

# SPEAKER SUMMARIES/BIOGRAPHIES

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

Minnesota Ground Water Association  
Spring Conference, 2018

### **Jim Stark**

Director, Minnesota Legislative Water Commission

### **Little Plover River Aquifer Test**

#### **Summary**

“Water use in the state is increasing rapidly and diverse interests have developed among numerous water users. The development of groundwater for irrigation has been increasing and a conflict has arisen between the irrigators and sports enthusiasts who are interested in maintaining streams for trout habitat. Much of this conflict is due to misunderstandings, by both groups, about the interrelation of groundwater and surface water and the magnitude of the effects of groundwater withdrawals on streamflow. Because of conflicts of this type, laws governing the development of water resources are being examined with the view toward their possible revision. At present, State water laws do not reflect the interrelations of surface water and ground waters.”

#### Introduction

*Hydrology of the Little Plover River basin, Portage County, Wisconsin, and the effects of water resource development*

USGS Water Supply Paper 1811, 1965

#### **Biography**

As the Director, Jim coordinates water-resource planning and legislation among Legislators in the Senate and House, and with State Agency staff. Previously, he was the Director of the USGS Minnesota Water Science Center. Jim holds degrees from the University of Minnesota, the University of Wisconsin, and from St. Thomas University.

## **Gretchen Sabel**

retired - Minnesota Pollution Control Agency

### **Ground Water Strategy and Ground Water Protection Act**

#### **Summary**

Groundwater depletion, contamination by industrial chemicals and landfill leachate, pesticides, salt, petroleum products and lots of things - all these threats met up with increasing demand for groundwater for water supplies for a growing population in the 1980's. The 1989 Groundwater Protection Act set up a process for dealing with some of these issues, and set in motion changes that are still grinding away today. In this talk, we will look at what went into this landmark legislation, what's been addressed and what remains today.

#### **Biography**

Born in Western Pennsylvania, Gretchen went to the University of Cincinnati, earning a bachelor's degree in Biology in 1975. She worked for the US Environmental Protection Agency in Cincinnati until 1978, when she moved to Minnesota. Here, Gretchen took a job with the State of Minnesota, working in various water-related programs with the Minnesota Pollution Control Agency, the Minnesota State Planning Agency and the Minnesota Environmental Quality Board over the next 36 years. Gretchen earned a Master's of Public Affairs degree from the Humphrey School at the University of Minnesota in 2005, and retired from the State in 2014. Gretchen is active with the League of Women Voters. She is also chair of the Andover Open Space Commission and the Anoka County Water Resources Task Force. Gretchen and her husband, Paul, have three grown children and five grandkids.

## Steve Thompson

retired – Minnesota Pollution Control Agency &  
Minnesota Department of Natural Resources

### **Life in the Deep State at the MPCA**

#### **Summary**

The term 'deep state' is used within political science to describe "influential decision-making bodies within government that are relatively permanent and whose policies and long-term plans are unaffected by changing administrations".

The term "ship of state" is another (less ominous) way to describe these "decision-making bodies". Anyone, like me, who has worked through more than one administration would be a member of the "ship of state/deep state". I kept working my same job in pretty much the same way through election cycles. This is a good thing. Stability through political change has been is one of the hallmarks of our democracy and that must not change.

But there is a related topic which is not often examined: the culture of our programs and agencies. All organizations have individual and unique cultures and personalities. For example, Exxon had a far different "personality" than 3M, and the MPCA has a different culture than the MDA. And there are different cultures within different programs within agencies. The question we need to ask ourselves: is our culture healthy?

The culture comes from many factors including:

- Mission or purpose of the organization/leadership
- Level of trust and dignity
- Competence and accountability
- Ethical standards
- Types of people who populate different professions

We may soon be seeing the political pendulum swinging in the other direction: from all government and government regulation is bad, to something else.

I hope that "something else" is level headed, science-based, reasonable government which has the competence and trust of the people to address our significant global issues. Despite all the distractions, it is more important than ever to improve our government systems and approaches. Honestly examining our program and Agency cultures and seeking to make improvements before they become problems is the job we need to do.

