ASC

AQUATIC SCIENCES CHRONICLE

2023 ISSUE 4

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Aquatic Sciences Chronicle

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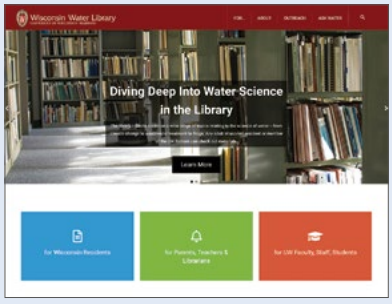
STAY CONNECTED

ON THE COVER: The road by Crystal Lake is dangerously close to being under water because of groundwater flooding. Some roads around the three nearby lakes have become submerged at times. Image by Wisconsin Sea Grant

Dunk yourself in resources while visiting the Wisconsin Water Library website

By ANNE MOSER



It's been said that a library can take you to worlds you could only otherwise imagine, introduce you to people you would otherwise never have the chance to meet, or spark a new interest or hone a skill.

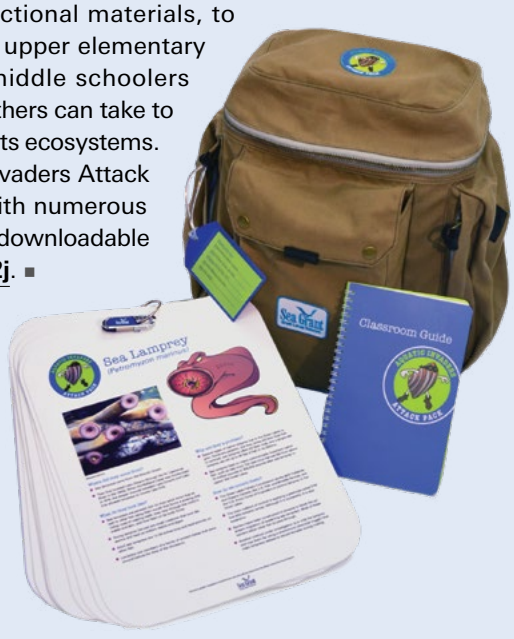
At the library supported by the Aquatic Sciences Center you can do all that, and more. From the Wisconsin Water Library's website (**waterlibrary.aqua.wisc.edu**), you can also pull off the virtual shelf more than 50 years' worth of groundwater research, sign up for a virtual book club on Indigenous children's literature and request delivery of a freeze-dried sea lamprey.

The library holds research summaries from the Water Resources Institute's funded projects. The reference material useful to other researchers is part of a collection that holds 30,000 volumes about water — surface, groundwater, lakes, streams, rivers, oceans, frozen and unfrozen. It was established in 1964 and is currently under the careful stewardship of Senior Special Librarian Anne Moser, who stresses that anyone in Wisconsin can borrow the resources in the library whether they are scientist, student, teacher, librarian or eager learner.

December's discussion featured the bilingual book, "Mnoomin maan'gowing / The Gift of Mnoomin," in which an Anishinaabe child explores the story of a mnoomin seed and the circle of life it sustains.

The overall collection includes volumes in the Maadagindan! Start Reading! offering (**go.wisc.edu/maadagindan**), which are the focus of an online book discussion and follow-up guide for anyone wanting to expand knowledge about or access to Ojibwe books for young readers. If you would like to join, please send an email to **akmoser@aqua.wisc.edu**.

The freeze-dried sea lamprey is part of a teaching tool about aquatic invasive species (AIS) in the Great Lakes region. This parasitic creature comes packaged along with acrylic blocks containing other nonnative species like rusty crayfish and zebra mussels, and instructional materials, to teach upper elementary and middle schoolers about AIS and actions they and others can take to prevent their spread, which disrupts ecosystems. That kit, known as the Aquatic Invaders Attack Pack, can be requested along with numerous other hands-on teaching kits and downloadable curriculum at **go.wisc.edu/s8ux2j**. ■



The Aquatic Invaders Attack Pack is filled with materials to help students and other groups learn about Great Lakes aquatic invasive species, the problems they cause and what can be done about them. Request a pack at **waterlibrary.aqua.wisc.edu/request-an-attack-pack**.

"Skill, tenacity, humility and compassion" Jim Hurley, director of the Aquatic Sciences Center, retires

By JENNA MERTZ | Images by WISCONSIN SEA GRANT

After 11 years as the director of the University of Wisconsin–Madison Aquatic Sciences Center, Jim Hurley retired in October.

Hurley oversaw both Wisconsin Sea Grant and the Water Resources Institute, two federal-state partnership programs that support research, education and outreach for the protection and sustainable use of Wisconsin's water resources. Under his leadership, both programs have addressed some of Wisconsin's most pressing water issues — PFAS in drinking water, rising levels of radium in groundwater, coastal erosion, flooding and so much more — and provided research opportunities for the next generation of water professionals.

Jon Pennock, director of the National Sea Grant College Program, said Hurley's leadership is one reason why Wisconsin Sea Grant is the well-respected program it is today.

His career and leadership philosophy reflects the importance of multidisciplinary research — and sharing that research outside the university with communities across the state.

"The Wisconsin Idea is not just a slogan, it's a way of life," said Hurley. "It defines our Sea Grant and Water Resources institutes' missions, and it's embraced by our researchers, outreach specialists and educators."

As director, Hurley also prioritized research experiences for undergraduates, launching what would eventually become the Freshwater@UW Summer Research Scholars Program, an initiative of which he is proud.

He served on the steering committee of the Freshwater Collaborative, a state-supported partnership between 13 Universities of Wisconsin schools that funds water education and research opportunities for students.

Marissa Jablonski, the executive director of the Freshwater Collaborative, said Hurley was a strong advocate who helped secure legislative funding for the program. Hurley, quite literally, always answered the call.

