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THE CENTER FOR WATERSHED SCIENCE AND EDUCATION

2015 REPORT

Center for Watershed Science and Education
College of Natural Resources
University of Wisconsin-Stevens Point

UW Extension
University of Wisconsin-Extension

About the Center

The Center for Watershed Science and Education is a partnership between the UW-Stevens Point College of Natural Resources and the UW–Extension. In the spirit of the Wisconsin Idea, the Center works to…

- *Support watershed stewardship*
- *Assist citizens with lake, river and drinking water quality problems*
- *Promote management strategies for water resource protection*
- *Provide water quality assessment and support*
- *Prepare students for careers as water resource professionals*

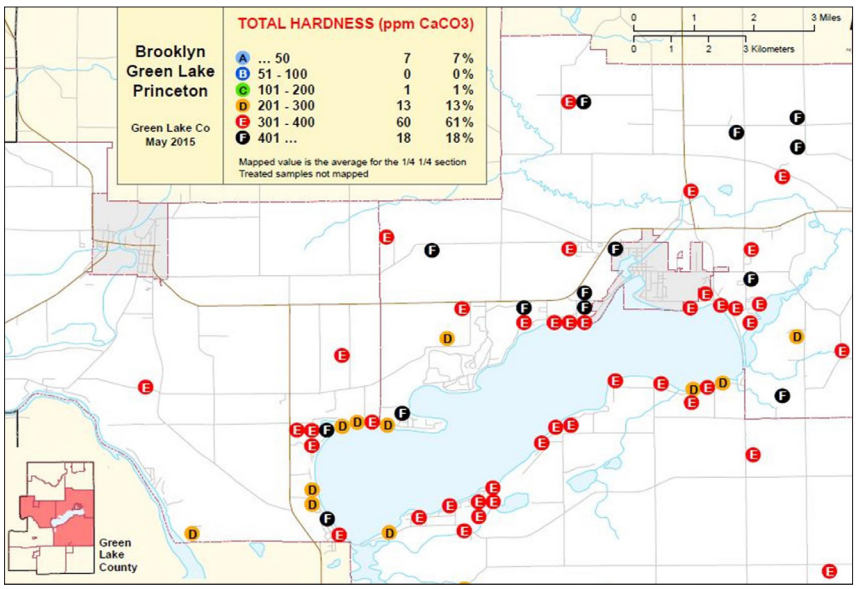
The Center works in every corner of Wisconsin, with concerned citizens, lake and stream associations and stewardship organizations, county conservation and Extension offices, and state and federal agencies. Contained in the Center is the Water and Environmental Analysis Laboratory (WEAL), a state of the art facility performing dozens of different analyses on water and other environmental media. Center staff includes four UW-Extension specialists, five project and technical staff, four environmental chemists, and three support staff. Typically fifteen students are employed as laboratory or project assistants.

Key Programs

DRINKING WATER SAFETY & GROUNDWATER EDUCATION PROGRAMS

The safety of drinking water for Wisconsin's families is a vital health concern. The Center's WEAL facility tested the well water of over 3,000 Wisconsin residents this past year. Analyses included coliform bacteria, nitrate, chloride, metals and sometimes pesticides. Ten percent of households had drinking water that exceeded standards for nitrate and 17% were unsafe because of coliform bacteria. Lab staff often counseled homeowners on interpreting their test results, well disinfection, and ways to make their water supplies safe.

The Center operated a nitrate screening booth for attendees of WI Farm Technology Days, held in Dane County on August 25-27, 2015. Some 400 people were counseled on water quality concerns, and over 100 had their water tested.



An example of a map showing 2015 drinking water quality data results.

Groundwater Education Specialist Kevin Masarik discusses groundwater quality with citizens at a booth during the fair.

