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Aquatic Sciences Chronicle

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UNIVERSITY OF WISCONSIN SEA GRANT INSTITUTE UNIVERSITY OF WISCONSIN WATER RESOURCES INSTITUTE

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Social Science Superhero!



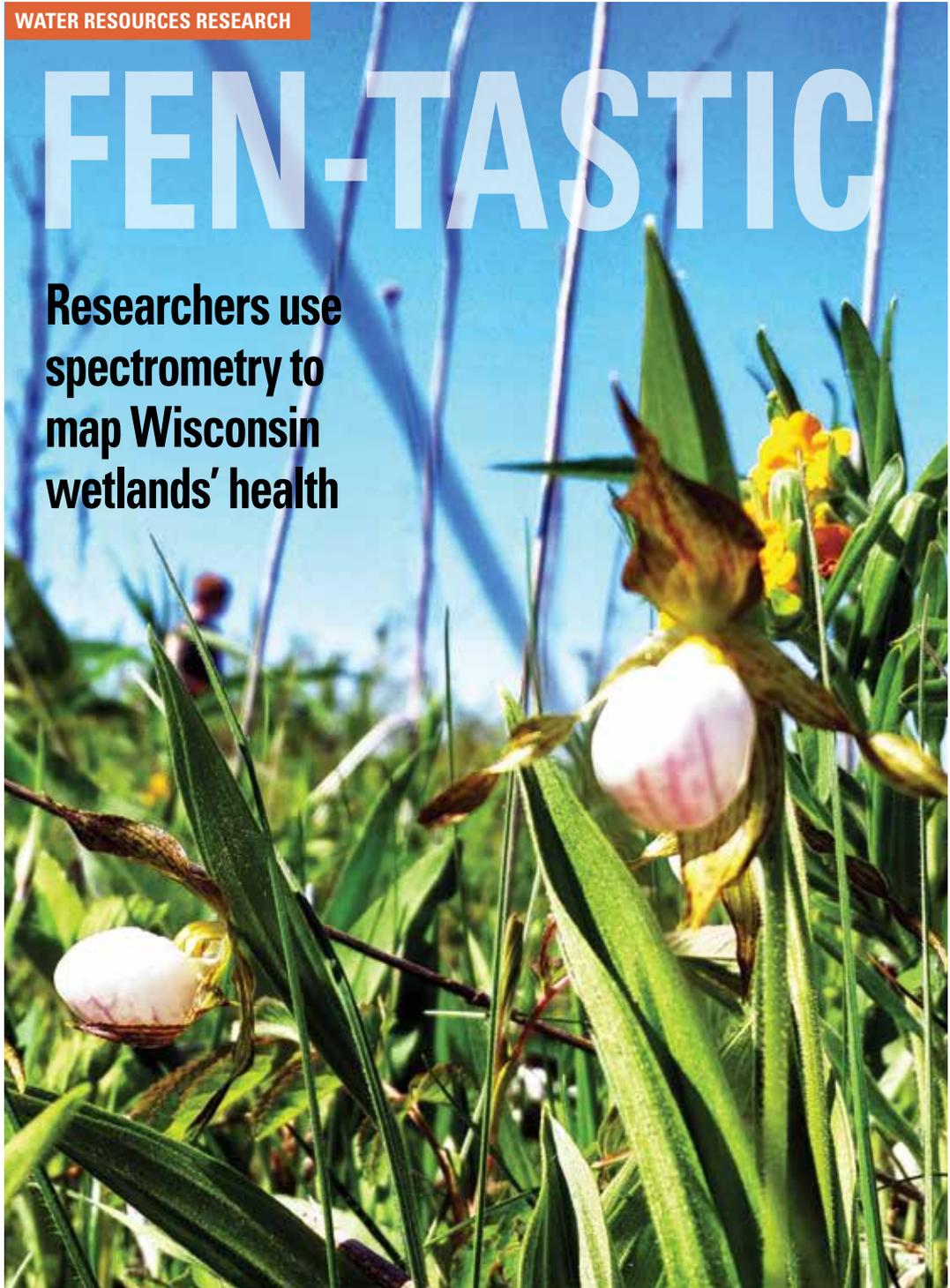
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Quagga Mussels Change the Rules

