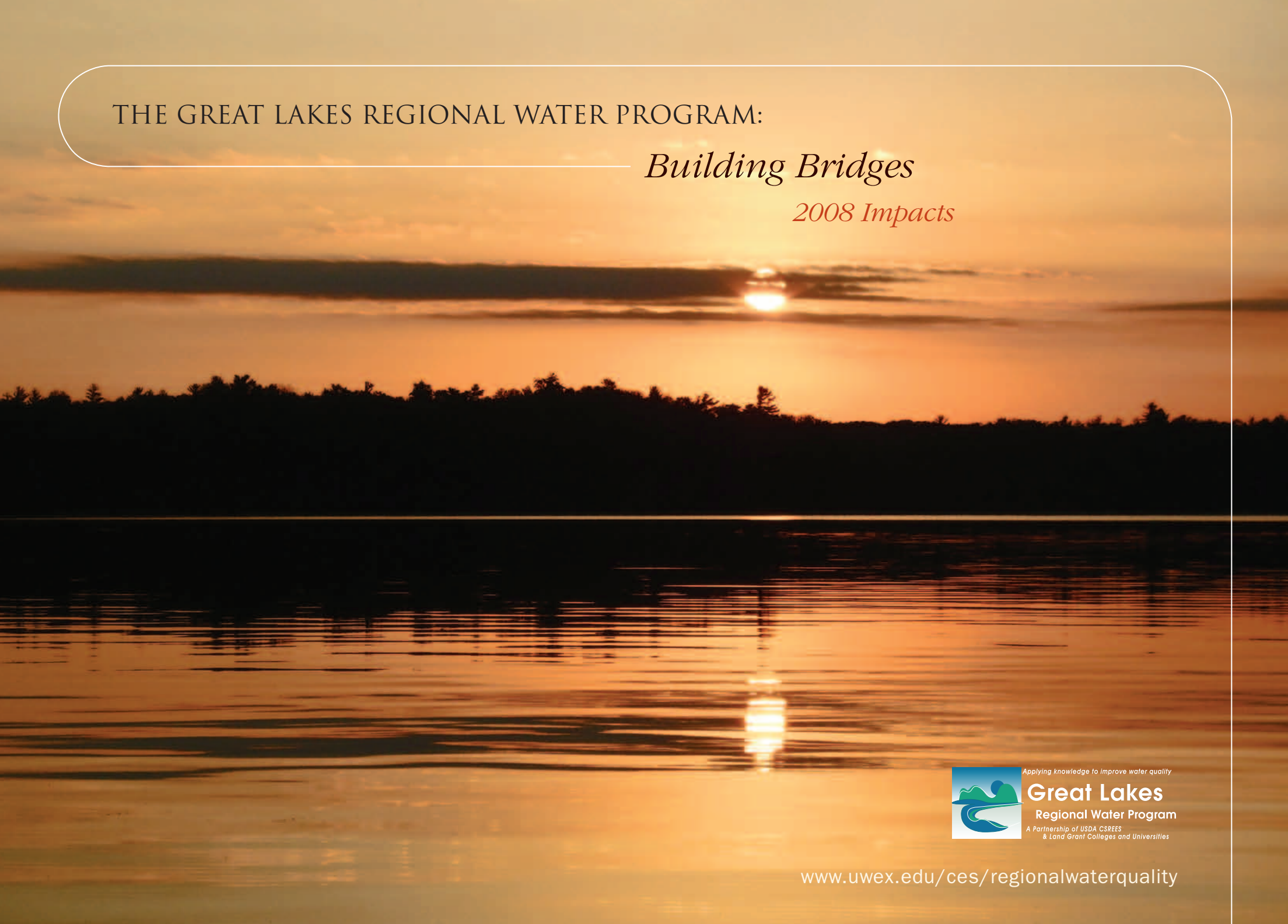

THE GREAT LAKES REGIONAL WATER PROGRAM:

Building Bridges

2008 Impacts

Applying knowledge to improve water quality

Great Lakes
Regional Water Program

A Partnership of USDA CSREES
& Land Grant Colleges and Universities

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GREAT LAKES Regional Water Program

Photos courtesy of: Jeffrey J. Strobel, Matt Duvall, Kris Stepenuck, Kevin Erb, Jim Gill, Tim McCabe, Patrick Robinson, Lynelle Hanson, Scott Herron, Wayne Goeken, Bob Mahler, Kinna Ohman, and Great Lakes Regional Water Program participants

Graphic design by Jeffrey J. Strobel and Jennifer Lach, UW-Extension Environmental Resources Center

THE GREAT LAKES REGIONAL WATER PROGRAM: *Building Bridges*

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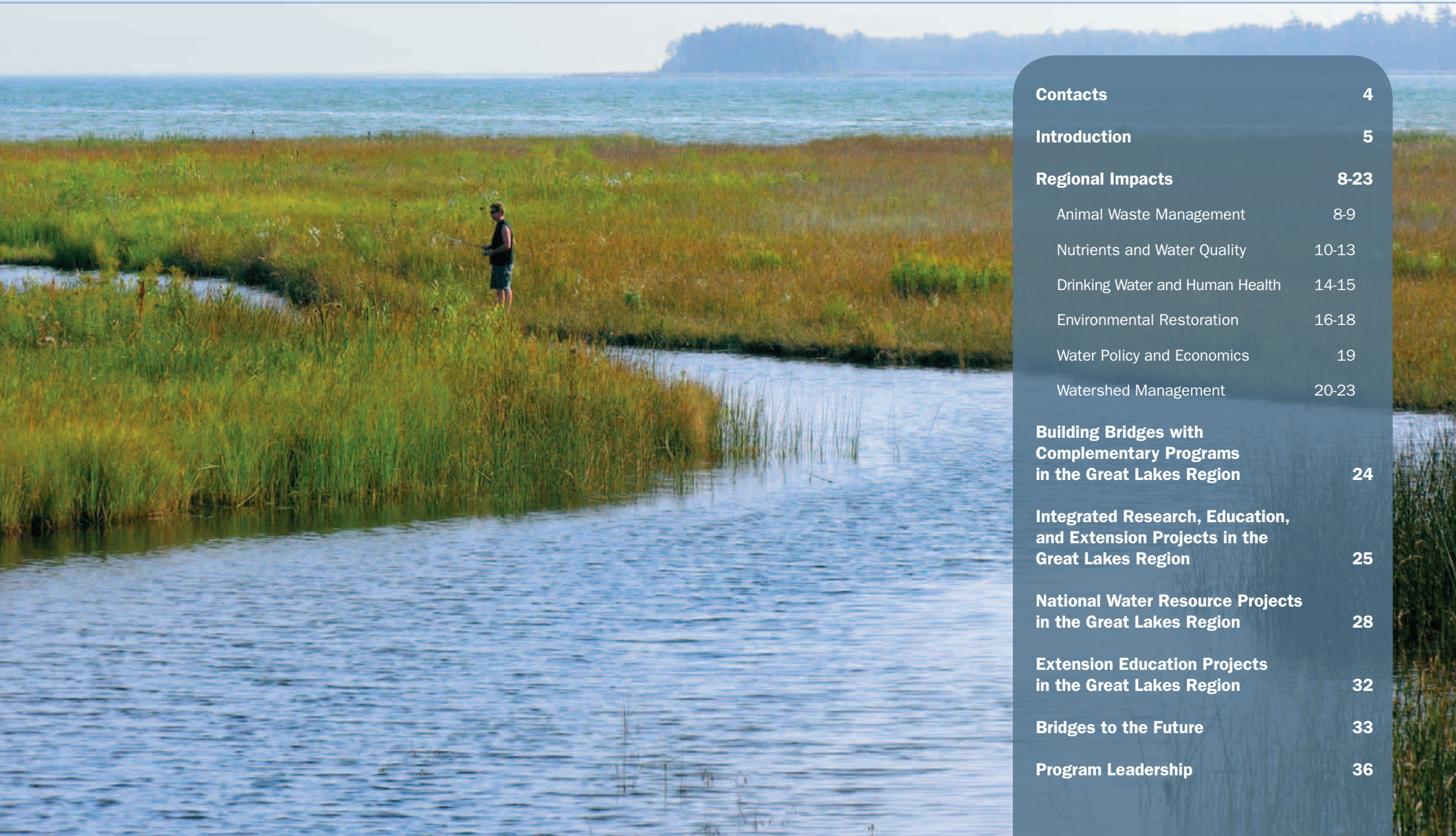
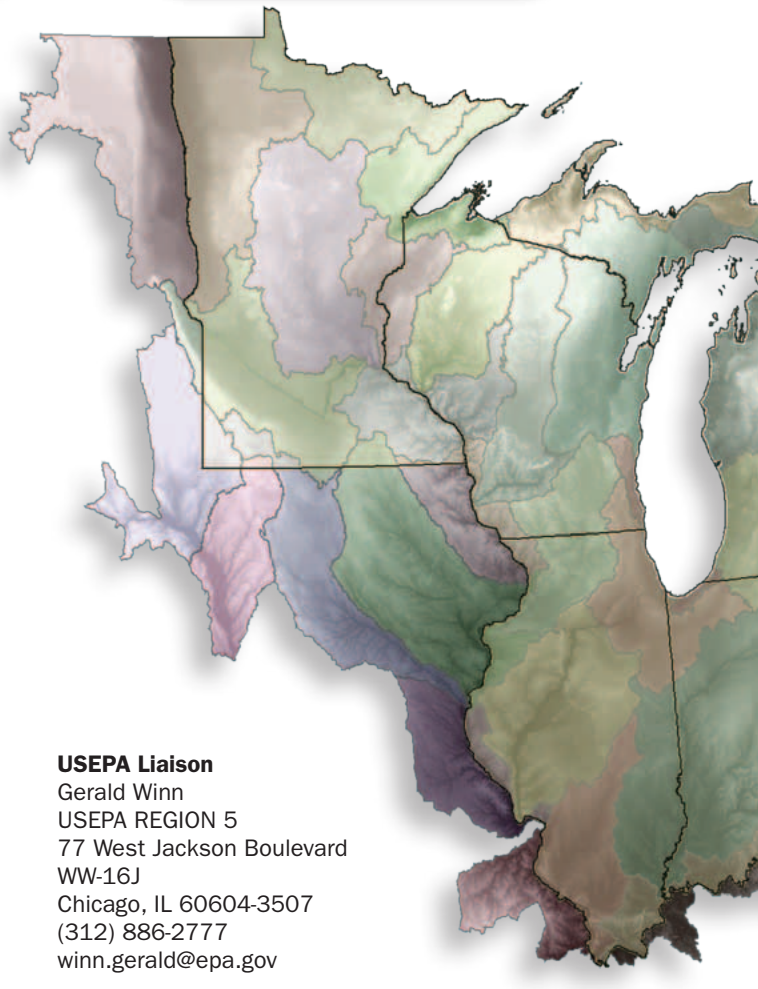


