

Minnesota Ground Water Association

www.mgwa.org

Newsletter

December 2016
Volume 35, Number 4

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MGWA President Ole Olmanson

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President’s Letter

What a fast year that was. It seems like not that long ago I was preparing to lead my first MGWA board meeting and now I’m handing over the reins to the next president. I do have to say that I have really learned a great deal over this year and have met many wonderful and dedicated people through my presidential duties. I would encourage anyone who might be interested in volunteering with MGWA to contact us to find out more.

I want to thank everyone who helped out with the fall conference; it ran very smoothly and I got some great feedback. We tried to have something of interest for everyone. I thought it was a good mix of technology, policy, current events, and groundwater science. Both of the out of town speakers commented on the large attendance and high level of engagement from our members. Additionally it was great to be able to advertise and promote both the MGWA

Foundation, and the newest white paper.

Speaking of the white paper, it is very possible that by the time this newsletter is released, we will have the final version of the Education Gaps white paper published and available to our members. The board and I have been able to review two drafts and I can say that the information available in the paper will be quite valuable to us and will help frame our approach to education as we move forward. One of the recommendations from the paper was to consider restarting the MGWA education committee. I think that is a good idea and would encourage anyone interested in being a part of it to contact us.

I still have one more year to serve on the board as past president, and I am looking forward to that, but I would like to take a minute to thank the rest of the board, our staff, and volunteers, who all do their part to help MGWA prosper and grow.

Taking the Pulse of the Membership:

Results of the Second MGWA Salary Survey – Part Two

by Kelton Barr

Last spring the MGWA initiated its second salary survey, garnering the salary information from 25 percent of our 507 members. If you

participated in this survey – thank you! You helped give important insight into the compensation picture for our groundwater profession.

This is the second installment of reporting the results of the survey. This article will describe the demographics of our membership by gender and their corresponding levels of compensation as determined from the survey results. As with the previous article,

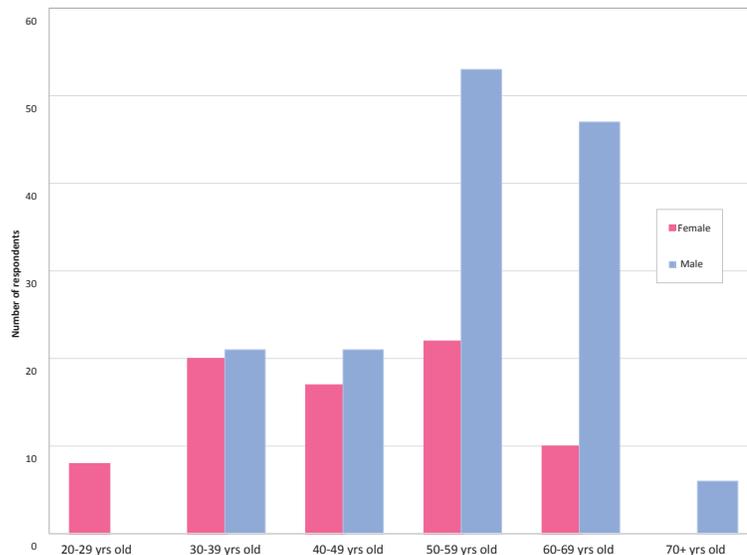
the tables referenced in this article and higher resolution versions of the figures can be found on the MGWA website for members - www.mgwa.org/newsletter_extras.php

Gender Demographics of the Membership

Only 31, or 11.6 percent of the respondents declined to state their

Figure 10. Number of Respondents by Gender and Age

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Newsletter Deadlines

Issue	Due to Editor
March '17	02/03/2017
June '17	05/05/2017
September '17	08/04/2017
December 17	11/04/2017

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Rexford Douglas Singer

1933 - 2016

MGWA member Rex Singer, age 83, of Falcon Heights, born March 30, 1933 in Rapid City, S.D., passed away July 30, 2016. He is survived by his wife of 55 years, Doris; his children, Mary (Jim) Bolles and Mark Singer; his grandchildren, Nicholas and Andrew Bolles, Grace Singer; and his brother, Robert (Audrey) Singer.

Rex graduated from South Dakota State University with a degree in Civil Engineering. He was a US Army veteran and went on to earn a Master's Degree in Public Health Engineering from the U of MN. He taught Sanitary Engineering courses for three years at SDSU and



then returned to the U of MN where he taught various courses in Environmental Health. His primary interest was with providing safe, adequate public and private drinking water supplies both in the US and abroad.

Judges/Volunteers Needed!

The Annual Anoka-Hennepin District Science, Technology, Engineering and Math (STEM) Fair

**Saturday, January 21, 2017,
8 A.M. – Noon**

Blaine High School

On January 21, 2017, the Anoka-Hennepin School District will be holding its Annual STEM Fair at Blaine High School. The Fair consists of students in grades K-12 presenting the findings of their research and experimentation to the public. The Fair is broken down into two divisions; grades 6-12 (8am – noon) and grades K-5 (8am - noon). With well over 1,500 students involved, this Fair is the largest of its kind in the entire State.

In order for this Fair to work, the District needs community members to be volunteers

and/or judges at the Fair. Prospective judges do not need science or math backgrounds. The district provides training for all of the judges. Please consider being a judge/volunteer and feel free to share this opportunity with anyone whom you feel would be interested.

The STEM Fair is a showcase of students doing authentic science at its highest level. There is no other opportunity like it in the District. Students doing STEM Fair projects improve their critical thinking, public speaking and research skills. They learn the nature of science and what it means to be a member of the scientific community.

You can find further information about the Fair (schedule, location map, judge/volunteer registration, Fair Coordinator contact information) at the following web site <http://www.anoka.k12.mn.us/stemfair>

This Year's Fall Conference – Standing Room Only!

There was great interest from the groundwater community in this year's fall conference! It was held November 16, 2016 at its usual venue—the University of Minnesota's Continuing Education and Conference Center in St. Paul, Minnesota. The conference theme of "Modern Advances in Groundwater" seemed to resonate, attracting more than 290 participants and filling all of the seats in the house.

Technical presentations covered the application of machine-to-machine (M2M) data visualization, news on the perfluoroalkyl substances (PFAS) front, Minnesota springs, the fate of secondary contaminants at the Bemidji oil-spill site, the power of satellite imagery, news on the delivery of water from South Dakota to Minnesota communities, and surface

and groundwater exchanges in lakes in the Northeast Twin Cities Metropolitan Area.

Technical Presentations

John Dustman from Summit Envirosolutions opened the conference by introducing the attendees to ways in which the IoT – the Internet of Things – can be harnessed to combine cloud-based data storage with a vast array of transducers, sensors, and other devices deployed in wells and M2M networks to enable real time data visualization. John envisions a future in which the well pumps "talk" to the other wellfield components and use data analytics to better manage the groundwater.

Ginny Yingling from the MDH gave an update on PFAS in Minnesota's groundwater. This class of chemicals is receiving renewed

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MGWA Newsletter December 2016

Ellen Considine – Candidate for President-Elect

Ellen Considine has worked as Groundwater Specialist at the Minnesota DNR for just over a year, where she has focused on issues of groundwater-surface water interaction. She was previously a hydrogeologist at Barr Engineering Company for nine years, where her work focused on groundwater supply and mining hydrology. Prior to working at Barr she was a groundwater modeler for MWH in Bishop, California after completing a Master's degree in Hydrogeology at the University of Nevada, Reno. Her bachelor's degree is in Geological Engineering from UW-Madison. "When I moved to Minnesota 10 years ago I was fortunate to be surrounded by a community of experienced hydrogeologists in my workplace, and when I joined MGWA I was pleased to learn that MGWA fosters a similar sense of community among groundwater



professionals statewide. I came to appreciate MGWA's contribution to inter-generational and inter-disciplinary discussion even more as a member of the Groundwater Education Gaps White Paper Workgroup this past year. Looking forward, I hope MGWA continues to be as relevant and available to new groundwater professionals as it has been to me."

Anneka Munsell – Candidate for Treasurer

Anneka Munsell is a Project Engineer with WSB & Associates, Inc. At WSB, she manages the wellhead protection plan program helping communities to protect their water supply and plan for the future. She also works as a storm-water/surface water modeler and tries to help bring a bit more groundwater knowledge into the surface water world. Anneka initially started her career at CH2M Hill in Redding, California working as an environmental engineer where she helped design remediation programs that resulted from Department of Defense and mining operations. She then moved in December 2012 to Minnesota to work as an Environmental Scientist with the Metropolitan Council Water Supply Group as a groundwater modeler



before moving to WSB. Anneka's lifelong love of water led her to get her Bachelors and Masters in Civil Engineering with an emphasis in Water Resources from South Dakota School of Mines and Technology.



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The primary objectives of the MGWA are:

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

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Abbreviations and Acronyms

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

Fall Conference, cont.

interest in Minnesota because the recently-lowered health advisories for two PFAS compounds have resulted in additional cleanup work in the Southeast Twin Cities Metropolitan area and new work in Bemidji and Duluth. Next, Dr. Greg Brick from the DNR gave an overview of the various springs that occur in Minnesota and showed how color infrared imagery and LiDAR are being used to pinpoint possible springs for field verification.

Dr. Crystal Ng from the University of Minnesota showed how her research is providing a better understanding of the fate of secondary contaminants such as iron and methane at the long-term Bemidji oil-spill site by using a three-dimensional multicomponent transport model. For example, her work has shown that the vast majority of the methane generated at this site is directly outgassed to the atmosphere and most of the generated iron is sorbed to the aquifer sediments.

