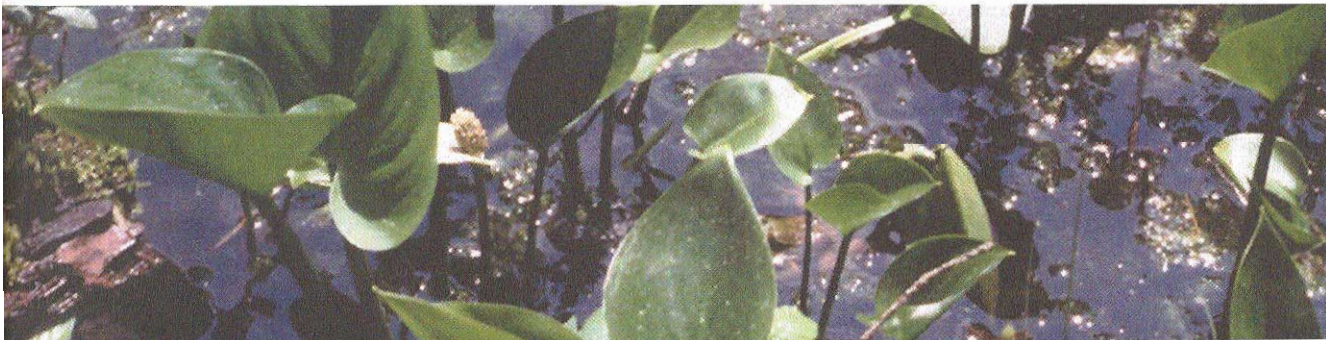
WR

2004-06 DIRECTORY OF PROJECTS AND PEOPLE

University of Wisconsin Water Resources Institute



WRI
University of Wisconsin

Publication No. WR04P001
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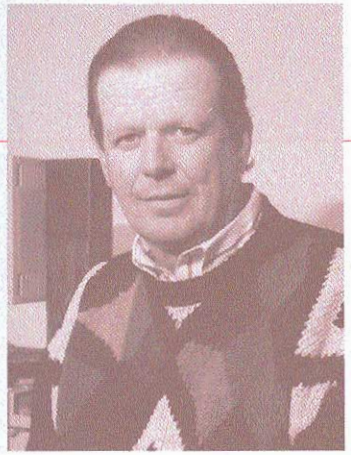
Produced by the University of Wisconsin Water Resources Institute under grants from the Water Resources Research Institute Program, U.S. Geological Survey, U.S. Department of the Interior, and from the State of Wisconsin. Federal grant 01HQGR0116.

First Printing: June 2004
Printed in the USA

Project Coordinator: Stephen Wittman; Editor: Stephen Wittman; Writers: Richard Hoops, John Karl, Stephen Wittman; Editorial Assistance: James Hurley, Mary Lou Reeb, Dan Marklein, JoAnn Savoy and Paula Lorenz; Proofreader: Gloria Gardner; Designer: Tina Yao; Production: Amy Kittleson, Harvest Studio; Cover Photo: *Jill Ladwig*.

INSIDE:



From the Director

This directory presents the University of Wisconsin Water Resources Institute (WRI) 2004–06 program of research and technology transfer dedicated to safeguarding the quality and supply of water in Wisconsin.

Established by the Water Resources Research Act of 1964, the University of Wisconsin WRI is one of 54 such programs located at land grant universities throughout the nation, as well as in Guam/ Federated States of Micronesia, Puerto Rico, the Virgin Islands and the District of Columbia. The program is funded through the Department of Interior's U.S. Geological Survey (USGS), with matching contributions from state and local sources. This includes funding from the University of Wisconsin System to support groundwater research.

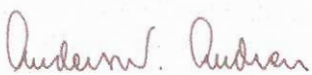
Charged with planning, developing and coordinating water research efforts, the WRI has developed a broad-based, statewide program of basic and applied research that addresses a variety of water-related issues. The WRI annually supports more than a dozen research projects related to drinking water, groundwater, surface water and groundwater-surface water interactions.

The Groundwater Coordinating Council, appointed by the governor, and the Groundwater Advisory Council, appointed by the chancellor of UW-Madison, work with the WRI to identify current and emerging issues and assist the institute in establishing research priorities. Priorities for 2004–06 include nonpoint-source pollution of surface waters; geological factors affecting groundwater movement, contamination and aquifer recharge; groundwater-surface water interactions; methods for developing sustainable groundwater practices, and technologies for treating contaminated waters.

