them with the registration steps necessary to denote this when the conference page is up.
- ◆ Hunt will plan to include a mentor-specific table in the entrance hall of the conference for students and mentors to gather.
- ◆ Considine will draft new mentor information text that can be added to the conference web page.
- ◆ Pound will draft new guidelines and information regarding the poster abstract submission process that can be added to the conference web page.

Meeting Date: Tuesday, April 24, 2018

Attendance: Ellen Considine, President; Evan Christianson, Past-President; Kate Pound, President-Elect; Anneka Munsell, Treasurer; Andrew Retzler, Secretary; Sean Hunt, WRI; Jeanette Leete, WRI.

Agenda: Approved with additions.

Past Minutes: Approved with changes.

Reports

Treasury:

- ◆ Munsell updated the Board on the Treasury Report. The numbers as reported include a total income for the period of January 1, 2018 to April 24, 2018 of \$52,358.04; net income for this period of \$30,166.67; total assets for this period of \$130,624.58.
- ◆ Munsell reported that we had not accrued all of the conference funds yet.

Newsletter:

- ◆ No report.

WRI Report:

- ◆ Hunt shared the membership numbers: 414 Professionals; 39 Retired; 28 Sustaining; and 3 Student. There are a total of 1552 members in the database with 484 of these being paid.
- ◆ Preparations have been underway for the upcoming Spring Conference. Hunt is expecting over 240 attendees and planning for about 15 walk-ins.
- ◆ Leete has had trouble with the printer and asked the Board for approval to buy a replacement. The Board will have Hunt look into printer options and prices and report back later for final approval.

MGWA BOARD MINUTES

MGWA Minutes, cont.

Web Page:

- ◆ Hunt updated all of the pages associated with the Spring Conference and sent out a notice about Social Hour.
- ◆ Hunt is preparing to add the Drain Tile White Paper to our page.

MGWAF Report:

- ◆ Christianson updated the Board on the March MGWAF meeting.
- ◆ Scholarships have been awarded to two students. There were four undergraduates and four graduates that applied. MGWAF agreed to fund two field camp scholarships again. Considine will have Scott Alexander send information about these scholarships to Hunt for the web page.
- ◆ A member has interest in donating \$5000 to MGWAF for scholarships annually with the request that they be tax-deductible and awarded based on need. MGWAF needs to review this possibility further.
- ◆ MGWAF anticipates between about \$10,000-\$12,000 in spending on donations and events.
- ◆ MGWAF discussed the Education Committee logistics and approve of the committee requesting funds through them.

Social Coordinator:

- ◆ Considine relayed Berquist's email update about the last Social Hour. The social this month was smaller with about 9 people in attendance. This was partly due to overlap with an AIPG social hour happening concurrently. Berquist has talked to the AIPG Social Coordinator to make sure there are no overlaps in the future.

Other Business:

White Paper Dinner:

- ◆ Considine said state employees are not allowed to accept a gift for work on state's time. If individual employees are uncomfortable with the paid dinner, they can pay themselves.

2018 Spring Conference:

- ◆ Christianson will prepare Pigeonhole for the meeting. Hunt will add a link to Pigeonhole on our web page. Hunt will send Christianson the agenda and feedback information for setting it up.
- ◆ Pound and Retzler will be near the check-in to help recruit mentors and mentees. Management will put together more signs for the mentor table and the poster room.
- ◆ Considine will bring a back-up laptop.
- ◆ The conference organization meeting at Hunt and Leete's will be on Wednesday, April 25 at 6:00 PM.
- ◆ Dinner after the conference for speakers and Board members will be at Stout's Pub.

Common Meeting Minutes Template:

- ◆ Leete said Ruth MacDonald would like common templates for the meeting minutes to make it easier for the Newsletter formatting. A proposed template was emailed to the Board. Retzler approved of using the proposed template. Christianson will check with Stephanie Souter if this template works for MGWAF.

2018 Fall Conference:

- ◆ Considine said the theme will be about planning for regional sustainable groundwater use and has a few speakers in mind.
- ◆ Considine asked Hunt to send out a call for abstracts, 200 words or less, and have them sent to the new MGWA President's email address.
- ◆ Retzler would like to nominate a member for the MGWA Outstanding Service Award for the Fall Conference. The Board will discuss this further at the next meeting.
- ◆ Pound suggested putting together a simple Word document or PDF guide for instructions on poster and speaker submissions.

Action Items:

- ◆ Hunt will look into new printer options and prices and report back to the Board.
- ◆ Hunt will add the Drain Tile Paper to the web page.
- ◆ Hunt will send Christianson the conference agenda and feedback information for Pigeonhole.
- ◆ Christianson will prepare Pigeonhole for the conference.
- ◆ Management will prepare more signs for the mentor table and poster room.
- ◆ Christianson will check with Stephanie Souter whether the new minutes template works for MGWAF.
- ◆ Hunt will send out a call for abstracts, 200 words or less, for the 2018 Fall Conference with instructions to send them to the new MGWA President email address.
- ◆ The Board will discuss the MGWA Outstanding Service Award for the 2018 Fall Conference at the next meeting.
- ◆ The Board will consider putting together a simple document of instructions for the conference web page on poster and speaker submissions.

Call for Nominations

**MGWA President
Elect and
MGWA Treasurer**

**Send nominations to
office@mgwa.org by
09/01/2018**