Dr. John Bolten, the associate program director from NASA's applied science program, turned down an opportunity to tour the White House and instead came to our conference to present information on how NASA is using data collected from 18 satellites dedicated to a variety of water-related purposes, including crop yield forecasts, flood impacts, and landslide hazards. Dr. Bolten mesmerized the audience with satellite data – showing a time-lapse visualization of continent-wide (Australia) flux in precipitation and soil moisture.

Jim Auen, operations manager of the Lewis and Clark Water System, presented an overview of the Lewis and Clark Water System, which in 2015 began providing water from South Dakota to several water-starved communities in Southwestern Minnesota.

Perry Jones from the USGS closed the day's technical program with an update on his research on surface- and groundwater exchanges at White Bear Lake and other north and east metro lakes.

In addition to these presentations, the conference included several poster presentations and exhibitors displaying their products and services.

MGWA Business

Attendees at the Fall Conference also had the opportunity to hear about MGWA activities, including the MGWA Foundation, white papers, and members who have volunteered their service to the association.

Scott Alexander from the University of Minnesota gave an overview of the endowments that the MGWA Foundation has set up for educational efforts and scholarship. **These endowments are supported mainly through donations, and the Foundation is seeking to grow the Olaf Pfannkuch and Calvin Alexander Fund, which was set up to support geology field camp students.** Amanda Strommer, who recently retired from the Foundation, also was thanked for her many years of great service!

Jeff Stoner gave an update on the Groundwater Education Gaps and Agricultural Drainage White Papers. The Groundwater Education Gap paper is nearly completed and is expected to be published in December 2016. Work is continuing on the Agricultural Drainage paper, the most controversial white paper topic to date.

Kelton Barr reminded the audience that **MGWA is looking for a new white paper topic** and urged them to submit any ideas using the nomination form on the MGWA website.

The MGWA president, Ole Olmanson, thanked two outgoing board members for their service to the organization: Emily Berquist (treasurer) and Lanya Ross (past president).

For those who missed the conference talks or want to view them again, links to the presentations are available at:

<http://www.mgwa.org/meetings.php>

The nomination form for new white paper topics is available at:

<http://www.mgwa.org/whitepapers.php>



MGWA White Paper Synopsis—

Minnesota's Groundwater Education Gap: Preparing Students to Effectively Manage Our Groundwater Resources in the Future

Executive Summary

Approximately three million Minnesotans who live in communities rely on groundwater for drinking and the 1.3 million who live elsewhere have wells. Furthermore, groundwater recharges many lakes and streams, supports habitat for many plants and animals, and is a more dependable source of water supply than surface water. Pumping to meet the water supply demands of communities, industry, agriculture, and mining is having an increasing impact on sustaining the amount of groundwater that is available locally. About 83 percent of community public water supplies derived from groundwater require some level of water-quality treatment (Minnesota Department of Health oral communication, November 2016). The natural quality of groundwater often requires community water suppliers and well owners to add treatment to reduce its hardness and to remove iron, manganese, arsenic, radium and other such contaminants. Human-caused contamination such as from fuel, solvents, and nutrients has impaired groundwater quality in some areas to the point that treatment is required to meet state and federal drinking water standards. Yet, with the statewide dependence that Minnesotans have on groundwater, many lack the basic knowledge about it to make informed decisions that will protect its quality and quantity for future generations.

Wise management of Minnesota's groundwater resources relies on a citizenry that is knowledgeable of basic groundwater principles and on groundwater professionals that start their careers with adequate postsecondary training. To this end, the Minnesota Ground Water Association (MGWA) has assessed potential gaps in groundwater education in Minnesota. Specifically, this assessment looked into deficiencies in, 1) the curriculum taught in grades K-12, 2) postsecondary graduation requirements for entry-level groundwater-related jobs, and 3) education goals about groundwater that are contained in water resources management strategies. Overall, improvements made in all three areas would better prepare future generations of Minnesotans to play more active roles in wisely using and managing their groundwater resources.

Currently, Minnesota's academic standards relating to K-12 education about groundwater only require that the hydrologic cycle be taught in the fourth and eighth grades. Schools must focus their curricula on meeting Minnesota academic standards and testing requirements so that in many schools, teaching about groundwater is limited to the hydrologic cycle and nothing more. The limitations of having only this academic requirement is reflected in a MGWA survey of groundwater professionals which indicates that the general public lacks knowledge about groundwater quality and what groundwater resources are available to them locally. Also, adults are uncertain about the roles that local, state, and federal government play in groundwater resource management and protection. Revisions to Minnesota academic standards for science that are scheduled for the 2017-2018 school year could narrow gaps in groundwater knowledge so that today's K-12 students may become tomorrow's groundwater literate adults and better prepared to solve problems relating to groundwater.

A MGWA survey of public sector and private sector employers indicates that no formal mechanism is in place for them to communicate to Minnesota's postsecondary institutions the knowledge, skills, and experience that they require of candidates for entry-level groundwater jobs. Furthermore, the survey indicates that only three of the twelve Minnesota colleges and universities that were selected for review offer coursework relating to groundwater beyond the introductory level. This translates into many postsecondary graduates from Minnesota facing stiff competition from better prepared graduates for entry-level groundwater jobs. MGWA, in consort with other professional organizations, has the opportunity to improve communication between employers and postsecondary institutions to help reduce these hiring problems.

Planning strategies that include education about water resources are documented by several organizations in the public sector and private sector, but either do not provide sufficient detail about groundwater education efforts for all of Minnesota's residents or focus on target groups related to a management objective. Also, there is limited coordination described between these strategies to promote a statewide approach to groundwater education. Furthermore, implementation of strategy goals promoting statewide education about groundwater to all Minnesotans ranges from partially complete to none. MGWA has an opportunity to assist with developing a statewide strategy for improving groundwater education that builds upon previous efforts and the experience gained by attempting to implement them.

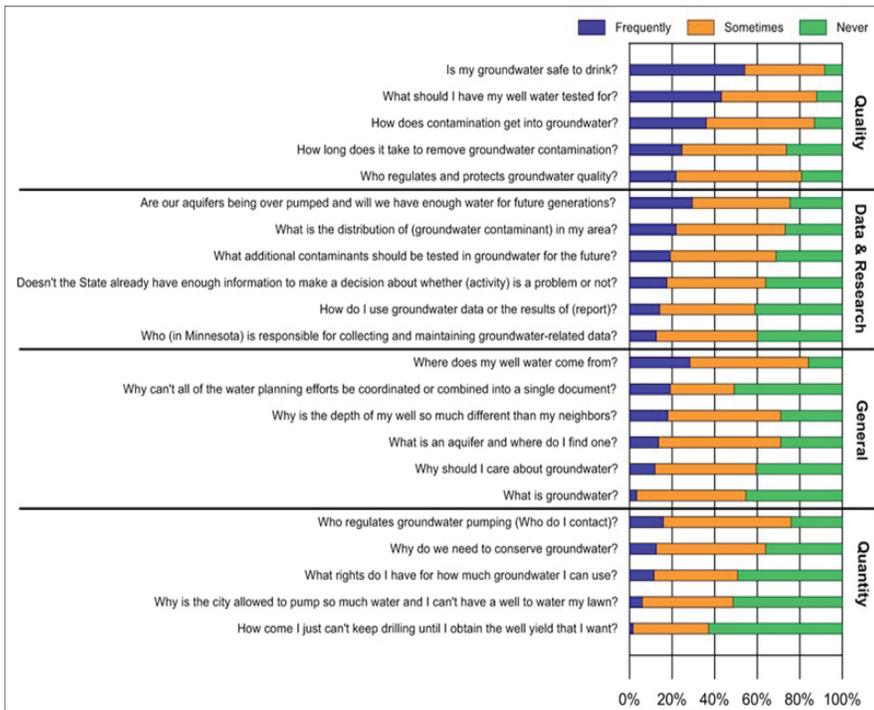
Findings suggest that increasing knowledge about groundwater could be accomplished through several avenues, such as changing Minnesota's academic standards or expanding teacher access to education resources that are approved by school boards and are applicable to cross disciplinary teaching methods. Support for filling the current education gaps appears to be widespread and MGWA could play a significant role by coordinating and engaging technical experts, elected officials, and educators within its membership. Furthermore, MGWA could help improve communication between employers and postsecondary institutions so that undergraduate degree requirements may better reflect employer hiring requirements as much as is practical.

Finally, there are opportunities available to organizations, such as MGWA, that are consistent with their missions relating to groundwater education. In particular, MGWA could participate in revising Minnesota academic standards for science, mathematics, and social studies and demonstrate how groundwater principles or management issues can be incorporated into classroom lessons for meeting these standards and their benchmarks. Also, the experience gained by developing this white paper can be shared with other professional organizations to broaden the discussion about current gaps in groundwater education and to develop approaches for eliminating them.

The following figures summarize some of the basic information that the white-paper workgroup obtained from two surveys of MGWA members and research of documents. Figure 1 shows by four general categories the relative frequency of questions from the public that surveyed members receive. Figure 2 summarizes survey results of employer-hiring requirements for coursework, training, or skills required for entry-level professional-groundwater positions in public and private sectors. Figure 3 summarizes statewide strategies for groundwater education based upon the, 1) criteria defined by the workgroup, 2) range of student types, and 3) approximate population identified.

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White Paper Summary, cont.