Paul McGinley and Kevin Masarik represented the Center at UW-Extension Day at the Wisconsin State Fair held in West Allis on August 4th. The display engaged attendees regarding groundwater and drinking water issues. In addition, people were able to use the Center's interactive tool to calculate how much money could be saved by investing in water conserving faucets and toilets.

Fourteen community-based drinking water education programs reached over 1300 well users in 11 counties (Clark, Dodge, Door, Green, Green Lake, Kewaunee, Sauk, Sheboygan, St. Croix, Taylor, and Wood). These programs enlist the help of local agencies and test water at the scale of one or two townships. Maps and interpretive materials specific to the area were prepared and delivered in an educational session for participants.

WISCONSIN RIVER WATER QUALITY SYMPOSIUM

2015 marked the 5th annual Wisconsin River Water Quality Improvement Symposium, which has been co-hosted by the Center since 2011. The Symposium is part of an ongoing mission to reduce algal blooms that occur throughout the river basin. This year's theme, "Making Connections for Clean Water", emphasized a collaborative effort to improve conditions in the Wisconsin River and its tributaries. In keeping with the theme, Finding Common Ground: 25th Anniversary of Lower Wisconsin Riverway was presented by keynote speaker Mark Cupp, Executive Director of the Lower Wisconsin State Riverway Board. More than 110 people participated, including citizen stewards, resource managers, educators and representatives from industry, agriculture, and municipalities. Private organizations and individuals provided $5000 in sponsorships. Nancy Turyk and Jeri McGinley were the key Center staff in this effort.

Left - River stewards from a variety of backgrounds discuss solutions for improving river conditions at the 2015 Symposium. Right - Algae blooms on the Petenwell Flowage of the Wisconsin River.

Citizens discuss strategies for protecting and preserving the quality of Lake Wausau during a community-based planning session.

COUNTY-SCALE LAKE ENGAGEMENT

Center scientists Nancy Turyk and Ryan Haney in recent years have worked with three central Wisconsin counties to improve property owner knowledge and capacity to tackle lake-related challenges. Turyk has led collaborative county-wide assessments of 74 lakes and lake ecosystems to understand the health of each lake. Ongoing community-based planning sessions incorporated the assessment results with local knowledge and expertise to guide and coordinate protection and improvement efforts. To date, more than 700 people have participated in the sessions and implementation has been initiated on many of the actions identified in the plans.

UNDERSTANDING WHAT'S UNDER THE ICE IN THE BIG EAU PLEINE

The Big Eau Pleine Reservoir, one of the fifteen largest lakes in Wisconsin, is a highly valued recreational resource and is important to Wisconsin River flow regulation. Since it was formed in the 1930s, it has been plagued by poor water quality and winter fish kills. Professor Paul McGinley along with recent UW-Stevens Point graduate, James Brodzeller, developed a computer simulation model for the Big Eau Pleine, working cooperatively with a technical committee of lake association members and representatives of the Wisconsin Valley Improvement Corporation, the Wisconsin DNR, Marathon County and the River Alliance. Their research helps explain how oxygen concentrations can vary year-to-year in this eutrophic water body. The results will be used in a citizen lake management planning effort let by Nancy Turyk, Aaron Thompson, and the River Alliance of Wisconsin.

