

Water Resources Center

MINNEgram

Governor Pawlenty signs landmark energy bill

On Thursday, February 22, Governor Tim Pawlenty signed an energy bill that requires Minnesota to obtain twenty-five percent of its energy from renewable sources by the year 2025. Addressing an eager crowd at the University of Minnesota's Cargill Building for Microbial and Plant Genomics, Pawlenty deemed the bill "one of the most aggressive renewable energy plans in the country."

In addition to the "twenty-five by '25" standard, the bill requires Xcel Energy, the largest electricity distributor in the state, to provide thirty percent of its energy from renewable sources. Such renewable alternatives include wind turbines, solar power, and biomass. The new standard complements the ethanol doubling plan set for 2013 (signed in 2005), and the Community-Based Energy Development tariff that aims to support local renewable

energy endeavors.

Initially touted by the governor in his 2006 State of the State address, the plan passed the House and Senate floors with ease under the banner of the Renewable Energy Standards Bill. Representative Aaron Peterson (DFL-Appleton) and Senator Ellen Anderson (DFL-St. Paul) were chief authors of the legislation. "This bill will send a very strong message across the country that Minnesota is open for green business," declared Anderson after the bill had cleared the

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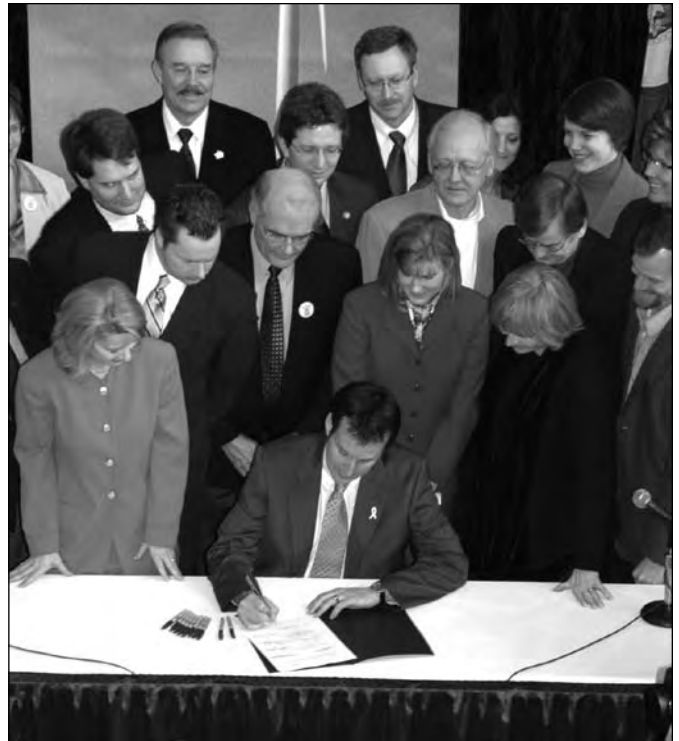


Photo by Martin Moen

Governor Tim Pawlenty signs the Renewable Energy Standards Bill at the University of Minnesota's Cargill Building for Microbial and Plant Genomics February 22, 2007, flanked by bill authors Sen. Ellen Anderson (left) and Rep. Aaron Peterson (left, behind Anderson).

WRC co-director receives lifetime award



WRC Co-Director Jim Anderson accepts the Ralph Macchio Lifetime Achievement Award from Ralph Macchio (left) and NAWT President Bruce Fox (center).

Jim Anderson, Co-Director of the WRC, received the Ralph Macchio Lifetime Achievement Award at the Pumper & Cleaner Environmental Expo last month in Nashville, Tennessee. Named for its first recipient, the award goes to an individual who, by service, leadership and dedication, has advanced the state of the pumping industry over the course of a career. "Anderson personifies this lifetime of commitment by his every action of educating the industry," said Tom Ferrero, executive director of the National Association of Wastewater Transporters (NAWT).

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Around the State

BWSR hires new executive director

ST. PAUL, Minn. – Effective January 22, the Minnesota Board of Water & Soil Resources (BWSR) announced that John Jaschke has been hired as the Board's Executive Director. Jaschke was the Water Resources Manager for Dakota County. Prior to that, he worked as BWSR's Land and Water Section Administrator. He has also worked as an area hydrologist for the Minnesota Department of Natural Resources and as a hydrogeologist for the U.S. Bureau of Mines.