Work supported by WRI involves more than 80 faculty, staff and students at UW–Madison, UW–Milwaukee, UW–Stevens Point, UW–Parkside and UW–Extension, as well as researchers from the Wisconsin State Laboratory of Hygiene and the USGS, and individuals from the private sector.

The new knowledge and technology resulting from WRI-supported work is transferred via its Web site, publications and conferences, and through support and training for graduate and undergraduate students. This helps ensure that the latest water-related research information reaches those who need it. Faculty, staff and students, public officials, administrators and industry representatives rely on WRI as a source of objective, scientifically sound information.

This directory provides a brief description of each research project supported during 2004–06. For more information about the program and updates on the projects presented here, we invite you to visit the WRI Web site at **www.wri.wisc.edu**.



Anders W. Andren, Director

List of Participating Institutions and Agencies, 2004–06

University of Wisconsin Water Resources Institute

University of Waterloo

University of Wisconsin-Extension

University of Wisconsin-Madison

University of Wisconsin-Milwaukee

University of Wisconsin-Parkside

University of Wisconsin Sea Grant College Program

University of Wisconsin-Stevens Point

University of Wisconsin System

U.S. Geological Survey

Wisconsin Department of Agriculture,
Trade & Consumer Protection

Wisconsin Department of Commerce

Wisconsin Geological & Natural History Survey

Wisconsin Department of Natural Resources

Wisconsin State Laboratory of Hygiene

Contaminant Transport

Elevated levels of arsenic have been detected in drinking water in large areas of northeastern and southeastern Wisconsin, while unacceptably high levels of nitrate have been found in many wells in the southwest quarter of the state. Many northern Wisconsin lakes are listed as impaired because of mercury contamination, and at least one chemical pesticide is detected in nearly 40 percent of wells statewide. Emerging contaminants of concern include antibiotics and other commonly used pharmaceuticals, household chemicals, and hormones and hormone-mimicking compounds known as endocrine disrupters. Understanding the transport of these contaminants—where they originate and how they move through the air or ground and get into our water—is of fundamental importance to finding ways to address such contamination.

Mercury Speciation along a Groundwater Flowpath

David Armstrong, UW–Madison, (608) 262-0768, armstron@engr.wisc.edu
Christopher Babiarz, UW–Madison, (608) 265-5085, babiarz@cae.wisc.edu

This project will analyze the movement of mercury in groundwater in an instrumented USGS watershed to investigate the changes in chemical species of inorganic mercury and of methyl mercury—the form of mercury that is most harmful to organisms. WR04R001

Occurrence of Estrogenic Endocrine Disruptors in Groundwater

William Sonzogni, UW–Madison, (608) 224-6200, sonzogni@facstaff.wisc.edu
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Steve Geis, UW–Madison, (608) 224-6230, sgeis@mail.slh.wisc.edu
Miel Barman, UW–Madison, (Lab of Hygiene), (608) 224-6230, mabarman@mail.slh.wisc.edu

This project will determine the presence of estrogenic endocrine-disrupting compounds in groundwater at sites that are vulnerable to contamination (1) from polluted rivers when high capacity wells draw down water tables and reverse groundwater flows and (2) from growing numbers of nonconventional waste disposal systems in rural areas. WR04R004

Evaluation of Contamination of Groundwater around Landfills

Tuncer Edil, UW–Madison, (608) 262-3225, edil@engr.wisc.edu
Craig Benson, UW–Madison, (608) 262-7242, benson@engr.wisc.edu
Jack Connelly, Wisconsin Dept. of Natural Resources, (608) 267-7574, johnston.connelly@dnr.state.wi.us

This project is assessing the level and pervasiveness of groundwater contamination associated with landfills by (1) evaluating data collected by the Wisconsin Department of Natural Resources that characterizes chemical constituents in landfills and adjacent groundwater, and (2) evaluating the mechanisms of contaminant transport in modern engineered landfills and, if necessary, developing plans to prevent future contamination. WR03R006

Fate of Respresentative Fluoroquinolone, Macrolide, Sulfonamide and Tetracycline Antibiotics in Subsurface Environments

K.G. Karthikeyan, UW–Madison, (608) 262-9367, kkarthikeyan@wisc.edu
Joel Pedersen, UW–Madison, (608) 263-4971, joelpedersen@facstaff.wisc.edu

