

# Minnesota Ground Water Association

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## Newsletter

June 2019  
Volume 38, Number 2

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- ◆ White Paper #4, Impacts of Stormwater Infiltration on Chloride in Minnesota Groundwater, page 6
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MGWA President  
Kate Pound

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## Letter from the President

### Spring is finally here!

By Kate Pound

We may still be finding potholes, but by the time you are reading this we should be long past any spring snowstorms. We are also past the first major event of the MGWA year – our Spring Conference. I was delighted to see such a good turnout at this year's conference (we were sold out!). This brings me to the two topics that are looming large for me. First:

### Conferences

*How are our conference themes or topics chosen? How are speakers identified? How is the conference program planned?*

Quite a few people have asked me this question – so I'll try to answer it here. The simple

answer is 'it varies'. The more detailed answer is that it is a somewhat fluid (!) process. The MGWA Board requests suggestions from you at each conference (that is on those yellow conference evaluation forms that we always ask you to fill out and hand in at the conclusion of each conference!). Those suggestions give us a flavor of topics that members are interested in. Ultimately it is the responsibility of the MGWA President (with the guidance and approval of the MGWA Board) to determine the conference theme or topic. The president then identifies and invites speakers that can address the topic or theme at hand. Another question I have been asked is:

*Should we be bringing speakers in from outside the Midwest – or should we focus on*

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## The Springs of Pine County, 1920

By Greg Brick, Ph.D.

The Pine County Game Refuge was established in "the cut-over country" of northern Minnesota in 1916, comprising about 180 square miles where the state's great pinery had once been. At the Fleming Camp, loggers had cut white pine and rolled it into the St. Croix River at nearby

Yellow Banks, from where it floated down to the sawmills on the lower river (Harris, 1952). This refuge later became St. Croix State Park, largest in Minnesota, in 1943. Thaddeus Surber (1871-1949) was an aquatic biologist who played a big role in the State Game and Fish Department, a predecessor of the DNR (Figure 1). Originally employed by the U.S.

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Figure 1. Surber's trophy, courtesy of Jen Oknich.

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## Newsletter Deadlines

Issue	Due to Editor
September '19	08/02/2019
New Format in December 2019, Ongoing Call for Submissions.	

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## MGWA MEMBER NEWS

### Bob Tipping Moves to MDH Source Water Protection

Bob Tipping has accepted the position of Hydrologist Supervisor 3 with the MDH Source Water Protection unit. His last day at MGS will be June 28th. Bob has 30 years of subsurface modeling and database experience from MGS. His research interests at the Survey focused on aquifer and aquitard characterization - both in unconsolidated materials and bedrock, along with mapping groundwater chemical composition and age. He looks forward to applying these tools toward source water protection and outreach efforts - while staying in touch with his University of Minnesota friends and colleagues!



### Transition to new supervisor of MPCA Groundwater Unit

After more than 40 years at the MPCA, Paul Hoff has left the agency for new adventures in retirement. Paul began his career at the agency in 1977 as a student worker in the Public Information Office. A few years later he began working full-time in the Public Information Office, eventually serving as director during the rapid MPCA growth years of Superfund, acid rain, and leaking tanks programs. His staff have produced legislative reports, state of the environment studies, and investigations of persistent toxic substances such as mercury, brominated flame-retardants, endocrine-disrupting chemicals and PFCs (now known as PFAS). In 2013 the Ambient Groundwater Program came to Paul's unit, bringing "new important work and great people." He's had years of fun and friendship with the MPCA softball teams and the golf league, and with the Lafayette Park Orchestra.

Taking over Paul's position is Erik Smith. He has been with the MPCA since 2012, working on water quality for the metallic mining industry. Originally from Massachusetts, Erik worked as a hydrogeologist for environmental consulting firms on the East Coast, as well as for the Michigan Department of Environmental Quality.

In addition, he managed environmental geochemistry laboratories at Texas A&M University and the University of St. Thomas in St. Paul. Erik has a B.S. in Geology from Salem State University and did graduate work at Michigan State University, focusing on groundwater modeling and contaminant transport. He is very excited to be in a position to support the critical work on groundwater quality and persistent and emerging contaminants conducted by the professionals in the Environmental Analysis and Groundwater Services Unit.



### Upcoming MGWA Conference Schedule

Update your calendars with MGWA conference dates in 2019 and 2020.

#### Spring Conference

April 28, 2020

#### Fall Conferences

November 12, 2019

November 12, 2020



## President's Letter, cont.

*learning about work that has been done in our own backyard?*

I am a firm believer in using both approaches – there are ongoing groundwater-related projects in Minnesota that many of us may not know of – or could benefit from updates on. We can also learn from those working in regions we are not familiar with – or who have navigated through the rough waters of challenges we may be facing in the future.

For those of you that attended the 2019 Spring Conference, you know that I broke with tradition and announced the **topic for the Fall 2019 Conference** a whole six months ahead of the conference. It is No Longer ‘out of sight – out of mind’ – Making Groundwater Visible to Citizens and Clients. My vision is to include a range of presentations that include topics such as: communicating uncertainty, expert testimony, legislator perspectives, as well as techniques for identifying and communicating with your audience – as well as examples of successes and failures. I want to draw on both local and national speakers and expertise. I encourage you to contact me ([president@mgwa.org](mailto:president@mgwa.org)) with any suggestions you may have for speakers – this is an opportunity to

bring good speakers in from outside the Upper Midwest – and share the results of less-known work completed locally.

### Volunteers

This brings me to my second topic. MGWA is a volunteer organization. I continue to be impressed by the number of individuals who have volunteered their time and expertise – typically over many years. I encourage you to volunteer your time and expertise – or encourage a colleague to do so. At the least consider going to our next social event (What’s to lose? We provide free appetizers, you purchase your beverage of choice) – the last one was held at the Groveland Tap in St. Paul – it is a great way to get to know members and build your network – and maybe figure out how you might be able to contribute. Now I’d better get this to our (volunteer) newsletter team. Happy Spring!



## Springs of Pine County, 1920, cont.

Bureau of Fisheries, he became a prolific contributor to Fins, Feathers, and Fur, a forerunner of the Minnesota Conservation Volunteer. His report on the Root River in southeastern Minnesota involved hiking “a thousand miles” while mapping its springs and other features during his tenure as Superintendent of Fish Propagation. He is known worldwide for the Surber Sampler, which he invented (Brick, 2016).

The Pine County Game Refuge, a sort of “polar Serengeti,” abounded in wildlife, according to Surber, including bears, wolves, foxes, moose, and deer. Some of these were attracted by the “natural licks,” which provided mineral nutrients.

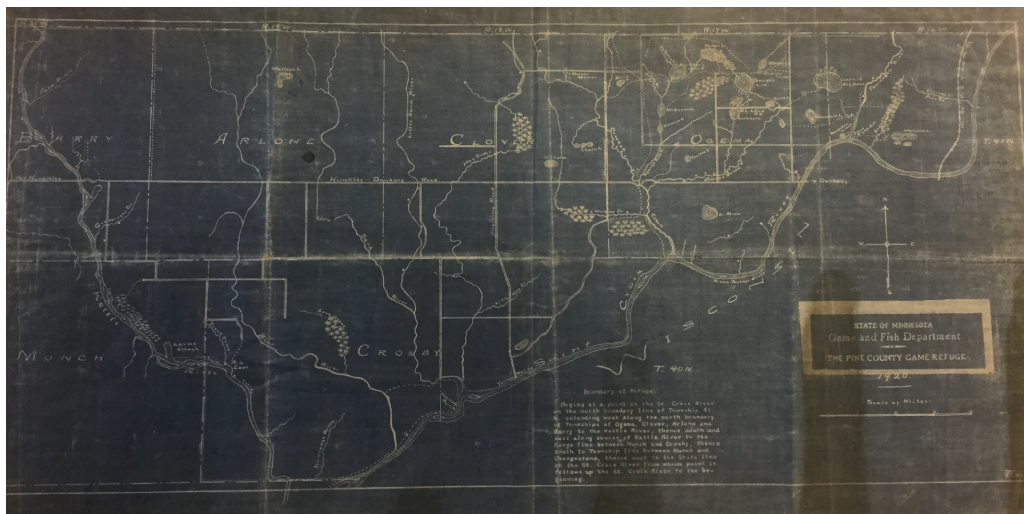


Figure 2. Surber's 1920 map of the Pine County Game Refuge, showing springs.

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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.

## MGWA's Corporate Members

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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

## MGWA NEWS

### MGWA Spring Conference 2019

#### It's Time to Talk About 'Till' – Glacial Sediments and Groundwater

by Andrew Streitz and Sharon Kroening

Thursday April 25, 2019, at the Continuing Education and Conference Center, University of Minnesota, St Paul

Glacially-deposited sediment mantles a significant portion of the land surface in the Upper Midwest. Our understanding of glacial sediments, their textural and lateral variability, and hydraulic conductivity is essential for management of surface- and near-surface aquifers.

This conference drew from experts on glacial processes, glacial stratigraphy, and the logging of glacial sediments ('tills') to provide a primer on glacial sediments. They then examined the evolving history of till and groundwater studies, with a focus on hydraulic conductivity based on work across the Upper Midwest, including an examination of the challenges faced by those who try to model groundwater flow and manage groundwater in glacial sediments.

**MGWA President Kate Pound** opened the conference with a welcome and a short description of the day's events. Following this, the presentations began.

#### Morning Presentations

Jason Moeckel of the Minnesota Department of Natural Resources, gave a presentation on the Intersection of Groundwater Models, Ecology, and Management. As Manager for the DNR's Monitoring and Analysis Section, he has seen the state's growing need for water and has helped implement the Department's new willingness to refuse requests for permitted withdrawals in order to assure supplies are sustainable and protective. Jason described the latest news in the White Bear Lake lawsuit in the context of the history of the legal struggle. He outlined how recent modeling of the lake and groundwater is used to run different scenarios for the region, and to prepare for droughts, population growth, and climate change. He also described efforts underway at Little Rock Creek and Bonanza Valley to ensure sustainable use of the groundwater resource.

