2012 volume 2

ASC
Aquatic Sciences Chronicle
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UNIVERSITY OF WISCONSIN SEA GRANT INSTITUTE UNIVERSITY OF WISCONSIN WATER RESOURCES INSTITUTE

INSIDE:


John Karl/Aquatic Sciences Center

SEA GRANT RESEARCH

Stories of Us

Place-based stories, GIS and water quality come together to form a complete picture of the St. Louis River Estuary.

Every place has its stories, shared experiences, history and perspectives collected by the people who live in and around them. There's power and science inherent in those place-based stories—which is why a pair of Wisconsin Sea Grant-funded researchers are looking to harness them to encourage environmental engagement and stewardship in Great Lakes coastal communities.

The concept's called spatial narratives. David Hart, UW Sea Grant's geographic information systems (GIS) outreach specialist, first encountered it when he heard Janet Silbernagel, professor of landscape architecture affiliated with the Nelson Institute for Environmental Studies at UW-Madison, give a talk on the topic that mentioned "deep maps," a concept forwarded in William Least Heat-Moon's book "PrairyErth." Hart and Silbernagel discovered they shared a kindred interest in the idea

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Aquatic Sciences Chronicle

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

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FEATURED WEBSITE

One Click Leads to Nearly Three Decades of Groundwater Information

One manifestation of Wisconsin's proud tradition of protecting its natural resources is the Groundwater Research and Monitoring Program, which includes the University of Wisconsin Water Resources Institute (WRI). The program went into place in 1984 and draws on the expertise of the University of Wisconsin System and all state agencies that oversee groundwater, including the Department of Natural Resources (DNR).

Results from one section of the program's research portfolio—the "partner projects," funded by the DNR and WRI—were difficult to access, until now. Nearly 200 summary and final reports are now available in a permanent and easily accessible electronic format at ***aqua.wisc.edu/channel/22***.

That digitizing effort was spearheaded by Wisconsin's Water Librarian Anne Moser. "I am proud of my work to ensure this entire archive is now preserved for contemporary and all future groundwater researchers, policymakers and management officials. I collaborated with professionals at the University of Wisconsin Digital Collections Center using state-of-the-art electronic archival techniques."

Paper copies of the reports will continue to be a part of Wisconsin's Water Library, along with more than 30,000 other titles available to any state resident with an interest in water-related information, particularly Wisconsin and Great Lakes issues.

Tracking Antibiotics in Soil

CAN CERTAIN TYPES OF CLAY NEUTRALIZE ANTIBIOTICS BEFORE THEY HIT THE WATER?

You could call it a case of environmental dominoes, a cause-and-effect cascade that slides down to affect the smallest organisms in potentially profound ways. It begins simply enough: Farmers may add common antibiotics like tetracycline to their livestock feed to help fend off diseases. Those antibiotics may excrete from the animals unmetabolized and enter soil or surface water after the famers apply animal manure as fertilizer. That's where they may be having an effect on soil microbes.

While some researchers are focusing on quantifying antibiotics in water systems and others are searching for methods of removing them, Zhaohui "George" Li, professor and chair of the Geosciences Department at the University of Wisconsin-Parkside, is focusing his energies on what's going on with those soil microbes in the presence of adsorbed antibiotics on clay minerals' surfaces or in the interlayers. Using funds provided by the UW's Water Resources Institute, he's been able to characterize the ways in which antibiotics are adsorbed into the two most common types of clay minerals in Wisconsin soil, where they begin to interact with—and possibly mutate—soil microbes.

"These minerals have large surface areas," explained Li, who's been working on this topic since 2008. "They could adsorb a lot of things, including feedstock antibiotics."

Similar to the ways a water softener functions to adsorb/remove calcium and phosphorous from drinking water, certain clay minerals have a high capacity to adsorb the ionic-charged antibiotic molecules on surface and in the interlayer.