REGIONAL CONTACTS



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INTRODUCTION

The Great Lakes Regional Water Program is a partnership among the Land-Grant institutions in Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin, along with the Cooperative State Research Education and Extension Service (CSREES). Through a grant from the CSREES National Integrated Water Quality Program (www.usawaterquality.org) that increases our ability to work across state lines, we deliver and share research, education, and outreach programs that either lead directly to cleaner water, or increase the capacity of people to manage water resources. We make every effort to take advantage of the diverse knowledge bases available in each state, as well as the economies of scale available when the Land-Grant universities and colleges and our partners in the region address water resource issues collaboratively. The Program is, in essence, a study in bridge building.

We do not, however, build bridges just to build them. We build bridges to:

- Ensure a safe and reliable source of water of the appropriate quality to meet the needs of food and fiber production, human health, use, and economic growth, and maintenance and protection of natural environmental systems;
- Provide regional leadership and coordination for research, higher education, and extension/outreach efforts related to water quality and availability;
- Strategically prioritize, plan, implement, and share multi-state water quality and availability initiatives that build on local, state, and national expertise;

- Build capacity among participating universities and our partners to achieve and communicate water quality and availability impacts;
- Serve as an entry point for federal and state agencies, commodity organizations, and other non-governmental organizations to access Land Grant university and Cooperative State Research Education and Extension Service resources to collectively address water quality and availability needs.

Bridges work in a number of ways to foster the resilience of ecosystems, ecosystem services, and the social systems crucial to their management. Lance Gunderson, C.S. Holling, and Stephen Light (1995) speak eloquently about the need for bridges in this era of complex problems and solutions. They highlight the importance of building bridges across scales from local to global; the importance of understanding the roles that different partners play in framing problems, developing solutions, and modifying approaches as new knowledge emerges; the need to craft public policies that bridge short and long-term time scales, geographic scales, and are flexible enough to change as we learn; and finally, the need to build bridges between the institutions that have been traditionally been involved in resource management and knowledge generation with the people that have a stake in the resources being managed.

Each of the initiatives described in this impact report expresses the value that the Great Lakes Regional Leadership Team and our initiative leaders place on building bridges in the areas identified by Gunderson, Holling, and Light. Initiatives are focused in eight CSREES national themes to help address regional priorities and maintain connectivity between the following initiatives:

- Animal Waste Management
- Nutrients and Water Quality
- Drinking Water and Human Health
- Environmental Restoration
- Water Policy and Economics
- Watershed Management

If you have an interest in building a bridge between your work and that of the Great Lakes Regional Water Program, please contact either an initiative leader or a Leadership Team member for more information. Contact information for initiative leaders is listed at the end of each initiative summary.

In addition to bridge-building related to specific initiatives in 2008, the Great Lakes Regional Water Program built leadership bridges as well. We built a bridge between approaches conceived in 2004 and new approaches coalesced this year from four years of learning. This impact report reflects focus on a smaller number of initiatives with deeper impacts from each. For more information about new Program directions, please see p. 33 of this report.

Members of our Leadership Team that have been with us since the start of the Program are changing roles, and we are welcoming new Team members. We are building bridges between leaders that are experienced with our program and leaders that bring new insights and strengths. For more information about the new roles and responsibilities of Program leadership, please see pp. 36-37 of this report.

Finally, we expanded existing bridges with the Land Grant North Central Region, by engaging university administrative leaders in each state as well as the North Central Cooperative Extension Association and the North Central Regional Association of State Agricultural Experiment Station Directors.

We hope that the connections built in 2008 provide greater access to the research, education, and outreach resources universities have to address the Great Lakes Region's water needs, and a greater knowledge and capacity for citizens and organizations to actively maintain and protect clean, plentiful, and resilient water resources in the region.

For more information about the Great Lakes Regional Water Program, please visit our website at: www.uwex.edu/ces/regionalwaterquality

REGIONAL THEME

Animal Waste Management

Building Bridges Through Regional Conservation Training

EPA and state regulatory agencies have identified thousands of watersheds as impaired for their intended uses. Watershed planning efforts have been initiated in most states to prioritize restoration efforts and create implementation timelines for nutrient load reduction. This trend will continue as environmental regulations continue to affect livestock producers of all sizes, particularly small and medium sized operations with more limited resources.

This initiative provides training to professionals that work with producers at both the state and regional level. The initiative serves Extension staff, private sector consultants, co-op agronomists, Certified Crop Advisors (CCAs), Technical Service Providers (TSPs), as well as state natural resources staff, Land/Soils and Water Conservation Districts (SWCDs) and Natural Resource Conservation Service (NRCS) – the "information multipliers" that work with farmers on conservation issues.

ANIMAL WASTE MANAGEMENT – SELECTED IMPACTS

- Launching of a multi-state conservation training website that allows sharing of training opportunities and approaches across states, as well as electronic course tracking for conservation professionals.
- New courses were offered in invasive plant management, wetland management, native pollinators, advanced forestry, and two new on-line courses were offered on Confined Animal Feeding Operation permit requirements and advanced comprehensive nutrient management planning.

In 2008, more than 1,000 conservation professionals participated in a conservation training needs assessment from Extension, NRCS, LCD/SWCDs and the private sector in the Great Lakes States. A product of this needs assessment process was the launch of a regional conservation training website and database, developed by Extension and NRCS (http://conservation-training.wisc.edu). This website hosts regional and state-based conservation training opportunities in the Great Lakes states, and is available to public sector conservation trainers across the region to help market their courses, register participants, take payment, and to track participation in continuing education for certification.