"John will be an asset to BWSR because of his variety of work experience and familiarity with the broad range of conservation issues across different parts of the state," said BWSR Board Chairman Randy Kramer. "He has a track record of building consensus, and I am confident that he will be a strong leader for the organization."

BWSR is the state's administrative agency for 91 soil and water conservation districts, 46 watershed districts, 23 metropolitan watershed management organizations, and 80 county water managers. The board consists of 17 members appointed by the governor, who are charged with optimizing local delivery of conservation services. The agency works through local governments to help the state attain its goals for clean water, clean air, and abundant fish and wildlife.

Jaschke replaces Ron Harnack, who had been BWSR's Executive Director for 15 years. Harnack announced his retirement in October, and he will be working part-time for the Red River Watershed Management Board.

"I am extremely proud of the BWSR accomplishments over the past 15 years," Harnack said. "The BWSR staff and the Board, working with local government units and private landowners, have been the key to those successes."

For more information about BWSR, go to www.bwsr.state.mn.us/.

Adapted from BWSR press release, December 21, 2006.

From the Director's Desk

As I write this letter, I am struck by how, at one level, there has been tremendous change over the last year, yet at another I feel like I have been here before and I am just reliving the same day. Sort of like the movie Groundhog Day. Last year at this time we discussed the potential for significant state funding to address Minnesota's impaired waters. The legislature last year provided initial funding to the Clean Water Legacy. This year they are discussing how to provide long-term funding to this effort. What happens in terms of these discussions will have a large impact on University water programs. So we will continue to watch these developments very closely.

We definitely are in a time of change. Deb Swackhamer, my co-director, has taken on the role of Interim Director of the Institute on the Environment, and, along with 15 faculty is in the process of putting form and substance to that Institute. In the meantime, we are in the middle of a search to fill in behind Deb. By the time of the next letter we should have our new leadership in place.

At the end of January, I attended the USDA-CSREES Water Quality Conference. At this conference, our Onsite Sewage Treatment Program was held up as one of three examples nationwide of a sustainable water quality program. Sara Christopherson made a marvelous presentation of our program. This is just the newest example of how our programs and projects continue to be held up as national examples for others to follow. It is both gratifying and challenging to play this leadership role.

I am just back from the Pumper and Cleaner Environmental Exposition in Nashville, Tennessee. More than 16,000 wastewater practitioners attend this Expo. One recurring theme throughout the week was the need for more education and research to help these professionals do their jobs better to protect our waters. It will be a challenge in the future to keep up the pace. I believe we are up to the task!



A handwritten signature in dark ink, appearing to read "Jim Anderson".

Jim Anderson, WRC Co-Director

IonE lands grant from state legislature

by Michael Kelberer, Institute on the Environment

The University of Minnesota's Institute on the Environment is on its way to addressing complex, global environmental issues with regional significance. Practically before the ink was dry, the Institute landed its first major project: a grant from the Legislative-Citizen Commission on Minnesota Resources to lead a public/private partnership to create a comprehensive, statewide conservation and preservation plan for the State of Minnesota.

The project is underway, with a July, 2007 deadline for a preliminary plan that will identify current and emerging natural resource trends and present initial recom-

mendations. A final plan, due July 2008, will identify future research and data-gathering needs, provide a prioritized list of conservation issues and strategies for addressing them, provide a general cost benefit analysis of these strategies, and provide benchmarks to evaluate progress in achieving them.

An important part of the planning process is the engagement of conservation constituencies from the outset to gather local resource data and concerns, and to gather feedback as strategies and priorities are developed.

Interested parties can contact the project at info@mnconservationplan.net.

Software helps citizens i.d. macroinvertebrates

As part of their public service role, graduate students in Water Resources Science and the Department of Entomology have been active in developing technical publications

and electronic media under the direction of Professor Leonard Ferrington. The materials will assist citizen volunteers in identifying aquatic macroinvertebrates collected from aquatic habitats in Minnesota.

