

Minnesota Ground Water Association

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Newsletter

December 2013
Volume 32, Number 4

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MGWA President
Bob Tipping

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President's Letter

At the time of this writing, we're halfway through November and on our way to Thanksgiving – and so, it is a good time to give thanks. Here are a few thank-you's that come to mind. Thanks to Past-President Kelton Barr, without whose persistence, the MGWA white paper initiative and planning for the 2015 sinkhole conference in Rochester would not have happened. The white paper initiative marks a significant step, by formalizing one of the primary objectives of the organization - "Education of the general public regarding ground water resources". Thanks to Bruce Olsen, Jeff Stoner and Mark Collins, who, along with Kelton, helped put the white paper initiative together. Thanks to President-Elect Eric Mohring for his musical tribute to Calvin Alexander on the fall field trip (see field trip summary and "The Ballad of Calvin

Alexander", later in this issue). Eric's wit and thoughtfulness puts MGWA in good hands for the coming year. Thanks to Audrey Van Cleve, who continues on for another year as MGWA Treasurer, for all her hard work and willingness to pitch in. Thanks to Julie Ekman, who finishes her term this fall as MGWA Secretary. We're going to miss you, Julie.

MGWA continues to offer many opportunities to volunteer, none more important and behind the scenes than the newsletter. Thanks to Tedd Ronning and the rest of the editorial board: Greg Brick, Sharon Kroening, Joy Loughry, Andrew Streitz and Eric Tollefsrud - for creating quarterly newsletters that are informative and fun to read. Thanks also to the MGWA Foundation board members who continue to do excellent work on groundwater education and outreach, and this year awarded their first

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Fall Field Trip: A Journey to the Paleozoic Plateau: The Karst of Southeastern Minnesota

Bob Tipping, MGWA President

On October 18th and 19th, thirty-six people came together to travel to southeastern Minnesota as part of the AIPG/AWG/MGWA Fall field trip. This was the first time the trip has been run in almost a decade. The trip, entitled "A Journey to the Paleozoic Plateau: The Karst of Southeastern Minnesota", was run, in part, to honor the work of Dr. E. Calvin Alexander Jr., University of Minnesota Department of Earth Sciences. Calvin is retiring from his position as Morse-Alumni Professor after being at the University for 40 years.

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Newsletter Deadlines

Issue	Due to Editor
March '14	02/07/2014
June '14	05/02/2014
September '14	08/01/2014
December '14	11/07/2014

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Jim Lundy Moves up at MDH

Jim Lundy is the new hydrologist supervisor in the Source Water Protection Program at MDH after nine years of conducting groundwater studies on various chemicals, including nitrate and radium, at MDH. Before that he spent 16 years in remediation programs at MPCA.

Originally from La Grange, Illinois, Jim received his bachelor's degree in geology and geography from Gustavus Adolphus College in St. Peter, Minnesota, and his master's degree in structural geology from the University of Minnesota (1985). He worked on a geophysics project at MPCA in 1986, and as a consultant (ENSR Consulting and Engineering) during 1987-89. After several months as a gold exploration geologist in northern Minnesota, he returned to MPCA in 1989, working in the MPCA leaking underground storage tank program, the MPCA superfund program, and in the MPCA Policy and Planning division, until moving over to MDH.

Historical Note: Shown here at the beginning of his MGWA career, Jim has contributed greatly to MGWA. Elected in 1999 to the three year rotation as President-Elect, President and Past-President, he was instrumental in the creation of the MGWA Foundation. He served as Secretary of the Foundation from 2000 through 2003 and he served on the newsletter team from 2000 through 2002.



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2014 Officer Elections

The offices of President-Elect and Secretary for 2014 are being filled. An email will be sent to all those eligible to vote (paid members for either 2013 or 2014).

Lanya Ross – Metropolitan Council – Candidate for President-Elect

Lanya Ross, candidate for President-Elect, is a principal environmental scientist at the Metropolitan Council. She evaluates and communicates the cumulative, long-term groundwater impacts of the many individual water supply decisions made in the Twin Cities metro area. Working for the Metropolitan Council provides a rather unique opportunity to focus full-time on regional groundwater patterns. This is different perspective from her prior work for the Shakopee Mdewakanton Sioux (Dakota) Community, where she worked to implement federal water resource initiatives at the very local level.

Lanya's lifelong fascination with landscapes impact on culture led her to get a BA in geology from Macalester College and a MS in geology from Northern Arizona University. Throughout her career, Lanya has focused on water supply projects – a critical, if muddy, nexus of culture and geology.

“A lot of what I enjoy most about my job has come from the MGWA recognition of the importance of groundwater research and protection, long-lasting partnerships, and ideas for inter-disciplinary projects. MGWA members are generous with their knowledge and with their criticism, a combination that continuously improves Minnesota's body of groundwater knowledge. And MGWA members are deeply engaged with their communities – from the local to the global level. This organization has been a great resource to me my entire career, and I know I'm not alone in feeling that way.”



Avery Cota-Guertin – MN DNR – Candidate for Secretary

Avery Cota-Guertin, candidate for Secretary, is a Hydrogeologist with the County Geologic Atlas program at the Minnesota Department of Natural Resources. She initially joined the atlas program in 2012 as a Field Hydrologist where she assisted in field data collection and seismic surveys. Avery is currently working on the technical analysis and preparation of the Part B Nicollet County and Sibley County Atlases as well as assisting the Groundwater Unit with data collection and analysis. She has a Bachelor of Science in Geology and Earth Science Education from the Minnesota State University Moorhead and a Master of Science in Geological Sciences from the University of Minnesota-Duluth.



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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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MGWA, cont.

President's Letter, cont.

student scholarship. Thanks to Gil Gabanski, for his years of service and help getting the Foundation to where it is today. On behalf of both MGWA and MGWA Foundation, thanks to Jennie Leete and Sean Hunt for keeping everything running.

Finally, thanks to MGWA members – it is always good to see each other at the conferences and get caught up. MGWA is a great group of people – all brought together, amazingly, over a single resource. This year's conferences on public health and economics attempted to

reach out to a broad range of people interested in groundwater, by exploring the links between the resource and everyday life. The quality of decisions we as a society make going forward will depend on our ability to explicitly recognize groundwater's present and future value throughout the hydrologic cycle. MGWA and MGWA Foundation continue to play an important role by making those links clear to the general public.

MGWA Fall Conference on the Economics of Ground Water

Presentation Descriptions

Sherri Kroening, and Andrew Streitz, MGWA Newsletter Team

The conference opened with remarks from the Association President, Bob Tipping. Bob presented the distinguished service award to Dr. E. Calvin Alexander Jr, a long-time professor in the geology department at the Minneapolis campus of the University of Minnesota. Calvin was honored for his extensive work both in the field and in the public sector. Calvin is perhaps best known for his extensive dye tracing work in the karst areas of southeast Minnesota.

The first presentation of the morning was made by Bonnie Keeler, from the Institute on the Environment, University of Minnesota, on "Linking Water and Well-Being: A Framework for Improved Assessment and Valuation of Groundwater-Related Ecosystem Services". She first raised the difficulty in understanding the value of a resource. Markets aid the production of private goods, not public. So how do we reward the production of public goods? For instance, we know that if grasslands are converted to cropland, the result will be value for farmers, and perhaps also increased nitrate in drinking water, and reduced flow in streams. She presented an analysis of public posting of vacation photos to the FlickrR website, attempting to correlate numbers with resource quality. In other words, do vacationers travel further for better quality lakes, streams, etc?

Ray Wuolo next gave a presentation on "Groundwater Models as Inputs into Ecosystem Services Models - Evaluating Uncertainty". He opened by saying that most people care only about groundwater for its relation to surface water. It is streams, lakes and wetlands that the public really values. He then talked about the competing interests and values that we all deal with in our work. He tied groundwater withdrawals to the ecosystem by pointing out that biological systems are very complicated, and it's difficult to assess how

pumping affects this balance. He closed with a short discussion of models, their use and abuse and how a modeler must communicate the uncertainty of the model, not just provide a calculated solution.

There was then a break to visit the posters and exhibits on display.

Enrique Valdivia is a district director for the Edwards Aquifer Authority in Texas, and gave a presentation on how this authority developed, within the context of Texas law on groundwater appropriations. This history includes the Texas Supreme Court deciding a case based on their understanding of groundwater as a resource that was secret, occult and concealed. Enrique described a groundwater management system that must take into account western water law, increasing demands, and persistent drought. This competition was captured in a phrase he shared, "Whiskey is for drinking and water is for fighting".