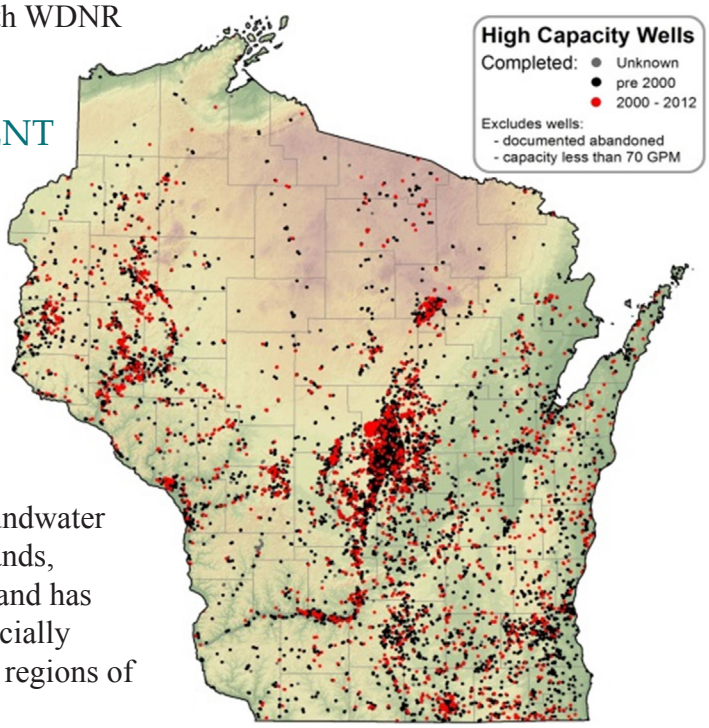
The Big Eau Pleine Flowage was home to the World Ice Fishing Tournament in 2012. (Photo courtesy of John Kennedy.)

TEACHER EDUCATION WORKSHOPS

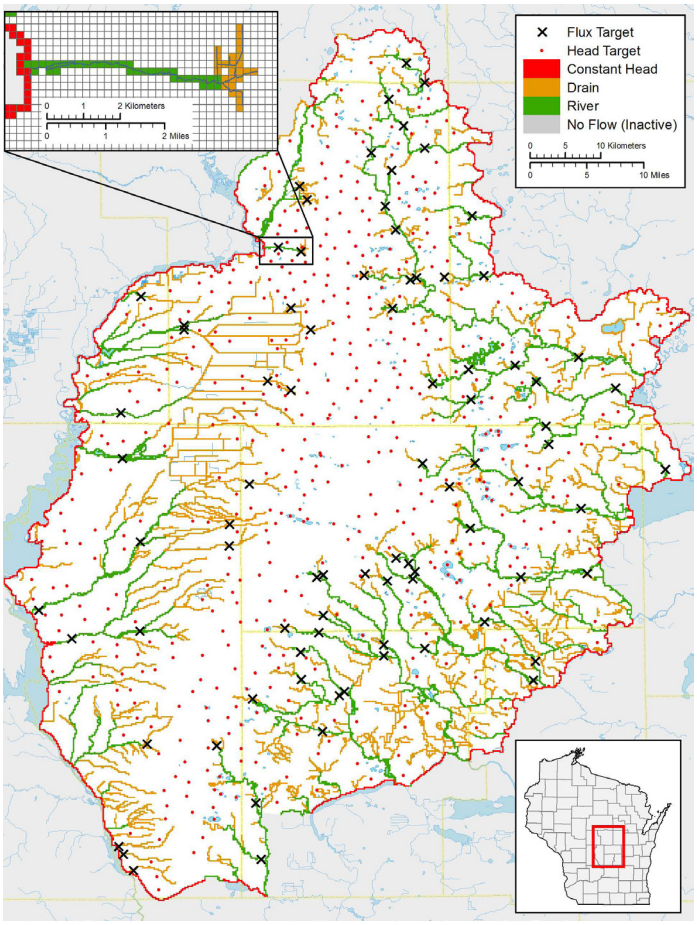
Kevin Masarik conducted three one-day workshops primarily for K-12 teachers on using a sand-tank groundwater model. The models, purchased from the UW-Stevens Point Student Chapter of the American Water Resource Association, are an essential teaching tool for incorporating groundwater education into the curriculum. Forty-eight teachers and other educators participated. Teacher reports indicated that 1,059 students participated in groundwater activities in school following the workshops. This program represents a team effort with WDNR and WGNHS.