"Following in the footsteps of his predecessor, Anders Andren, Jim has led Wisconsin Sea Grant to preeminence in the Sea Grant network of 34 programs across all of our coastal and Great Lakes states, Puerto Rico and Guam. He has done so with a combination of skill, tenacity, humility and compassion that serves as an inspiration to all of us in Sea Grant who have worked with him," said Pennock.

Hurley meeting with summer research scholars at the UW–Madison Memorial Union Terrace.

Hurley, an expert on mercury in the Great Lakes, also served as a professor in the Department of Civil and Environmental Engineering at the University of Wisconsin–Madison. He's published over 100 research articles and worked on the U.S. Environmental Protection Agency advisory board that developed a risk assessment for mercury emissions.

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Sea Grant education on fishery expected to lead to $15 million in exports to Sweden

By MOIRA HARRINGTON

Swedish hospitality wouldn't be complete without a spread of crackers or bread and accompanying roe, the eggs from fish also known as caviar. Because of Sea Grant's role in facilitating the exchange of information, some of this roe will be coming from the Great Lakes.

A decision from the World Wildlife Fund-Sweden to rank Wisconsin commercial lake whitefish and cisco fisheries as "green, best choice" with regard to sustainability means the roe from these fish can grace Swedish tables as a tasty, salty treat of sikrom or löjrom without obstacles.

Prior to that release of that ranking for commercial fisheries in the Wisconsin and Michigan waters of lakes Superior and Michigan, the lake whitefish fishery – which yields sikrom – was in jeopardy. The cisco fishery of Lake Superior, which yields löjrom, was also in question. Great Lakes commercial fishers rely on the international sale of roe, a high-value product, to make ends meet.

Sharon Moen, Sea Grant's food-fish outreach coordinator, explained: "About two years ago, I was contacted by a fish processor/seafood importer/exporter operating in Door County. Because lake whitefish and cisco were rated red (unsustainable) by the World Wildlife Fund-Sweden, roe sales were plummeting as the products were being pulled from Swedish markets. The vigor with which red-rated products are leaving the Swedish marketplace has escalated each year since then. If the ratings didn't change this year, the Great Lakes roe industry would have been devastated."

Thanks to Moen's intervention, that rating changed from red to green early in the morning in September when new rankings were released. What led up to that change were Moen's presentations to the Swedish Seafood forum, production and distribution of fact sheets on the fishery, and lengthy facilitated conversations. She brought together Great Lakes fisheries managers, roe processors, the Monterey Bay Aquarium's Seafood Watch staff, World Wildlife Fund-EU, World Wildlife Fund-Sweden and Swedish seafood industry leaders.

There is another "green" to celebrate – green to the tune of $15 million annually. That's the estimate from domestic tribal and commercial fishers and processors about the worth of their anticipated roe export to Europe.

"Within minutes of my Sept. 28 joint presentation with Andy Edwards, treaty natural resources manager with the Red Cliff Band of Lake Superior Chippewa, the two largest retail chains in Sweden contacted an importer to place orders," said Moen.

One of those importers reached out to Moen and said, "It's thanks to your hard work and extraordinary presentation our deepest wishes came true!" said Tony Hartwig, CEO of Olle Hartwig Aktiebolag. "Now, we have busy days working out a market plan to promote roe again from Lake Superior, Wisconsin!"

Moen is pleased the ranking has been changed because she wholeheartedly stands by the science behind the management of the fishery and the professionalism of the commercial fishers. "From my perspective, the red rating reflected communication challenges, the complexity of Great Lakes fisheries management and the scarcity of money for a due-diligence assessment."

As Dan Grooms said, "Fishing the Apostle Islands for food had been an integral part of the Anishinaabe's way of life. Our fishers and our tribe depend on responsible fisheries management for sustainability for future generations." Grooms was formerly the business manager of Red Cliff Fish Co., owned by the Red Cliff Band of Lake Superior Chippewa. ■

Baileys Harbor Fish Co. staff processing roe (above) and bringing in the catch (left). Above photo by Sharon Moen, Wisconsin Sea Grant; left photo by Baileys Harbor Fish Co.

New grants will go toward meeting freshwater career needs

By MOIRA HARRINGTON

Earlier this year, Sea Grant learned it was the recipient of three grants that will bolster the future careers of those interested in fresh water.

The Freshwater@UW Summer Research Opportunities Program will continue matching water-related mentors from throughout the Universities of Wisconsin with undergraduates to guide them in an immersive research experience and acquaint them with the many graduate school opportunities in Wisconsin.

The program's second summer, in 2023, attracted 31 students from across the nation to work on university campuses at Eau Claire, Green Bay, La Crosse, Madison, Milwaukee, Oshkosh and Superior.

Sea Grant's Alison Mikulyuk coordinates the program which, she said, is growing freshwater research and the workforce through collaborative, cross-system programming that trains and will, ultimately, recruit, retain and diversify the next generation of water professionals.

"The program attracts talented students to the Badger State where they gain skills that are directly applicable to future work in Wisconsin," Mikulyuk said.

A second project, "Partnering to Boost Aquaculture Workforce Development in Wisconsin," is based on a 2020 Sea Grant needs assessment of Wisconsin's food-fish farmers that identified the need to bring young people into the industry.

Sea Grant staff Sharon Moen, food-fish outreach coordinator; Dong-Fang Deng, aquaculture specialist; and Emma Hauser, aquaculture specialist, will expand aquaculture training opportunities, linking commercial fish farms in the state to high schools, colleges and universities to foster farm experiences and skill-building workshops.

One such idea for that skill-building will be supporting high school teams to participate in an existing annual aquaculture competition. Students design and build a system to grow fish.

"We are looking forward to successfully inspiring young people to enter the aquaculture workforce. It can offer a good standard of living and a remarkable quality of life," Moen said.

The final project is co-led by Sea Grant's Emerging Contaminants Scientist Gavin Dehnert. He and co-investigator Tisha King-Heiden of the University of Wisconsin-La Crosse will oversee two undergraduates as they develop a new bioassay, which is a way to study the immune response of wild fish to toxic substances.

