

Minnesota Ground Water Association

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Newsletter

March 2018
Volume 37, Number 1

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MGWA President
Ellen Considine

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President's Letter

By Ellen Considine, MGWA President

The 2018 Winter Olympics have just begun, and North Korea and South Korea have contributed a united Olympic team. Maybe someone more politically savvy than I could have forecast that union, but when I first heard the news I thought the Minnesota Public Radio newscaster had misspoken. As a child of the 1980s, I remember when the Berlin Wall was torn down and the excitement, amazement, and tears I saw in newly reunited Germany on the nightly news. So I asked my dad if, in the 1960s and 70s, he ever thought East and West Germany would be reunited. Which brings me to the spring conference topic: Present in the Future – What we were worried about 30 years ago, what came to pass, and gazing into our future.

I have found that this topic of generational change and constancy is a theme woven

throughout every element of my life: with my family, at work, and at play. Even my yoga instructor taught us that the Warrior II (Virabhadrasana II) pose centers us in the present while we extend one hand into the future and the other hand remains in the past. Likewise, as scientists, engineers, regulators, and educators, we must carry forward the knowledge bestowed on us while we expand and refine it to pass on to others. Now in 2018 we are facing knowledge loss as the baby boomer generation retires. So I wanted to take this opportunity to ask what the groundwater community was worried about 15, 30 and 60 years ago. Which of those predictions turned out to be right? Which never came to be? Likewise, I want to ask the prognosticators and philosophers among us: what do the model forecasts tell us? What are our blind spots?

— continued on page 2

Featured Photo: SJU Students

Two St. John's University (SJU) students, Elizabeth Ames (left) and Justin Haase (right), collected samples last May from Island Lake in Collegetown as part of a quarterly field monitoring plan developed by MDH Source Water Protection hydrologists.

The students sampled both public water supply wells at SJU and two nearby lakes for general chemistry parameters over the course of a year.



St. John's University Students
Assist MDH Hydrologists with
Field Monitoring

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Newsletter Deadlines

Issue	Due to Editor
June '18	05/04/2018
September '18	08/03/2018
December '18	11/16/2018
March '19	02/02/2019

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MEMBER NEWS

Annika Munsell Promoted at the DNR

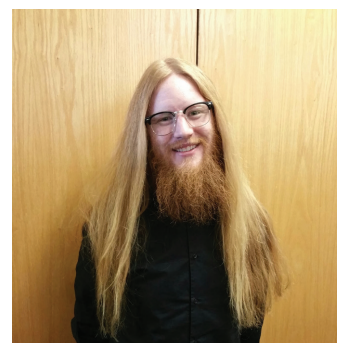
Annika Munsell has joined the groundwater modeling team as a permanent DNR employee. She previously worked as a temporary groundwater modeler at the DNR. She is currently working on developing a groundwater model for the Cold Spring area to help quantify the total impact of pumping to the Cold Spring Creek trout stream and working on groundwater modeling in other parts of the State. Prior to the DNR she managed the wellhead protection program and worked as a surface water project engineer at WSB & Associates, a groundwater modeler at the Metropolitan Council, an environmental engineer at CH2M, and a groundwater modeler at the USGS. She obtained her B.S. and M.S. of Civil Engineering at South Dakota School of Mines.



Michael Ginsbach Joins the MPCA

Michael Ginsbach accepted a hydrologist position with the Remediation Division of the Minnesota Pollution Control Agency. His new position is for a data accessibility and mapping project. The goal is to make groundwater data from Superfund sites more accessible to the public and to help the MPCA become a more data-driven organization. The project will compile groundwater data from the Superfund program into a centralized database, create maps of groundwater contamination, and develop a web-based interactive map and data portal to improve data accessibility.

Prior to accepting this position, Michael worked as a hydrologist for the North Dakota State Water Commission managing groundwater resources in central North Dakota. Michael has a B.S. in geology from North Dakota State University, a B.S. in earth science education from North Dakota State University, and a M.S. in geosciences from Idaho State University.



President's Letter, cont.

At the 2018 Spring Conference we will continue the "new traditions" of lightning talks and questions and answers using the Pigeonhole Live application. I encourage you to sign up for a lightning talk, on any topic, and to cheer on your coworkers or students to sign up. The conference may also incorporate new elements; we are evaluating the feasibility of hosting a concurrent special session on professional ethics. We also have re-formed

the conference committee, and I am eager to hear their ideas.

It seems fitting, with the release of the Education White Paper and the passing of MGWA's first president, Gil Gabanski, last year, that we take a day to ponder what the previous generation has given us and what we are passing on to the next generation. I look forward to seeing you at the Spring Conference!



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MEMBER NEWS

Byron Adams to Retire from MPCA in June – Freedom & The Bucket List

I was asked to write something about my career and retirement from the MPCA or else somebody would make something up about me; which might be more interesting than what I come up with; but here are a few thoughts.

I started my career at the MPCA in January of 1986, not so fresh out of my 12-year college career, with degrees in Soil Science from the University of Minnesota. Deb McGovern hired me as a Hydrologist in the “pre-Superfund” site investigation unit, at the MPCA Rosville Office. It was an exciting time at the PCA when Superfund Sites were all the rage. TCAAP, Reilly Tar and USNIROP were hitting high numbers on the Superfund Site list.

There were many personalities in that building that have come and gone; but I remember starting with other fresh out of college faces, the likes of: Mike Connolly, Jim Lundy, Shawn Ruotsinoja, Becky Lofgren, and others. Field work and site visits were a bigger part of our jobs in those days, and for a few years Mr. Lundy, Joe Julik, Jay Frischman, Andrew Streit and I would conduct geophysical surveys at contaminant sites, looking for buried waste, depth to bedrock or conductivity anomalies that reflect contaminant plumes. Over the course of my 32+ years at the MPCA I was lucky enough to work my way up the Hydrologist series ladder, finding jobs in RCRA, Industrial Water Quality, the Ethanol Sector, and finally ending up in the Environmental Analysis and Groundwater Unit. My work as a Hydrologist has been interesting and challenging and has allowed me to talk to people about a natural resource we all highly depend upon; but is unseen and relatively unknown by most people; groundwater. The last several years of my career have included more desk work, research projects, report writing and internal meetings; in contrast to the middle years of my career, working with MPCA permittees and the public, in many ways the most rewarding years of my career.

I’ve watched a lot of people come and go from the PCA; moving to consulting jobs, to other state agencies and retiring, while I have stayed put. My best guess is I’ve had over a dozen different supervisors, 4 different job classifications, and 6 or 7 different job assignments. Some job changes were by my choice and others happened by internal organizational changes, e.g. Goal 21. I’ve always maintained that if you didn’t like what you were doing here, just wait, it will change soon enough.

In retrospect, I will remember the people more than the work. I am retiring because the time is right, the numbers add-up, I am not a big fan of the new “open” office environment, and there are a million things to do in life besides work. Also, all of the people I’ve spoken too, who have retired, have said they have not regretted it one bit.



When asked what I will do in retirement, I will first enjoy my freedom by sleeping-in, getting-up in a leisurely fashion, having a cup of coffee, walking the dog, and otherwise maintaining an active lifestyle trying to keep-up with my wife riding down the mountain bike trail of life. There are many places to go and play. The mini-camper has been purchased to head to the trails and mountains. Along the way there are many things to see, people to meet, food to eat, beer to drink, music to play and listen to, rocks to climb, sunsets to watch and life to enjoy. If you see me on the trails, road, coffee shop or local brewery - don’t forget to say Hi! I may help you fix your flat tire, give you a belay, or buy you a cup of coffee, or better yet a beer.

Cheers, Byron

Wayne Sarappo Retires from the MPCA

Wayne Sarappo retired from the MPCA on February 6th, 2018 after 34 years of service. He was born and raised in Philadelphia and graduated from LaSalle University in 1973 with a B.A. in biology. In 1977, Wayne received a M.A. in biology from St. Cloud State University with an emphasis in limnology. He began his career by conducting stream, river, and lake studies with various consulting firms. In 1983, Wayne began working at the MPCA in the Construction Grants Program. In 1985, Wayne accepted a position as a project manager in the Superfund Program where he remained until he retired.

