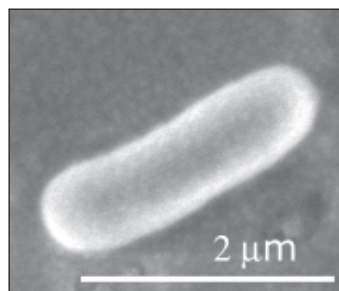


WRC awards 2005 grants

The WRC is pleased to announce the selection of five research projects for funding in the 2005 WRC competitive grant program. The projects include a study on estrogen in swine manure, triazine-contaminated groundwater remediation using bacteria, the integration of biological indicators in the TMDL process, a water quality monitoring strategy based on agroecoregion boundaries, and wireless technologies applied to environmental variables. Funding for the projects is provided by the Water Resources Research Institute program of the U.S. Geological Survey (USGS), and the Center for Agricultural Impacts on Water Quality, a program of the College of Agricultural, Food and Environmental Sciences.

Use of *Arthrobacter aurescens* for Remediation of Groundwater Contaminated with Triazine Herbicides

Atrazine and simazine, two s-triazine herbicides, are used extensively to control broad-leaf weeds in many crops, including corn, sorghum, and sugarcane. Concomitant with the herbicides' extensive, long-term use is their common detection in ground water, sediments, and soils above the U.S. EPA's maximum concentration level.



The bacteria, *Arthrobacter aurescens*, may provide a less expensive way to clean up atrazine-contaminated water.

Professors Michael Sadowsky (Soil, Water, and Climate) and

Lawrence Wackett (Biotechnology Institute) have isolated and identified a gram-positive bacterium, *Arthrobacter aurescens* TC1, that has the ability to degrade over 25 s-triazine compounds,

WRC grants continued on page 4

Vaux to discuss the need for a national strategy to solve U.S. water resources problems

Dr. Henry J. Vaux, Jr., will address the ways the U.S. can equip itself to solve the water resources problems of the future at the third Power of Water lecture, "Envisioning Solutions to the Nation's Water Problems." The seminar is free and open to the public and will be held at 3:00 p.m. on Wednesday, April 6, 2005, in the Bell Museum Auditorium on the Minneapolis campus of the University of Minnesota. The lecture will include a question-and-answer session followed by a reception in the Bell Museum. The Power of Water lecture series is part of the President's 21st Century Interdisciplinary Conferences and is sponsored by a grant to the WRC from the University of Minnesota President's Office. Dr. Vaux chaired both the National Research Council Committee on Assessment of Water Resources Research and the Water Science and Technology Board. He is a professor of resource economics, emeritus, at the University of California.

Minnesota Water 2005 and Annual Water Resources Conference form partnership

Two important conferences in the state will join forces this October to present the *Minnesota Water 2005 and Annual Water Resources Joint Conference*, to be held October 25–26, 2005, at the Earle Brown Heritage Center in Brooklyn Center. Previously, water scientists and professionals have had the opportunity to attend the Water Resources Center's *Minnesota Water* biennially and the annual *Water Resources Conference*, put on by the College of Continuing Education. *Minnesota Water* has emphasized the linkage between current research and management practice, while the annual *Water Resources*

Conference grew out of a need to share management practices and tools. This year, planners believe that the time is right to combine the two conferences under a joint sponsorship to allow for the natural synergy and interaction between their audiences. "The objectives of the two conferences are complementary, and the joint conference embraces a broader and more inclusive mission," said Deb Swackhamer, Co-Director of the WRC.

Planners have issued one call for abstracts, which is available at the WRC Web site (<http://wrc.coafes.umn.edu/>). Abstracts are due April 15, 2005.

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Around the State



WATER RESOURCES UPDATES

MPCA announces statewide plan for mercury in water

The Minnesota Pollution Control Agency (MPCA) has released a preliminary plan for cleaning up mercury pollution affecting the state's lakes and rivers. The proposal, which is on the MPCA Web site (address below), specifies how much mercury levels should be reduced to restore waters impaired by mercury.

