Minnegram

Water Resources Center

University of Minnesota
Driven to Discover℠

In This Issue

September 2009

The Water Resources Center is affiliated with the College of Food, Agricultural and Natural Resource Sciences and University of Minnesota Extension.

Water Resources Center
University of Minnesota
1985 Buford Avenue
St. Paul, MN 55108
612-624-9282

wrc.umn.edu

WRC to host annual Minnesota Water Conference

The Water Resources Center will host the fourth annual Minnesota Water Resources Conference at the St. Paul RiverCentre, October 26–27, 2009. The conference will feature research highlights and innovative and practical water resource management approaches, to include:

- Best practices in the design and application of water resources management techniques
- Implications of water policy decisions
- Research into current and emerging issues

The conference facilitates interaction among water resources professionals such as resource managers; researchers; local, state, and federal agency staff; consultants; practicing engineers; and students.

Six ninety-minute concurrent sessions with four hour-long breakout topics will be offered during the two-day conference. There will be a poster session and reception at the end of the first day, and posters will be available for viewing throughout both days.

The conference is sponsored by the WRC and the College of Continuing Education, and co-sponsored by the Department of Civil Engineering, the Minnesota Section of the American Society of Civil Engineers, Minesota Sea Grant, and the Natural Resources Research Institute. Register at: wrc.umn.edu.

Conference keynotes represent research and political arenas

Jerry Schnoor, University of Iowa

Jerry Schnoor *Living With a Changing Water Environment.* Professor Schnoor is the Allen S. Henry Chair in Engineering and co-director of the Center for Global and Regional Environmental Research at the University of Iowa. Since 1999, Schnoor has been a member of the National Academy of Engineering, elected for his research using mathematical models in science policy decisions. He chaired the U.S. Environmental Protection Agency's (EPA) Office of Research and Development, Board of Scientific Counselors, 2000–2004, and is a member of EPA's Science Advisory Board and the National Institutes of Health (NIH) National Advisory Environmental Health Sciences (NAEHS) Council. Schnoor is considered one of the founding fathers of phytoremediation, using plants to help clean the environment. He serves as editor-in-chief of the leading international environmental journal, *Environmental Science and Technology*; and his other research interests include water quality modeling, environmental observatories, sustainability, and global change.

Betty McCollum *Building Partnerships for Clean Water.* Ms. McCollum is serving her fifth term in the United States Congress representing Minnesota's Fourth District. She sits on the House Appropriations and Budget Committees and holds the position of Senior Democratic Whip within the House Democratic Caucus. Congresswoman McCollum served in the Minnesota House of Representatives from 1993 to 2000 and was elected Assistant Leader three times by her Democratic-Farmer-Labor Party colleagues. Throughout her career in public service, Congresswoman McCollum has been a champion for excellence in education and protecting the environment, recently proposing an amendment to the National Water Research and Development Initiative Act that would expand the bill to include evaluation of the nation's water supply for chemical contaminants, such as pharmaceuticals and endocrine disrupting compounds.

Betty McCollum, U.S. House of Representatives (MN-04)

Conference speakers, continued on page 5

Director's Corner

As I toured Southeastern Minnesota areas devastated by the 2007 floods with the Board of Water and Soil Resources this August, I was heartened to see towns and lives being rebuilt and to see state funds being put to good use. I was also reminded that while the rest of us have moved on, those who live and work in the Southeast are still dealing with the reconstruction.

As a society, we have a short attention span. It is important to remember that recovering from these disasters takes time. Restoring our land and water resources after years of degradation also takes time. While we all want to see instant results and know that funds are being well spent, often it is a longer process to make sustainable improvements to our environment. I know that when I review grants, I can become impatient, wondering why proposers are still seeking funding for projects I have seen for several years. Then I remind myself that when we seek to improve our land and water resources, we are working with complex systems. Our efforts take time, funding, and sustained energy to be truly successful. While we must take on the new initiatives and issues, we must also finish the work we have started, and that work may take years.

Persistence and dedication were themes in recent office discussions about the percentage of onsite systems that are in compliance with state regulations, highlighting another situation in which long-term benefits require long-term solutions. Trends over the past thirty years have been impressively positive. Estimates in the 1980s found only about 20 percent of septic systems in compliance with Minnesota regulations. By the mid-1990s, estimated compliance was approximately 50 percent, and currently the estimate is over 75 percent of septic systems in compliance. The trend shows a huge improvement over several decades, especially considering that this work is accomplished one household at a time. We must continue to support those who work on this issue of compliant septic systems through training, designing, installing, inspecting and funding onsite septic systems and the many other environmentalists who continue to make steady improvements with long-term efforts.