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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

Association Officer Announcements

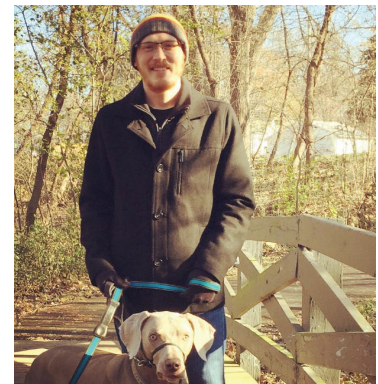
Kate Pound is the President-Elect of the MGWA for 2018. Kate is a geology professor at St. Cloud State University. She brings her experiences of working in places with no or minimal liquid water (Antarctica, Australian outback) and locations where surface water is a prominent landscape-forming element (New Zealand) to students and teachers that are learning about groundwater movement in Minnesota. Andrew Retzler will continue to serve as the MGWA Secretary.

The association would like to recognize and thank outgoing Past President Ole Olmanson and outgoing President Evan Christianson. As Past President, Evan will serve on the MGWA Foundation Board as the MGWA Liaison.

Please take the time to congratulate and thank all the new and outgoing officers. The MGWA could not exist without their service.



Kate Pound



Andrew Retzler



Ole Olmanson



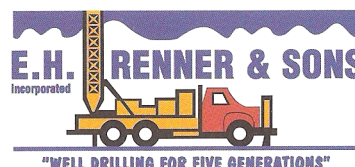
Evan Christianson

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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MGWA 2018 Spring Conference

Where's my flying car? Groundwater past, present, and future

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.

Call For Posters And Lightning Talks

If you would like to present a short and direct five-minute talk ("lightning talk") or a poster pertaining to Minnesota groundwater or the conference theme, please contact Ellen Considine (ellen.considine@state.mn.us) by April 16th. For conference registration information contact WRI by phone at (651)705-6464 or email: office@mgwa.org.

MGWA Spring Social Event

Are you ready for spring? Come out and socialize with friends and colleagues who also love talking about water! The next MGWA Social Hour is **April 5th from 4:30 to 6:30pm at Groveland Tap, 1834 St. Clair Ave., St. Paul, MN 55105**. Free parking in a small parking lot nearby or on the street. We will have tables in the back of the restaurant with signs on the table. Contact Emily Berquist at emily.berquist@state.mn.us with any questions. We look forward to seeing you there!



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MGWA Annual Report, 2017

By MGWA Board

In 2017 the MGWA held two conferences: Management, Analysis, and Optimization of Groundwater Data (spring) and The Effect of Agriculture on Groundwater Resources (fall). This year the MGWA earned a total of \$105,099.40 (Figure 1) with majority of the income from the programs, including both conferences. The MGWA had a total of \$72,715.01 (Figure 2) in expenses with the largest expense being programs (conferences). This produced a net income of \$32,384.40. This year the MGWA transferred \$40,000 to the MGWA Foundation for use in scholarships and other requested uses. The required federal nonprofit information returns for 2016 were prepared and are available to the public on the [MGWA website](#). The 2017 returns are due in May 2018.

Three social events were held in 2017 with 15-20 attendees at each event. In 2017 we had a total of 27 students, 37 retired, 39 sustaining, and 445 professional members. Sustaining members pay an extra \$20 to provide reduced membership rates for student and retired members. We had four corporate memberships, which combine professional memberships and newsletter advertising.

White Paper Updates

White Paper Topic #3, Drain Tiles and GW Resources

The Drain Tiles and Groundwater Resources final report is nearing completion and soon will undergo final review by the MGWA Board. Once that happens a link to the report will be placed on the MGWA website. A short article announcing the white paper will also be included in the June newsletter, where an executive summary of the Drain Tile report will be provided. The workgroup labored long and hard to provide an overview of the science surrounding drainage and groundwater infiltration. It is expected that this document will spur new work in this important field.

White Paper Topic #4, Stormwater infiltration and chloride in Minnesota groundwater

The project workgroup has begun work researching their topic. The effort is led by Mike Trojan, and he is supported by a broad range of team members from state agencies, consultants, and county/city staff. A more detailed update will be provided in the next newsletter.

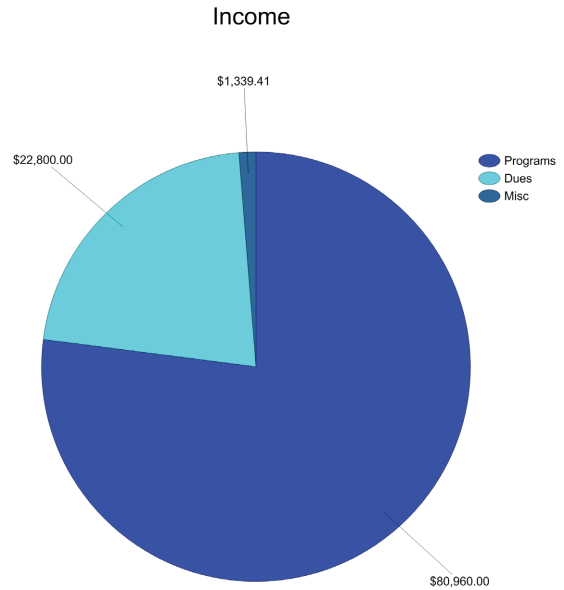


Figure 1. Total MGWA income for 2017

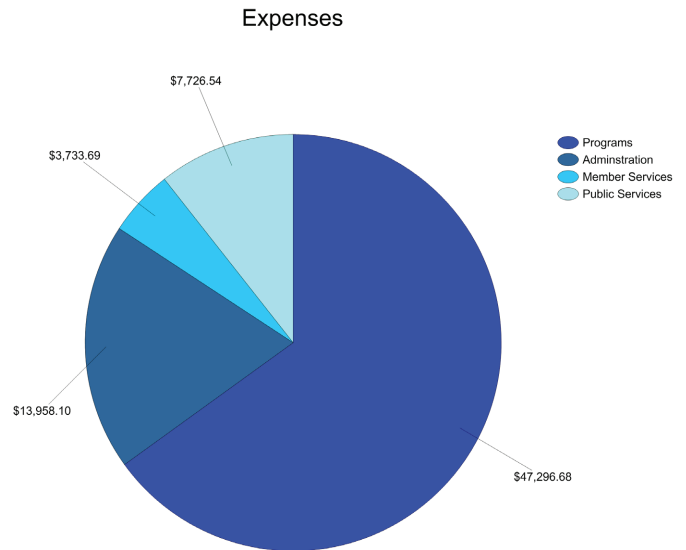



Figure 2. Total MGWA expenses for 2017



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State Mapping Advisory Committee

By John D. Clark, Ph.D.

Environmental Scientist, Water Supply Planning, Metropolitan Council

Have you heard of STATEMAP? I hadn't until recently. Here are the technical specifications of this program: STATEMAP is a 1:1 (state and federal) geologic mapping funding program and is part of the National Cooperative Geologic Mapping Program. The program arose through collaboration between the USGS and the American Association of State Geologists, which led to the passing of the 1992 National Geologic Mapping Act. The funding provides the opportunity to map at 1:100,000 or more detailed scales and to compile existing mapping in digital formats.

So, what does this have to do with geologic mapping in our above-average state of Minnesota? As many of you are aware, the Minnesota Geological Survey (MGS) has one of the best state geologic programs in the nation. We all benefit from the amazing research and mapping resources MGS and its partners have produced over the years. The STATEMAP program has been a vital funding partner for the MGS for the better part of three decades and has aided the completion of many of the state geologic atlases.

A State Mapping Advisory Committee (SMAC) meets each year to review STATEMAP project proposals put forth by MGS staff. The committee is comprised of eight members, representing a diverse group of organizations and agencies. MGWA has traditionally served on the committee, and I was fortunate enough to be asked by the board to represent our organization this time around.