Currently, more than 1,200 Minnesota lakes and river reaches are listed as "impaired waters" because the fish in them have too much mercury in their tissues. Mercury is a toxic metal that can accumulate as it moves through the biological food web to fish and is passed to people who eat them. It can cause serious human health effects, particularly for infants and children. The state Health Department issues advisories on eating fish with too much mercury.

Mercury is a difficult pollutant to address, because it can travel long distances through the atmosphere and fall to earth with rain and snow. Ninety percent of the human-caused mercury deposition in Minnesota comes from sources outside the state. Since 1990, when Minnesota began inventorying mercury releases, the state has substantially reduced mercury releases to the environment, especially from manufactured products. The MPCA estimates mercury releases in Minnesota dropped about 68 percent between 1990 and 2000, and that we will reach a legislatively established 70 percent reduction goal in 2005.

The MPCA's mercury reduction plan calls for a 93 percent reduction in human-caused sources of mercury in order to lower mercury levels in fish and remove

From the Director's Desk

In our own backyard

In the last issue, my Co-Director, Deb Swackhamer, wrote about global water issues and Water Resources Center activities addressing those issues. As I write this note, a delegation is flying to Vientienne, Laos, to continue our discussions with the Mekong River Commission to establish a long-term partnership. In this issue, I would like to focus on an activity a little closer to home.



About the time you are reading this, approximately 100 faculty, state, and federal agency representatives from the six states within U.S. Environmental Protection Agency (USEPA) Region 5 will be meeting in Madison, Wisconsin. The purpose of the gathering is to prioritize activities of the U.S. Department of Agriculture-Cooperative State Research, Education, and Extension Service (USDA-CSREES) funded activities of the Great Lakes Water Quality Coordination Project.

The program goals are: provide regional coordination of research, education, and extension/outreach efforts addressing water quality problems, build continuing education and professional development programs based on current available information, offer an entry point for state and federal agencies, commodity organizations, and other non-government organizations to access the resources within the Land Grant universities and collectively address water quality problems of mutual interest.

The project has increased communication and coordination in regional water quality programming. It has increased coordination among Land and Sea Grant institutions and tribal colleges. The regional Water Quality Leadership Team has become an outreach arm to federal agencies such as USEPA and U.S. Department of Agriculture-Natural Resource Conservation Service (USDA-NRCS), and other organizations by initiating efforts to identify and work toward common priorities. The Great Lakes Regional Project has leveraged over \$6 million (a 3:1 ratio) benefiting water quality research and outreach efforts.

It is approaches like this that ensure that research, extension, and outreach funding to address water quality issues in the region are used most effectively to help reach real solutions. To learn more about the Project visit the regional Web site at www.uwex.edu/ces/regionalwaterquality.

Jim Anderson, WRC co-director

fish consumption advisories. This goal is driven by the state's Northeastern region, where lakes are more sensitive to mercury, and becomes the statewide goal because air deposition is relatively uniform across the state.

Because so many of the sources of mercury are outside Minnesota's control, the large majority of reductions will have to come at the federal and international level.

The MPCA intends to have an informational comment period to allow it to obtain a broad array of suggestions and comments on the scientific information

presented in the draft plan.

Public meetings on the draft statewide mercury reduction plan will take place later this winter or early spring at MPCA regional offices and in St. Paul. To be added to a notification list for the meetings, contact Howard Markus at the MPCA, (651) 296-7295 or (800) 657-3864 or howard.markus@pca.state.mn.us. The proposed plan and a fact sheet are on the MPCA Web site at www.pca.state.mn.us/water/tmdl/tmdl-mercuryplan.html.