With stories and lessons learned from the past, Steve will comment the following topic areas:

- Making science- and data- grounded decisions in a political climate
- Creating accountability systems which evaluate programs, administration, staff
- Maintaining integrity, quality and dignity in government
- Encouraging creativity, innovation, and program improvement
- Balancing judgment and certitude
- Designing transparency into systems

## **Biography**

Steve is a geologist/hydrogeologist, builder, musician, farmer, father, and husband who lives and works on 80 acres near River Falls, WI. Steve is launching several farm-based endeavors: a woodworking business, a small inn in a restored immigrant log home, and a horse-boarding stable. The farm produces timber, maple syrup, and hay. Steve also spends time playing music; he plays cello for the East Metro Symphony Orchestra and has played solo and in duets in various venues.

Steve spent much of his professional hydrogeology career working for the State of Minnesota in various positions and programs at the MPCA and MN DNR. Steve joined the MPCA's Petroleum Remediation program in 1990. Those were the early years of the program, and Steve played a significant role in shaping the policy and guidance document development for the program. Later, Steve spent time as supervisor in the MPCA Superfund program with responsibility for several of the State's largest sites. He next took a supervisor position charged with reestablishing the Ambient Groundwater Network and building the Watershed Pollutant Load Monitoring Network. Both networks continue to collect and provide valuable environmental data and information about Minnesota's groundwater and river systems. Steve spent the last few years of his State career as supervisor of the Groundwater and Hydrogeology Unit at MN DNR with the focus on sustainability of groundwater supplies and overseeing the Hydrogeologic Atlas program.

Prior to working for the State, Steve worked as geologist for Exxon, looking for deep gas deposits in Oklahoma, and worked for several years as a high school science teacher.

Steve has a BA in Biology from Concordia College (Moorhead, MN) and a MS in Geology from the University of North Dakota (Grand Forks, ND).

## **Ingrid Verhagen**

Minnesota Pollution Control Agency

### **History of Groundwater Contamination Assessment and Management Around Closed Landfills**

#### **Biography**

Ingrid Verhagen received her B. S. in geology from a Grand Valley State University in 1982 and her M.S. In geology with a Chemistry minor from University of Minnesota Duluth in 1985. She worked for 25 years as a hydrogeologist in the Closed Landfill Program at the MPCA. She has also worked in the Superfund Program, Solid Waste Permitting and is currently providing business analysis, training and support for MPCA data systems.

## **Krista Hood**

US Geological Survey

### **Evaluating and Understanding Nitrate Trends in Groundwater in Wisconsin**

#### **Summary**

Nitrate is the most widespread contaminant in Wisconsin and is found to exceed drinking water standards in 10% of private wells. The prevalence of agriculture combined with the importance of nitrogen for high crop yields assures us that nitrate will continue to be a constituent of concern for Wisconsin into the future. The National Water Quality Assessment program (NAWQA) has been evaluating the quality of the Nation's water for almost three decades. NAWQA groundwater studies have examined multiple spatial and temporal scales of water-quality trends. One of the more significant findings from the NAWQA decadal network sampling in Wisconsin is the strong correlation between nitrate concentrations in groundwater and fertilizer use. Understanding long-term trends are critical to interpreting the overall health of an aquifer but with sampling designs that typically monitor infrequently, we often overlook short-term or seasonal variability that can be used to determine additional factors affecting groundwater water-quality.

The NAWQA Enhanced Trends Network (ETN) was designed to evaluate water-quality trends in groundwater on shorter time scales. Using in situ and above-ground sensors we are collecting high-frequency data combined with annual and sub-annual discrete samples at multiple wells in the glacial aquifer. Data collected for the ETN study up to this point suggest that some water-quality parameters do not have enough variability to be of hydrologic interest in the short term. This is most common in the deeper wells with older recharge ages but dissolved oxygen has little variability at all the sites. However, in some wells, variability of nitrate, for example, can be linked to both seasonality and antecedent hydrologic conditions. We can use the information from these fine-scale studies to increase the power of long-term trends for predicting behavior of nitrate and other contaminants in groundwater in order protect public and private drinking water sources.