Courses include topics such as Integrated Pest Management, Comprehensive Nutrient Management Planning, grazing, and conservation planning. In 2008, new courses were offered in invasive plant management, wetland management, native pollinators, advanced forestry. and two new on-line courses were offered on Confined Animal Feeding Operation permit requirements and advanced comprehensive nutrient management planning.

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REGIONAL THEME

Nutrients and Water Quality

Drainage Management to Reduce Nitrate Loads from Midwestern Agriculture

At least 50 million acres of cropland in the Midwest require subsurface drainage to remain productive, but nitrate losses through tile drainage systems have been shown to degrade stream quality and contribute to hypoxia in the Gulf of Mexico. The Great Lakes Regional Water Program works with regional and national partners to advance management practices that can mitigate the negative impact of drainage, and integrate, synthesize, and recommend effective research and strategies. The goal is to identify and advance solutions that minimize nitrate loss while maintaining productivity in agricultural fields. This initiative and its partners promote:

- research to improve our understanding of how well and where new drainages practices work, and identify knowledge gaps.
- education and outreach to enable producers to understand drainage management alternatives and benefits, and contractors to understand alternative design.
- increased collaboration among research, extension, industry, farmers and professionals.

In 2008 as in past years, the initiative's drainage management team |met with the Agricultural Drainage Management Systems Task Force (a technical work group that includes members from the Agricultural Research Service, the Cooperative State Research Education and Extension Service, Land Grant universities, the Natural Resources Conservation Service, and the private sector) to address regional drainage issues. Drainage management research from this initiative was presented at numerous national and regional conferences, as well as disseminated through Extension. The focus of this research is to identify and advance technology and solutions that minimize nitrate loss while maintaining productivity in agricultural fields.

The publication *Questions and Answers About Drainage Water Management for the Midwest* was created to respond to a clearly expressed need of many agencies including USDA- NRCS, universities, EPA and state environmental agencies. More than 20,000 copies have been distributed regionally and nationally. A second printing was initiated due to high demand.

In response to demand for further work, a successful five-state NRCS Conservation Innovation Grant program is underway, in collaboration with the Agricultural Drainage Management Coalition that represents the drainage industry. This grant has funded demonstration sites in each state (Minnesota, Iowa, Illinois, Indiana, Ohio) that will result in national recommendations. Field Days have allowed contractors to participate in installation, and fostered farmer learning about the practice. This effort will promote and characterize drainage water management at a larger scale than has previously taken place in the Midwest region. A database of the different sites, with their soil, crop, drainage system, slope, climate, and other relevant factors will be developed. Results from the different sites will be analyzed to explain similarities and differences in effectiveness.

Contact: Jane Frankenberger - frankenb@purdue.edu

Partners: The Agricultural Drainage Management Coalition, private sector (drain tubing manufacturers, drainage contractors), USDA Agricultural Research Service, US-EPA, USDA- NRCS, ARS.

Publications: Questions and Answers on Drainage Water Management http://www.uwex.edu/ces/regionalwaterquality/Flagships/DrainageDocs/purduedrainagepub.pdf

NUTRIENTS AND WATER QUALITY – SELECTED IMPACTS

- Increased the awareness of researchers, educators, resource managers, and private sector professionals of the most recent science on the impacts of drainage water management.
- Conservation Innovation Grant with partners has funded demonstration sites in each state (Minnesota, Iowa, Illinois, Indiana, Ohio) that will result in national recommendations.
- Field Days allow contractors to participate in installation of practices, and farmers and others to see the practice
- The Midwest Cover Crop Council has substantially increased awareness of the value of cover crops as a conservation practice, and is designing a new decision tool for farmers.

Nutrients and Water Quality – continued

Midwest Cover Crops Council

Recent research has shown that improved management of row crops alone cannot achieve the needed nutrient reductions to achieve national hypoxia goals. In addition to improving drainage management, increasing the percentage of land that has perennial crops or cover crops is critical to reduce nutrient losses. This initiative began by targeting only cover crops rather than perennial crops because of the perceived better fit with existing agriculture. A stable, long-term group called the Midwest Cover Crops Council evolved from that effort. A primary goal of the Council is to make cover crops easier, more profitable, and better supported by Land Grant universities and other agencies to result in increased nutrient uptake during the winter and reduced nutrient loss to ditches and streams.

Midwest Cover Crops Council website.

The Midwest Cover Crop Council (MCCC), comprised of researchers, Extension educators and specialists, NRCS staff and farmers from the Great Lakes States and Canada, improves the ecological and environmental functioning of the predominant annual cropping systems in the upper Mississippi and Great Lakes Basins by incorporating cover crops on agricultural land.

The Council employs a number of activities to achieve its overall goal of increasing cover crops adoption in the Great Lakes/Upper Midwest region.

The primary areas of work include: policy, communications, research, education/outreach, and fundraising. The Council is implementing five year action plans in each of these areas that will increase funding for research and development, enhance public awareness and support for cover crops, develop policy incentives and programs to increase farmer adoption of cover crops in the region, and provide education and training necessary so that farmers and agencies can make the appropriate shifts to facilitate this adoption.

In 2008, a new effort was launched to develop a web-based regional cover crop selection tool to assist farmers in making cover crop decision and foster the adoption of cover crop systems. The tool is under development and will be available in 2009. In addition a MCCC website and listserv were established. The site is hosted by Michigan State University and can be accessed at: www. mccc.msu.edu.

Contacts: Dale Mutch - mutch@msu.edu and Eileen Kladivko - kladivko@purdue.edu

Partners: The MCCC is a Great Lakes regional initiative connecting seven states and Canada. MCCC is also recognized by Green Lands Blue Waters as a subgroup which expands the network down the Mississippi River. The W.K. Kellogg Foundation has also contributed funding for the initiative.

Third annual meeting of the Midwest Cover Crops Council, held in Indianapolis, March 2008.

"Children of a culture born in a water-rich environment, we have never really learned how important water is to us. We understand it, but we do not respect it."

– WILLIAM ASHWORTH,
NOR ANY DROP TO DRINK, 1982

REGIONAL THEME

Drinking Water and Human Health

Building Volunteer Capacity to Monitor E. coli in Surface Water

Contamination of water by fecal matter threatens public health and is a concern to those using the water for drinking or recreational activities. Trying to detect pathogens in water can be expensive and may pose potential health hazards. The EPA recommends *Escherichia coli (E. coli)* as the organism of choice for the evaluation of recreational freshwaters for fecal contamination since its presence suggests the possible presence of human pathogens such as harmful bacteria, protozoa and viruses. With limited agency resources and funds available, monitoring by a trained network of volunteers may provide the needed resources to target impaired areas, ensure safe recreational opportunities, and produce effective watershed management plans.

This initiative has worked with volunteers to test the reliability and preference of six testing methods by comparing volunteer results with certified laboratory analyses. Results indicated that four of the six methods were acceptable for screening for *E. coli* in surface waters (EasyGel® Incubated, 3M™ Petrifilm™, IDEXX Colisure® , and IDEXX Colilert®) and one (3M™ Petrifilm™) was found to correlate best with certified laboratory analyses.

In 2008 hands-on monitoring workshops were held at a national and regional conferences. In follow-up surveys, participants indicated that most had shared what they learned with others. About a third had conducted *E. Coli* monitoring, and 20 percent had adapted the program for their own uses and/or partnered with others to support volunteer *E. Coli* monitoring.

As a result of state agency partnerships with this project, the Wisconsin Department of Natural Resources created a

home for this project's data within its newly developed Surface Water Integrated Monitoring System (SWIMS). SWIMS is a database of water quality information collected by WDNR staff and partners, including volunteers and the State Lab of Hygiene. The data in this system are used by biologists for making management decisions about waters and are shared with the EPS through their database system. In MN, the Pollution Control Agency has encouraged the entering of citizen-collected data into the STORET data base for use in assessing impaired waters. This came about because of the partnership established through this project and continued communication on results of the study.

Volunteers from the Red River Valley in northwestern Minnesota learned how to monitor their favorite stream for E. Coli bacteria.