WATER RESOURCES RESEARCH

FEN-TASTIC

Researchers use spectrometry to map Wisconsin wetlands' health



Aaron Carlsson, Flickr

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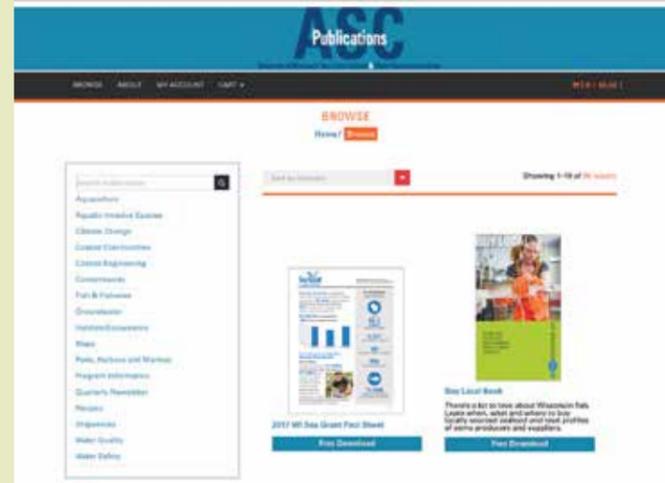


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FEATURED WEBSITE



New Publication Website for Water-Related Information

publications.aqua.wisc.edu

Seeing your way through the daily barrage of emails, tweets and news feeds to get to information that aids decision-making, awareness raising and — quite simply — the enjoyment of water resources can be difficult.

At the Aquatic Sciences Center, two people recently stepped into the swirl of Wisconsin-water-related material. They've brought new order and a snappy presentation to more than 95 items on a publication website.

"We wanted to provide an updated and cleaner look to assist visitors in more easily finding what they need," said Web Developer Tom Xiong.

What they need could be anything from free downloads — fact sheets, manuals and program-related information — to a colorful Fish of the Great Lakes poster for only \$2.48, plus shipping.

One challenge for the new site, said Linda Campbell, was getting the postage calculations right. This involved building a system that was easy for shoppers to use but also accurately tallied shipping costs for sales outside of the country.

"Each year, we get interest from about a dozen international residents who want to purchase items. It was always difficult to let them know what the true cost would be for, say, an aquaculture manual because shipping costs could really add up," said Campbell, the publication sales and distribution coordinator. "Now, the site displays the cost up front and eliminates the need for me to email back and forth with a prospective customer. Solving this matter may seem small since it affects so few website visitors, but it's actually an example of the care that our web developer takes to make sure everyone has a good experience when visiting our website."

Most online projects take longer than expected, but in this case the result was worth the wait as items are now curated into easily searchable categories, accompanied by images of the publications — aquaculture; aquatic invasive species; climate change; coastal communities; coastal engineering; contaminants; fish and fisheries; groundwater; habitats/ecosystems; maps; ports, harbors and marinas; program information; quarterly newsletter; recipes; shipwrecks; water quality; and water safety.



FEN-TASTIC

Mapping the health of Wisconsin wetlands using spectrometry

You've likely heard of fens, a particular type of miry and mineral-rich wetland, in the context of European geography or literature. Shakespeare referenced fens in "King Lear," and J.K. Rowling included them in the Harry Potter universe. (They were reportedly the home of wizard Salazar Slytherin.)

The team's research is backdropped by the ongoing debate over new high-capacity well applications in Wisconsin. The Wisconsin Department of Natural Resources is looking for tools to help efficiently and effectively evaluate the wells' potential effect on fens and other wetlands. Spectrometry, which delivers images that can suggest the levels of

"We're using vegetation as an indicator to changes in the groundwater regime."