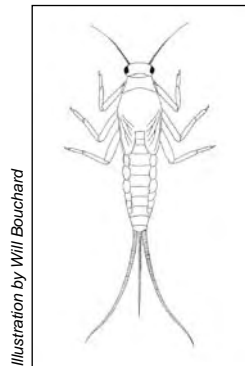


Illustration by Will Bouchard

Ephemeroptera
(mayflies)

In 2004, a spiral-bound identification guide was developed by Will Bouchard to help citizen volunteers accurately identify invertebrates collected as part of their volunteer water quality monitoring efforts. To date, more than 2000 copies have been disseminated, and many additional copies have been downloaded from an online access site at the Water Resources Center (WRC). This manual has been an astonishing success, and has facilitated improved accuracy of identifications by citizens who volunteer their personal time to help our collective efforts to improve monitoring of water resources in Minnesota. The manual may

be purchased at the WRC. More information can be obtained online at: <http://wrc.umn.edu/outreach/vsmp/edmaterials/>.

Recently, Moriya Rufer and Ferrington completed development of an interactive verification program to complement the spiral bound manual and allow citizens to check the accuracy of their identifications. This interactive web-based software is called VSM-IVP, and it can be accessed from the Ferrington lab web page at: <http://www.entomolgy.umn.edu/midge/VSMIVP.htm>.

The software went online in early December, and the authors are now in the early stages of developing an expanded version two (v2) with digital clips and coordinated audio segments to increase the appeal to several user groups, based on the feedback received about the online version. Assisting in development of v2 are Claire Serieyssol (WRS), Adam Sealock (WRS), Brenda Asmus (WRS), Will Bouchard (Ent) and Brian Schuetz (Ent). In addition, several states have already adopted the software or are evaluating it for potential use in their respective citizen volunteer programs. West Virginia has provided links to the VSM-IVP software on their official state web pages for water quality programs, and towns in Maryland, Massachusetts and Pennsylvania have asked for permission to endorse it as part of their local programs.

Swackhamer appointed to Clean Water Council

On December 22, Governor Tim Pawlenty appointed Water Resources Center Co-Director Deb Swackhamer, along with fourteen others, to the Clean Water Council. The Council will serve as an advisory panel on the implementation and administration of the Clean Water Legacy Act, passed by the 2006 legislature. The additional fourteen appointees are:

- Marilyn Bernhardson of Redwood Falls
- Pamela Blixt of Minneapolis
- Earl Bukowski of Sauk Rapids
- Brian Davis of St. Paul
- John Greer of Albany
- Delvin Haag of Buffalo
- Scott Hoese of Mayer
- David Jeronimus of Duluth
- William Moore of Woodbury
- Steven Pedersen of Coon Rapids
- Louis Smith of Minneapolis
- Sarah Strommen of Ramsey
- Paul Torkelson of St. James
- Robert Vogel of New Market

WRC and Extension partner to pilot conservation plan training

by Les Everett, Water Resources Center

A certification training program for agricultural and conservation professionals was launched in February, enabling more private and public sector professionals to prepare conservation practice plans. Course offerings in 2007 include certification training for Nutrient Management Practice 590, Comprehensive Nutrient Management Planning (CNMP), RUSLE2 and Land Treatment.

The USDA Natural Resources Conservation Service (NRCS) does not have sufficient staff to prepare all of the plans required for farmers who have signed up for Farm Bill conservation programs. Consequently, NRCS pays for technical assistance from non-NRCS providers, ei-

ther directly or through farmer contracts. Because of a shortage of certified providers, many farmers with conservation program contracts are currently unable to put the specified practices on the land. This has consequences for future conservation program allocations to the state, as well as for progress toward conservation objectives.

Minnesota is depending heavily on Farm Bill conservation programs to enlist farmers in cleaning up its impaired waters. In order to increase use of conservation programs, the State Legislature set aside funds in the Clean Water Legacy Act to provide certification training for private and public providers of technical services. Consequently, the Minnesota

Department of Agriculture and the Board of Water and Soil Resources contracted with the UM Water Resources Center and UM Extension to pilot certification training for 2007 to 2009.

The technical services training Web site, including course information and registration, is available at tsp.umn.edu. Curricula for the courses and organizational assistance are being provided by the Great Lakes Regional Water Quality Conservation Training Program (RCTP), housed at the University of Wisconsin, Madison. The core team for developing and delivering the courses are Kevin Blanchet, WRC/UM Extension; Jeff St. Ores, NRCS; and Kevin Erb, RCTP.