This year's Water Resources Conference, October 26 and 27 (see article on page 1), brings a mix of looking ahead to new initiatives and issues and celebrating the work that has been completed and is ongoing. The keynote and luncheon speakers are nationally known experts from Minnesota as well as from other parts of the country. The breakout sessions and poster session highlight the good work of water professionals here in Minnesota in the areas of research, implementation, civic engagement and policy. The conference is a great venue to connect with current colleagues and meet new colleagues. We hope to see you there!

Faye Sleeper

An interview with Congresswoman Betty McCollum about her amendment to the Water Research and Development Initiative Act

Summary of Amendment: To amend H.R. 1145 to address both water quality and water quantity in the purpose statement; include the impacts of contaminants of emerging concern in our water supply as a research outcome; and enhance coordination of water quality research between the existing National Institutes for Water Resources, authorized in the Water Resources Research Act of 1984.

Q: What motivated you to introduce this measure?

A: Our national water research strategy has historically focused separately on water quantity (availability) and water quality. However, water quality and quantity are inextricably linked. Our national water policy objective should be to ensure availability of clean water. My amendment clarifies that our national water research strategy must simultaneously address issues of water quality and quantity.

My amendment also responds to the growing concern over chemical pollutants, such as pharmaceuticals, personal care products, and endocrine disrupting compounds, in our water supply. Today we know enough about these contaminants to be worried, but not enough to provide good information to our state health officials or our constituents. After hearing from constituents and researchers at the University of Minnesota, I crafted this amendment to add the investigation of scope and impacts of chemical contaminants as a new research objective to our national water research policy. This measure supports the priorities of Minnesotans who voted for dedicated clean water funding as a state constitutional amendment in 2008.

Q: How will your amendment benefit Minnesota?

A: We all know Minnesota contains over 10,000 lakes, the headwaters of the Mississippi River, and the largest of the Great Lakes – Lake Superior. As research increasingly indicates the presence of chemical pollutants in our water supply, understanding the impacts of these contaminants is critical for the health of the people of Minnesota and the integrity of our water ecosystems.

Q:How might this affect the role of the University of Minnesota's Water Resources Center or the University at large?

A: Research centers, like the Water Resources Center at the University of Minnesota, already play a significant role in water quality research, as part of the network of 54 existing federally-funded research institutes at higher education institutions all across the country. They conduct research on water quality challenges specific to each region. Currently this research network is an under-utilized resource, with little coordination between institutes and with federal research centers. My amendment would increase coordination among the centers so they are more effective partners in federal water quality efforts, linking the research goals of these water research centers with the new federal water research plan called for by the National Water Research and Development Initiative Act.

WRC awarded 319 funding to create standardized training for watershed professionals

Ann Lewandowski, WRC research associate, and Faye Sleeper, WRC co-director, were awarded MPCA funding through Clean Water Act (CWA) Section 319 to coordinate the development of standardized training for local professionals who lead watershed and total maximum daily load projects. Fellow University researchers Bruce Wilson, Bioproducts and Biosystems Engineering, and Ken Brooks, Forest Resources, complete the team that will design and implement the training program. The team will work with an advisory group composed of representatives from local governments such as watershed districts and soil and water conservation districts, as well as state agency representatives.

The goal of the project is to ensure that those involved in watershed and impaired waters planning and implementation projects understand legal frameworks, programmatic requirements, and watershed science resources and tools. Several factors point to the wisdom of more standardized basic training: local experts are retiring as the baby-boom generation ages; new clean water funds require additional staffing of statewide projects; and projects using federal, state, and local funds must demonstrate clear results.

Photo credit: Dave Hansen

UM-led standardized training will benefit watershed professionals and TMDL projects.

The curriculum will likely consist of two levels of training. Level one will cover the basics of watershed management, such as hydrology, restoration techniques, and legal and organizational tools, and will be taught in an interactive web format. Level two will add a four-to-five-day hands-on and classroom component. Colleagues at Michigan State, Purdue, and The Ohio State University have committed to sharing experience from their watershed training programs, including electronic delivery. Plans will be vetted and refined by the advisory committee. Other universities find that web-based training is accessed not only by professionals but others with interest in watershed processes such as teachers, lake home owners, and students.