ERIC BOOTH, UNIVERSITY OF WISCONSIN-MADISON



But fens aren't fictional — they're real, and they're right here in the state, in the glaciated parts of southeastern and south-central Wisconsin. They're home to several rare and important plant species — think sedges and orchids — and they're an important indicator of overall environmental health.

That's why a team of researchers, led by University of Wisconsin-Madison Hydroecologist Eric Booth, spent much of the summer using both partial and full-range imaging spectrometers to get a detailed look at the health of two sets of fens — three pristine and three degraded by the nearby presence of wells. Their work is backed by the University of Wisconsin Water Resources Institute.

nutrients like phosphorous and nitrogen in plants, has the potential to be one of those tools.

"What's needed is a good model that can accurately estimate the impact," Booth said. "There's just not a ton out there in terms of evaluating the impact to an ecosystem that depends on groundwater."

And fens most definitely depend on groundwater — more specifically, groundwater with a unique water chemistry that's high in carbon and calcium but low in the nitrates and phosphorous that typically dominate wetlands that experience greater amounts of runoff from sources such as agriculture. Changes in the groundwater level or

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Fishing for Landslides



New Device Offers Insight Into How and When Lake Michigan Bluffs Fail

Lucas Zoet (above) used a new instrument to capture information about the exact events that occur just before and during a bluff failure.

The highest water levels in more than 30 years on Lake Michigan have caused erosion that threatens people's homes and property. Wisconsin Sea Grant-funded researchers responded to the problem by developing an instrument that can measure bluff failures and help predict when they might occur.

The unique instrument is a bluff assessment data generating experiment recorder, or BADGER. It is the brainchild of Lucas Zoet and J. Elmo Rawling with the University of Wisconsin.

"Bluffs don't retreat at a stable rate," explained Zoet, an associate professor of geoscience at the University of Wisconsin-Madison. "What's happening is that the bluff will sit in the same configuration for days, weeks or months. Then, over a span of a few seconds or minutes, all of the material will landslide its way down from a higher elevation to a lower elevation."

To capture what happens during this crucial time, the researchers deployed three BADGERS – two in Racine County and one in Ozaukee County.

Zoet describes the BADGER in terms of a fishing pole: "There's a spool like the reel on a fishing pole, and then there's a line that comes out of it. At the other end of the line where you would hook a lure, we stake that into the part of the bluff that we think is going to fall apart. The reel box is back on the stable part of the bluff. When the bluff fails and the reel unspools the line, we can measure accurately how fast the bluff is moving by how fast the reel unspools."

The reel box also contains instruments that, when stuck in the ground, measure soil humidity and temperature. Other instruments inside the box measure air humidity and temperature.

The BADGERS were developed by the researchers with help from UW-Madison Department of Geoscience engineers in partnership with the Wisconsin Geological and Natural History Survey.

"We're the first to invent something like this," Zoet said. "Nobody's ever put one out on a bluff, and they haven't coupled it with soil moisture measurements."

Zoet wasn't sure they'd be able to catch a landslide in action. "It's kind of like fishing," he said.

However, they were successful. On December 13, 2016, a bluff in Racine County slumped and dropped about 500 cubic feet of material onto the beach below.

Catching a December landslide was unexpected.

"Most landslides occur during spring when there's a lot of water moving around, not winter," Zoet said. The BADGER recorded the ground moving for a day beforehand at "a pretty high rate, which is about one millimeter or two per hour."

During the hours before the landslide, the bluff started to move at an ever-higher rate. The researchers suspect that freezing water inside the soil expanded and wedged open cracks in the bluff, causing the landslide.

Zoet said better understanding of the physical processes that cause bluff failures will help researchers make more educated predictions about

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Lucas Zoet



BEFORE



AFTER



People and Stories of Lake Michigan

People are drawn to water for a variety of reasons — for work, for sport, for play, for spiritual meaning — and Lake Michigan has inspired many to write about those experiences. The library has a collection of some of these stories.