#### **Biography**

Krista Hood is a hydrologist at the Wisconsin Water Science Center in Middleton, WI. She started working at the USGS when she was a student at the University of Wisconsin-Madison. Krista started with the survey assisting in surface water and ecological sampling for the National Water Quality Assessment. She continues to work in water quality but has turned her focus to high frequency water quality monitoring. Some of her other project work includes database management, statistical analysis of soil and water chemistry data, and hydrologic data analysis.

#### **Education**

M.S. Soil Science, University of Wisconsin-Madison

B.S. Soil Science and Geology, University of Wisconsin-Madison

## **Dr. Amit Pradhananga**

University of Minnesota, College of Food, Agricultural and Natural Resource Sciences

### **Applying Social Science to Groundwater Studies**

#### **Summary**

Groundwater protection requires coordinated action from multiple stakeholders across jurisdictional boundaries including at the state (e.g., state agencies) and local levels (e.g., soil and water conservation districts, counties). The success of state-level initiatives depends on the participation of local government units. Therefore, it is critical to understand capacities and constraints associated with groundwater protection at the local level. This study assesses the capacity of local government unit (LGU) (i.e., cities and counties) staff to engage in groundwater protection. The primary objectives of this study were to: 1) assess capacities and constraints associated with groundwater protection, and 2) identify and prioritize critical capacity-building needs of LGUs in groundwater and drinking water protection. Data were gathered using a statewide survey of LGU staff in 2017. Survey design was informed by the Social Measures Monitoring System (SMMS). This study builds on a 2015 statewide survey of Soil and Water Conservation District (SWCD) staff that was funded by the Department of Natural Resources. Study findings suggest that while LGU staff were aware of groundwater issues, and believed that groundwater issues are important to their LGU, they lack the resources and technical expertise needed to protect groundwater. LGU staff identified several constraints to groundwater protection including lack of trained staff devoted to groundwater protection, and insufficient awareness and commitment to groundwater protection among local community members. While respondents believed that local community member engagement and education and outreach are important to address groundwater issues, they were unsure or disagree that their LGU is effective in these roles. Implications for groundwater planning and programming will be discussed.

#### **Biography**

Amit Pradhananga is a Research Associate in the Department of Forest Resources and the Center for Changing Landscapes at the University of Minnesota (UMN). His research centers on investigating the human, social, and policy dimensions of natural resources in the context of water resource, forest, invasive species, and recreation resource management, as well as climate change adaptation. He has led multiple projects using quantitative and qualitative social science research methodologies on a range of topics including conservation practice adoption, community engagement, groundwater protection, and park and trail visitor experiences. In addition, he provides training in social science assessment methods to natural resource professionals from state and local agencies and organizations.

## **Brian P. Dunnigan P.E. and James C. Schneider Ph.D.**

Olsson Associates

### **History of Groundwater Appropriation, Water Law, and Groundwater Modeling in Nebraska**

#### **Summary**

Nebraska has been actively managing its surface water for over 100 years under the doctrine of prior appropriation common to the western United States. However, unlike most western states, groundwater use was never incorporated into that management system. In the early 1980's, a groundwater management mandate was assigned to recently created Natural Resource Districts (NRDs), a system of locally elected units of government. Groundwater and surface water were managed independently, and with little to no cross-consideration, for the next 20 years.

Early groundwater models projected dire consequences related to current and expected future groundwater use. When these projections failed to come to pass, confidence in groundwater modeling was significantly eroded by the early 2000s. After a U.S. Supreme Court ruling in an interstate water dispute, Nebraska was forced to recognize the impact of groundwater use on surface water supplies. A sweeping legislative change in 2004 created the authorities needed to overcome decades of inaction and institute a truly proactive system of integrated water management. As groundwater models are the only way to estimate changes in streamflow due to groundwater use, the State and the NRDs have invested heavily in their development and use. Currently there are regional groundwater models covering the state, and sub-regional models and other specialized tools are coming forward to meet future water management needs.