Contacts: Jerry Iles - Iles.9@osu.edu and Lois Wolfson - wolfson1@msu.edu

Website: http://www.uwex.edu/ces/regionalwaterquality/Flagships/Volunteer.htm

Publications:

Citizens Monitoring Bacteria – A Training Manual for Monitoring E.coli - www.usawaterquality.org/volunteer/Ecoli/Manual.htm

The Volunteer Monitor Newsletter - Volume 18(1) - http://www.epa.gov/owow/monitoring/volunteer/newsletter/volmon18no1.pdf

The GL Region Citizens Monitoring Bacteria Team received the national CSREES Outstanding Water Quality Program Award at the WQ conference in Sparks, Nevada in February 2008.

DRINKING WATER AND HUMAN HEALTH – SELECTED IMPACTS

- Developed recommendations on testing methods for E. coli analysis.
- Leveraged more than $160,000 and more than 3,000 hours of volunteer time in 2005-06 alone.
- Increased visibility and credibility of volunteer monitoring efforts.

REGIONAL THEME

Environmental Restoration

Building Bridges Across Cultures and Ways of Knowing: Wild Rice in the Upper Great Lakes Region

Wild rice (Zizania spp.) is a native aquatic plant in the Upper Great Lakes Region, which includes the states of Michigan, Minnesota, and Wisconsin. This shallow water plant is of great importance to the ecology of many lakes and streams. This native grain also has an important cultural value to the indigenous people of the Upper Great Lakes Region. One of the North American migration stories of the Anishinaabeg (a term that many Great Lakes tribes use to describe themselves) is deeply connected to wild rice. According to their oral history, prophets foretold that the Anishinaabeg should journey westward from the east coast until they found "the food that grows on water." Their journey ultimately led them to the wild rice beds of the Upper Great Lakes. Wild rice, or manoomin as the Anishinaabeg call it, has been a central component of the culture of indigenous people in the region for thousands of years.

Unfortunately, wild rice populations have declined throughout much of the plant's historic range, due in large part to human impacts. Achieving a long-term goal of regional, sustainable wild rice populations requires a multi-state effort that includes engaged, long-term partnerships, coordination, and cooperation.

Rice camp instructor Kathy Hoagland, teaching traditional methods of processing wild rice.

This initiative builds bridges between a diverse group including tribes, universities, agencies, non-profit organizations, communities and private interests in the Upper Great Lakes. A primary goal is improved regional understanding of both the biophysical and human dimensions of the issues related to sustaining wild rice. Building on past work in this area, including a regional conference and the formation of a Native Wild Rice Coalition and Wild Rice Camp, the focus in 2008 was to disseminate the Wild Rice Camp model regionally. Participants learned about Anishinaabeg wild rice and Traditional Ecological Knowledge (TEK). Preliminary results show that this being is incorporated into tribal education curricula and community programming.

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Publications: Wild Rice Brochure http://www.uwex.edu/ces/regionalwaterquality/FocusAreas/restoration/restoration-ft.htm

Partners: This initiative has engaged a wide array of wild rice managers from state, regional, and federal resource management agencies, tribal communities and tribally affiliated Land-Grant colleges as well as numerous land grand and non-land grant institutions.

Rice camp instructor Bill Paulson, demonstrating birch bark basket making techniques.

ENVIRONMENTAL RESTORATION – SELECTED IMPACTS

- Wild rice camps, a culturally grounded outreach method, are leading to the incorporation of new knowledge about rice into tribal educational curricula and community programming.
- A rich diversity of partners have a greater shared understanding of wild rice and related water resource management issues in the region. This shared understanding is essential for future impacts in wild rice management.
- On May 30th, 2008, Wisconsin's Governor Doyle announced the nomination of the St. Louis River freshwater estuary for National Estuarine Research Reserve (NERR) designation. The development of a freshwater estuary NERR site at the headwaters of the Great Lakes will create a platform for future regional collaborative research and outreach related to freshwater estuary systems, helping to ensure the viability of Great Lakes coastal resources.

Expanding the National Estuarine Research Reserve Program in the Great Lakes Region

Great Lakes freshwater estuaries are unique coastal landforms that occur where river and Great Lakes water mix in shallow wetlands located near the mouth of a river. Great Lakes communities have developed adjacent to freshwater estuaries because of their importance as sources of water, food, and navigation. The National Estuarine Research Reserve (NERR) System is a nation-wide network of protected coastal estuaries that are designated and supported through the National Oceanic and Atmospheric Administration (NOAA). The NERR program integrates research, outreach, and stewardship activities related to estuary resources, including Great Lakes freshwater estuary resources. NERR sites represent a partnership between federal and state governments that often leverage substantial additional resources.

Wisconsin's Governor Doyle signing the NERR nomination document.

The development of a freshwater estuary NERR site at the headwaters of the Great Lakes will create a platform for future regional collaborative research and outreach related to freshwater estuary systems, the Great Lakes, and coastal resources. This research and outreach could have significant benefit to the entire Great Lakes Region. On May 30th, 2008, Wisconsin's Governor Doyle announced the nomination of the St. Louis River freshwater estuary for NERR designation. The St. Louis River freshwater estuary, situated on the border between Wisconsin and Minnesota, is located at the headwaters of the Great lakes. The river represents the largest United States tributary to one of the world's largest freshwater resources. A Wisconsin NERR designation will result in the St. Louis River joining Old Woman Creek as only the second Great Lakes freshwater estuary in the NERR System. A second NERR site in the Great Lakes region will create an important platform for collaborative freshwater estuary research and comparative studies.

Wisconsin's proposed Lake Superior NERR includes components of the 12,000-acre St. Louis River freshwater estuary.

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Partners: This initiative has engaged a wide array of local, state, and federal agencies, governments, tribal communities and organizations, citizen groups, non-profit environmental groups, and land grand institutions.

REGIONAL THEME

Water Policy and Economics

TMDL Training for Water Resource Professionals – A Multi-State Pilot

This project piloted the first in a series of workshops to bring together professionals with various backgrounds from federal, state and local agencies, academia, non-governmental organizations (NGOs), and the consulting sector. Goals for the workshop series include 1) increasing understanding of the biological, chemical, and physical interactions at a watershed scale, 2) identifying and recognizing the gaps in knowledge among the many specialists, and, most importantly, 3) developing synergistic interactions among professionals with common TMDL and water quality goals. Participants in the first workshop indicated that their knowledge of the TMDL process and the importance of an interdisciplinary approach increased from fair to good. The evaluations also clearly reflected the ongoing need for regular, basic TMDL process training. The workshop also led to a research symposium that brought together decision makers at the state and federal level, active implementers, researchers, and non-governmental organizations who focus on science to identify the current state of knowledge and research needs to manage surface waters. This initiative is establishing a research agenda for the next five to ten years that will provide a foundation for multi-state work.

Contact: Faye Sleeper - fsleeper@umn.edu

WATER POLICY AND ECONOMICS – SELECTED IMPACTS

- Increased knowledge of the TMDL process across agencies, academia, non-governmental organizations, and consultants.
- Establishment of a long-term research agenda for TMDLs and impaired waters in the Great Lakes Region.

REGIONAL THEME

Watershed Management

The Midwest Spatial Decision Support System (MSDSS) Partnership

Local watershed management is an important process for economic development and environmental improvement. One group working to advance and support watershed management in the region is the Midwest Spatial Decision Support System (MSDSS) Partnership.

The Partnership is composed of professionals from universities, public agencies, and private organizations with an interest in improving the management of watersheds through development, promotion and use of web-based, user-friendly, geo-spatial watershed management data and decision support systems. A decision support system consists of a host of computer programs that integrate databases, simulation models, decision models, and user interfaces. These systems then can assist a user in evaluating the economic and environmental impacts of competing watershed management alternatives. By adding a Geographic Information System (GIS), a decision support system can assess and present information geographically, and spatially.