GROUNDWATER PUMPING ENGAGEMENT

Groundwater pumping has been called the "conservation issue of the decade" as demands for groundwater increase. Center staff have been performing high-profile scientific evaluation and education reaching clientele that includes the farm community, lake and stream advocates, state and local agency staff, and legislators. Much of the concern about pumping is due to concerns for surface waters. Because groundwater and surface waters are connected, tradeoffs exist between the amount of groundwater pumped and "healthy" levels for aquifers, lakes, wetlands, and streamflows. The expansion of groundwater demand has principally been for agricultural irrigation, and is especially occurring in the Central Sands, Antigo, and northwest regions of the state.



High capacity wells in Wisconsin. Wells installed since the year 2000 are shown in red.



The Central Sands groundwater model.

CENTRAL SANDS GROUNDWATER MODEL

Groundwater flow models are mathematical tools that allow hydrologists to evaluate how groundwater pumping will change water levels and streamflows, among other uses. Dave Mechenich and George Kraft have been developing and improving Central Sands groundwater flow models for the last decade and employing them to explain why some high profile water bodies like the Little Plover River, Long Lake, and Pleasant Lake are drying due to groundwater pumping. The latest versions of modeling tools are being used by Wisconsin DNR to determine "safe" amounts of pumping for some lakes and streams. The model has been used to predict how water levels and streamflows will decline as pumping increases in certain areas, providing citizens and officials with a glimpse of potential futures.

EDUCATION FOR TOOLS IN LAKE MANAGEMENT

Center staff have conducted training sessions for agency staff, consultants, and citizens in the use of management tools such as the Wisconsin Lake Management Suite, a computer program for estimating phosphorus concentrations in a lake and its relationship to watershed sources of phosphorus. This training course combines lake science with application of the computer program. As in 2014, Nancy Turyk and Paul McGinley offered a workshop at the 2015 Wisconsin Lakes Conference, and all available spots were filled by attendees.

Field technician Jessica Haucke (middle) guides a citizen volunteer through the process of gathering streamflow data.

VOLUNTEER STREAMFLOW AND LAKE LEVEL MONITORING

In a joint project with county conservation offices and WDNR, we launched a program that provides citizen volunteers with professional grade monitoring equipment, training, and quality control to acquire accurate streamflow and lake level data. These data are uploaded to the WDNR's Surface Water Integrated Monitoring System (SWIMS) database for archiving. Six counties are now participating, and monitoring is occurring at 80 stream sites and 50 lakes.

Recognitions of Excellence

From left to right: Mallika Nocco, Justin Isherwood, George Kraft, Lynn Isherwood and Chris Kucharik.

ISHERWOOD FARM

Justin and Lynn Isherwood of Isherwood Farm received a $5000 award from USDA for their research partnership with Center Director George Kraft and UW-Madison researchers Mallika Nocco and Chris Kucharik. The Isherwoods have opened their farm for research into questions about irrigation water consumption, climate change, and nutrient leaching to groundwater. Their farm has received extensive instrumentation with lysimeters and weather stations, and they have happily cooperated with infrastructure installation, sharing their farming practices, and adapting operations around hardware.

From left to right: John Wagner (President, WWF) George Kraft, George Meyer (Director, WWF)

WATER CONSERVATIONIST OF THE YEAR

The Wisconsin Wildlife Federation (WWF) recognized director George Kraft for his career's worth of efforts in water resources. WWF President John Wagner stated, "[Kraft] has provided expert information to farmers, municipalities, landowners, local and state governmental officials and conservationists. His work has included modernizing Wisconsin's groundwater pumping management policies and laws, nitrate and pesticide pollution of groundwater, and assisting stewardship groups organize and manage their water resources." He lauded Kraft especially for his work on high capacity wells and their role in lowering water levels in lakes and flows in streams.

Kevin Masarik accepts his awardfrom the UW-Extension Community after being named Outstanding Specialist of the year.

OUTSTANDING SPECIALIST AWARD

Kevin Masarik, Groundwater Education Specialist with the Center for Watershed Science and Education was the recipient of the 2015 Outstanding Specialist award from the UW-Extension Community, Natural Resource and Economic Development Program Area. Masarik was honored for his academic excellence, innovation and extraordinary quality of communication.