FRESH WATER: WOMEN WRITING ON THE GREAT LAKES

Alison Swan, editor. East Lansing, Mich.: Michigan State University Press, 2006.

“Fresh Water” is a collection of nonfiction works by women writers focused on the Midwest and living with the five interconnected freshwater seas that we know as the Great Lakes. Contributing are renowned poets, essayists and fiction writers.

PERIMETER: A CONTEMPORARY PORTRAIT OF LAKE MICHIGAN

By Kevin J. Miyazaki. Madison, Wis.: Wisconsin Historical Society Press, 2014.

Commissioned by the Haggerty Museum of Art at Marquette University to create an artwork reflecting on the importance of fresh water, Milwaukee-based photographer Kevin J. Miyazaki embarked on a two-week drive around Lake Michigan to create a “contemporary portrait of Lake Michigan.” Residents, environmental scientists, artists, a Native-American water rights advocate, surfers and commercial fishermen shared their thoughts with him on why this body of water is important to all.

SOME LIKE IT COLD: A SHEBOYGAN SURFIN’ SAFARI

By William Povletich. Cincinnati, Ohio: Clerisy Press, 2010. “Some Like It Cold” chronicles the lives of two brothers and the surfer culture in Lake Michigan they helped build.

THE THIRD COAST: SAILORS, STRIPPERS, FISHERMEN, FOLKSINGERS, LONG-HAIRED OJIBWAY PAINTERS, AND GOD-SAVE-THE-QUEEN MONARCHISTS OF THE GREAT LAKES

By Ted McClelland. Chicago: Chicago Review Press, 2008. Chronicling the author’s 10,000-mile Great Lakes circle tour, this travel memoir seeks to answer a burning question: Is there a Great Lakes culture, and if so, what is it?

Please visit the Water Library at waterlibrary.aqua.wisc.edu for more information or to learn about more stories of Lake Michigan and all the Great Lakes.

Anyone in Wisconsin can borrow these books. Just email ask-water@aqua.wisc.edu.



< Erosion threatens a cabin on the coast of Lake Superior, Sand Island in the Apostle Islands National Lakeshore.

Marie Zhulkov / Wisconsin Sea Grant

WHEN SURVEY SKILLS ARE YOUR SUPERPOWER

SEA GRANT’S SOCIAL SCIENTIST HELPS ESTABLISH A COLLABORATIVE STORMWATER AWARENESS CAMPAIGN FOR LAKE MICHIGAN

She’s been on the job for more than a year now, and Wisconsin Sea Grant’s social scientist located in Milwaukee, Deidre Peroff, has found plenty of ways to put her skills to use. One major project she’s working on is designed to collaborate with several stormwater awareness campaigns for people living along Lake Michigan’s Wisconsin shoreline.

“There are many different campaigns out there designed around stormwater,” Peroff said. “Some of them overlap in the messaging that they use — but they’re really all trying to relay the same message, which is what you do at a household level is connected to how chemicals and pollution can get into Lake Michigan through untreated stormwater.”

The project is led by Jacob Fincher of the Southeastern Wisconsin Watersheds Trust Inc. (also called Sweet Water) and is funded by the Wisconsin Coastal Management Program. Sweet Water already has its own popular campaign around Milwaukee, Respect Our Waters, which features Sparkles the Water Spaniel as a mascot and “spokes-dog.” But this new effort would extend new messages northward to Door and Brown counties, along with the watersheds in between.

Additional project partners include the Lake Michigan Stakeholders steering committee, the Lakeshore Natural Resource Partnership, the East

Central Regional Planning Commission and the Fox-Wolf Watershed Alliance.

Although Peroff was hired too recently to be included in the original grant application, Fincher of Sweet Water realized how useful her social-science skills could be and brought her in.