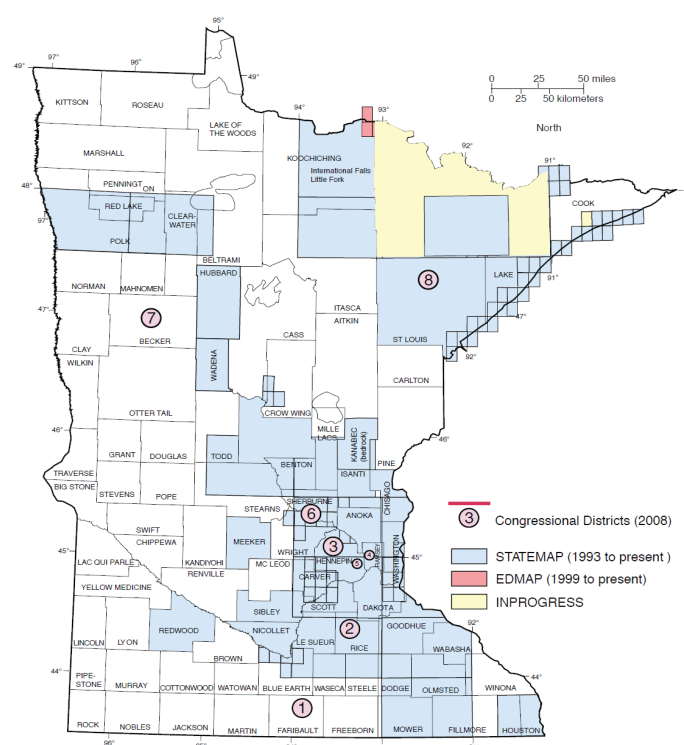
On a lovely, sunny morning in late October 2017, the SMAC came together to review proposals. Proposals are evaluated based on state mapping priorities and a set of guiding principles including: the need for geologic mapping to guide decision making, sustainable management of water, population growth, mapping to support mineral exploration and reclamation, advancing the science of geology, and the benefits of geologic mapping to society.

The SMAC selected four projects to put forth for matching STATEMAP funds. These included surficial geologic mapping of Dakota and Steele Counties, as well as bedrock mapping of St. Louis, Rock, and Noble Counties. A proposal letter was drafted by the committee chair, reviewed by the committee, and sent to the STATEMAP review panel. The review process takes several months, with the MGS usually receiving word sometime during the spring, but anything can happen in Washington, D.C.

MGWA first president, Gil Gabanski, performed this duty for many years, and it was a real honor for me to participate in this committee knowing that this group's activities and MGS funding were important to Gil. The MGS are an excellent group of

dedicated people who obviously care deeply about the importance of geologic mapping and the continued advancement of earth science. This shined through in the proposals we reviewed. These mapping efforts can't happen without local backing. I hope that MGWA members will continue to support state geologic mapping in your communities by communicating the value of this work with your county agencies and by promoting collaboration between the MGS and your organizations. More information can be found on the website: [State Geologic Survey Mapping \(STATEMAP\) Component](#).

Information on the money spent on projects supported by the STATEMAP program in Minnesota since 1993 is also available on the second page of the linked document: [Mapping in Minnesota via the National Cooperative Geologic Mapping Program](#).



Mapping projects supported by National Cooperative Geologic Mapping Program funding in Minnesota since 1993.

The Sacred Heart Geyser

By Greg Brick, Minnesota Department of Natural Resources

Our springs were better known a century ago than they are today because they supplied drinking water. The DNR's Minnesota Spring Inventory is recapturing that information by mapping springs across the State. One of the most interesting results has been relocating long-lost mineral water resorts and spas, and one of the most spring-rich corridors has been the Minnesota River valley.

In Renville County, the most notable mineral water spring was the Sacred Heart Geyser, described by geologist Charles P. Berkey (1901) (Fig 1). He included a chemical analysis of the waters because they were bottled for medicinal purposes. According to *The History of Renville County* by Franklyn Curtiss-Wedge (1916) the water was sold "throughout the United States and also in many foreign countries." Later, its only use was to water livestock, according to a local resident.

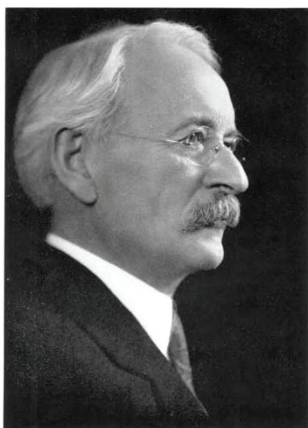


Fig 1. Geologist Charles P. Berkey (1867-1955). Courtesy of the Berkey Blog.

Equally interesting was the bone bed discovered while improving flow from the spring. "In this boggy earth were found complete skeletons of buffaloes and deer, many antlers, and vast quantities of fossils, as well as petrified frogs, snakes, turtles, leaves, twigs and the like." This was the reason Dr. Berkey got involved, when called in to consult. He concluded that the animals had become trapped (Curtiss-Wedge, 1916, p. 1318).



Fig 2. The stone springhouse on Skalbeck's Spring Farm. Photo by Greg Brick.

On December 14, 2017, DNR personnel visited the spring after securing permission at "Skalbeck's Spring Farm" along Hawk Creek, and followed the water up a secluded side ravine to its point of origin. A stone springhouse was found about the size of a garden shed, constructed of colorful boulders with a concrete roof (Fig 2). Such springhouses would have served as refrigerators back in the day. But alas, in accordance with the old maxim of how rarely springs bubble up into the marble basins we build for them, the water was found to issue elsewhere, from a cluster of springs in a meadow on the downhill side of the structure. The water currently collects into a spring run of about 50 gallons per minute (Fig 3), sourced from Quaternary alluvium (Jennings and Adams, 2013).



Fig 3. A cluster of springs in the meadow drains to the spring run, springhouse visible at the upper left. Photo by Greg Brick.

There was no sign of the artificial geyser, which vanished long ago. The effect had been created by a bent pipe running down from the spring which filled with water like a siphon and spouted every 12 minutes when the pressure had built up. It was perhaps a plumber's version of the Old Faithful geyser, worthy of what was dubbed "one of the most notable places of the county."

An earlier version of this article was submitted to the newsletter of the Sacred Heart Area Historical Society (SHAHS).

References

- Berkey, C.P. (1902). Sacred Heart Geyser Spring. *The American Geologist* 29: 87-88.
- Curtiss-Wedge, F. (1916). *The History of Renville County, Minnesota*. Chicago: H.C. Cooper, Jr.
- Jennings, C.E. and R.S. Adams (2013). *Surficial Geology, Plate 3 of D.R. Setterholm, project manager, Geologic Atlas of Renville County, Minnesota. Minnesota Geological Survey County Atlas C-28, Part A.*

Sherburne County Geologic Atlas, Part B

By Jim Berg, DNR

The DNR recently published the Part B hydrogeology portion of the Sherburne County Geologic Atlas. It illustrates the hydrogeologic setting and inherent pollution sensitivity of the aquifers in the county. This information can be used to make land-use decisions that concern aquifer sensitivity, water quality, and sustainability. Part B expands on the Part A geology portion that was previously published by the Minnesota Geological Survey.

Sherburne County is located in east-central Minnesota on the northwestern fringe of the Twin Cities metropolitan area. The majority of urban land use occurs along the western county boundary that parallels the Mississippi River in the communities of Elk River, Big Lake, Becker, Clear Lake and a small portion of eastern St. Cloud.

The county topography and surficial deposits were created as re-treating glaciers formed a large lake and sandy sediment flowed into it from the melting ice (Part A, Plate 3). This thick and widespread surficial sand and gravel of the Anoka sand plain is one of the most important geologic features controlling the groundwater availability and pollution sensitivity. The underlying buried sand and gravel aquifers are rapidly recharged through the sand plain. Interconnected pathways of rapid recharge are common in the county and create areas of high to very high pollution sensitivity all the way to the top of the bedrock.