This project is assessing the ability of soils to act as sinks for antibiotics and to determine the extent to which association with particle-bound and dissolved natural organic matter influences antibiotic mobility in soils and subsurface environments. WR03R008

The Role of Dissolved Organic Carbon in Aquatic Mercury Cycling

James Hurley, UW–Madison, (608) 262-0905, hurley@aqua.wisc.edu

Part of a larger effort involving watershed-level additions of stable isotopic tracers, this project is assessing the role dissolved organic carbon plays in the transport and speciation (creation of different forms) of mercury, with the goal of better understanding the relative importance of uplands, wetlands and atmospheric sources of mercury contamination in aquatic environments. WR03R010

Watershed Transport and Transformations of Atmospherically Derived Mercury: A Whole Ecosystem Amendment Study

James Hurley, UW–Madison, (608) 262-0905, hurley@aqua.wisc.edu

This project is employing new mass spectrometric techniques to measure the amount of mercury entering remote watersheds and aquatic ecosystems via atmospheric fallout and to determine the movement of distinct mercury isotopes through those ecosystems into the tissues of aquatic plants and animals. WR00R001
Funding also provided by Electric Power Research Institute and Wisconsin Department of Natural Resources

Groundwater Supply and Recharge

Seventy percent of Wisconsin's population depends on groundwater for drinking water. Groundwater is also essential to many manufacturing processes, and it is used to irrigate potato, corn and many other crops. Groundwater sustains springs, streams, lakes and wetlands, providing essential habitat and drinking water for wildlife. Altogether, Wisconsin's 12,000 public drinking water systems, 800,000 private wells and 12,000 high-capacity industrial and agricultural wells are drawing about 760 million gallons of groundwater per day, and large-scale withdrawals of groundwater are adversely affecting the environment, economy and public health in large areas of the state. Severe drops in groundwater levels are occurring in the Lower Fox River Valley and Lake Winnebago watershed, in southeastern Wisconsin, and in central Dane County.

Development of Tools to Address Groundwater in Comprehensive Planning

Lynn Markham, UW–Stevens Point, (715) 346-3789, lynn.markham@uwsp.edu
Charles Dunning, U.S. Geological Survey, (608) 821-3827, cdunning@usgs.gov
Chin-Chun Tang, UW–Stevens Point, (715) 346-4853, chin-chun.tang@uwsp.edu

This project is providing rural communities with much-needed specific examples of how local governments have devised and implemented groundwater protection measures while developing comprehensive plans. The project identifies the major challenges of groundwater protection projects and establishes a network of advisors for these projects. WR04R005

Hydrostratigraphy of West-Central Wisconsin: A New Approach to Groundwater Management

David LePain, UW–Extension, (608) 262-8658, dllepain@wisc.edu
Kenneth Bradbury, UW–Extension, (608) 263-7921, krbradbu@facstaff.wisc.edu

This project is supporting the development of a realistic conceptual model of west-central Wisconsin's geologic and hydrogeologic systems. It will compile data from publicly available sources into a searchable digital database and synthesize the information in a preliminary modern hydrostratigraphic framework for the region's Cambrian-Ordovician bedrock. WR04R006

Delineation of Flow Paths, Capture Zones and Source Areas, Allequash Basin, Vilas County, Wisconsin

Mary Anderson, UW–Madison, (608) 262-2396, andy@geology.wisc.edu

This project is using geochemical tools to identify source areas of recharge waters and geologic controls on groundwater chemistry. Field data and modeling will help delineate groundwater flow paths along two transects within the Allequash basin, a subbasin within the Trout Lake watershed. The project is also investigating the geologic factors controlling groundwater chemistry along these paths from origin point to discharge point. WR04R002

A Combined Hydrogeological/Geochemical Investigation of Groundwater Conditions in the Waukesha County Area, Wisconsin

Timothy Grundl, UW–Milwaukee, (414) 229-4765, grundl@umn.edu
Kenneth Bradbury, UW–Extension, (608) 263-7921, krbradbu@facstaff.wisc.edu
Daniel Feinstein, U.S. Geological Survey, (414) 962-2582, dtfeinst@usgs.gov
David Hart, UW–Extension, (608) 262-2307, dhart@geology.wisc.edu