The science of how it happens is determined by the type of clay mineral. Li likens smectite, the most common type of clay

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wisconsin's**water**library

Environmental Justice

Environmental justice is a concept that was born in the early 1980's and is defined by the U.S. Environmental Protection Agency as "the fair treatment and meaningful involvement of all people regardless of race, color, sex, national origin, or income with respect to the development, implementation and enforcement of environmental laws, regulations and policies." This concept began in the United States and has now spread around the world. Start at home by reading some of these great titles.

BLESSED UNREST: HOW THE LARGEST SOCIAL MOVEMENT IN HISTORY IS RESTORING GRACE, JUSTICE, AND BEAUTY TO THE WORLD

By Paul Hawkin. New York: Penguin Books, 2007.

"Blessed Unrest" is the account of how people use imagination, conviction and resilience to redefine their relationship to the environment and to one another, healing the wounds of the Earth with passion and determination.

DUMPING IN DIXIE

By Robert D. Bullard. Boulder, Colo: Westview Press, 2000.

Starting with the premise that all Americans have a basic right to live in a healthy environment, "Dumping in Dixie" chronicles the efforts of five African-American communities, empowered by the civil rights movement, to link environmentalism with issues of social justice.

SLOW VIOLENCE AND THE ENVIRONMENTALISM OF THE POOR

By Rob Nixon. Cambridge, Mass.: Harvard University Press, 2011.

Nixon examines a cluster of writer-activists affiliated with the environmentalism of the poor in the global South. By approaching environmental justice literature from this transnational perspective, he exposes the limitations of the national and local frames that dominate environmental writing.

SOIL NOT OIL: ENVIRONMENTAL JUSTICE IN A TIME OF CLIMATE CRISIS

By Vandana Shiva. Cambridge, Mass. : South End Press, 2008.

With "Soil Not Oil," Vandana Shiva connects the dots between industrial agriculture and climate change. Shiva shows that a world beyond dependence on fossil fuels and globalization is both possible and necessary.

To see more books on this topic, visit the recommended reading list at *aqua.wisc.edu/channel/23*

Anyone in Wisconsin can borrow these books. Just email *askwater@aqua.wisc.edu.*

EDUCATION

Great Lakes Earth Partnership Brings Restoration-Education Together

Wild rice beds on the Bad River Reservation and a Milwaukee beach are miles apart. University students and elementary schoolchildren are years apart. Although there are disparities here, they are brought together through an innovative restoration-education project funded by Sea Grant and known as the Great Lakes Earth Partnership.

The project builds on a comprehensive and interdisciplinary curriculum that includes inquiry-based learning integrated with sustainability, biodiversity, and pollution-prevention principles and service learning. That curriculum was created at the University of Wisconsin-Madison Arboretum in 1991.

Last year, teams of teachers, students and citizen volunteers attended one of three Great Lakes Earth Partnership institutes in the Lake Superior, Fox River/Green Bay or Milwaukee River basin. They will be at it again this summer.

"If we can engage students and the community to see the connection between land and water, they can see that how we take care of the land affects how we take care of the water," said Cheryl Bauer-Armstrong of the Arboretum.

Now, six Wisconsin school districts are participating in restoration activities, such as installing rain gardens. One mentoring aspect involves an army of K-12 students—roughly 800 in all—working with UW-Green Bay, UW-Madison, UW-Milwaukee and Northland College students in the three watersheds.

JIM HURLEY

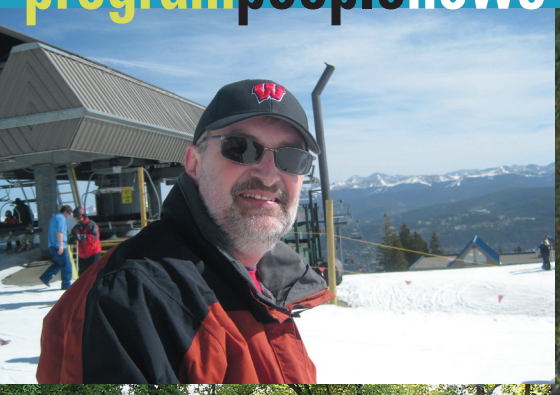
RETURNS TO AQUATIC SCIENCES CENTER AS DIRECTOR