Excerpted from a Minnesota Pollution Control Agency press release, December 22, 2004

Eisenreich unfolds the framework behind European water policy

On March 1, former University of Minnesota faculty member, Dr. Steven J. Eisenreich, presented a lecture titled "The Water Framework Directive as the Paradigm for the Ecological and Chemical Protection of European Surface Waters" in 110 Green Hall on the St. Paul Campus of the University. The lecture detailed the differences in water policy evolution between the US and Europe, the precautionary principle and bottom-up implementation of European water policy, and the ambitious plans for water protection

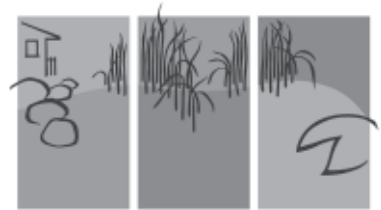
currently underway in the European Union. Approximately 50 students and faculty were in attendance.

Eisenreich is the Head of the Inland and Marine Waters Unit of the Institute for Environment and Sustainability, Joint Research Center Ispra, European Commission. Prior to moving to Italy, he was Chair of the Department of Environmental Sciences at Rutgers University, and Professor of Civil Engineering and Director of the Gray Freshwater Biological Institute at the University of Minnesota.

Shoreland education

Workshops designed to help property owners improve shoreland management, implement a shoreline revegetation project, and manage curly leaf pondweed will be held around the state this year. There will also be a new workshop addressing shoreline erosion. The workshops are sponsored by the Water Resources Center, Minnesota Sea Grant Program, and University of Minnesota Extension Service.

For a workshop schedule, registration form, and more information about the shoreland education program, visit www.extension.umn.edu/water/shore or contact Tracy Thomas Wilson at (612) 625-2282.



Curly Leaf Pondweed Management

Mora-January 29

Osakis-February 5

Little Falls-February 19

Shoreland Volunteer Workshops

Maple Lake-March 12

Perham-May 7

Mankato-September 16

Carlton-September 30

Shoreland Revegetation Workshops

Clear Lake-February 12 & March 19

Litchfield-March 5

Longville-April 1

Prior Lake-April 9

Detroit Lakes-June 10

Shoreland Planting Workshops

Prior Lake-May 21

Outing-June 4

Onamia-July 9

Sherburne County-July 16

Shoreline Erosion Workshop

Nisswa-April 15

Aquatic Plant Identification

Menahga-July 22-23

WRS seminar showcases national experts

The Water Resources Science program invites you to attend the following seminars as part of the Spring 2005 Water Resources Science Seminar Series.

April 2, 2005. Dr. Wayne Wurtsbaugh, from the Department of Aquatic, Watershed, and Earth Resources at Utah State University, will present a lecture titled "Landscape Limnology: Linking Physical, Chemical, and Biological Processes in Streams and Lakes."

April 25, 2005. Dr. David Arscott, from the Stroud Water Research Center in Pennsylvania, will deliver a lecture titled "Enhanced Monitoring in Streams and Reservoirs of the New York City Drinking Water Supply Watersheds."

Lectures are open to the public and will be held at 3:00 p.m. in room B45 of the Classroom Office Building on the St. Paul Campus of the University of Minnesota. The Classroom Office Building is located at 1994 Buford Avenue in St. Paul. The seminars were organized by WRS students Mark Green and Valerie Were. For more information, contact Mark Green at gree0686@umn.edu or Valerie Were at were0005@umn.edu.

WRSIA receives grant for Sarita wetland

The Water Resources Students in Action (WRSIA) were awarded one of 17 Beautiful U Day grants for their proposal to design, construct, and install interpretive signage at the Sarita Wetlands on the St. Paul campus. The Sarita Wetland serves many functions that may not be obvious to the general public, such as providing habitat for migrating waterfowl and other animals, improving surface water quality, and attenuating flood peaks. The proposed signs will provide insight into the form and function of the Sarita Wetlands and convey the importance of maintaining existing wetlands and restor-

ing degraded wetlands. Many thanks go to WRSIA member and Water Resources Science student, Erica Schram, for proposing the idea for the signage and applying for the grant.