Bob Tipping retook the stage before the lunch and poster break to make several announcements. First he thanked Gil Gabanski for his long service to the Association, including helping to define the Association's goals, serving as President, and his long tenure on the Foundation Board. Bob then presented plaques of recognition to Gil, Past-President Kelton Barr, and long-serving Association Secretary Julie Ekman. Bob then introduced the White Paper Initiative. Charter members are Kelton Barr (Braun Intertec), Mark Collins (HDR Engineering - retired), Bruce Olsen (MDH - retired), and Jeff Stoner (USGS). They met with interested members during an afternoon break to seek ideas for upcoming topics. The goal is to research a groundwater subject, find consensus on its merits and meaning, and produce a report that can be used to communicate complex hydrologic issues to legislators, the public, and government partners.

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Abbreviations and Acronyms

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

MGWA, cont.

Fall Conference on the Economics of Ground Water, cont.

Following lunch, Mike Strodman from the Minnesota Rural Water Association gave a presentation on “The Search for Clean Groundwater and the Economic Costs Associated”. His partner was Scott Burlingame from the Park Rapids Public Works Department. Mike talked about the difficulty in finding adequate water supplies due to rising nitrate levels in farm country. He described a pilot project the City of Park Rapids undertook with farmers in the groundwater watershed of the city supply wells to rotate crops as a means to cut the application of nitrogen. The City eventually decided to build a new treatment system due to the uncertainty of reaching nitrate reduction goals.

Dave Legvold is a self-described farmer and educator, and he joined the conference to talk about his experience with new farming techniques designed to reduce soil loss, maintain soil health, reduce runoff, and dramatically cut the application of nitrogen, all while producing high yields of corn. His entertaining talk included a report by a St. Olaf student on a comparison of Dave’s conservation farming techniques vs. standard farming as practiced in Minnesota. He suggested that Minnesota farmers had much to learn from their colleagues in Iowa when it came to

the reduction in the use of nitrogen, and the related decrease of nitrate detected in water resources.

Jason Moeckel, the manager of the monitoring and analysis section at the Minnesota Department of Natural Resources, closed the conference with a presentation on the department’s efforts to plan for groundwater sustainability. Jason spoke about how some of the state’s groundwater is at risk due to contaminants such as nitrate, and overpumping. When establishing groundwater limits, the Department must consider current and projected water levels, water quality, ecosystems, and the ability of future generations to meet their needs. He described two strategies the agency has put in place to manage the state’s groundwater—the draft strategic plan for groundwater management and the development of groundwater management areas.

More information on the fall conference is available on the MGWA website, including most of the presentations. This information is located in the “MGWA Meetings” area of the website at: www.MGWA.org/meetings.php

Fall Field Trip, cont.

Starting early Friday morning, in the Twin Cities, we traveled first to Rochester to pick up additional field trippers and then on the Whitewater State Park, where Jeff Green of the DNR described dye tracing at a sinking stream within the St. Lawrence Formation. We then traveled to Cherry Grove Blind Valley, just south of Wycoff, Minnesota. Along the way, we drove through Saratoga Township, where our bus discussion turned to frac sand operations and the depositional history of the St. Peter and other cratonic sheet sandstones of North America.

At Cherry Grove, we visited the largest sinkhole within the DNR’s Scientific and Natural area there, which is one of several closed depressions that collectively form a blind valley – disconnected by topography from surface drainage to nearby Canfield Creek.

Next stop was Kent Dornink’s farm southwest of Preston, where the Minnesota Department of Agriculture (MDA) with funding from the Clean Water, Land and Legacy Amendment, and in cooperation with Minnesota Agricultural Water Resource Center, the Nature Conservancy, Monsanto, and the Fillmore and Mower Soil and Conservation Districts have established one of

three field sites to evaluate how agricultural practices used in the region affect runoff and water quality of local rivers and streams (www.mda.state.mn.us/cwf/rrpartnership). The presentation was done by Kevin Kuehner from MDA’s Preston field office. Kevin did a great job of taking questions about the site, and coping with the role as “lightning rod” for a field trip participant dissatisfied with MDA in general.

The last stop of the day was at a Prosser Formation – Galena Group quarry near the Dornink Farm. Tony Runkel, with the Minnesota Geological Survey (MGS) presented results from a recent study looking at geologic controls on groundwater and surface water flow, and its impact on nitrate concentrations in streams. Then it was on to the Eagle Bluff Environmental Learning Center to check in for the evening’s lodging and then dinner at the Branding Iron Restaurant in Preston.

Dinner at the Branding Iron was highlighted by words both prepared and impromptu by former students and colleagues of Calvin, and in music courtesy of Eric Mohring, in tribute to his

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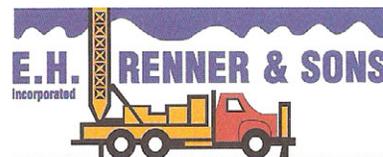
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INDUSTRY NEWS

Pace Analytical Purchases Microseeps Laboratory, Pittsburgh, Pennsylvania, and Heritage Environmental Services' Commercial Laboratory, Indianapolis, Indiana

Pace Analytical (Pace), the second largest environmental testing firm in the U.S., recently announced the acquisition of Microseeps Laboratories in Pittsburgh, Pennsylvania. Microseeps is a leading testing source for the environmental remediation process known as monitored natural attenuation (MNA) and compound specific isotope analysis (CSIA) in support of in-situ remediation techniques for the degradation of subsurface contaminants. Microseeps has worked with USEPA, USGS, American Petroleum Institute and the U.S. Department of Energy. Microseeps is a recognized leader in CSIA as is their ZymaX Forensics laboratory located in Escondido, CA. With the combined capabilities and capacity of both labs, Pace Analytical has become one of the industry's strongest providers of these specialty niche services in the U.S. and around the world.

Pace also announced the acquisition of the commercial laboratory operations of Heritage Environmental Services, LLC, an environmental firm headquartered in Indianapolis, Indiana. Heritage's commercial laboratory is a leading testing source for groundwater quality and waste characterization in the Midwest. Heritage's laboratory has been serving environmental markets for over 30 years and has a strong, loyal customer base.

McGhie & Betts, Inc. is now a Division of WSB & Associates, Inc.

Following a recent merger, McGhie & Betts is now a division of WSB. McGhie & Betts offers clients more than 67 years of consulting experience. The firm practices in the fields of land surveying, urban-land planning, consulting-civil engineering, geotechnical engineering, construction material testing, landscape architecture, and aviation planning. WSB & Associates, Inc. is a professional consulting and design firm with offices in Minneapolis, St. Cloud, and St. Paul. The firm provides engineering, planning, environmental, and construction services.

WSB has long been interested in a Rochester office, and Northfield has been a longtime client. Though WSB successfully served its Southeast Minnesota clients from offices in Minneapolis and St. Paul, this Rochester and Northfield presence offers the opportunity to better serve existing clients and introduce WSB's services and committed team to new clients.



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Fall Field Trip, cont.

career. Please see “The Ballad of Calvin Alexander” in this issue – really quite something, especially if you know Calvin. The group was also joined by people who had come down just for the dinner. It was a fun ending to a full day, at least for those who didn’t stay up to enjoy a late night bonfire.

Saturday morning started with a trip to the National Trout Center in Preston (<http://nationaltroutcenter.org/>), with presentations by George Spangler, Professor Emeritus from the University of Minnesota’s Department of Fisheries, Wildlife and Conservation Biology, and Jeff Broberg, from McGhie and Betts in Rochester and member of the Legislative and Citizen’s Commission on Minnesota Resources (LCCMR). Both George and Jeff serve on the Trout Center’s board of directors. They provided a nice link between hydrogeology and trout health – illustrating the relationship between trout weight and stream temperature.

Last stops on Saturday were near the city of Fountain, where the group visited a sinkhole excavation site at what once was an entrance to an attempted commercial cave in the early 1900s. The excavation is being conducted by John Ackermann from the Karst Preserve (www.karstpreserve.com). The other stop was at Fountain Big Spring, which once served as the city’s water supply. Calvin spoke about the nature of springs, both in terms of their aesthetics and their temporal qualities. Tony Runkel presented recent mapping by the MGS that shows structural controls on the location of springs at this site.

All the stops on this field trip were in some way tied to the work Calvin Alexander. Calvin has spent much of his career working on and in karst terrain. His research has provided the foundation of what we know about the hydrogeology of this area. Calvin,

through his work, has also challenged our understanding by continuing to ask questions. Karst, with all its surprises, is ideally suited for Calvin’s approach to research, which, in the true sense of field work, requires the ability to see things with a fresh eye. His work has influenced science and policy, and his deep respect for the natural world has made a lasting impression on his students. Thanks Calvin! Thanks also to Calvin’s wife Sheri, Sara Welna, Heather Arends, Betty Wheeler, Jeanette Leete and Sean Hunt for help putting the trip and field guide together, Mike for driving the bus, and Jeff Green, Jeff Broberg, George Spangler, Tony Runkel, Kevin Kuehner and Kent Dornink for their presentations and insights into the geology, hydrogeology and cultural history of southeastern Minnesota.