WRC researcher assesses vulnerability in the Mekong River

by Karlyn Eckman, Water Resources Center

Since 2005, the Water Resources Center has partnered with the Mekong River Commission Secretariat (MRCS) to do a vulnerability assessment in the lower Mekong basin countries of Laos, Thailand and Cambodia. These countries are experiencing rapid environmental changes due to many factors, including economic growth, urbanization, irrigation, invasive aquatic species and deforestation. A massive new complex of Chinese hydropower dams on the upper Mekong is also under construction. These pressures on aquatic resources will have both positive and negative consequences for the 40 million people living downstream who depend on the Mekong for their food and livelihoods.

Through the Mekong-Mississippi Partnership, the WRC and MRCS are working on Socioeconomic Vulnerability Assessment (SVA) to identify possible impacts on human populations. In 2005, an international team led by Lilao

Bouapao of the MRCS and Karlyn Eckman of the WRC began with a literature review to determine what dimensions



A fisherman near Vientienne, Laos, in a traditional wooden boat used for fishing with submerged nets and fishtraps.

had already been studied. The review found that most of the published literature is focused on biophysical resources, but that few socioeconomic studies have been done on human dimensions and the

Mekong. The review also found that SVA has probably never been attempted on a major international river system. SVA methods were first developed by nongovernmental organizations in Asia, and have now been used in many countries. SVA is relatively unknown in the U.S.

Currently, the team is developing an interdisciplinary SVA research methodology for the lower Mekong basin. The team will also collaborate with the United Nations Food and Agriculture Organization to link food security and nutritional data with GIS databases.

SVA field work is likely to begin in June 2007 at pilot sites in all four countries. Lilao Bouapao will be using the SVA data for his Ph.D. research in the Water Resources

Science graduate program.

For more information, please visit the WRC web site at <http://wrc.umn.edu/outreach/mekong/>.

UMD–NRRI makes custom tools for laboratories

Prototyping technology saves time and money

by June Kallestad, UMD–NRRI

“If only we had a...[fill in the blank].” As a busy scientist or student in the lab, you may be able to dream up a useful new tool, but lack the time to design it and build it. Don’t lose the dream. The University of Minnesota Duluth (UMD) now has rapid prototyping technology to make your ideas into something you can really use.

Here’s an example. Water quality biologists at UMD’s Natural Resources Research Institute (NRRI) wanted to save time and money by making their lab operate more efficiently with a larger water sample splitter. Biological supply companies didn’t sell

what they needed. NRRI biologist Dan Breneman explained his needs to Steve Kossett, Chief Design Engineer at NRRI’s rapid prototype center. Kossett made a CAD drawing according to Breneman’s

specifications, and within days the scientists had a sample splitter that fit their needs exactly.

“Steve was able to modify the dimensions of an existing device,” explained Breneman. “This very simple tool has saved us a lot of time and money in the lab.”

NRRI’s rapid prototype center—Northern Lights Technology Center—uses the latest laser and three-dimensional printer technologies to make plastic and resin-based items from computer-generated drawings. They can also use CT scan files to build 3D skeletal models or images, as well as direct metal cast parts in aluminum and zinc.

For more information about the capabilities and possibilities for applications of these technologies, please visit www.nrri.umn.edu/NLTC or call Katy Larson at 218-720-4301.



Photo from UMD-NRRI

Dan Breneman demonstrates the usefulness of his lab’s new and improved water sample splitter. The original splitter is in the foreground.

LacCore facility helps scientists study sediments

by Amy Myrbo, Postdoctoral Researcher and LacCore Facility Manager

Where can you turn for help collecting lake sediment core samples? If you already have cores, how do you extract their maximum scientific value? Maybe you need advice on analytical techniques, or you want some sediment samples prepared and analyzed but don't have the equipment or experience to do it yourself. Or you might be a retiring professor who wants her collection of cores to be cared for and studied by future generations.

The University's LacCore Facility handles these sorts of requests every day. Staff at the facility help scientists from around the world collect, analyze, and preserve sediment samples taken from lakes, wetlands, peatlands, reservoirs, and other continental aquatic environments. Research projects range from the history of human impacts on urban lakes in the Twin Cities to a 1.5-million-year record of past climate in the East African Rift.