Since its inception in 1997, Beautiful U Day has provided an opportunity to celebrate the University's natural resources, buildings, and grounds. The theme for this year's Beautiful U Day is "A River Runs Through Us: A Celebration of the Mississippi," and the celebration will take place on April 21. Funding for the grants was provided by all University departments.

WRC committed to volunteer monitoring

Although the Volunteer Stream Monitoring Partnership's (VSMP) external funding came to an end with the New Year, the resources it developed, interest in monitoring it fostered, and the collaborations and communications it established will remain. The WRC anticipates distributing the VSMP electronic newsletter, helping to convene local coordinators, and sponsoring the 2005 River Summit.

VSMP established quality assurance/quality control protocols, developed standardized data sheets for monitoring, and designed appropriate field sampling protocols.

Since 2000, VSMP conducted 40 training workshops for approximately 400 volunteers and interested citizens. Through the trainings, VSMP staff was able to educate students, teachers, citizens, and natural resource professionals.

VSMP produced tools to strengthen volunteer monitoring, including a *Guide to Volunteer Stream Monitoring* that describes activities for different experience levels to collect data for various purposes, and the *Guide to Aquatic Invertebrates of the Upper Midwest*, designed to help volunteers improve their identification skills and increase the accuracy and reliability of macroinvertebrate data.

Each year, VSMP organized a River Summit that offered

valuable opportunities to bring together stakeholders, introduced volunteers to current water quality issues, and recognized the efforts of all of the partners and the volunteers themselves. In the four-year history of the River Summit, more than 800 people have attended the event and 43 professionals shared their experience in presentations.

A monthly electronic VSMP newsletter was distributed to an e-mail list of more than 300 people. The newsletter was used to advertise events, bring the audience up to date on technical issues, and broadcast news from the extensive network of partners.

The VSMP Web site (www.vsmmp.org) offers PDFs of annual reports, publications, newsletters, educational materials, data sheets, and

protocols, and other resources for monitoring. The Web site will remain a tool for local coordinators and volunteers to maintain communication and consistency.

The VSMP was administered through the WRC. A grant from the Metropolitan Council provided the majority of funding for VSMP. Additional sources of funding included the McKnight Foundation, the Mississippi Watershed Management Organization, and the Extension Great Lake Regional Water Quality project.



High school students use VSMP protocols to collect data on a Hennepin County creek.

WRC grants continued from page 1

including atrazine, simazine, and ametryn. By degrading the s-triazine chemicals, the bacterium removes them from the environment. The research will focus on the remediation of ground water and sediments using the formulated bacterium by batch and column-based aquifer models.

Estrogens and Estrogenic Activity in Swine Manure

Estrogen hormones can adversely affect the reproductive biology of fish, turtle, frogs, humans, and other vertebrate species, even at low concentrations. For this reason, the public is very interested in estrogen hormones as an emerging contaminant. Runoff from manure-applied fields can carry estrogen hormones to rivers, lakes, and streams.

The goal of this project, led by research associate Kuldeep Kumar (Soil, Water, and Climate), is to quantify the levels of various forms of estrogen and

estrogenic activity in various types of swine waste facilities in Minnesota. The type of facility, along with pig age, waste management plan, and season all affect the level of estrogen and estrogenic activity in the manure. The project will provide correlation between these variables and estrogen that can be used to protect the quality of water resources. This research is relevant in Minnesota, which ranks third in hog production in the U.S.

A Rapid Bioassessment Approach for Integrating Biological Data into TMDL Development for Organic Enrichment of Streams in Urbanizing Watersheds

Biological data are typically integrated into the establishment of Total Maximum Daily Loads (TMDLs) to assist in development of designated use categories, and in monitoring efforts to ensure that water quality standards are met. Prediction of biological responses resulting from the attainment of a TMDL is not currently a

fundamental part of the TMDL process.