Sedimentary bedrock formations of the county are at the northwestern edge of a large region of layered sandstone, shale, and

carbonate rock that range in thickness from 50 to over 200 feet. These sedimentary rocks include the following in ascending order: 1) Mesoproterozoic units (Mss): Solor Church Formation, Fond du Lac Formation, and Hinckley Sandstone; 2) the Cambrian: Mt. Simon Sandstone, Eau Claire Formation, Wonewoc Sandstone, and Tunnel City Group (Lone Rock and Mazomanie formations); and 3) the Cretaceous: Dakota Formation. Large capacity water supply uses the Mt. Simon aquifer and the older group of Precambrian (Mesoproterozoic) sedimentary units, including the Hinckley Sandstone and Fond du Lac Formation. The Mesoproterozoic bedrock units are often similar in appearance and difficult to differentiate in the subsurface, so the terms “red clastics” or “Mesoproterozoic sedimentary rocks” (Mss) are used to describe them.

Potentiometric surface maps of the buried sand aquifers and Mt. Simon–Mss aquifer show a general pattern of groundwater flow toward the Mississippi River valley, with the exception of the northeastern corner of the county where the flow is northeast toward the Rum River. Local flow is toward the larger rivers and creeks, such as the Elk and St. Francis Rivers, and Briggs Creek. These maps indicate some groundwater discharge from all the buried sand aquifers is to the Mississippi River and portions of its tributaries.

Ninety-two groundwater samples were collected from wells in a range of aquifers and the following major quality issues were investigated: groundwater residence time, recharge source (direct precipitation or through surface water bodies), anthropogenic (human caused) sources, and naturally occurring elements of

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Sherburne County Geologic Atlas, Part B, cont.

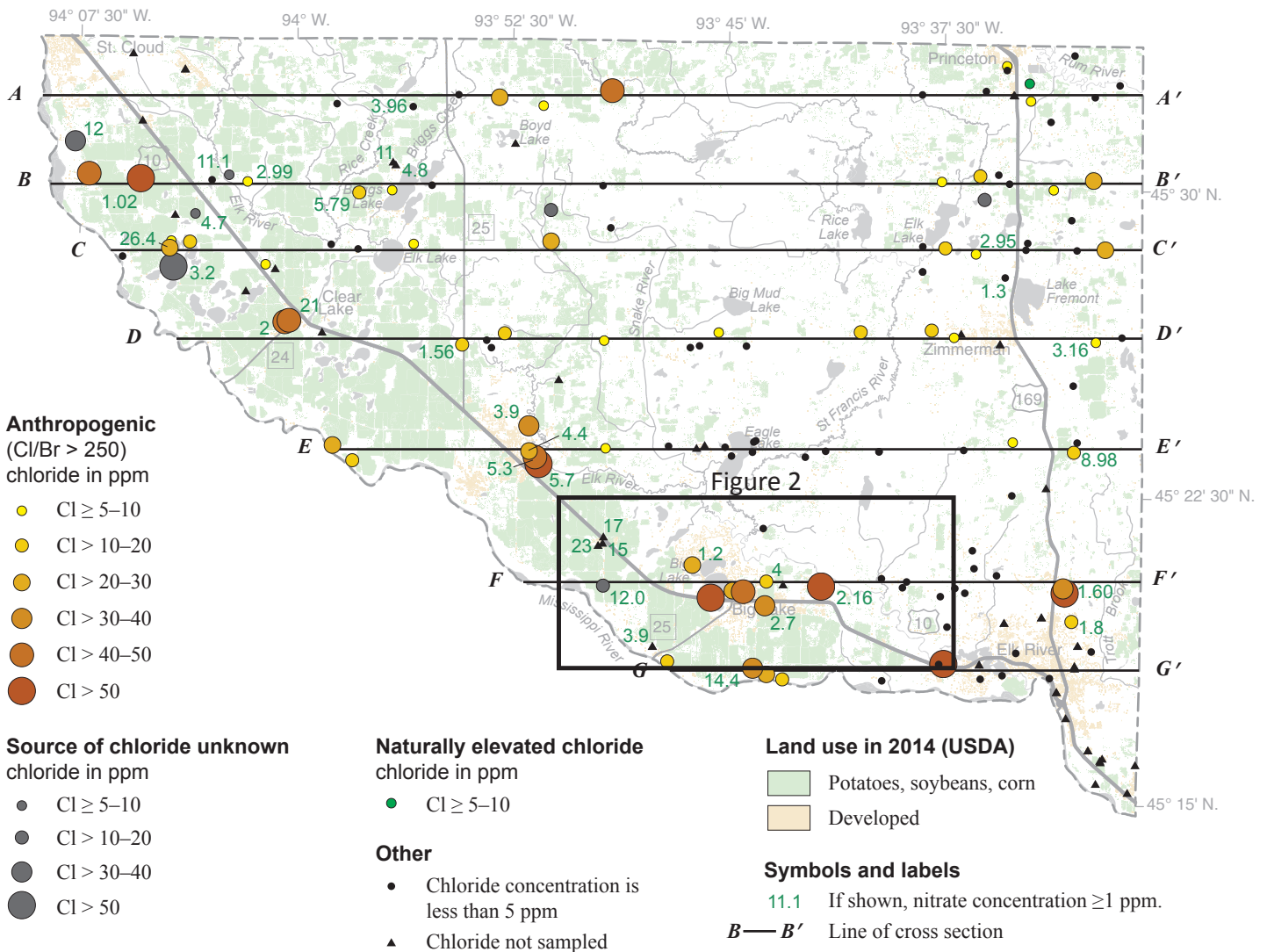


Figure 1. Elevated concentrations of chloride and nitrate. Boxed area in the south indicates area shown in Figure 2 (map modified from atlas Figure 16).

health concern. Agencies that supplied additional data included the MDH, MPCA, and MGS. The following highlight some results unique to the county. References to the standards listed can be found in the report.

Elevated chloride can come from sources such as deicing chemicals, water softener salts, and fertilizers. Chloride is a significant contaminant in Sherburne County with 50 percent of groundwater samples exceeding the limits (chloride ≥ 5 parts per million and chloride/bromide > 250, Figure 1). These elevated occurrences are relatively widespread across the county in the surficial sand (ss) aquifer, and most of the buried sand aquifers (csr, cse, scs, mls, fs2, and suu). Elevated chloride was also found in bedrock aquifers.

Elevated nitrate comes from sources such as fertilizer and animal or human waste. Elevated concentrations (≥ 1 parts per million) were found in approximately 30 percent of the groundwater samples. All but two were from samples that also contained elevated concentrations of chloride (Figure 1). These were most common in the western portion of the county where agriculture is common, and were found in the surficial sand, buried sand, and

bedrock aquifers. The maximum contaminant level for nitrate in public drinking water supplies is 10 parts per million.

Also included in the report is a summary of naturally occurring arsenic and manganese concentrations. Only 5 percent of the wells had elevated concentrations of arsenic (≥ 10 parts per billion), but 68 percent had elevated concentrations of manganese (100 parts per billion).

The majority of the reported water use in the county is for crop irrigation (70 percent) and mainly draws from the surficial sand and buried sand aquifers. Municipal water supply is the second most common use category (20 percent) with bedrock and buried sand aquifers as the most important sources.

Pollution sensitivity is defined as the potential for groundwater to be contaminated because of the hydrogeologic properties of the material hosting or overlying it. The report contains two types of pollution sensitivity maps: near-surface materials and buried aquifers. This article describes the pollution sensitivity in the southern portion of the county around the City of Big Lake (see boxed area in Figure 1).

Sherburne County Geologic Atlas, Part B, cont.