Contributing to Student Success

Undergraduate student Vadym Ianaiev carefully performs his lab duties as part of a paid internship within the WEAL.

The Center provides students with experience and employment doing real-world work in the water resources field. The WEAL provided fifteen students with paid internships, including three international students. Students receive training and supervision from professional environmental chemists in a WDNR-certified lab. WEAL staff also engages with students in Advanced Techniques for Environmental Analysis (Water 492/692) to promote a scientific assessment of polluted environments using state-of-the-art methods and instrumentation. Additionally, WEAL staff provides laboratory tours and analyses for courses taught in Fisheries and Water Resources, Soil and Waste Management, and Chemistry.

The Center employed undergraduate students to work side-by-side with staff and community members on Center projects. This past year, student staff were involved in field work, data assessment, lake planning with community members, and assisting with the Wisconsin River symposium. Center staff also engages with students in courses such as Water Quality Management, Wastewater, Constructed Wetlands for Water Quality Control, Current Issues in Water Resources, Introduction to Soil and Water Resources and Ecological Basis for Natural Resources.

Additionally, several students worked with Center/WEAL staff advisors to conduct research for poster presentations at events including the CNR Research Symposium, American Water Resources Association Conference, and Wisconsin Lakes Convention. These opportunities help students to improve their presentation and research skills while receiving helpful feedback from judges, faculty and/or professionals in their field.

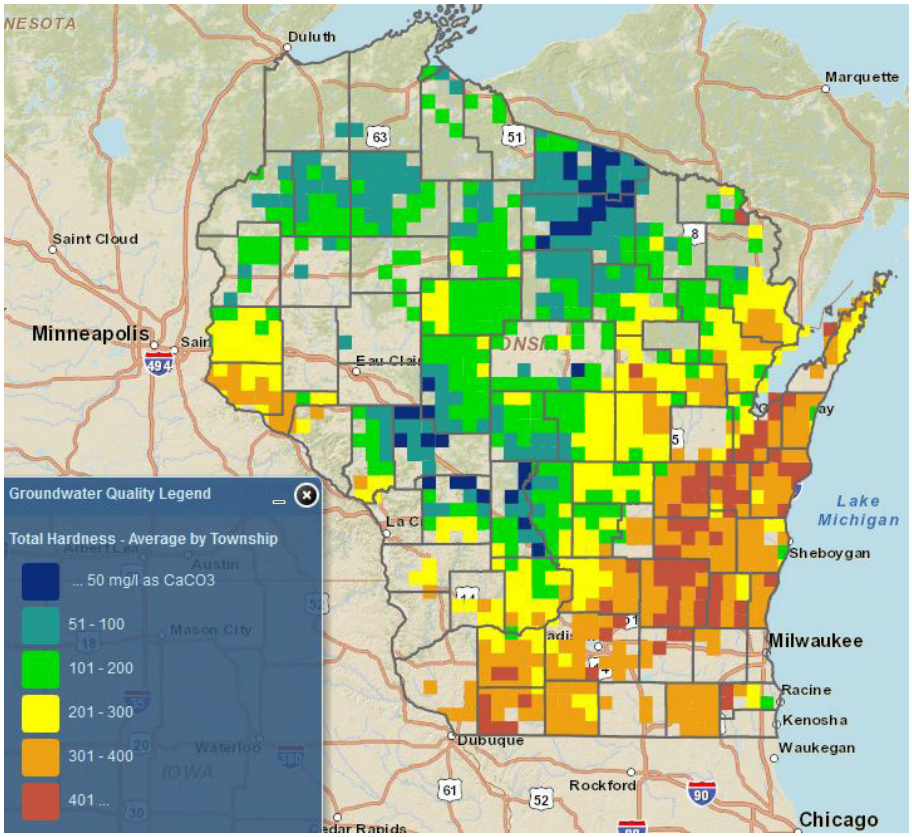
UWSP undergraduate student Amy Sandel (right) with Ph.D. dissertator Mallika Nocco.