**Carrie Jennings from the Freshwater Society** then followed with a masters class in understanding till, in a presentation entitled, "**Till: Spatially variable, complex and dense**". She began by answering the question of why Minnesota has so much till. It's because we have a million year+ history of deposition. She showed some great pictures of classic tills. She pointed out that we tend to devote our greatest study to the top few meters

of till, but need to consider the full thickness to understand the complexity. And she took special care to ensure listeners did not equate till with clay. They are different! Till is the product of glacial erosion, transport, and deposition, while clay is a clastic mineral particle with a grain size of less than 2 micrometers that forms over long periods of time from chemical weathering of silicate-bearing rocks. She finished by discussing the hydraulic conductivity of tills. The dominant orientation of the rock elements such as grains and clasts, as well as joints are important factors to consider.

**Barb Lusardi of the Minnesota Geological Survey** was up next with a presentation called, "**The Old Gray Till – It ain't what it used to be!**" She gave an overview of the County Geologic Atlas Program, including the use of roto sonic drilling to identify the till units in each county. She also described advances the MGS made in classifying and mapping the state's till units. She informed the meeting attendees that the MGS published a report in 2016 that listed the naming convention for the state's till units as well as their stratigraphic framework. Barb also displayed some new results of east-west cross-sections produced at one-kilometer intervals for selected counties, and at proposed cross-sections at five kilometer intervals for the entire state. Finally, she let the audience know that the MGS just completed a new compilation of the 1982 state wide quaternary geology map. The new map includes each till unit's texture and provenance and lists the formations and members.

**Bob Tipping, also of the Minnesota Geological Survey** then presented on "**Assessing vertical recharge through Minnesota's glacial sediments – A mapping perspective**". He started by giving some history on the first efforts in Minnesota to determine groundwater vulnerability, based on geologic properties. He then walked the audience through changes to this approach as new information and techniques became available. He also described changes in subsurface mapping, incorporating groundwater level data, geochemistry and geology to understand vertical groundwater gradients. The eventual goal is to provide users with new tools to determine vertical flow, and as an example he used the relatively new concern of chloride and how its movement into deeper systems can be tracked.

**Bill Simpkins of Iowa State University, and Jared Trost of the US Geological Survey** described a joint project that quantified the variability of hydraulic properties and flux of water through till confining beds to buried

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## MGWA Spring Conference, cont.

aquifers at four sites in Minnesota. The project also included support from the MGS, MDH and DNR, and Environmental and Natural Resources Trust fund. The talk was entitled “**Ground-water flow through till: Tortoise, hare, or not in the race?**” Jared began the talk by describing the study, the areas chosen and a main goal, to determine sustainability of water supplies in confined systems. And to do that you need to know how water recharges through till. Bill described the unusual nature of the study, with multiple wells in the till, overlying a pumped aquifer, a necessity if you wish to study recharge through till. The team used tritium and chloride/bromide ratios to track flow. Modeling is being undertaken to attempt to tie the datasets together.

## Student Awards

After the lunch break, **Lanya Ross** represented the MGWA Foundation in the awarding of Gil Gabanski Student Scholarships to two recipients, Alexandra Torrance from Bemidji State University and Elizabeth Flage from the University of Minnesota.

**Scott Alexander** then presented awards for the upcoming hydro field camp to Sianne Luzzi, a graduate student at the University of Minnesota, and Stacy Zeigler, a student at St. Cloud State.

## MGWA Programs

**Carrie Jennings** from the MGWA White Paper Committee updated the membership on the status of both the current topic, chloride in stormwater, and the new topic involving a review of the 1989 Groundwater Protection Act. She has lined up a few volunteers and would welcome hearing from members who wish to become involved in this new project.

**Cathy Udem** then gave an update on the newly reconstituted **MGWA Education Committee**. She also sought volunteers from the membership to participate.

**Kate Pound** returned to the podium to announce the title for **next Fall’s conference**, (GW Out of sight, out of mind?). She asked members for ideas for speakers and presentations.

## Afternoon Presentations

**Justin Blum** of the **Minnesota Department of Health** kicked off the afternoon talks with a detailed discussion of his over 30 years’ experience interpreting pumping tests in his presentation, “**Leakage is for ‘Lumpers’ – Lessons Learned from Aquifer Tests in Layered Till**”. This was a continuation of Jared and Bill’s talk, with Justin describing the effort involved in analyzing the pump test data generated in the study of recharge through the till. Justin said this was the first time he’s been able to perform an aquifer test with obwells in the till overlying the aquifer. He walked through what’s involved in this kind of work. And he stated very strongly that analyzing aquifer test data teaches one that you have to learn to love to lump units!

**Paul J. Martin** of **Aqua Insight Inc.**, in Waterloo, Ontario, was up next with an overview of a system used in the Waterloo metropolitan area to understand, protect, and use their water resources, in a presentation entitled, “**In Search of Till “Windows” – Modeling the Waterloo Moraine Multi-Aquifer System**”. The centralized approach was spurred by a water contamination tragedy in 2000 involving feedlot runoff reaching a municipal well that led to the death of seven people, and sickened over

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## MGWA Spring Conference, cont.

2,300. They now have a sophisticated transient model that can be used to run scenarios involving the threats posed by drought and climate change.

**Keith Schilling, the State Geologist of the Iowa Geological Survey**, finished off the day with a presentation called, “**Old till is not over the hill for groundwater protection: Hydrogeology of Pre-Illinoian till in eastern Iowa**”. He described an effort to reactivate a large study site. It was originally built in the 1990s, involving 22 wells, well nests, extensive sampling, but then was abandoned due to a lack of funding. Ten years later he explored the possibility of making use of this investment by taking new samples. With simple layer cake geology and very slow recovery rates for the wells. They decided to NOT use standard sampling procedure and bail the wells because of the slow recovery rates. So they first measured the groundwater head, then sampled the wells and finally bailed them. Then they returned in one year later to measure, resample and rebail, in that order. They found that some of the wells had still not returned to the original head levels of a year previous. They then followed up with a third visit one week later, with the same procedure. The geochemistry yielded interesting results about the vertical recharge through oxidized and unoxidized soils.

## Impacts of Stormwater Infiltration on Chloride in Minnesota Groundwater

**An Update on MGWA White Paper Topic #4,**  
by Mike Trojan

All sections of the document have now been assembled into the MGWA report format. A first major editing was also performed to properly order content. The bibliography was also organized. The Conclusion and Recommendation sections will be finished by June, and the internal review and formatting, with the introduction of images is expected to be completed by July. At that point external reviews will be scheduled, with a goal of finalizing the report by September. Once the report is complete, the workgroup will arrange for the placing of the report with its supporting materials on the MGWA website, and then turn its attention to sharing the report and its conclusions with interested parties.



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## Leaky Lakes and Buried Bedrock Valleys

By Jim Berg, Minnesota Department of Natural Resources

Never has groundwater been so newsworthy in the state of Minnesota. Lake and groundwater levels went up and down and then up again. Left over chemicals from product manufacturing sank deep into aquifers and flowed in multiple directions. The hydrogeologic conditions around these situations and more are highlighted in the recently completed **Groundwater Atlas of Washington County**.

This atlas is a revision of an earlier geologic atlas completed in 1990 by the Minnesota Geological Survey (MGS). The complete updated atlas is available in two parts: the geology (Part A) completed by the MGS in 2016 and the groundwater (Part B) completed by the DNR in 2019. The DNR groundwater atlas not only builds on the foundational information of the MGS, but also includes a large amount of legacy chemistry data from the U.S. Geological Survey (USGS), Minnesota Department of Health (MDH), and recently collected DNR chemistry data.

Typical of all Part B groundwater atlases, the report is a comprehensive look at a wide range of groundwater characteristics and conditions in the county. Topics include water-table elevation and depth; residence-time indicators (tritium and carbon-14); groundwater and surface-water interaction, and inorganic chemistry distribution (chloride, nitrate). Additionally, the report includes maps of pollution sensitivity, potentiometric surface and groundwater flow, and hydrogeologic cross sections. Hydrographs illustrate the interaction between groundwater, surface water, stream flow, and precipitation, using extensive online database information from the DNR and Metropolitan Council.

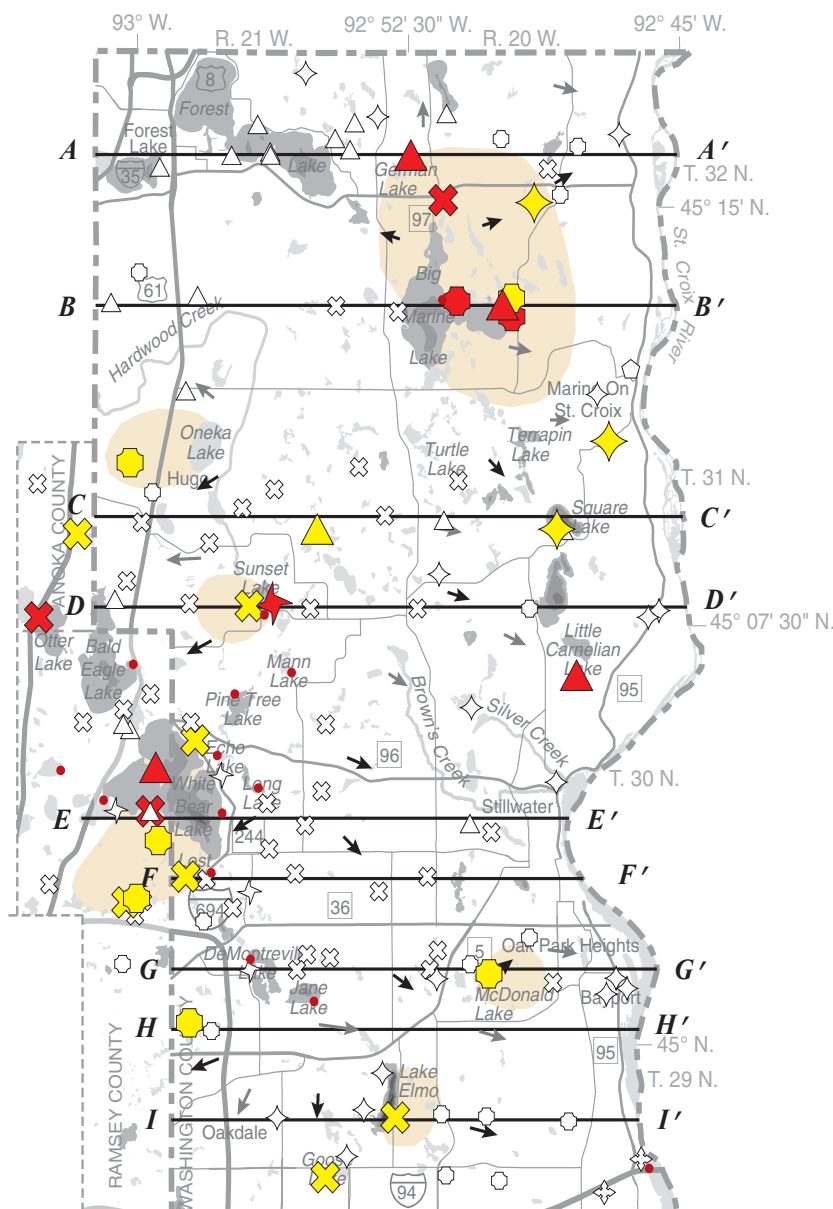
Of all these topics perhaps two of the most interesting are the leaky lakes characteristic of the northern part of the county and buried bedrock valleys characteristic of the south.