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The Ballad of Calvin Alexander

To the tune of "The Ballad of Jed Clampett" aka the "Beverly Hillbillies" theme, courtesy Eric Mohring.

Come and listen to a story of a man named Cal A poor southern Baptist, Oklahoma his locale. He said "unemployment – it's not the thing for me!" So he headed out for Missouri to get his PhD! (In chemistry that is ... test tubes ... reagents...)

One day ol' Cal he was staring at the moon, Dreaming of some line of work that might be opportune. He said "lunar gasses – might be the thing for me!" So he loaded up his truck and moved to Pillsbury

(Hall that is Mass specs ... Helium....)

Ol' Cal got restless, his lab coat it was frayed He said "must be some other way a living to be made! I used crawl around in caves, some pleasures there to see" I think I'll try my hand at that 'hydro-geo-lo-gy'

(Groundwater that is ... limestone... karst)

The professor kin they gnashed their teeth and pulled out their hair, They said "we brought you here to work on lunar gasses rare! This foolishness must stop if your job you want to keep!" But he said "I've got my tenure so go take a flying leap!"

(A flying <bleep> that is... a big one...)

Ol' Cal he saw some water disappearing down a cave, Which started him a wonderin' how that water did behave, A load of glowing dye down the cavern he did fling, Dyeing red a raccoon that was drinking from a spring.

(Rhodamine that is....Crimson tide)

Ol' Cal he took to scappin' with the ol' bureaucracy, And with many a bureaucrat did argue audibly. Some say the thing he could

have used to act more laudably Was a tiny little helping of that ol' diplomacy.

(Just a tiny helping that is... Not a heapin' helping)

Now it's time to say goodbye to Cal and all his kin. We hope this little tune has not caused him chagrin. If it is the sight of old Calvin you do crave, Your best bet to find him is in some nearby cave.

Calvinnnnn... AlexZander Leadin' the spee-lunk-ears



Calvin Alexander — photo by Tonia O'Brien



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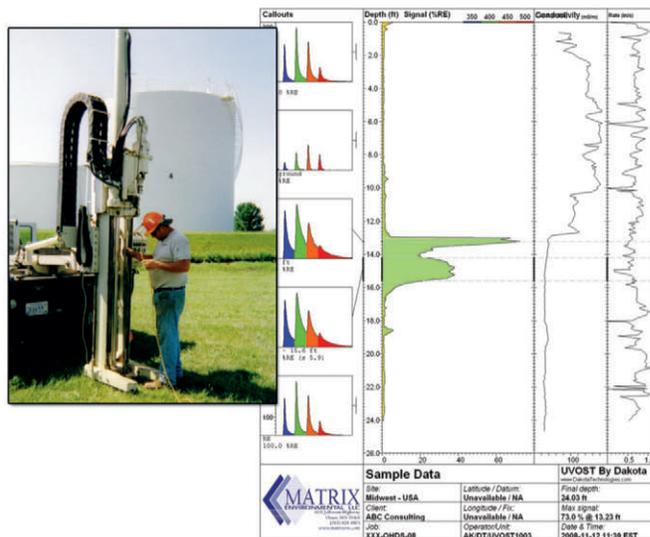
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MORE Groundwater Data Available Through Updated MPCA Website!

The MPCA recently upgraded its Environmental Data Access website, which provides public access to the agency's groundwater quality data. The updated website provides access to a much larger amount of data from the MPCA's ambient groundwater monitoring network, closed landfill program, and selected remediation sites, as well as the MDA's ambient groundwater monitoring data. The new website is located at www.pca.state.mn.us/index.php/data/groundwater.html.

Map- or text-based searches can be used to access the data on the website. With the map-based search, the user can click on a groundwater station to view and download the monitoring data. Several groundwater stations can be captured in the map-based search by using the "select" tool to draw an area on the map. Alternately, a text-based search can be used to select groundwater stations by city, county, collection date, analyte group, and many other search criteria.



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MGWA Members: Please Submit Ideas for White Paper Topics

The White Paper initiative is up and running, and all members of MGWA are encouraged to submit topics for the first White Paper. This will be the first opportunity for our Minnesota Ground Water Association to address an issue that is relevant to the future of Minnesota's groundwater and its associated users. To submit a topic, go get the nomination form on the MGWA website at http://www.mgwa.org/white_paper_topic_nomination.doc. Please fill out all the sections, including your name and contact information. This information will be kept confidential, but we need to make sure that all topics submitted are from MGWA members. Please feel free to collaborate with your colleagues; a submittal can have several authors contributing to it. But we need one to be the primary author with contact information.

Once your topic nomination form is filled out, please email it to office@mgwa.org by **January 31, 2014**. A topic will be selected by the White Paper Committee and the MGWA Board and announced to the membership in late winter. All the other topics submitted will be kept as part of the evaluation for the next White Paper.

We know that our membership is brimming with ideas for topics – you have been verbally volunteering them already! Together we will start addressing the issues facing Minnesota's groundwaters. We look forward to seeing your topic!

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LETTERS TO THE MEMBERSHIP

Assistance with Establishing a Statewide Water Conservation Framework

Hello MGWA members,

My name is Dave Leuthe and my new job is about helping the DNR establish a statewide water conservation framework. As some of you may recognize, I am not new to the water management world. I retired from DNR with just shy of 35 years of work on water conservation, protection and management, so I am no stranger to the issues that confront us all and continue to emerge.

If you look at a definition of conservation: "Preservation or restoration from loss, damage, or neglect" and then think about how we manage our water supplies, you will quickly realize, and already know that we have such a long journey ahead. We have created water conservation challenges on both the supply and the demand side of water our water resources.

On the supply side of water, we have treated water as an inexhaustible commodity and with contempt for the problems it causes in our desires to modify the landscape to suit our own purposes. Since we do not value it, we seek to rid it from the landscape and soil profile as fast as possible. We have commissioned water to carry away our sewage and dilute it and carry our wastes downstream to places where it will not bother us anymore. We run it off our impervious surfaces in the most efficient pathways where it carries away our expensive chemicals and valuable soils, which then create problems for other peoples in other places. We have worked hard to drain our wetlands and our soils to make the land more productive for "traditional forms of agriculture" which also carries away our expensive chemicals and valuable soils. The cumulative effect of all these actions allows all this water to unleash its power to such a great degree that the volume and timing of water discharge destabilizes the streams and rivers in the entire downstream watershed, in addition to carrying away our valuable resources.

Soliciting Feedback on the Evolving Environmental Geology Concentration at St. Cloud State University

Dr. Kate Pound, St. Cloud State University

The Atmospheric and Hydrologic Sciences Department at St. Cloud State University currently offers BS Programs in Hydrology and Meteorology and has recently established an Environmental Geology Concentration (as well as a general Earth Science Concentration) within the Earth Science Program. The aim of the environmental geology concentration is to provide students with a pathway to careers in environmental geology across the spectrum of consulting, state and federal agencies, watershed districts, and nonprofit organizations. The concentration also provides a means for the Atmospheric & Hydrologic Sciences Department to package the existing geology courses in a manner that both attracts students and prepares them for employment. The concentration draws on courses across multiple colleges (College of Science and Engineering, School of Public Affairs, College of Liberal Arts), and is multidisciplinary in nature. We would like written feedback on the content and structure of the concentration. We would like to know whether you think that the courses included prepare students adequately for employment. Our questions for you include: What is missing? What could be eliminated? How much math, physics, and chemistry should be

On the demand side we have contaminated our surface waters and surficial aquifers to the point that they cause threats to our health and we have attempted to escape these problems by tapping deeper aquifers where contamination has not yet reached. As the aquifers are pumped harder, we begin to lower water levels and induce recharge. We continue to remove the natural biological filtration systems that once were capable of cleansing our waters (free of charge, I might add) destined for aquifer recharge. With more water exported faster and fewer intact natural buffering systems remaining, the water that is left to recharge our aquifers will not be as clean as the water we are removing now. With the complex nature of the chemicals we create to make life easier finding pathways into our aquifers, it guarantees that future generations will have to pay very high costs to get the clean water we once were well endowed with. Additionally, as we pump more volume from our aquifers, it generally lowers the water levels in everything upgradient of the pumping source. This means that surface waters which depend on a groundwater component from either water table conditions or head pressure from deeper formations will begin to be impacted by this loss of hydrology. The loss of baseflow contributions to surface watersheds from reduced levels impacts all the systems designed around this once steady baseflow component.