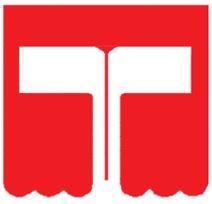


The final paper has been approved by the Board of MGWA. Publication of the full paper on the public MGWA Web site is anticipated in December 2016. The Workgroup wishes to thank the MGWA for the opportunity to represent the members on this issue. The data provided through member surveys were critical to the findings of this paper.

Figure 1. Summary of how often groundwater professionals are asked by the public the listed questions about groundwater

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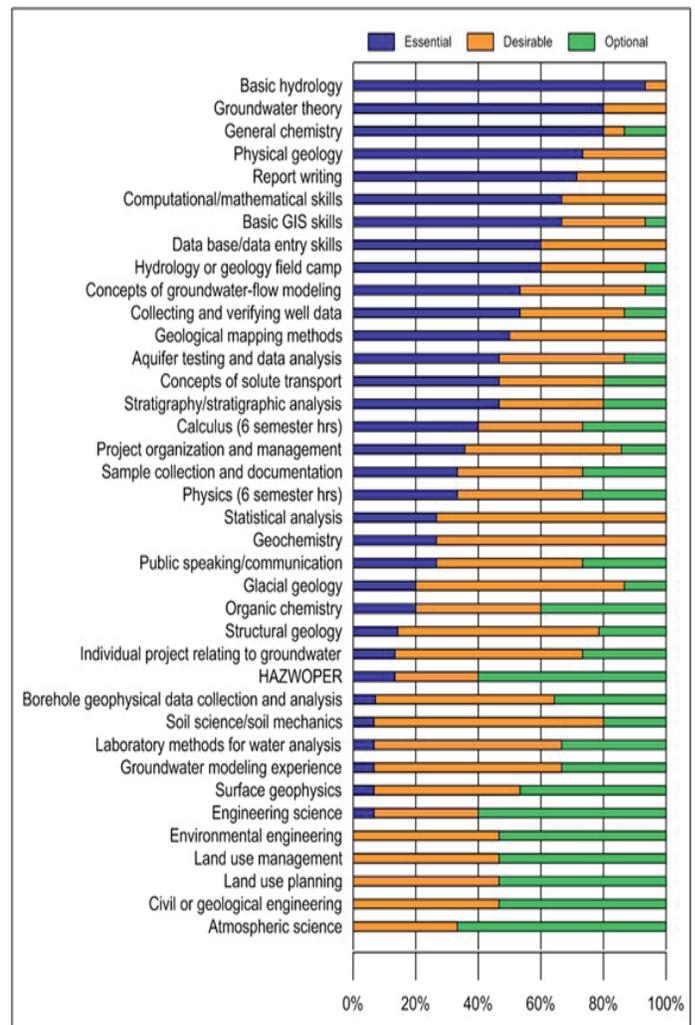


Figure 2. Employer Survey Respondents' Ranking of Skills Required for Entry-Level Professional-Groundwater Jobs

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White Paper Summary, cont.

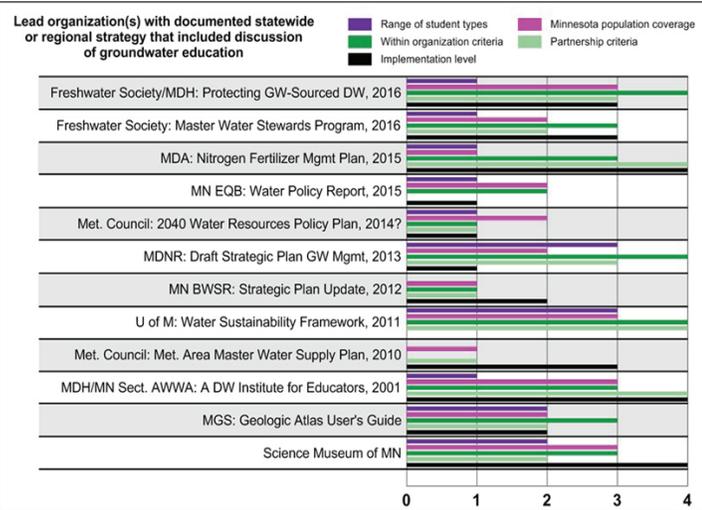


Figure 3--Summary of Documented Statewide Strategies for Groundwater Education A relative score, in which 4 is the highest, is used to indicate the degree to which the review criteria have either been implemented or address all strategic goals. For example, a strategy that targets K-12, teachers, and adults would score 3. A strategy that targets about half of Minnesota population, such as greater Minnesota, would score 2. The number of strategy-attainment criteria for within organization and partnership (4 of each defined in Appendix 4.1) is reflected by the score. A strategy that is fully implemented in function and funding would score a 4.

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Groundwater Education Gaps White Paper Work Group Action Items

November 14, 2016

The Groundwater Education Gaps Work Group offers the following action items to the Minnesota Ground Water Association (MGWA) Board of Directors for their consideration.

1. The MGWA Groundwater Education Committee should be reactivated to provide a mechanism for addressing education gaps and capitalizing on opportunities for promoting groundwater education that are identified by the findings of white papers.
2. The MGWA should participate in the public comment process as the Minnesota Department of Education revises the Minnesota Academic Standards for science in 2017-2018, to determine whether groundwater education gaps can be reduced in grades K-12.
3. The MGWA should establish a work group that would develop example classroom lessons incorporating groundwater principles or management issues to help K-12 students achieve mastery of Minnesota academic standards and benchmarks in science and engineering.
4. The MGWA should ask its membership for volunteers who will work with teacher groups and other professional organizations to identify a mechanism for accessing groundwater-related teaching resources.
5. MGWA should approach other professional geoscience and engineering organizations to determine whether there is interest in developing a better mechanism for employers to communicate their hiring requirements for entry-level groundwater-professional positions to postsecondary institutions.
6. The MGWA should host a forum where the development of a statewide strategy for improving groundwater education for all Minnesotans can be discussed with government agencies, professional organizations, citizen groups, and MGWA members.

If you are interested in volunteering for or providing input to any of these proposed actions, feel free to contact anyone of the white paper follow-up people:

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Salary Survey, cont.

gender. The remaining respondents were separated by gender and were further subdivided by their decadal age group – i.e. whether they were in their 20s, their 30, etc. Age was used as the most precise indicator of general experience; while experience was queried in the survey, it was more descriptive with the amount of experience at different types of employers reported by groups of years (e.g. 1-5 years, 6-10 years, etc.). The resulting distribution of member respondents by age and gender is shown in Figure 10 (continuing the Figure numbering from the first article). Please keep in mind this is a description of our respondents.

Much has changed since the 2011 survey! The oldest cohort with salary information – those in the 60-69 year-old cohort, has grown from one of the smallest cohorts to one of the largest, reflecting the aging of our membership as well as the limited employment in the groundwater field that existed in the 1970s. This cohort has 57 members or 25.3% of the respondents, comprised of 17.5 percent females and 82.5 percent males. With the passage of CERCLA and other landmark legislation, employment in the groundwater field rapidly expanded; correspondingly, this cohort and the cohort of those respondents in their 50s are the largest cohorts. The 50-59 year-old cohort, with 75 members or 33.3 percent of the respondents, also was predominantly male with 29.3 percent females and 70.7 percent males.

As the groundwater field matured, new employment opportunities apparently decreased with time,