Two of the decision support systems now on-line are Digital Watershed (http://www.iwr.msu.edu/dw/) and Long-Term Hydrologic Impact Assessment Model (L-THIA). Digital Watershed is a centralized information system and online computing site for use in watershed analyses throughout the United States. Information is grouped primarily by 8-digit watersheds. Using a GIS interface, citizens, government officials, and watershed stakeholders can access a database that contains watershed boundaries, aerial photography, regulated facilities and pollutant loadings, natural resource inventories, transportation infrastructure, soils, and numerous other data. Digital Watershed also contains linkages that seamlessly transfer users to other decision support tools and interfaces such as Google Earth and L-THIA. L-THIA (http://cobweb.ecn.purdue.edu/~sprawl/LTHIA7) is a web-based, GIS tool that assists decision makers in understanding before and after water quantity and water quality impacts of proposed land use changes. Results can be used to generate community awareness of potential long-term problems and to support physical planning aimed at minimizing disturbance of critical areas.

In addition to the support systems previously mentioned, the Partnership has eleven other web based systems throughout the region. These can be

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Partners: Indiana Department of Environmental Management; International City/County Management Association; Michigan State University, Institute of Water Research; Purdue University - Agricultural and Biological Engineering, Forestry and Natural Resources; State University of New York at Buffalo; University of Wisconsin Extension; U.S. Environmental Protection Agency, Region 5 - Office of Public Affairs, Water Division and the Office of Information Services; Wisconsin Department of Natural Resources.

accessed through the MSDSS website (http://www.epa.gov/waterspace). The Partnership's commitment to user-friendly, web-accessible tools and on-line training continually gains credibility. Through a series of workshops, user preferences for various tool characteristics were determined. These included scalability, which allows users to look at the appropriate level of data and detail; consistent data and methodology for easy access to a variety of data; and the ability to customize the data.

Developing Social Indicators for Nonpoint Source (NPS) Management

NPS pollution often results from aggregate impacts of individual actions across the landscape. Effective management of NPS water pollution requires addressing both environmental conditions and the choices people make that impact the environment. State NPS programs work through agencies and organizations at the local level to encourage private landowners to adopt and maintain various land management practices that reduce NPS impacts and threats. NPS programs have had difficulty evaluating and documenting clear linkages between project activities and measurable progress toward water quality goals.

Historically water quality projects operating within short time frames have not been able to sufficiently demonstrate direct impacts on water quality. This perception was reinforced by a recent assessment of the Environmental Protection Agency's (USEPA) NPS program administered through Section 319 of the Clean Water Act (the 319 Program). The assessment found that the 319 Program was not demonstrating results, primarily because it lacked clear efficiency measures, targets and baselines for measures, and regular, independent program reviews.

In an effort to improve evaluation of its 319 Program, USEPA Region 5 and the Region 5 state water quality agencies are working together to develop and implement an evaluation framework for NPS intended to more clearly link program activities to water quality outcomes. In addition to capturing traditional administrative measures (e.g., funds awarded and spent, workshops held, projects implemented) and environmental indicators (e.g., physical and biological measures of stream health), the NPS evaluation framework for Region 5 includes social indicators of progress toward water quality goals. For assistance in developing this social component of the NPS Evaluation Framework, the regional 319 Program staff and state agency NPS program coordinators have initiated a joint project in cooperation with land grant universities in the region. The project involves a variety of stakeholders and is led by a team with representation from USEPA, state water quality agencies, and land grant universities in the CSREES Great Lakes Region. The initiative has developed a suite of indicators that are being piloted in several Midwestern watersheds. To view the Social Indicators Handbook, or for more information about this initiative visit the project website: http://www.uwex.edu/ces/regionalwaterquality/Flagships/Indicators.htm

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Partners: This initiative has developed strong partnerships with USEPA Region 5 and state water quality agencies in the region, and has actively engaged local nonpoint source managers in developing and testing the system. CSREES has contributed additional funds to this initiative through a NIWQP integrated grant.

Watershed Management – continued

Building Capacity of Watershed Organizations, Agricultural Landowners, and Land Planners to Protect and Restore Watersheds

Land use and drainage planning play a significant role in watershed health. In fact, many of the water quality issues affecting watersheds in the Midwest are directly linked to land use decisions, affecting urban stormwater runoff and sedimentation. But many watershed organizations and individual land owners lack the knowledge, skills, and contacts to participate effectively in land use planning, zoning, and evaluation of construction site plans. This initiative uses multi-state video conferences with facilitated local meetings, watershed leadership trainings, poster sessions, and presentations to share the stories of landowners and watershed volunteers who have improved their communities by linking land use decisions to watershed management planning goals. In particular, the initiative goals are to:

- Improve capacity of watershed organizations, farmers, land owners, and local governments to restore and protect watersheds thorough effective land management.
- Enhance collaboration and joint programming among Extension natural resources professionals at land grant institutions in the Great Lakes region.
- Improve knowledge of watershed organizations, farmers, landowners, and local government officials on effective strategies linking land and watershed management in the Great Lakes.
- Increase opportunities for watershed organizations, farmers, and landowners to participate in local, state, and regional land use decisions.

For more information visit the 'Extraordinary People Creating Extraordinary Communities' website: http://ohiowatersheds.osu.edu/ep

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Partners: This initiative is a partnership between the Extension systems in Great Lakes Region states, state agencies with oversight responsibility for stormwater management, local municipal partners, and USEPA.

WATERSHED MANAGEMENT – SELECTED IMPACTS

- Regional georeferenced database of stormwater Best Management Practices on the web.
- Dissemination of NPS evaluation framework using social indicators.
- Dissemination of regional on-line decision support tools for watershed management.
- Multi-state video conference and training program for watershed managers.
- The social indicators project has leveraged more than $1,000,000, along with the expertise of federal and state agency staff and local watershed organizations.

This initiative is responsible for the development and implementation of a system of web-based tools that will increase the capacity of local communities, regulatory agencies, and others to collect, store, view, query, manipulate, analyze, and mine spatially referenced data on stormwater best management practices.

http://www.uwex.edu/ces/regionalwaterquality/flagships/stormwater

The submitted information is stored in a database and displayed on a project webpage when queried by a user of the system. The web based mapping system that the database will eventually be integrated into is available at http://www.iwr.msu.edu/dw/ and will be made available via a Google Maps application. As the database grows and the number of projects increases it will become more difficult for users to effectively navigate the site to find the desired information. To address this issue a database search tool is being developed that will allow the user to specify the stormwater management practices that they are interested in and to define a geographic boundary within which to limit the search. The tools are being designed to help local communities create comprehensive, spatially referenced inventories of stormwater best management practices. This effort involves The Great Lakes Regional Water Program Stormwater Initiative, University of Minnesota Extension & Water Resources Center, and Ohio NEMO programs.

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"Water links us to our neighbor in a way more profound and complex than any other."

– JOHN THORSON, INDIAN WATER RIGHTS p. 21

Building Bridges With Complementary Programs in the Great Lakes Region

The CSREES National Integrated Water Quality Program funds three types of grants in addition to the Regional coordination grants like the Great lakes Regional Water Program. One of the goals of regional coordination is to make the most of federal, state, and local resources for water research, education, and outreach. One way the Great Lakes Regional Water Program accomplishes this goal is to share successful water programs across the region and the nation. In this year's impact report, we are highlighting the integrated research, education, and Extension grants and national water resource grants (formerly called National Facilitation grants) based in the Great Lakes Region. While these projects are funded directly through the CSREES National Integrated Water Quality Program, they often build on or collaborate with Great Lakes Regional Water Program efforts. In addition, they demonstrate other excellent contributions universities and their partners in the Great Lakes Region are making toward managing water resources.

NATIONAL IMPACTS IN THE GREAT LAKES REGION

Integrated Research, Education, and Extension Projects

- *Using Social Indicators to Improve Adoption of Land Management Practices to Protect Water Quality in Three Midwestern Watersheds —*

Nonpoint source (NPS) pollution from agriculture is the primary source of water quality impairment in the United States and addressing NPS in rural agricultural watersheds requires influencing farmers' management practices. In order to influence farmers' management practices, we need to understand the factors that influence farmers' decisions to adopt or reject conservation practices. This project focuses on the impact of various interventions (education, outreach, and incentive programs) that are based on an in-depth understanding of the target audience and social context in three watersheds in the Midwestern United States. The project is evaluating the effectiveness of a framework of social indicators for identifying the factors that promote and hinder adoption of agricultural Best Management Practices. As well, it will measure the effectiveness of education and outreach programs designed specifically to address the social factors that hinder adoption of agricultural best management practices.

