

PRESENTATION SUMMARIES & SPEAKER BIOGRAPHIES

Minnesota Ground Water Association
Spring Conference 2022 – April 28, 2022

Online via Zoom

A Groundwater Tour of Minnesota



John Seaberg

Minnesota Department of Natural Resources

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Hydrogeology of Minnesota: A whirlwind tour from 30,000 feet

Presentation

- Geologic setting
- Physical and geologic properties
- Hydrology
- Groundwater provinces and major aquifers
- Groundwater availability and use
- Surface water/groundwater interactions
- Current conditions
- Groundwater technical resources for Minnesota

Education

MS: (Geology, hydrogeology emphasis, Civil Engineering minor) University of Minnesota, Twin Cities, 1985

BS: (Geology and Geophysics) University of Wisconsin, Madison, 1980

Experience

Groundwater Specialist, Minnesota Department of Natural Resources, 2017 – present

Senior Analyst/Hydrogeologist, Merjent, Inc., 2011 – 2017

Consulting Hydrogeologist, 2009 – 2011

Senior Consultant/Hydrogeologist, Natural Resource Group, LLC, 2004 – 2009

Hydrogeologist/Research Scientist, Minnesota Pollution Control Agency, 1990 – 2004

Hydrogeologist, Barr Engineering, 1986 – 1990

Hydrogeologist, EWA, Inc., 1985 – 1986



Josh Kirk

Barr Engineering Co.

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Banking groundwater: Saving for a not so rainy day

Presentation

- Overview of aquifer storage and recovery (ASR) and managed aquifer recharge (MAR) fundamentals
- Case studies on ASR and MAR around the country
- Potential benefits of ASR and MAR in Minnesota
- Evaluation of potential sites suitable for ASR and MAR in Minnesota

Education

MS: (Civil Engineering, environmental focus) University of Minnesota, Twin Cities, 2020

BS: (Environmental Engineering, GIS minor) University of Minnesota, Twin Cities, 2019

Experience

Environmental Engineer, Barr Engineering Co., 2020 – present

Associate Engineer, Minnesota Technical Assistance Program (MnTAP), 2019 – 2020



David Scheer

Minnesota Pollution Control Agency
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Characterizing chlorinated ethene sources and transport in a complex fractured rock aquifer impacting Twin Cities area municipal supply

Presentation

- Background: Area of interest, regional geology and chemicals of interest
- Distribution of chlorinated ethenes in the PdC-J
- Contaminant transport pathways and transport mechanisms in the PdC-J
- Distribution of chlorinated ethenes in shallow groundwater
- Vapor intrusion
- Shallow tetrachloroethene plume

Education

BA: (Geology, Geophysics emphasis) St. Cloud State University

Experience

Hydrogeologist, Minnesota Pollution Control Agency, 1993 – present
Environmental Specialist, Minnesota Pollution Control Agency, 1988 – 1993



Stephanie Tassier-Surine

Iowa Geological Survey

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Sinkhole mapping in a multi-county area of north-central Iowa

Presentation

- Sinkhole update to Worth, Cerro Gordo, Mitchell, and Floyd counties
- Using detailed geologic map information to create a karst susceptibility map
- Field investigations including Electrical Resistivity (ER) of mapped sinkholes to evaluate subsurface characteristics
- Summary and future work

Education

MS: (Geology) University of Massachusetts, 1999

BA: (Geology) Grand Valley State University, 1996

Experience

Geologist and STATEMAP Program Coordinator, Iowa Geological Survey, University of Iowa, 2014 – present

Research Geologist, Iowa Geological Survey, Iowa Department of Natural Resources, 1999 – 2014

Hydrogeologist, Tighe & Bond Consulting Engineers and Environmental Specialists, Westfield, MA, 1998 – 1999



Aaron Meyer

Minnesota Rural Water Association

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Drinking water protection – Connecting the dots for Rock County rural water

Presentation

- Introduction to Minnesota Rural Water Association
- Minnesota drinking water nitrate hotspots
- Rock County Rural Water's approach to addressing elevated nitrates
- Lessons learned from working with agencies and producers

Education

MS: (Natural Resource Management), North Dakota State University, 1998

BS: (Biology) Concordia College, Moorhead, 1995

Experience

Sourcewater Protection Specialist, Minnesota Rural Water Association, 2006 – present

Water Resource Specialist, Stearns County Soil and Water Conservation District, 1998 – 2006



Jennifer Rose

Minnesota Department of Natural Resources

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It's all connected: Pumping deep aquifers lowers water levels in shallower aquifers in northwest Minnesota (Co-authors: Michele Walker, Rosalyn Krog, and Amanda Yourd)

Presentation

Groundwater use for agricultural irrigation has expanded in recent years in southern Red Lake County and central Polk County in northwest Minnesota. The number of groundwater appropriation permits increased from 11 in 2010 to 40 in 2021. This increase in high-capacity pumping has led to water supply problems for dozens of rural residences. The aquifer system in this area consists of water table aquifers along former Glacial Lake Agassiz beach ridges and multiple unconsolidated buried aquifers that are typically confined by glacial till. The aquifer system is not fully characterized due to the nature of the glacial deposits. Expansion is occurring in areas that have not been previously studied. The DNR is requiring aquifer tests as part of permit requirements and monitoring groundwater levels to study the aquifer system.

Results show that the buried aquifers are leaky confined and strongly interconnected when pumped. High-capacity pumping from the deep buried aquifers lowers water levels in the shallower buried aquifers where many domestic wells are screened. Shallow buried aquifers can take months to recover after the deep buried aquifers are pumped which has led to water supply problems even after pumping has stopped. The interconnection of the buried aquifers demonstrates the leaky nature of the confining units and highlights the need to manage these multilayered aquifers as a system rather than individually to ensure water supply for all groundwater users.