#### **Biographies**

Brian Dunnigan is a licensed professional engineer with a bachelor of science in civil engineer from the University of Nebraska-Lincoln. He currently leads Olsson Associates' Nebraska Water Resources team located in Lincoln and Omaha, Nebraska. He has over 35 years of experience in water resources management. As the former director of the Nebraska Department of Natural Resources, his statutory responsibilities included: administering and regulating surface water to ensure compliance with interstate compacts and agreements; directing the floodplain management and dam safety programs; operating the state's stream gaging program; coordinating integrated water management planning in collaboration with local natural resources interests; coordinating state-wide water planning; registering groundwater wells and issuing surface water permits; and managing state cost-share programs to aid in proper use and protection of Nebraska's water, land, and related natural resources.

Jim Schneider is a hydrogeologist with a Ph.D. in geology from the University of South Florida. He is currently a senior scientist with Olsson Associates' Nebraska Water Resources team in Lincoln, Nebraska. He has 15 years of experience in water resources management. At Olsson he has managed a variety of projects, many of which involved development of a groundwater model. He played a major role in the development of Olsson's Groundwater Evaluation Toolbox (GET), a cloud-based tool that automates the use of groundwater models. Prior to his time at Olsson Jim worked at the Nebraska Department of Natural Resources, originally as their senior groundwater modeler, and eventually as the deputy director. He led the department's efforts to develop regional groundwater models covering the **entire state**. He also provided expert witness testimony to the U.S Supreme Court regarding interstate litigation between Kansas and Nebraska.



## **Kelton D. L. Barr**

Kelton Barr Consulting, LLC

### **Applying Past Lessons Learned to Future Groundwater Problems**

#### **Summary**

The last 40 years of hydrogeologic investigations on Superfund sites in Minnesota and elsewhere have taught us several lessons about the nature of groundwater contamination sites and plumes. These lessons have come at a cost of billions of dollars and the loss of much of the groundwater resources beneath and near our population centers. In addition, we have become aware that our increasing pumpage of groundwater to meet our water supply needs can take an adverse toll on our ecological resources. Examination of the full effects of our groundwater withdrawals have shown us additional limits to the extent and sustainability of our groundwater supplies.

As we look into future scenarios of population increases, growth of our cities and metropolitan areas, and climate change, we should be aware of and apply the lessons we have learned in the groundwater profession. An example is presented, looking at the prospects of enhancing aquifer recharge in the seven-county Twin Cities metropolitan area. The results of this study found that the viable recharge sites are predominantly in the southeastern portion of the metro area. Other work examining land practices and water quality trends will also be presented.

[https://metro council.org/Wastewater-Water/Planning/Water-Supply-Planning/Studies-Projects-Workgroups-\(1\)/Ongoing-Studies-Projects/Regional-Feasibility-Assessments.aspx](https://metro council.org/Wastewater-Water/Planning/Water-Supply-Planning/Studies-Projects-Workgroups-(1)/Ongoing-Studies-Projects/Regional-Feasibility-Assessments.aspx)

#### **Biography**

Kelton Barr is Principal of Kelton Barr Consulting, LLC. For more than 44 years he has been a consulting hydrogeologist for several local and national firms. During this time he has been involved with the investigation and modeling of groundwater hydrology, karst flow systems, bioremediation, and geothermal systems, working on projects throughout the United States. Kelton has a B.A. in geology from Carleton College and a M.S. in hydrogeology from the University of Minnesota. He has conducted short courses on behalf of the University of Wisconsin, U.S. Environmental Protection Agency, U.S. Air Force, several oil companies, and more than 20 states' regulatory agencies.