To date, four watershed groups have learned how to use and apply social information to improve outreach and education materials. Based on survey results indicating interest in curricula on social dimensions of watershed management, project staff are developing educational materials and a visualization tool that encompasses the socio-demographic, environmental, attitudinal, and behavioral characteristics in the management of subwatersheds.

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Integrated Research, Education and Extension Projects – continued

- *Evaluating Watershed Health Risks Through Integrated Water Quality Analyses, Community Capacity Assessments, and Outreach Appraisals —*

Few watershed communities have the water quality information needed to effectively address water quality concerns or policy mandates. In addition, many communities lack the capacity to develop watershed management plans or implement conservation practices. This project integrates social and water quality data to evaluate and communicate watershed and community health risks through active stakeholder involvement, and to provide recommendations for watershed conservation and community capacity-building. To date, several indicators of community capacity have been identified and will be assessed through community inventories, focus groups, interviews with key stakeholders, and a broader resident survey.

As well, historic data from three ambient water quality monitoring stations were synthesized covering the last 25 years of record to determine the impacts of land use change on water quality. Additional research has been conducted to inventory and assess community capacity for watershed planning and conservation across capacity indicators in four of seven subwatersheds.

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"Water . . . symbolizes such values as opportunity, security, and self-determination . . . Strong communities are able to hold onto their water and put it to work. Communities that lose control over water probably will fail in trying to control much else of importance."

– PROF. HELEN INGRAM, "WATER POLITICS: CONTINUITY AND CHANGE," 1990

Multiobjective Watershed Management Support Systems For Spatial Allocation of Agricultural Conservation Practices

Current approaches to targeting selection and locations for implementation of conservation practices are limited because they cannot accommodate environmental, economic, and institutional criteria simultaneously. This project is using a participatory process to develop a tool that enhances stakeholders' capacity to identify the optimal set of conservation practices and their spatial placement within a watershed. This multi-objective watershed management support system can be used to identify near optimal watershed plans that reduce sediment, nutrient, and pesticide deliveries at a watershed outlet to less than regulatory or target values at the lowest cost.

The Soil and Water Assessment Tool (SWAT) model, under development, will be used for flow and water quality parameters, using watershed information (soil, land use, topography), meteorological information (temperature, precipitation), stream discharge and water quality data.

An autocalibration tool has also been developed to perform sensitivity analysis and calibrate the model using a number of calibration objective functions. A tool for visualization of model outputs has been developed to facilitate consistent production of output maps and tables for reporting purposes. A state-of-the-art, web-based data collection technology has been designed to facilitate the collection of stakeholders' inputs in the BMP targeting process. The initial modeling results indicate that Best Management Practices can be optimized using watershed models to maximize agricultural production and water quality benefits.

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National Water Resource Projects

Changing Public Behavior: Increasing Citizen Involvement Using Target Audience Information

Extension's water management professionals are trying to improve their understanding of target audiences. They want to use tested education and social science techniques to plan outreach programs that will encourage the public to adopt environmentally friendly habits. Educators want to learn to apply social assessment processes to assure that their initiative has the desired impact, and to create a source of data for measuring the impacts of their water management strategies.

The Changing Public Behavior project (CPB) trains scientists, natural resource professionals, and educators to develop and use target audience information to improve citizen understanding and involvement in community decision-making for water resources.

Project resources, developed with the advice of national leaders in training, education, and social sciences, include both in-person and web-based training materials. Curriculum activities incorporate case studies that highlight regional priority water management themes and worksheets that encourage self-study and practice.

In 2008, a number of website resources were developed including a self-study training module, http://wateroutreach.uwex.edu/SSModuleIntro.cfm, and a searchable target audience database, http://wateroutreach.uwex.edu/cpb/tad/index.cfm. Additionally, educators gained confidence in using target audience information to plan outreach strategies.

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Website: http://wateroutreach.uwex.edu/CPBhomepage1.cfm

EPI-NET

The Environmental Pathogens Information Network (EPI-NET) is a stable, centralized source of environmental microbiological contamination information. Its purpose is to encourage information sharing, connect a network of stakeholders, regulatory officials, and technical experts, provide a reliable point of reference (methods and data interpretation) and increase our ability to develop a coherent national research agenda and good public policy. EPI-NET's primary communication mechanism is through their website, where visitors will find valuable references and the recent news related to pathogen contamination and detection in water and food.

Participants take part in the lecture portion of a recent workshop - "Use of indicators for monitoring microbial water quality: A hands-on experience workshop," held at the USGS Microbiology Laboratory in Columbus, Ohio.

In addition to the website, hands-on workshops set up as a laboratory class provide current, research-based information to professionals working on pathogens and *E. coli.* Topics include pathogens in the environment, emerging pathogens including Cyanobacteria, and microbial source tracking.

Participants performing sample filtration and bacterial enumeration procedures during the workship, "Use of indicators for monitoring microbial water quality: A hands-on workship," held at the USGS Microbiology Laboratory in Columbus, Ohio.

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Website: http://www.epi-net.org/eng

National Water Resource Projects – continued

The Environment Report Builds Bridges to America and Beyond

The Environment Report, a production of Michigan Public Media based at the University of Michigan, produces a free news service of environmental reports used by more than 130 public radio stations in 20 states and the District of Columbia. The news service disseminates three-to- four feature reports and four-to-five spot news reports every week. On October 2nd 2008, The Environment Report launched a new, daily, four-minute report hosted by Senior Editor Lester Graham. Since its October launch, the report has been picked up by 19 public radio stations, including stations in Detroit, Chicago, Salt Lake City, and Buffalo.

Because of the size and demographic makeup of the public radio audience, The Environment Report is uniquely positioned to inform the American public about land use and water quality. The Environment Report reaches the general public radio audience – an audience tuned in for general news reports. This audience is not necessarily seeking environmental information, unlike an audience tuning-in to an environmentally or science-based show. The general public radio audience comes from a cross-section of political beliefs and is one of America's most educated, most influential, and most civic-minded audiences. As these listeners learn about the relationship between water quality and agriculture through high-quality journalism, they are able to make informed decisions. Under its most recent grant from the United States Department of Agriculture, the staff at The Environment Report is producing and distributing 120 public radio stories focused on the dynamic relationship between the agricultural sector and water quality in the Great Lakes watershed and in other watersheds in the eight Great Lakes states and beyond. The ultimate goal of these reports is to educate policy makers, farmers, landowners, community leaders, and the general public about the relationship of agricultural policies and actions to regional water quality.

Cows on the Getz Farm take shelter during the day and graze during the night.

Hawthorne Family Farm.

In addition to the stand-alone reports and the daily show, the reports are also posted on The Environment Report's website (environmentreport.org) and packaged its daily podcast (this NPR partnership podcast averages 15,000 downloads per month). Each week, 447,000 listeners throughout the country hear Environment Report stories (Radio Research Consortium, Fall 2007 National Estimates).

During the current USDA funded project, the Environment Report has expanded its evaluation of listener knowledge and attitudes. An initial phone survey was completed in 2006. A comparison phone survey was conducted in 2008 and found some of the following results:

- In 2006 a total of 37% of respondents reported making more environmentally friendly purchases. In 2008, 65% indicated that they were making more environmentally friendly purchases – an increase of nearly 30% in two years.
- In 2006, 31% said that they have purchased more foods that have a lower environmental impact. In 2008, 48% reported this purchasing behavior, an increase of 17% in two years.
- In 2008, 84% agreed that environmental reports on public radio affect their attitudes about the environment.

