Minnesota Ground Water Association
www.mgwa.org

Newsletter

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Volume 38, Number 3

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MGWA President Kate Pound

Letter from the President

The Unexpected

By Kate Pound

I'm guessing that all of you have experienced the 'unexpected' – whether it be analytical results, model predictions, legislative decisions, or interpretations that evolve through deep familiarity with a dataset. There are also the more personal aspects of the 'unexpected.' Sometimes the unexpected result or experience may be the consequence of a seemingly insignificant decision you made – without realizing its potential. I'm sure you all have professional or personal stories you can share long these lines. I'm going to share two with you.

First, many of you will be aware of the USGS National Water Quality Assessment (NAWQA) Program. It was set up in 1991 to develop long-term, nationally consistent information on the quality of the nation's streams and groundwater. This program was organized into three 10-year cycles, with each successive cycle building upon the findings of the past cycle. We are in Cycle 3. Consistent, periodic monitoring of same sites has made long-term trends analysis possible. Nested studies (local to regional to national) allow interpretation and perspective of local, state, and regional findings by other organizations. I am sure that many of you were or are employed as part of this program.

The unexpected part of this success story (see the article in this newsletter) is that the current 10-year cycle is being cut short essentially behind closed doors after new leadership (Don Cline, now Associate Director for Water) was

— *continued on page 3*

2019 Earth Science Week

Since October 1998, the American Geosciences Institute has organized this national and international event to help the public gain a better understanding and appreciation for the Earth sciences and to encourage stewardship of the Earth. This year's Earth Science Week will be held from October 13 - 19, 2019 and will celebrate the theme "Geoscience Is for Everyone." The event will emphasize both the inclusive potential and the importance of the geosciences in the lives of all people.

People of all ages are invited, during Earth Science Week 2019, to join in this creative endeavor through our available learning resources and activities. The theme is meant to encourage individuals of all backgrounds, ages, and abilities to engage with the geosciences, whether that is as a geoscience professional, a hobbyist, or through civic engagement.

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

Newsletter Deadlines

New Format in December 2019, Ongoing Call for Submissions.

MGWA MEMBER NEWS

Leonard Rice Engineers

Leonard Rice Engineers, Inc., (LRE) has provided leadership in consulting services related to planning, managing, and developing surface water and groundwater resources throughout the Western United States since 1970. In May 2019, LRE expanded to provide these services across the Midwest by establishing an office in the Twin Cities.

Joining the office are **Dave Hume**, Senior Project Manager and Vice President of Midwest Operations; **Mike Plante**, Lead Hydrogeologist; and **Roscoe Sopiwnik**, Senior Environmental Scientist. Dave, Mike, and Roscoe were colleagues at Leggette, Brashear's and Graham, Inc. (LBG) and subsequently WSP following WSP's acquisition of LBG in 2017. The LRE Midwest team will continue to partner with engineering firms and municipal, rural water, industrial, and agricultural clients to address their groundwater supply and resource needs.

Dave is a licensed professional geologist in Minnesota, Wisconsin, Nebraska, and Missouri with 30 years of groundwater consulting experience. He began his groundwater-focused career in Minnesota in 1990 after completing his M.S. in Geology with an emphasis on hydrogeology. He worked as a hydrogeologist for Delta Environmental Consultants until the mid-1990s focusing on remedial investigations of petroleum and other industrial contaminants in soil and groundwater. He then moved from consulting to Unisys' Corporate Environmental Affairs Group where he worked again as a hydrogeologist on superfund and RCRA sites across the country. In 2000, Dave joined LBG as project manager and lead hydrogeologist supporting contaminant remediation and groundwater supply projects across the Midwest. Dave spent the ensuing almost 20 years developing and expanding the firm's groundwater supply and resource management practice, most recently as a supervising hydrogeologist for WSP.

Mike is a licensed professional geologist in Minnesota and Texas and a Geographic Information System Professional (GISP) with over 20 years of environmental and water supply consulting experience. After graduating from the University of MN in 1996 with a B.S. in Geology, he worked as an offshore geophysicist with Schlumberger (Houston, TX) responsible for 3D seismic data processing. Mike joined LBG as a hydrogeologist in 1999 and supported environmental characterization and remediation projects, facility response planning, emergency response, and groundwater supply projects across the Midwest. While at LBG, Mike completed a Master of Geographic Information Science (MGIS) degree from the University of MN (2003), expanding in-house GIS expertise in the Midwest as LBG's GIS Coordinator; most recently, Mike was a supervising hydrogeologist with WSP. In his role at LRE, Mike works to expand LRE's water-supply services in the Midwest and increase LRE's GIS capabilities. As an avid GIS user, Mike continuously strives to find new ways to apply GIS, spatial analysis, and geospatial modeling to solve groundwater related issues and provide understanding to challenging hydrogeology projects.

Roscoe is a GISP, with over a decade of experience providing diverse hydrogeologic and GIS consulting. After graduating from Macalester College in 2006 with a B.A. in Geography, Environmental Science, and Geology, he joined LBG in 2006 as an Environmental Scientist with a focus on hydrogeology and GIS. While at LBG, Roscoe obtained his MGIS degree and Master Minor in Water Resources Studies from the University of MN (2012), and helped grow LBG's Midwest hydrogeology-centered GIS spatial analysis capabilities. More recently, Roscoe was a senior environmental scientist for WSP. Roscoe's role at LRE focuses on project management and providing hydrogeologic and GIS services to help grow LRE's presence in the Midwest. As a GIS professional, Roscoe is passionate about applying GIS spatial analysis and geospatial modeling to solve challenging groundwater sustainability related issues.

As members of MWGA, Dave, Mike, and Roscoe regularly attend MGWA's semi-annual conferences to maintain awareness of current trends and hot topics within the groundwater community, and frequently present at groundwater-focused and GIS conferences.

Upcoming MGWA Conference Schedule

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

Spring Conference	Fall Conferences
	November 12, 2019
April 28, 2020	November 12, 2020

President's Letter, cont.

brought in a couple years ago. NAWQA cycle 3, year 8 (federal FY 2020) is slated to suffer a 50% budget reduction, year 9 a 75% budget reduction, and year 10 funding is scheduled to be cut completely. One of many ramifications is that many of the publications (work in years 8-10), were planned to publish interpretation of data already collected and have been dropped or cut. There will be no Cycle 4. This is an unexpected cut to an effective and successful water quality monitoring program, with broad consequences.

The second story of the 'unexpected' is more personal. I used to think baseball was a 'stupid' game. I was raised on cricket (yes, games can extend over days). As my sons grew up in the Twin Cities they participated in various neighborhood youth leagues and my interest was piqued. About ten years ago I needed a non-academic challenge over the summer; I decided to teach myself/learn how to score baseball games. I learned more about teaching and learning that summer than I have ever learned from any pedagogy workshop. My approach to teaching (especially where it comes to the recording and interpretation of data) changed forever. This summer I needed a break or distraction from academia and research. I decided to work at Target Field. By the time you read this, the truly unexpected part of my summer endeavor will be long past – I am throwing out the honorary first pitch at Target Field this evening – August 3rd. Maybe some of you were there and wondered whether I had a doppelganger.

So, back to the theme of unexpected outcomes. Please read the more detailed report in this newsletter about the demise of the National Water Quality Assessment (NAWQA) Program. While professional affiliations may preclude some of you from contacting legislators about concerns you may have about its demise, please encourage and support colleagues that are able to voice their concerns. In the meantime, I exhort you all to try something new or challenging – you never know where it may lead! I look forward to seeing you all at the MGWA Fall Conference.

Two New MGWA Officers Sought for 2020

The MGWA board needs to fill two officer positions – President-Elect and Secretary– for 2020. The President-Elect takes a leadership role in the planning of one or more of the MGWA meetings while "learning the ropes" of MGWA leadership. The Secretary is responsible for recording the meeting minutes and provides general oversight of membership services. Here's a chance for you or someone you nominate to get in on the front end of groundwater resource protection in Minnesota.