The grants are from the Freshwater Collaborative of Wisconsin, which is a partnership of Wisconsin's 13 public universities, connecting with industry partners, local communities, policymakers and advocacy groups. The collaborative's mission is to establish Wisconsin as a world leader in freshwater science, technology, entrepreneurship and economic growth. ■

continued from page 3

"Skill, tenacity, humility and compassion" Jim Hurley, director of the Aquatic Sciences Center, retires

"I could call him on less than a day's notice saying, 'There's an event tonight in Madison; I simply cannot be there. I wish I could, I'm double-booked, the legislators will be there — is there any way you can go?' And he would not even take a breath and say, 'I'll be there.'"

When it was easy to get bogged down in the details of funding and organizing multi-institution collaboration, Hurley always saw the big picture.

"He was the steering committee member who could easily zoom out in these really difficult conversations and say, let's keep a perspective on the UW system, Wisconsin Idea and let's see how we all fit together," said Jablonski.

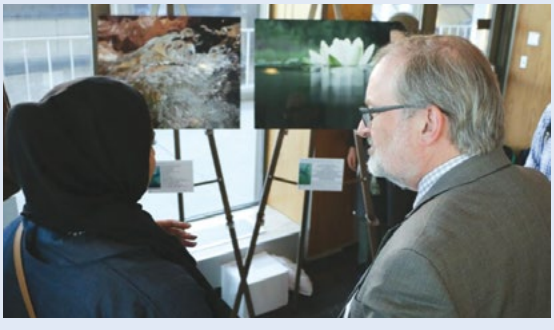
Pennock also lauded Hurley's ability to bring perspective to big, thorny problems.

"I have seen Jim lead his staff and rally the Sea Grant network during his time as president of the Sea Grant Association. Each time, people with sometimes different views and approaches ultimately followed his lead, supported his efforts and had his back because everyone knew that Jim understood the big picture and complex landscape of each issue and, as importantly, always had their backs," said Pennock.

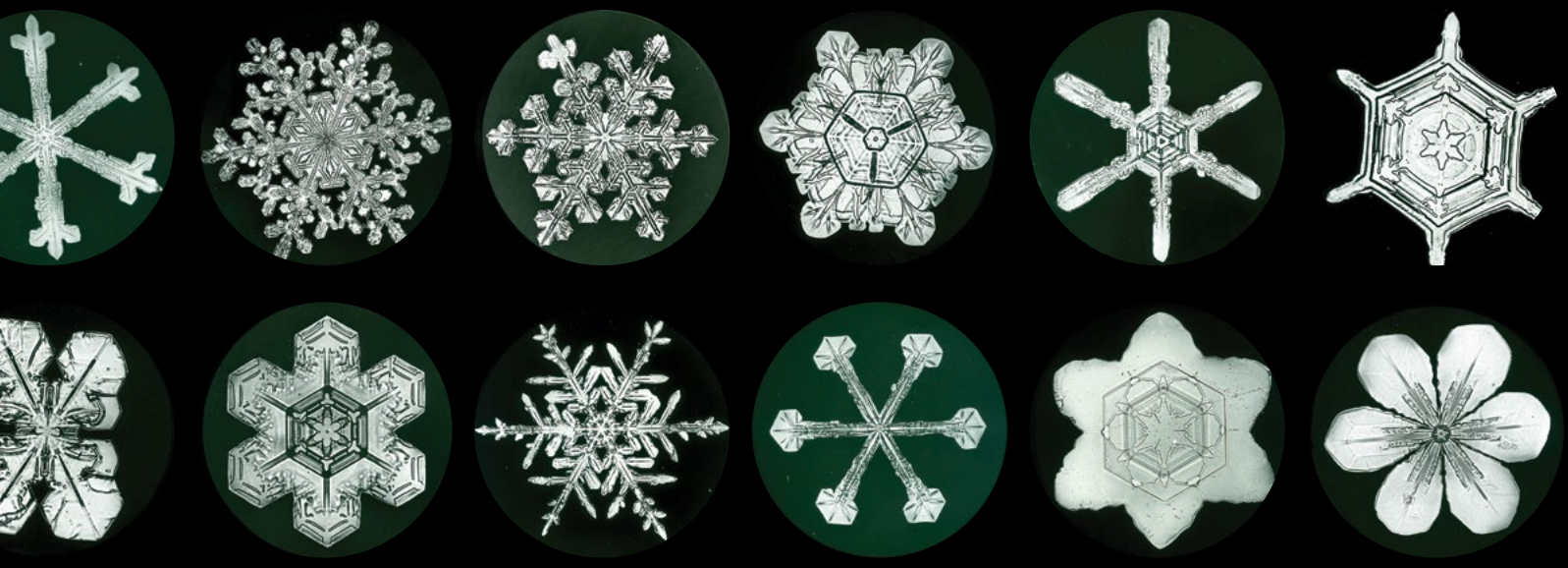
Hurley, of course, is quick to redirect the warmth of such high praise to his colleagues.

"Over the past few years, my respect for our ASC staff has continued to grow. They accepted the challenges posed by the pandemic and continued to provide excellent service to Wisconsin citizens. More importantly, they also responded to national social unrest by committing to enhancing diversity, inclusivity, environmental justice and access in all their programming," said Hurley.

"I'm proud, as an administrator, to have played a small part working alongside a group like that." ■



Hurley talks with a student photographer at an event showcasing the Under the Surface program.

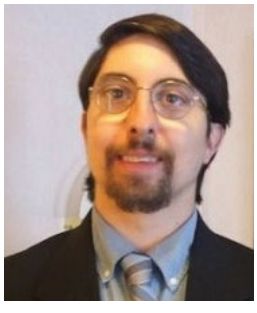


Snow crystal images from the Bentley Collection housed at UW–Madison's Space Science and Engineering Center.

