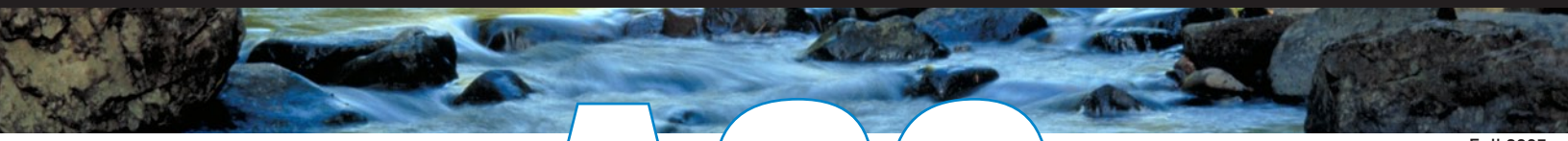

Fall 2005

ASC
Aquatic Sciences Chronicle
www.aqua.wisc.edu/chronicle
UNIVERSITY OF WISCONSIN SEA GRANT INSTITUTE & UNIVERSITY OF WISCONSIN WATER RESOURCES INSTITUTE

INSIDE:

UW SEA GRANT RESEARCH

Scientists Launch Mercury Mission

OBJECTIVE: CAPTURE STATE OF THE SCIENCE AT CONFERENCE

EIGHTH INTERNATIONAL
CONFERENCE ON MERCURY AS A GLOBAL POLLUTANT
MADISON WISCONSIN
AUGUST 6–11, 2006

Across the globe, policymakers are grappling with the problem of mercury pollution. In Indonesia, Brazil, and several other countries, millions of people continue to use mercury in small-scale gold mining operations, releasing as much as 2 grams of the neurotoxin into the environment for every gram of gold recovered. In the United States, coal-based energy production and the manufacture of certain products—including batteries, dental fillings, vaccines, cosmetics, and weapons—have significantly increased the rate and amount of mercury in the environment, particularly in the atmosphere, lakes, streams, and fish.

To make sound decisions, policymakers need sound science, and in Madison, Wis., more than 40 of the world's leading mercury researchers gathered to provide just that. Their four-day workshop in July was the first step toward drafting a "declaration" on the state of mercury as a global pollutant, a scientific consensus that could ripple through policy decisions around the world.

At the workshop, scientists began drafting four concise summary papers on different aspects of mercury pollution. Those summary papers will form the foundation of an international conference to be held next summer, according to James Hurley, conference co-chair and Sea Grant's assistant director for research and outreach. The early jumpstart is part of a strategy to make the Eighth International Conference on Mercury as a Global Pollutant highly focused and policy-relevant, Hurley said.

The conference will be held Aug. 6-11, 2006, and is expected to attract about 800 scientists. At its conclusion, the summary papers will be boiled down to a short statement on the state of the science of environmental mercury.

"We wanted this to be more than just another gathering of scientists independently reporting on their own research," Hurley said. "We want it to be a real conversation and debate, and we want to give the entire mercury community a chance to discuss the conclusions."

The time is ripe for a succinct summary of the science of environmental mercury, according to Chris Babiarz, a scientist in environmental chemistry and engineering at UW-Madison and also a member of the conference organizing committee.

Babiarz said scientists developed ultra-clean field sampling tech-

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In preparation for a 2006 international conference, researchers drafted four summary papers on environmental mercury at a workshop held July 13-18 in Madison, Wis.

Aquatic Sciences Chronicle

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The Aquatic Sciences Center is the administrative home of the **University of Wisconsin Sea Grant Institute** & **University of Wisconsin Water Resources Institute.**

University of Wisconsin Sea Grant Institute is part of a national network of 30 university-based programs funded through the National Sea Grant College Program, National Oceanic & Atmospheric Administration, U.S. Department of Commerce, and through matching contributions from participating states and the private sector. *www.seagrant.wisc.edu*

University of Wisconsin Water Resources Institute is one of 54 Water Resources Research Institutes nationwide authorized by the federal Water Resources Research Act and administered through the U.S. Geological Survey. *www.wri.wisc.edu*

Sea Grant University of Wisconsin WRI University of Wisconsin

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Michigan Sea Grant developed and hosts the CoastWatch site in cooperation with NOAA's Great Lakes Environmental Research Laboratory and Michigan State University. Besides Wisconsin, Sea Grant programs in Minnesota, Illinois-Indiana, Ohio, and New York help support CoastWatch as well.