So, as I embark on my challenge to establish a statewide water conservation framework, I will need partners, like the MGWA, who fully understand what I am talking about. The basic understanding of our complex hydrologic systems needs to become commonplace understanding in the hearts and minds of every citizen, land manager, organization and every level of government if we are going to protect the health and minimize the economic costs of sustainable living for future generations. I look forward to your good work in helping others understand the nature of the challenges ahead and your ideas on effective solutions embedded in our water conservation strategies.

required versus recommended? We will be able to request some changes to the concentration if we are able to demonstrate that potential employers have reviewed, commented on, and made specific suggestions regarding the concentration. A poster summarizing the current requirements for the Environmental Geology Concentration is available at the MGWA website (www.mgwa.org/meetings/2013_fall/pound.pdf), and comments and suggestions can be emailed to Dr. Kate Pound (kspond@stcloudstate.edu). We are planning to have a half-day meeting in early January where we can discuss suggestions with a variety of potential employers. Please contact Kate if you are interested in participating.

LINKS OF INTEREST

Many more Minnesota farms relying on irrigation for bigger yields

by Elizabeth Dunbar, Minnesota Public Radio

September 8, 2013

<http://minnesota.publicradio.org/display/web/2013/09/06/number-of-irrigated-farm-fields-in-minn-surges->

Book Review

The “Book Review” is an occasional feature as time and space allows. MGWA members are welcome to suggest new titles to the editors for consideration, or to submit reviews themselves.

Groundwater for the 21st Century: A Primer for Citizens of Planet Earth (2013) by John A. Conners. McDonald & Woodward Publishing Company, Granville, OH. Paperback, 634 pages, 6 by 9 inches, ISBN 978-1-935778-10-3. List price \$39.95. Reviewed by Greg Brick Ph.D.

This book is advertised as a comprehensive primer for people who are not groundwater specialists. Dr. Conners has taught hydrogeology for 30 years and explicitly states that he is not presenting a textbook. Yet, I was happy to find that many of the familiar equations in hydrogeology still managed to escape the censor! There are even a few sample problems to chew on. Personally, I recall taking undergraduate classes in Public Health for which this book would have been ideal.

Chapter 1 is largely a review of an undergraduate Chem 101 course, Chapter 2 of Geo 101, and these may be readily skipped by those having college coursework in these fields. Darcy’s Law is not introduced until page 179, showing that the book is well supplied with introductory material for those who require it. Among the 14 chapters, a strength of the book is its extensive treatment of regional aquifers. The emerging topic of groundwater ecology, on the other hand, seems neglected, and I would have liked to have read more about karst.

As an avid devotee of springs, a minor point for me is Conners’ classification of springs into Nongravity (thermal) and Gravity springs, which seems somewhat arbitrary. The USGS hydrologist Myron Fuller (1910) was the first to divide springs into artesian and gravity springs, without regard to temperature, and I think this is more workable than placing artesian springs in the gravity category, as Conners does. (Indeed, ALL springs must be gravity springs in some sense, as the laws of gravity are not suspended anywhere, so even Fuller’s dichotomy is not ideal.)

Epigraphic quotations adorn nearly every section in the book, the one I like best being on page 562, “It is simply unimaginable that American politics as we know it today will deliver the transformative changes needed” (Gus Speth). Some unintentional humor

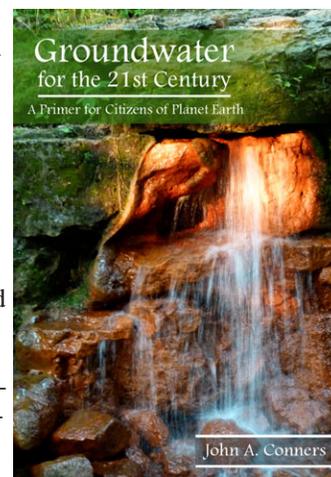
may be found on page 11, where the author claims that hydrogeologists are in great demand, a common assertion among educators. They should be in great demand, but I have friends who have left the field for greener pastures.

For such a lengthy book, the only typos I noticed in a first reading are such things as on page 7 where the promoter of the historic Grenelle well in Paris is given as ‘Arayo’ (instead of Arago). The element phosphorus is misspelled ‘phosphorous’ (the adjectival form) throughout the book.

The book is well illustrated, with 280 diagrams, maps, and color photographs. The references are up to date, most of them since the year 2000, including discussions of the impacts of climate change and fracking, yet including the time-honored hydroclassics of our field. Appendix C is a list of the drinking water MCLs. The book does not contain a glossary of hydrogeological terminology, which I think would have been useful, especially considering the intended audience.

What niche does this book fill? According to the author, “this book will help to fill the yawning gap between the advanced texts and the popular science publications.” It is more comprehensive and detailed than Chapelle’s *The Hidden Sea* (2000). Conners’ book is a layperson’s version of Driscoll’s *Groundwater and Wells* with its good descriptions of well construction and water sampling. Its discussion of concepts such as ‘hydrophilanthropy’ carries it beyond a merely technical treatise into the realm of advocacy. I sensed Malthusian undertones in many passages throughout the book, but I am in entire agreement. The population of Planet Earth is reaching its limits.

This book is highly recommended for its target audience: concerned citizens. In that sense, it occupies a niche between facile popularization and the more weighty professional tomes such as Driscoll’s ‘Bible’.



New USGS Publication

The U.S. Geological Survey, Minnesota Water Science Center is pleased to announce a new publication, “**Evaluation of internal loading and water level changes: implications for phosphorus, algal production, and nuisance blooms in Kabetogama Lake, Voyageurs National Park, Minnesota**” by Victoria Christensen and Richard Kiesling (USGS) and Ryan Maki (National Park Service). The publication in the *Journal of Lake and Reservoir Management* highlights how dam operations have the potential to affect water quality in reservoirs. Dam operations at Kabetogama Lake were modified in 2000 to restore a more natural water regime and improve water quality. The U.S. Geological Survey and National Park Service evaluated nutrient, algae, and nuisance bloom data in relation to changes in Kabetogama Lake water levels. Water and sediment data were collected at Voyageurs National Park during 2008–2009 to assess internal phosphorus loading, that is phosphorus released from the bottom sediments, and determine whether this is a factor affecting phosphorus concentrations and algal productivity. Stratification in certain

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areas, higher bottom water and sediment nutrient concentrations than in other parts of the lake, and phosphorus release rates estimated from sediment core incubations indicated that Lost Bay on the northern side of Kabetogama Lake is one of several areas that may be contributing to internal loading. Internal loading of phosphorus is a concern because increased phosphorus may cause excessive algal growth including potentially toxic cyanobacteria. Comparison of the results of this study to previous studies indicates that chlorophyll *a* concentrations have decreased, whereas total phosphorus concentrations have not changed significantly since 2000.

To cite this article: Victoria G. Christensen, Ryan P. Maki & Richard L. Kiesling (2013) Evaluation of internal loading and water level changes: implications for phosphorus, algal production, and nuisance blooms in Kabetogama Lake, Voyageurs National Park, Minnesota, *Lake and Reservoir Management*, 29:3, 202-215.

To link to this article:

<http://dx.doi.org/10.1080/10402381.2013.831148>

Benton County Geologic Atlas, Part B

Summarized by Jim Berg, Minnesota DNR

Introduction

This article is a summary of the Benton County Geologic Atlas, Part B published in 2012 by the Minnesota DNR and written by Jeremy Rivord. The primary groundwater resources in Benton County are located in the surficial and buried sand and gravel deposits that are present in many areas of the county. These deposits are part of a complex geologic sequence of unconsolidated glacial sediments that range from 50 to 300 feet thick. The surficial sand and gravel aquifer that is shown in Figure 1 consists of fluvial sand and gravel deposited by the Mississippi River and glacial outwash from the most recent retreat of glacial ice. The surficial aquifer occurs in northwest Benton County where it is connected to underlying buried aquifers (Rice area aquifer system). This aquifer system is an important resource in the area around Little Rock Lake and the town of Rice. The surficial sand and gravel aquifer also extends along the southern border of the county as part of the regional Anoka Sand Plain aquifer (Lindholm, 1980). The Mississippi River has large influences on surface water and groundwater flows throughout the county. All three major surface watersheds in Benton County drain to the Mississippi River; the regional groundwater system also discharges to the Mississippi River.

Groundwater residence time and anthropogenic chemical indicators

Also shown on Figure 1 are some of the chemical characteristics of well water samples were collected from 96 area wells and analyzed for tritium (³H), stable isotopes, and natural ion and trace metal concentrations. Groundwater residence time is defined as the approximate time that has elapsed from the time the water infiltrated the land surface to the time when it was pumped from the aquifer. Tritium occurrences in groundwater were the most important constituent used for determining groundwater residence conditions. Tritium is a naturally occurring radioactive isotope of hydrogen. Concentrations of ³H in the atmosphere were greatly increased between about 1953 and 1963 by above-ground nuclear tests (Alexander and Alexander, 1989). The presence of ³H in water samples indicates water has infiltrated the land surface since the early 1950s. A short residence time or tritium age suggests higher pollution sensitivity, whereas a longer residence time suggests lower sensitivity.