### Leaky Lakes

A leaky lake is a surface-water body that loses some water through underlying permeable materials to underlying aquifers. These lakes have limited or no inflowing streams (closed basin) and are therefore dependent solely on groundwater inflow and direct precipitation.

In Washington County, these lakes are underlain by major bedrock aquifers that readily discharge to major rivers (Mississippi and St. Croix), creating gradients that also enhance movement of water out of these lakes.

These lakes naturally lose water to evaporation and leave a distinctive evaporative chemical signature downgradient in the connected aquifers. These stable isotope data show that a relatively large number of samples (30) had evaporative signatures throughout the county and adjoining areas to the west. These samples were further divided into higher and lower evaporative



**Figure 1. Lake recharge to aquifers indicated by stable isotope characteristics of groundwater samples**  
Most groundwater samples collected in the county originated as direct infiltration of precipitation (white symbols). However, many samples from the central and northeastern part of the county have evaporative signatures (larger yellow and red symbols, small red dots -- surface water) indicating that some of the water is recharged from nearby lakes. The approximate extent of evaporative signature water is shown with tan irregular shapes downgradient of leaky lakes.

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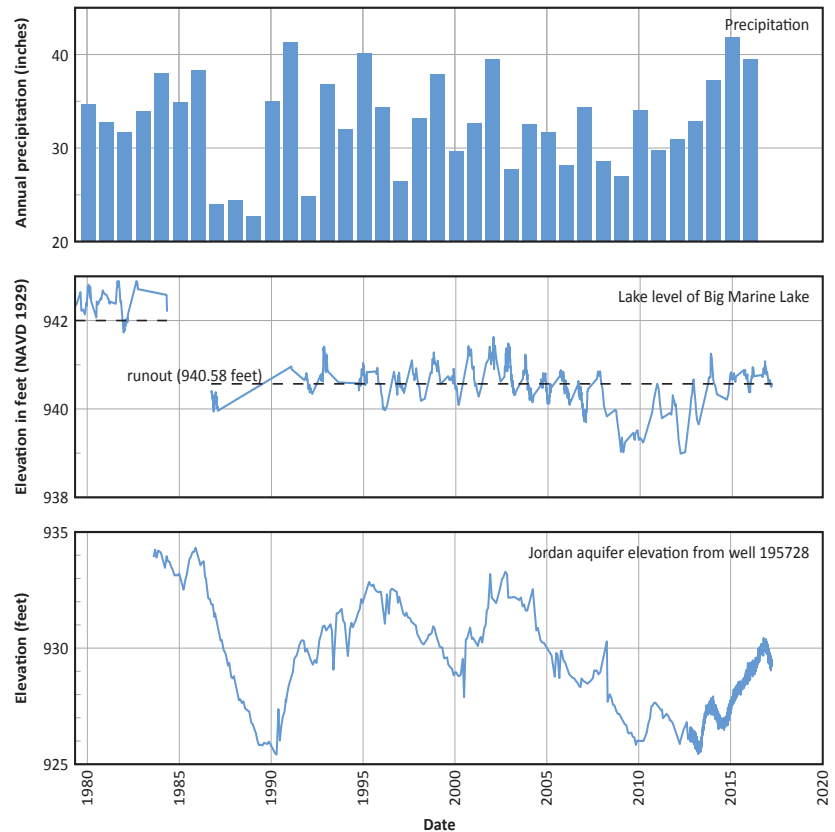
## Leaky Lakes, cont.

signatures (**Figure 1**). In addition, the approximate extent of the evaporative signature areas are shown using data in all aquifers. The stronger evaporative signatures were associated with Big Marine, Otter (Anoka and Ramsey counties), White Bear (Ramsey and Washington counties), and Sunset lakes. The areas around the larger lakes were sampled for stable isotopes through the combination of DNR, MDH, and USGS projects.

Big Marine (**Figure 2**) and White Bear are examples of deeper lakes with hydraulic connections to a range of underlying aquifers, from relatively shallow buried sand aquifers to the deeper Jordan aquifer. Conversely, Forest and Bald Eagle are shallower lakes that are relatively isolated from underlying aquifers by the underlying fine-grained New Ulm Formation.

Other evidence of leaky lakes can be found by comparing water level data from DNR observation well and lake data sets with precipitation monitoring data. Closed-basin lakes that are dominated by groundwater recharge can have a high fluctuation range caused by short-term climate changes (precipitation and evaporation). These short-term changes not only alter the net amount of direct precipitation to the lake but also affect the elevation of the regional water table and other underlying potentiometric surfaces. This creates yet another unseen mechanism that affects lake-water levels by increasing or decreasing the hydraulic gradient between a lake and underlying aquifers (**Figure 3**).

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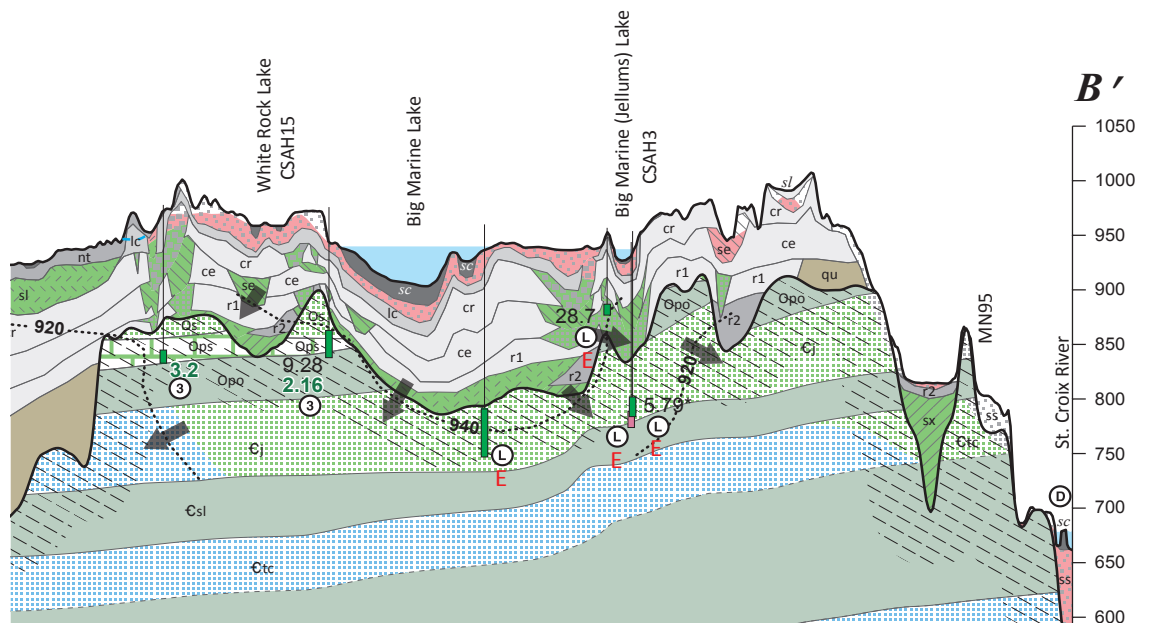


**Figure 3. Big Marine Lake fluctuations**

At Big Marine Lake two low precipitation periods are reflected in the lake and water levels from the Jordan aquifer (1987–1989 and 2003–2012). Groundwater levels dropped approximately 6 feet from the 932–934 feet peak levels of the intervening years. The corresponding lake-level followed by dropping approximately 2.5 feet from the peak in 2002 (limited lake-level data were available during the earlier drought period).

**Figure 2. Big Marine Lake – closed basin**  
Big Marine Lake is apparently underlain by permeable material (pink and green patterned areas) allowing some lake

water to recharge underlying aquifers. Leakage from the lake is indicated by evaporative signature water from well samples (red “E”) in the Jordan (Cj) and shallower buried sand aquifers. Mixed tritium-age groundwater (green patterned areas) and anthropogenic chloride (black numbers) in underlying aquifers is also an indication of permeable conditions beneath the lake and in the surrounding area.