FEATURED WEB SITE
CoastWatch
www.coastwatch.msu.edu

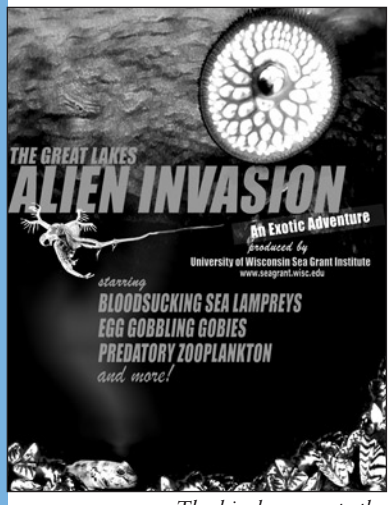
Wisconsin anglers, as well as students in the classroom, now have access to the latest available Great Lakes surface water temperature information via the Web.

The CoastWatch site captures daily National Oceanic and Atmospheric Administration (NOAA) satellite transmissions and presents the most current information as contour lines called isotherms. The maps are available for all five Great Lakes.

"Surface temperatures can change quickly with weather, winds, and lake currents. CoastWatch can help anglers save time and fuel searching for temperature breaks," said Philip Moy, UW Sea Grant fisheries specialist.

Because these maps are updated frequently and are available year-round, the site can also be used as a real-time teaching tool for science classes.

Besides lakewide regional temperature maps, a zoom-in feature provides coverage of seven Wisconsin Great Lakes ports—Racine, Milwaukee, Sheboygan, Kewaunee, Sturgeon Bay, Washburn, and Superior. Coverage for each port spans a 25- to 30-mile radius so that detailed information for surrounding ports is available as well.



The kiosk recounts the pandemonium visited upon the Great Lakes by zebra mussels, round gobies, Eurasian ruffe, and nine other alien invaders. It sails across Lake Michigan twice each day on the Badger car ferry from May to October.
poster illustration: Tina Yao

people news

With a retro sci-fi, horror-flick look, UW Sea Grant's interactive computer kiosk "*Great Lakes Alien Invasion*" earned the Judges Award for Outstanding Impacts in Individual Communications Projects at Sea Grant Week 2005, June 3-8 in Camden-Rockport, Maine. Kudos to the project team of **Phil Moy**, **Tina Yao, Stephen Wittman**, and **James Grandt**. Special thanks to **John Janssen** of the WATER Institute for underwater video footage.

The institute's "Wisconsin's Great Lakes Shipwrecks" Web site (*www.wisconsinshipwrecks.org*) received First Place in Web Based Outreach Efforts. The site features historical images, underwater video footage, and histories of 18 shipwrecks in Wisconsin's waters of Lake Superior and Lake Michigan. Congratulations to **John Karl, Rich Dellinger**, and (former) Wisconsin Historical Society archaeologists **Catherine Green** and **Russ Green**. And more kudos to **Yao**.

collage illustration: Tina Yao fish illustration: Gina Mikel

UW WATER RESOURCES RESEARCH

The Ultimate Test Tube

LANDMARK MERCURY POLLUTION STUDY SITED AT PRISTINE LAKE

Researchers Christopher Babiarz (l) and Michael Tate set up an experiment to monitor possible movement of mercury through shallow and deep sediments beneath a remote lake in Canada.

An intense debate has developed over how to regulate combustion sources of mercury to the atmosphere, including emissions from coal-fired power plants. Expensive emission controls have been proposed, yet it is unclear whether these controls would reduce mercury levels in fish and ultimately people. An international group of researchers is trying to answer this question by performing a unique experiment on a remote lake in Ontario.

The study, named METAALICUS (Mercury Experiment to Assess Atmospheric Loading in Canada and the United States), is currently underway in Canada's Experimental Lakes Area. Set aside by the Canadian government in 1968 for research, the area of 58 lakes and their watersheds offers scientists unparalleled opportunities to conduct experiments on entire freshwater ecosystems.