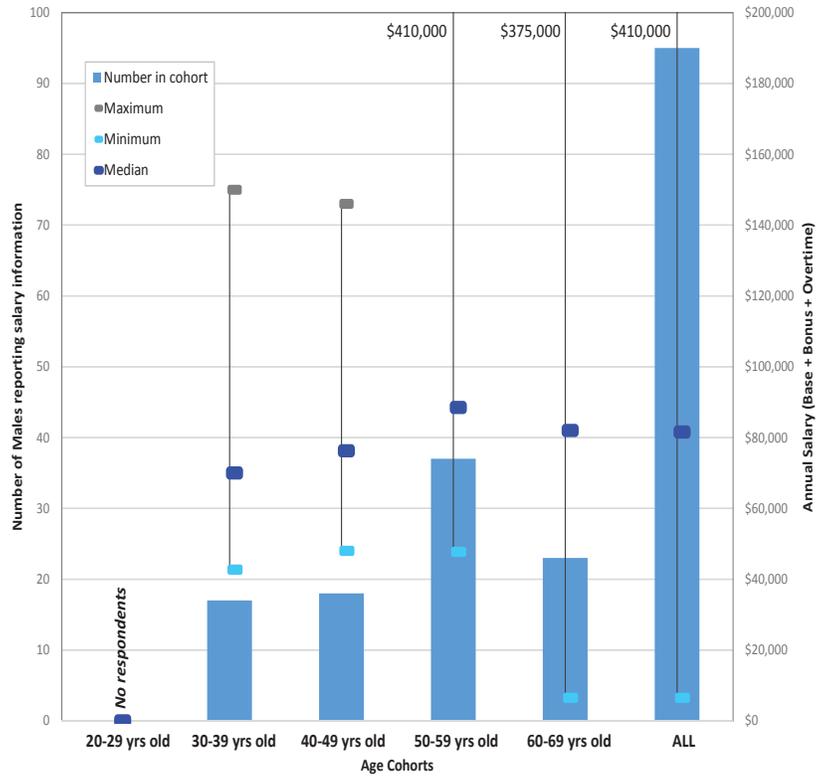


Figure 12. Salary (base + bonus + overtime) for male salary respondents

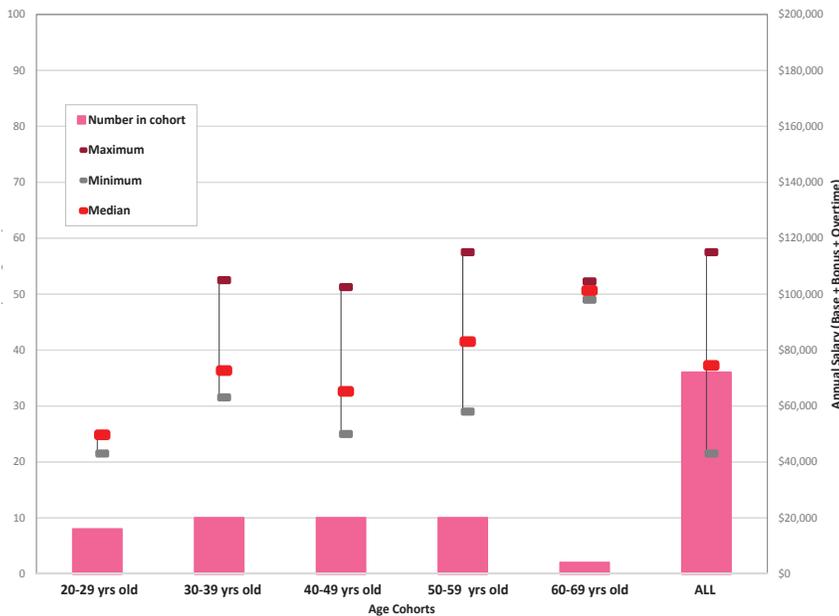


Figure 11*. Salary (base + Bonus + overtime) for female respondents
*The numbering of figures is continued from the article in the September 2016 newsletter

with relatively fewer numbers of members in the younger cohorts. The cohort of respondents in their 40s has 38 members or 16.9 percent of the respondents, with nearly equal gender representation, 44.7 percent females and 55.3 percent males. The cohort of respondents in their 30s has 41 members or 18.2 percent of the respondents, with another nearly equal gender representation of 48.8 percent females and 51.2 percent males. Finally, the cohort of respondents in their 20s has 8 members or 3.6 percent of the respondents, all female. Because of its small sample size and lack of male respondents, the remainder of the article generally excludes this age cohort from further discussion. The numerical results are compiled on the member website.

Compensation by Gender and Age

The annual salary information surveyed included base salary, bonuses, and overtime. Because some of the respondents did not give their salary information, the number of respondents in this summary of results is 131, almost one-half of the respondents in our first survey, and consisted of 36 females and 95 males. This salary information is also shown in Figures 11 and 12 for female and male respondents, respectively. Annual benefits (employer contributions for insurance, retirement, and other perks) are similarly shown on Figures 13 and 14 for female and male respondents, respectively.

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Salary Survey, cont.

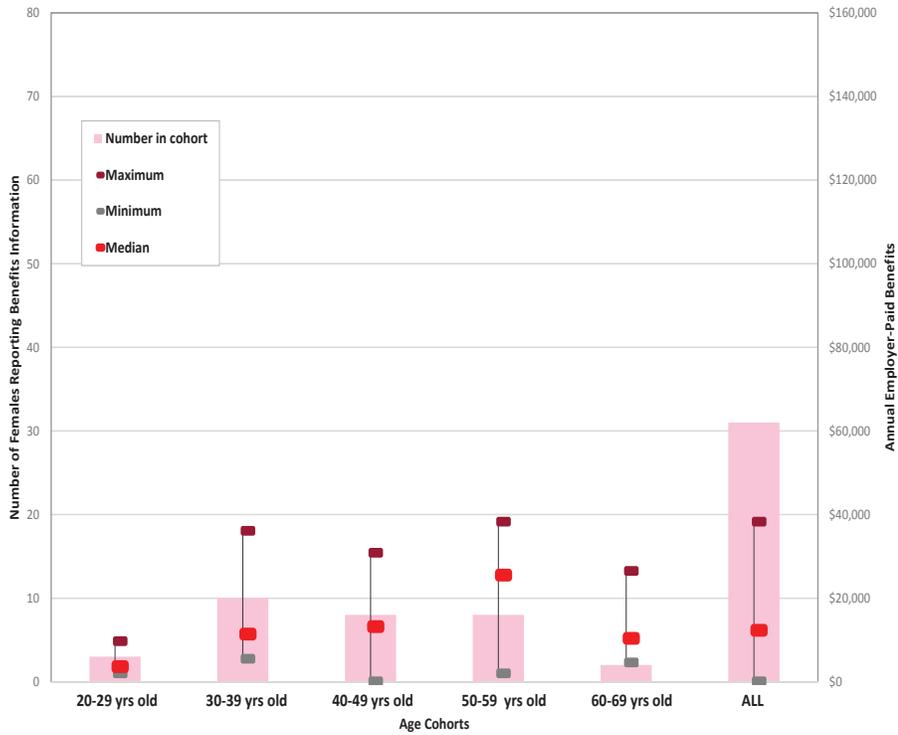


Figure 13. Employer-provided benefits for female respondents

The median salaries for the successive female age cohorts show a generally increasing trend. Rounding to the nearest thousand, the median salary for female respondents in their 20s is \$50,000, increasing to \$101,000 for female respondents in their 60s.

The median salaries for the successive male age cohorts show a general increase through the 50s cohort, then a slight decrease. The median salary for male respondents in their 30s is \$70,000, increasing to \$89,000 for male respondents in their 50s, and then decreasing to a median salary of \$82,000 for male respondents in their 60s.

Median benefits for the successive female and male age cohorts show variable trends. Again rounding to the nearest thousand, the median benefits for female respondents range from \$4,000 for the 20s cohort to \$25,000 for the 50s cohort. The median benefits for male respondents range from \$10,000 for the 30s cohort to \$25,000 for the 60s cohort.

Similarly, median PTO for the successive female and male age cohorts also show a generally increasing trend. The median PTO for female respondents in their 20s is 21 days, increasing to 32.5 days for female respondents in their 60s. The median PTO for male respondents in their 30s is 22.5 days, increasing to 36 days for male respondents in their 60s.

Public Sector vs Private Sector Compensation, by Gender and Age

The survey results were broken down further to also examine effects of the type of employer. As in the first article, current employment in an educational, research, or non-profit institution; a city, county, regional, state, or federal agency; or other public entity was collectively termed to be in the public sector. Current employment in a consulting, testing, construction, mining, or drilling firm or other private entity was collectively termed to be in the private sector. Some respondents did not report in all four areas of gender, age, employment, and compensation information and were omitted from this analysis. This reduced the number of respondents to 228. The results for salaries are summarized in Figures 15 and 16 and in the tables on the website.

The median salaries for the successive female and male age cohorts in the public sector are summarized in Figure 15. Results for both female and male respondents show a generally increasing trend. The median salary for female respondents in their 30s is \$46,000, increasing to \$98,000 for female respondents in their 60s. The median salary for male respondents in their 30s is \$46,000, increasing to \$81,000 for male respondents in their 60s.

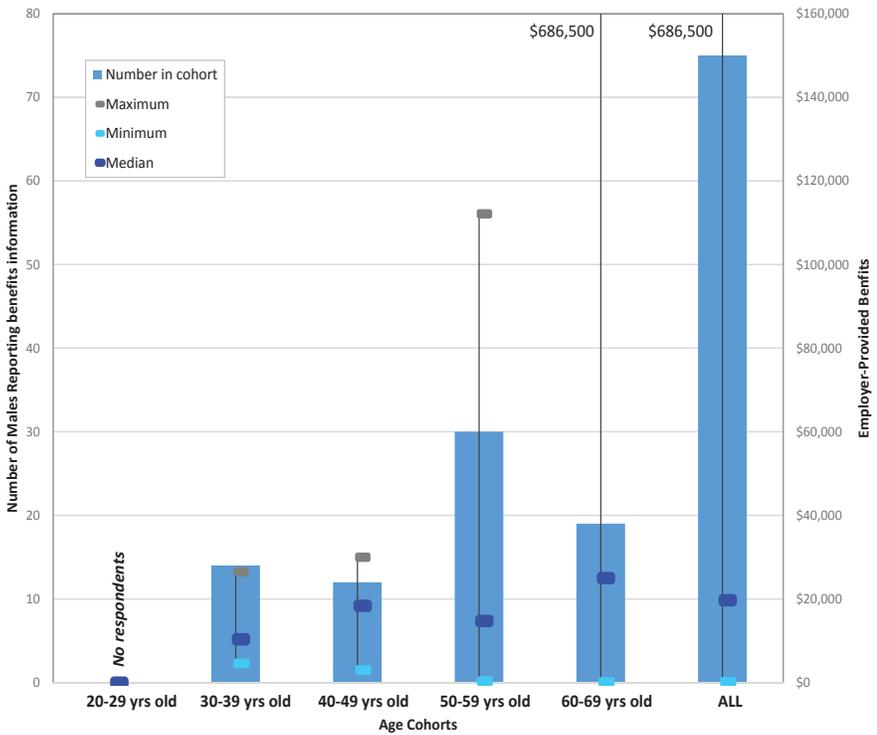


Figure 14. Employer-provided benefits for male respondents

— continued on page 10

Salary Survey, cont.



Figure 15. Annual salary by gender and age — Public Sector — continued on page 10

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Salary Survey, cont.