UW Communications / Bryce Richter (inset) and Jeff Miller (above)

Jim Hurley, a University of Wisconsin-Madison environmental chemist, returns to the ASC after a year with the Wisconsin State Laboratory of Hygiene

"You can take the boy out of Sea Grant, but…?" Jim Hurley, former research and outreach assistant director for the Aquatic Sciences Center (ASC), included these words in a farewell email to his Sea Grant colleagues when he left his position in 2011. Apparently the Sea Grant influence was too strong to resist. Hurley returns to Wisconsin Sea Grant and the Water Resources Institute (collectively managed as the ASC) as director—effective May 1.

"I'm excited to be back," Hurley said. "I had developed such a great network of people in Wisconsin and beyond during the 12 years I was here before. You don't always realize how lucky you are to work with these talented people until you're disconnected from them."



JIM HURLEY

RETURNS TO AQUATIC SCIENCES

"The energy, the innovation, the ability to link research and outreach — these are unique to Sea Grant,"

JIM HURLEY

Photos: (bottom left) Phil Moy, assistant director for research; Jim Hurley; and Chris Babiarz, assistant scientist with the Water Resources Institute. (top left) Hurley appreciating water in its solid form. (Photo by Julia Hurley.) (middle photos) Hurley worked on the Mercury Experiment to Assess Atmospheric Loading in Canada and the United States study, in the Experimental Lakes Areas of Canada, purposely adding mercury to an ecosystem to assess its impacts. (top right) Hurley with U.S. Sen. Russ Feingold at the Eighth International Conference on Mercury as a Global Pollutant, Madison, Wis., Aug. 6-11, 2006. (bottom right) Hurley talks with a fellow Lake Superior enthusiast in Ashland, Wis.

Continued from previous page

Hurley, a University of Wisconsin environmental chemist, comes to the ASC from the Wisconsin State Laboratory of Hygiene where he served as director of its environmental health division. He credits his year at the lab with reinforcing the recognition that environmental issues and public health are linked, and he hopes to bring that perspective back to the ASC. Hurley was also appointed as a tenured faculty member in the Department of Civil and Environmental Engineering at UW-Madison and started teaching and forming his research group with new graduate students.

INCREASED OPPORTUNITIES FOR GRADUATE STUDENTS

At the ASC Hurley hopes to increase the visibility and opportunities for Sea Grant- and Water Resources Institute-funded graduate students. "I'd like to have them interact more with our staff, with each other and with researchers from other Wisconsin programs. After all, the students are why we're all here," Hurley said.

In addition to his director position, Hurley will have a 25percent faculty appointment. He will be teaching a graduate level water analysis course this fall.

A RELEVANT BACKGROUND FOR THE JOB

Martin Cadwallader, Dean of the University of Wisconsin-Madison Graduate School, will be Hurley's boss. "We're excited that Jim has agreed to assume leadership of our Aquatic Sciences Center, including the UW Sea Grant Institute," said Cadwallader. "He has an excellent, relevant background that makes him perfectly qualified for the job.

CENTER AS DIRECTOR

His intimate knowledge of the Aquatic Sciences program, its mission and staff means he'll hit the ground running and help enhance the status of a program that already enjoys an unparalleled international reputation."

Hurley has the daunting task of replacing Anders Andren as long-time director of the ASC. Andren, who recently retired, plans to stay on board to help with the transition through June 30. Then he intends to stay active by helping other Sea Grant programs with grant application reviews or with writing proposals. He's also looking forward to pursuing his passion for composing and playing guitar music.

Andren is pleased with his successor, "I was really delighted when I was told that Jim had been appointed as the new director of the University of Wisconsin Aquatic Sciences Center. This is a great fit for the University of Wisconsin, for the Sea Grant and Water Resources Institutes, and for Jim. Because of his previous work with us and his thorough knowledge of water related issues on a local, regional and national scale, he will be able to hit the ground running immediately. This was just a great choice. I could not be happier for Jim and the staff of the Aquatic Sciences Center."