At one lake, roughly 80 miles from the U.S. border, researchers are trying to determine whether new mercury entering the environment is more likely to build up in fish than the mercury that has already accumulated in lake sediment and surrounding soils.

"That's the real key to this study," says James Hurley, UW Water Resources assistant director for research and outreach and one of the study's 16 investigators. "To predict the effects of decreased mercury emissions, you need to be able to separate the 'new' mercury from the 'old' mercury."

To do this, the researchers are adding minute amounts of mercury—about one teaspoon in total—to the lake and its watershed. They have divided the study into three parts, each using a different isotope of mercury. These are stable, non-radioactive forms of the element that have slightly different arrangements of atoms, allowing them to be identified and traced as they move through the environment.

One isotope is applied directly to the lake's surface, another to the adjacent wetland, and the third is sprayed over an upland forest using a crop duster. The applications began in 2001, following a year of baseline monitoring. The researchers hope to continue adding mercury until the ecosystem reaches a steady state. When additions of the isotope end, they'll watch to see what happens to mercury levels in the lake's fish.

The researchers are also hoping to learn more about how inorganic mercury, found in the air, converts to methylmercury, the toxic organic form that fish and humans can accumulate in their bodies.

"If you can figure out the rates of conversion to methylmercury and release to water, you can probably figure out how much mercury will bioaccumulate in fish," says Hurley. "The goal is to then apply our results on bioaccumulation to different types of environments."

The study's findings will be crucial in deciding how much and how quickly to regulate emissions from coal-fired power plants and how soon these measures might lead to less contaminated fish on dinner tables.

Wisconsin's portion of METAALICUS is funded by the National Institute for Water Resources, Electric Power Research Institute, Wisconsin Department of Natural Resources, and Wisconsin Focus on Energy. For more information about the project, visit *www.umanitoba.ca/institutes/fisheries/METAALICUS1.html.* — KS

Generations Go Back to School

A young limnologist collects a sample of algae on Lake Mendota.

This summer, UW Sea Grant and the UW Center for Limnology helped prove you're never too old—or too young—to learn something new.

Limnology and Marine Science was one of 10 "majors" offered at this year's Grandparents' University, a two-day workshop that gives children and their grandparents a chance to learn together on the UW campus.

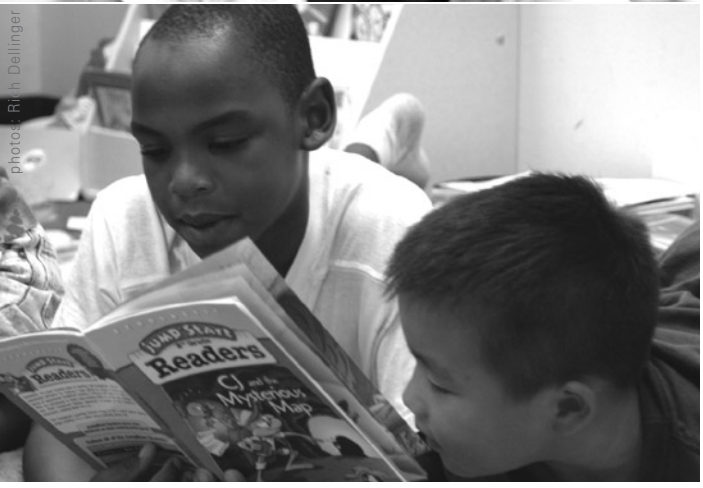
Jim Lubner, UW Sea Grant's marine education specialist, challenged students to a game of "Great Lakes Jeopardy" and explained how researchers use remotely operated vehicles, or ROVs, to collect information underwater. Phil Moy, fisheries and aquatic nuisance species specialist, introduced some of the Great Lakes' least desirable inhabitants, including purple loosestrife, Asian carp and zebra mussels.

Later, John Magnuson, director emeritus of the UW Center for Limnology, took the students for a tour of Lake Mendota aboard the R/V *Limnos*, the university's 26-foot research trawler.

The Wisconsin Alumni Association and the UW-Extension Family Living Programs offer Grandparents' University each summer. For more information, visit *www.uwalumni.com/grandparents*.