## Leaky Lakes, cont.

### Buried bedrock valleys (Figure 4)

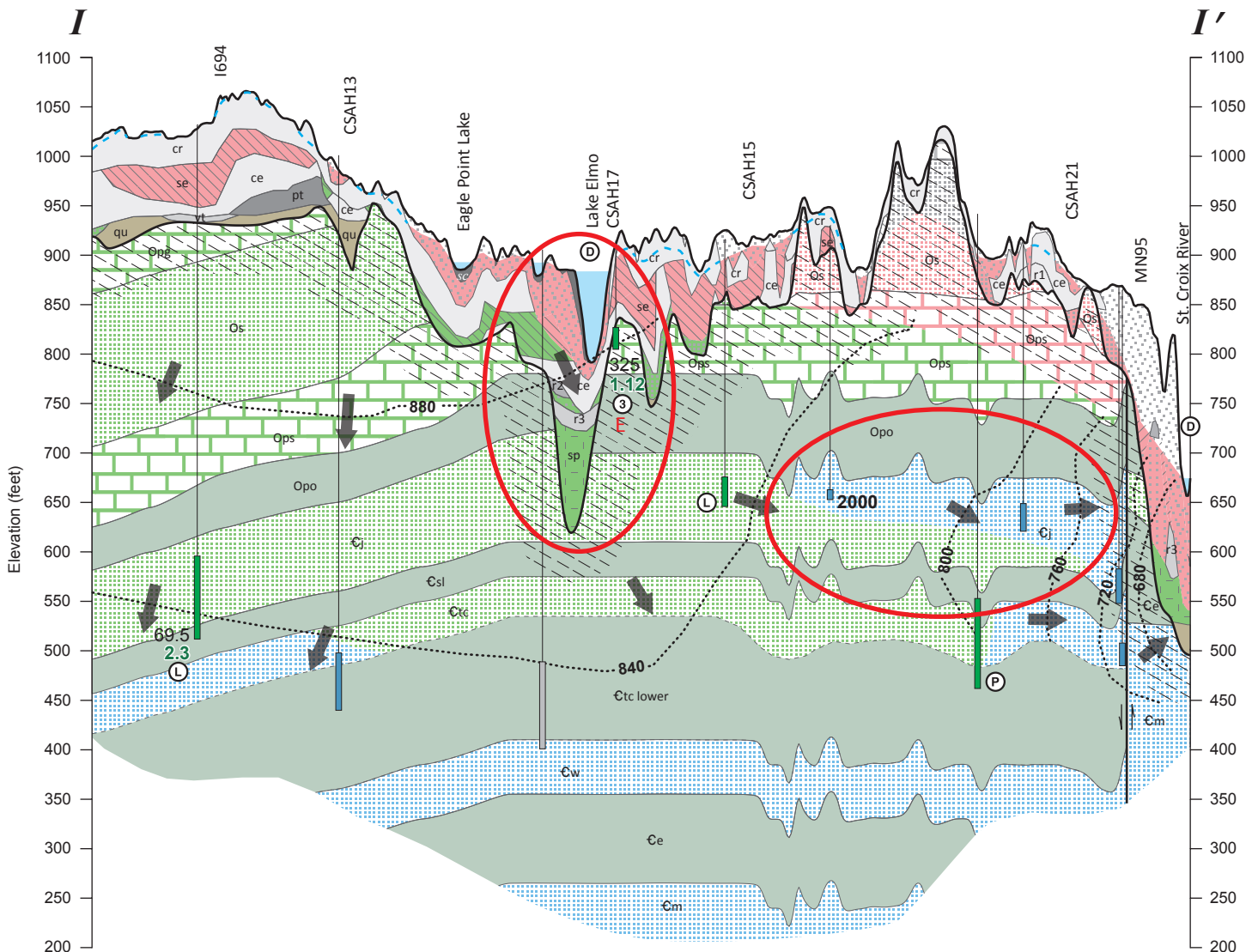
The southern part of the county is characterized by a thin layer of surficial sand and sandy till (approximately 50 to 100 feet thick), shallow bedrock aquifers with likely karst-type porosity and permeability, a deep buried bedrock valley (200 to 250 feet), and faulted bedrock in the east. These factors contribute to deep penetration of recent and mixed tritium-age water that can range as deep as 600 feet from the combined effects of lateral groundwater flow and deep fractured bedrock from the buried bedrock valleys.

The location of the main buried bedrock valley relative to the groundwater divide is a major control of the direction of flow

of mixed tritium-age groundwater in the Jordan (Cj) and Upper Tunnel City (Ctc) aquifers. In Figure 4 the buried valley lines up approximately with the groundwater divide in the Jordan aquifer. Mixed tritium-age water was found on both sides of the buried valley. The Jordan and Upper Tunnel City aquifers are sensitive to contaminants through complicated groundwater pathways of hydraulically connected aquifers and lateral groundwater movement.

The distribution of conservative chemical tracers shown in **Figure 5** is based on what we know of groundwater flow directions and geologic features that allow recharge through

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**Figure 4. Effects on groundwater flow**

The buried bedrock valley under Lake Elmo (vertical red oval) lines up approximately with the groundwater divide (diverging flow arrows). Downward and laterally flowing groundwater containing tritium and other conservative tracers appears to have penetrated deeper into the Jordan (Cj) and Upper Tunnel City (Ctc) aquifers through the buried bedrock valley and associated fracture bedrock (diagonal dashed zone at bedrock surface). Another notable feature is the lake discharge to groundwater, indicated by the evaporative signature (red "E") from a shallow well downgradient from Lake Elmo.

The eastern end of this cross section contains an unusual layering of residence time. In the Jordan aquifer, vintage tritium-age water (blue) is found above mixed tritium-age (green) water. The mixed tritium-age water may be drawn deeper than would be expected by pumping (P) from the Upper Tunnel City aquifer, lateral flow (L), and a naturally downward gradient (arrows).

## Arsenic

Erickson, Melinda L., Helen F. Malenda, Emily C. Berquist, Joseph D. Ayotte. 2019. Arsenic concentrations after drinking water well installation: Time-varying effects on arsenic mobilization. *Science of the Total Environment*, in press. <https://doi.org/10.1016/j.scitotenv.2019.04.362>

**Abstract:** Chronic exposure to geogenic arsenic via drinking water is a worldwide health concern. However, effects of well installation and operation on arsenic concentrations and mobilization are not well understood. This knowledge gap impacts both reliable detection of arsenic in drinking water and effective public health recommendations to reduce exposure to arsenic. This study examines changes in arsenic and redox geochemistry over one year following installation of 254 new domestic water wells in three regions of the north-central USA that commonly have elevated arsenic concentrations. Our regions' geologic settings share some important characteristics with other high-arsenic aquifers: igneous bedrock aquifers; or late Pleistocene-age glacial sand and gravel aquifers interbedded with aquitards. Over the study, arsenic concentrations increased by 16% or more in 25% of wells in glacial aquifer regions, and the redox conditions changed towards more reducing. In wells in the bedrock region, there was no significant change in arsenic concentrations, and redox conditions changed towards more oxidizing. Our findings illustrate the importance of understanding short- to moderate-term impacts of well installation and operation on arsenic and aqueous chemistry, as it relates to human exposure. Our study informs water quality sampling requirements, which currently do not consider the implications sampling timing with respect to well installation. Evaluating arsenic concentrations in samples from new wells in the context of general regional pH and redox conditions can provide information regarding the degree of disequilibrium created by well drilling. Our analysis approach may be transferable and scalable to similar aquifer settings across the globe.

### Highlights:

- ◆ Well construction disturbs aquifer and groundwater geochemical equilibrium.
- ◆ Arsenic concentrations measured in new wells increase over time in certain settings.
- ◆ Aquifer redox conditions change for at least one year after well construction.
- ◆ Changing redox conditions affect arsenic mobility and concentrations in groundwater.
- ◆ Initial samples from new wells may not be representative of long-term concentration.

## Micropollutants

Elliott Sarah M., Erickson Melinda L., Krall Aliesha L., Adams Byron A. (2018) Concentrations of pharmaceuticals and other micropollutants in groundwater downgradient from large on-site wastewater discharges. *PLoS ONE* 13(11): e0206004. <https://doi.org/10.1371/journal.pone.0206004>

**Abstract:** Large subsurface treatment systems (LSTS) and rapid infiltration basins (RIB) are preferred onsite wastewater treatments compared to direct discharge of treated wastewater to streams and adjacent facilities. Discharge of these wastewater treatments may result in contaminant loading to aquifers that also serve as drinking water sources downgradient from the

discharge site. Until recently, few studies have characterized the contribution of micropollutants (e.g. pharmaceuticals, fragrances, flame retardants, etc.) to receiving aquifers. We conducted a pilot project to characterize the occurrence of micropollutants in groundwater downgradient from 7 on-site treatment systems in Minnesota, USA: 5 community LSTS and 2 municipal RIB. One downgradient monitoring well was sampled three times at each facility over one year. Of 223 micropollutants analyzed, 35 were detected. Total sample concentrations ranged from 90 to 4,039 ng/L. Sulfamethoxazole (antibiotic) was detected in all samples at concentrations from 7 to 965 ng/L. Other pharmaceuticals (0.12–1,000 ng/L), organophosphorus flame retardants (10–500 ng/L), and other anthropogenic chemicals (4–775 ng/L) were also detected. The numbers and concentrations of micropollutants detected were inversely related to dissolved oxygen and depth to water. Ratios of pharmaceutical concentrations to human-health screening values were <0.10 for most samples. However, concentrations of carbamazepine and sulfamethoxazole exceeded screening values at two sites. Study results illustrate that large on-site wastewater systems designed to discharge to permeable soil or shallow groundwater effectively deliver pharmaceuticals and other micropollutants to groundwater aquifers and could contribute micropollutants to drinking water via water supply wells.

## The USGS Health Based Screening Levels (HBSLs) may not be well-known in the groundwater community

Health-Based Screening Levels (HBSLs) are non-enforceable water-quality benchmarks that can be used to (1) supplement U.S. Environmental Protection Agency (USEPA) Maximum Contaminant Levels (MCLs) and Human Health Benchmarks for Pesticides (HHBPs), (2) determine whether contaminants found in surface-water or groundwater sources of drinking water may indicate a potential human-health concern, and (3) help prioritize monitoring efforts. HBSLs were developed by the U.S. Geological Survey (USGS) National Water-Quality Assessment (NAWQA) Project for contaminants without USEPA MCLs or HHBPs.