LacCore is the National Lacustrine Core Repository and Analysis Facility, part of the Limnological Research Center (LRC) in the Department of Geology and Geophysics. In addition to the Repository, which



Photo by Amy Myrbo

Sediment coring on Swiftcurrent Lake in Glacier National Park, a collaboration between LacCore, Macalester College, and Bryn Mawr College.

houses thousands of meters of high-quality sediment cores from lakes worldwide, the facility features a state-of-the-art core laboratory. The National Science Foundation and the University provide funding for three full-time scientific staff who are dedicated to supporting lake sediment research in the field, laboratory, and classroom. This funding structure—recently renewed for three more years—provides staff assistance and instrument time for all academic researchers free of charge. Supplies and hourly technician time are provided at cost.

Established in 2000, LacCore has built on the foundation of the existing

Core Lab and the LRC itself, a hub of collaborative research stretching back to the 1950s. LacCore was funded primarily to serve the large-scale Global Lake Drilling (GLAD) projects, also begun in 2000, which collect hundreds to thousands of core meters per expedition. An analog of the onboard labs of marine drilling research vessels such as the *Joides Resolution*, LacCore is organized to streamline “initial core description”—a series of steps including multisensor logging for physical properties, core splitting, high-resolution digital imaging, and lithological description. Principal investigators from different institutions, along with their students, visit the facility for days or weeks at a time and process their cores, leaving with subsamples and large amounts of data. The facility hosted over 130 visiting scientists in 2006 (over half of whom were involved in projects with 50 meters or less of sediment core), and assisted countless others by phone and email. Facility staff also help researchers collect cores from diverse lake types, by renting

out coring equipment, accompanying field expeditions, and serving as scientific staff on GLAD operations. Educational activities include lectures, lab tours, an undergraduate workshop course, collaborations with middle- and high-school teachers and their students, development of written protocols, and hands-on training and short courses.

As the applications of sediment core research continue to expand into diverse fields of water resources science, LacCore can increasingly be of assistance to the University and broader communities. Please contact LacCore staff Anders Noren (Curator), Kristina Brady (Assistant Curator), and Amy Myrbo (Lab Manager) to discuss your ongoing or proposed project, to schedule time in the lab, or just for a tour. For more information call 612-626-7889 or visit laccore.org.



Photo by Anders Noren

LacCore's linescan camera produces digital core images at a resolution of 10 pixels per millimeter.

U of M Water Community News

Seven WRS faculty members named IonE Founding Fellows

On January 12, Provost E. Thomas Sullivan and Interim Director of the Institute on the Environment Deb Swackhamer named the fifteen Founding Fellows of the new Institute on the Environment. Seven of the fifteen are Water Resources Science faculty. The full list may be found in a green box at <http://www.academic.umn.edu/provost/interdisc/environment/>.

- **Susan Galatowitsch**, professor in the College of Food, Agricultural and Natural Resource Sciences' Department of Horticulture Science and Director of Graduate Studies for the Conservation Biology program.
- **Sagar Goyal**, professor and Director of Graduate Studies in the College of Veterinary Medicine's Department of Veterinary Population Medicine.
- **Lucinda Johnson**, senior research associate in the Natural Resources Research Institute at the University of Minnesota, Duluth.
- **David Mulla**, professor in the College of Food, Agricultural and Natural Resource Sciences' Department of Soil, Water, and Climate.
- **Paige Novak**, associate professor in the Institute of Technology's Department of Civil Engineering.
- **Christopher Paola**, professor in the Institute of Technology's Department of Geology and Geophysics and Director of the National Center for Earth-surface Dynamics (NCED).
- **Stephen Polasky**, professor in the College of Food, Agricultural and Natural Resource Sciences' Department of Applied Economics and the College of Biological Sciences' Department of Ecology, Evolution, and Behavior.

Jim Anderson (Water Resources Center and Soil, Water and Climate), **Barb Liukkonen** (Water Resources Center and Minnesota Sea Grant), **Sara Christopherson**, **Karlyn Eckman**, and **Les Everett** (Water Resources Center) attended the USDA-CSREES National Water Conference on January 28–February 1, 2007, in Savannah, Georgia.