Peroff’s first contribution was to develop a survey that was sent to 55 organizations along the Wisconsin Lake Michigan coast that already have stormwater campaigns. The survey asked them what counties and watersheds they work in, what kind of outreach they do, which topics they address, and if they are interested in working to develop a collaborative stormwater outreach campaign.

“The ultimate goal is to get people on the same page so we’ll have a greater impact with the campaign,” Peroff said. Plans include developing another survey for households along the lake, which Peroff will also help design. “I feel like my superhero nickname should be Survey Girl,” she laughed.

The messages will be spread via workshops, community events, television and radio ads, and online. The campaign’s effectiveness will be evaluated by an advertising agency as well as through a follow-up survey. Guess who will likely have a hand in that survey?—MEZ



Our superhero social scientist Deidre Peroff joins forces with Jacob Fincher and Sparkles, the Water Spaniel of the Southeastern Wisconsin Watersheds Trust, to bring stormwater awareness to all.

Wisconsin Sea Grant

EDUCATION

OUTREACH

New ROV Offers Insight Into Old Shipwreck

In June, frequent Wisconsin Sea Grant collaborators/Maritime Archaeologists Tamara Thomsen and Catlin Zant teamed with Crossmon Consulting and Woods Hole Oceanographic Institution to use a state-of-the-art remotely operated vehicle (ROV) to capture the first-ever clear images of the *S.S. Senator*, a wreck that sank in 1929 in 450-plus feet of water east of Port Washington.

Thomsen was part of the team that used a standard ROV and multi-beam sonar imagery to get a rough sense of the *Senator's* location back in 2015. The new ROV offered much more detail.

The *Senator* was outfitted to carry automobiles on deck and within her hold between Milwaukee and Detroit. On Halloween day in 1929 — the same week as the Black Tuesday stock market crash — the 4,048-ton steel carrier got caught in a dense fog, colliding with another carrier called the *Marquette*. The *Senator* split in two and sank, along with the 268 Nash automobiles it was carrying. The deck load of cars ended up in the sand aft of the vessel's stern, but the cars within the ship's hull appear to remain lashed down in place.

"Cars were still down there inside the vessel," said Thomsen. "This gave us the opportunity to examine what really happened in the *S.S. Senator's* final moments; moments that took the lives of nine of her crew."

For more information, see wisconsinshipwrecks.org.

Researchers from Woods Hole examine images of the *Senator* captured by a new ROV able to operate at greater depths.



Byce Richter / UW-Madison

Careful Management Could Be the Cure

Backed by Wisconsin Sea Grant, Tony Goldberg, a UW-Madison professor of epidemiology, created a quick and accurate test for viral hemorrhagic septicemia virus (VHSV, a deadly disease that attacks the internal organs of fish populations, leading to bloody and unsightly fish kills). Over the past year, Goldberg and his research team have taken the test into the rivers and streams of Wisconsin, from the Apostle Islands to Janesville and the Wisconsin-Illinois border, trying to track the virus's locations and movement among fish populations. The goal? Developing an effective management strategy to contain — or even eliminate — VHSV.

"If we catch wildlife diseases early, there's a lot we can do about them," said Goldberg. "There's a window where you can intervene and be adaptive and smart and prevent or even get rid of some diseases with really careful management. VHSV will not be the last fish disease to plague Wisconsin. If we do this exercise and are effective with it, we have a test case, an action plan for the future."

Improving the Toolbox

For years, fish ecologists have used a specific type of nitrogen isotope to determine what's known as a fish's trophic position — i.e., its place in the greater food web. Backed by Wisconsin Sea Grant, a team led by UW-Madison Professor of Zoology Jake Vander Zanden has discovered a more powerful tool that not only allows researchers to map the modern Great Lakes food web but could also help determine what it looked like 100 years ago.

The new method involves focusing on amino acids that carry a constant trophic discrimination factor, giving researchers both a clear starting baseline and a definitive means of determining which species are eating and being eaten by each other.