Limnologist John Magnuson points out the life inhabiting the muck of Lake Mendota to his granddaughter during Grandparents' University.

Frogs Leap into Story Hour



photos: Rich Dellinger

Children at the Allied Drive Learning Center on Madison's south side were treated to an afternoon of books, music, crafts, and treats through a University of Wisconsin-Madison library outreach program.

The "Allied Drive Story Hour" began last summer when the UW Water Resources Library launched the first of a series of story-hour programs. The program has become a partnership among six other specialized campus libraries and the Madison School and Community Recreation (MSCR) Safe Haven Childcare Program.

Besides hearing several stories, the children enjoyed Babcock ice cream and gummy frogs while they crafted fly-catching frogs from green foam and party blowers.

On July 25, Water Resources Librarian JoAnn Savoy and other Aquatic Sciences Center staff hosted a frog-themed reading hour for 25 kindergarten and elementary school children. Lynn Schneider, a graduate student at the School of Library who has been organizing the reading programs as a volunteer, read *From Tadpole to Frog* by Wendy Pfeffer, a story about the life cycle of frogs. *Marsh Music* by Marianne Berkes and *Jump, Frog, Jump!* by Robert Kalan were also featured. The afternoon wrapped up with gifts—a book and bookmark for each child.

Each month a different campus library hosts a reading hour with themes relating to their specialized topics. In December, staff at the Schwerdtfeger Library (Space Science and Engineering) talked to children about the science of snow, and the Data Program Library Service held a story hour about numbers.

The Primate Center Library, Steenbock Memorial Library (Agriculture and Life Sciences), School of Library and Informational Studies Library, and the Center for Instructional Materials and Computing are also participating in the program.

Fore more information about Great Lakes frogs, explore the UW Sea Grant website seagrant.wisc.edu/frogs.

illustrations from Great Lakes Frogs Web site by Gina Mikel

photo: Jackson Cross

Lili Prahl, a sophomore majoring in biochemistry and wildlife ecology, makes precise measurements of frogs to test for fluctuating asymmetry.

PRAHL AWARDED WESTON FELLOWSHIP

Lili K. Prahl has been awarded the Carl J. Weston Memorial Fellowship. Prahl is currently working as an undergraduate assistant with William Karasov, helping with a UW Sea Grant-funded research project identifying the direct effect of metals on behavior, sexual development, and reproduction of amphibians in Great Lakes ecosystems.

Prahl has assisted in Karasov's laboratory since she expressed an interest in his research as a high school student.

"She approached her work with great responsibility," said Karasov. "I have met few high school or undergraduate students performing at her level."

Besides helping with data analysis and field and laboratory work, Prahl has taken on her own project. She is testing whether exposure to the metal cadmium in water increases limb deformities in frogs that are also exposed to a parasite.

Established in 1995, the Weston Memorial Scholarship supports undergraduate students interested in Great Lakes and ocean issues. If you would like to make a tax- deductible contribution to the UW Sea Grant Undergraduate Scholarship Fund, contact Mary Lou Reeb at (608) 263-3296 or *mlreeb@seagrant.wisc.edu*.

Mercury *continued from page 1*

niques and new analytical chemistry procedures about 20 years ago, and research since then has started to answer some old questions.

"It's a good time to review what we've learned," Babiarz said.

The summary papers started at the workshop address four broad topics that will be addressed in the four plenary sessions of the conference next summer: (1) societal consequences of mercury pollution; (2) recovery of mercury-contaminated fisheries; (3) health risks and toxicological effects of methylmercury; and (4) identifying sources of atmospheric mercury deposition.

The summary papers will be posted on the conference Web site about six weeks before the event, providing attendees with common starting points for discussion. Individual talks and poster sessions will be grouped by these four topics and will follow the corresponding plenary sessions, an arrangement Hurley says is intended to maintain focus on the important issues.

Another goal of the planning committee, which has been working for five years, is to make the conference particularly accessible to under-represented groups, including graduate students, beginning professionals, and representatives from developing nations.