HOPING FOR SNOW:

Wisconsin snow data project captures snowflake images and students' attention

By MARIE ZHUIKOV



Michael Notaro, director for the Nelson Institute Center for Climactic Research at UW–Madison

LISTEN TO THE STORY

Wisconsin Water News
Episode 53
Hoping for snow
go.wisc.edu/8zi4pj

We've all heard that no two snowflakes are alike. But few people know that most are similar enough to be classified.

Michael Notaro with the University of Wisconsin–Madison is teaching Wisconsin schoolchildren the similarities in snowflakes not only to share the wonder of nature and information about the Great Lakes climate but also to expand an international environmental database.

The database is called GLOBE, which stands for Global Learning and Observations to Benefit the Environment. This environmental education youth citizen science program began in 1995 and is run by NASA (National Aeronautics and Space Administration). It is sponsored by the National Oceanic and Atmospheric Administration (NOAA), the National Science Foundation and the U.S. Department of State. According to Notaro, more than 40,000 schools in 127 countries participate by inputting data such as temperature, wind speed, soil moisture and bird migration from their communities into the online GLOBE database.

Notaro, director for the Nelson Institute Center for Climatic Research, said his Sea Grant-funded Snow-GLOBE Youth Citizen Science Collaborative project helps address a lack of climate science education in the classroom.

"There's very little time allocated toward the topics of weather and climate, particularly climate change," he said. "Also, a lot of educators have expressed discomfort in terms of their training and teaching related to climate. So, I'm trying to provide the tools for the teachers, the training for the teachers, and also the opportunities for the students to learn how to become citizen scientists – that they themselves, even as a young person, can support some of the missions of NASA, NOAA and other agencies."

He's currently working with eight schools and three environmental centers across Wisconsin in Beloit, Racine and Door County, Wisconsin. The children measure snow depth, snowfall amounts and their liquid equivalents. This data has a home in GLOBE already. What doesn't have a home is snowflake classification. Notaro would like to change that.

The children take photos of snowflakes with their cellphones and a special lens, which Notaro provides. "They start with a wooden board with black velvet. The flake falls on it. Then you use a clip-on macro lens to take a photo and a high-precision ruler to estimate the crystal's diameter. I also provided information like images from the Bentley Library," Notaro said.

The Bentley Collection (**go.wisc.edu/64e79c**) is housed at UW–Madison's Space Science and Engineering Center. It contains photomicrographs

(photos taken through a microscope) by Wilson Bentley, a homeschooled Vermont farm boy who developed a passion for studying water in all its forms. Snowflakes were his specialty, and he sold collections to universities across the United States, including UW–Madison.

Based on the shape of the crystal, students can classify what type of snowflake it is. Some of the options include columns, hexagons, two branches, four branches and the typical holiday-card version with six branches.

Notaro said the photography activity is a hit. "Kids are interested in their cellphones, as we know. Kids are interested in photography. This connects those interests to science."

Such data will help track what's going on with snow in Wisconsin. Notaro's goal is to expand the project to more middle schools, high schools and environmental centers in Wisconsin and across the Great Lakes.

"Ideally, I hope to find a school where there are three or more teachers interested in participating," he said. "That helps with the longevity of their involvement. And then I usually set up a professional development workshop near them. I'll order GLOBE equipment, so I supply all the equipment that they need. Then I provide training and calibration instructions and work with the school."

Interested educators can contact Michael Notaro at **mnotaro@wisc.edu**.

"This upcoming winter we'll be able to get some data collected. The goal is building up the schools and the resources toward data collection. I hate to say it, but hopefully, it snows a lot," Notaro said. ■

Darien Becker, environmental educator with Welty Environmental Center (right), instructs two interns from Beloit Memorial High School on how to identify snowflakes using the Snow-GLOBE protocol. Image by Aaron Wilson, Welty Environmental Center

WISCONSIN WATER LIBRARY

Snow Season

The days are short, the nights are long and the weather is cold. There is no better time to cozy up with a good book about snow. For kids of all ages.

Best in Snow by April Pulley Sayre. New York: Beach Lane Books, 2016.

A Big Bed for Little Snow by Grace Lin. New York: Little, Brown and Co., 2019.

First Snow by Po-mi Pak. San Francisco: Chronicle Books, 2016.

Into the Snow by Yuki Kaneki. New York: Enchanted Lion Books, 2016.