The searchable table contains 808 contaminants, of which 175 have HBSLs, 79 have MCLs, 140 have HHBPs, and 414 have no available benchmark. MCLs and HHBPs are provided for user convenience; for more information about them, and to obtain current values, please visit the USEPA websites. Learn more about HBSLs and guidance on their use at the USGS HBSL website: <https://cida.usgs.gov/hbsl/apex/f?p=104:1>

## Novel sampling method

A novel vadose zone and shallow water table solids sampling method: Trost, Jared J., Thomas M. Christy, Barbara A. Bekins. 2018. A Direct-Push Freezing Core Barrel for Sampling Unconsolidated Subsurface Sediments and Adjacent Pore Fluids. *Vadose Zone Journal*, 17(1). <https://doi.org/10.2136/vzj2018.02.0037>

**Abstract:** Contaminants passing through the unsaturated zone can undergo changes in narrow reaction zones upon reaching saturated sediments. Understanding these reactions requires sampling of sediment together with adjacent water and microbes in a manner that preserves in situ redox conditions. Use of a basket-type core catcher for saturated, noncohesive sediments results in redistribution or loss of fluids during sample retrieval. Previously

— continued on page 11



### Novel Sampling Method, cont.

developed sample-freezing drive shoes for hollow-stem auger drilling rigs lessened fluid redistribution and retained all material that entered the core barrel in noncohesive sediment cores by freezing the base of the core with liquid CO<sub>2</sub>. This technology has not previously been compatible with direct-push rigs that are commonly used for contaminated site assessments. Here, we describe a freezing core barrel designed for direct-push rigs that is compatible with commercially available tool strings. The device can be used interchangeably with unsaturated-zone direct-push tool strings, enabling core collection for studies of contaminant transport and transformation spanning unsaturated to saturated profiles. In all 10 attempts during testing near Bemidji, MN, the device froze a 10- to 15-cm (4–6-in) plug that retained fluids and sediments in a 1.2-m (4-ft)-long, 5.0-cm (2.0-in)-diameter polyvinyl chloride (PVC) sleeve. Cores were collected from variably saturated sediments spanning the capillary fringe through the upper 2 m of the saturated zone in sandy glacial outwash sediments. The median recovery was 81% of the drive length, similar to a sample-freezing drive shoe developed for a wire-line piston core sampler operated with a hollow-stem auger drill rig.

### Cryptosporidium in groundwater

Stokdyk JP, Spencer SK, Walsh JF, de Lambert JR, Firnstahl AD, Anderson AC, Rezanian LW, Borchardt MA. 2019. Cryptosporidium incidence and surface water influence of groundwater supplying public water systems in Minnesota, USA. *Environmental Science & Technology*. 53(7): 3391–3398.

<https://doi.org/10.1021/acs.est.8b05446>

**Abstract:** Regulations for public water systems (PWS) in the U.S. consider Cryptosporidium a microbial contaminant of surface water supplies. Groundwater is assumed free of Cryptosporidium unless surface water is entering supply wells. We determined the incidence of Cryptosporidium in PWS wells varying in surface water influence. Community and noncommunity PWS wells ( $n = 145$ ) were sampled ( $n = 964$ ) and analyzed for Cryptosporidium by qPCR and immunofluorescence assay (IFA). Surface water influence was assessed by stable isotopes and the expert judgment of hydrogeologists using site-specific data. Fifty-eight wells (40%) and 107 samples (11%) were Cryptosporidium positive by qPCR, and of these samples 67 were positive by IFA. Cryptosporidium concentrations measured by qPCR and IFA were significantly correlated ( $p < 0.001$ ). Cryptosporidium incidence was not associated with surface water influence as assessed by stable isotopes or expert judgment. We successfully sequenced 45 of the 107 positive samples to identify species, including *C. parvum* (41), *C. andersoni* (2), and *C. hominis* (2), and the predominant subtype was *C. parvum* IIa A17G2R1. Assuming USA regulations for surface water-supplied PWS were applicable to the study wells, wells positive for Cryptosporidium by IFA would likely be required to add treatment. Cryptosporidium is not uncommon in groundwater, even when surface water influence is absent.

### USGS work on secondary hydrogeologic regions:

<https://onlinelibrary.wiley.com/doi/full/10.1111/gwat.12806>

“Secondary Hydrogeologic Regions of the Conterminous United States” in the journal *Groundwater*.

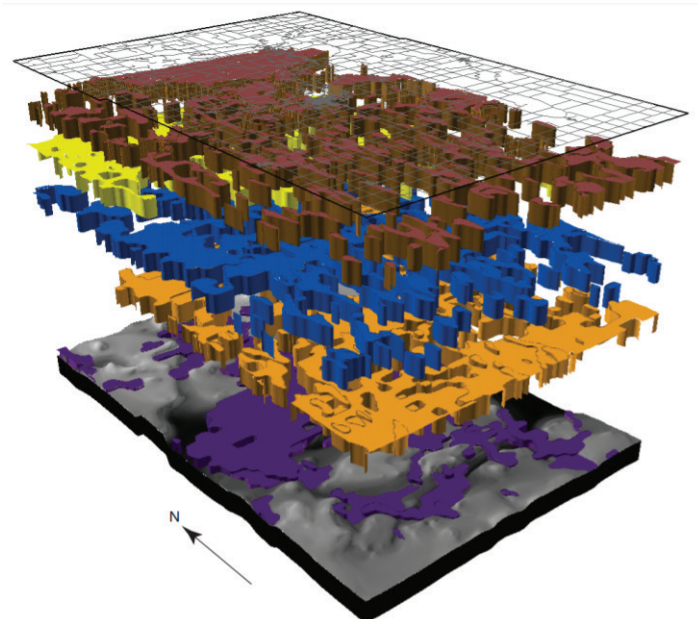
The U.S. Geological Survey (USGS) previously identified and  
MGWA Newsletter June 2019

mapped 62 Principal Aquifers (PAs) in the U.S., with 57 located in the conterminous states. Areas outside of PAs, which account for about 40% of the conterminous U.S., were collectively identified as “other rocks.” This paper, for the first time, subdivides this large area into internally-consistent features, defined here as Secondary Hydrogeologic Regions (SHRs). SHRs are areas of other rock within which the rocks or deposits are of comparable age, lithology, geologic or physiographic setting, and relationship to the presence or absence of underlying PAs or overlying glacial deposits. A total of 69 SHRs were identified. The number and size of SHRs identified in this paper are comparable to the number and size of PAs previously identified by the USGS. From a two-dimensional perspective, SHRs are complementary to PAs, mapped only where the PAs were not identified on the USGS PA map and not mapped where the PAs were identified. SHRs generally consist of low permeability rocks or deposits, but can include locally productive aquifers. The two maps, taken together, provide a comprehensive, national-scale hydrogeologic framework for assessing and understanding groundwater systems.

### New from MGS - Kandiyohi County Geologic Atlas

Kandiyohi County Geologic Atlas is now available (<https://conservancy.umn.edu/handle/11299/202737>). In Kandiyohi County, MGS employed a process that combined the geologic contextual understanding of a geologist and the expertise of a geologic information specialist with the data-handling capability of a geographic information system (GIS) to create the three-dimensional models of the Quaternary sand and gravel deposits. These three-dimensional models relate sand and gravel-bearing units (potential aquifers) to the glacial events that formed them.

Figure: Vertical distribution of Quaternary sand bodies—Select sand and gravel units from the sand model for Kandiyohi County, displayed with distinct colors and depicted in an expanded side view, from the surficial sand and gravel (brown) down to the bedrock surface (gray). This figure illustrates that individual components of the sand model can be manipulated and depicted in a variety of ways with GIS software.



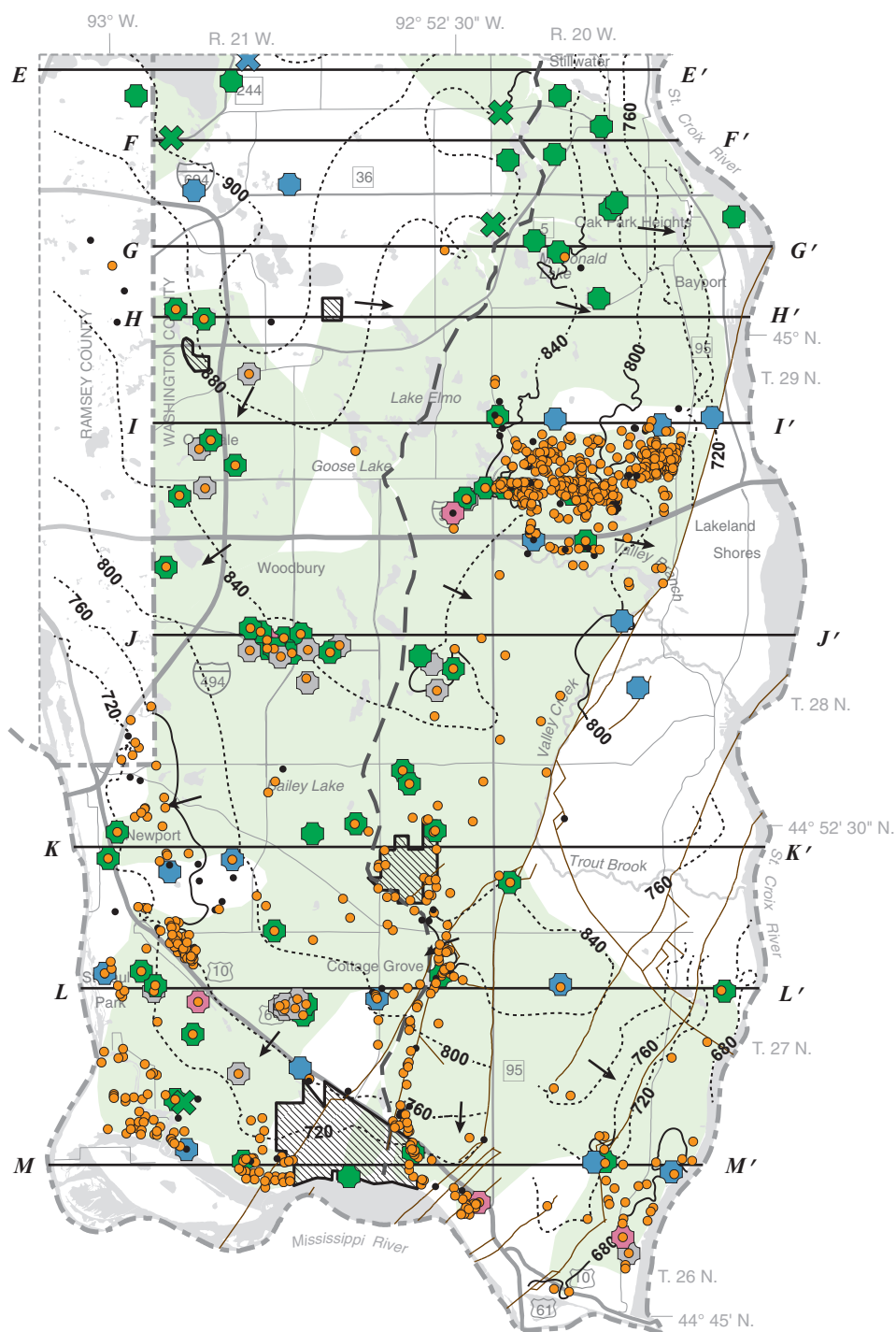
## Leaky Lakes, cont.

faults, buried valleys and interconnected sand. The mapped areas are based on the possible extent of detected tritium, perfluorobutyrate (PFBA), or elevated anthropogenic chloride. Some areas may actually be larger or smaller than depicted if more data were available.