The Secretary serves a two-year term and the President-Elect serves a year before becoming President in 2021, followed by a year as Past-President.

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

2020 Earth Science Week, cont.

Each day of Earth Week has a specific theme:

Sunday, October 13 is ***International Earthcache Day*** – a GPS scavenger hunt!

Monday, October 14 is ***Earth Science Literacy Day***. The *Big Idea* video series explains why Earth science literacy is important.

Tuesday, October 15 is ***Earth Observation Day***. Remote sensing is explored as an exciting and powerful educational tool.

No Child Left Inside Day. NCLI Day encourages students to go outside and research Earth science in the field like a professional geoscientist.

Wednesday, October 16 is ***National Fossil Day***. The annually held National Fossil Day celebration is dedicated to promoting the understanding and appreciation of fossils.

Thursday, October 17 is ***Geoscience for Everyone Day***. Help young people from underrepresented communities explore exciting careers in the geosciences.

Friday, October 18 is ***Geologic Map Day***.

Saturday, October 19 is **International Archaeology Day,** a celebration of archaeology and the thrill of discovery.

2019 MGWA Board

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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

Braun Intertec

Barr Engineering

Rochester Public Utilities

Links at www.mgwa.org

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

Quo Vadis? – Status of the Natural Water Quality Assessment Program (NAWQA)

By Kate Pound, MGWA President

A longstanding study of groundwater in the US, the National Water-Quality Assessment (NAWQA), has apparently been targeted for the cutting block in Federal fiscal year 2021. Congress established the USGS NAWQA Program in 1991 to develop long-term, nationally consistent information on the quality of the Nation's streams and groundwater. Congress recognized the critical need for this information to support scientifically sound management, regulatory, and policy decisions. NAWQA has established goals and objectives via thorough input process with outside stakeholders as documented by the National Academy of Sciences[1], and the USGS[2,3]. The program established a systematic process with ambitious and focused goals to examine water quality from a national perspective. NAWQA leadership built highly productive teams that have been responsible for innovative methods and process development.

NAWQA has been organized into three 10-year Cycles, with each successive Cycle building upon the findings of the past Cycle. We are currently in Cycle 3. Consistent, periodic monitoring of same sites has made long-term trends analysis possible. Nested studies (local to regional to national) allow interpretation and perspective of local, state, and regional findings by other organizations. The current 10-year cycle is being cut short essentially behind closed doors after new leadership (Don Cline, now Associate Director for Water) was brought in a couple of years ago. NAWQA Cycle 3, Year 8 (federal FY 2020) is slated to suffer a 50% budget reduction, Year 9 a 75% budget reduction, Year 10 funding is scheduled to be cut completely. Many planned publications (work in Years 8-10), publications that were planned to publish interpretation of data already collected, have been dropped/cut. There will be no Cycle 4.

NAWQA has been successful in helping us build tools for the monitoring of water quality – as well as better understanding and managing threats to water quality. This is demonstrated via the more than 1,500 publications cited on the NAWQA website[4]. A quick online search finds about 600 publications (predominantly journal articles) via the science citation index database that cite 'national water quality assessment program,' 'national water quality assessment project,' or 'NAWQA' as the funding entity. Another 400+ reports, maps, fact sheets, and other USGS publications are available via the USGS online publications warehouse[5] if one searches using 'NAWQA.' Hundreds of 'health based screening levels' have been established and are served on a USGS website[6] to give human-health perspective to water quality monitoring results. The program has also yielded numerous MS and PhD theses, presentations and posters at local, regional, national, and international meetings.

This effective and successful water quality monitoring program will be eliminated without a plan for systematic, ongoing water quality monitoring -- and equally importantly, without systematic interpretation and publication of water quality results. Supposedly, "key" monitoring will be picked up elsewhere in the new national framework, but there is no clear plan in place.

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1. National Research Council, Preparing for the Third Decade of the National Water-Quality Assessment Program. The National Academies Press: Washington D.C., 2012; p 185.
2. Rowe, G. L., Jr.; Belitz, K.; Essaid, H. I.; Gilliom, R. J.; Hamilton, P. A.; Hoos, A. B.; Lynch, D. D.; Munn, M. D.; Wolock, D. W., Design of Cycle 3 of the National Water-Quality Assessment Program, 2013-2023. Part 1: Frame of Water-Qualty Issues and Potential Approaches. U.S. Department of the Interior, U.S. Geological Survey: Reston, Virginia, 2010; p 54.
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MDH's Website Addresses Have Changed

Reprinted from MDH Well Management News

We recently made some changes to our website to better serve our visitors. You will notice that all of the Well Management Section webpages have different Uniform Resource Locators (URLs). We recommend you update your bookmarks and links. Two new URLs for commonly used webpages at our site are:

- Wells and Boring – Well Management Program
- Minnesota Well Index (MWI)

MGWA-related Legal Entities; An Explanation

by Jeanette Leete

Have you ever wondered about the legal and fiscal status of the MGWA organization? How about the MGWA Foundation? If so, then we've got a short primer for you. Below are three columns that describe the legal nature and limitations of different types of non-profits: the MGWA Foundation, the MGWA Association (what we typically think of as MGWA), and for comparison, a typical membership organization.

	MGWA Foundation	**MGWA**	**Typical Membership Organization (MGWA applied, but our mission was too broad)**
What type of Non-Profit is It?	Charitable Organization	Civic League - Community Welfare Organization	Professional Organization
What purpose does it serve?	Public Benefit	Community Benefit	Mutual Benefit
What is the IRS designation?	501 (c) 3	501 (c) 4	501 (c) 6
Are the IRS returns public?	Filings must be available to the public for inspection.	Filings must be available to the public for inspection.	Filings must be available to the public for inspection.
Party On?	Social activities must be insubstantial	Social activity must not be primary	Social activity may serve business purposes, but may not be primary
Can this type of organization lobby at the legislature?	Legislative activity must be insubstantial, relate to exempt purpose, and be <20% of expenses if election made to track and report on lobbying expenditures	No limit on legislative activity as long as it furthers the exempt purpose	No limit on legislative activity as long as it furthers the exempt purpose; lobbying expenditures may limit the deductibility of dues
Can we help someone win public office?	Absolute prohibition against political activity on behalf of any candidate	Political activity expenditures are permitted, but must be reported to the IRS	Political activity expenditures are permitted, but must be reported to the IRS
How about directing benefits to individuals on the board?	Must serve public purposes. Immediate loss of 501 (c) (3) status if benefits inure to individuals.	Serves community purposes, somewhat narrower than (c) (3). Shall not benefit membership over public. No benefits shall inure to individuals.	Serves the professional purposes of the members. No benefits shall inure to individuals.
May I deduct the money I give from my income tax?	Donations are deductible as charitable contributions by donors on their tax returns	Donations and dues are not deductible as charitable contributions. Donations and dues (if result in directory listing) deductible as business or advertising expenses	Donations not deductible as charitable contributions - businesses sometimes deduct as advertising; dues may be deductible as a business expense
Are income taxes owed on profits? What about sales tax?	Exempt from federal income tax on program activities. Registered as a charitable trust with MN Attorney General. Annual filings maintain status. Exempt from state income tax. Denied sales tax exemption.	Filed for and was granted state income tax exemption for profits from program activities. Subject to sales and use tax. Denied sales tax exemption.	Exempt from state income tax and program activity profits. Subject to sales and use tax.
Can we get nonprofit mailing rates?	Eligible for low cost non-profit bulk mailing permit	MGWA filed for a non-profit permit and was denied	Not eligible.
What if we have only a few generous donors?	Must take care to generate broad-based public support to avoid classification as a private foundation	Not an issue under (c) (4)	Not an issue under (c) (6)
Profits from activities not related to programs are taxed	Pays tax on unrelated business income if over $1,000. Files 990T	Pays tax on unrelated business income if over $1,000. Files 990T	Pays tax on unrelated business income if over $1,000. Files 990T.