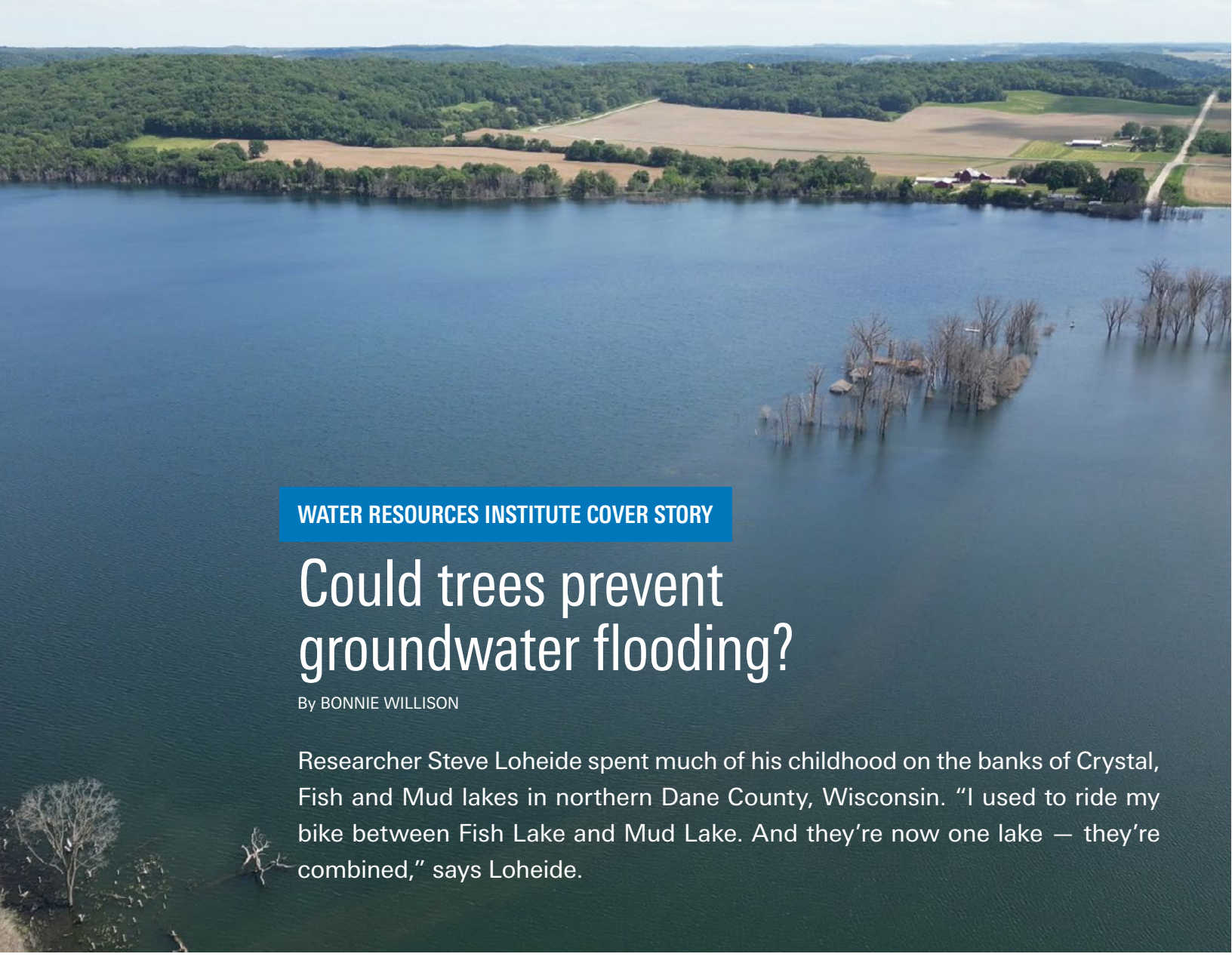
Onigamiising: Seasons of an Ojibwe Year by Linda LeGarde. Minneapolis: University of Minnesota Press, 2017.

Winter Bees & Other Poems of the Cold by Joyce Sidman. Boston: Houghton Mifflin Harcourt, 2014.

Snow for Everyone! By Antonie Schneider. New York: North South Books Inc., 2019.

Snowy Race by April Jones Prince. New York: Holiday House, 2019.

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



WATER RESOURCES INSTITUTE COVER STORY

Could trees prevent groundwater flooding?

By BONNIE WILLISON

Researcher Steve Loheide spent much of his childhood on the banks of Crystal, Fish and Mud lakes in northern Dane County, Wisconsin. “I used to ride my bike between Fish Lake and Mud Lake. And they’re now one lake — they’re combined,” says Loheide.

Steve Loheide, professor of ecohydrology at the University of Wisconsin–Madison's Department of Civil and Environmental Engineering. Image by Sarah Stathas

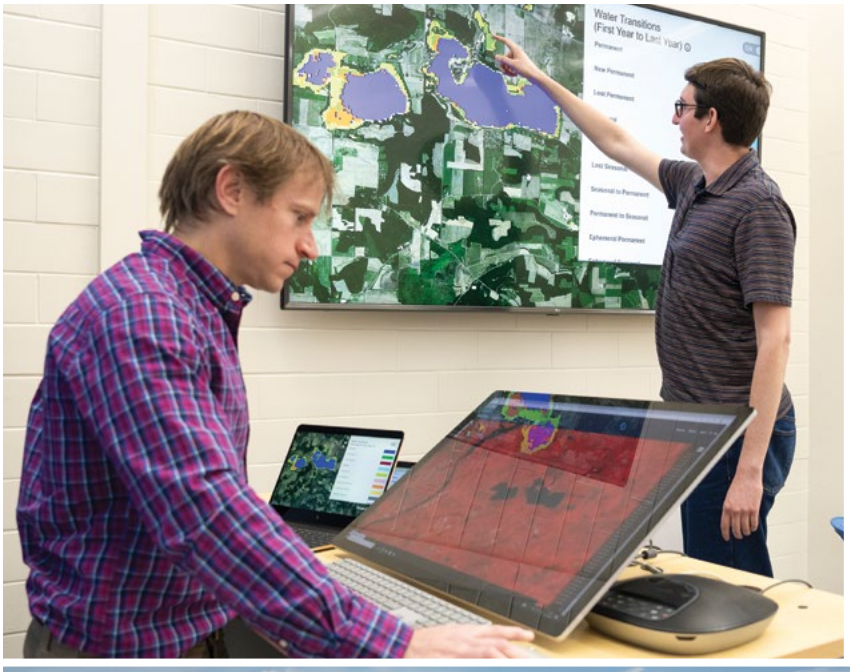
Water levels in Crystal, Fish and Mud lakes have fluctuated drastically for at least a century. In his office, Loheide keeps a copy of a 1914 newspaper clipping titled “Crystal Lake, dried up, again filling with water.” According to the article, Crystal Lake dried up in the early 1900s and farmers started growing crops on the former lake bottom. But by 1914, water was starting to return.

Today, the lake is overflowing its banks, causing destruction of homes, businesses and cropland. During Loheide’s lifetime, he has witnessed a 17-foot increase in the water level in Fish Lake. This experience inspired Loheide, now an ecohydrology professor at UW–Madison’s Department of Civil and Environmental Engineering, to embark on a research project to understand why groundwater flooding is plaguing these lakes and what we can do about it.

“Groundwater flooding is perhaps a little bit more insidious” than surface water flooding, Loheide said. The groundwater flooding at these internally drained basin lakes is caused by a slowly rising water table. What is causing the water table to rise? Loheide and his collaborators professor emeritus Ken Potter and Ph.D. student Eric Kastelic ask that question in their project "Biomanipulation of Groundwater Flooding," funded by the Wisconsin Water Resources Institute.