Education

MS: (Geology) Oklahoma State University

BS: (Geology) North Dakota State University

Experience

In 2007, Jennifer began her career as hydrogeologist in New Zealand. She worked at a multi-disciplinary consulting firm and at GNS Science, one of New Zealand's Crown Research Institutes for six years. In 2013, Jennifer joined the Minnesota Department of Natural Resources (DNR). Her role at DNR is to provide expert technical analysis on the nature, availability, and use of groundwater in northwestern Minnesota.



Ellen Considine

Minnesota Department of Natural Resources

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30 days without water: Climate change and well interference in northwest Minnesota

Presentation

Climate change models predict that overall, the future climate in Minnesota will be wetter and warmer. Irrigated agriculture has recently expanded north into areas where high-capacity groundwater use was historically minimal and where aquifers are not well-mapped. During approximately the last decade of wet years, most irrigators didn't need and didn't use the maximum volume of groundwater for which they were permitted.

But the climate models also predict more extreme weather, including drought. The drought of 2021 was a climatic phenomenon that beget comparison to the drought of 1988 across northwest of Minnesota it. In 2021 many irrigators in Minnesota used their entire permitted volume...and then some.

The drought, and high groundwater use for irrigation that accompanied it, led to a record-setting number of well interference complaints. In Minnesota, groundwater for domestic use is the highest priority in case of a water shortage, and the DNR investigates complaints of well interference at no expense to the domestic well owner. Although the effects of climate change may be slow to directly affect groundwater recharge and groundwater flow patterns, the human response to climate change (i.e., intensive use of groundwater) caused rapid consequences for domestic well owners across western and northwest Minnesota.

Education

MS: (Hydrogeology) University of Nevada, Reno

BS: (Geological Engineering) University of Wisconsin, Madison

Experience

Ellen started her career sampling and gaging streams at the U.S. Geological Survey in Wisconsin, then worked as a groundwater modeler, field geologist, and project manager in consulting for 10 years. Since joining the DNR in 2015, she has focused on areas of Minnesota where groundwater sustainability and groundwater depletion of surface water are a concern.



Barbara Bekins

United States Geological Survey

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An overview of ongoing research and recent results at the Bemidji crude oil spill study site

Presentation

- Site introduction
- Crude oil source zone natural depletion
 - Oil chemistry changes
 - Efflux trends
- Groundwater contaminant plume:
 - Partial metabolites of crude oil compounds
 - Arsenic mobilization
- Ongoing research

Education

PhD: (Geology) University of California, Santa Cruz

MS: (Mathematics) San Jose State University

BS: (Mathematics) University of California, Los Angeles

Experience

Barbara is a research hydrologist with the U.S. Geological Survey, Water Mission Area, located in Menlo Park, CA. She has studied the fate and transport of crude oil contaminants in groundwater for over 25 years and presently serves as research coordinator for the USGS crude oil spill study site near Bemidji, Minnesota. She is a fellow of the Geological Society of America and the American Geophysical Union and a member of the National Academy of Engineering.



John Swenson

University of Minnesota Duluth and MineraLogic LLC

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Elevated salinity in shallow groundwater of the western Lake Superior basin: Relict of glacial forcing?

Presentation

Groundwater from shallow bedrock wells proximal to Lake Superior in Minnesota, Wisconsin, and western Michigan frequently shows significantly elevated concentrations of Na, Ca, and Cl, with no obvious correlation to host lithology. In this talk, I develop a simple model of basin-scale groundwater flow in response to wet-based Pleistocene glaciation and then use scaling arguments to explore the potential of this model to explain observed relationships. Model results suggest that intense circulation beneath the Superior Lobe of the Laurentide could displace deep, saline groundwater to the margins of the ice sheet, generating a salinity anomaly in what today is the periphery of the lake. Following deglaciation, this anomaly has been dissipating via back flushing, aided by smaller-scale flow systems, fed by meteoric recharge in the Lake Superior Highlands and discharging near modern lake level.

Education

PhD: (Geology and Geophysics, minor Civil Engineering) University of Minnesota, Twin Cities

BS: (Physics and Mathematics) University of Minnesota, Duluth

Experience

John has more than twenty years of experience tackling complex problems as an academic researcher and industry consultant, with areas of specialization that include hydrology, hydrogeology, sediment transport, heat transfer, and rock weathering.



Megan Haserodt

United States Geological Survey
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What we learned from modeling groundwater in the St. Louis River Basin and on the Iron Range (co-presented with Tim Cowdery)

St. Louis River Basin GFLOW Groundwater-Flow Model

Presentation

- Introduction to analytic element models
- Groundwater model of St. Louis River basin
- Example model applications

Education

MS: (Hydrogeology) University of Wisconsin, Madison, 2014
BA: (Geology and Chemistry) Hope College, 2011

Experience

Hydrologist, U.S. Geological Survey, 2016 – present
Hydrogeologist, Foth, 2014 – 2016
Environmental Scientist, Kenai Watershed Forum, 2011 – 2012
Reclamation Ecologist, Aster Canyon Consulting, 2011



Tim Cowdery

United States Geological Survey

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What we learned from modeling groundwater in the St. Louis River Basin and on the Iron Range (co-presented with Megan Haserodt)

Iron Range MODFLOW Groundwater-Flow Model

Presentation

- Three-dimensional finite-difference groundwater model of the Iron Range
- Model construction: techniques and assumptions
- Groundwater balance under current conditions
- Pre-mining scenario
- Hydrologic changes from mining

Education

MS: (Hydrogeology) University of Minnesota, 1997

BA: (Geology) Carlton College, 1983

Experience

Hydrogeologist, U.S. Geological Survey, 1992 – present