"It's pretty humbling to think that there have only been two other Wisconsin Sea Grant directors in 40 years," Hurley said. "There are not many other Sea Grant programs with the same longevity that have consistently maintained a high level of excellence."

The head of the national State Water Resources Research Institute with the US Geological Survey, John Schefter, had this to say: "I am pleased to learn that Jim has been selected for the position of director of the Aquatic Sciences Center. In my many years of administering the State Water Resources Research Institute Program, the UW Water Resources Institute has been one of the few consistently among the very best of the 54 such institutes nationwide. I expect that Jim will continue in that tradition. "

AN INTERNATIONALLY RECOGNIZED SCIENTIST

Throughout his career, Hurley has worked extensively on the impact of mercury in northern Wisconsin lakes, the Great Lakes and the Everglades. Hurley has chaired several regional and national Sea Grant committees and was a member of the US Environmental Protection Agency's Science Advisory Board, which developed a risk assessment for US mercury emissions in 2011. Hurley earned a distinguished service award in 2009 from the Wisconsin Chapter of the American Water Resources Association and earned the Assembly of Sea Grant Extension Program Leaders Chairman's Award in 2006.

"Jim's not only an internationally recognized scientist and mercury expert, he's also got a wealth of experience with Sea Grant," said Val Klump, director of the Great Lakes WATER Institute at the UW-Milwaukee School of Freshwater Sciences. "He's a terrific guy and really well-liked. It's hard to imagine anyone else with his credentials who is better prepared for this job. Jim will help keep the Wisconsin program as a national leader for Sea Grant and Water Resources."

Hurley welcomes a return to the creativity and motivation of the people in the Aquatic Sciences Center and Sea Grant nationally. "The energy, the innovation, the ability to link research and outreach — these are unique to Sea Grant," Hurley said.—MZ

David Hart, Janet Silbernagel (two in middle) and Max Axler (far right) with staff of the Esri Application Prototype Lab.

Stories of Us

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of the deep map, and how it might be harnessed for science and citizen engagement.

"We thought, could this idea be ramped up to the level of the Great Lakes?" asked Hart. "What's going to allow us to become better stewards is to be able to tell stories about why the Great Lakes are worth preserving, why they're special and sacred to the people who use them all the time."

The idea for the current Great Lakes spatial narratives project grew out of a 2009 call for special projects related to the St. Louis River Estuary and the designation of the National Estuarine Research Reserve in Duluth-Superior. Hart and Silbernagel were aiming to test-drive the spatial narratives concept in the estuary. At the same time, a Minnesota-based group led by George Host at the University of Minnesota-Duluth was looking to detail stressor gradients in the estuary as a means of exploring the scientific connections between human activity and water quality.

The two projects proved a powerful match. Focusing on five key topics affecting the estuary—mining, shipping, fishing, wild rice and recreation—the project has produced an arsenal of tech-friendly geotools, including a mobile-based geoquest game called "Up River" that showed the ways people have used and interacted with the estuary in the area's ever-evolving narrative. Soon, there'll also be an interactive website with audio perspectives and a geo-archive. UW graduate student Max Axler, meanwhile, is working on constructing a deep map for the estuary and a second geoquest.

Hart and Silbernagel were anxious to expand the success of the spatial narrative model into communities along the Great Lakes coastline. This time, they found an even more powerful partner: Esri, the California-based GIS software giant. Two years ago, Silbernagel and former graduate student Robbie Greene attended the company's annual GeoDesign Summit, where they discussed the spatial narratives/stressor gradients project. The concept caught the attention of Esri CEO Jack Dangermond, who offered the services of his company's Application Prototype Lab to help Silbernagel and Hart develop a geotool that would allow users to craft their own spatial narratives about their coastal communities using Web and mobile devices.