The goal of this project, in its second year of funding and led by Leonard Ferrington, Jr. (Entomology), is to develop and refine a rapid bioassessment technique using chironomid pupal exuviae to integrate biological data into a current TMDL study of Minnehaha Creek in Hennepin County, Minnesota. Rapid bioassessment protocols developed from this research will then be tested for broader effectiveness on a local scale in several urban streams in the Minneapolis-Saint Paul metropolitan area.

Water Quality Monitoring Strategy Based on Agroecoregion Boundaries in the Minnesota River Basin

Different land uses and their specific characteristics can determine the effect that overland runoff has on the water quality of rivers and streams. David Mulla

WRC grants continued on page 5

Fluorochemicals in Minnesota waters

Research conducted by Matt Simcik (Environmental Health Sciences) as part of the Water Resources Center Competitive Grants Program has produced a low-cost technique to analyze environmental samples for perfluorochemicals (PFCs). The timing of this research and its results coincide with increasing concerns about PFCs as persistent, bioaccumulating, toxic chemicals.

Used in many products including Teflon and Scotchgard, fluorochemicals are relatively stable compounds that exhibit low vapor pressures and hydrophobicity. Contrary to the behavior that is commonly associated with these chemical properties, fluorochemicals can enter the environment through several channels. Fabrics treated with fluorochemicals can leach low volatility compounds into wastewater. More volatile perfluorochemicals can volatilize and circulate around the globe until they undergo atmospheric reactions or deposition to aquatic and terrestrial systems. Industrial fluorochemical production wastes also contain residual fluorochemicals.

Scientists from 3M, the producer of Scotchgard, have found perfluorooctanesulfonate (PFOS) in human blood around the world. In the U.S., 95 percent of the population surveyed showed measurable amounts of PFOS in their blood. PFOS appears to be a common

degradation product of Scotchgard, and was a major component of aqueous fire fighting foam. Others have found PFOS globally in aquatic biota and water, illustrating its persistent, bioaccumulating tendencies. An indicator of PFOS's toxicity



Simcik and Dorweiler prepare to portage while collecting liver and water samples in Voyageurs National Park.

is its use as an insecticide, however this has not been widespread. Subsequently, 3M has discontinued the production of PFOS.

Once in the environment, perfluorooctanoic acid (PFOA), another commonly found perfluorochemical, has been shown to increase estrogenic hormones and hepatic toxicity. Fluorochemicals, as a class, are not easily degraded by physical mechanisms.

Simcik, along with graduate student Kelly Dorweiler (Environmental Health Sciences), has developed a procedure that involves single quadrupole Liquid

Chromatography-Mass Spectrometry (LC/MS) to analyze environmental samples for PFCs. The procedure uses a column of fluorosilica gel to remove chromatographic interference, which previously hindered the use of the relatively simple LC/MS method. Expensive equipment possessed by a relatively small number of labs was required to perform the Liquid Chromatography-Tandem Mass Spectrometry (LC/MS/MS) and Fluorine Nuclear Magnetic Resonance (^{19}F NMR) and avoid chromatographic interference, but LC/MS/MS could still suffer some effects of the environmental matrix if not removed by some sort of clean up.

To test the new method, Simcik and Dorweiler collected liver samples from northern pike and water from Agens, Locator, and Little Trout lakes, located in remote areas of Voyageurs National Park in northern Minnesota. All three lakes are accessible only by foot, have no inlet or outlet, and support no industry. Thus, the PFOS levels up to 12.2 ng/g of wet weight in the livers and 1.2 ng/L in water support their hypothesis that atmospheric deposition is responsible for transport of PFCs to the environment.

This research was funded by the USGS-WRRI 104B National Grants Competition and the Center for Agricultural Impacts on Water Quality.

WRC grants continued from page 4

(Soil, Water, and Climate) hypothesizes that water quality impairment is primarily driven by factors accounted for by agroecoregion boundaries, including major cropping system, slope steepness, soil internal drainage, and mean annual precipitation, and that the variability in water quality is greater for minor watersheds across different agroecoregions than for minor watersheds within agroecoregions.