Communications

In the past year, Center staff have worked to update and maintain the Center for Watershed Science and Education website. There are nearly 1,200 site visitors each month with nearly 1,400 unique page views. Currently, there are over 70 recent or historical reports available for download and viewing. In addition to the website, staff have managed the Marathon, Portage, and Waushara county lakes Facebook pages and email list-serves. These venues help the Center to connect with hundreds of citizens and provide updates on lake planning, volunteer opportunities, events and other relevant lake and river information. Over 20 scientific papers, posters, and reports have been prepared by staff members, who have also delivered over 100 presentations for various groups, meetings, and conferences.

WELL WATER QUALITY VIEWER

The Wisconsin Well Water Quality Viewer is the most accessed resource on the Center's website. The Viewer is used by citizens looking for information about local groundwater quality and by professionals or local leaders looking for data related to their specific communities or stakeholders. Maps and tables generated from the viewer are used by a number of state agencies (e.g. Wisconsin Department of Health, Wisconsin Department of Natural Resources, county governments) and other organizations.



The Wisconsin Well Water Quality Viewer can be used by any individual seeking information about local groundwater quality.

SCIENTIFIC PAPERS AND REPORTS

DeVita, W.M, J.Hall. 2015. Selection and Evaluation of Chemical Indicators for Waste Stream Identification. Report to Wisconsin Department of Natural Resources.

Kraft, G. J., C. Mechenich, D. J. Mechenich, J. E. Cook, and J. L. McNelly. 2015. Natural resource condition assessment: Saint Croix National Scenic Riverway. Natural Resource Report NPS/SACN/NRR—2015/1003. National Park Service, Fort Collins, Colorado.

Kraft, G. J., C. Mechenich, D. J. Mechenich, J. E. Cook, and J. L. McNelly. 2015. Natural resource condition assessment: Mississippi National River and Recreation Area. Natural Resource Report NPS/MISS/NRR—2015/990. National Park Service, Fort Collins, Colorado.

Kraft, G. J., D. J. Mechenich, C. Mechenich, M. D. Waterhouse, J. McNelly, J. Dimick, and J. E. Cook. 2014. Natural resource condition assessment: Grand Portage National Monument. NPS/GRPO/NRR—2014/783. National Park Service, Fort Collins, Colorado.

SCIENTIFIC PAPERS AND REPORTS (CONTINUED)

Luczaj, J.; Masarik, K. Groundwater Quantity and Quality Issues in a Water-Rich Region: Examples from Wisconsin, USA. Resources 2015, 4, 323-357. doi: 10.3390/resources4020323

McGinley, P.M., W.M. DeVita, A.L. Nitka. 2015. Evaluating Chemical Tracers in Suburban Groundwater as Indicators of Nitrate-Nitrogen Sources. A final report prepared for the Wisconsin Department of Natural Resources. 48 pp.

Mechenich, C., J. A. VanDeHey, J. E. Cook, D. J. Mechenich, J. L. McNelly, and G. J. Kraft. 2015. Natural resource condition assessment: Voyageurs National Park. Natural Resource Report NPS/VOYA/NRR—2015/1007. National Park Service, Fort Collins, Colorado.

Minks, M.R., M.D. Ruark, B. Lowery, F.W. Madison, D. Frame, T.D. Stuntebeck, M.J. Komiskey, and G.J. Kraft. 2015. At-grade stabilization structure impact on surface water quality of an agricultural watershed. Journal of Environmental Management 153: 50-59.