"When we think about restoring the Great Lakes, we think about bringing it back to a historical or desirable condition," said Vander Zanden. "When we talk about the historical condition, which is often the target, we're completely blind. It's really important to know that."

Tori's Back

As in Tori Kiefer, the student who served as Wisconsin Sea Grant's first-ever maritime archaeology fellow in the summer of 2016. Kiefer helped lead a field school of East Carolina University students in a survey of the shipwreck *Atlanta*. Kiefer also compiled the successful nomination of the *Atlanta* to the National Register of Historic Places.

Thanks to the Wisconsin Historical Society offering permanent positions to Tamara Thomsen and Caitlin Zant, maritime archaeologists and longtime funded researchers with Wisconsin Sea Grant, salary dollars were available to bring Kiefer back for the second part of the research project, a field survey of the tugboat *Arctic*. She'll stay through the end of 2017.

Rule-Changing Quaggas Lead to New Research

A collaborative research project about the impacts of quagga mussels in Lake Michigan has led to more funding for the issue from the National Science Foundation (NSF). The original project, jointly supported by the Wisconsin and Illinois-Indiana Sea Grant programs during 2012-14 looked at the effects of this invasive mussel in the deep parts of Lake Michigan on plankton abundance, the phosphorus cycle and water movement.



Narayan Mahon

The new project is being funded by the Biological Oceanography and Physical Oceanography divisions of NSF for more than \$1 million in expectation that the results will be useful for understanding conditions in other large lakes, and coastal areas as well.

The principal investigators are Harvey Bootsma and Qian Liao with the University of Wisconsin-Milwaukee and Cary Troy with Purdue University. David Cannon is a Ph.D. student working on the project at Purdue.

In the original project, the team discovered quagga mussels in Lake Michigan are eating more plankton than the amount that is reaching them by sinking from above. How and why this could happen is what they'll be looking at with the new project.

"We think that food delivery to the bottom of the lake is not just determined by the passive settling of phytoplankton as it's sinking through the water, but that plankton is always being circulated in

the lake," said Bootsma. "It's like the plankton are on a kind of conveyor belt where they're going up and down."

The researchers also found the mussels are changing the lake's phosphorus cycle. "The nutrient-loading models used to set limits for phosphorus aren't accurate anymore because of these new components to the ecosystem — bottom-dwelling filter feeders," Bootsma said. "They have changed the rules for how Lake Michigan works."

"Lake managers have a conundrum right now. They've got too much algae in the nearshore zone and they want to reduce phosphorus to solve that problem. But there's not enough phytoplankton in the offshore zone because of the mussels. So if they reduce phosphorus loading in the lake, they could make that offshore problem even worse so that there's virtually no food left out there for the rest of the food web," Bootsma said.

With the new project, Bootsma said his team hopes to determine what the "sweet spot" is for phosphorus

loading. "There may not be one perfect phosphorus load that solves both the nearshore and offshore problem, but we'd like to try and find one that minimizes the nuisance algae while at the same time keeps the offshore animals alive with enough plankton production."

The NSF project got underway this spring. "Although we're focusing on Lake Michigan, the work has implications for most of the other Great Lakes as well as other lakes in general that are being invaded by mussels," Bootsma said. "We're looking at a fundamental change in the way lakes work, and that's the kind of thing the NSF is interested in."

"It's generally accepted that the ecosystems of smaller, shallower lakes — Lake Erie, for example — are at the greatest risk of quagga mussel invasion," Cannon added. "Our results could help show other researchers that the effects of mussels on large, deep lakes cannot be ignored and, more importantly, how they can be accounted for." — MEZ and IM

The quagga mussels have changed everything. A team of researchers including Harvey Bootsma (left), Qian Liao, Cary Troy and David Cannon is attempting to determine phosphorus limits that can both minimize near-shore algae and allow for necessary plankton production in the presence of the mussels.