Now Patrick Robinson, environmental studies specialist, UW-Extension, has joined up with Hart and Silbernagel to lead an evaluation of citizen engagement in Wisconsin coastal communities with the spatial narrative tool through social science research. "What we want to do is implement and evaluate the geotool's effectiveness in fostering place-based learning, spatial literacy and stewardship," said Silbernagel. "What effect might the tool have in facilitating all of that?"

Where the St. Louis Estuary project focused more on using the perspectives of particular interest groups to form the narrative—fishermen, environmentalists, boat owners and others—Silbernagel is hoping the spatial narratives that emerge from Great Lakes communities will be driven more by users, community leaders and youth. The notion is that the science will emerge from the stories as well.

"Stories are very powerful," noted Hart. "People are recognizing the power of stories to communicate science. Seeing the potential this technology has to communicate the issues surrounding a particular place and being able to delve into them and explore them and get our hands on them makes so much more sense." —ARC

For more information, watch Silbernagel's talk at Esri's 2011 GeoDesign Summit: aqua.wisc.edu/channel/24

UW-Madison/College of Agricultural Science

WATER RESOURCES RESEARCH

TRACKING ANTIBIOTICS IN SOIL

CAN CERTAIN TYPES OF CLAY NEUTRALIZE ANTIBIOTICS BEFORE THEY HIT THE WATER?

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mineral in certain parts of Wisconsin, to a hardcover book with many pages. The antibiotics get onto the cover paper as well as into the inner pages, which can affect the germicidal effect of the antibiotics. Kaolinite, a clay mineral more commonly found in the southeastern U.S., is more like a book that has its pages glued shut, leaving only the surface area as a place for antibiotics to be adsorbed and affect microbes.

Li's current work is threefold: He's trying to quantify how much antibiotic each type of clay can adsorb, and identify under what conditions the amount adsorbed might increase. (Hint: It's likely linked to changes in pH.) If the pH levels do change, how does that affect the stability of adsorbed antibiotics? And finally, the biggest and most critical piece: When the antibiotics are adsorbed into the surface of the clay, are they strong enough to continue attacking bacteria in soils?

If they are, it could have serious implications for infectious disease control. "If these antibiotics are functioning and reacting to microbes, maybe not quite to the degree where they can kill them, the microbes can begin developing resistance to antibiotics."

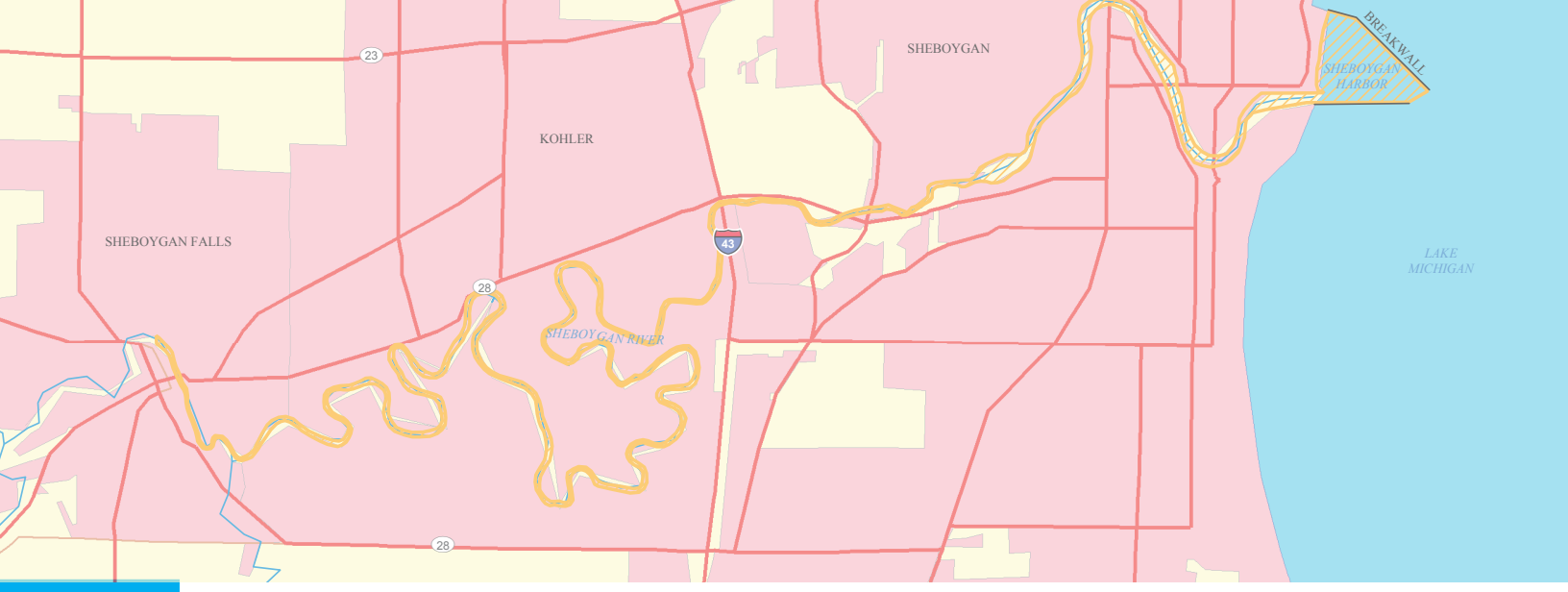
New resistant bacteria strains could end up posing a threat not just to livestock, but to humans as well.