In addition, some groundwater samples suspected of having a long residence time were analyzed using the carbon-14 isotope. Carbon-14 is a naturally occurring radioactive isotope of carbon with a half-life of 5,730 years; it is used to estimate groundwater residence time between 100 years and 40,000 years. The estimated groundwater residence times for 5 groundwater samples

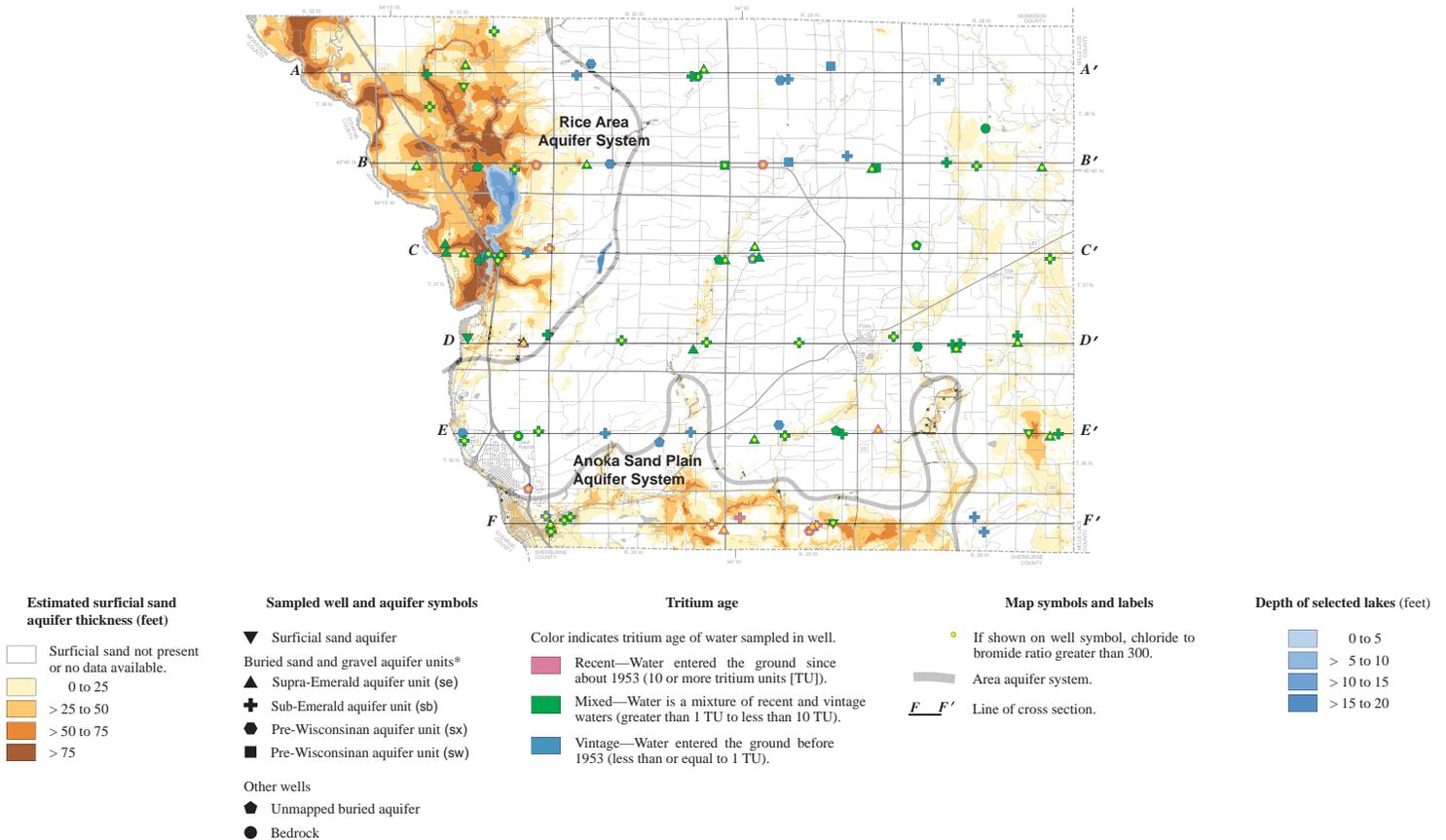
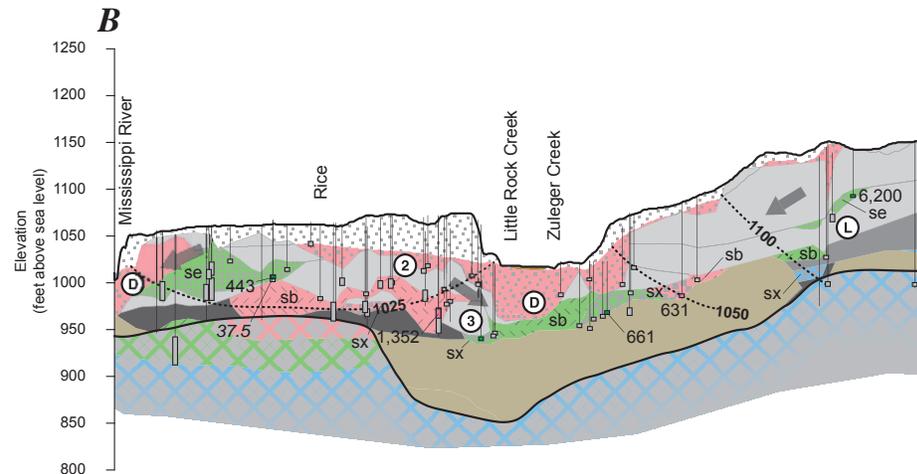
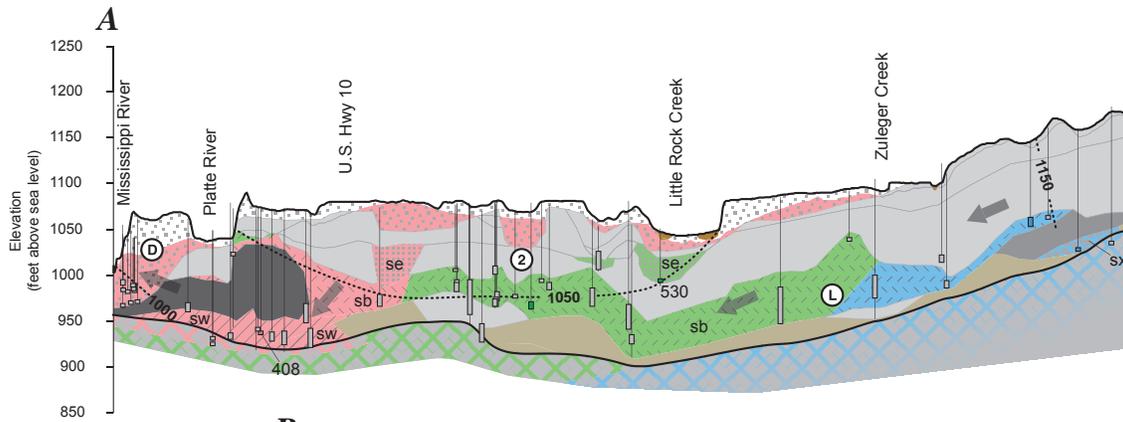


Figure 1: Surficial sand and gravel aquifer thickness in Benton County. This figure also shows chemical characteristics of groundwater samples collected from 96 area wells.

Figure 2 (facing page): Western portions of cross section A-A' and B-B'. Some of the interconnections of the Rice area aquifer system to other main aquifers in the county are shown.

Benton County Geologic Atlas, Part B, cont.



CROSS SECTION EXPLANATION

Tritium age

Darker color in small vertical rectangle (well screen symbol) indicates tritium age of water sampled in well. Lighter color indicates interpreted age of water in aquifer.

- Recent—Water entered the ground since about 1953 (10 or more tritium units [TU]).
- Mixed—Water is a mixture of recent and vintage waters (greater than 1 TU to less than 10 TU).
- Vintage—Water entered the ground before 1953 (less than or equal to 1 TU).
- Well not sampled for tritium.

Groundwater conditions

- ① Infiltration through a thin layer of overlying, fine-grained material to an underlying aquifer.
- ② Groundwater recharge from overlying surficial aquifer to buried aquifer.
- ③ Groundwater leakage through multiple aquifers and fine-grained layers.
- Ⓣ Groundwater discharge from a buried aquifer to surface-water body.
- Ⓛ Lateral groundwater flow.
- Ⓞ Groundwater movement out of cross section.