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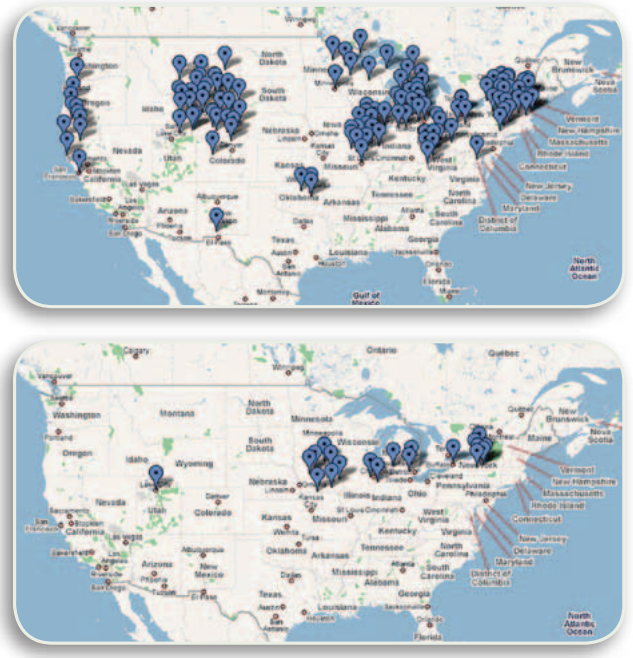

Top:
Stations airing stand-alone news service stories from *The Environmental Report.*

Bottom:
Stations airing the new, daily *Environmental Report* hosted by Senior Editor Lester Graham.

Energy Independence, Bioenergy Generation and Environmental Sustainability: The Role of a 21st Century Engaged University

The emergence of the bioeconomy and its focus on energy development from Midwest agriculture has significant ramifications for the environmental and economic well-being of the region. This project is developing a highly inclusive model of citizen interest and is aimed at empowering stakeholders and the public to make well-informed decisions that respect local economies and the environment. Staff development through regional and national training will be based on an extensive needs assessment process undertaken in 2008. The primary audience is Extension professionals and public officials working with communities on bioenergy.

Curricular design will likely include but not be limited to: biofuel basics and fundamentals; biofuel business development; biofuel facility understanding and feasibility; external factors in facility siting ranging from water quantity/quality to market factors; social, economic and environmental impacts of biofuel related to land use change, public sector roles in biofuels and aggregation to a bioeconomy; other externalities; implications for the local and regional economy, etc. A significant component to this training will be water quality and quantify concerns.

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NATIONAL IMPACTS IN THE GREAT LAKES REGION

Extension Education Projects

Amish and Anabaptist Education on Water Quality, Nutrient Management, and Best Management Practices

Major Amish water quality problems include contaminated drinking water, misapplication of manure, fertilizer, and pesticides, over-grazing permanent pastures, and streambank erosion from livestock grazing. This project focuses on education for Amish and Anabaptist clientele about agricultural Best Management Practices that will improve drinking water and surface water quality on the farm. The goal is to educate 20,000 Amish families about water quality and nutrient management issues and promote Best Management Practice adoption using on-farm visits, publications, well water sampling, soil and manure testing, management plan development, demonstration sites, training programs, and a national Amish and Anabaptist conference.

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"The watershed is the first and last nation whose boundaries, though subtly shifting, are unarguable."

– GARY SNYDER

Bridges to the Future

NEW DIRECTIONS FOR THE GREAT LAKES REGION IN 2009

The following programs have emerged as opportunities for collaboration among the Great Lakes states.

The Great Lakes: The Great Lakes Region is divided primarily between two major water basins, both of which have received significant policy attention in the past 5 years. The Great Lakes Compact developed by the Council of Great Lakes Governors has been ratified by Congress and signed by President Bush. Groundwater withdrawals are a concern not only in the Great Lakes Basin, but throughout Great Lakes states and provinces. In addition to supply issues, groundwater withdrawals can affect the quality of water, by either pulling in less desirable sources of water or reducing the quality of existing supplies. In 2009, the Great Lakes Regional Water Program will gather information on existing resources and activities related to the impacts of groundwater and surface water withdrawals and the influence that surface and groundwater connections have on those impacts. Specifically, the Program will focus on:

- Existing public policy related to groundwater and surface water connections and withdrawal impacts;
- Perceived gaps in public policy related to groundwater and surface water connections and withdrawal impacts;
- Priorities for action related to groundwater and surface water connections and withdrawal impacts;
- Opportunities to build partnerships with agencies and organizations that are already providing leadership on this issue, or would benefit from university research and outreach expertise.

These priorities are supported by water resource management agencies Michigan and Wisconsin, and are consistent with priorities articulated by the Council of Great Lakes Governors.

The Upper Mississippi River Basin: The Upper Mississippi River Basin is the other major water basin in the Great Lakes Region. The Mississippi River is one of the world's great rivers, cutting through the midsection of the United States for more than 2,300 miles and draining 41% of the continental United States. The river serves multiple purposes as the home of a diverse population of living things, a critical thoroughfare for commerce, natural resources for commerce and recreation, and rich cultural and historical significance. While many organizations focus on the Upper Mississippi, the link between ongoing research with the many organizations is still weak at best. Our goal for this initiative is to build a stronger network of working relationships among universities and colleges to harness multi-disciplinary expertise and ensure that this information is easily accessible by basin communities, NGOs and other public and private entities.

Bridges to the Future – continued

Impaired Waters and TMDLs: Over the past four years the GLRWP has worked very effectively at the watershed level, from delivering watershed leadership and training programs, to working on specific issues such as urban runoff and other nonpoint source issues. Impaired waters and Total Maximum Daily Loads are rising in importance at the watershed level. States in the Great Lakes Region as well as across the nation approach these issues in very different ways, yet all have the same goals. There are lessons to be learned from other states, as well as advances in watershed science that will inform all states in the Great Lakes Region.
Over the next four years we will:

- Expand training opportunities on TMDLs and impaired waters;
- Continue to develop social indicators and performance measures that serve as an important intermediate indicator of improvement in water quality;
- Explore the new advances in TMDL and impaired waters policy development, scientific research, and implementation in each state and determine where there are opportunities for better collaboration;
- As the focus increases across the nation on the human dimension of watershed work, develop projects that can advance the integration of the social/behavioral sciences and the natural sciences to improve the success rate of restoration and protection activities.

Research and Outreach on Working Farms: Wisconsin's Discovery Farm program is a group of operating, commercial Wisconsin farms cooperating in on-farm systems evaluation and demonstration projects. Modeled after Wisconsin's Discovery Farms program, and fitting the unique conditions and needs of participating states, this initiative will work with farmers and agricultural organizations to:

- Increase understanding of agricultural impacts on soil, water, and air quality and work toward reducing adverse impacts;
- Integrate outreach and research programs with environmental management and regulatory efforts;
- Provide research-based information on agricultural production and natural resource management to public policy makers; and
- Promote the economic viability of agriculture across the region's diverse livestock and cropping systems.

Capstone Engineering Courses for Water-Related Curricula: This initiative will work with Land Grant institutions in the Great Lakes Region and the Accreditation Board for Engineering and Technology (ABET) to develop and/or enhance capstone service learning experiences for accredited agricultural engineering and civil engineering programs in water resources. We expect that this initiative will lead to improved design criteria for water

resource management practices, a more skilled and confident agricultural and civil engineering workforce, and ultimately, improved water quality and community safety. We will first catalog and make contact with all ABET accredited agricultural and civil engineering programs with water-related specializations or emphases in the region. Contacts with water resources engineering professionals will be developed so real-world projects with real-world constraints can support student learning. A multi-state approach to this issue increases quality, consistency, and efficiency in the development of service learning efforts for future engineering professionals interested in water-related careers. This initiative is an important step in integrating the GLRWP with the instructional mission of the Land Grant Universities.

Program Leadership

NEW DIRECTIONS FOR THE GREAT LAKES REGION IN 2009

The Great Lakes Regional Water Program has been fortunate to have a constant suite of steady hands at the wheel since the Program's inception in 2000. With only one change during that time, the Program is now undergoing a number of leadership transitions. These transitions have happened slowly and with care. Please join us as we express our appreciation for the contributions of those moving on to new roles, and those that are boarding the boat as new members of the Regional Leadership Team.

Minnesota Leadership: Jim Anderson and Faye Sleeper

Jim Anderson, most recently a professor in the University of Minnesota Department of Soil, Water, and Climate, provided vision and leadership as Co-Director for the University of Minnesota Water Resources Center since its creation in 1997. In 2006 the Center was recognized by USGS as one of five Exemplary Water Programs in the country. One of the hallmarks of the agriculture initiatives under Jim's direction was the ability to work in partnership with a variety of state and federal agencies as well as commodity organizations and environmental groups on problems to address water quality issues related to agriculture. We thank Jim for his dedication to building bridges for effective water programs, and for making sure we always took time to have fun on the water as well. Jim continues to provide sound advice and liven up discussions related to developing initiatives in on-farm research and outreach and Upper Mississippi River issues.