The objectives of this project, led by Mulla, are (1) to measure the export of nutrients and sediment in minor watersheds across three different agroecoregions making up the Blue Earth,

Le Sueur, and Watonwan watersheds of south central Minnesota and (2) to evaluate the variability in export of nutrient and sediment in minor watersheds within three agroecoregions of south central Minnesota.

Wireless Technologies Applied to Environmental Variables and Nutrient Loadings

Both spatial and temporal heterogeneities in the environment influence a variety of processes of interest to environmental engineers, geochemists, hydrologists, and policy makers. These spatially and temporally distinct events can only be detected with a high speed real-time

embedded networked sensing.

The objective of the proposed research, led by Miki Hondzo and William Arnold (Civil Engineering), is to develop a platform for small-scale sensor networks that wirelessly provide real-time data for selected environmental conditions and concentrations. Specifically, Hondzo and Arnold will use recently commercially available sensor boards and processors to measure and transfer environmental parameters, including temperature, light, humidity, wind velocity, pressure, and precipitation along the Mississippi River. Additionally, they will link a commercially available nitrate bisensor to the boards and processors.



U of M Water Community News

Jim Anderson (WRC Co-director and Soil, Water, and Climate) and **Deb Swackhamer** (WRC Co-director and Environmental Health Sciences) will serve as Co-chairs of the Science Advisory Panel for the Lake Pepin TMDL plan. **Les Everett** (WRC) serves on the Executive Committee of the Stakeholder Advisory Committee.

Patrick Brezonik (Civil Engineering) received a distinguished service award from the National Academies in December and was designated a lifetime National Associate of the Academies. Last October, Brezonik also gave an invited presentation on global water quality issues at a National Academy of Sciences colloquium at Irvine, California, on the role of science in solving the Earth's emerging water problems.

Ken Brooks (Forest Resources) presented a paper titled "Improving Water Quality and Enhancing Hydrologic Stability of the Minnesota River through Agroforestry and other Perennial Cropping Systems" at the USDA-CSREES National Water Quality Conference in San Diego, February 7–10.

Barb Liukkonen (WRC and Sea Grant) was co-author of two papers, titled "Building the Capacity of Volunteer Monitoring for *E. coli* in the Upper Midwest" and "Bacteria Monitoring in the Upper Midwest: Developing Consistent Training and Monitoring Methods," presented at the conference.

Melinda Erickson (Water Resources Science) and her advisor, **Randal Barnes** (Civil Engineering), recently had the article "Glacial Sediment Causing Regional-Scale Elevated Arsenic in Drinking Water" accepted by the journal *Ground Water*. Erickson has also made several presentations in the past few months. On November 16, she gave a talk titled "Beyond the Minimum: Purposefully Designing (or Redesigning) Ground Water Sampling Schemes" at the Minnesota Ground Water Association Fall Conference on Management and Analysis of Ground Water Data.

On November 22, she gave an invited seminar, "Late Wisconsin-aged Drift and Elevated Arsenic Concentrations in Drinking Water in the Upper Midwest, USA," at North Dakota State University. Ms. Erickson presented the talk "Arsenic in Minnesota Ground Water: Occurrence and Geochemical Mobilization Mechanisms" on February 7, as part of the WRS Spring 2005 seminar series. Finally, on February 24, in Charleston, SC, she presented the paper "Arsenic in Drinking Water in the Upper Midwest, USA" at the National Ground Water Association's 2005 Naturally Occurring Contaminants Conference: Arsenic, Radium, Radon, and Uranium. A full paper will be published in the conference proceedings. The trip to SC was partially funded by the Water Resources Science program through a student travel grant.