These researchers are creating a comprehensive model of the hydrostratigraphy, magnitude and direction of groundwater flow, and the geochemical processes at work within a deep sandstone aquifer with the goal of understanding the processes behind the occurrence of excessive drawdown, high salinity and high radioactivity. WR03R002

Providing Communities with the Groundwater Information Needed for Comprehensive Planning

Douglas Cherkauer, UW–Milwaukee, (414) 229-4563, aquadoc@uwm.edu

The researchers on this project are working with a test community to compile local groundwater information and develop a water budget and flow model with the ultimate goal of developing a procedure by which communities can incorporate such information into their planning processes and use the model to test development options. WR03R007

Design & Evaluation of Rain Gardens for Enhancement of Groundwater Recharge

Kenneth Potter, UW–Madison, (608) 262-0040, kwpotter@facstaff.wisc.edu

As part of a larger effort to encourage the use of rain gardens to enhance groundwater recharge in Wisconsin, this project is developing guidelines for the design of rain gardens and operating an experimental rain garden to provide information on long-term performance and efficacy. WR03R001

Remediation

Remedying groundwater contamination is one of the most challenging areas of water resources research. Research in this theme is aimed primarily at finding effective and economical ways to remediate—remove, neutralize or contain—arsenic, nitrates, pesticides, petrochemicals and other toxic contaminants in groundwater. In many cases, the most cost-effective approaches now being explored involve the use in-place techniques, such as the installation of reactive chemical barriers and the use of natural bacteria, trees and other plants (phytoremediation).

Foundry Slag for Treating Arsenic in Groundwater and Drinking Water
Craig Benson, UW–Madison, (608) 262-7242, benson@engr.wisc.edu
David Blowes, University of Waterloo, (519) 888-4878, blowes@sciborg.uwaterloo.ca
Iron is a key element of some treatments that remove arsenic from groundwater, and this project will evaluate the effectiveness of recycling slag from gray-iron foundries in Wisconsin for use in water treatment. WR04R008

Monitoring Environmental Effects at an Established Phytoremediation Site
William DeVita, UW–Stevens Point, (715) 346-3753, wdevita@uwsp.edu
Mark Dawson, Sand Creek Consultants, Inc., (715) 365-1818, hydeenv2@triver.com
This project will (1) evaluate the effectiveness of a stand of approximately 800 hybrid poplars in cleaning up severely contaminated groundwater and (2) determine the amount of water these trees utilize. WR04R007

Combination of Surfactant Solubilization with Permanganate Oxidation for Groundwater Remediation
Zhaohui Li, UW–Parkside, (262) 595-2487, zhaohui.li@uwp.edu
The goal of this project is to develop a cost-effective and efficient "pump-while-treat" method for the remediation of dense nonaqueous-phase liquids in groundwater by synchronizing the process by which contaminants are made soluble and degraded. WR03R009

A Comparison of USEPA-Approved Enzyme-Based Total Coliform/*E. Coli* Tests for Microbiological Groundwater Monitoring and Laboratory Consultation

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Sharon Kluender, UW–Madison, (608) 224-6262, hesk@mail.slh.wisc.edu

The limited amount of data available on nine U.S. Environmental Protection Agency-approved methods of testing groundwater for microbial contamination suggests large differences in their abilities to detect and enumerate both total coliforms and *E. coli*. This project is evaluating these new methods to determine their suitability for Wisconsin groundwater. WR04R003

Water Resources Research Institute Internship at the U.S. Geological Survey

Anders Andren, UW–Madison, (608) 262-0905, awandren@aqua.wisc.edu

This project will match student interns with USGS scientists to give students practical experience in the collection and interpretation of field samples and data related to water chemistry, hydrology and aquatic life as well as land use and stream habitat. WR04E001

Water Resources Research Institute Program, U.S. Geological Survey
water.usgs.gov/wrri
This program (Section 104B) provides the core federal funding for the UW Water Resources Institute. Charged with planning, facilitating and conducting research to resolve state and regional water problems, the program also promotes technology transfer and provides training for scientists and engineers. The Wisconsin WRI cooperates with the USGS in establishing programmatic direction, coordinating regional research, and facilitating information and technology transfer.

The program also awards funding under the Water Resources Research Institutes National Competitive Grants Program (Section 104G). In cooperation with the National Institutes of Water Resources, the USGS solicits proposals for research on emerging issues related to water quality and quantity. Any qualified faculty or staff member affiliated with an institution of higher learning in the United States is eligible to apply for a grant through its state water research institute or center. Collaboration between the USGS and university scientists is especially encouraged. Each dollar of the federal grant must be matched with one dollar from nonfederal sources.