Symbols and labels

- ³⁰⁰ If shown, chloride to bromide ratio greater than 300. ← General direction of groundwater flow. Lake or river.
- ²⁰⁰⁰ If shown, groundwater residence time in years, estimated by carbon-14 (¹⁴C) isotope analysis. - - - 1030 - - - Approximate equipotential contour as labeled. Peat.
- ^{12.6} If shown, nitrate as nitrogen concentration equals or exceeds 10 parts per million. — Land or bedrock surface.

Aquifers - grouped by stratigraphy

Aquifer unit name	Aquifer unit code	Geologic unit code
Surficial sand aquifer		Qc, Qf, Qa, Qp, Qw1, Qwr, Qns, Qno, Qnw, Qef, Qci
Supra-Emerald aquifer unit		Qse
Sub-Emerald aquifer unit		Qsb
Pre-Wisconsinan aquifer units		Qsx
		Qsw

Crystalline bedrock - can be a low hydraulic conductivity aquifer or aquitard depending on location

Precambrian crystalline bedrock

Confining units - grouped by texture ranging from highest sand content (light gray) to lowest sand content (dark gray) indicating relative hydraulic conductivity (Plate 4, Part A, Table 1). Relative hydraulic conductivity based on texture as derived from Dingman (2002).

Relative hydraulic conductivity	Color code	Geologic unit code
Highest relative conductivity >60% sand gravely, sandy loam		Qnd, Qcr, Qce, western Qbs
Intermediate relative conductivity >40-60% sand loam to clay loam		Eastern Qbs (Browerville), Qbs (Lake Henry and St. Francis), Qwt (Old Rainy)
Lowest relative conductivity <40% sand clay loam		Qxe and Elmdale Qwt
Not determined		Qu

Benton County Geologic Atlas, Part B, cont.

ranged from 400 to 2,000 years, which is relatively young for groundwater in buried sand aquifers in Minnesota. These relatively young Carbon-14 ages and the predominance of recent or mixed tritium age groundwater samples (80 percent) indicate a shallow groundwater system that is recharged relatively quickly and is therefore relatively sensitive to pollution.

Anthropogenic (caused by humans) geochemical indicators such as chloride concentration, nitrate concentration, or the chloride to bromide ratio (Cl/Br), also showed the relative sensitivity and rapid recharge of aquifers in the county. Fifty-one of the samples collected had an elevated (>300) Cl/Br value, and nine of those 51 had nitrate concentrations greater than the EPA health standard of 10 parts per million (ppm).

Rice Area Aquifer System

The western portions of cross section A-A' and B-B' (Figure 2, locations shown on Figure 1) illustrate some of the interconnections of the Rice area aquifer system and all the main aquifers in the county. Crop irrigation is the largest permitted category of use within Benton County and represents almost 85 percent of water appropriated in 2010. The sub-Emerald aquifer unit (sb) provided the majority of appropriated water, accounting for 46 percent of the reported water use in 2010. The sub-Emerald aquifer unit also serves as a primary source of agricultural irrigation for crops grown in the sandy soils of northwest Benton County located within the Rice Area aquifer system. In this aquifer system, recharge to the Emerald aquifer units moves vertically downward from the overlying surficial sand aquifer and laterally from the more-deeply buried sub-Emerald aquifer unit to the east

of Little Rock Creek.

Water samples with recent-aged tritium were collected from pre-Wisconsinan and sub-Emerald aquifer units at an elevation lower than the Mississippi River, which is the regional groundwater discharge area. Recent-aged tritium at these elevations indicates that local pumping likely induced recharge downward from overlying buried aquifer units (western portions of cross sections AA' and BB').

2010 Synoptic investigation of the Rice Area aquifer system

The Minnesota DNR conducted a synoptic water level study in the Little Rock Creek watershed during the spring and summer of 2010 as part of the Part B geologic atlas and to supplement the hydrologic dataset for a groundwater model of the watershed initiated by the Benton County Soil and Water Conservation District (SWCD). Little Rock Creek is a Minnesota DNR designated trout stream (Class 2A Brook and Brown Trout) that was listed in 2002 on the State's 303(d) List of Impaired Waters for a lack of coldwater fish assemblage. The Little Rock Creek Stressor Identification Report concluded that an increase in groundwater withdrawals near Little Rock Creek has intercepted groundwater baseflow that normally would have discharged into the creek. The results of diminished baseflow to the creek are elevated in-stream temperatures and reduced habitat for the impaired biota (Felix, 2010). Synoptic measurements occurred on April 19, July 22, and September 8 of 2010. Static water levels were measured from 21 wells in the Emerald aquifer units (se and sb) and other aquifers. On the same dates, streamflow in Little Rock Creek was measured at five locations. Figure 3 shows the extent of the synoptic

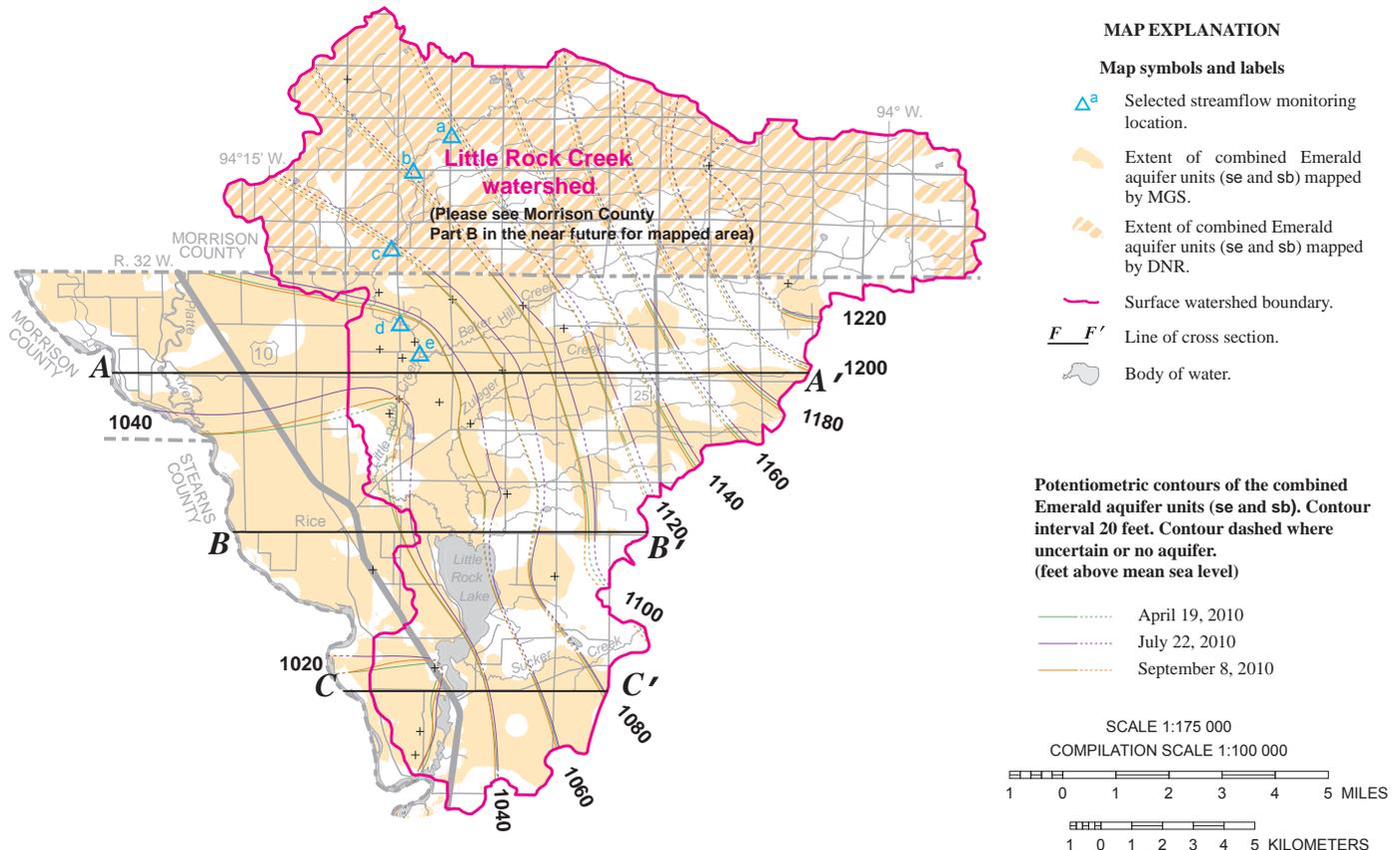


Figure 3: Extent of the synoptic water level measurement area, well locations, and stream gaging sites.

Benton County Geologic Atlas, Part B, cont.

area, well locations, and stream gaging sites.

Potentiometric contours from the Emerald aquifer units for each synoptic event are shown in Figure 3. Contours estimating change in static water levels between April and July are shown in Figure 4.