John Gulliver (Civil Engineering, St. Anthony Falls Laboratory) traveled to Costa Rica in January to give two seminars on Water Management with New Technologies at EARTH University, which offers an education in agricultural sciences and natural resources in order to contribute to sustainable development in the humid tropics.

Rodrigo Molina, an undergraduate chemical engineer major from Chile, recently won a national paper and presentation competition for his undergraduate research on atrazine removal from drinking water by immobilized enzymes. Molina's research was directed by **Michael Sadowsky** (Soil, Water, and Climate; Biotechnology Institute; Microbiology), **Larry Wackett** (Biotechnology Institute), and **Michael Semmens** (Civil Engineering).

Deb Swackhamer served as Chair of the USEPA Science Advisory Board panel that reviewed the EPA Draft Framework for Inorganic Metals Risk Assessment in Washington, DC on February 1–2.

University of Minnesota Water Resources Science Program Degree Recipients

Wendy Hieb received an M.S. in November 2004. Her thesis was titled "Identifying the sources of fecal coliform bacteria in Lake Superior watersheds." Hieb was advised by **Randal Hicks** (Biology) and **Michael Sadowsky** (Soil, Water, and Climate, BioTechnology Institute, Microbiology).

Yuhu Yan received his M.S. in November 2004. His Plan B paper was titled "Remote sensing reflectance measurements and analysis in the western arm of Lake Superior." Yan was advised by **Michael Sydor** (Physics).

Jean Doyle received her M.S. in December 2004. Her thesis was titled "Impervious surface mapping and change monitoring using Landsat remote sensing." Doyle was advised by **Marvin Bauer** (Forest Resources).

Julie Klejeski received an M.S. in December 2004. Her thesis was titled "Nutrient Budgets in Urban Lakes in Virginia, Minnesota." Klejeski was advised by **Erik Brown** (Geology and Large Lakes Observatory).

Randy Lehr received his Ph.D. in February 2005. His thesis was titled "Application of bioanalytical techniques to the management of environmental estrogens." Lehr was advised by **Deb Swackhamer** (WRC and Environmental Health Sciences).

Brian Huser received his Ph.D. in February 2005. His thesis was titled "Phosphorous Sorption by Sediments in Eutrophic and Acidic Lakes." Huser was advised by **Pat Brezonik** (Civil Engineering) and **Ray Newman** (Fisheries, Wildlife, and Conservation Biology).



Upcoming Events

March 30–31, 2005. **4th Annual Western Great Lakes Research Conference.** Northern Michigan University, Marquette, Michigan. The conference provides a forum for information and idea sharing between researchers and managers of national parks and other public lands throughout the Western Great Lakes area. For information, contact RaeLynn Jones Loss at (612) 624-0734 or Jerrilyn Thompson at (612) 624-3699, or visit the conference Web site at www.cnr.umn.edu/cesu/conferences/wglc/.

March 30–31, 2005. **Shallow Lakes Conference.** Arrowood Resort, Alexandria, Minnesota. The Conference will focus on the impacts of shoreland development on shallow lakes and subsequent surface water and in-lake habitat changes. For more information, contact Shannon Fisher, DNR, at (507) 359-6073 or shannon.fisher@dnr.state.mn.us.

April 5–6, 2005. **Midwest Regional Chapter—Society of Environmental Toxicology and Chemistry Annual Meeting.** University of Wisconsin, Madison, Wisconsin. The theme of this year's meeting is "Stressor Impacts to Populations of the Great Lakes Region: well known and newly emerging." This theme will help draw focus on the nature and importance of ecological risk concerns in the Great Lakes Region and the research currently underway on these vital re-

sources. Refer to the meeting website at www.midwestsetac.org for information.

May 15, 2005. **Save Lake Pepin.** Hok-Si-La Park, Lake City, Minnesota. The event will be held to inform the public about Lake Pepin and the Lake Pepin Watershed TMDL project. The MPCA is coordinating with an ad-hoc consortium of Mississippi River-related and local organizations to plan the event. It will take place from 1:00–4:00 p.m. at Hok-Si-La Park on Hwy 61 just north of Lake City. Planning is under way to include educational boat rides, displays, music, and food, as well as a kickoff message on the importance of saving Lake Pepin.