New MPCA Report Describes Minnesota's Groundwater Quality

By Sharon Kroening, MPCA

Groundwater contamination has been of considerable interest lately in Minnesota. Nitrate pollution is present in more than a dozen of the state's public water supplies and thousands of private drinking water wells [1]. Chloride, which often is applied as a deicing chemical or used in water softening, has polluted some of the state's lakes and streams and is seeping into the state's groundwater as well. Man-made chemicals, like the polyfluorinated alkyl substances (PFAS) and volatile organic chemicals (VOCs), have also polluted the groundwater in many parts of the state, such as the 100-square mile PFAS contamination plume in the in the eastern part of the Twin Cities Metropolitan Area (TCMA) [2]. The current status and trends in these and other chemicals in the state's groundwater recently was described in a report "The Condition of Minnesota's Groundwater Quality, 2013-2017" released by the MPCA. This article shares some of the highlights from the investigation.

This study focused on water quality conditions and trends in aquifers that are vulnerable to human-caused contamination. Familiar groundwater pollutants like nitrate, chloride, and VOCs were discussed as well as newly recognized ones like PFAS and contaminants of emerging concern (CECs).

Several information sources were used to provide a comprehensive assessment of the state's water quality. This approach was necessary because groundwater quality monitoring in Minnesota is a coordinated effort among several state agencies. One excellent example of this cooperation between the state agencies is the ambient groundwater monitoring. Minnesota state law splits these responsibilities between the MPCA and MDA—the MPCA monitors for non-agricultural chemicals in the groundwater and the MDA conducts similar monitoring for pesticides and fertilizers. In this report, data from the MPCA's Ambient Groundwater Monitoring Network and the MDA's ambient groundwater monitoring were used to describe water-quality conditions and recent trends near the water table. Water-quality conditions in the aquifers used to obtain drinking water were described using information collected by the MPCA as well as published reports or data from the MDA's private well monitoring networks[3], MDA's Township Testing Program[4], and the DNR's County Atlas Program[5].

The installation of new monitoring wells for the MPCA's network enhanced the understanding of groundwater contamination in urban areas in Minnesota. The MPCA's network mainly is comprised of shallow monitoring wells which intersect the water table but also includes some deep wells. The shallow wells act as an "early warning system" which allows the agency to understand what chemicals can readily be transported to the groundwater as well as discern the effect land use has on groundwater quality and quickly identify any emerging trends. From about 2011-2015, the MPCA added approximately 150 new wells to its network to fill identified monitoring gaps. This included installing wells which represent ambient conditions in commercial/industrial areas and improving the network's coverage in residential areas that rely on subsurface sewage treatment systems (SSTS) for wastewater disposal and treatment.

These monitoring network improvements refined our knowledge on the distribution of nitrate and chloride in the shallow groundwater underlying urban areas throughout the state. Nitrate concentrations rarely exceeded state standards in urban parts of the state–less than five percent of the sampled wells that intersected the water table had concentrations exceeding the state class 1 domestic consumption use standard of 10 mg/L as nitrogen (Minn. R. ch. 7050, 7060)[6]. The median nitrate concentrations in the shallow groundwater underlying the monitored urban land use settings ranged from 1.1 to 1.8 mg/L as nitrogen, with the highest median concentration in the shallow groundwater underlying residential areas served by centralized wastewater treatment systems. In contrast, most wells with high chloride concentrations were located in urban areas, especially the 11-county TCMA. Chloride concentrations also had very distinct variations with urban land use. The highest median concentration, 81.9 mg/L, was in the shallow groundwater underlying commercial/industrial areas. Chloride concentrations in these areas were almost twice as high as those in residential areas where the median concentrations ranged from 44.6 mg/L in areas using centralized wastewater treatment to 16.1 mg/L in areas using SSTS.

Deicing chemicals or water softener salt likely was the source of the majority of the high chloride concentrations in commercial/industrial areas and residential areas. Chloride/bromide (Cl/Br) ratios were computed to determine the potential chloride sources in the state's groundwater. Various chloride sources can be distinguished using Cl/Br ratios because chloride is typically 40-8000 times more abundant in groundwater. As a result, small differences in bromide concentrations yield vastly different ratios. Almost three-quarters of the wells used to sample the shallow groundwater underlying commercial/industrial areas of Minnesota had a Cl/Br ratio greater than 1,000 which indicted the chloride source was halite (also known as rock salt). Salt in this form usually is applied as a deicing chemical or to regenerate the resins in softeners that remove calcium and magnesium from the water. Halite was also an important chloride source to the shallow groundwater underlying the state's residential areas, with 51 to 62% percent of the wells having Cl/Br ratios consistent with a halite source.

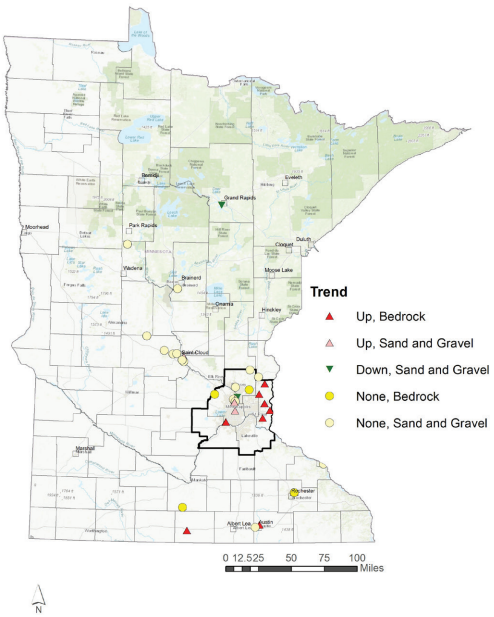

Figure 1. Temporal trends in chloride concentrations in Minnesota's groundwater, 2005-2017

— continued on page 8

Minnesota's Groundwater Quality, cont.

Increasing chloride concentrations in the state's bedrock aquifers indicated that the high concentrations found near in the unconsolidated, water table aquifers were slowly seeping into the deep aquifers used to obtain drinking water. Chloride trends in the bedrock aquifers were largely untested until now because insufficient data had been collected from most of the deep wells to perform the analyses. Overall, 40 percent of the tested wells had increasing chloride concentrations from 2005-2017. A greater percentage of the wells with increasing trends were installed in bedrock aquifers as opposed to near the water table. This suggested that chloride inputs to the land surface have stabilized but a pulse of high chloride concentrations from past years was slowly making its way down to the deep bedrock aquifers. Almost 70 percent of the bedrock aquifer wells tested had increasing chloride concentrations. The percentage of unconsolidated water table wells with increasing trends was much smaller–22 percent. Most of the bedrock aquifer wells with increasing trends were installed in the Prairie du Chien aquifer, and the remainder were installed in the Galena and St. Peter aquifers.

Monitoring conducted as part of the MDA's Township Testing Program showed the townships with the largest percentage of drinking water wells with nitrate concentrations exceeding the state class 1 standard tend to be located in the southeastern Minnesota. Result maps produced by this program classified townships most impacted by nitrate contamination as having at least 10% of the tested wells with concentrations equal to or exceeding the state class 1 standard of 10 mg/L as nitrogen. The majority of these townships were located in southeastern Minnesota.

VOCs were not detected very frequently in the ambient groundwater. From 2013–2017, the MPCA tested 275 ambient network wells for these chemicals. The percentage of the sampled wells with detectable VOC concentrations ranged from 5% in 2015 to 8% in 2013 and 2014. When VOCs were detected, they usually were found in monitoring wells screened near the water table and the measured concentrations were typically low (< 1 ug/L).

The most frequently detected VOCs were the disinfection byproduct, chloroform, and the solvents tetrachloroethylene (PERC) and trichloroethylene (TCE). Chloroform detections generally were sporadic. In the majority of the wells with detections, chloroform was only detected once from 2013–2017. The use of disinfected public water and its eventual recharge into the groundwater was the likely source of the chloroform found in the ambient groundwater. The one common feature among all of the wells with any chloroform detections from 2013–2017 was that they were located in areas served by municipal water-supply systems that disinfect their water using chlorine or chloramines.