Wisconsin Groundwater Research & Monitoring Program
www.dnr.state.wi.us/org/water/dwg/gcc/research.htm
A coordinated effort of the UW System and the Wisconsin departments of Natural Resources, Commerce, and Agriculture, Trade & Consumer Protection, this state-funded program solicits proposals for new and continuing groundwater monitoring projects or for research to meet specific agency needs and objectives.

U.S. Geological Survey-Water Resources Research Institutes Student Internship Program
water.usgs.gov/wrri/Hill_Memo_All.pdf
This program offers undergraduate and graduate students valuable experience working in the field or laboratory as interns with the USGS. Faculty members at participating institutions can hire a student for work on a water-related project, with funding administered by the WRI. Interns are employed by participating universities and colleges.

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If you would like more information on any of the programs mentioned above or wish to be on the mailing list to receive requests for proposals, please visit the WRI "Funding Opportunities" Web page (**www.wri.wisc.edu/funding**) or contact the WRI administrative offices at (608) 262-0905.

UW Water Resources Institute Web Site

wri.wisc.edu

This Web site is the world's online gateway to the UW Water Resources Institute (WRI) and offers a variety of information for anyone interested in water-related issues and research. The site includes information about current and previous research projects, funding opportunities, conferences and other upcoming events, the Water Resources Library, and all WRI publications. Unique features include a searchable database of Wisconsin water experts and the Wisconsin Groundwater Research & Monitoring Project database, which makes the groundwater research funded by WRI and several Wisconsin state agencies readily accessible to the public.

UW Water Resources Library

wri.wisc.edu/library

One of only a handful of libraries in the United States whose collections consist solely of water-related publications, the Water Resources Library houses more than 30,000 volumes, including more than 24,000 unique titles, 60-plus journals and more than 100 newsletters. Begun in 1964, the collection of this academic library covers all major topics in water resources, with particular emphasis on Wisconsin and the Great Lakes, including groundwater protection, wetland issues and the impacts of agricultural chemicals. The library also maintains collections of popular materials, K–12 science curricula and children's water-related books. Located at the UW–Madison Aquatic Sciences Center, the Water Resources Library is staffed 9 a.m. to 4:30 p.m. Monday through Friday. Staff members are available to help UW faculty, staff and students find information and to use various electronic resources, perform subject searches, obtain materials through interlibrary loan, and answer reference questions.

Wisconsin's Water Library
aqua.wisc.edu/waterlibrary

"Wisconsin's Water Library" is an online library of water publications available to all Wisconsin residents. Books and other library materials covering all major water topics may be checked out online by any Wisconsin resident free of charge and sent to the user's local public library for pick up and return. The online library also includes "Ask a Librarian" for those needing assistance as well as reading lists, book reviews, videocassettes, special features on current topics and more. "Wisconsin's Water Library" is an outreach project of the UW Water Resources Library, which has the distinction of being the first academic library in Wisconsin—perhaps in the United States—to make its collection directly available to the public.

Wisconsin Water Policies Inventory
aqua.wisc.edu/waterpolicy

The Wisconsin Water Policies Inventory (WPI) Web site contains current Wisconsin statutory, administrative and other policies pertaining to water. Policies are organized by categories for easy browsing, though the inventory can also be searched by keywords. Members of the public, decision makers and researchers can quickly determine whether Wisconsin has a policy on a water topic of interest, where it can be found and who implements it. Launched in 2004, the Wisconsin WPI is believed to be the first and only searchable state policy database of its kind in the United States.

Annual State AWRA Meeting

wri.wisc.edu

Each year, the Wisconsin WRI cosponsors the annual meeting of the Wisconsin Section of the American Water Resources Association (AWRA). This meeting provides a forum for presentations, technical papers and posters covering a variety of water-related subjects. The Wisconsin event is unique among state AWRA meetings in that students especially are encouraged to present papers or posters describing original research.

UW Aquatic Sciences Center Publications Store

aqua.wisc.edu/publications

This Web site features an annotated list of our most popular publications, including brochures, fact sheets and posters, as well as a variety of other WRI and UW Sea Grant Institute products. The site includes an online shopping feature that allows users to make purchases with a credit card or obtain items free of charge.

Index of Principal Investigators

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