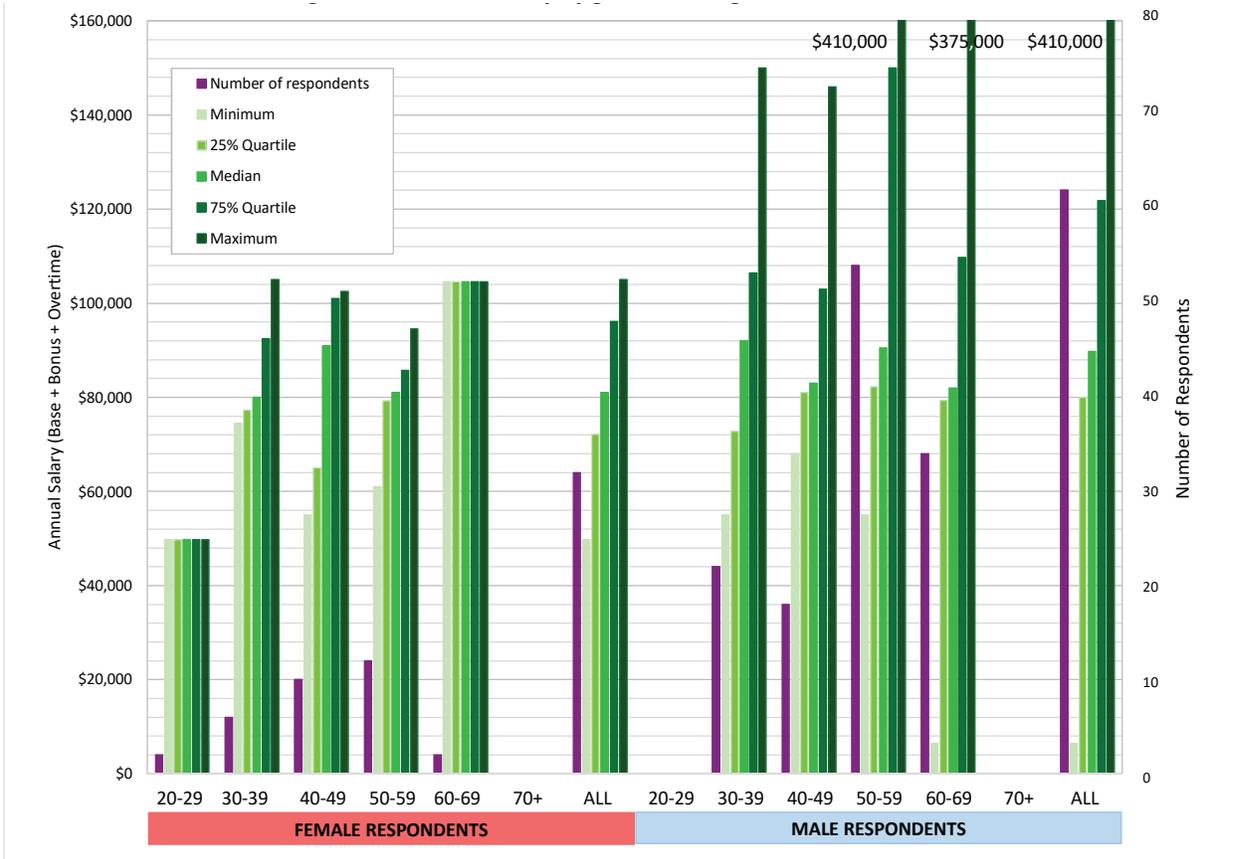


Figure 16. Annual salary by gender and age — Private Sector

Similarly, the median salaries for the successive female and male age cohorts in the private sector summarized in Figure 16 also show a generally increasing trend. The median salary for female respondents in their 20s is \$50,000, increasing to \$105,000 for female respondents in their 60s. The median salary for male respondents in their 30s is \$92,000, decreasing to \$82,000 for male respondents in their 60s.

Figures 15 and 16 also show that females make up 47 percent of the public employment of respondents and 27 percent of the private employment of respondents, indicating that private employment is more male-dominated than public employment. The figures also show that there can be a greater range for salaries in the private sector’s age cohorts, on both ends of the ranges.

Female vs Male Compensation, by Age and Type of Employment

In many fields of employment, there has been a gap between the compensation of males and females. To assess whether such a gap exists in the Minnesota groundwater community, the survey results were compared by age cohorts and by type of employment. Figure 17 shows the female:male ratio by age cohort for median salary, benefits, and PTO as well as the female: male ratios for the public and private sector salaries.

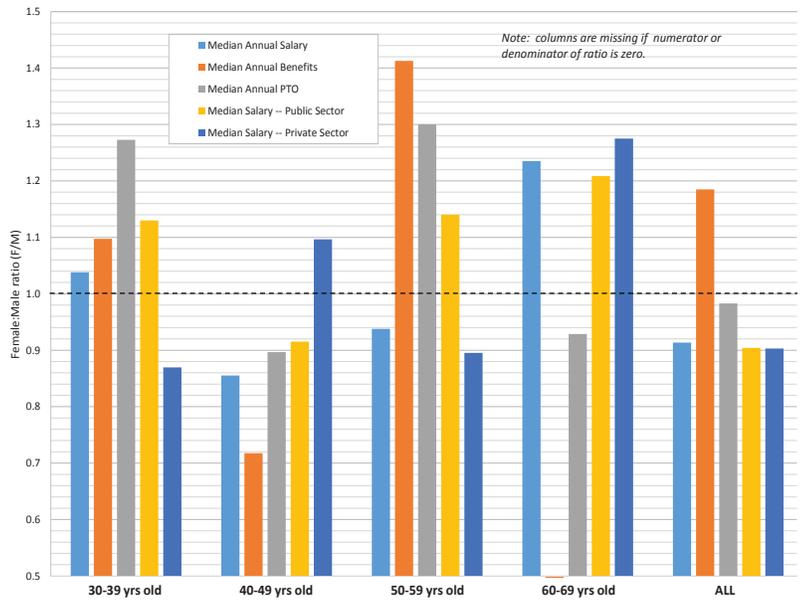


Figure 17. Female:Male Ratio for Compensation

— continued on page 14

An Update on the County Geologic Atlas Program at MGS

By Dale Setterholm, MGS

The County Geologic Atlas Program is about 35 years old now, and an acceleration of this work over the last decade has had an amazing impact on our progress. At this time 48 of Minnesota's 87 counties have a completed atlas Part A, or an atlas underway. Part A of each atlas, produced at MGS, focuses on the geology of the county. The DNR Division of Ecological and Water Resources follows and produces Part B of each atlas, focused on groundwater.

Through the first 25 years MGS completed 21 counties, a pace that would not have completed statewide coverage until about 2061. Having recognized this work as an essential component of sustainable management of Minnesota water resources, the Legislative-Citizen Commission on Minnesota Resources (LCCMR) initiated an acceleration of the program in 2007 with funds from the Environment and Natural Resource Trust Fund. Their support was later augmented by funding from the Clean Water Fund of the Legacy Amendment. MGS garners federal cost-sharing through the Great Lakes Geologic Mapping Coalition and the STATEMAP Program of USGS to leverage these funds, and we also benefit from a contract with DNR for atlas work.

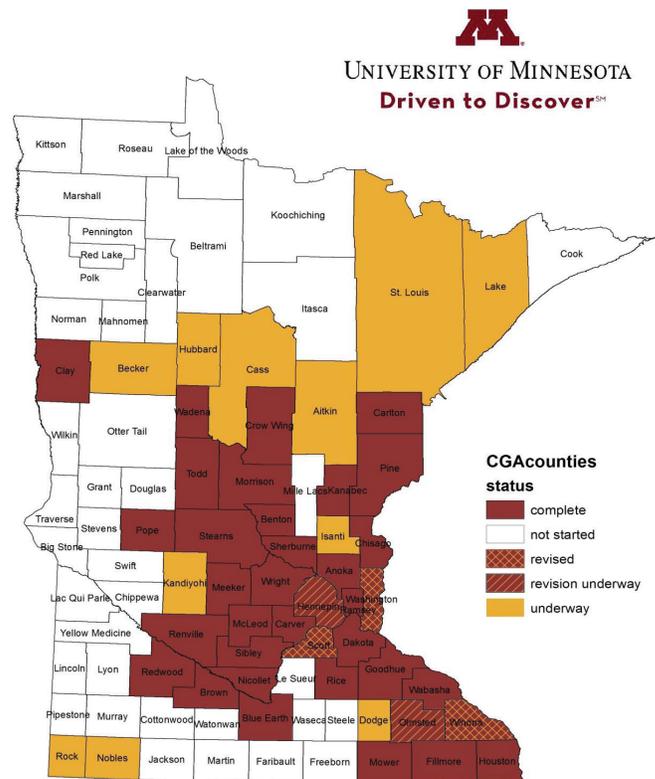
The acceleration funding has enabled us to complete 19 more Part A studies and make progress on an additional 13 in just 9 years. This includes revising 3 of the earliest atlases and starting revision on 2 more. With continued support we anticipate starting about 5 new projects each year, so in 8 years every county in the state will have a completed project or a project underway. This would provide completed statewide coverage of Part A products in about 12 years. The map in Figure 1 shows the status of each county. We also anticipate completing more atlas revisions in counties where GIS products are lacking, and where additional data will significantly improve map accuracy.

The geographic distribution of atlas progress reflects our attention to population centers and transportation corridors, to growth areas, to areas of groundwater vulnerability, and especially to those counties who showed interest in supporting and using geologic atlases to protect and make wise use of their resources. Early in the program counties were required to pay a substantial portion of the atlas costs. Currently, counties are only asked to provide some in-kind services, typically establishing accurate locations for wells with construction records. Those records are an essential data element in our work.