An additional anthropogenic indicator—PFBA—was added to this evaluation since it is a conservative tracer like chloride, and large amounts of PFBA data have been collected by MDH since 2006 in southern Washington County. PFBA is one of several per- and polyfluoroalkyl substances (PFAS; formerly referred to as PFCs) found in the groundwater in Washington County. Substances

containing PFAS manufactured by the 3M Corporation were disposed at 4 locations in the southern part of the county from the late 1940s to the early 1970s. Similar to chloride, PFAS was not distributed everywhere at the surface. Therefore, detection of PFAS in groundwater samples indicates higher pollution sensitivity, but the absence does not necessarily indicate lower sensitivity. For this evaluation, PFBA was used since it is the most soluble and mobile of the PFAS, and thus the most widespread in Washington County.

For more information contact Jim Berg, hydrogeologist (651-259-5680, [jim.a.berg@state.mn.us](mailto:jim.a.berg@state.mn.us)) or Paul Putzier, supervisor (651-259-5692, [Paul.putzier@state.mn.us](mailto:Paul.putzier@state.mn.us)). Website: [mndnr.gov/groundwatermapping](http://mndnr.gov/groundwatermapping)



*Figure 5. Distribution of conservative chemical tracers in the Jordan aquifer. Much of the Jordan aquifer is sensitive to contamination through complicated groundwater pathways and lateral groundwater movement. The light green area is the interpreted extent of tritium, PFBA, and anthropogenic chloride in the Jordan aquifer. The orange circles indicate detections of Perfluorobutyrate (PFBA) in the southern half of Washington County.*



## MGWA FOUNDATION

### Field Camp Scholarship Awards

#### Siane (Si) Camila Luzzi

Siane is a graduate student in the Bio-products and Biosystems Engineering department at the University of Minnesota, where her Master's research is focused on dairy wastewater treatment using microalgae. Her actual research takes place in Morris, where she works in collaboration with the West Central Research and Outreach Center (WCROC) and the North Central Soil Conservation Research Laboratory (USDA-ARS). Next fall, she will start her Ph.D. at the same department but focus on groundwater, having Dr. Joe Magner as her advisor. Siane is from Brazil and in her whole academic life she was curious about the interactions between groundwater, soil and the surface water. She believes that her Ph.D. research will help specialists to understand better these interactions and improve water conservation techniques. The field camp will allow her to learn about the glacial/fluvial aquifer system.



#### Stacy Zeigler

Stacy is a senior at St. Cloud State University, graduating with a Bachelor of Science in Hydrology/Geology minor in December 2019. She has an Associate of Science in Engineering from Central Lakes College. This summer she is attending the UMN Hydrogeology Field Camp and is extremely grateful for this award. Currently, she is focused on her senior project of modeling the water flow through Charles A. Lindbergh State Park in Little Falls, MN, to help mitigate trail washout issues. She plans to work as a hydrologist or hydrogeologist upon graduation. Her special interests are in wetlands and forests. Stacy and her family spend as much time as possible exploring outdoors. She feels it's imperative to impart the value of our planet's health and beauty to her children. Her primary goal is to help maintain and improve our natural water systems for generations to come.



### MGWA Foundation, Board Meeting Minutes, Regular Quarterly Meetings

**Meeting Date: Friday, September 7, 2018**

#### Attendance:

- ◆ Scott Alexander, president; Stu Grubb, director; Evan Christiansen, director; Eric Mohring, director; Stephanie Souter, secretary; Kara Dennis, treasurer; Jennie Leete, Sean Hunt

#### Financial Report:

- ◆ Kara provided an updated budget summary sheet. The investment funds went down a little, since the market cooled off in the first quarter of 2018. We are still up +6.15% overall, and +0.54% since the beginning of 2018.

#### Account values (9/7/18)

- ◆ MGWAF Endowment: \$203,810.87
- ◆ HOP Funds: \$51,720.78
- ◆ Unrestricted funds: \$16,474.00

#### Debits:

- ◆ \$734.39 Advisory Fee (4/13/18)
- ◆ \$747.36 Advisory Fee (7/13/18)

#### Credits:

- ◆ \$12.17 Amazon Smile
- ◆ \$85.00 Freshwater Society

MGWA Newsletter June 2019

### MGWA Foundation Board of Directors

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## MGWA FOUNDATION MINUTES

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

- ◆ \$5.00 Donation from Jill Peterman to HOP Funds
- ◆ \$300.00 Donation from Lori and Davis Alessio (in honor of Gil Gibanski)
- ◆ \$20.00 Donation from John Seaberg to HOP Funds
- ◆ \$4,529.93 Credited past Advisory Fees
- ◆ Kara moved the HOP funds from the Affinity Plus account into a separate HOP account that will be managed by Wells Fargo.
- ◆ MGWA is still paying a 1.5% advisory fee. Stu will contact Kent about the 1.5% advisory fee and ask him to switch it to the 1% advisory fee.
- ◆ Kara will contact Kent about attending the next MGWAF meeting on Friday December 14, 2018 to give a financial overview from 2018.

### **Grant Applications:**

- ◆ Metro Children's Water Festival is asking for \$2500
- ◆ MGWAF approved the request
- ◆ Jennie will follow up and pay out of the unrestricted funds/Hiway Account
- ◆ Nicollet and Soil Water Conservation District is requesting for \$2000
- ◆ MGWAF approved the request
- ◆ Jennie will follow up and pay out of the unrestricted funds/Hiway Account
- ◆ Motion and second to approve the two children's water festival grants at requested amounts. Motion passed.
- ◆ Carleton College is requesting \$2000 for a geothermal installation
- ◆ Stu provided further explanation of the grant application. Discussion.
- ◆ Motion and second to approve request. Motion passed.
- ◆ Jennie will follow up and pay out of the unrestricted funds/Hiway Account

### **Gil Gibanski Scholarship Updates:**

- ◆ Stephanie provided an update on the Gil Gibanski scholarships. There will be two scholarships again this year, a \$1500 undergraduate scholarship and a \$1500 graduate scholarship. Stephanie will be preparing the application materials for 2019, and she will make sure that students from Michigan can apply for the scholarships.
- ◆ A third scholarship could go to high school students or students at technical schools. Stephanie will talk to Lanya.
- ◆ Kara will share the scholarships on social media.

### **Calvin-Olaf/Field Scholarship:**

- ◆ There were only two applicants for the Calvin-Olaf/field camp scholarships. MGWAF approved both applicants for \$1250 scholarships.
- ◆ Noah Slade
- ◆ Douglas Kimball
- ◆ Jennie will follow up and pay out of the unrestricted funds/Hiway Account

### **Education:**

- ◆ Kate Pound is leading the effort to reform the education committee, and they are developing a work plan and a list of priorities that they want to work on
- ◆ Many of the committee members were a part of the Education white paper committee

### **MGWA Board Update:**

- ◆ MGWA Board has worked with the Newsletter Editorial Group to create a template for the meeting minutes for both the MGWA Foundation and the MGWA Board. Future meeting minutes will have this format.
- ◆ Can we get a combined MGWAF and MGWAB meeting? There should be a combined meeting that happens annually.

### **MGWAF Reappointments:**

- ◆ The board is appointed every January for two year terms.
- ◆ We support having a diverse group on the Board.
- ◆ Should there be a more formal re-appointment process for whoever is at the end of their two year term? Maybe an annual check-in would be important to give people the option. Should there be term limitations?

### **MGWA Meeting:**

- ◆ We need contact exhibitors for the fall MGWA meeting. Kara will take over reaching out to the exhibitors, and Eric will send Kara the email and the sponsor's list that he has sent out in the past.

### **Meeting Date: Friday, December 14, 2018**

#### **Attendance:**

- ◆ Scott Alexander, president; Stu Grubb, director; Eric Mohring, director; Stephanie Souter, secretary; Kara Dennis, treasurer; Lanya Ross, director.

#### **Current Business:**

- ◆ Approve meeting minutes: Stu – Motion, Lanya – Second. Motion passed.

#### **Officers:**

- ◆ Discussion on 2019 officers. Bylaws do not specify re-electing officers every year, but Ellen requested that MGWAF let MGWA know about officers. Eric made a motion to keep officers the same. Stu seconded. Motion passed. Scott will inform Ellen.
- ◆ Kara mentioned hosting future meetings at MDH, where there are conference rooms with Skype capability.



## MGWA FOUNDATION MINUTES

### Review current year finances:

- ◆ Account values (12/14/18)  
MGWAF Endowment: \$198,380.00  
HOP Funds: \$51,720.78  
Unrestricted funds: \$16,474.00
- ◆ Credits:  
\$7.42 Amazon smile
- ◆ Debit:  
\$802.77 Advisory Fee (10/12/18)

### Discuss investment results:

- ◆ Kent Sward from Wells Fargo Advisors met with MGWAF members to discuss investment portfolio. 2018 has not been as good of a year for investments overall and value is down. Overall investment portfolio shows a positive return since 2016.