May 19–20, 2005. **Geological Society of America—North Central Section Meeting.** Radisson Metrodome, Minneapolis, Minnesota. The meeting will consist of numerous symposia, theme sessions, workshops, and fieldtrips. For additional information, including registration, visit the meeting website at www.geosociety.org/sectdiv/Northc/05ncmtg.htm.

May 23–27, 2005. **The International Association for Great Lakes Research 2005 Annual Conference.** University of Michigan, Ann Arbor, Michigan. "Great Lakes Ecosystem Forecasting: Improving, Understanding, and Prediction" is the theme for this year's conference, with five

sessions devoted specifically to that theme. For information, visit the conference website at www.iaglr.org/conference/2005/.

March 29, 2005. **Phosphorus Conference 2005.** University of Minnesota, St. Paul, Minnesota. Leading phosphorus experts will discuss phosphorus transport, water hypoxia, the phosphorus index, and fertilizer recommendations. The conference is sponsored by the College of Agriculture, Food, and Environmental Sciences. For more information, including registration details, visit the conference Web site at www.coafes.umn.edu/phosphorus, or call Erik Kattan at (612) 624-1456.

June 16–18, 2005. **Open Source Geospatial '05.** University of Minnesota, Minneapolis, Minnesota. This international conference will address geospatial data technologies developed by or of relevance to the Open Source community. The conference program will include hands-on workshops, keynote talks, paper presentations, technology sessions, and round-table discussions and is designed to bring together the MapServer, EOGeo, and OSGIS communities with the intent to be broadly inclusive. For more information, visit the conference website at <http://mapserver.gis.umn.edu/mum/mtg2005.html>.

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Publications and Resources



Great Wisconsin Birding and Nature Trail Guide. Wisconsin Department of Natural Resources. 2004. The Wisconsin DNR—Endangered Resources Program is pleased to announce that the Great Wisconsin Birding and Nature Trail: Lake Superior/North Woods viewing guide is now available! This full color, 72-page viewing guide contains information and maps for 88 sites in the northern 18 counties of Wisconsin. All of the sites for this project were collected via the “Birding and Nature Trail” link on the Wisconsin Bird Conservation Initiative (WBCI) website, www.wisconsinbirds.org/trail/. Copies of the guide are available from the Wisconsin Department of Tourism. To get your free copy, contact 1-800-432-TRIP or www.travelwisconsin.com/d2k/search/kits.html. To access the guide online, go to www.travelwisconsin.com/thingstodo/birding.htm.

A Guide to Planning for Coastal Communities in Wisconsin. Bay-Lake Regional Planning Commission. 2004. A new guidebook is available to help Wisconsin’s Great Lakes communities incorporate coastal resource management into their comprehensive plans. The guide is available to download from the Wisconsin Coastal Management Program website at www.doa.state.wi.us/pagesubtext_detail.asp?linksubcatid=276, or may be requested directly from Bay-Lake RPC by calling (920) 448-2820 or emailing mwalter@baylakerpc.org. A website, http://planning.lic.wisc.edu/new_Coastal/Coastal_Guide.htm, developed by the Land Information and Computer Graphics Facility at UW-Madison, also provides comprehensive planning assistance to local communities.

Great Lakes Basin Program for Soil Erosion and Sediment Control 2004 Annual Report. Great Lakes Commission. 2004. This annual report is available online at <http://www.glc.org/basin/pubs/keeping/>. Managed by the Great Lakes Commission, this federal/state partnership provided funding to support 38 small and 10 large grants in all eight Great Lakes states in 2004. Since the program’s inception in 1991, over 300 projects have been supported, all directed at improving Great Lakes water quality by reducing the amount of soil and attached nutrients entering the water.