The acceleration of the Atlas Program has affected staffing at MGS at a critical time. The MGS staff includes 8 geologists (27%) with more than 35 years on the job. Another 6 geologists (20%) have more than 25 years' experience. In contrast, 13 of our geologists (43%) have less than 5 years' experience. The interaction of those two groups is critical to transferring institutional knowledge to a new generation of mappers. LCCMR support of atlases has made this possible.

Atlas products have also undergone a transformation. The original atlases consisted of maps printed on paper of the surficial geology, bedrock geology, data distribution, bedrock topography, depth-to-bedrock, and some interpretive maps to address particular issues such as well construction or mineral resources. There were also maps of the hydrogeology of bedrock and Quaternary aquifers. Hydrogeologic maps were produced by MGS until the

Status of Part A Geologic Atlases November 2016



mid-nineties, and by DNR since. Recent atlases include all those elements, additional maps, databases, and numerous delivery formats. A modern atlas includes a complete depiction of the Quaternary stratigraphy as digital surfaces (rasters). These rasters, in turn, are used to produce maps of the location, depth, and thickness of aquifers within the glacial sediment. Rasters are also used to depict bedrock stratigraphy. Combined with Quaternary stratigraphy products, these rasters provide a three-dimensional representation of the subsurface. All data that supports the maps are provided in digital form. The atlas GIS format enables users to create customized maps, and to compare and contrast geologic or hydrologic maps with other GIS data as diverse as parcel data or public health. Free GIS software is available to bring limited GIS functionality to those users without expensive software, and pdf files ensure the atlas products will never be out of print.

In the course of creating atlases we often recognize key features of the bedrock or glacial materials that affect how water moves through them. The atlases provide ample data to evaluate those features in companion studies, and the results enhance water management activities.

All the MGS atlas products are available at <http://conservancy.umn.edu/handle/11299/708>. We have also created a User's Guide to Geologic Atlases <http://hdl.handle.net/11299/166713> to make them more usable by non-geologist decision makers at all levels of government.

DNR Designates Bonanza Valley Groundwater Management Area

The Department of Natural Resources this week designated the state's second groundwater management area. Designation of the central Minnesota Bonanza Valley Groundwater Management Area allows a more comprehensive and focused approach to ensuring that groundwater supplies will be adequate to meet human needs while protecting lakes, streams and wetlands.

The DNR also approved a management plan for the area, designed to ensure adequate supplies of groundwater. The designated area includes parts of Stearns, Pope, and Kandiyohi counties along with smaller parts of Douglas, Meeker, Swift and Todd counties.

The Bonanza Valley Groundwater Management Area Plan lays out five broad objectives and describes specific actions the DNR will take. The plan was developed over two years by DNR staff and an advisory team of nearly two dozen representatives of local government, industry, and other agencies.

"Here in the land of 10,000 lakes and hundreds of streams and rivers, it's easy to take water for granted," said Commissioner Tom Landwehr. "But in some parts of Minnesota, such as the Bonanza Valley, growing demands on groundwater could place

our aquifers and other resources at risk if we're not careful. This plan explains how the DNR will work to make sure our use of groundwater remains sustainable."

The plan provides a framework within which the DNR will work with major water users, including municipalities and farmers. This cooperative effort will promote conservation, protect surface waters and water quality, improve the groundwater appropriations permitting process, and resolve any conflicts that might arise among users.

The Bonanza Valley Groundwater Management Area is one of three groundwater management areas under development around Minnesota. The North and East Twin Cities Metropolitan Area was designated in November 2015 and the Straight River near Park Rapids in north-central Minnesota is yet to be designated.

More information, including plans and maps for the Bonanza Valley Groundwater Management Area, can be found on the project webpage www.dnr.state.mn.us/gwmp/area-bv.html.



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STUDENT SECTION

Development Strains on Water Resources in Dane County, Wisconsin

Josh Olson; University of Wisconsin, Madison

As a graduate student in the hydrogeology and water resources management programs at UW-Madison, my work has primarily focused on two projects that deal with local surface and groundwater issues. For the groundwater topic, I have been examining the long-term effects of municipal pumping in Dane County, Wisconsin, where Madison is located. More specifically, I have been investigating regional flow changes induced by pumping and the impacts on municipal water quality of multi-aquifer wells, which were drilled through the regional Eau Claire aquitard, connecting the shallow and confined groundwater systems. Efforts have included both physical and geochemical modeling of the situation. Using the 2016 Groundwater Flow Model for Dane County recently developed by the Wisconsin Geological and Natural History Survey and USGS, I ran particle tracking simulations under pre-development and current conditions, focusing on the impact of pumping along the Madison Isthmus (Fig. 1). These simulations revealed that pumping has accelerated and shifted flow in the deep aquifer toward the isthmus and significantly increased downward flow across the aquitard. Using these results as evidence for the interaction between the shallow and confined aquifers, the scenario was modeled using PHREEQC to assess the impact of mixing shallow, oxygen-rich groundwater into the anoxic, confined system. Though this model is still under development, initial results seem to indicate a potential for mobilization of chromium from the confined aquifer matrix.

My second project involves a stormwater retention pond, Stricker's Pond, in Middleton, Wisconsin, a suburb of Madison. Though there is evidence that Stricker's Pond was historically ephemeral, that is no longer the case under current levels of development. Flooding issues led to the implementation of

a discharge system that drains Stricker's Pond into neighboring Tiedeman Pond, which is pumped into Lake Mendota. Concerns of the potential for future flooding, as well as ecological issues, led to a request for the water resources management group from the Nelson Institute at UW-Madison to conduct a pond assessment. As part of these efforts, I installed pressure transducers onsite (Fig. 2) and maintained a pond stage database. Combining stage values with local precipitation data provided valuable information about the stormwater storage demand on the pond. One particularly significant storm this summer dropped 4.2 inches of precipitation over a 72-hour period and caused a 3 foot increase in pond stage. Ultimately, I used this information to generate a water budget for the pond that examined increases in pond storage volume and surficial runoff rates associated with precipitation events.

As I plan to graduate in May, both of these projects are scheduled for completion next semester. I would like to sincerely thank the MGWA for supporting me in my efforts, which benefitted substantially from your financial support.



Figure 2. Transducers were installed within PVC casings and located near the pond's outlet structure..

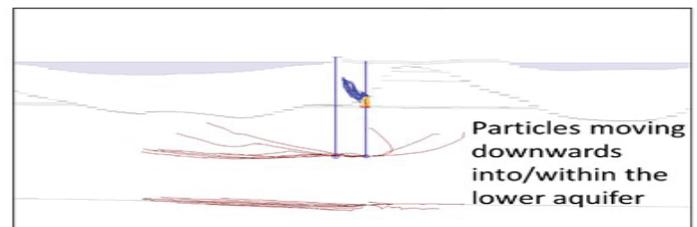
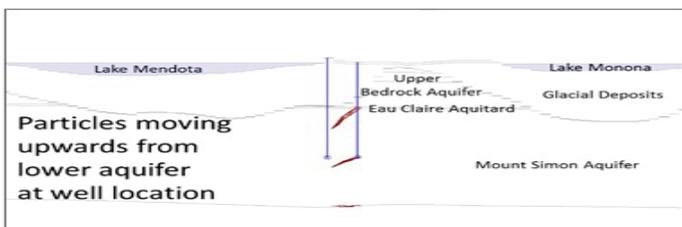


Figure 1. Backward-traced, 100-year simulations (cross-sections) at a municipal well on the Madison Isthmus under pre-development (left) and current conditions (right). Particles were released from the Mount Simon aquifer, Eau Claire aquitard, and Wonewoc aquifer (bottom of upper aquifer). Path colors are depth-coded using a cool (blue-glacial deposits) to warm (red-Mount Simon) color scale.

Salary Survey, cont.

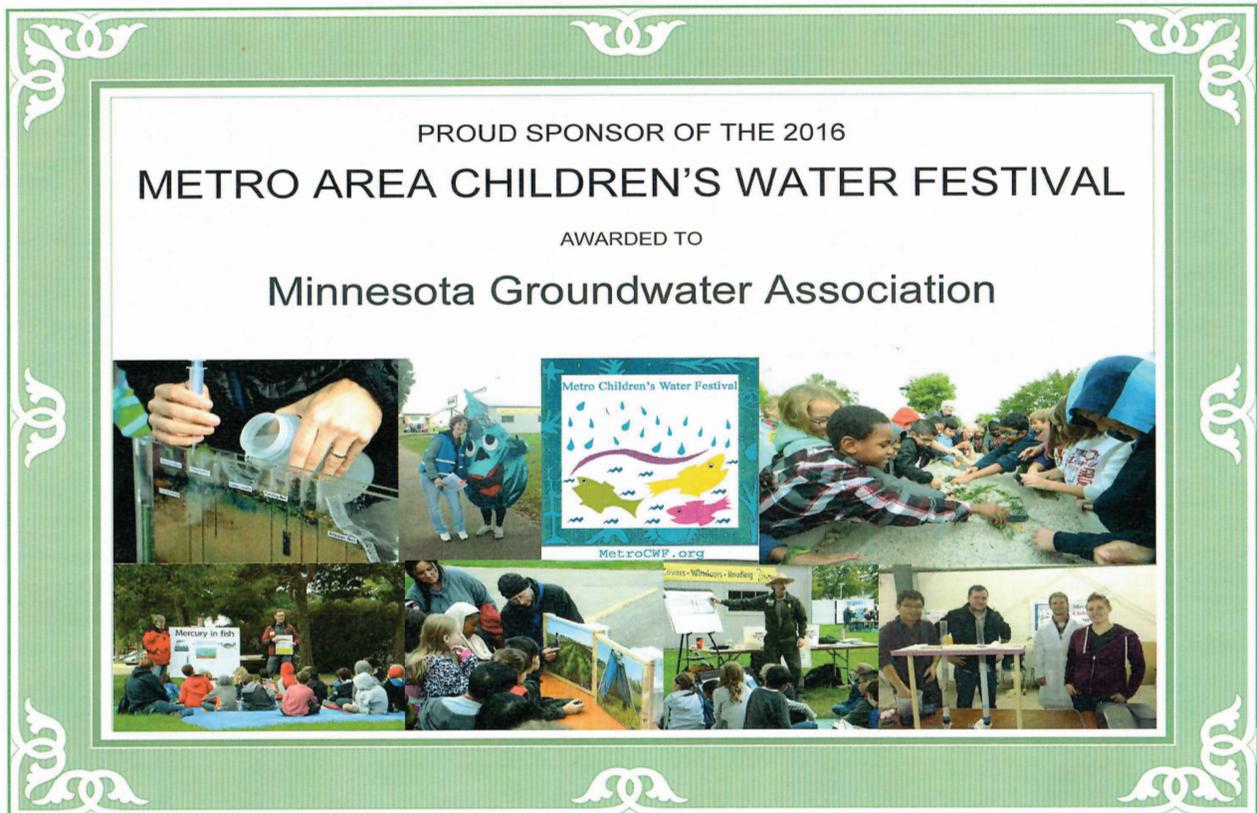
This figure indicates that median salaries are fairly comparable, ranging from 0.86 for the 40s cohort to 1.24 for the 60s cohort and having an overall ratio of 0.91. Likewise, the median benefits also are fairly comparable, ranging from 0.72 for the 40s cohort to 1.41 for the 50s cohort, and an overall ratio of 1.18. The ratios for PTO were also generally very close to parity, ranging from 0.90 for the 40s cohort to 1.30 for the 50s cohort and an overall ratio of 0.98.