### New grant applications:

- ◆ Northwestern MN Water Festival, \$1000 request.
- ◆ Lanya made a motion to approve grant, second from Eric. All approved. Motion passed.

### Gabanski Scholarships for the coming year:

- ◆ Stephanie provided an update on the 2019 scholarship process. Scholarship subcommittee is complete. Jim Lundy is retiring. John Woodside is joining for review. Cathy VH is stepping down, Mike McDonald joining for review. Lanya and Joy Loughry are also on the subcommittee along with Stephanie.
- ◆ Discussion on compiling academic contacts in a different format than the current list that is an online outlook account. Stephanie will pull contacts out and put into a google sheet that others can add to and edit. Scott will send scholarship info to Michigan contacts. Kara noted the same was true for vendor contacts, suggested having a similar list for that.

### HOP-CAL Hydrocamp awards:

- ◆ Discussion on timing for the hydrocamp awards. The application notice will go out in January, to line up better with when students are applying for the camp. Awards expected in March.
- ◆ Education Committee re-forming.

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### Springs of Pine County, 1920, cont.

Surber's linen map of the North Shore springs was discovered among the DNR Fisheries stream surveys and donated to the Minnesota Historical Society (Brick, 2016). Since then another Surber map has been found, at the James Taylor Dunn Library of the St. Croix Watershed Research Station. Drafted by Surber and dated February 2, 1920, this is a blueprint linen map (35 X 70 cm) of the Pine County Game Refuge (**Figure 2**). Surber had spent much time in 1918 and 1919 hiking the refuge, defying the strawberry brambles—a sort of botanical barbed wire—and found that the streams “are almost universally fed by many springs” (Surber, 1919), which he mapped. His lakes, showing depth contours, look like ghostly fingerprints on the map.

Comparing Surber's map with the online version of the Minnesota Spring Inventory (MSI) it's apparent that he did not perceive the Glacial Lake Lind spring-line (Brick, 2017). On the other hand he did map the springs along the Douglas Fault (I thought MSI was the first to do that!) and he has mapped many more springs in Ogema Township than are found in the database. While the date of the map (February 2nd) might suggest that Surber mapped the springs in winter (when they'd be easier to see) the absence of tree cover in the “cut-over” would have also facilitated the mapping. He wrote an accompanying report, Pine County Streams, which described Barnes Springs (among others), which still goes by that name today.

In a sort of redemptive act, the great pinery was thus converted from cutover to game refuge, which Surber was happy to depict cartographically.

### References

- Brick, G. (2016). Biological Reconnaissance Map Rediscovered. *Minnesota Conservation Volunteer* 79(464): 60-63.
- Brick, G. (2017). The Glacial Lake Lind Spring-Line of the St. Croix Valley. 2017 Research Rendezvous, St. Croix Watershed Research Station.
- Harris, J. Merle (1952). Geology of St. Croix State Park. *Conservation Volunteer* 15(88): 41-46.
- Surber, T. (1919). The Pine County Game Refuge as a Playground for the Nature Student, Camper, and Angler. *Fin, Feathers and Fur* No. 18, pp 1-4.

## MGWA BOARD MINUTES

### MGWA Board of Directors Regular Meetings

**Meeting Date: Tuesday, January 15, 2019**

#### **Attendance:**

- ◆ Kate Pound, President; Julia Steenberg, President-Elect; Ellen Considine, Past-President; Vanessa Baratta, Treasurer; Andrew Retzler, Secretary; Sean Hunt, WRI; Jeanette Leete, WRI; Andrew Streitz, Newsletter; Jane de Lambert, Social Coordinator; John Clark, SMAC Representative; Anneka Munsell, MGWA Member & Past-Treasurer

#### **Treasury Report:**

- ◆ Baratta updated the Board on the Treasury Report. The numbers as reported include a total income for the period of January 1, 2019 to January 14, 2019 of \$13,235.00; net income for this period of \$13,208.13; total assets for this period of \$128,807.63.
- ◆ Leete shared with the Board a table highlighting the differences in the rules and regulations between the organization classifications of MGWA versus MGWAF. Streitz asked about sharing this information in an upcoming Newsletter. Leete will re-draft a version for the Newsletter and send to Streitz.

#### **Newsletter Report:**

- ◆ Streitz reported that the December Newsletter was released. Ruth MacDonald continues to work with the Newsletter Team and Leete to help organize Newsletter articles and documents and create style guides. The Newsletter Team continues to work on the new Newsletter model that will focus on a web-based push system for articles and reporting. Munsell is helping develop this new format using WordPress, and the Newsletter Team is still on schedule for a rollout next year. Pound recommends having a short presentation on the new format possibly during the Fall Conference. Munsell is working on a draft version of the new format to share with the Board and management before proceeding further.
- ◆ Steenberg mentioned that the link to the December Newsletter on the web page is routed to the wrong document. Hunt will correct this.

#### **WRI Report:**

- ◆ Hunt refreshed the MGWA President email account and got Pound set up. Hunt described the MGWA Google Drive system for those new to the Board. Hunt will get the new officers access.
- ◆ Hunt shared with the Board the latest paid membership numbers for 2019—3 students, 33 retired, 222 professionals, and 26 sustaining. These numbers are low because members will be renewing their membership during this period. Hunt sent a membership renewal email reminder out to membership and expects paper reminders to be mailed out in February.
- ◆ Leete shared with Steenberg the venue reservation dates for future conferences that will take place during her tenure—April 28, 2020 and November 12, 2020.
- ◆ Pound updated the new officers about the on/off discussion over the years regarding a possible conference venue change or plans to better cater to out-state members.
- ◆ Pound was notified by Lanya Ross of a possible meeting collaboration opportunity with an AWWA conference meeting around March-April.

#### **Web Page:**

- ◆ Hunt added the December Newsletter to the web page, updated some employment opportunity listings, and finalized the 2018 Fall Conference summary web page with audio recordings and PDFs. The MGWAF scholarship pages and notices are expected to be updated soon.
- ◆ The Board discussed odd redirects and ads that members report experiencing when accessing the web page. Hunt will ask Ole Olmanson more about this to work on a solution.

#### **Social Coordinator:**

- ◆ The Board welcomed Jane de Lambert who will be the new MGWA Social Coordinator. de Lambert will continue to plan quarterly social hour meetings for students and MGWA members near universities and colleges. Currently, de Lambert is planning to have the next social hour in April at Groveland Tap. The Board discussed ways to increase attendance at the social hours, including emailing nearby professors who can spur interest in geology students to attend.
- ◆ de Lambert will talk to Emily Berquist about the MGWA Facebook account login credentials and will continue to use this platform.

#### **White Paper Committee:**

- ◆ Streitz reported that the workgroup for the 4th White Paper (chlorides) is only a couple months away from wrapping up a draft.
- ◆ Streitz and Mindy Erickson will be rotating off of the White Paper Committee and taking their spots are Lanya Ross and Jared Trost.
- ◆ No new White Paper topics have been received from membership thus far. Hunt will send out an email notice to membership and report back to Streitz.
- ◆ Hunt will also update the White Paper Committee contact to Carrie Jennings, as suggested by Streitz.
- ◆ Pound recommended Board members talk with colleagues and encourage them to submit White Paper topics.
- ◆ Streitz said Lanya Ross and Jared Trost will likely start on the Committee around June or July.

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.

### Education Committee:

- ◆ Pound shared with the Board a MGWA Education Committee project proposal to assist the Freshwater Society at the 2019 Water Summit Symposium. A funding request for the project will be submitted to MGWAF in the future.

### Other Business:

#### State Mapping Advisory Committee (SMAC):

- ◆ John Clark, MGWA's SMAC Representative, shared with the Board an update on the Committee meeting that occurred in October to review and discuss the latest round of mapping project proposals for USGS Statemap funds. Clark stated that the feedback from USGS after the 2018 submission was to try and include more scientific investigation in the mapping projects proposed. Clark listed off this year's list of proposed projects and those the Committee selected for final submission.
- ◆ Clark would again like to meet with the MGWA Board prior to the October 2019 Board meeting to discuss any thoughts or concerns the Board might have that he should consider when the Committee meets again to review the next round of project proposals.

#### MGWAF Board Updates:

- ◆ Two additional nominations to the MGWAF Board, Katrina Marini and James Vanderwaal, have been received. Considine moves to approve Katrina Marini and James Vanderwaal to the MGWAF Board; Steenberg seconded; motion passed. Pound will request information from MGWAF regarding the details of their membership renewals and officer positions.
- ◆ The Board discussed scholarship timeline with plans to discuss this further at the next meeting. The Field Camp Scholarship announcement timeline needs to be worked out—Pound will contact MGWAF Board about this.
- ◆ Leete suggested having past recipients of the Field Camp Scholarship present their experiences at conference meetings.

#### MGWA Letter Request:

- ◆ Pound reported that the Minnesota Rural Education Association is trying to remove Earth Science as a requirement for K-12 education. Pound shared with the Board an example letter drafted by several Earth Science educators in Minnesota to legislators expressing their concern and recommendation that these standards not be removed. Pound recommends that MGWA draft a similar letter—the Board agrees. Pound will work on a draft version of the letter and share it with Board members via email for review.

#### 2019 Spring Conference:

- ◆ Pound continued to discuss her ideas regarding the 2019 Spring Conference on tills and groundwater. Pound already has several speakers lined up, but is still working on an official title for the conference. Pound will work on putting together an official title, a list of keynote speakers, and a short summary of the conference to send to Hunt to be used as an announcement to membership. Hunt will share past examples with Pound.
- ◆ The Board discussed recommended talk and poster abstract submission timelines. Considine mentioned she has canned language under the 2018 conference folder on Google Drive for Pound to utilize.
- ◆ Many of the conference details should be worked out by the end of next month's Board meeting.