The areas with the largest change are north of Little Rock Lake including two wells with the -10 foot change in water levels. Even with the increase in precipitation between April and July (1.4 and 3.4 inches, respectively) streamflows at all sites in July were less than April streamflows, indicating a loss of water through evapotranspiration and recharge to the groundwater system for area wells and baseflow for local surface waters. Water levels in groundwater and surface waters are typically highest after a winter of minimal consumptive use and a pulse of spring recharge from snowmelt. As the growing season progresses, evapotranspiration and consumptive use lowers groundwater levels in the Emerald aquifers. With lower groundwater levels, these aquifers provide less baseflow to local surface waters. During drought periods, and as the demand for irrigation groundwater increases, this watershed and groundwater system will likely show decreasing water levels in streams and aquifers.

This article has only briefly summarized selected features of the surficial aquifer thickness map, hydrogeologic cross sections, the Rice Area aquifer system characterization, and the Little Rock Creek investigation. The Part B geologic atlas also features a water table elevation map, potentiometric surface maps of buried aquifers, a compilation aquifer test data, a near surface pollution sensitivity map, and pollution sensitivity maps of buried sand

and gravel aquifers. The atlas consists of four plates available in PDF format and GIS layers for all the essential parts of the atlas products. We encourage readers to access this information at:

www.dnr.state.mn.us/waters/programs/gw_section/mapping/platesum/bentcga.html

Paper copies of the Part A and B geologic atlases can be obtained by contacting Minnesota Geological Survey map sales, 612-627-4782, www.mnngs.umn.edu/mapsales.html

For questions or more information about the Part B Geologic Atlas call or contact Jan Falteisek, 651-259-5665, jan.falteisek@state.mn.us or Jeremy Rivord, 651-259-5728, jeremy.rivord@state.mn.us

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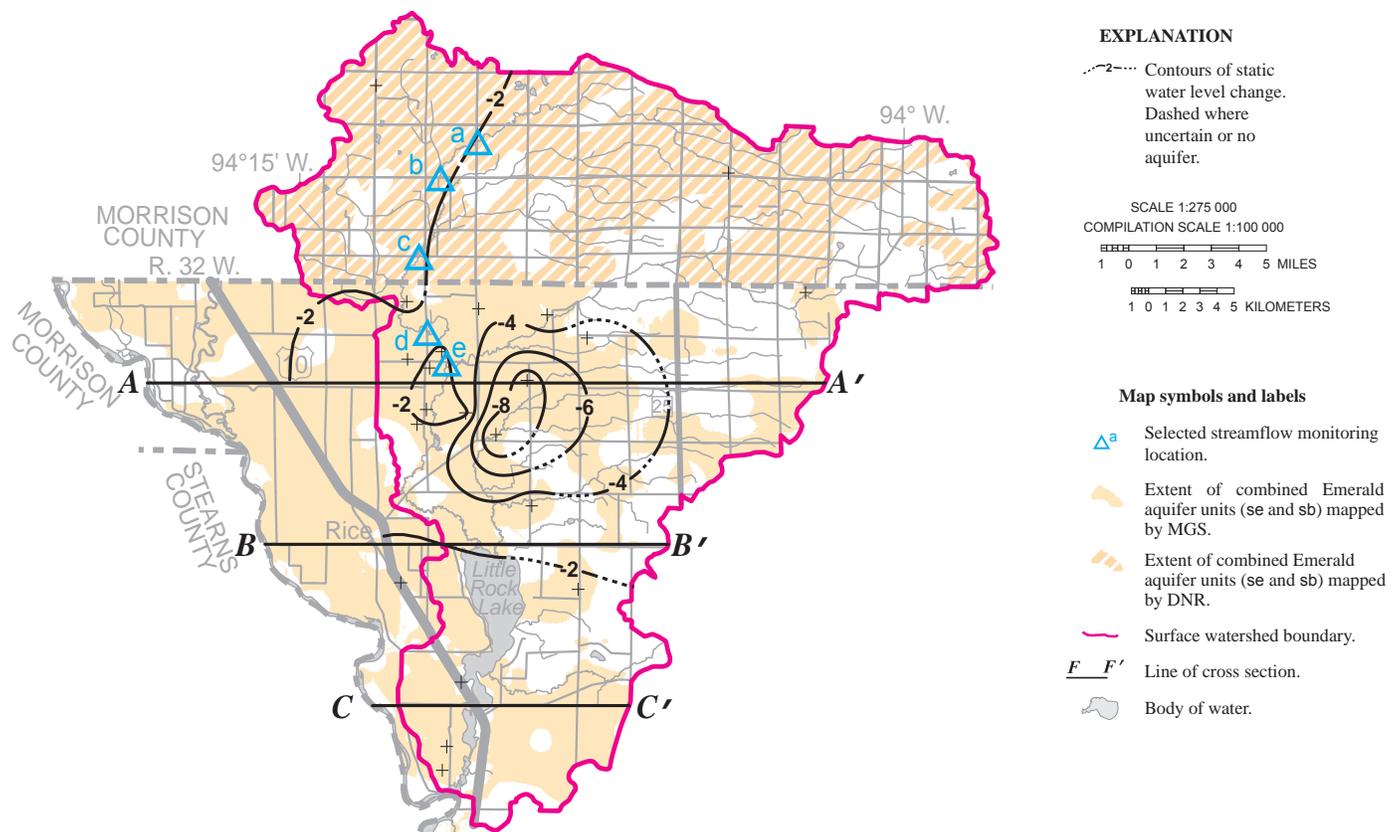


Figure 4: Contours estimating change in water levels between April and July, 2010.

The Discovery of Groundwater Microbes in 1675

By Greg Brick Ph.D.

Antony van Leeuwenhoek (1632 - 1723) was the Dutch linen draper who has been called the ‘father of protozoology and bacteriology’ by his biographer Dobell (1932). Leeuwenhoek used simple lenses that he ground himself to discover ‘animalcules’ in a wide variety of environments – including groundwater.

Leeuwenhoek reported his findings in a series of letters in Dutch to Henry Oldenburg, secretary of the Royal Society of London, who translated them for publication in the *Philosophical Transactions*. The most famous is Letter 18, published in 1676, describing his discovery of bacteria and protozoa the year before. All of the published letters can be found online at JSTOR, and the link for Letter 18 is www.jstor.org/stable/101758. The smallest organism known at that time was the cheese mite, according to Stein (1931). When you consider that some protozoa, like the paramecium, are large enough to be seen with the naked eye, Leeuwenhoek’s revelations seem long overdue. Even more astonishing, Robert Hooke published his famous *Micrographia* in 1665 (*i.e.*, years before Letter 18) using a *compound* microscope, depicting the fine structure of cloth, cork cells, fleas, and microscopic bread molds (Gest, 2004), among other things, but did not see or describe bacteria or protozoa. A bizarre omission, with the benefit of hindsight, is that Leeuwenhoek seemed unaware of the medical implications of his discoveries (Dobell, 1932, pp. 372-373). And it was not until decades later that others began to name and classify what Leeuwenhoek had discovered, described, and only crudely depicted (Dobell, 1932, pp. 375-376).

Leeuwenhoek’s intensity is suggested when he reports that “in narrowly scrutinizing 3 or 4 drops I may do such a deal of work, that I put myself into a sweat” (Dobell, 1932, p. 125). Becking (1924) has offered us a psychological interpretation of this activity, condescendingly attributing it to a man trying to kill time during “the dreary Dutch days, when rain drizzled outside”. Given the staggering number of valuable observations that Leeuwenhoek made (nicely summarized by Cole, 1937) one could only wish that others had been just as bored! I confess I was nearly floored when, upon visiting the Bio-Medical Library at the University of Minnesota, I came across what looked like an encyclopedia set, only to find that it was Leeuwenhoek’s collected writings. Even more remarkable when you consider that he didn’t begin his researches until he was forty years old.

However, you would as little think of calling Leeuwenhoek’s lenses ‘microscopes’ as you would call the common magnifying glass a microscope, although some of them, with lenses only a millimeter in diameter, magnified up to 270 times or more – a far cry from the modest, several-fold magnification of the ones we are familiar with today. Being a draper, Leeuwenhoek, far from deserving the title ‘the father of microscopy’ (or even more absurdly, the father of the microscope!) as some have called him, was simply using a tool of his trade, the magnifying glass – employed for making thread counts – but applying it to other things around him.

Letter 18 records the first observation of bacteria and protozoa, but what is significant in the present context is that it also records the first observation of microbes (probably flagellated protozoa, according to Dobell, 1932, p. 129) in *groundwater*. It is sometimes assumed that the realization of the existence of microbes

in groundwater is a more recent thing, and while that is true with regard to their important role in the subsurface biosphere, the fact is that the discovery of microbes in groundwater and the discovery of microbes themselves is coeval, having occurred in the town of Delft, Holland, in 1675, when Leeuwenhoek sampled the well in the courtyard of his house. He was usually mindful of the possibility of contamination from surrounding sources, which is why he often rinsed his specimen containers before collecting the representative sample, but the fact that the microbes seemed to bloom seasonally might suggest a secondary source.