Nitka, A. 2014. Developing and Testing a Method for the Analysis of Chemical Human Waste Markers in Groundwater and Identifying Sources of Nitrate Contamination (thesis). UW-Stevens Point, Stevens Point, WI

Turyk, N., Hull, S. Updated Lake Management Plans for 26 Lakes in Portage County, Wisconsin. Reports to Portage County and Wisconsin Department of Natural Resources.

Turyk, N., P. Garrison, R. Haney, S. Kaplan, D. McFarlane, P. McGinley, J. McNelly, D. Rupp, Golden Sands RC&D, Inc., 2014. Lake Study Reports for 33 Lakes in Waushara County, Wisconsin. Final reports to Waushara County and Wisconsin Department of Natural Resources.

Turyk, N., R. Haney, D. Rupp. Lake Management Plans for 11 Lakes in Marathon County, Wisconsin. Reports to Marathon County and Wisconsin Department of Natural Resources

Turyk, N., R. Haney, D. Rupp. Lake Management Plans for 8 Lakes in Waushara Co., Wisconsin. Reports to Waushara Co. and Wisconsin Department of Natural Resources.

POSTERS AND PRESENTATIONS FOR PROFESSIONAL SCIENTIFIC CONFERENCES

DeVita, W.M, J.Hall. 2015. "Selection and Evaluation of Chemical Indicators for Waste Stream Identification." Wisconsin Chapter of the American Water Resources Association, Annual Meeting

Brodzeller, J. and P. McGinley. 2015. Understanding Dissolved Oxygen in the Big Eau Pleine, Modeling Winter Oxygen Profiles with CE-QUAL-W2. Poster presentation at the Wisconsin Section American Water Resources Association, Annual Meeting, Oconomowoc, March, 2015.

Ester, C., M.A.Nocco, A. Sandel, C.J. Kucharik, G.J. Kraft. 2015. "Estimating groundwater recharge and solute loading in agricultural systems using passive capillary lysimeters." American Water Resources Association, Wisconsin Section.

Gaffield, S., D. Marshall, G.J. Kraft, and F. Rowe. 2015. "The Pleasant Lake contested case hearing: one step toward managing cumulative groundwater impacts in Wisconsin's central sands." American Water Resources Association, Wisconsin Section, Annual Conference.

Kraft, G.J., D.J. Mechenich, and J. Haucke. 2015. "Predicting impacts from anticipated irrigation development in the Wisconsin central sands." American Water Resources Association, Wisconsin Section, Annual Conference.

Masarik K., and D. Mechenich. "UW-Extension paints detailed picture of groundwater quality for Wisconsin citizens", oral presentation at Joint CNRED & FLP UW-Extension Conference. October 2014. Wisconsin Dells, WI.

Masarik, K. "Investigating Intra-annual Variability of Well Water in Lincoln Township", oral presentation at WI Section American Water Resources Association, Annual Meeting. March 2015, Oconomowoc, WI.

McGinley, P.M. and N. Turyk. 2014. Groundwater Inflow and Marl Formation Rates in Small Lakes. Presentation at the North American Lakes Management Conference, Tampa FL, November 2014.

Nitka, A. W. DeVita, P. McGinley. 2015. Peering in the 21st Century: Chemical Tracers for Nitrate Source Identification. Presented at the Annual Meeting of the Wisconsin Water Association, September 10, 2015, Wisconsin Dells, WI.

Nitka, A., W. DeVita, P. McGinley. 2015. "Evaluating Chemical Tracers in Suburban Groundwater as Indicators of Nitrate-Nitrogen Sources." American Geophysical Union annual meeting. San Francisco, CA. American Water Resources Association, Annual Meeting, Oconomowoc, WI.

Timm, A. and P. McGinley. 2015. Understanding Stream Phosphorus Concentrations—Contrasting the Roles of External Inputs and Internal Reactions. Poster presentation at the Water Environment Federation Central States Education Conference, Madison, 2015.

Turyk, N. 2015. "Shoreland mapping as a motivational tool for restoration and tracking change." Society of Freshwater Science, Annual Conference.