Larry Baker (Water Resources Center) presented a talk entitled "Source reduction for urban stormwater management" to the Public Works Forum, held at the Ramsey-Washington Watershed District December 21, 2006. Baker was also invited to attend the workshop "Integrating Social Science into NSF Environmental Observatories" held in Alexandria, VA, January 24–25, 2007.

Kristina Brady, **Anders Noren**, and **Amy Myrbo** (LacCore/ Geology and Geophysics) visited the U's Cloquet Forestry Center to participate in the Fond du Lac Band's gidakiimanaaniwigamig winter camp for tribal K–12 students.

Sara Christopherson (Water Resources Center) presented at the Michigan Onsite Wastewater Recycling Association gathering January 8–10, 2007, in Lansing Michigan. Christopherson also presented at the Wisconsin Onsite Wastewater Recycling Association January 25–26, 2007, in Green Bay, Wisconsin.

K. William Easter (Applied Economics) presented an invited paper, "The Role of Nested Institutions in International Water Management: A Global Perspective," at an International Water Management Conference in Madria, Spain.

Les Everett (Water Resources Center) presented the poster, "Conservation tillage on-farm research and demonstrations in Minnesota" at the 2007 USDA-CSREES National Water Conference on January 28–February 1, 2007, in Savannah, Georgia.

Lucinda Johnson (NRRI), along with **Lee Frelich** (Forest Resources) and **David Tilman** (Ecology, Evolution and Behavior), recently joined explorer Will Steger at the State Capitol to present information on the impacts of climate change to eight committees from both the Minnesota House and Senate.

Mike Kilgore (Forest Resources) has been named to the newly established Conservation Legacy Council. Kilgore was elected Council Chair.

Jason Kish (Water Resources Science) presented his poster "Planktonic Archaea and Nitrogen Cycling in Lake Superior" at the 2007 American Society for Limnology and Oceanography Aquatic Sciences meeting February 4–9, 2007, in Santa Fe, New Mexico.

Barb Liukkonen (Water Resources Center and Minnesota Sea Grant) presented a poster titled "Possible Effects of Arsenic in Drinking Water on Dairy and Beef Products" at the USDA-CSREES National Water Conference January 28–February 1, 2007, in Savannah, Georgia.

Julian D. Marshall recently joined the Department of Civil Engineering at the University of Minnesota. Dr. Marshall is an environmental engineer whose primary research interest is population exposure to air pollution, especially transportation emissions.

Michael Semmens (Civil Engineering) received a Senior Fulbright Scholarship to visit Norway in February 2007. He is working with a water and wastewater research group in the engineering program at the Norwegian University of Science and Technology in Trondheim for six months.

Deb Swackhamer (Water Resources Center and IonE) received a grant for a project titled "Minnesota Statewide Conservation and Preservation Plan." This grant was awarded by the Legislative-Citizen Commission on Minnesota Resources. For more information about this grant, see the article entitled "IonE lands grant from State Legislature" on page 2.

Upcoming Events

Save the Date!

The Minnesota Water 2007 and Annual Water Resources Joint Conference will be held October 23–24, 2007. The Conference will be held at the Earle Brown Heritage Center in Brooklyn Center, MN.

The Water Resources Science Seminar Series is held on Friday at 3:00 p.m. in Borlaug Hall, room 375. Refreshments are served at 2:30. A list of presenters and their topics may be found at <http://wrs.umn.edu/seminarseries/>.

The Minnesota River Seminar Series is currently underway. To view the presentation schedule, visit <http://wrc.umn.edu/mnseminarseries/>.

March 26–27, 2007. **Ecological Impacts of Hypoxia on Living Resources Meeting.** Hollywood Casino, Bay St. Louis, Mississippi. This meeting is being jointly coordinated by NOAA and the Northern Gulf of Mexico Cooperative Institute. Visit <http://www.ngi.msstate.edu/hypoxia/> for registration information.

April 29–May 3, 2007. **The 2007 Groundwater Summit.** Albuquerque, New Mexico. The summit is designed to facilitate the exchange and dissemination of technical information and new science developments, allows a means for discussion of policy and regulatory issues pertaining to ground water, and

promotes good will between scientists and engineers worldwide. For more information, visit <http://www.ngwa.org/e/conf/0704295095.cfm>.