According to Kastelic, groundwater flooding in the area is likely due to multiple factors, like changes in both precipitation and land use over the last 100 years. “This part of Wisconsin used to predominately be tallgrass prairie and oak savanna,” said Kastelic. A century ago, settlers transitioned the landscape to shallow-rooted row crop agriculture.

Right: The shallow roots of a corn plant. Image by Wisconsin Sea Grant



Top left: Steve Loheide works with Ph.D. student Eric Kastelic in the lab. Image by Sarah Stathas

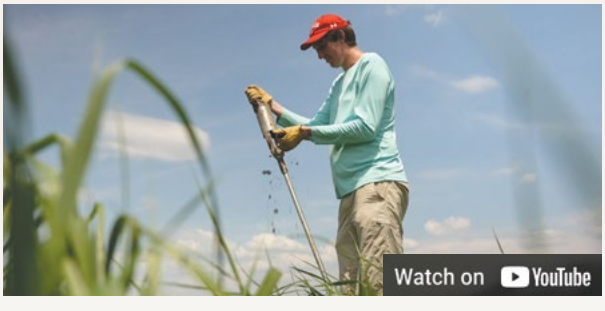
Top right: Kastelic installs groundwater monitoring wells and soil moisture arrays at 3 different sites — one forested, one crop and one restored prairie — to understand how system dynamics are changing based on vegetation type. Image by Wisconsin Sea Grant

Left: Mud Lake and Fish Lake are now combined. Image by Wisconsin Sea Grant

Loheide and Kastelic hypothesize that this transition from deep-rooted to shallow-rooted plants, paired with climate change, has affected the water table. As part of the project, the team will be documenting the changing water table and creating a model to study the feedbacks between land use change and climate change in hydrologic systems. "We want to model this system and determine if we had more trees on the landscape, would we see less groundwater flooding?" says Loheide.

The research team hopes the data can help communities, like those surrounding Crystal, Fish and Mud lakes, build resilient landscapes. If the research shows that large-scale tree plantings could be a viable solution to groundwater flooding in internally drained basins, Loheide could see this being explored as a strategy to help vulnerable communities. ■

WATCH THE VIDEO



Could trees prevent groundwater flooding?

For more information about this project, watch the short video. **go.wisc.edu/s694uk**

Summer outreach scholars dip toes into water-related careers

By JENNA MERTZ

Twelve undergraduate students from across the country spent a jam-packed 10 weeks over the summer collaborating with outreach specialists on coastal and water resources projects across Wisconsin. Scholars conducted research, engaged kids and adults, and shared the stories of Great Lakes science, all while working alongside mentors to explore careers and graduate education in the aquatic sciences.

For complete descriptions of the projects, see **go.wisc.edu/m6317b**.

Beach Ambassador Program for Great Lakes Water Safety

Alan Liang, UW–Madison

Alan Liang and other ambassadors spent their time sharing water safety information with the public, including how to wear a life vest, escape a rip current, recognize water quality conditions and determine whether it's safe to swim. The program began in 2021 in response to an increased number of drownings at Milwaukee beaches.

Harvesting Manoomin as a Climate Adaptation and Resilience Strategy

Elliot Benjamin, Marquette University
Lucia Richardson, Northland College

Elliot Benjamin and Lucia Richardson researched how manoomin (wild rice) is connected to human, plant and animal communities and how those connections can help the plant thrive — despite the changes in climate, water quality, land use and hydrology that threaten its existence.

Climate Change and Green Infrastructure

Alexander Wuethrich, Northland College

Alexander Wuethrich studied the ways the city of Ashland can use green infrastructure to absorb and slow the flow of stormwater into Lake Superior.

Restoration and Monitoring of Coastal Habitats

Isabelle Haverkampf, Northland College
Gweni Malokofsky, UW-Green Bay

Isabelle Haverkampf and Gweni Malokofsky spent their summers working on multiple projects in the Lake Michigan watershed, including surveying fish and manoomin (wild rice) in Green Bay and collecting water quality and site assessment data at Forget-Me-Not Creek between Two Rivers and Manitowoc, Wisconsin.

Expanding Voices Heard in the Wisconsin Water Library

India-Bleu Niehoff, UW–Madison

India-Bleu Niehoff worked with Senior Special Librarian and Education Coordinator Anne Moser on a wide variety of education and library projects, including leading lessons on shipwrecks and sturgeon and coaching kids on how to use remotely operated vehicles (ROVs) constructed from clothes hangers – plus writing blog posts, leading book clubs and more.

PFAS Bioaccumulation in Plants and Animals Associated with Aquatic Ecosystems

Assessing Aquatic Plant Management Tools for Invasive, Native and Nontarget Organisms in Lake Ecosystems

Britta McKinnon, UW-Milwaukee
Heidi Wegehaupt, UW–Madison

Britta McKinnon and Heidi Wegehaupt spent their summers in lakes and labs working to paint a more complete picture of how contaminants enter and affect aquatic ecosystems. The scholars participated in two research projects: one focused on poly- and perfluoroalkyl substances (PFAS) and the other on herbicides.

Summer scholars Isabelle Haverkampf and Gweni Malokofsky surveying wild rice in Green Bay with University of Wisconsin-Green Bay Assistant Researcher Amy Carrozzino-Lyon and Sea Grant Fisheries Outreach Specialist Titus Seilheimer. Image by Wisconsin Sea Grant

Eat Wisconsin Fish

Jojo Hunt, University of Denver
Crow Idnani, Cornell University

Jojo Hunt updated the fish finder map on the Eat Wisconsin Fish website (**eatwisconsinfish.org**), which helps consumers find local businesses that raise or sell Wisconsin fish. Crow Idnani suggested updates to "A Consumer's Guide for Wisconsin Farm-Raised Fish," a publication of the UW–Stevens Point Northern Aquaculture Demonstration Facility (NADF) and the Wisconsin Department of Agriculture, Trade and Consumer Protection.