Hurley Honored

James Hurley, director of Wisconsin Sea Grant, and Terry White, second district supervisor of Douglas County, were honored in April by the Lake Superior National Estuarine Research Reserve and its Research Advisory Board (RAB).

Both Hurley and White were recognized with outstanding achievement awards for their support of the reserve by Director Erika Washburn.

"Jim was a primary driver in the reserve nomination, site selection and designation process," Washburn

said. "He was a major contributor to the mission and visioning process for the reserve. He is a consummate collaborator and advocated for the reserve in both Washington, D.C., and Madison."

White has been a member of the RAB since 2015. In that short time, he has had major impacts on the remodeling process for the reserve's learning center on Barker's Island, and he has contributed to reserve programming.





John Kari / Wisconsin Sea Grant

Fishing is big business in Wisconsin, and the amount an angler is willing to pay for a successful fishing trip varies by species of fish.

But, Wait: Now How Much Would You Pay?

WISCONSIN SEA GRANT RESEARCHER QUANTIFIES THE VALUE OF LAKE MICHIGAN SPORTS FISHERIES

Wisconsin anglers remain willing to pay a significant amount of money for a successful recreational fishing trip on Lake Michigan, but the amount varies based on the fish species in question.

That's one of several takeaways from research conducted by Daniel Phaneuf, a University of Wisconsin-Madison professor of agricultural and applied and economics and UW-Madison graduate student Jennifer Raynor. Their work, supported by Wisconsin Sea Grant, represents the latest quantification of the economic value of Wisconsin's Lake Michigan sports fisheries — and the potential value of certain fish species to the anglers.

Over the course of the 2016 fishing season, Phaneuf and Raynor distributed surveys to licensed anglers. The surveys included a choice experiment designed to get fishers to rank different types of trip configurations, based on trip cost, the type and size of fish involved and how many of that fish they'd likely catch. For instance, anglers were asked if they would pay \$100 for a trip that resulted in catching two medium-sized lake trout, or if they would not take a trip at all under those conditions.

"We wanted people to think about the different attributes of recreation trips, as well as the tradeoffs they'd have to make to enjoy each," explained Phaneuf.

Based on Phaneuf and Raynor's findings, a Wisconsin angler would be willing to pay an average of \$140 dollars for a successful Lake Michigan trip that targeted Chinook salmon. Switch the fish to lake trout, a species that typically offers less resistance to being caught, and the average amount anglers were willing to pay dropped to \$90. Those dollar amounts include everything from travel expenses to charter-trip costs.

"One big thing we can learn from this is that several species can generate economic value," said Phaneuf. "That raises the question: Because of biological vulnerabilities with salmon and lake trout, what other fisheries could generate value?"

The responses indicated that one big possibility is walleye, a species Phaneuf and Raynor also included in the survey. Respondents indicated that on average, they'd be willing to pay \$180 for a successful, walleye-based fishing trip.

"Economics is all about tradeoffs," said Phaneuf. "If salmon declines, can walleye take its place?"

To come up with total dollar values, Phaneuf used creel survey data collected by the Wisconsin Department of Natural Resources to gauge the number of fishing trips actually taken by anglers in Wisconsin each year. From the most recent set of data, Phaneuf was able to multiply the number of trips by the survey results to estimate that Lake Michigan fishing trips for Chinook salmon generated \$32 million in 2016, while lake trout trips produced \$8 million and walleye trips \$33 million.

Those numbers offer ample evidence that Wisconsin anglers value and use Lake Michigan fisheries.

"We're used to thinking about the economic value of market activity," said Phaneuf. "But it's equally valid for non-market commodities like fishing trips. It reminds us that environmental resources do generate economic value, and this value should be considered in policy debates."

Phaneuf and Raynor's numbers are likely to be of interest to state fisheries managers, who can potentially use them to guide management decisions. Given that the populations of native and non-native species are affected by everything from invasive species and environmental degradation to changes in state budget and policy, they could be especially valuable.