TCE, a solvent whose major use is to degrease metal parts, was detected in five wells from 2013–2017. TCE mostly was detected in shallow monitoring wells that were located near or within commercial/industrial areas. The highest TCE concentrations were measured in the two monitoring wells in St. Paul that were located a few hundred feet apart. In these wells, concentrations as high as 46 ug/L were reported. These two wells also had PERC detected in them.

PFAS were another set of chemicals that predominantly were found in the groundwater underlying urban areas. A 2013 MPCA study targeting wells in areas naturally vulnerable to contamination found at least one of these chemicals in almost 70% of the tested wells. Perfluorooctanic acid (PFOA) was detected in about 30% of the tested wells and perfluorosulfonic acid (PFOS) was detected in about 12% of them. Concentrations in about five percent or less of the wells exceeded the PFOA HBV of 35 ng/L set by MDH in 2017 and the PFOS HBV set by MDH in 2019. Some of the wells with exceedances of the PFOA and PFOS HBVs were located in the vicinity of the known industrial contamination from the 3M Company in Washington County, and the others were shallow wells located in other parts of the TCMA and cities in outstate Minnesota.

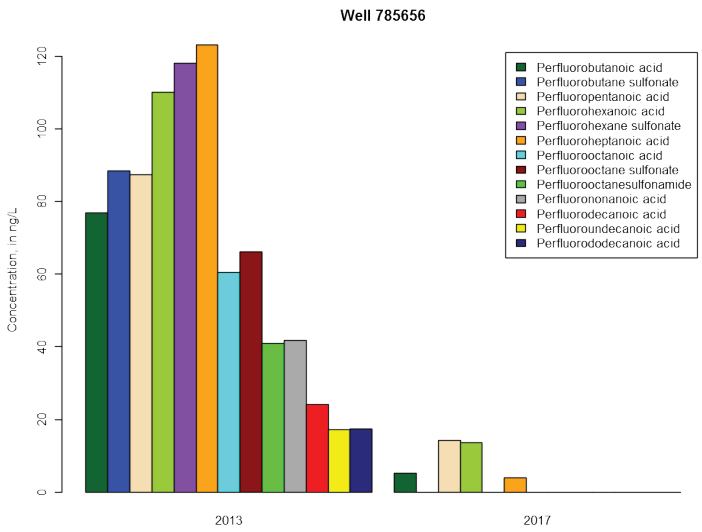

Figure 2. PFAS concentrations in monitoring well 785656 in Crow Wing County, 2013 and 2017

A very limited resampling of some of the wells with PFAS detections was conducted in 2017 and indicated that concentrations of the measured PFAS declined in most of the wells sampled outside of Washington County. **Figure 2** illustrates the extreme variability in PFAS detections and concentrations measured in some shallow monitoring wells outside of the eastern TCMA. The PFAS decreases measured in 2017 may have been due to changes in the types used in products over the last 10 years. For example, the production of PFOA and PFOS was reduced in the U.S. and other countries as part of a global stewardship program. New PFAS were developed to replace these chemicals in products, and one caveat of this study is that the replacement PFAS chemicals were not measured in either the 2013 and 2017 studies.

The full report is available on the MPCA's website at: https://www.pca.state.mn.us/water/groundwater-data

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Update on PFAS (Formerly Known as PFCs) in Minnesota

Reprinted from Minnesota Department of Health Well Management News

Background

Per- and Polyfluoroalkyl substances, also known as "PFAS," (and previously known as "PFCs") are a family of man-made chemicals that have gained worldwide attention as environmental contaminants because some are very soluble in water, are mobile in the environment, and are resistant to degradation. PFAS are organic chemicals with carbon chains of varying lengths that can be either fully or partially saturated with fluorine atoms and that have a carboxylic acid or sulfonate functional group attached to one end. PFAS have been found in many species of wildlife around the world including fish, bald eagles, and mink. Studies have revealed that it is likely that most people in the world have some level of PFAS in their blood, regardless of their age. People are exposed to PFAS through water, food, dust, or other consumer products. Some PFAS can accumulate and stay in the human body for many years. If exposure to PFAS is stopped, levels in the human body will decline over time.

PFAS were originally developed in the 1940s and were used around the world by many industries. 3M Company began manufacturing PFAS in Minnesota in the 1950s. PFAS were used to make products that resist heat, oil, stains, grease, and water and were used as coatings in many products including food packaging, nonstick cookware, and stain-resistant carpets and fabrics. PFAS were also used in firefighting foam, chrome plating, and for other industrial applications. 3M Company voluntarily stopped production of some of the most extensively used PFAS, namely Perfloruooctanoic Acid (PFOA) and Perfluorooctane Sulfonate (PFOS) in 2002; however, they are still produced internationally and may enter the United States in consumer products.

The Minnesota Department of Health (MDH) and the Minnesota Pollution Control Agency (MPCA) began investigating PFAS in Minnesota in 2002. MDH's public health laboratory was one of the first laboratories in the country to develop methods to detect PFAS in water. The laboratory developed methods to detect PFAS associated with 3M Company wastes in the eastern Twin Cities metro area (East Metro), PFAS associated with firefighting foams, and PFAS in blood serum, garden produce, and other media. In 2002, laboratory detection levels for PFAS were higher than they are today, and risk assessment advice suggested that exposure to small amounts of PFAS were not a health concern. Lab methods have improved since then and we are now able to detect these chemicals down to the parts per trillion range in groundwater. Risk assessment has also improved and new studies suggest that long-term exposure to PFAS, at the parts per trillion level, might adversely affect some of the most vulnerable members of the human population, namely fetuses and infants.

Health Effects

While MDH believes that the immediate health risks for most people exposed to PFAS are low, the most current information indicates that fetuses and infants are more vulnerable. Long-term exposure to PFOA, PFOS, and Perfluorohexane Sulfonate (PFHxS) leads to a build-up of these chemicals in the human body. Fetuses and breastfed infants, born to women who have had long-term exposures to PFOA, PFOS, and/or PFHxS, can be exposed to elevated levels of PFAS during development.

Scientists are actively studying whether PFAS cause health problems in people. In some studies, higher levels of PFOA and PFOS in a person's body were associated with higher cholesterol, changes to liver function, changes in thyroid hormone levels, and reduced immune response. More studies are needed to determine if PFAS caused these health outcomes, or if other factors were responsible.

Studies in animals have shown some health effects including changes in development, liver and thyroid function, and immune response; increased kidney weight and cellular changes, and increased tumors in certain organs. Research continues on PFAS and health effects such as birth outcomes, hormone balance, cholesterol levels, immune response, and carcinogenicity.

Health Guidance Levels for PFAS

Water that contains levels of PFAS above drinking water values should not be used for drinking or cooking, but is safe for bathing, showering, washing clothes, and cleaning. Currently, MDH has health-based guidance values for the following PFAS in drinking water:

PFAS in the East Metro

From the 1950s to the 1970s, 3M Company disposed of PFAS wastes at four locations in the East Metro including the Oakdale and Woodbury dumpsites, the Washington County Landfill in Lake Elmo, and at the 3M manufacturing plant in Cottage Grove. PFAS were first detected in Minnesota groundwater in 2003 in the East Metro near the 3M manufacturing plant in Cottage Grove and near the Washington County Landfill in Lake Elmo. Since that time, MDH and MPCA have tested over 2,600 private and public wells and MDH has issued over 1,100 drinking water advisories. (A drinking water advisory consists of a letter issued

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PFAS Chemical	Drinking Water Guidance Value (parts per billion [ppb])
Perfluorobutane Sulfonate (PFBS)	2.0
Perfluorohexane Sulfonate (PFHxS)	0.047*
Perfluorooctane Sulfonate (PFOS)	0.015**
Perfluorobutanoic Acid (PFBA)	7.0
Perfluoropentanoic Acid (PFPeA)	Not Established
Perfluorohexanoic Acid (PFHxA)	Not Established
Perfluoroocatnoic Acid (PFOA)	0.035

**New Health Based Value (HBV) established by MDH, and released on April 3, 2019.*

***Revised Health Based Value (HBV) established by MDH, and released on April 3, 2019. (Previous HBV for PFOS was 0.027 ppb.)*

PFAS Update, cont.

by MDH, to a well owner, indicating that PFAS has been detected in the water above health advisory levels, and that the water is not safe for consumption.) Granular activated carbon (GAC) filters have been provided to the cities of Oakdale and Cottage Grove to treat water from affected municipal wells, and also to residents with affected private wells. Also, in Lake Elmo, approximately 200 private wells were permanently sealed and the homes were connected to the Lake Elmo municipal water system. In 2007, MDH's Well Management Section established a Special Well and Boring Construction Area in parts of Lake Elmo and Oakdale in order to notify the public and well contractors of PFAS contamination in groundwater, to require plan review for the construction and sealing of wells in the area, and to require water testing for PFAS for new wells constructed in the area.