Some watershed planners are concerned that a new certification program will create additional costs and requirements. The certification will not be mandatory, but will give people the opportunity to learn the basics in a standardized format, and give employers the assurance that their staff members know the requirements as well as the resources available to them. "With local government's expanding role in water resources management, having well-trained staff is imperative," said Ray Bohn, coordinator for the Minnesota Association of Watershed Districts. In the pilot phases of the program, the training may be subsidized while feedback is collected from the trainees to improve the program. After the pilot phase is complete, there will be a fee to take the course.

The project has received partial funding through the CWA 319 nonpoint source program, and will begin later this fall. The hope is to move into a pilot phase in 18 months.

Policy Update

New interagency leadership team coordinates Clean Water Fund distribution

In spite of the legislative summer recess, the Water Resources Center (WRC), state agencies, and legislative committees have been hard at work implementing the Clean Water Fund (CWF) appropriations bill. The three-eighths of one-percent sales tax went into effect on July 1, and approximately $151,000 worth of projects and programs are now in play.

The funds are distributed across multiple agencies, programs, and projects, many with shared responsibilities. This has necessitated a coordinated agency management structure, and the agencies have created the Clean Water Fund Interagency Leadership Team to integrate and coordinate projects across all agencies receiving CWF appropriations. These include the Minnesota Pollution Control Agency (MPCA), the Department of Natural Resources (DNR), the Department of Agriculture (MDA), the Department of Health (MDH), the Public Facilities Authority (PFA), the Board of Water and Soil Resources (BWSR), the Metropolitan Council, and the University of Minnesota WRC. Senior leadership from all agencies participates in twice-monthly meetings to map out how programs will be coordinated, how success will be measured, and how progress will be reported. For example, BWSR is leading the effort to distribute the grant funds allocated to fund protection and restoration projects at local and regional levels. The Request for Proposals will be out in early October. The MPCA is leading the way with an interagency committee to establish measures that can be used to track how well goals are being met. The MPCA is also establishing a "data portal" that will provide access to all State environmental data. The PFA has already prioritized and awarded its funds for upgrading water infrastructure around the state.

The CWF Interagency Leadership Team is a model of state agency collaboration on multijurisdictional issues and responsibilities, and is a great first step in implementing the CWF.

Survey finds manure workshop attendees likely to save money, adopt water-friendly practices

Minnesota farmers and producers who participated in University of Minnesota-sponsored small group manure management workshops are likely to adopt water-friendly practices that also save them money, according to a survey by the University's Water Resources Center.

During the winter of 2008–2009, Water Resources Center researchers held "Value of Manure" small group workshops in 22 counties across the state. The 267 workshop participants—87 percent of whom were agricultural producers —learned to use a University-developed spreadsheet program to compare costs and returns from alternative manure management practices on their own farms.

As a result of the workshop and spreadsheet findings, 74 percent of workshop attendees said they would change their application rates and timings. Between one-quarter and one-third of all attendees who weren't already testing, calibrating, and keeping a record of their manure applications said they would start as a result of the workshops.

In addition to helping farmers reduce the amount of phosphorus and pathogens that enter surface and ground water as a result of over-application, the plans had the added benefits of saving farmers money by lowering costs. Nearly 75 percent of attendees said they could improve manure economic return per acre by five dollars or more based on their spreadsheet calculations.

"The result is win-win," said Water Resources Center agronomist and education coordinator Les Everett. "Producers are finding they can save fertilizer expense while reducing the amount of nitrogen, phosphorus, and pathogens that could potentially reach surface waters and ground water as a result of over-application."

The workshops were organized by the Water Resources Center and University of Minnesota Extension, with assistance from Soil and Water Conservation Districts and county feedlot officers. They were funded by a federal grant through the Minnesota Pollution Control Agency. For more information, visit wrc.umn.edu.