Environmental Video Production

Jeremy Van Mill, Madison College

Jeremy Van Mill worked alongside video producer Bonnie Willison, filming and photographing Sea Grant-funded researchers, outreach specialists and fellow summer scholars in the field. ■

What does housing have to do with green infrastructure?

By MARIE ZHUIKOV

When Linda Reid, owner and principal consultant with Water 365 LLC, interviewed people in the northern tier of Wisconsin about barriers to green infrastructure, she was surprised by the results.

"Housing supply, housing availability, housing quality and housing costs all rose to the top as key issues for nature-based solutions and green infrastructure implementation challenges," she said. "That wasn't something that was planned."

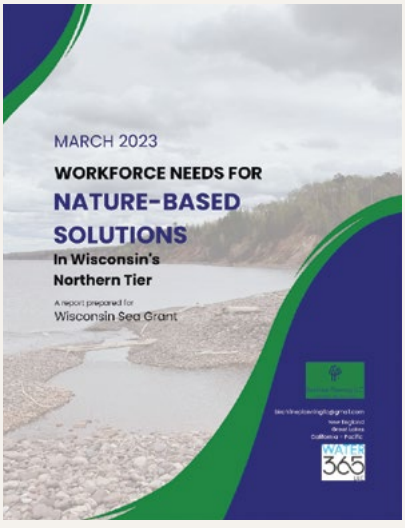
Her report, titled "Workforce Needs for Nature-Based Solutions in Wisconsin's Northern Tier," was prepared along with Birchline Planning LLC. The report's findings were discussed last summer during a webinar (**go.wisc.edu/3iqtic**).

Juli Beth Hinds, another report author and principal at Birchline Planning, added, "It's not economical to renovate properties that are in pretty poor condition because the market for resale just isn't high enough yet. In other words, one of the flipping shows from HGTV is not coming soon to Washburn or Ashland. Those economics aren't working and they're working against the region."

Hinds also said short-term summer rentals take many homes off the market due to the area's tourism economy.

Yet the report also found strong capacity, interest and strengths in the region that support the use of nature-based solutions.

"Overall, the region's public, private, educational and nonprofit leaders have an exceptional understanding of nature-based solutions and green infrastructure practices," said Natalie Chin, Wisconsin Sea Grant's climate and tourism outreach specialist who commissioned the report. "However, the region is held back by the sheer lack of people available to carry out this work.



AVAILABLE FOR FREE DOWNLOAD

"Workforce Needs for Nature-Based Solutions in Wisconsin's Northern Tier"

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Also, communities need more capacity when it comes to project management. Writing grants and executing them is a full-time job just by itself for these types of projects."

Providing employment programs for people emerging from incarceration and addiction was cited as one possible solution to green infrastructure project employment needs during the webinar.

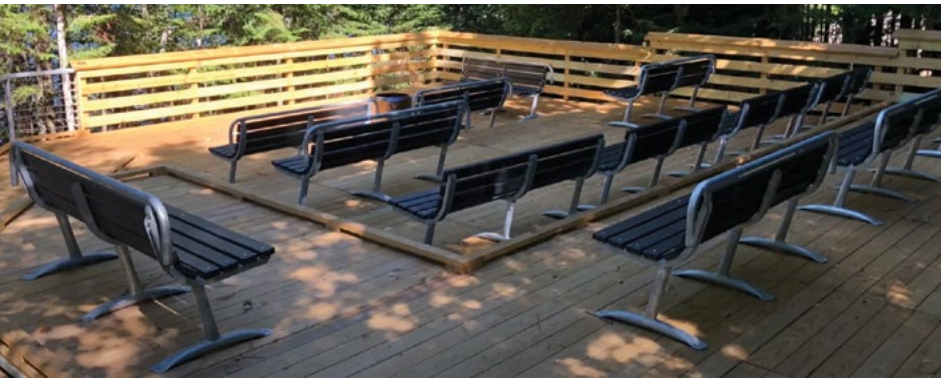
Hinds said, "We need the environmental community's voice in the dialogue around housing supply, around the problems of Wisconsin municipal levy limits, around addiction and incarceration and around community vitality. Often, these aren't seen as environmental resilience issues, but they absolutely are."

As next steps, this report recommends that Wisconsin Sea Grant and its regional partners consider options to build grant and project management capacity, address the regional housing shortage, work toward legislative reform and facilitate training that will support specific needs in the northern tier around nature-based solutions. Case studies of efforts in other rural regions are provided to illustrate successful strategies from other areas. ■

For the summer 2024 opportunities for students, see **go.wisc.edu/xs02lk**.

Providing access for all to a national lakeshore

By MARIE ZHUIKOV



Above: The newly accessible park amphitheater replaces a muddy, sloped site impassable for a wheelchair user. Image by Friends of the Apostle Islands National Lakeshore

Right: Tommy Richardson discusses construction of the amphitheater. Image by Marie Zhuikov, Wisconsin Sea Grant

Bottom right: The fire pit on the accessible amphitheater boardwalk. Image by Marie Zhuikov, Wisconsin Sea Grant

> "National parks do really belong to all of us. That has to include the one in five Americans who face mobility challenges every day. That's 61 million people. And if you add to that the millions more who experience vision or hearing or even cognitive challenges, it quickly becomes clear that for many people, obstacles in national parks can be the difference between the trip of a lifetime and being left behind."
>
> *Jeff Rennicke, executive director of the Friends of the Apostle Islands, from a Wisconsin Public Radio interview*

When Natalie Chin, Wisconsin Sea Grant's climate and tourism outreach specialist in Superior, Wisconsin, first heard about the Access for All campaign by the Friends of the Apostle Islands (Friends) last year, she was immediately interested.