Investigations in the East Metro have identified an area of PFAS groundwater contamination covering over 150 square miles that has affected the drinking water supplies of over 140,000 Minnesotans. Communities in the East Metro area affected by PFAS include: Afton, Cottage Grove, Denmark Township, Grey Cloud Island Township, Lake Elmo, Lakeland, Maplewood, Newport, Oakdale, the southeast part of St. Paul, St. Paul Park, West Lakeland Township, Woodbury, and northern Dakota County adjacent to the Mississippi River. MDH and MPCA will continue to test wells that have already been sampled to track changes in water quality over time, and will test additional wells in the affected areas in 2019. East Metro residents who live in a "priority sampling area," who are interested in having their well water tested for PFAS, can get on a waiting list by filling out a well sampling request form at

- Perfluoroalkyl Substances (PFAS).

Remedies for East Metro Residents

Well owners in the East Metro area who receive a drinking water advisory letter from MDH are eligible to receive bottled water until either a whole house, granular activated carbon (GAC) filter is installed to remove PFAS from their drinking water, or the home is connected to a municipal water system (where available.) All bottled water, GAC filters, and filter installation and maintenance costs are paid by the state of Minnesota as a result of the 2007 Consent Decree between the State of Minnesota and 3M Company. MPCA oversees the bottled water delivery and GAC filter installation and maintenance. MPCA also reimburses most, if not all, costs for connection to a municipal water system. Persons with PFAS below drinking water guidance, who have not been issued a drinking water advisory, can choose to minimize their exposure to PFAS by purchasing bottled water, connecting to a safe source of water if available, or by installing their own water treatment filters to remove PFAS. Granular activated carbon (GAC) and reverse osmosis (RO) filters are effective at removing PFAS from drinking water.

Settlement of Lawsuit with 3M Company

In 2010, the Minnesota Attorney General sued 3M Company, alleging that the company's production of chemicals known at the time as PFCs, had damaged drinking water and natural resources in the southeast Twin Cities metro area. On February 20, 2018, the State of Minnesota settled the lawsuit against 3M Company in return for a grant of $850 million dollars. After legal and other expenses were paid, approximately $720 million dollars were made available for drinking water and natural resource projects in the East Metro. The grant will be used for projects to provide a clean, sustainable water supply to the East Metro area, and for natural resource projects to enhance aquatic resources, wildlife habitat, and outdoor recreational opportunities in the affected area. Any remaining funds can be used for statewide environmental projects.

Other PFAS Investigations in Minnesota

PFAS has been detected in groundwater near firefighting training areas in Bemidji and Duluth, Minnesota. In Bemidji, the firefighting training site is located at the Bemidji airport. PFAS has been detected in several Bemidji municipal wells that are located on the airport property, down gradient of the firefighting training area. As a result, the city is planning replacement of at least one city well. In Duluth, the firefighting training area is located at the Duluth airport and Air National Guard Base. PFAS has been detected in surface water near the airport and a small number of private wells close to the airport. Drinking water advisories have been issued for two domestic wells near the airport.

Since 2008, MDH has completed three biomonitoring projects that tested the blood of over 350 East Metro residents for PFAS, as directed by the Minnesota Legislature. These projects found that PFAS levels were higher in longer-term East Metro residents than the average U.S. population, but that levels have decreased significantly over time. Results showed that efforts to reduce drinking water exposure to PFAS were successful in reducing PFAS blood levels in the population.

PFAS, namely PFOS, has also been detected in fish in some lakes in Minnesota and has led to the establishment and posting of fish consumption advisories. MDH's fish consumption guidelines help people limit exposure to contaminants like Polychlorinated Biphenyls (PCBs), mercury, and PFOS found in fish. Information on fish contamination in Minnesota lakes and waters, and fish consumption advisories can be found on the MDH and the DNR websites at:

- Fish Consumption Guidance
- LakeFinder

In 2006 and 2007, MPCA collected samples from wastewater treatment plants and permitted landfills in Minnesota and found low levels of PFAS in effluent from waste water treatment plants and in groundwater, leachate, landfill gas, and gas condensate at several landfill sites in Minnesota.

Lastly, in 2010, MDH conducted a study on PFAS in garden produce and found primarily Perfluorobutanoic Acid (PFBA) in vegetables, at low levels, below health concern.

Federal Regulations

Currently, there are no enforceable federal standards for PFAS in drinking water. The Environmental Protection Agency (EPA) has issued "Lifetime Health Advisories for PFOA and PFOS." PFAS are not considered to be "hazardous waste" according to current federal standards; however, the EPA has initiated the process to classify PFOA and PFOS as hazardous waste.

More Information on PFAS

- Perfluoroalkyl Substances (PFAS)
- History of Perfluoroalkyl Substances (PFAS) in Minnesota
- Perfluorochemicals (PFCs)
- EPA's Per- and Polyfluoroalkyl Substances (PFAS)

Robbing Peter to Pay Paul: An Extinct St. Peter Spring-line in St. Paul, Complete with Headstones

By Greg Brick, Ph.D.

When springs dry up an explanation is often sought for. The present story involves a cold case but the probable culprit is not far to seek. It's another application of the new data acquired by the Minnesota Spring Inventory (MSI).

On March 4, 2016, I was mapping springs along the eastern side of Fort Snelling State Park, near the town of Mendota. I found abundant natural alcoves along the Minnesota River bluff south of the historic Sibley House. Each alcove was associated with a spring having a discharge of about one gallon per minute. So when I later saw that the fretted bluffs of nearby Crosby Farm Regional Park in the city of St. Paul, on the Mississippi River, had a similar appearance on LIDAR coverage, I expected a like bonanza.

I went to Crosby Park on a pleasant autumn day, October 24, 2018, to map these springs. I found a meandering dirt path that conveniently followed the indentations in the cliff-line, but few springs, apart from the big spring that must have provided water to the former Crosby dairy farm. The Crosby alcoves were unexpectedly dry and this was after a lengthy period of rains. The appearance and geology of the Sibley alcoves was identical except that as noted above springs were associated with nearly every one of them (**Figure 1**).

To confirm that these observations were not merely the result of seasonal fluctuations, both spring-lines were revisited on the same day, August 5, 2019, after a lengthy dry spell. The results were the same as before.

Spring alcoves owe their origin to spring sapping. Groundwater, emerging from the head of the alcove, undermines the cliff face, causing it to collapse, the resulting debris being swept away by the flowing water. The ravine thus eats its way back into the cliff. Alcove spacing may reflect the spacing of vertical joints in the sandstone.

The river gorge was carved by upstream migration of the Glacial River Warren waterfall at the end of the last Ice Age and the sapping process began thereafter. The spring-cut alcoves thus had thousands of years of postglacial time to gnaw their way into the bluffs, more than a hundred feet in some cases.

Some alcoves along the Metro river bluffs are artificial, due to limestone quarrying. But these usually have distinctive quarry faces and squarish morphology. Moreover, the Crosby alcoves are shown on the earliest maps of sufficient scale, most notably the G. M. Hopkins Atlas of 1886. Plate 7 clearly depicts the alcoves among the "Fort Street Outlots" on Stewart Avenue, which at that time was outside St. Paul city limits, and devoid of dwellings.