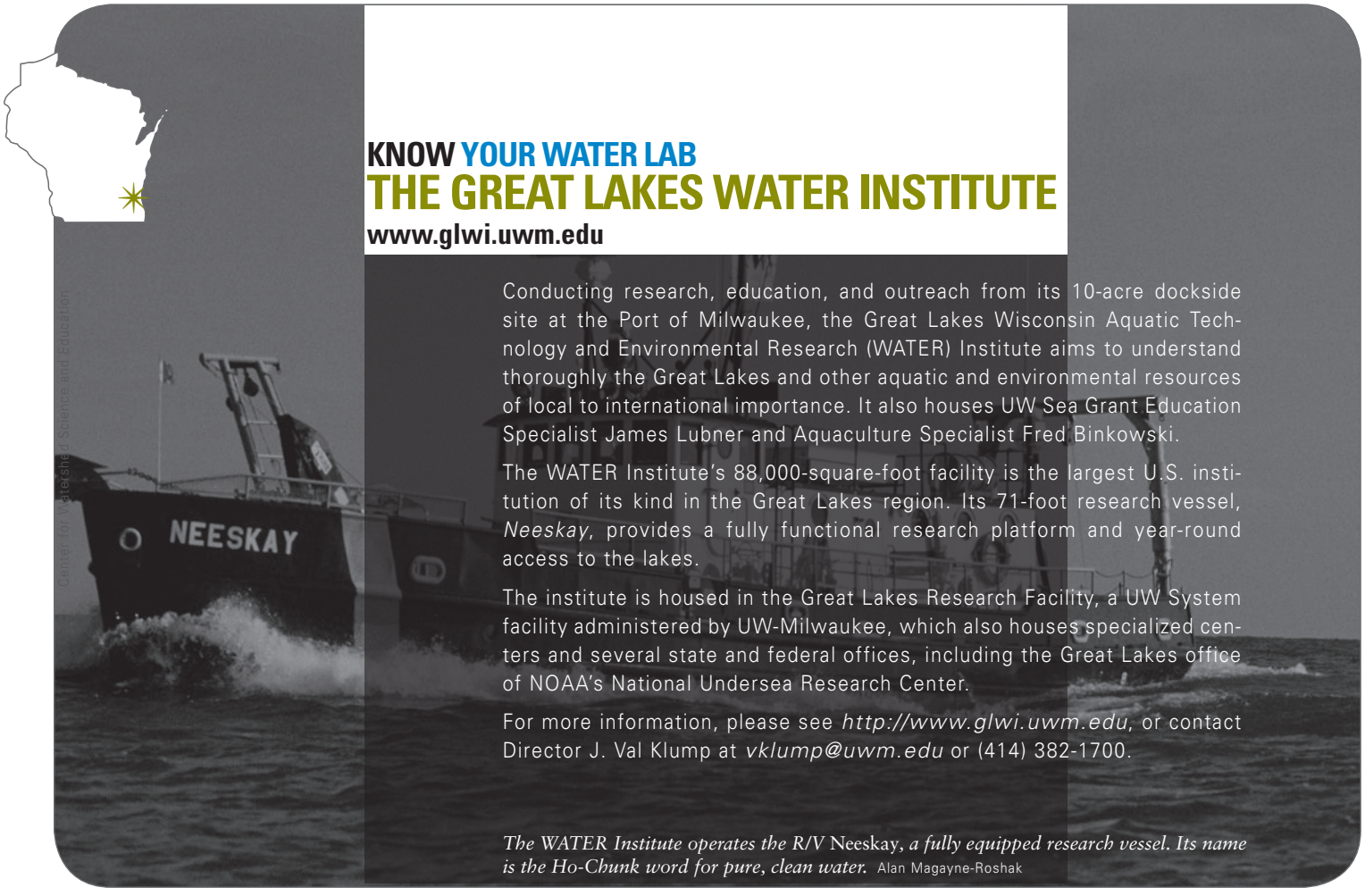
After the conference next summer, the organizing committee will attempt to publish the declaration and all four supporting papers in a single issue of a peer-reviewed journal.

Sponsors of the conference so far include the U.S. Environmental Protection Agency, the U.S. Geological Survey, the Electric Power Research Institute, the Florida Department of Environmental Protection, and UW Sea Grant.