Figure 17 also shows the female:male ratios for median salaries by public and private sector employment. The public sector shows ratios ranging from 0.92 for the 40s cohort to 1.21 for the

60s cohort with an overall ratio of 0.90. The private sector shows ratios ranging from 0.87 for the 30s cohort to 1.28 for the 60s cohort with an overall ratio of 0.90.

These results are meant to provide a context for the types of compensation for individual professionals and for groups of professionals. We hope that this information can be useful for overcoming anecdotal comparisons of the compensations of the different types of educational levels, lengths of experience, and places of employment.

Donations to the MGWA Foundation sponsored the Metro Children's Water Festival



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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 Foundation Minutes

Meeting Date: September 8, 2016

Directors Present: Members Present: Scott Alexander, Cathy von Euw, Eric Mohring, Stu Grubb, Stephanie Souter, and Amanda Strommer (via conference call)
Others Present: Jennie Leete and Sean Hunt, MGWA Management

Current Business: June 16, 2016 Meeting Minutes.

Stu made a motion to approve and Eric seconded. All in favor; motion carries. Minutes sent to newsletter.

Current financials and update of transition to financial advisor and close out of CDs. Total for the MGWAF fund is \$147,058.31 as of 9/6/16. Total for the HO Pfannkuch (HOP) fund is \$30,398.33. No credits/debits to MGWAF. Closed Out the I16 Step Up CD account on 8/11/2016. Mailed check for \$108,067.25 to Wells Fargo Advisors. HOP received credits from donations. MGWA giving MGWAF \$80,000 but transfer needs to be worked out. The board discussed the various accounts.

Discussed idea to separate endowment and non-endowment funds and talk to financial advisor on options. Cathy recommended that for the existing funds we will talk with Kent at Wells Fargo and consolidate funds within the account. Stu made a motion to allocate the \$80,000 from MGWA into the general endowment fund and develop an offer to match future donations to HOP fund with money from general endowment, Eric seconded. All in favor; motion carries.

No new grant applications.

Update of Scholarship Policy.

Amanda provided a summary of the proposed changes to the scholarship policy and the process that the committee has been taking over the past few years. Changes have been made to the application and scoring criteria. Stephanie discussed the categories in the scoring tool and application and whether an application is complete. Stu mentioned having a conversation about potentially increasing the scholarship (either increase number or amount). Stu made a motion to approve the revisions to the scholarship policy, Stephanie second. All in favor; motion carries.

Other Business-

Update on Heinle-UW Madison Grant. Heinle grant application was approved via email, check was sent to UW Madison, who then wanted to take almost 50% overhead. Board will need to be aware of that type of situation with future awards.

Pfannkuch Fund: increasing balance and offering a field camp scholarship.

Camp will be handicap accessible and is 3 weeks up north. Will be accepting applications in January. There is potential for two \$1000 scholarships, four \$500 scholarships, or even more. Scott will discuss with other folks organizing the camp and convene a camp scholarship committee. Eric suggested using the same timeline and similar format to the regular MGWAF scholarships. Jennie expressed the need for setting up a formal budget to manage the number of scholarships to give out (camp or regular) as well as other grant requests. Should be discussed at December meeting.

Internal Accounting: Stu suggested that we maintain an internal accounting for MGWAF funds. The accounts should at least include:

- ◆ Endowment – HOP Fund, restricted
- ◆ Endowment – HOP Fund, unrestricted
- ◆ Endowment – Everything else, restricted
- ◆ Endowment – Everything else, unrestricted (Current balance = \$0)
- ◆ General Fund (includes Unrestricted funds previously generated by the Endowment along with funds donated as unrestricted)

Fundraising. Three main opportunities coming up:

- 1) Freshwater Society Weather Guide calendars - MGWAF has a code to enter and can get \$5 for every purchase if someone enters our code. MGWA will promote
- 2) Give to the MAX day is November 17th – This is the day after the fall conference so it may be good timing to promote at the conference.
- 3) New member information - encourage donations.

MGWA Liaison Report. Fall conference is November 16th. Cathy needs details so she can email potential vendors. The next meeting will be day, December 8th, 2016 at 11:30 AM. After the meeting a grant request was received from Brown-Nicollet Community Health Board for the Brown-Nicollet-Cottonwood Children's Water Festival. Motion via email to approve \$1,000 by Stephanie, seconded by Amanda. All in favor; motion carries. Also after the meeting Eric made a motion to approve the following resolution: "The MGWA Foundation Board of Directors approves the 2015 990 information return to be filed with the Office of the Attorney General of Minnesota and certifies that the MGWA Foundation Board of Directors has assumed, and will continue to assume, responsibility for determining matters of policy, and have supervised, and will continue to supervise, the operations and finances of the organization." He also moved to authorize Cathy von Euw and Jeanette Leete to execute and submit the 2015 990 document on behalf of the MGWA Foundation. Second by Amanda. All in favor; motion carries.

MGWA BOARD MINUTES

Minnesota Ground Water Association Board Meeting Minutes

Meeting Date: Tuesday, September 13, 2016

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

Attendance: Ole Olmanson, President; Lanya Ross, Past President; Evan Christianson, President-Elect; Andrew Retzler, Secretary; Jeanette Leete, WRI; Sean Hunt, WRI; Kelton Barr, MGWA White Paper

Past Minutes: Approved with changes.

Newsletter: September newsletter files are in and being reviewed, including results from the latest salary survey sent out to membership. Leete suggested placing the survey results on the website as a standalone PDF document. Christianson raised the question about comparing our survey results to similar organizations nationwide, and the Board discussed possibilities. The Board discussed options for future MGWA surveys. Olmanson will provide a newsletter Fall Conference update in the coming week.

Treasury: Leete discussed the Treasury Report with the Board. The total income for the period of January 1, 2016 – September 13, 2016 is \$64,971.62; total assets for this period are \$125,750.26. Net income from January 1, 2016 – September 13, 2016 is \$6,884.49. The \$80,000 approved at the last Board meeting to be moved to the MGWA Foundation has not been transferred as of yet. Leete is awaiting further account information.

Web Page: Hunt has no updates. Olmanson does not expect to have the website update ready prior to upcoming conference registration, and Hunt has a workaround to use the current website for conference matters.

WRI Report: Leete reported that taxes have been finished and turned in. Hunt and Leete described expected future tasks—billing of membership dues, conference details, and newsletter matters.

MGWAF Report: The Board discussed proceedings from MGWAF's last meeting, including:

- Latest updates on MGWAF's investment strategy (Leete and Hunt)
- Scholarship committee details and discussing the policy wording (Ross)
- Brown-Nicollet-Cottonwood (BNC) Water Quality Board seeking \$1,000 from the MGWA Foundation for their annual Children's Water Festival (Ross)

White Paper: Barr described the latest White Paper updates to the Board. Regarding the Groundwater Education White Paper, a second draft is being reviewed by outside experts; a draft is expected to be submitted to the Board for review the end of September. The final draft submitted to the Board for review will then be expected the end of October. Barr expects the White Paper Group will be ready to showcase results at the upcoming Fall Conference. The White Paper Group has been noting areas in need of improvement regarding groundwater education in the K-12 system. Barr stated these findings and recommendations will be presented to the Board in the coming weeks. These matters may be addressed further during the White Paper presentation at the Fall Conference.

Barr reported that the Drain Tile White Paper Group has now had two meetings, and that Calvin Alexander has stepped down as the workgroup chair, but will remain a member of the workgroup. Barr and the Board discussed various options for a workgroup chair replacement.