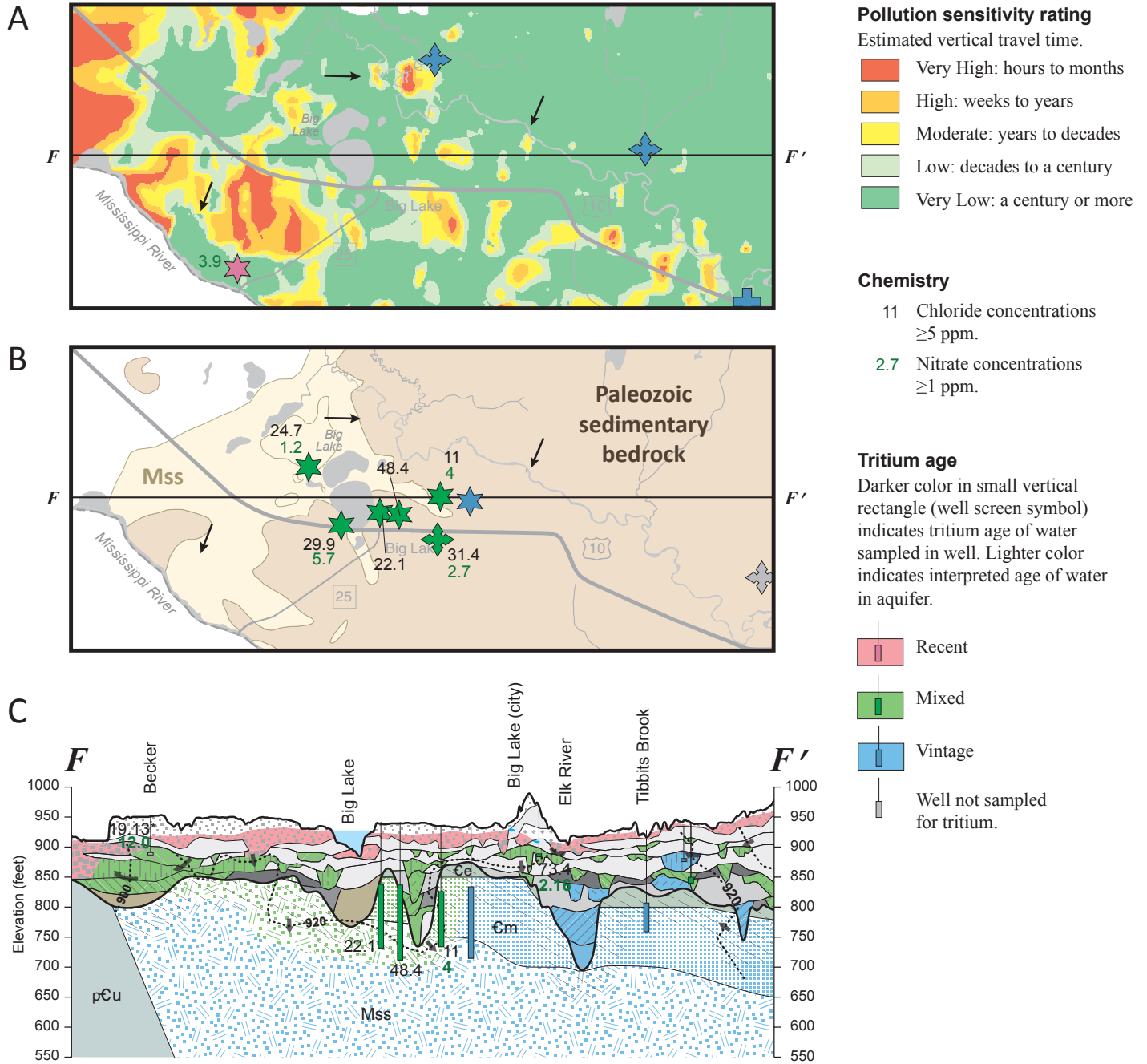


Figure 2 (A-C). Southern Sherburne County, Big Lake area. Location is indicated with box in Figure 1.

A. Very low pollution sensitivity is common for the bedrock surface for most of the eastern part of the county, but numerous areas of moderate to very high sensitivity exist in the Big Lake area. (map modified from atlas Figure 30).

B. Results from deeper wells (Mt. Simon–Mss aquifer, star symbols). Mixed tritium-age water, elevated anthropogenic chloride, and elevated nitrate suggest that high pollution sensitivity conditions may affect the deeper parts of the aquifer (map modified from atlas Figure 31).

C. This cross section F–F' runs through the middle of Figures 2A and 2B and shows the extent of the mixed tritium-age water in the subsurface (map modified from atlas Plate 7).

— continued on page 12

Publications and Links

From the MGWA newsletter team

There have been several recent groundwater-related publications of interest, including these from USGS and from MGS.

The USGS has a new arsenic variability article 'online early' at *Groundwater*:

- ◆ Erickson, M.L., Malenda, H.F. and Berquist, E.C., 2018, [How or when samples are collected affects measured arsenic concentration in new drinking water wells](#): Groundwater, accepted Author Manuscript.

Also of interest from USGS are the following:

- ◆ Smith, E.A., Sanocki, C.A., Lorenz, D.L., and Jacobsen, K.E., 2017, [Streamflow distribution maps for the Cannon River drainage basin, southeast Minnesota, and the St. Louis River drainage basin, northeast Minnesota](#): U.S. Geological Survey Scientific Investigations Map 3390, pamphlet 16 p., 2 sheets.
- ◆ Reeves, H.W., Bayless, E.R., Dudley, R.W., Feinstein, D.T., Fienen, M.N., Hoard, C.J., Hodgkins, G.A., Qi, S.L., Roth, J.L., and Trost, J.J., 2017, [Generalized hydrogeologic framework and groundwater budget for a groundwater availability study for the glacial aquifer system of the United States](#): U.S. Geological Survey Scientific Investigations Report 2017–5015, 49 p.
- ◆ Stackelberg, P., 2017, [Groundwater quality in the Cambrian-Ordovician aquifer system, midwestern United States](#): U.S. Geological Survey Fact Sheet 2017–3056, 4 p.
- ◆ Stackelberg, P., 2017, [Groundwater quality in the glacial aquifer system, United States](#): U.S. Geological Survey Fact Sheet 2017–3055, 4 p.
- ◆ Stackelberg, P.E., Szabo, Z., Jurgens, B.C., February 2018, [Radium mobility and the age of groundwater in public-drinking-water supplies from the Cambrian-Ordovician aquifer system, north-central USA](#): Applied Geochemistry, v. 89, February 2018, Pages 34–48.

Sherburne County Geologic Atlas, Part B, cont.

Figure 2A shows the pollution sensitivity for the top of bedrock in this part of the county. Most of the bedrock aquifer usage is from the eastern edge of the county, where the Paleozoic sandstones of the Mt. Simon and Wonewoc exist along with the underlying Mesoproterozoic clastic units, such as the Hinckley and Fond du Lac. Within this area, pollution sensitivity is mostly very low (green) with many scattered areas of moderate (yellow) to very high (red). Data shown are only from wells with shallower constructions relative to the bedrock surface so the tritium data are representative of the bedrock surface.

Figure 2B is the same area showing data from wells constructed in the deeper portions of the bedrock aquifers (star symbols), with water that entered the ground within the last 60 years (green symbols). Most of these wells are in areas of moderate to very high sensitivity. This association suggests that the higher sensitivity conditions at the top of bedrock surface extend to some of the deeper portions of the bedrock aquifers.

Figure 2C shows cross section F-F' through the middle of Figures 2A and 2B. The top of bedrock (bedrock surface) is formed

- ◆ Krall, A.L., Elliott, S.M., Erickson, M.L., Byron, B.A., March 2018, [Detecting sulfamethoxazole and carbamazepine in groundwater—Is ELISA a reliable screening tool?](#): Environmental Pollution, v. 234, p. 420–428.