For details, visit the conference Web site, *www.mercury2006.org*. — JK

THE FIFTH ANNUAL LAKE STURGEON BOWL

Up to twenty Wisconsin high school teams are eligible to compete in this regional competition of the National Ocean Sciences Bowl at UW-Milwaukee. Top prizes include a trip to the national finals in Monterey, California, a tour of the Shedd Aquarium, and field trips aboard the R/V *Neeskay*. For more information, visit *www.glwi.uwm.edu/sturgeonbowl*.



KNOW YOUR WATER LAB
THE GREAT LAKES WATER INSTITUTE
www.glwi.uwm.edu

Conducting research, education, and outreach from its 10-acre dockside site at the Port of Milwaukee, the Great Lakes Wisconsin Aquatic Technology and Environmental Research (WATER) Institute aims to understand thoroughly the Great Lakes and other aquatic and environmental resources of local to international importance. It also houses UW Sea Grant Education Specialist James Lubner and Aquaculture Specialist Fred Binkowski.

The WATER Institute's 88,000-square-foot facility is the largest U.S. institution of its kind in the Great Lakes region. Its 71-foot research vessel, *Neeskay*, provides a fully functional research platform and year-round access to the lakes.

The institute is housed in the Great Lakes Research Facility, a UW System facility administered by UW-Milwaukee, which also houses specialized centers and several state and federal offices, including the Great Lakes office of NOAA's National Undersea Research Center.

For more information, please see *http://www.glwi.uwm.edu*, or contact Director J. Val Klump at *vklump@uwm.edu* or (414) 382-1700.

The WATER Institute operates the R/V Neeskay, *a fully equipped research vessel. Its name is the Ho-Chunk word for pure, clean water.* Alan Magayne-Roshak

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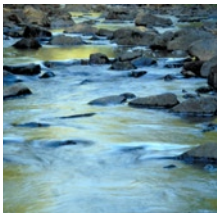
a joint newsletter from UW Sea Grant and UW Water Resources



CALENDAR OF EVENTS

NOVEMBER 1-3

State of Lake Michigan/State of Green Bay Conference
Green Bay, Wisconsin
www.aqua.wisc.edu/solm/

NOVEMBER 4

Applications due for 2006-07 Wisconsin Coastal Management Grant Program
http://coastal.wisconsin.gov

NOVEMBER 9-11

25th International Symposium of the North American Lake Management Society
Madison, Wisconsin, *www.nalms.org*

MARCH 4, 2006

The Fifth Annual Lake Sturgeon Bowl
Up to twenty Wisconsin high school teams are eligible to compete in this regional competition of the National Ocean Sciences Bowl at UW-Milwaukee. For more information, visit *www.glwi.uwm.edu/sturgeonbowl.*

REPRINTS

"Refugia and Local Controls: Benthic Invertebrate Dynamics in Lower Green Bay, Lake Michigan Following Zebra Mussel Invasion," Tara Reed, Sarah J. Wielgus, Alyssa K. Barnes, Jeremiah J. Schiefelbein and Amy L. Fettes, *Journal of Great Lakes Research*, 30(3):390-396, 2004

"ARNT2 Is Not Required for TCDD Developmental Toxicity in Zebrafish," Amy L. Prasch, Warren Heideman and Richard E. Peterson, *Toxicological Sciences*, 82:250-258, 2004

"Cytochrome P450 Activity in Green Frogs (*Rana clamitans melanota*) Exposed to Water and Sediments in the Fox River and Green Bay, Wisconsin," Robin E. Jung, William H. Karasov and Mark J. Melancon, *Bulletin of Environmental Contamination and Toxicology*, 73:955-962, 2004

"Inhibition of the Reattachment of Young Adult Zebra Mussels by Single-Species Biofilms and Associated Expolymers," J.H. Kavouras and J.S. Maki, *Journal of Applied Microbiology*, 97:1236-1246, 2004

"Lake Herring (*Coregonus artedi*) and Rainbow Smelt (*Osmerus mordax*) Diets in Western Lake Superior," Timothy B. Johnson, William P. Brown, Timothy D. Corry, Michael H. Hoff, Jill V. Scharold and Anett S. Trebitz, *Jounral of Great Lakes Research*, 30(1): 407-413, 2004

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