All these springs emanate from the St. Peter Sandstone, an easily eroded rock that's protected above by the Platteville Limestone, which is exposed at the heads of many of the alcoves. The springs are fed by the water-table in the sandstone and issue at the toe of the slope. But if the water table in the sandstone drops for some reason, the springs would cease to flow, leaving the alcoves as paleo-discharge features. A somber row of Platteville "headstones" in Crosby Park thus remain as mute monuments to where lively springs had once disported themselves (**Figure 2**).

A plausible explanation for the apparent dewatering of the alcoves on the Crosby side of the river is the construction of the Fort Road sewer, which runs under Fort Road, paralleling the bluff line. This sewer was carved in the sandstone, beginning in downtown St. Paul in 1873 and extending to the southwest as the Fort Road neighborhood filled up with houses and industry (Brick 2009). Unlined bedrock sewers like this are well known to act as horizontal wells, lowering the water table in their vicinity as groundwater infiltrates the tunnel. There's nothing similar on the Mendota side.

References

Brick, G. (2009). Subterranean Twin Cities. Minneapolis: University of Minnesota Press.

Figure 1. Juxtaposed LIDAR coverage showing (on the right) the close association between springs (yellow circles) and fretted bluff in Ft. Snelling State Park, versus the comparative absence of springs (on the left) at Crosby Farm Regional Park. Both images are shown at the same scale with about 1.3 miles of bluff line in each case.

Figure 2. Paleo-discharge features? One of the many dry alcoves at Crosby Farm Regional Park with Platteville Limestone outcrop visible at top of slope.

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 Foundation, Board Meeting Minutes, Regular Quarterly Meetings

Meeting Date: Tuesday, March 19, 2019

Location: MDH Freeman Building in St. Paul (room B-212)
Attendance: Scott Alexander, president; Kara Dennis, treasurer; Lanya Ross, director
Others: Jennie Leete, Sean Hunt, Ellen Considine, Katrina Marini (incoming director)

Current Business:

Approve December 14, 2018 meeting minutes: Minutes approved electronically following the meeting.

Review current year finances:

Account Values (3/19/2018)

- MGWAF Endowment: $213,608.19
- HOP Funds: $60,807.93
- Unrestricted Funds: $24,697.43

Credits:

- $490.00 Deposit (1/28/2019)
- $13.03 Amazon Smile (2/15/2019)
- $85.00 Deposit (2/25/2019)
- $7,500.00 Deposit (2/25/2019)
- $100.00 Donation from Mark Richards in honor of Gil Gabanski (2/25/2019)

Debits:

- $439.73 Advisory Fee (1/11/2019)
- $500.00 Check to Freshwater Society (3/6/2019)

Discuss investment results:

The HO Pfannkuch funds were moved over to a separate Wells Fargo account. So far in 2019, the HO Pfannkuch fund interest rate is +1.78%, and the MGWAF Endowment interest rate is +5.62%. Both accounts are up, and the investment portfolio shows a positive return since 2016. Restricted funds are in the Wells Fargo HO Pfannkuch fund and MGWAF Endowment, and the Wells Fargo Business Brokerage Cash and Hiway Account funds are unrestricted.

New grant applications

The MGWA Education Committee in collaboration with the Freshwater Society requested $500 for the 2019 Water Summit. They requested approval by the end of January 2019. Stu made a motion to approve the grant, second from Stephanie. All approved. Motion passed.

Gabanski Scholarships for the coming year

The scholarship subcommittee made recommendations for the 2019 MGWAF Scholarship awardees. There were a total of 4 undergraduate student applicants, and the scholarship subcommittee recommended Alexandra Torrance, a senior at Bemidji State University as the undergraduate winner. She has been on a research team since October 2018 that are working on developing methods to measure the degradation of oil spilled in the subsurface. There were a total of 3 graduate student applicants, and the scholarship subcommittee recommended Elizabeth Flage, a graduate student at the University of Minnesota – Twin Cities campus. Her research focuses on the interaction of groundwater and surface water. She is currently employed by BWSR as a Wetland Mitigation Program Assistant, while also attending classes and working towards her graduate degree. Kara made a motion to approve the scholarship awardees, second from Ellen, All approved. Motion passed.

Vote on committee recommendations

New directors have been approved by the MGWA Association Board. Welcome to new directors: Katrina Marini and James Van Der Waal.

Education Committee re-forming

The Education Committee Board meeting is scheduled for Thursday, March 21st.

Action Items:

- Lanya will take over writing thankyou letters to donors. Jennie will make sure that contact information is included when she forwards donation information to Kara, and Kara will forward this information to Lanya.
- Kara will put together a 2018 MGWAF financial summary for Jennie
- Kara will add a tab to the financial spreadsheet in the MGWAF folder that explains the unrestricted/restricted funds

Electronic action 4/23/2019-4/30/2019:

Scott Alexander recommended two candidates for the field camp award: Sianne Luzzi, a graduate student at the U of M who is originally from Brazil and arrived via Toronto, and Stacy Zeigler, a student at St. Cloud State who has gone back to school after being a mom. Both students plan to attend the U of M Hydrogeology Field Camp this summer and should bring a wealth of life experiences and an ability to share some of their hard earned wisdom with the other camp attendees.
Motion from Eric, Second from Stephanie. All voted yes.

New MGWA Foundation Directors

By MGWA Newsletter Team

Katrina Marini and James Vanderwaal joined the MGWA Foundation as new directors this year. The MGWA Foundation provides scholarships to undergraduate and graduate students and grants for educational events like the Children's Water Festival.

Katrina Marini's interest in geology started through her family's summer vacations, which included camping at National Parks and Monuments throughout the western US and at Minnesota State Parks. She found her passion for groundwater while studying geological engineering at South Dakota School of Mines and Technology.

Katrina was exposed to environmental issues affecting active mines and historic mining districts during two internships at a Nevada copper mine. As a graduate student, she had the opportunity to develop a groundwater model of a glacial aquifer system with the U.S. Geological Survey (Water Science Center in Rapid City). Since 2012, she has worked at Barr Engineering Co. (Duluth office), where she has continued to work on groundwater models, frequently in glacial and fluvial systems. She enjoys assisting clients with a wide variety of questions related to quantity and quality of groundwater – with and without use of groundwater models. She remains interested in mining and mine remediation, particularly in Minnesota.

Katrina hopes to see an increase in groundwater education opportunities in greater Minnesota during her time on the MGWA Foundation Board.

James Vanderwaal, PH PG, holds degrees from the University of Montana, Oregon State University, and Heriot-Watt University (Scotland). Prior to joining the Minnesota Department of Natural Resources in 2012, he worked for the U.S. Geological Survey and consulting firms in Alaska (15 years), and taught engineering students at two colleges in Malaysia (16 years). He has published research work in both Forest Science and the *Journal of the American Water Resources Association*. With the DNR, James started as a monitoring hydrologist, and in 2014 became the SW Minnesota regional groundwater specialist, stationed in Marshall. In his fun time, James gardens with his wife, plays mandolin, and sings with the trio *Red Hat Gypsy*.

Publications & Links from the USGS

Drinking water quality in the glacial aquifer system, northern USA

Groundwater quality in the glacial aquifer system, USA, was evaluated by comparing constituent concentrations to benchmarks; exceedance of a benchmark is considered high. Trace elements are widespread across the study area, with an estimated 5.7 million people relying on groundwater with high concentrations of one or more trace elements; manganese and arsenic are most often at high concentration. Nitrate is found at high concentration in 4.0% of the study area, serving about 740 thousand people. Organic compounds including pesticides and volatile organic compounds are high in 2.0% of the assessed study area, with about 870 thousand people relying on groundwater with high concentrations of an organic compound. High arsenic and manganese concentrations occur primarily in the hydrogeologic terranes composed of thick, stratigraphically complex, fine-grained glacial sediment, coincident with groundwater under reducing conditions (indicated by iron concentrations >100 µg/L); high nitrate is uncommon in those same terranes. When nitrate is high in thick, fine-grained, complex terranes, though, it is much more commonly associated with groundwater under more oxidizing conditions. Common geogenic trace elements occur at high concentration due to characteristic geologic and geochemical conditions. Conversely, anthropogenic nitrate and organic compounds are introduced at or near the land surface. High concentrations of nitrate or organic compounds are generally limited to areas in proximity where people live and use the chemicals.