Recent MGS publications of note for the groundwater community include the following:

- ◆ Lusardi, B.A., Gowan, A.S., Meyer, G.N., Thorleifson, L.H., 2016, [Quaternary stratigraphy of Minnesota](#): state-wide cross-sections, Minnesota Geological Survey Open-File Report 16-1.
- ◆ Jirsa, M.A., Boerboom, T.J., Radakovich, A.L., Chandler, V.W., Peterson, D.M., Schmitz, M.D., Dengler, E.L., Wagner, K.G., Meyer, G.N., Horton, J.M., Setterholm, D.R., Lively, R.S., 2016, [Preliminary geologic maps of Lake and St. Louis Counties, northeastern Minnesota](#): Minnesota Geological Survey Open-File Report 16-04.
- ◆ Lusardi, B.A., 2017, [Minnesota Geological Survey 1:100,000 surficial geologic texture database](#): Minnesota Geological Survey Open-File Report 17-01.

And, in case you missed it, here are “relatively recent” (2014) MGS publications of possible interest:

- ◆ Setterholm, D.R., 2014, [Geologic Atlas User’s Guide](#): Using Geologic Maps and Databases for Resource Management and Planning.
- ◆ Runkel, A.C., Tipping, R.G., Green, J.A., Jones, P.M., Meyer, J.R., Parker, B.L., Steenberg, J.R., Retzler, A.J., 2014, [Hydrogeologic Properties of the St. Lawrence Aquitard, Southeastern Minnesota](#): Minnesota Geological Survey Open-File Report 14-04.
- ◆ Tipping, R.G., 2014, [A hydrochemical survey of groundwater flow in the Rochester Metropolitan Area, Minnesota](#): Minnesota Geological Survey Open-File Report 14-05.

by the Hinckley Sandstone and Fond du Lac Formation (Mss units), Mt. Simon Sandstone (Cm), and thin discontinuous layers of the Eau Claire Formation (Ce). The overlying glacial sediment provides only minimal protection for the Mss and Mt. Simon aquifers because commonly interconnected sand layers and sandy till units allow fairly rapid penetration of water (recharged within the past 60 years, shown in green). The surrounding blue areas are interpreted as aquifers containing water that entered the aquifers more than 60 years ago, with some residence times estimated as thousands of years. Elevated chloride concentrations (11 to 48 parts per million) from human sources help to confirm the higher pollution sensitivity of this area.

For more information:

[Sherburne County Geologic Atlas, Part B](#)

[DNR County Geologic Atlas program, Part B](#)

For Part A and to purchase paper copies of this atlas: [MGS County Geologic Atlas Program, Part A](#)

NGWA Announces National Groundwater Awareness Week

By the National Groundwater Association

(WESTERVILLE, OH — February 7, 2018) The National Ground Water Association today announced this year's National Groundwater Awareness Week (#GWA2018) will take place March 11-17. An annual observance established to highlight the responsible development, management, and use of groundwater, the event is also a platform to encourage yearly water well testing and well maintenance to prevent waterborne illnesses.

Established in 1999, National Groundwater Awareness Week provides an opportunity for people to learn about the importance of the resource and how it impacts lives. "Approximately 132 million Americans rely on groundwater for drinking water, so, simply put, it makes life possible," said Aaron Martin, public relations and awareness manager of NGWA. "Additionally, groundwater is used for irrigation, livestock, manufacturing, mining, thermoelectric power, and several additional purposes, making it one of the most widely used and valuable natural resources we have."

From manmade contaminants such as PFAS (per- and polyfluoroalkyl substances) and naturally occurring ones like arsenic affecting its quality to potential depletion of the resource in India, South Africa, Australia, and the American West, groundwater was an important topic in 2017. NGWA expects much of this narrative to continue throughout 2018, emphasizing the need for increased awareness regarding one this critical natural resource.

Consider the following:

- ◆ Americans use **79.6 billion gallons** of groundwater each day.

- ◆ Groundwater is **20 to 30 times larger** than all U.S. lakes, streams, and rivers combined.
- ◆ **44 percent** of the U.S. population depends on groundwater for its drinking water supply.
- ◆ More than **13.2 million households** have their own well, representing **34 million people**.

The 2018 theme of "Tend. Test. Treat." was established to encourage a more holistic approach to sustain an adequate supply of quality groundwater. Testing your water might prompt well inspection and maintenance, and water treatment can mitigate naturally occurring contamination revealed by the test. So, **test** your water, **tend** to your well system, then **treat** the water if necessary.

NGWA encourages every person to be a "groundwater advocate" both during National Groundwater Awareness Week and beyond by protecting and conserving groundwater. Businesses, individuals, educators, students, federal agencies, cities, associations, and everyone in between can share their story through our website or on social media. For downloadable information on the event, including:

- ◆ A social media toolkit
- ◆ Facts about groundwater
- ◆ Event FAQs
- ◆ Logos and graphics
- ◆ Videos

Please visit GroundwaterAwarenessWeek.com or WellOwner.org.



National Groundwater Awareness Week

TEST. TEND. TREAT.

March 11 - 17

Notes from the Hydrogeology Field Camp and the Pfannkuch-Alexander Fund

By Scott Alexander, MGWA Foundation President

The Pfannkuch-Alexander Fund was initiated in 2010 and designed to bring students with strong, broad life skills a hydrogeology field camp experience. It is expected that these life experiences will be shared with other students to promote a more diverse field camp experience and help build a stronger hydrogeology community.

The first two Pfannkuch-Alexander awards were given in 2017. An award committee was formed and comprised former Hydrogeology Field Campers, who now work for private consultants and state agencies. The committee reviewed the applicants not on academic scholarship, but on their desire and success in overcoming barriers to achieve their goals. Specifically, applications were evaluated on: 1) resolve and determination to succeed, 2) future goals and plans to achieve them, 3) ability to communicate the hardships they have overcome or currently face, and 4) a desire to share their life experiences with other students.

Two finalists were selected from a pool of eight strong applicants, and each received a \$1,500 award. The 2017 awardees were Laura Lyon, a graduate student at McGill University, Montreal, Canada, and Hunter Quintal, an undergraduate at Brown University, Providence, Rhode Island. Both Hunter and Laura brought strong work ethics and abundant, hard earned life experiences to the Hydrogeology Field Camp. This work ethic helped bring out strong effort in the rest of the field campers. Laura and Hunter became leaders in other ways in addition to being active participants at the Hydrogeology Field Camp. Laura was a trained yoga instructor and led a series of evening sessions to help relieve the stress of long field days and evenings completing assignments and reports. Hunter likewise led a morning boot camp to help get students moving and in shape for a day of field work. Group work outs started at 6 am and included trail runs, calisthenics, and canoe paddling.

The Hydrogeology Field Camp is designed to bring diverse students together to work as a team. The camp strives to include strong students from around the U.S. and other parts of the world with our fine University of Minnesota students. About half of the camp is made up of University of Minnesota students, and

Figure 1. Field Camp Participants, 2017. Credit: Logan Jacobs, 2017 participant



the remainder are from the outside. The outside students make a significant effort to come to Minnesota. In particular, Brown University does not offer a field camp – they purposely want their students to take at least one class away from their campus to broaden their student’s experiences.

Additionally, the Hydrogeology Field Camp at the University of Minnesota has been working with the International Association for Geoscience Diversity (theiagd.org) to create the world’s first fully accessible geology field camp. This effort was greatly aided by the fact that we are not scaling mountain peaks, as at many traditional field camps. Instead, we have a relatively level field site and stay at the ADA compliant Deep Portage Learning Center (deep-portage.org). We are developing new curriculum applying universal design to accommodate students with both non-apparent disabilities and physical impairment. Interestingly, these new activities help not just students with accessibility issues but everyone gain a clearer understanding of the topics. One student, Dave Kill, shared this example at camp. Before data loggers were available, Dave recorded pumping test data using a plank. By bolting an 8 foot long 1”x4” plank to the pro-top of a monitoring well, he measured a constant depth to water and put a tick mark on the plank with the date and time. This created a visual record of drawdown at the field site.

The Pfannkuch-Alexander endowed fund is growing but more donations still are needed to continue offering annual awards. Donations to the Pfannkuch-Alexander fund can be made through the [MGWA Shop](#).