Although the hyperlink for the original text is provided above, Dobell, in his classic 1932, biography, *Antony van Leeuwenhoek and his Little Animals*, asserted that Oldenburg’s translation was defective, omitting more than half the original, which Dobell found in the archives and retranslated for his book. Below is Dobell’s version of this discovery (pp. 128-129).

Observations on Well-Water

I have in my yard, standing in the open air, a well, which is about 15-foot deep before you come to the water. It standeth at the south, but so encompassed with high walls, that even when the sun is in the sign of Cancer, the coping of the well is not shone upon. This water cometh out of the ground, which is well-sand, with such force, that whenever I have tried to empty the well there was always about a foot of water still left in. On a summer day this water is so cold that ‘tis not feasible to keep your hand in it for long. Having no thought that there would be living creatures in it (for ‘tis very palatable and clear), I examined it in September of last year [1675], and discovered therein a great number of very small animalcules, which were very clear, and a bit bigger than the very smallest animalcules that I’ve ever seen. And I imagine (having aforesaid weighed a grain of water), that there were commonly more than 500 living creatures in one grain of this water. These animalcules were very sedate, moving without any jerks. In the winter I perceived no little animals, nor did I see any of them this year before the month of July, and then not in such great plenty; but in the month of August, their number was much increased.

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MGWA BOARD MINUTES

Minnesota Ground Water Association Board Meeting Minutes

Meeting Date: September 6, 2013

Location: Fresh Grounds Café 1362 West 7th Street, St. Paul, MN
Attendance: Bob Tipping, President; Kelton Barr, Past President; Eric Mohring President-Elect; Audrey Van Cleve, Treasurer; Julie Ekman, Secretary; Tedd Ronning, Newsletter Editor; Sean Hunt, WRI; Jennie Leete, WRI.
Past Minutes: August minutes approved.
Treasury: Copies of the report were provided by Van Cleve. Net income is \$22,107; total assets: \$75,225.
Newsletter: Ronning reported that the newsletter was sent to Leete last Friday. Barr will provide an article on the White Paper Initiative.
Web Page: Hunt has been updating web pages on MGWA fall events.
WRI Report: Leete provided copies of the Business Manager's Report that summarizes activities since the last meeting. Activities include maintaining membership information, reconciling bank statements, exploring fall field trip food options, working on the September newsletter, and completing tax forms for the MGWA Foundation.
Old Business: Fall Conference: The deadline for early registration is October 25th. Pamphlets will be mailed and the web page edited to highlight October 25th as the last date to receive the discounted registration price. An explanation of the student registration fee will be included (students will pay \$65 then are refunded \$50 upon attending the conference). The Board decided to change the exhibitor registration deadline to October 15th (from September 25th). Tipping reported that the conference agenda is full. There will be six speakers instead of seven; this will allow for an extended time for poster perusal. Tipping plans to visit local colleges to encourage students to attend the conference and provide posters. Tipping is the contact person for posters. Fall field trip: The attendance limit is 55 and so far 10 have registered. All of the stops throughout Fillmore County are finalized with speakers; bus arrangements are ready. The Board discussed options for delivery of box lunches to Whitewater State Park. The Saturday itinerary includes a stop at the National Trout Center; the Center promotes education on water quality and trout. E. Calvin Alexander and Tipping are developing a guidebook for the fieldtrip. White Paper Initiative: Barr handed out a list of questions on the White Paper Initiative for the Board to discuss and answer. The list is extensive and Board members will independently write their thoughts on these for discussion and decisions during the next Board meeting. Additionally, Board members are asked to look for examples of white papers and send them to Barr and Tipping.
New Business: Mohring expressed concern that the University's Geoscience Department is moving away from groundwater education which is very important and necessary to addressing Minnesota's water issues.

Meeting Date: October 10, 2013

Location: Fresh Grounds Café, 1362 West 7th Street, St. Paul, MN
Attendance: Bob Tipping, President; Kelton Barr, Past President; Eric Mohring President-Elect; Audrey Van Cleve, Treasurer; Julie Ekman, Secretary; Sean Hunt, WRI; Jennie Leete, WRI.
Past Minutes: September minutes were approved as amended.
Treasury: Copies of the report were provided by Van Cleve. Income increased due to registrations for the fall field trip and conference; expenses also show an increase due to these events, the newsletter publication, and tax preparations. Net income is \$26,894; total assets: \$82,401.
Newsletter: The September issue is published. Hunt resolved the download problems that some were experiencing. The deadline for the next issue is November 2nd.
Web Page: Hunt has uploaded the Fall Conference and Field Trip information.
WRI Report: Leete provided copies of the Business Manager's Report that summarizes activities since the last meeting. Activities include sending informational emails, reconciling accounts, preparing and mailing the conference brochure, conference and field trip registrations, producing the newsletter, and attending the MGWAF meeting.
Old Business: Fall Conference: Barr shared an idea for the conference program: include one page per speaker or poster presenter that would include a photo of the speaker/presenter, their bio and would include space for notes. Barr and Gabanski will contact consulting businesses to encourage them to exhibit at the conference. Barr suggested that the MGWA Foundation could form a team to lead and coordinate exhibit sponsorships for future conferences. Fall field trip: The attendance limit is 55 and so far 32 have registered. The deadline for registration will be Monday, October 14th. Corporate sponsorships have reached \$700. Lunch arrangements have been finalized. Tour details will be sent to registrants. Tipping and Leete will format the tour guidebook. White Paper Initiative: Board members discussed details about the White Paper Initiative: committee responsibilities, structure and content of a white paper, and the preparation and presentation of a white paper. The Board will review the remaining questions and send suggestions to Barr by Tuesday, 10/15.

MGWA 2014 Membership Dues

Professional Rate:	\$35
Full-time Student Rate:	\$15
Newsletter (printed and mailed)	\$20
Directory	\$7

Membership dues rates were revised at the October 1, 2010 meeting of the MGWA Board. They remain unchanged.

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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.

Thank You Gil!

By Bob Tipping, MGWA President

Excerpts from the first edition of the MGWA newsletter, October, 1982:

“The Minnesota Ground Water Association is unlike any other professional society in the state. The Association focuses not on one profession, but on one basic resource – ground water.... The Minnesota Ground Water Association has been founded to bring together members of the various professions whose responsibility it is to solve our ground water problems, and to promote intelligent use of groundwater resources in the state.... These are some topics for discussion at future MGWA meetings. What are the available techniques for mapping shallow, discontinuous aquifers? Who owns ground water in Minnesota? What are the criteria for selecting water disposal sites? What are the ...effects of agriculture and mining practices on Minnesota ground water? Can the practices be changed, ... at what cost?

... How can we ‘demystify’ the concepts of ground water hydrology for the general public?”

The author is Gil Gabanski, first president of the Minnesota Ground Water Association, and currently retiring as president of the Minnesota Ground Water Association Foundation. Gil could easily have been proposing topics for MGWA’s current white paper initiative (see Kelton’s article this issue). Gil also outlines the basic purpose of MGWA – to get people together from various professions to offer their perspective, based on their experience with Minnesota ground water. Gil finishes the article with the following:

“The Minnesota Ground Water Association invites – and challenges – you to work to solve Minnesota’s ground water problems. Bring to the Association your experience and professional pride, but not your prejudices. Be generous enough to teach but willing still to learn and listen. LET’S GET STARTED”

For over 30 years, Gil has spoken his mind and encouraged other MGWA members to do the same. My personal experience is that you better check the time remaining when you give Gil the podium. Seriously, the most common response I got when asking about Gil was that he has been extremely generous with his time, always trying to make connections, particularly for people just getting started in the ground water profession. Gil is enthusiastic about ground water, and he has helped others feel the same way. Thanks Gil!

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FOUNDATION NEWS

Second Annual MGWA/MGWAF Scholarship Announced

The Minnesota Ground Water Association (MGWA) and MGWA Foundation are excited to announce the Second Annual \$1,000 student scholarship for undergraduate or graduate students majoring in hydrogeology, groundwater hydrology, or similar programs at an accredited college or university in Minnesota or an adjoining state or province. The goal of this scholarship is to alleviate a portion of the educational costs of qualified students, while also increasing their interest in the professions of hydrogeology, groundwater geology, and related programs.

There were many qualified candidates who applied for the scholarship last year and we encourage those who were not successful to re-apply this year! The application form and additional information can be found on the MGWA website at:

<http://www.mgwa.org/foundation/funding.php>

The application deadline is January 31, 2014. Please pass this information on to any students who may be interested in applying for this valuable scholarship!

MGWA Foundation Board of Directors

Thanks from Children's Water Festival Attendees