## Meeting Date: Tuesday, February 19, 2019

### Attendance:

- ◆ Kate Pound, President; Julia Steenberg, President-Elect; Ellen Considine, Past-President; Vanessa Baratta, Treasurer; Andrew Retzler, Secretary; Sean Hunt, WRI

### Treasury Report:

- ◆ Baratta does not have an updated Treasury Report at this time.
- ◆ Baratta reported that Munsell prepared the year-end Annual Report for the upcoming Newsletter.

### Newsletter Report:

- ◆ Prior to the meeting, Streitz updated the Board via email that the March Newsletter has been sent to the publisher.
- ◆ Streitz is in need of a quick summary piece on the upcoming 2019 Spring Conference for the Newsletter. Pound will prepare one and send it to Streitz.

### WRI Report:

- ◆ Hunt shared with the Board the various year-end tasks that the Management Team has completed or are still working on. Some of these tasks include the business registration of MGWA with the State and 2017 IRS annual reporting. Application materials for the MGWAF Student Scholarship have also been added to the Google Drive for MGWAF to review.
- ◆ Hunt reported that paper membership renewals have not been sent out to members yet, and that they will likely be sent out along with the 2019 Spring Conference brochure.

### Web Page:

- ◆ Hunt reported that Olmanson cleared out a number of suspicious files from the MGWA web page and that the web page passwords have been updated to try and prevent the occurrence of being redirected to an unrelated web page that several members have reported. During

## MGWA 2019 Membership Dues

Sustaining Member	\$65
Professional Member:	\$45
Retired Member	\$25
Full-time Student Member	\$20

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



## MGWA BOARD MINUTES

### Save These Dates

#### MGWA Conferences

11/12/2019

4/28/2020

11/12/2020

#### MGWA Minutes, cont.

the meeting, several Board members were still being redirected when attempting to visit the MGWA web page on their phones. Hunt will continue to look into this problem.

- ◆ Pound has been getting an out-of-date certificate warning for the MGWA email account. She will take a screen capture of the warning and send it to Hunt for review.

#### MGWA Foundation:

- ◆ The Foundation has not met, but is scheduled to meet on the same day as the next MGWA Board meeting in March. Pound will set up a Doodle poll to reschedule the MGWA Board meeting so that some of the Board members can attend the Foundation meeting.

#### Social Coordinator:

- ◆ Prior to the meeting, de Lambert notified the Board via email that she has scheduled a social event at the Groveland Tap in St. Paul on Tuesday, April 9th from 4:30-6:30pm. There will be an announcement in the upcoming Newsletter.

#### White Paper Committee:

- ◆ Pound approved a request made by an outside organization to share a table of information that was compiled for the Chloride White Paper that is in preparation.

#### Education Committee:

- ◆ The Education Committee did not meet last week.
- ◆ Pound reported that the Committee has gotten approval for funding from MGWAF for the joint Water Summit Symposium with Freshwater Society. The Board discussed the protocols for funding requests to MGWAF. Hunt said the funding request form is available online and must be filled out and sent in to the Foundation. Pound will double-check with the Education Committee to verify this procedure will be followed.
- ◆ Pound asked about our policy for the use of the MGWA logo. The Board agreed that our logo could be shared and used for an event, provided that its' use is for this one-time event only. This should be made clear with an attached statement such as, "We are providing this logo for your one-time use for [event name] on [date of event] as approved by the MGWA President." Hunt will review the logo images he has on file and place them on the Google Drive.

#### Other Business:

##### MGWAF Board Details:

- ◆ Pound sent out an email to the MGWAF Board requesting an update on the MGWAF officers list and Field Camp Scholarship details. Baratta suggested Pound give Scott Alexander a call to get these details worked out. Steenberg also suggested contacting the Field Camp Scholarship Committee directly. Pound will give Alexander a call and report back at our next meeting. Baratta recommended having the Field Camp Scholarship Committee approve generalized paperwork that could easily be updated annually.

##### 2019 Spring Conference:

- ◆ Pound shared with the Board a list of invited speakers and discussed other potential speakers.
- ◆ Hunt needs to finalize the conference web page details and send out a conference notice to the membership and a call for abstracts on lightning talks and posters.
- ◆ Pound asked about Exhibitors details. Hunt said that the Management Team has been trying to interest the MGWAF in finding Exhibitors as a means of fundraising. Hunt will send an email to MGWAF regarding Exhibitor details.
- ◆ Retzler reminded the Board about past discussion involving a joint meeting between MGWA and MGWAF and suggested that the Foundation Board could also be invited to the post-conference happy hour. Pound will extend an invitation to the MGWAF Board.
- ◆ Hunt reminded Pound about needing a timeslot in the conference schedule for the Student Scholarship recipients.

##### 2020 AWWA Conference:

- ◆ Steenberg updated the Board on the possibility of MGWA participating in the AWWA meeting in the spring of 2020, as suggested by Lanya Ross. A joint conference is unlikely, but it could be a good opportunity for MGWA members to attend or present their work. There might also be an opportunity to develop a groundwater tour in the metro area.

##### Operations Manual:

- ◆ The Board discussed the possibility of a future meeting to work on finalizing the Operations Manual. Retzler will review the work that has been done and what still needs to be done, and provide an update at the next Board meeting.

##### Citizen Letter:

- ◆ Pound shared with the Board a letter from a concerned citizen she received regarding a landfill permit in Kandiyohi County and the concern for groundwater contamination. The Board discussed the letter and Baratta suggested recommending that the citizen reach out to a regional MPCA employee for further information. Pound will relay this suggestion to the citizen.

### Meeting Date: Thursday, March 21, 2019

#### Attendance:

- ◆ Kate Pound, President; Julia Steenberg, President-Elect; Ellen Considine, Past-President; Vanessa Baratta, Treasurer; Andrew Retzler, Secretary; Sean Hunt, WRI; Jeanette Leete, WRI; Sharon Kroening, Newsletter; Annika Munsell, MGWA Member

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## MGWA BOARD MINUTES

### MGWA Minutes, cont.

#### Treasury Report:

- ◆ Leete updated the Board on the Treasury Report. The numbers as reported include a total income for the period of January 1, 2019 to March 21, 2019 of \$23,897.90; net income for this period of \$12,377.77; total assets for this period of \$104,399.35.

#### WRI and Web Page Report:

- ◆ Hunt listed off a number of tasks they have completed, including: finalizing conference web page, finalizing conference brochure and mailing out with paper membership renewal forms, processing incoming conference and membership renewal payments, and finalizing the contract for the conference venue space.
- ◆ One confirmed exhibitor for the Spring Conference and Hunt finalized the exhibitor conference web page and notified the MGWAF to send out to past exhibitors. The Board discussed the current process for soliciting exhibitors for the conferences. Kroening suggested keeping an expanded list of people to call to solicit exhibitors. Steenberg recommended that each Board member notify any contacts they may have that could lead to more exhibitors. Considine plans to email the MGWAF Board to remind them about their role in the exhibitor solicitation process.
- ◆ Hunt set up the award materials and web page for the field camp award.

#### MGWA Foundation:

- ◆ The Foundation met on Tuesday, March 19 at MDH. Considine and Hunt shared with the Board their updates and discussion, including: a review of their investment accounts, approving support for the Freshwater Society Water Summit, and approving two candidates for the scholarship awards.
- ◆ Hunt reminded the Board about the application procedure for requesting funds from MGWAF. Pound shared this procedure with the Education Committee.
- ◆ Hunt reported that Scott Alexander plans to contact the Scholarship Committee to start moving the scholarship process forward. Hunt also said there was discussion about a scholarship/research grant for K-12 students.
- ◆ Hunt will send out an email to membership regarding the scholarship deadline.

#### Education Committee:

- ◆ Pound reported that the collaboration with the Freshwater Society's Water Summit has officially been funded through MGWAF. The Water Summit takes place May 9-10. Pound will send Hunt a link with accompanying info to send out to membership.

#### Newsletter Report:

- ◆ Leete reported that the Newsletter is still expected to be sent out in March. Information in this issue is scarce so far. Steenberg recommended that we add a section about the Hennepin Atlas and include pictures of Dale Setterholm, Bruce Bloomgren, Barb Lusardi, Jordan Mayer, and Jarrod Cicha in the section related to MGS staff news. Steenberg and Retzler will compile this info and send to Leete.
- ◆ Kroening reported that the Newsletter Team met Wednesday, March 20 to go over materials for the June issue. The June issue is expected to have a number of technical articles and some member news.
- ◆ Munsell shared with the Board a preview of their work regarding the proposed new format for the Newsletter. The Board discussed the new format and other ideas. Munsell will send out a link to the draft blog format once things are set-up further. Leete mentioned the ISSN code currently used for the MGWA Newsletter and recommended that the Newsletter Team keep this in mind when drafting up the new format.
- ◆ The Board discussed the idea of removing the membership lock currently in-place for accessing the Newsletter. Considine motioned to make the Newsletter public access and to remove the membership lock currently in-place; Baratta seconded; motion passed. The Board also recommended to Hunt and Leete that they include membership username and password details in the membership email receipts when renewing.

#### Social Coordinator:

- ◆ No updates.

#### Other Business:

##### Operations Manual:

- ◆ Pound will set-up a meeting with Retzler outside of the Board meeting to discuss the Operations Manual.

##### Web Page Re-Direct Issue:

- ◆ Hunt reported that Ole Olmanson looked into suspicious files on our web page to remove and also recommended using a scan service to find and remove any suspicious files. Some of these are free. Munsell and Kroening have contacts with expertise on web security and will ask those contacts for further recommendations. Steenberg recommended including a note in the Newsletter to share with members that the Board is aware of the current problem and are exploring possible ways to fix it.

##### 2019 Spring Conference:

- ◆ Pound shared with the Board the finalized list of speakers and schedule.
- ◆ The Board discussed exhibitors and posters. Steenberg recommended pushing the poster abstract submittal deadline to April 12 and notifying membership. Pound will update the poster abstract submittal form with this new deadline date and send to Hunt.
- ◆ Pound will call Stout's Pub to make a hold on the back room for post-conference gathering.

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