Erickson, Melinda L, Richard M. Yager, Leon J. Kauffman, and John T. Wilson, 2019. Drinking water quality in the glacial aquifer system, northern USA, *Science of the Total Environment*, (https://doi.org/10.1016/j.scitotenv.2019.133735).

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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 of Directors Regular Meetings

Meeting Date: Tuesday, April 16, 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

Agenda: Approved with changes.

Past Minutes: Approved.

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 April 16, 2019 of $59,222.90; net income for this period of $18,692.51; total assets for this period of $118,555.81.

Newsletter:

- Kroening reported that the Newsletter Team will meet on Thursday to go over materials for the June issue.
- Munsell has the draft layout for the new version of the Newsletter up for review.
- Kroening's brother looked into the website redirect issue for MGWA and couldn't find any big issues besides a syntax error.

WRI Report:

- Hunt reported that the March Newsletter was finalized and distributed.
- Hunt and Leete have been processing incoming conference registrations and membership renewals.
- Hunt did not receive information from Pound to send out an email about the Freshwater Society's Water Summit. Pound purposely delayed as to not interfere with the Spring Conference dealings. Pound will put something together for Hunt to send out to membership.
- Hunt shared the latest membership numbers with the Board—381 Professionals; 43 Retired; 40 Sustaining; 4 Students.

Web Page:

- Hunt updated the Newsletter portion of the website to allow for open access to all of our Newsletter issues.
- Hunt signed up for a free weekly scan service to prevent any further website issues. The redirect issue doesn't currently seem to be a problem anymore.

MGWA Foundation:

- Considine sent out a reminder to MGWAF about Conference Exhibitors. Kara Dennis has been on top of it. Pound asked whether or not we need to explicitly state MGWAF's role in soliciting Exhibitors in the MGWA Operations Manual. The Board agreed. Considine will add this to her revisions.

Social Coordinator:

- de Lambert organized a Social Hour the previous week that was well-attended by MGWA members. Considine mentioned that the Social Hour blurb on the website should be taken down now.
- de Lambert is now in control of the MGWA Facebook page.

White Paper Committee:

- No updates.

Education Committee:

- Steenberg updated the Board on a small subcommittee that has now been organized, known as the Field Trip and Workshop subcommittee. There have only been a couple of meetings so far and the subcommittee is interested in hearing from the membership and getting feedback on what field trips and workshops they would be interested in. Hunt recommended using SurveyMonkey. Steenberg and others from the subcommittee will put together survey materials for Hunt to set-up on SurveyMonkey and send out to membership.

Other Business:

2019 Spring Conference:

- Pound has all of the abstracts together and will update these on Google Drive and let Hunt know.
- There are 10 invited speakers and 14 posters. Steenberg will help gather poster presenters and make sure the room is set-up. Leete suggested putting the large cross-section posters that Barb Lusardi plans to bring on the outer hallway walls instead.
- Pound is in need of drivers for shuttling speakers to and from the airport. Baratta can help.
- Pound will also be reaching out to the Board and others later to have dinner with invited speakers the night before the conference and post-conference at Stout's Pub.
- The Board discussed how they would handle Mentors this time. Steenberg and Considine volunteered to help choose mentors prior to the meeting and use mentor materials previously put together by Pound and Retzler to prep them. Steenberg suggested using the Social Hour table signs in de Lambert's possession for the Mentor tables during lunch. Steenberg will get these from de Lambert. Considine will put Mentor ribbons on attendee badges prior to the conference.
- The Board discussed how they would Scholarship & Award winners this time. Pound would like to make sure the awardees are aware they will need to be on-stage to receive their award, and plans to gather all awardees up on stage for each award at once. Considine will relay this information to Stephanie Souter at MGWAF. Pound will check with Scott Alexander to see if the Field Camp Award is finalized.

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MGWA BOARD MINUTES

MGWA Minutes, cont.

2019 Fall Conference Title:

- Pound shared with the Board a few title suggestions for the 2019 Fall Conference and asked the Board to think about other suggestions. Pound wants to have a topic and clear title finalized prior to the 2019 Spring Conference to help notify membership earlier and possibly bring in speakers sooner than in the past.

Operation Manual:

- Considine has done some major revisions and reorganization of the Operations Manual. She will continue to work on this and gather together materials to share with the Board and hand over to Retzler for final editing after the 2019 Spring Conference.

Outstanding Service Award:

- Mindy Erickson is interested in nominating a member for the MGWA Outstanding Service Award for the 2019 Fall Conference. The Board requested that Erickson fill out a nomination form to be submitted by the June Board meeting for review.

Action Items:

- Pound will put together a notice email for the Freshwater Society's Water Summit and pass along to Hunt to send out to membership.
- Considine will add a statement in the Operations Manual specifying the MGWAF's role in soliciting Exhibitors for the Conference meetings.
- Steenberg will draft a series of survey questions for the Field Trip and Workshop subcommittee and pass along to Hunt to send out to membership through SurveyMonkey.
- Pound will place all of the Spring Conference abstracts on Google Drive and notify Hunt.
- Steenberg will help with the Spring Conference posters.
- Baratta will help shuttle invited speakers to/from the airport.
- Pound will email the Board and interested members about dinner plans the night before the conference and post-conference at Stout's Pub.
- Considine and Steenberg will choose mentors prior to the Spring Conference and let them know they will be receiving mentor materials to help guide their conversations.
- Steenberg will get the Social Hour table signs from de Lambert to use on the Mentor lunch tables.
- Considine will add the Mentor ribbons to the attendee badges.
- Pound will check with Scott Alexander to verify the Field Camp Award has been finalized.
- Pound requested that the Board think about Fall Conference title ideas and submit them to her prior to the Spring Conference.
- Considine will continue her work revising and reorganizing the Operations Manual and will provide an update to the Board after the Spring Conference.
- Pound will let Mindy Erickson know that she will need to fill out a nomination form for the MGWA Outstanding Service Award prior to the June Board meeting.

Meeting Date: Tuesday, May 28, 2019

Attendance: Kate Pound, President; Julia Steenberg, President-Elect; Ellen Considine, Past-President; Andrew Retzler, Secretary; Sean Hunt, WRI; Jeanette Leete, WRI; Sharon Kroening, Newsletter

Agenda: Approved with changes.

Past Minutes: Approved.

Treasury Report:

- Hunt and Leete updated the Board on the Treasury Report. The numbers as reported include a total income for the period of January 1, 2019 to May 28, 2019 of $66,774.66; net income for this period of $9,254.77; total assets for this period of $94,473.48.
- Hunt noted that the conference bill from UMN had an error and was sent back for correction. Leete reported that an updated bill was received and processed.
- Leete finished reporting MGWA taxes for 2018.

Newsletter:

- Kroening reported that the Newsletter Team met last week and that all items for the June issue were formatted and sent over to Leete.
- Currently they are gathering items for the September issue and looking over other organization websites for ideas related to the new digital Newsletter style.
- Pound noted the Newsletter ads income in the Treasury Report and asked Kroening if they have considered how the new digital style may affect this. The Newsletter Team still needs to look into this further. Kroening will set up a meeting with Anneka Munsell and Jim Aiken to discuss future ad ideas.

WRI Report:

- Hunt ran the latest membership numbers, but does not have the specific numbers with him right now. There are about 500 paid members currently. The Board discussed recent membership trends, how to keep membership up, and asking other organizations about their current membership trends. Kroening suggested putting together a blurb in the Newsletter describing why you should join MGWA with comments from current members.
- The Management Team finished all of the pre- and post-conference tasks. Hunt also reported that incoming membership renewal requests have slowed down.

Web Page:

- Hunt published the final Spring Conference page complete with audio recordings, started making an outline for a Fall Conference registration page, and posted some updates on the Education Committee page for Cathy Undem.
- Hunt and Ole Olmanson still need to meet to discuss in detail web page security. Two possible

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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.