Old Business: Fall Conference: Olmanson provided the Board with an updated list of speakers and topics to review. Ginny Yingling (MDH), Greg Brick (DNR), Mindy Erickson (USGS), and John Bolton (NASA) have confirmed. The Board discussed other possible speakers and topics, including:

- Horizontal well drilling along the Missouri River
- Twin Cities Metropolitan Council recharge areas
- Nitrate talk possibly by Scott Korom (Barr Engineering)
- Bemidji oil spill talk possibly by Crystal Ng (UMN)

Olmanson will provide Hunt with a conference announcement in the coming week. Hunt will start preparing the conference website.

The Board discussed conference posters, and Ross updated the Board that the Water Bar appears to be set for taking part in the conference.

Social Hour: Olmanson suggested scheduling the next Social Hour within the week of October, 17th-21st. Retzler and Berquist will scope out the Sporty's Pub venue and finalize a scheduled date with them.

Meeting Date: Tuesday, October 11, 2016

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

Attendance: Ole Olmanson, President; Lanya Ross, Past President; Evan Christianson, President-Elect; Emily Berquist, Treasurer; Andrew Retzler, Secretary; Tedd Ronning, Newsletter; Jeanette Leete, WRI; Kelton Barr, MGWA White Paper; Bruce Olson, MGWA White Paper; Jeff Stoner, MGWA White Paper; Ellen Considine, MGWA White Paper

MGWA 2017 Membership Dues remain unchanged

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

MGWA BOARD MINUTES

MGWA Board Meeting Minutes, cont.

- Agenda:** Approved with Social Hour addition.
Past Minutes: Approved.
Newsletter: Ronning reports that the December newsletter is in the beginning stages. One of the scholarship students will be submitting an update about their research project in the next issue. Part two of the MGWA salary survey will also be included in the next issue.
- Treasury:** Berquist discussed the Treasury Report with the Board. The total income for the period of January 1, 2016 – October 10, 2016 is \$64,976.67; total assets for this period are \$84,103.57. Net income from January 1, 2016 – October 10, 2016 is \$24,889.54. Leete reports that \$41,000 from MGWA's Affinity Plus account has been transferred to the MGWA Foundation. Leete is still awaiting the results of MGWAF's financial advising to make further transfers.
- Web Page:** Changes to the conference page have been made for the upcoming Fall Conference, and online registration is up and running. The White Paper pages have been updated. Olmanson plans to transfer the current website content to a new content management system after the Fall Conference.
- WRI Report:** Fall Conference brochures and membership renewal forms have been sent out to membership. Addresses in the membership database are being revised during this recent mailing effort.
- MGWAF:** The Metro Council Children's Water Festival was a success, and Ross thanks MGWA for their continued support. Sponsorship money for the Brown-Nicollet-Cottonwood Water Festival has been given. MGWAF continues to work with a financial advisor to secure new accounts and investments.
- White Paper:** Several representatives for the Groundwater Education Gap White Paper are present to discuss the latest draft and findings with the Board. The goal is to have a finalized draft prior to the Fall Conference. The Board shared their thoughts on the draft and discussed what role (if any) the MGWA should have in leading the charge for making changes to the state education standards based on the findings of the White Paper Workgroup. Stoner states that several members of the Minnesota Board of Education expressed interest in the White Paper topic. Based on their findings, the White Paper Workgroup suggests reviving the MGWA Education Committee as a means to addressing the education gap. The Board discussed this suggestion and the past role of the Education Committee. Christianson revisited the idea of having representatives to discuss White Paper topics to educational institutions, interested parties, and the general public. Christianson recommends using this as a vehicle for MGWA to reach out to educators and others to make changes towards addressing the education gap, but that the focus of an Education Committee should not be solely on the findings and suggestions of this latest White Paper topic. The Board and White Paper representatives discussed methods to making changes in educational standards, with a general consensus that utilizing cross-disciplinary methods to integrating groundwater science in the K-12 system might be the easiest and most effective process. The White Paper representatives propose to ask membership for their comments regarding the MGWA Education Committee and possible future actions at the upcoming Fall Conference. The Board reviewed and discussed the questions that might be posed to membership. Barr reminded the Board that there is currently an opportunity, and limited window, to make changes to the 2017 state education standards. The Board thanks all of those involved with the assembly of this White Paper, and plans to have a compilation of comments and suggestions to the workgroup by the end of the week.
- Old Business:** Social Hour: Retzler updated the Board on the next planned Social Hour, scheduled for Tuesday, October 18, 2016 from 4:30 to 6:30pm at Sporty's Pub & Grill on Como Ave. An event flyer was sent out to membership. Leete has MGWA sign stands and nametags that can be used.
Fall Conference: Olmanson updated the Board on the state of the conference. The invited speaker from NASA, John Bolten, cannot accept travel funds from MGWA as a federal employee. MGWA plans to initially front the travel costs. Olmanson reports being two speakers short for the conference as of now, but that some possibilities still remain to fill these slots. Olmanson raised the question of possible speakers for modern dating techniques, and would like to have the speakers finalized within a week or two.

Meeting Date: Tuesday, November 8, 2016

- Location:** Fresh Grounds Café, 1362 West 7th Street, St. Paul, MN
Attendance: Ole Olmanson, President; Lanya Ross, Past President; Evan Christianson, President-Elect; Emily Berquist, Treasurer; Andrew Retzler, Secretary; Jeanette Leete, WRI; Sean Hunt, WRI
Past Minutes: Approved with revisions.
Newsletter: December newsletter is still being compiled. Deadline for additions to the newsletter is November 23

The MGWA Board meets once a month, currently over lunch, on the second Tuesday, at Fresh Grounds on W 7th Street in St. Paul.

Members are welcome to attend and observe

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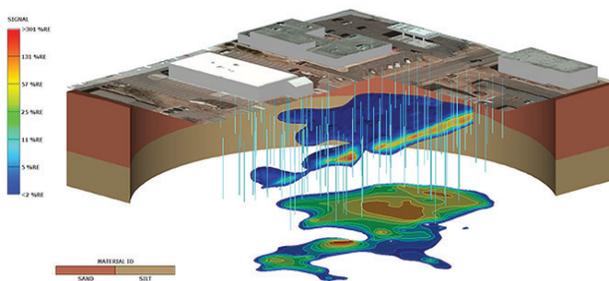
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Petroleum LNAPL screening
Hydrostratigraphic profiling
- ◀ **TarGOST® & TarGOST-HP**
Coal tar and creosote screening
Hydrostratigraphic profiling
- ◀ **DyeLIF™**
Chlorinated DNAPL screening
Hydrostratigraphic profiling
- ◀ **Membrane Interface Probe & MiHpt**
VOC screening & hydrostratigraphic profiling
- ◀ **Hydraulic Profiling Tool**
Hydrostratigraphic profiling
- ◀ **Advanced Data Analysis**
Maximize LIF data value
- ◀ **Data Visualization**
2D & 3D Conceptual site models



MGWA BOARD MINUTES

MGWA Board Meeting Minutes, cont.

- Treasury:** Berquist discussed the Treasury Report with the Board. The total income for the period of January 1, 2016 – November 7, 2016 is \$107,428.59; total assets for this period are \$117,786.74. Net income from January 1, 2016 – November 7, 2016 is \$46,587.72. Leete reminded the Board that we have gained from conference registration fees, but have not yet paid for the conference expenses. Leete also reports we are still waiting to transfer more funds to the MGWAF once their accounts are figured out.
- Web Page:** Hunt has nothing to report. Leete mentioned the delay in early bird conference prices being updated after the deadline—which has been corrected. Olmanson briefly discussed the website transition from the old to new system. Olmanson still plans to start this transition after the Fall Conference.
- WRI Report:** Hunt and Leete have been processing conference registrations, updating conference prices, processing membership fees and updating the membership database. 207 members have renewed, and there are 266 registrants for the conference.
- MGWAF Report:** Ross reports the MGWAF meeting has yet to take place. Hunt will work on finalizing the student scholarship materials to put up on the website prior to the conference. Scholarships will be announced at the conference.
- Old Business:** White Paper: Overall, the Board believes the White Paper Committee addressed a lot of the main issues from the draft review of the Groundwater Education Gap White Paper. Olmanson and Retzler suggested the figures could still use a little work to increase their clarity, consistency, and readability throughout the document. Christianson suggested making changes to the cover of the White Paper. The Board agrees the cover may be misleading with the findings and message of the paper, and suggest it be revised to something simpler. The Board discussed options for moving ahead with the White Paper document and clarification of the Board's role and actions in the review process of White Paper documents. Christianson motions to approve the technical content of the paper with the recommendation that it move to the final copy-editing process. Ross seconded the motion. A vote was called; all Board members present voted in favor—motion passed. Ross recommends the White Paper Committee review online material about making artwork and figures more accessible to the colorblind and others.
Fall Conference: Olmanson has compiled the bio and abstracts for the conference speakers on the MGWA Google Drive. The Board reviewed the finalized schedule of speakers. Ross reports the Water Bar will be present. The Board discussed the possible location of the Water Bar exhibit in the exhibitor space. Ross took suggestions from the Board for specific waters to serve during the conference. Ross reported that the Governor is very interested in the Water Bar and would like to hear about how it was received at the conference. Berquist suggested increasing graduate student participation as speakers at future conferences. The Board discussed this idea and what steps would be necessary to find student presenters and fit them within the conference topics. The Board may consider this idea in future conferences.
- New Business:** Board Nominations: There are no current president-elect nominations to report. Leete suggested asking for nominations at the conference.
Future Conference Topics: Olmanson presented to the Board a detailed list of future conference topics assembled by Jamie Wallerstedt. The Board thanks Wallerstedt for the contribution, and were interested in several of the ideas listed.



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