Educators embark on a Superior Science expedition

Cindy Hagley, Minnesota Sea Grant

Fifteen lucky teachers and informal educators conducted Great Lakes research firsthand as they cruised Lake Superior for a week in July on the U.S. EPA research vessel, *Lake Guardian*, as part of a program of workshops co-led by Minnesota Sea Grant. The workshops offered explorations of the ecology, geology, geography, weather, and biogeochemical processes of lakes Huron and Superior, with particular emphasis on human impacts and parallels between Great Lakes and ocean systems. Participants collected planktonic and benthic organisms and analyzed water quality data. Educators worked side-by-side with Jay Austin, assistant professsor in the Department of Physics and at the Large Lakes Observatory in Duluth, with U. S. EPA scientists, and with University of Minnesota faculty in the Water Resources Science program.

Photo credit: Minnesota Sea Grant

Superior Science Expedition members display some ot their work after disembarking from their floating classroom.

The educators learned a great deal about the science of the Great Lakes, and returned to shore full of ideas about how to transform their summer learning into lessons, but, as one teacher said, "We will take much more from it than that. Each one of us will take back the experience of truly being scientists for a week, and with that we will help our students grow and encourage them not just to be happy learning in a classroom, but to explore the world around them."

The Shipboard and Shoreline Science educational cruise is one of many workshops offered by the Center for Ocean Sciences Education Excellence (COSEE) Great Lakes (www.coseegreatlakes.net) and is funded by the National Science Foundation and the National Oceanic and Atmospheric Administration. The R/V *Lake Guardian* cruises are offered in partnership with the U.S. EPA Great Lakes National Program Office.

UM's Twin Cities household ecosystem project links consumer behavior to household pollution

Attitudes toward the environment are not necessarily good predictors of eco-friendly environmental behaviors in households, according to early results of the Twin Cities Household Ecosystem Project, a comprehensive household pollution study spearheaded by Larry Baker, a senior fellow in the University of Minnesota's Water Resources Center.

The project, which involved a 22-page survey of 3,000 urban and suburban households in Ramsey and Anoka counties—an area stretching from urban St. Paul neighborhoods to exurban developments—to determine what motivates people's behaviors related to pollution, is the first of its kind in terms of scope and scale.

The survey focused on carbon dioxide, which contributes to global warming, and nutrients, including nitrogen and phosphorus, which contribute to eutrophication of surface waters. The questions centered on a range of behaviors such as household energy use, recycling, food choices, vehicle use, vacation habits, pet ownership, and lawn care practices. To complete the survey, a team of eight undergraduate students measured 5,300 trees on a subsample of the surveyed properties to allow the researchers to estimate the annual carbon uptake by trees in household yards.

"Households are a major source of pollutants in post-industrial cities. The goal of our study is to understand the connection between household behaviors and pollution production," said Baker, an environmental engineer.

The interdisciplinary study includes the contributions of Sarah Hobbie, an ecologist and instructor in the University's Department of Ecology, Evolution and Behavior; Kristen Nelson, an environmental sociologist and assistant professor in the University's Department of Forest Resources; and University postdoctoral research associate Cinza Fissore.

"We're finding that general attitudes toward the environment are not good predictors of specific environmental behaviors," said Nelson. "For example, if someone isn't aware that fertilizer can impair water quality, they aren't likely to change their behavior. But even if they are aware, they may need more information about what to do to help them to change their behavior. Even more importantly, they may need to know that their own behavior actually makes a difference."

Researchers expect the study to be used to design policies to reduce pollution, including ones that target households that produce a disproportionate amount of pollution.

The study is funded by the National Science Foundation's program on Coupled Human-Natural Systems.

Conference speakers, continued from page 1

Paul Capel, University of Minnesota

Paul Capel *Land Use and Water Quality: Lessons from the First Two Decades of the USGS NAWQA Studies.* Dr. Capel works on the fate and transport of organic chemicals in the environment. He is a research scientist with the US Geological Survey's Water Resources Division where he is coordinating a national study on agricultural chemicals and has worked with the Pesticide National Synthesis for the National Water-Quality Assessment (NAWQA) Program. Major research interests are environmental chemistry, environmental fate and behavior of organic chemicals, environmental chemodynamics, and environmental education. His current research predominantly focuses on the occurrence, behavior and transport of pesticides in the hydrologic system (air, surface water, stream sediments, ground water). He is an adjunct professor in Civil Engineering at the University of Minnesota, as well as faculty in the Water Resources Science Graduate Program, teaching Environmental/Aquatic Chemistry.