Save These Dates

MGWA Conferences

11/12/2019

4/28/2020

11/12/2020

MGWA Minutes, cont.

solutions: move our web page to a new hosting provider for better security or pay for an annual fee to provide a security check. Hunt prefers the latter because he likes the payment portal available with our current web host. The Board agreed that Hunt should go ahead and pursue the $300 annual security check fee with our current provider.

MGWA Foundation:
- No updates

Social Coordinator:
- No updates.

White Paper Committee:
- No updates.

Education Committee:
- Pound missed the last meeting. Steenberg passed around the draft questionnaire that the Field Trip subcommittee plans to send out to membership. The Board reviewed the questionnaire and provided comments. Kara Dennis plans to make the questionnaire on SurveyMonkey. Hunt recommended that Dennis login to SurveyMonkey using the MGWA account. Hunt will set up a temporary paid account and send Dennis the login credentials. The Board also discussed the workshop aspect to the questionnaire. Considine recommends looking into a professor from Hamline who gives a great talk on ethics as one possibility for a future workshop or conference addition.

Other Business:

2019 Spring Conference:
- Hunt processed all of the feedback from the conference. Largely positive responses. Many people enjoyed the speakers and focus on glacial deposits. Some members felt that 40 minute talks were too long. A number of comments were also made regarding the food vendor, however, this is provided by the UMN and largely out of our control.

2019 Fall Conference:
- Pound requested that Board members email her any speaker suggestions for the Fall Conference.
- Hunt asked about a more formal notification for the Fall Conference. Pound will put something together for Hunt to send out to membership.

Operation Manual:
- Considine will finish her revisions and send them to Retzler and Pound. Retzler will make the final revisions and organizational edits and share with the Board when done.

Next Meeting Date:
- The regularly scheduled meeting for June works for everyone but Retzler. Steenberg volunteered to act as interim Secretary and record meeting minutes in his place.

Summer Meeting Break:
- This year the Board will meet in July and not in August.

Action Items:
- Kroening will set up a meeting with Anneka Munsell and Jim Aiken to discuss the future of Newsletter ads with the new web-based format.
- Hunt will purchase the annual security maintenance for our current web page.
- Hunt will purchase a temporary premium-level membership for the MGWA SurveyMonkey account and send the login credentials to Kara Dennis.
- Pound will put together a more formal notification regarding the upcoming Fall Conference for Hunt to send out to membership.
- Considine will finish her revisions on the Operations Manual and send it to Retzler and Pound at that time.
- Retzler will make final revisions on the Operations Manual upon receiving Considine's edits.

Meeting Date: Tuesday, June 18, 2019

Attendance: Kate Pound, President; Julia Steenberg, President-Elect (via phone); Ellen Considine, Past-President; Sean Hunt, WRI; Andrew Streitz, Newsletter

Agenda: Approved.

Past Minutes: Will be approved at the next meeting as hard copies were not available.

Treasury Report:
- Vanessa Baratta was not available.
- Hunt reported that one additional membership was received. No other major changes from last time to report from the mgmt. team.

Newsletter:
- Streitz reported that he and Sharon Kroening met with Anneka Munsell to discuss logistics of advertising in a web-based newsletter. They plan to meet with Jim Aiken (advertising manager) in future to discuss further.
- Streitz reported that the goal of advertising is to keep companies engaged but to make sure that the advertising is not onerous for newsletter readers.
- Streitz asked whether there is a goal for income from advertising. Hunt related that advertising is a very small portion of MGWA's budget (around $600 income per year compared to approximately $21,000 per year for membership dues).
- Streitz and Hunt will look into corporate memberships newsletter advertisements.

WRI Report:
- Hunt reported that the management team has not had much activity during the past month.

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MGWA Minutes, cont.

Web Page:

- Pound briefly described the security concerns with the website.
- Hunt stated that the security issues had returned last week. Therefore he engaged a security software. Hunt contacted Ole Olmanson, who reviewed the website and identified an infected file. Olmanson determined that the infected file was allowing changes to be made to the website and recommended that WordPress be re-installed on the server.
- Olmanson plans to do the re-installation later this summer. Pound queried whether a message could appear while the server is down to let website visitors know that the server is down.
- Hunt will ask Olmanson whether such a message is possible.
- Pound to thank Olmanson for his time.
- Hunt is optimistic that the combination of a server re-installation coupled with security software will solve the website redirection problem. In case it is not adequate, Pound suggested bringing a website security professional to a future meeting to discuss options.

MGWA Foundation:

- MGWAF met last week.
- The Wells Fargo endowment seems to have grown to a point where the annual growth could be used to fund scholarships. Scott Alexander is working on drafting a spending policy.
- Hunt related that MGWAF should put out an annual report and develop an annual budget.
- Considine will pass this reminder along to MGWAF and communicate strong support from the Board for development of a spending plan/budget.

Social Coordinator:

- Jane de Lambert had mentioned to Pound the potential for a social event at the end of the summer.
- Pound will follow up with de Lambert regarding the next social event.

White Paper Committee:

- Streitz and Mindy Erickson are moving off the White Paper Committee near the end of July. Lanya Ross and Jared Trost will move onto the committee.
- Carrie Jennings proposed a 5th white paper topic, revisiting the 1989 Groundwater Protection Act, to the White Paper Committee (WPC). The WPC reviewed this topic alongside all new and previous topic suggestions and chose to pursue Jennings' topic. Jennings identified 3 or 4 people at the Spring Conference who would be willing to work on it. The scoping document isn't finalized yet.
- The 4th white paper is expected to be completed fall 2019.
- Streitz will discuss with the White Paper Committee who should liaise with the Board in future.

Education Committee:

- The Committee has continued to meet.
- Steenberg reported that the field trip sub-committee met and worked on the survey for the membership.
- Steenberg will remind Kara Dennis to send the final survey to Hunt for transmittal to the membership. Hunt reminded that the language for the email should also be included.
- The sub-committee met with Paul Gardner from MPCA to discuss potential field trips.

Other Business:

Nomination for MGWA Outstanding Service Award

- The award was reviewed and the Board voted unanimously to approve the award to REDACTED INDIVIDUAL.
- Pound will notify the nominators.
- Hunt will order the plaque.

2019 Fall Conference:

- Pound shared a draft schedule and asked about budget for bringing in speakers.
- Hunt has set up a website for the conference.
- Pound will get a conference description to Hunt.
- Pound inquired whether we ask permission of speakers to record their presentations. Streitz suggested that we verbally offer speakers an opt-out the day of the conference.

Operation Manual:

- Considine continues updating the Operations Manual.

Action Items:

- Streitz and Hunt will look into corporate membership newsletter advertisements.
- Pound will follow up with de Lambert regarding the next social event.
- Streitz will discuss with the White Paper Committee who should liaise with the Board in future.
- Steenberg will remind Kara Dennis to send the final survey to Hunt for transmittal to the membership. Hunt reminded that the language for the email should also be included.
- Pound will notify the nominators.
- Hunt will order the plaque.
- Hunt will ask Olmanson whether a message stating "server down for maintenance" can be put on the MGWA webpage while it is offline.
- Pound to thank Olmanson for his time, also to ask if he can attend a future Board meeting to discuss website security.
- Pound will check to see if the venue is available for the July 16 Board meeting and cancel August reservation (if needed).
- Pound will get a conference description to Hunt.

MGWA FOUNDATION FUNDRAISER

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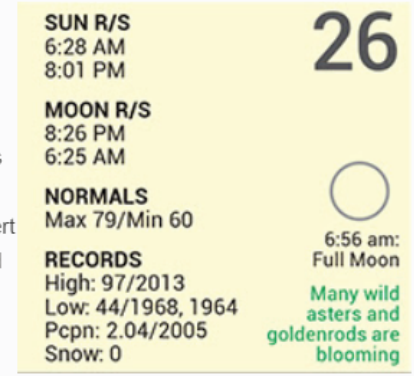

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