May 20–23, 2007. **The Tenth National Watershed Conference.** La Crosse, Wisconsin. The theme of this conference is “Total Watershed Awareness-Extending the Legacy,” and will include presentations ranging from rapid watershed assessments to new watershed management tools. Visit <http://watershedcoalition.org/> for registration information.

June 17–20, 2007. **ASABE Annual International Meeting.** Minneapolis, Minnesota. This is a meeting for Agricultural and Biological Engineers and is a great way for engineers to continue to master their profession with over 160 specialized technical session presentations and six divisional poster sessions that help keep our industry information on cutting edge technologies as well as introduced to the latest research. For more information, visit : <http://www.asabe.org/meetings/aim2007/>.

July 23–26, 2007. **2007 UCOWR/NIWR Conference: Hazards in Water Resources.** Boise, Idaho. For registration information, visit <http://www.ucowr.siu.edu/>.

July 31, 2007. **Midwest Strip-Tillage Expo 2007.** Hawkeye Community College, Waterloo, Iowa. Manufacturers, researchers and farmers will demonstrate equipment for strip-tillage and

associated operations, and will present the latest information on strip-tillage related topics, including equipment selection, fertility management, and guidance technology. For more information, visit <http://wrc.umn.edu/outreach/striptillageexpo/midwest/>.

August 12–18, 2007. **30th Congress of the International Association of Theoretical and Applied Limnology.** Montreal, Quebec. For registration and program information, visit <http://www.sil2007.org/>.

August 14, 2007. **Minn-Dak Strip-Tillage Expo.** Fergus Falls, Minnesota. For more information, visit <http://wrc.umn.edu/outreach/striptillageexpo/minndak/>.

September 5–6, 2007. **2007 Clean Water Partnership Summit.** Cincinnati, Ohio. This conference will focus on innovation in water research and development in the areas of drinking water, homeland security, sustainability, and ecosystems. Visit <http://etprogram.org/summit07> for more information about this event.

October 29–31, 2007. **Making a Great Lake Superior 2007.** Duluth Entertainment and Convention Center, Duluth, Minnesota. This conference will gather researchers, land and resource managers, educators and basin residents to participate in interdisciplinary discussions about the most important issues facing Lake Superior. For more information, visit <http://www.seagrant.umn.edu/superior2007/>.

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Publications and Resources

Streamflow of 2006—Water Year

Summary. United States Geological Survey, 2006. For more than 125 years, the USGS has monitored flow in selected streams and rivers across the U.S. The USGS collects data from more than 7,400 streamgages, many of which provide real-time data in 15 minute increments. This report examines changes in streamflow over the course of 2006 relative to this monitoring record. The publication may be accessed online at <http://water.usgs.gov/waterwatch/2006summary/>.

Impervious Surface Classification

The University of Minnesota's Remote Sensing and Geospatial Analysis Laboratory, in cooperation with the MPCA, has recently completed classifications of impervious surface area of the state for 1990 and 2000, and for 1986, 1991, 1998 and 2002 for the Twin Cities metro area. Classification has enabled quantifying the spatial and temporal patterns of impervious surface area over large geographic areas. The maps and statistics derived from the classifications are available by county,

city, ecoregion, watershed and lakeshed, in a web-based mapping application at: <http://land.umn.edu/>.

Ground-Water Quality of the Northern High Plains Aquifer, 1997, 2002-2004.

United States Geological Survey, 2007. This report assesses water-quality conditions in this subregion of the High Plains aquifer and relates ground-water quality to natural and human factors. To order this publication online, visit <http://pubs.er.usgs.gov/usgpsubs/>.

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Senate floor.

While the governor praised the efforts of the legislature and the stakeholder community in the passing of this bill, he reminded those present that "there is still much more work that needs to be accomplished this session," referring to his "Next Generation Energy Initiative." This ambi-

tious plan would accelerate Minnesota to the forefront of renewable energy standards by calling for even more renewable energy, increased energy conservation, and substantial reduction in carbon emissions. His tone was optimistic, however, adding that "it is a great day for Minnesota when we can all come together and

support renewable energy."

For additional information about the renewable energy standards bill, and the governor's "Next Generation Energy Initiative," visit <http://www.governor.state.mn.us/> and type "Renewable Energy Standards Bill."