Rex Johnson *Wetland Drainage and Its Impacts in Minnesota.* Dr. Johnson's research career focuses on the relationships of migratory birds and their habitats at multiple spatial scales, with a special emphasis on wetland and grassland birds of the North American Prairie Pothole Region (PPR). Since 1998, he has been employed by the Migratory Bird Program of the U.S. Fish and Wildlife Service. There he has worked intensively on the systematic integration of biological planning and monitoring into migratory bird conservation. He works with migratory bird joint ventures, and the international migratory bird conservation initiatives, especially the North American Waterfowl Management Plan. Since 2000, Dr. Johnson also has led the Service's Habitat and Population Evaluation Team (HAPET), which provides scientific decision support to many federal, state, and local agencies working in the PPR.

Rex Johnson, U.S. Fish and Wildlife Service

CommunityNews

Bill Arnold (WRS graduate faculty, CE) spent three weeks in August as a visitor at Shanghai Jiaotong University, where he learned about ongoing water quality research in Shanghai and exploring collaborative opportunities.

Jim Cotner (WRS graduate faculty, EEB), **Mark Edlund** (WRS graduate faculty, St. Croix Watershed Research Station), **Joy Ramstack** (St. Croix Watershed Research Station), Kyle Zimmer, and Kevin Theissen of the University of St. Thomas have received a collaborative research grant from NSF to study organic carbon burial in shallow lakes.

Karlyn Eckman (WRC) presented a paper July 8, 2009, "Understanding Target Audiences in Water Resources Projects" at the Universities Consortium on Water Resources (UCOWR) in Chicago, IL. Eckman also organized a training workshop for survey enumerators held in Grand Rapids, MI, June 16–18, 2009.

Mark Edlund was aboard the research vessel *Laurentian* in May 2009 collecting sediment cores from stations throughout the southern basin of Lake Michigan as part of his project, "Habitat or Food? Demise of the Benthic Food Web."

The National Science Foundation awarded a Doctoral Dissertation Improvement Grant to **Jacques Finlay** (WRS graduate faculty, EEB) and **Martin Tsui** (WRS). The title of the grant is "Mercury Bioavailability and its Environmental Controls in a River Network." The study examines if and how mercury is methylated by natural stream ecosystems in the forested watershed at summer baseflows in the Angelo Coast Range Reserve in northern California in summer 2009.

As part of a new course, Design for Sustainable Development, taught by **John Gulliver** (WRS graduate faculty, CE), three student teams entered the Acara Challenge to develop a venture capital pitch to solve a water problem in a large slum of Mumbai, India. Each team had four University of Minnesota students and three students from the Indian Institute of Technology-Bombay. Team ReachOut Water Solutions from the University of Minnesota won the competition and was awarded $25,000 to go to Mumbai and implement their solution, creating a sustainable business venture.

Robert Hecky (WRS graduate faculty, LLO) attended the centennial celebration of the International Joint Commission (IJC) under the Boundary Waters Treaty of 1909 between the United States and Canada. Hecky also attended a workshop June 14–15 that brought together the two North American Commissions with three African Great Lakes Commissions to discuss issues of common interest and the possibility of future collaboration.

Lucinda Johnson (WRS graduate faculty, NRRI) was elected president of the North American Benthological Society (NABS) for 2010. NABS is an international professional society representing stream and aquatic ecologists.

Cheryel Konate began work as the office administrator for the WRC on July 29, 2009. She fills the vacancy left by the retirement of Maria Juergens in May 2009. Konate previously worked at the University as an administrator in the Department of Medicine, Division of Renal Diseases.

Mike Sadowsky (WRS graduate faculty, SWC) has been named director of the University's BioTechnology Institute.

Shawn Schottler and **Jim Almendinger** (St. Croix Watershed Research Station) were recently awarded a $300,000 grant from the Legislative-Citizen Commission on Minnesota Resources (LCCMR) to evaluate the long-term effects of intensified tile drainage on river flows in Minnesota. The Minnesota Pollution Control Agency is providing an additional $300,000 in matching funds.

Brandy Toner (WRS graduate faculty, SWC) received funding from the Center of Urban and Regional Affairs to study arsenic in Minnesota ground water. Her proposal was titled "Arsenic Vulnerability Maps for New Domestic Wells in West-Central Minnesota." **Melinda Erickson** (WRS graduate faculty, USGS) is a collaborator.