"If the antibiotics in fact are no longer active, that's not a bad situation,' noted Li. "The clay minerals have strong adsorption for certain antibiotics, which will decrease the antibiotic concentration in the aqueous phase significantly. Our next thing is to think about how they can be degraded and removed through photoreactions once they've been intercalated into the interlayer of swelling clays."

And that's exactly where Li's work will focus next—exploring whether it's possible to accelerate the degradation by exposing the antibiotic-adsorbed clay minerals to ultraviolet rays. "There are still a lot of things that need to be studied," said Li. "Now that we can detect these antibiotics in surface water and minerals, it becomes a question of gauging the extent of environmental pollution. This is an emerging issue."—ARC

"Clay minerals have strong adsorption for certain antibiotics, which will decrease the antibiotic concentration in the aqueous phase significantly."

ZHAOHUI "GEORGE" LI,
UNIVERSITY OF WISCONSIN-PARKSIDE



OUTREACH

Major roads
Surface water
Urban Areas
Areas of Concern

THE SHEBOYGAN RIVER AREA OF CONCERN, ABOVE, ENCOMPASSES THE LOWER SHEBOYGAN RIVER DOWNSTREAM FROM THE SHEBOYGAN FALLS DAM, INCLUDING THE ENTIRE HARBOR AND NEARSHORE WATERS OF LAKE MICHIGAN.

Sea Grant Programs Team Up to Produce Area of Concern Video

According to the U.S. Environmental Protection Agency (EPA), there are currently 49 Great Lakes Areas of Concern (AOC), sites where water and sediment quality have become severely degraded. There are 30 AOCs in the United States, 14 in Canada and five shared by both countries.

And chances are good that residents have absolutely no idea they may be living in one. Or that efforts to clean up the water and sediment are occurring in and around their own communities.

That's why Illinois-Indiana Sea Grant and University of Wisconsin Sea Grant are teaming up to produce a public information video that's designed to inform anglers, boaters, marina operators and local businesses of the benefits that can come from a remediated AOC.

The video, funded by a grant from the EPA Great Lakes National Program Office, will feature several Great Lakes AOCs, including the Sheboygan River AOC, the Milwaukee Estuary AOC, the Muskegon Lake AOC and the Grand Calumet River AOC. Caitie McCoy, a social scientist with Illinois-Indiana Sea Grant, will interview people who live and work in these AOCs, and UW Sea Grant videographer John Karl will shoot and edit the footage into a five- to seven-minute video.