Figure 2. Plank Set Up for Water Level Measurements. Credit: Ivan Carabajal, University of Cincinnati



MGWAF BOARD MINUTES

Meeting Date: September 19th, 2017

Directors Present: Scott Alexander, Eric Mohring, Stephanie Souter, Kara Dennis, Sean (MGWA), Lanya Ross (phone)

Approval of June Minutes. Motion: Stephanie In favor: All. Sean suggested change to item 5, changes made.

Current finances – Kara

- ◆ Affinity Plus checking account closed. Kara will deposit with Wells Fargo. (\$5690).
- ◆ Change in asset value in WF investment account was \$1500 for the last quarter. Making 10% so far this year on WellsFargo investment fund, with 1% fee. Investments are fairly conservative, but the first year was very positive.
- ◆ Credits: MGWA – leftover from spring meeting \$21,280. Transfer to brokerage \$750.
- ◆ Amazon Smile - \$23.14. Transfer to Affinity Plus \$5686.96.
- ◆ Debits: 2 hydrocamp scholarships @ \$1500 each. Advisory fee \$653.99. Transfer from Affinity Plus \$5686.96.
- ◆ Endowment balance: \$190,875.00
- ◆ Non-endowment sub-total: \$16,316.20
- ◆ H.O. Pfannkuch Fund: \$50,939
- ◆ Total account balance is \$259,390.18
- ◆ The Hiway checking account should be closed. MGWAF earns no interest at HiWay. We have a Wells Fargo checking account.
- ◆ Continued discussion on restricted and unrestricted funds and how to track the balances of each. Because asset values change, it is suggested that we track the percentage of restricted vs unrestricted funds. Previous policy said that interest would go into the endowment. Now ‘income’ is based on change in asset value for a time period.

Action items for Kara and Jennie (consulting with Stu)

- ◆ Kara and Jennie will close the HiWay checking account.
- ◆ HOP fund to Wells Fargo – needs to still have separate tracking
- ◆ Financial reports should report ‘change in value’ instead of ‘interest’
- ◆ Behind the scenes tracking for restricted vs unrestricted funds and looking at investment growth and how to apportion that into restricted (R) vs unrestricted (U) Suggestion: add a column to designate funds as they come in as R or U. Kara can send new version to other directors for feedback.
- ◆ Follow up with WF regarding advisory fee – MGWA’s policy requires that MGWA pay it. MGWAF should invoice MGWA for WF advisor fees.
- ◆ Invite Kent to next meeting in December

New Grant Applications: Brown-Nicollet CWF \$2,000. This festival has been held since 1997. MGWAF has funded it in the past. 700-1000 4th graders. Motion to approve: Stephanie, Second: Eric, In favor: ALL.

Action item: Lanya will resend notification letter and that can be used for this grant and future ones.

2017/2018 Budgeting: Stu’s recommendation was 4-6% value of endowed fund – that would be \$7,600 at current amount of endowment. Need to grow endowment to around \$300,000 to fund what we have been giving out.

2016-2017 spending: Set overall budget at December meeting. Stephanie asked about scholarship amounts. Discussion on increasing the amount vs increasing the number. Motion (Eric): Increase scholarship amounts to \$1500 each for 2017-2018. Second: Lanya. In favor: ALL.

Type	Amount
Scholarships	\$2,000.00
CWFs	\$4,500.00
Hazwoper	\$2,000.00
Field camp	\$3,000.00
	\$11,500.00

Miscellaneous: Sean is creating a spreadsheet of MGWA and MGWAF directors, including subcommittee members.

Action Items from June:

Continued discussion on encouraging non-traditional students and bring in social/economic diversity among applicants for scholarships. If we add another scholarship, it could be more focused on non-traditional students. Undergrad and grad scholarships miss those who aren’t going to college. Lanya mentioned the Right Track program, based in the City of St Paul. – perhaps further discussion in December.

Fundraising: Conference flyer is out, with an insert for weather guide calendars. Someone needs to try and solicit exhibitors for conferences usually has been sent out by Cathy. Eric agreed to work with Stu and Sean on Exhibitor solicitations.

Next meeting: December 14th, 12-130, U of M, Tate Hall

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

MGWA BOARD MINUTES

MGWA Board of Directors Regular Meetings

Meeting Date: Tuesday, October 17, 2017

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

- Attendance:** Evan Christianson, President; Ellen Considine, President-Elect; Ole Olmanson, Past President; Anneka Munsell, Treasurer; Andrew Retzler, Secretary; Sean Hunt, WRI; Jeanette Leete, WRI; Andrew Streitz, MGWA Newsletter
- Past Minutes:** Approved with changes.
- Newsletter:** The September newsletter was released. The Newsletter team is transferring several things that fell behind in the previous quarters to Leete. The Newsletter team is developing stories for the next issue. Munsell said a book review will be in the next issue. The deadline for the next President's Letter can be after the Fall Conference so Christianson can reflect on the conference. Streitz would like Christianson to send in an updated photo for the next issue.
- Treasury:** Munsell does not have a compiled report yet and will email it out to the Board as soon as possible.* Leete is processing credit charges from the incoming membership renewals and conference registrations. Munsell is working on the MGWA Annual Report, with plans to include it in the MGWA Newsletter.
*Update: Munsell shared an updated and corrected Treasury Report via email in early January. The numbers as reported include a total income for the period of January 1, 2017 to December 18, 2017 of \$105,694.41; net income for this period of \$34,229.70; total assets for this period of \$89,423.85.
- WRI Report:** There was a mix up with the conference room contract. Leete has sent in a new contract. Leete committed to 220 attendees in her conference contract email. Hunt sent out the conference email, conference brochure, membership renewals, and MGWAF fundraiser information. Hunt and Leete are busy entering data received from these sent notices. Hunt reported that about a quarter of previous membership has already renewed. Hunt plans to send out more notices regarding White Paper topics, a Fall Conference reminder with calls for lightning talks and posters, and an email regarding MGWAF fundraiser calendars and Amazon Smile. Considine suggested including a call for White Paper topics in the next newsletter. Olmanson asked Leete about current financial system details. Olmanson will explore further financial system options to see whether the process could be simplified and streamlined. Leete mentioned that any new system would need to be compatible with the current QuickBooks setup.
- Web Page:** Munsell made the Board aware of a broken link to a PDF document on the current web page under the Corporate Memberships section. Olmanson will look into this.
- MGWAF Report:** Munsell did not attend the meeting, but provided the Board with updates from a copy of the meeting minutes. The value of the Wells Fargo account has increased, and the Foundation would like to have MGWA pay for the Wells Fargo advisory fees on the account, as is MGWA's policy. MGWAF is working with Wells Fargo further on the details. Two hydro field camp scholarships were disbursed, and the student scholarships were increased to \$1500 each. Funding for the Brown-Nicollet Children's Water Festival has also been approved. Hunt described the MGWAF meeting further and the new meeting venue of Tate Hall on the University of Minnesota-Twin Cities campus. Christianson and Leete further discussed the Wells Fargo advisory fees, with the conclusion that MGWA should be paying all administrative fees so that MGWAF can remain a fully charitable organization.
- White Paper Update:** Streitz gave a brief history and overview of the White Paper Committee and previous topics/workgroups. Streitz highlighted the two new members to the committee, and discussed the progress of the current drain tile paper. There were some misunderstandings as to the exact focus of the drain tile paper that have been dealt with. Streitz said the committee would like designate a White Paper Workgroup leader from the beginning in the future to help keep volunteers more organized and on track. The workgroup drafts have all been submitted, and there should be a draft for the committee within a month's time. Streitz discussed how the committee is interested in building from the White Papers—such as with field trips pertaining to the topics. Streitz currently believes the committee would handle most of the planning of such trips with the workgroups, and would then bring these plans to the Board to comment on. The White Paper Committee is currently reviewing new topics for the next paper. Streitz reminded the Board of the importance of stressing the particular focus of white papers initially to make sure they properly reflect our organization. Leete discussed how a pre-formatted Word document could easily be made for the workgroup volunteers to use when drafting the paper. Considine agreed that volunteers should be given a template to follow for consistency. Considine suggested an outreach committee of some sort to help advertise the content of the white paper findings for each topic to the public and groundwater community. Christianson brought up the previously discussed Education Committee and how they could be responsible for White Paper outreach too. Hunt suggested a member of the Board attend the next White Paper Committee meeting.
- Old Business:** Fall Conference Planning: Christianson distributed the latest conference schedule. Hunt will look further into MDH credit requirements with the updated schedule.