2010 Research Grant Competition

The Water Resources Center (WRC) holds an annual competition for research funds provided by Congressional appropriation to the Water Resources Research Institutes through the US Geological Survey. We are pleased to announce the WRC research grant competition for 2010. Proposals should emphasize innovative approaches to advancing the scientific understanding or imaginative strategies for solving important water resource problems. Proposals are invited from researchers from any college or university in Minnesota, and are sought on a wide range of subjects related to water resources science and engineering.

Proposals will be evaluated on scientific merit and relevance to state and national needs, on potential to attract extramural funding, and on clearly articulated and relevant impact of the research. All proposals will be reviewed by both in-state and out-of-state reviewers, and an advisory panel will select the proposals for funding. We especially encourage proposals from junior faculty. The submission deadline is noon, **Monday, November 9, 2009.** Decisions will be made by early January 2010. Funding is contingent on the appropriation of funds by Congress.

For more information, visit wrc.umn.edu

NIWR names Deborah Swackhamer president-elect

Deborah L. Swackhamer, co-director of the Water Resources Center, has been named president-elect of the National Institutes of Water Resources (NIWR) based in Washington D.C. Swackhamer will begin the one-year term as president-elect October 1, 2009, in addition to her regular University duties, and will become president on October 1, 2010.

As president of NIWR, Swackhamer will oversee the network of 54 water resources centers located in land grant institutions across the country, and will lead the agency's efforts to coordinate and promote the training and research activities of water quality professionals and researchers in the United States and around the world.

Student News

Larry Gunderson received his M.S. in May 2009. His thesis was: "Relationships Between Watershed Characteristics, Agroecoregions, Ecoregions and Sediment Levels in Minnesota." Gunderson's advisor was **Dave Mulla.**

Ajay Jones won Best Student Poster at the 49th Annual Meeting of the Aquatic Plant Management Society in Milwaukee, WI, in July 2009. His poster was titled "Native macrophyte community response to herbicidal treatments of *Potamogeton crispus*." **James Johnson** and **Ray Newman** were co-authors.

James Johnson won in a three-way tie for Best Student Paper at the 49th Annual Meeting of the Aquatic Plant Management Society in Milwaukee, July 2009. His talk was titled "Evaluation of lake-wide herbicide treatments for controlling curlyleaf pondweed (*Potamogeton crispus* L.) in Minnesota Lakes." **Ray Newman** was co-author.

Marian Kramer received her M.S. in June 2009. Her thesis was "Holocene Climate and Environmental Change from White Owl Lake Sediments, White River Plateau, Colorado." She was advised by **Erik Brown.**

Brittany Kruger received her M.S. in July 2009. Her thesis title was: "Effect of Organic Matter Type and Salinity on Dissolved Organic Matter Isolation via Ultrafiltration and Solid Phase Extraction." She was advised by **Elizabeth Minor**.

Candice Lavelle received her M.S. in May 2009. Her thesis was "Laboratory Simulation of the Possible Effects of Environmental Estrogens on the Reproductive Health of Free-Ranging Adult Fathead Minnows." She was advised by **Peter Sorenson**.

Bruce Ludwig received his M.S. in June 2009. His thesis was "Upwelling in Idealized Stratified Lakes." He was advised by **Jay Austin**.

Eric Merten received his Ph.D. in June 2009. His dissertation was titled "Instream Wood Transport and Effects of Forest Harvest on Geomorphology and Fish in Northern Minnesota Streams." He was advised by **Heinz Stefan** and **Jacques Finlay**.

Caitrin Mullan received her M.S. in June 2009. Her thesis was: "Assessing Scenic Quality of Urban Waterways: Creating a Foundation for Developing a Comprehensive Scenic Resource Management Tool for the Mississippi National River and Recreation Area." She was advised by **Dorothy Anderson** and **Larry Baker**.

Kara Raymond received her M.S. in May 2009. Her thesis was: "The Effects of Rotational Grazing Systems and Continuous Grazing Systems on Stream Channels and Macroinvertebrate Communities in the Driftless Area Ecoregion." She was advised by **Nick Jordan** and **Bruce Vondracek**.

Scott Walz received his M.S. in June 2009. His thesis was: "Water Budget of a Restored Minnesota Wetland." He was advised by **Ken Brooks**.