## **Tim Gieseke**

Minnesota Department of Natural Resources

### **CAMP: Community-based Aquifer Management Partnerships**

#### **Summary**

A discussion on how the DNR Region 4 C.A.M.P. pilot effort attempts to connect water, culture, science and community. The presentation is framed around a Re-Connect, Re-Think, and Re-Structure approach as it relates to groundwater and common pool resource management – with a few slides thrown in on how these so-called “wicked problems” emerge.

#### **Biography**

Tim is the Groundwater Planner for DNR’s Division of Ecological and Water Resources, Region 4 in New Ulm since 2016. He leads the delivery of Community-based Aquifer Management Partnerships (CAMP) where he is responsible for increasing awareness and engaging communities as it relates to co-managing aquifers. In addition to this role, he has experience as a SWCD director, a farm bill/water policy analyst, ag producer and owner of an ag-environmental consulting business. He holds a MS in environmental sciences and has written two books on the socio-economics of landscape sustainability; *EcoCommerce 101* (2011) and *Shared Governance for Sustainable Working Landscapes* (2016).

## **Chris Elvrum**

Minnesota Department of Health

### **Groundwater Restoration and Protection Strategies (GRAPS)**

#### **Biography**

Chris Elvrum is the manager of the Well Management Section at the Minnesota Department of Health where he oversees the program that regulates the construction, maintenance and sealing of wells and borings in Minnesota. Previously, he worked at the Metropolitan Council in the area of water supply planning and as an environmental consultant in Wisconsin. Chris received a B.S. Degree from the University of Wisconsin - Eau Claire and a M.S. Degree from the University of Kentucky, both in Geology. He is a licensed professional geologist in Minnesota.



# LIGHTNING TALKS

## Round 1

**Ellen Considine, MGWA**  
*Education Committee*

**Bill Olsen, Dakota County**  
*Minnesota Unique Well Numbers*

**Brian Bohman**  
*Groundwater and Agriculture: What's working and what's missing?*

**Mark Toso, Minnesota PCA**  
*Monitoring wells are holes in the ground that tell you lies*

## Round 2

**Evan Christianson, Barr Engineering**  
*Big scale and gradual change, using models to put it into perspective*

**Jeff Green, Minnesota DNR**  
*Minnesota Groundwater Tracing Database (MGTD)*

**Julie Blackburn, RESPEC**  
*Irrigation Management Scheduling Tool*

**Dan Miller, Minnesota DNR**  
*Update on White Bear Lake*

# POSTERS

**Kinzey Stoll, UMD**

***Isotopes Found in Precipitation Around Lake Superior***

**Nick Budde**

***Analysis of Stream Temperatures in East Indian Creek, Wabasha County, Minnesota***

**Carmelita Nelson, DNR**

***Interactive Poster: New Water Conservation Reporting***

**Edward Pencak**

***Hydrogeology of Trout Brook in Dakota County***

**Nicholas Budde**

St. Cloud State University

***Analysis of Stream Temperatures in East Indian Creek, Wabasha County, Minnesota***

## **Abstract**

Brook trout populations have been rebounding in southeastern Minnesota streams since the 1970s. Brook trout prefer cool, stable stream conditions, which can be supplied by groundwater inflow to streams. As a part of a Minnesota Environmental Trust Fund and National Science Foundation sponsored project, the Minnesota Geological Survey in cooperation with the Center for Transformative Environmental Monitoring Programs (CTEMPS) studied two thousand meters of the headwaters of East Indian Creek in Wabasha County, Minnesota to relate geology and hydrology to brook trout habitat. Areas of groundwater inflow to the stream can be identified to help understand trout habitat. A fiber optic distributed temperature sensor (DTS) cable placed along the streambed of the study reach continuously sensed temperature using Raman light scattering. Data was collected every five minutes for 4 weeks at one meter resolution in both September 2017 and January 2018. A calibration method that successfully calibrates the stream temperatures was developed and the need for in-stream calibration points at both upstream and downstream ends of the study area was established. The study also involved the qualitative location of multiple areas of groundwater input into the stream signified by trends in stream temperature.