McCoy and Karl plan to use the video to raise awareness about the process and benefits of remediation. One of their goals is to recruit potential non-federal partners to participate in current and future remediation projects under the Great Lakes Legacy Act. Filming and interviews will occur in 2012.

istock

Survey to Check Out Consumers' Knowledge of Fish Facts

What's on your dinner plate? Yellow perch or rainbow trout? If yes, how often does it show up on your family's menu? Do you know if it's wild-caught or farm-raised?

A new Sea Grant consumer survey is trying to ferret out some answers to these questions, and more. It's part of a new campaign to raise awareness about the safety and sustainability of local Wisconsin fish from neighborhood grocery stores.

A good place to begin that awareness-building is to learn what questions consumers may have about things like how to select and prepare local fish, nutritional benefits and health risks, and how fish are raised or harvested commercially.

Kathy Schmitt Kline, an outreach coordinator, is heading up the project that will deploy the survey in Madison-area grocery stores as a pilot study through the next few months. Survey results will inform the development of websites, fact sheets and other products to provide science-based information to answer consumers' local-fish consumption questions.

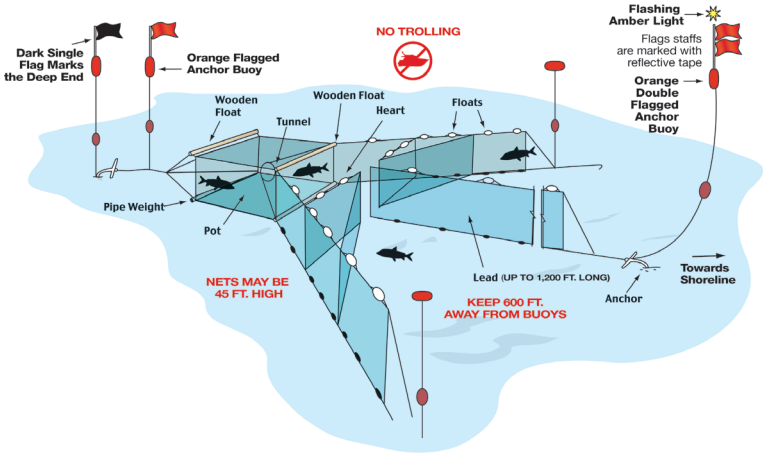
Kathy Schmitt Kline wants to know what you think about when you think about fish.

UW Sea Grant Maps Angler Safety Near Lake Michigan Trap Nets

The waters of Lake Michigan are just that much safer for recreational anglers due to UW Sea Grant's map distribution of commercial trap net sites near Sheboygan, Manitowoc and Door counties. Last spring and summer, there were 3,500 visits to seagrant.wisc.edu and an additional website, and 1,000 maps were distributed through bait shops and at boat landings. Another 35 posters went up along shorelines.

The maps indicate net coordinates and depths. They help prevent entanglement, which can be extremely dangerous if anglers and/or their equipment become wrapped up in the system of net, buoy lines and anchors that may be more than a quarter-mile long. The nets are designed to catch whitefish and allow non-target species to be released unharmed.

In 2012, the trap net awareness efforts will continue with more maps, posters and downloadable information so that more people can safely enjoy the bounty of Lake Michigan.



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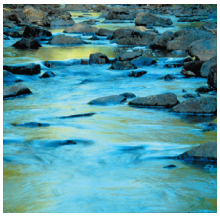

CALENDAR OF EVENTS

AUG. 19-23, 2012
142 Annual Meeting of the American Fisheries Society
Minneapolis – St. Paul
afs2012.org

AUG. 19-23, 2012
StormCon
Denver
stormcon.com

SEPT. 11-12, 2012
8th Annual Great Lakes Restoration Conference
Cleveland
conference.healthylakesl.org

OCT. 20-24, 2012
National Conference on Coastal and Estuarine Habitat Restoration
Tampa, Fla.
estuaries.org

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