MGWA BOARD MINUTES

MGWA Minutes, cont.

Christianson would like to get more lightning talks and posters. Hunt plans to send an email reminder to membership highlighting these. The Board plans to meet on November 14 for conference prep. Metropolitan Council, two other exhibitors, and the Water Bar will have spaces at the conference. Christianson will have an award for outgoing Board member Ole Olmanson, and will discuss the details further with Hunt and Leete. The Board discussed Pigeonhole and agreed to use it in some fashion for this conference. Christianson will work through the details, likely opting for the cheaper package that will require deleting and reposting. The Board agreed on Stout's again as the location for the post-conference dinner. Abstracts for the conference are due November 1. Hunt asked Christianson about the scheduled lunchtime, as he will need to notify the facility. Christianson stated the current time is not finalized, and will let Hunt know as soon as it is.

Board Nominations/Elections Discussion: The Board is currently accepting nominations for the Secretary and President-Elect positions. Retzler nominated himself for another term as Secretary. A notice about nominations will need to be made at the conference.

Operations Manual Workshop: The Board agreed to cancel the November Board meeting in lieu of the Operations Manual Workshop, scheduled to take place at 5pm on November 21 at Munsell's house. The Board would like to add in the White Paper and Newsletter guidelines too. Streitz will talk to Kroening about Newsletter guidelines.

Meeting Date: Tuesday, December 19, 2017

Attendance: Evan Christianson, President; Ellen Considine, President-Elect; Ole Olmanson, Past President; Anneka Munsell, Treasurer; Andrew Retzler, Secretary; Sean Hunt, WRI; Jeanette Leete, WRI; Andrew Streitz, MGWA Newsletter

Past Minutes: Approved with changes.

Newsletter Report: Streitz reported that the Newsletter is ready and that it will move to Leete for final production. Hunt will send out a notice to membership regarding the Newsletter when finalized.

Treasury Report: Munsell shared with the Board the Treasury report. The numbers as reported include a total income for the period of January 1, 2017 to December 18, 2017 of \$105,694.41; net income for this period of \$34,229.70; total assets for this period of \$89,423.85.

WRI Report: Hunt shared membership update—337 paid members. Christianson asked about cost difference between this year's Fall Conference and past conferences. Leete will email Christianson the differential cost of profit/loss. Hunt will include in his Newsletter notice to membership an update regarding the Fall Conference web page.

Web Page: Hunt finished putting together the Fall Conference web page. Hunt will notify membership in the email he sends out regarding the Newsletter. Hunt uploaded member lists of current MGWA-affiliated committees to the MGWA Google Drive. Hunt and Olmanson discussed usability issues regarding the updating process of conference web pages. Olmanson researched ways to integrate Quickbooks into our current web page content management system. Olmanson reported that there is currently no simple solution. Hunt updated the White Paper pages.

MGWAF Report: Hunt said that the Foundation met with their Wells Fargo financial advisor, and that the student scholarships deadline is the end of January.

Old Business: Board Nominations/Elections. The Board received a nomination for President, Kate Pound. Munsell motioned to approve the nomination of Kate Pound for MGWA President; Considine seconded; motion passed. Retzler nominated himself for Secretary and was approved by the Board at the October Board meeting. Olmanson suggested the Board try to get back on a normal timeline for seeking Board nominations. Munsell suggested the Board consider ways to make the nominations more open. Hunt will prepare election materials for voting. Christianson suggested closing the election a week prior to the next Board meeting in January.

Operations Manual Update. Olmanson and Retzler have drafts for their sections of the manual ready. Retzler uploaded his files to the MGWA Google Drive. The Board plans to have all drafts ready for the next Board meeting in January.

New Business: Drain Tile White Paper. Streitz reported that a draft is currently in review. A main contributor is a USGS employee thus the draft is undergoing the USGS review process. USGS review will provide additional credibility. If the USGS and White Paper Committee/Workgroup do not agree, the USGS employee may be moved from a main contributing role to a role that does not require USGS review. After USGS review, the paper will go to the White Paper Committee and then to the Board. Christianson asked about the USGS review timeline. Streitz expects the Board will see a copy within 5-6 weeks, and Mindy Erickson (USGS and White Paper Committee) does not expect any delays. Streitz will double-check with Mindy Erickson on this. The Board agreed on an informal goal to have the paper done by

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

Save These Dates

MGWA Conferences

04/26/2018

11/15/2018

February in time for the 2018 Spring Conference. Streitz will send a draft copy to Christianson to distribute to the Board so that they may feel more comfortable about the current content while it undergoes USGS review.

Stormwater/Infiltration White Paper: Streitz updated the Board on the next White Paper. Mike Trojan (MPCA) is leading the effort and has been recruiting people for the workgroup. Hunt will also send out a notice to membership asking for workgroup participants in his Newsletter email. Streitz expects the Board will have a copy of the White Paper scope by the next Board meeting in January.

The Board generally discussed its' role involving White Papers and the White Paper review process.

Fall Conference Review: Hunt distributed the compiled feedback on the conference. Overall, feedback was positive. The lack of ethics training was mentioned in the feedback. Considine has ideas to incorporate ethics training into the next conference. The Board discussed the pitfalls of using Pigeonhole this time around. Olmanson suggests finding a workaround to remove older questions from the system and have newer, relevant questions be at the top. Hunt will contact Tim Cowdery (USGS) about getting his presentation PDF for the conference web page. The Board discussed the shortcomings of the Student-Mentor lunch at this conference and ways to make it better.

Outreach Committee: The Board discussed the possibility of reestablishing an Outreach Committee. The Board felt it is the membership's responsibility to establish committees if there is enough general interest. The Board will not discuss this idea further until they hear more from the membership.

Social Events: Berquist has maintained the Facebook page and emailed regional hydrology professors about the MGWAF student scholarships. Berquist would like to schedule a social hour for the first week in April

2018 Look Ahead: Considine would like to establish a Conference Planning Committee for the upcoming Spring Conference. Committee will help formulate subtopics and review the feasibility for a new conference venue in the coming years. Current venue for conferences is already booked through 2018. Olmanson suggested Conference Committee also help bring in vendors. Hunt will send out an email to membership notifying them about the Conference Committee. Considine has several conference topic ideas in the works. Christianson made the Board aware of a new organization in the region, Minnesota Association of Environmental Professionals. Considine would like to plan an ethics workshop in coordination with the Spring Conference. The Board likes the idea of having the workshop be an add-on to the conference, and possibly occur the day before with a happy hour afterwards. The Board discussed individuals who might be able to lead such a workshop. Leete suggested adding a question in the upcoming elections voting process as to whether ethics training is of interest to the membership. Munsell would like to explore the possibility of a web video conference option for MGWA Board meetings—to make the meetings more accessible to those outside of the Twin Cities metro. Munsell will work on a Treasury Report graphic for the Annual Report and March Newsletter.

Ethics, Integrity and the Law for Geoprofessionals

May 9, 2018

Part 1: Ethical Decision Making with Integrity

May 16, 2018

Part 2: Statutes and Rules of Professional Conduct

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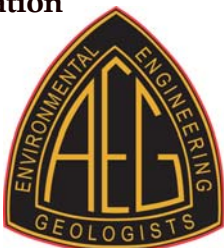
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Tom Sale, PhD

Colorado State University
Center for Contaminant Hydrology

Chuck Newell, PhD, PE

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Tom Sale is internationally-recognized among the most expert authorities on LNAPL science. His research at the Center of Contaminant Hydrology at Colorado State University has created many technology breakthroughs creating a paradigm shift for LNAPL site management strategies.

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