Faye Sleeper is a current Co-Director (along with Deb Swackhammer) of the University of Minnesota Water Resources Center. She is the new Minnesota State Water Quality Coordinators, and leads research and outreach activities related to Impaired Waters and TMDLS, linking with U of M researchers, state and federal agencies, and other Universities in the upper Midwest. She is Principal Investigator for the Clean Water Legacy Results and Tracking project and actively works on identifying research and training needs in impaired waters and urban runoff.

Faye has an M.A. in Geography from the University of Minnesota and a B.A. in Sociology and History from Grinnell College. She brings to the WRC seventeen years of experience working with water quality issues while at the Minnesota Pollution Control Agency. Her most recent work was with watershed programs where she managed several nonpoint source grant programs and worked with many partners in developing the TMDL program. We welcome Faye and look forward to her insights into water resource bridge-building.

"Who looks upon a river in a meditative hour, and is not reminded of the flux of all things?"

– RALPH WALDO EMERSON

Illinois Leadership: Michael Hirschi and George Czapar

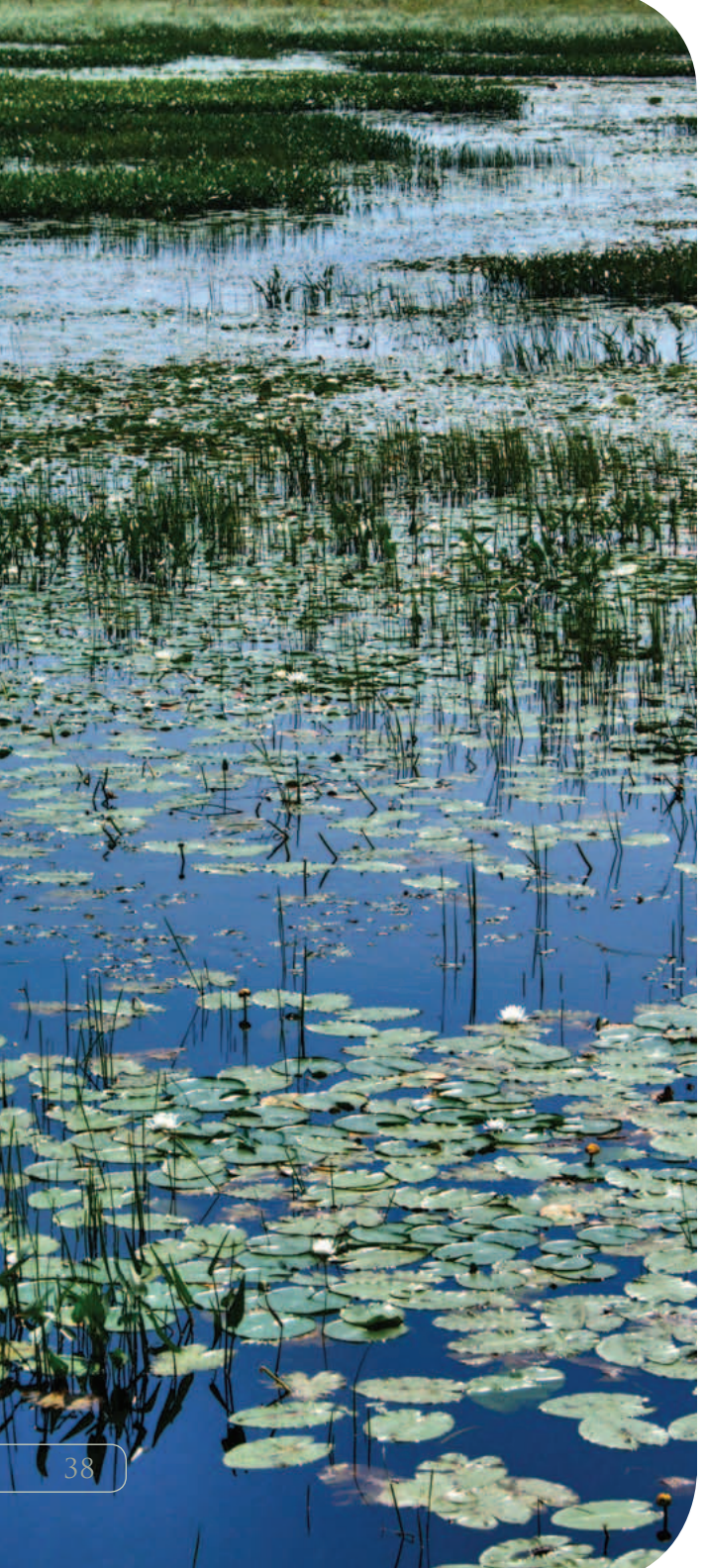
Mike Hirschi has served in the role of Water Quality Program Coordinator for University of Illinois Extension since 1992. Dr. Hirschi is a tenured faculty member in the Department of Agricultural and Biological Engineering, carrying a 3-way appointment in research, teaching, and outreach. Recently, he moved to a new position as Assistant Dean in the Undergraduate Programs office in the College of Engineering. Dr. Hirschi will continue his involvement with the Great Lakes Regional Water Program by working with Land Grant universities to enhance opportunities in higher education for engineering capstone projects that focus on interdisciplinary water resource management – building bridges with the next generation.

George Czapar is the new State Water Program Coordinator, and an Extension Educator in Integrated Pest Management for the University of Illinois. He served as the leader of the Strategic Research Initiative in Water Quality for the Illinois Council on Food and Agricultural Research. This collaborative research project helped provide the scientific basis for developing nutrient standards in Illinois. He currently serves as coordinator for the Illinois Council on Best Management Practices. The goal of this coalition of agribusinesses, agricultural organizations and University of Illinois Extension is to encourage adoption of best management practices to protect and improve water quality in Illinois. Dr. Czapar also has an adjunct faculty appointment in the Department of Crop Sciences, where he teaches and advises students in the Off-Campus Graduate Studies Program. He received his B.S. and M.S. degrees in Agronomy from the University of Illinois, and a Ph.D. in Weed Science from Iowa State University.

Wisconsin Leadership: Robin Shepard and Ken Genskow

Robin Shepard, a faculty member in the University of Wisconsin-Madison Department of Life Sciences Communication, has served as the Wisconsin State Water Quality Coordinator since 1991. He has represented the Great Lakes Region, as the Regional Water Quality Coordinator and Principal Investigator on this Regional Collaboration Project since its initial funding in 2000. Dr. Shepard has been a member of the executive committee of the CSL for three years and as was CSL co-chair in 2003. He has been instrumental in integrating social science contributions to water resource research and outreach into the National Water Program's annual conference. Shepard also served as Wisconsin Program Director for Community, Natural Resources and Economic Development, providing an effective bridge between Program Directors in community development, agriculture, and natural resources and the Great Lakes Regional Water Program. He recently was appointed as Executive Director for the North Central Cooperative Extension Association, and in that capacity is building direct linkages for this project with the Extension Deans/Directors within the region. As a result of his new appointment, Ken Genskow will be assuming the Wisconsin State Water Quality Coordinator role.

Ken Genskow is a faculty member in the UW-Madison Department of Urban and Regional Planning. He directs UW-Extension's statewide Basin Initiative and is Wisconsin's new State Water Quality Coordinator. This natural resources outreach and extension program involves fifteen Basin Educators working throughout the state in territories defined by Wisconsin's major river basins. Ken addresses issues of environmental planning and policy, watershed planning, and collaborative and participatory approaches to resource management. His research and applied work have explored the evaluation and assessment of collaborative watershed management, watershed governance, and the effectiveness of educational and technical assistance programs on land management. Ken is interested in planning processes that provide for meaningful participation by stakeholders in resource management initiatives as well as planning approaches that explicitly incorporate a social component into environmental planning and management.



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THE GREAT LAKES REGIONAL WATER PROGRAM:

Building Bridges

2008 Impacts

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Applying knowledge to improve water quality
Great Lakes Regional Water Program
A Partnership of USDA CSREES & Land Grant Colleges and Universities

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