"It's helpful to understand that people's preferences are important in managing fisheries," says Raynor, a New York native who's working on a Ph.D. in agricultural and applied economics. "There's obviously a difference between considering the human dimension and managing for ecological purity."

Phaneuf is hoping to follow up his Lake Michigan work with a more sophisticated analysis that examines how anglers' values and preferences are changing over time. He will be adding data from Canada and the other Great Lakes.

"Looking back in time, there's variation in the number of trips people took, as well as the number of fish they caught," he said. "For instance, this means economic value was different when the salmon stock was higher than it is today." —ARC

WATER RESOURCES RESEARCH

Fen-tastic

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chemistry caused by well pumping or other environmental changes could have devastating effects on the fens.

The research team will gauge the health of the fens from three angles. They'll attach the spectrometer to a plane and conduct a series of low-altitude flyovers to capture high-pixel images that convey biochemical information about the plants in the fen. On the ground, they'll collect and data-sample leaves from the fen to compare the plant chemistry to the images they collect. They'll also use handheld spectrometers on the ground to offer a second, on-the-ground view of the fen's plant life.

Booth and the rest of the team will rely on the remote sensing lab of Phil Townsend, a UW-Madison professor of forest and wildlife ecology, to interpret the results. The tool they'll be using, purchased by the University of Wisconsin as part of its 2020 Research Project, can capture detailed images and chemical signatures beyond the near-infrared and visual spectrum, the traditional range plant ecologists have studied.

"We hypothesize that the fens will be low in nutrient concentrations like phosphorous and nitrogen," said Booth. "Our idea is that nutrient concentration changes can be sensed in the vegetation. We're using vegetation as an indicator to changes in the groundwater regime."

The research team conducted three flyovers this summer. The on-ground work also occurred throughout the summer. Booth is aware the biggest challenge will be successfully relating the high-resolution images the spectrometer collects to the plant chemistry information his team will gain in the lab.

"When we're done, we'll have a continuum of images from un-impacted to impacted," he said. "Hopefully we will see some striking contrasts that can then be used as a means of mapping a fen's status. That gives you the ability to go back and easily redo area surveys to check on the health of a certain fen." —ARC



A bluff assessment data generating experiment recorder, also known as a BADGER, ready for work. A BADGER can measure how fast a bluff is moving, soil humidity and temperature, and air humidity and temperature.

Lucas Zoet

SEA GRANT RESEARCH

Fishing for Landslides

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what will happen in the future with respect to erosion at the bottom of bluffs and how that can lead to bluff failures. The information will be useful for people who live in areas with bluff erosion. City planners and beach managers will also find the information useful in determining building locations and beach stability.

"We learned that bluffs fail in a couple of different ways that we didn't anticipate before," Zoet said. "This project also sets the ground for us to deploy BADGERS in other parts of the coast to learn how different types of geology and different types of bluffs might fail compared to what we've already observed in Racine County." —MEZ

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Aquatic Sciences Chronicle

a joint newsletter from UW Sea Grant and UW Water Resources



CALENDAR OF EVENTS

OCT. 17 – 19, 2017

Great Lakes Restoration Conference

Buffalo, N.Y.

healthylakes.org

OCT. 18 – 21, 2017

**North American Association
for Environmental Education**

San Juan, Puerto Rico

naaee.org

You Could Flood Capitol Hill

With Water Calls and Emails

If you are interested, you can contact your federal representative and senators to let them know how much you value water research, the education and extension of water research results and their support for these goals. This is the kind of work the University of Wisconsin Water Resources Institute and Sea Grant Institute make possible to the benefit of Wisconsin's quality of life, local economies and public health.

For the House of Representatives, search for your members of Congress and contact information here: house.gov/representatives/

For the Senate, search here: senate.gov/general/contact_information/senators_cfm.cfm