Christine Wennen received her M.S. in June 2009. Her thesis was: "Application of a Wireless Sensor Network for Urban Water Quality Management: Pollutant Loading in Stormwater Ponds." She was advised by **Bill Arnold** and **Raymond Hozalski**.

Upcoming Events

September 24–25, 2009

Land Conservation & Clean Water Summit 2009

Minnesota Landscape Arboretum
Chaska, MN

The goal of the summit is to help communities and natural resource professionals better manage our land and water resources and maximize new funding and technical opportunites. For information visit: www.arboretum.umn.edu

October 6–7, 2009

H_2O Uncertain Resource Nobel Conference XLV

Gustavus Adolphus College
St. Peter, MN

The conference will examine the current state of world water resources. For information visit: gustavus.edu/events/nobelconference/2009/

October 20, 2009

21st Annual St. Croix River Research Rendezvous

Warner Nature Center, Marine on St. Croix, MN

This forum, brings together scientists, resource managers, agency staff and the interested public to hear presentations about research plans, projects and findings in the St. Croix watershed. For more information, please call (651) 433-5953 ext. 13.

October 26–27, 2009

Minnesota Water Resources Conference

RiverCentre, Saint Paul, MN

This conference presents innovative and practical water resource management approaches and highlights research about Minnesota's water resources, including best practices in design and application of water resource management techniques, implications of water policy decisions, and research into current and emerging water issues. Register at: wrc.umn.edu/waterconf

Minnegram

Minnegram is sponsored by the University of Minnesota College of Food, Agricultural and Natural Resource Sciences, University of Minnesota Extension, the USGS-USDI National Institutes for Water Resources, and the Agricultural Experiment Station. It is published quarterly by the University of Minnesota Water Resources Center; all opinions expressed within are representative of the respective authors and do not necessarily reflect the views of the supporting entities.

Directors: Faye E. Sleeper, Deborah L. Swackhamer

Editor: Christine Hansen

Submissions: Minnegram welcomes articles, community news, news stories, photos, and other materials for publications.

Please address correspondance to:
Minnegram Editor, Water Resources Center, 173 McNeal Hall, 1985 Buford Ave., St. Paul, MN 55108.
E-mail: mng-ed@umn.edu • Web site: http://wrc.umn.edu • phone: 612-624-9282.

Publications & Resources

Trends in Streamflow and Nutrient and Suspended-Sediment Concentrations and Loads in the Upper Mississippi, Ohio, Red, and Great Lakes River Basins, 1975–2004, 2009. David L. Lorenz, Dale M. Robertson, David W. Hall, and David A. Saad. A comprehensive assessment of the changes in nutrient and sediment concentrations and loads from 1993 to 2004 in streams and rivers in the Upper Mississippi, Ohio, Red, and Great Lakes River Basins.

This new USGS study has been posted online: pubs.usgs.gov/sir/2008/5213/

Recent Environmental History of the Upper Mississippi River, 2009, *The Journal of Paleolimnology*, special issue. Dan Engstrom was the guest editor. The studies focus on the reconstruction of environmental change in the Mississippi and St. Croix Rivers through the paleolimnological analysis of sediment cores from the natural impoundments at Lake Pepin and Lake St. Croix.

Characteristics and nitrogen value of stratified bedded pack dairy manure, 2009. Russelle, M. P.; K. M. Blanchet; G. W Randall; and L. A. Everett. From the Compost Dairy Barn Manure project funded by the Rapid Response fund from the UM Experiment Station. Published online in *Crop Management*:

www.plantmanagementnetwork.org/sub/cm/research/2009/pack/

Mercury bioaccumulation in a stream network. Martin M.T.K.; J. C. Finlay; E. A. Nater. Published in *Environmental Science and Technology* August 2009. The study showed for the first time that mercury concentrations in stream insect larvae differ spatially in a small stream network. The findings suggest in stream processes mediate mercury transformation.

Paperless Minnegram

Sign up to receive the Minnegram electronically.

Help us reduce our use of ink and paper.

Order your Minnegram online at:

http://wrc.umn.edu/minnegramsurvey

Water Resources Center
173 McNeal Hall
1985 Buford Avenue
St. Paul, MN 55108

Address service requested

NONPROFIT ORG
U.S. POSTAGE PAID
MINNEAPOLIS, MN
PERMIT NO. 155