The campaign seeks funding for projects to make the Apostle Islands National Lakeshore in Lake Superior more accessible, and Chin was able to use Sea Grant funds to support a series of four trips that the Friends organized to allow people to see the accessibility progress the National Park Service has made so far.

Chin attended an Access for All tour last summer. Before boarding the park service boat that would take tour-goers to Stockton Island, Lynne Dominy, park superintendent, and Jeff Rennicke, executive director of the Friends, provided a short orientation.

"This park has been here for over 50 years," Dominy said. "It has a lot of outdated infrastructure as do many of the national parks across the whole nation, and we're working on them one step at a time."

Accessible outdoor privies are among the projects recently completed in the park. Others in the works include a boardwalk to the lighthouse on Sand Island and a ramp to replace 45 steep stairs that lead down to Meyers Beach, a busy entry point for kayakers who want to visit the park's mainland sea caves.

Tommy Richardson, marine and grounds supervisor and accessibility coordinator for the Apostle Islands National Lakeshore, and his eight-man crew ferried supplies for the amphitheater via three or four boat trips and hand carried them to the site on the hillside during renovation. After three weeks of work they had a new structure that featured a ramp and a tiered deck with benches. A round metal firepit sits on a metal grate on the boardwalk at the front of the amphitheater.

The fire pit was Richardson's brainchild. He said designing one that could be used safely on a boardwalk was challenging. "If you Google it, not a lot comes up."

He gained ideas from consulting with other accessibility coordinators and visiting other accessible outdoors sites in the area. His same firepit design is now used at the three accessible campsites on the island.

Dominy explained that the park's accessibility efforts are spreading to the rest of the community and within the park service. "This is how you create change – to show people that it's possible. Then everybody wants to be a part of it because people want Bayfield to be accessible... We set a really high bar and we expect everyone to come on board with us."

To learn more about the Access for All campaign, visit their website.
friendsoftheapostleislands.org/access-for-all/ ■

LISTEN TO THE STORY

WISCONSIN WATER NEWS

Wisconsin Water News
Episode 52
Providing Access for All to a National Lakeshore
go.wisc.edu/d52285

Sea Grant-hosted water quality panel discussed solutions on phosphorus use

By MOIRA HARRINGTON | Images by WISCONSIN SEA GRANT

Last summer, Wisconsin Sea Grant sponsored a panel about the effect of phosphorus flowing off surrounding land and into waterways. An excess of the nutrient can lead to the growth of a bacteria known as cyanobacteria, also called blue-green algae.

Blue-green algae blooms are potentially fatal to pets, fish and other wildlife. They can consume all the oxygen in a waterbody, destroying the biodiversity of an ecosystem that may have formerly teemed with plants, fish, frogs and mussels.

For people, there is some concern that just being near affected water could cause neurological conditions, such as ALS, said one of the panelists, Dan Egan. "You don't want toxic blue-green algae in your life, in your neighborhood. You don't want it anywhere."

More than 1,500 people attended the event held at the University of Wisconsin–Madison Memorial Union Terrace on the shore of Lake Mendota, which Egan has called "ground zero" due to frequent and toxic blue-green algal blooms and its status as what's been termed the most studied lake in the world because the Center for Limnology is located along its shores. UW–Madison is where the field of American limnology began in the 1800s.

Last spring, Egan published "The Devil's Element: Phosphorus and a World Out of Balance," which outlines the world's mining, processing and use of phosphorus. It also explains the element's paradox — phosphorus brings agricultural plenty but can lead to devastation in waterways.

Jake Vander Zanden, an expert on freshwater lakes and director of the Center for Limnology, and Randy Jackson, a professor from the university's Department of Agronomy who spoke about agriculture's role in nutrient loading, rounded out the panel.

The conversation among the trio was moderated by popular entertainer Charlie Berens, known for his humorous takes on Wisconsin norms, speech and food choices as host of the Manitowoc Minute newscast and through his bestselling book, "The Midwest Survival Guide."

For this event, though, Berens used his notoriety and established platform — his Cripescast podcast, which explores Midwestern themes and people — to call attention to this important environmental topic.

Egan noted that phosphorus is in every single cell on Earth. It doesn't go away and since time immemorial has been part of a cycle that allowed a trickle of phosphorus into the world. However, he noted, "We've turned that cycle into a straight line and that line runs into the water" when phosphorus in the form of fertilizer is applied to farm fields, golf courses and lawns.

"Phosphorus puts food on our table. It's existed forever, but in the last 120 years we've figured out how to turn a slow trickle of this essential nutrient into a gusher." Egan continued, "We are also burning through it at such a pace that it's getting into the water, and when it gets into the water, it's not gonna grow a kernel of corn or a soybean, it's gonna grow algae. And too often it's toxic algae."

Vander Zanden highlighted other contributors, such as urban runoff. He used the Madison, Wisconsin, location as his demonstration case: Lake Mendota receives all the stormwater runoff from streets. "It's important for you all to know that that water that runs off is not treated. It goes directly to the lake. It's phosphorus that comes off, also oils and metals and all sorts of other pollutants.

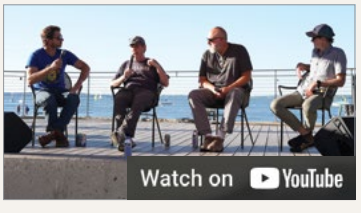
"Another is sewage treatment effluents. That's not a huge source in the grand scheme of things. And then there are other sources as well, industrial sources, factories and so on; those are actually minor."

continued on page 15

Above: (L to R) Dan Egan, Charlie Berens, Randy Jackson and Jake Vander Zanden.

Bottom left: More than 1,500 people attended the event held at the University of Wisconsin–Madison Memorial Union Terrace on the shore of Lake Mendota.

WATCH THE VIDEO



Event Recording

Charlie Berens and author Dan Egan: Phosphorus in Our Waterways Panel

go.wisc.edu/sn8b6t

Left: Congresswoman Gwen Moore with former Sea Grant Director Jim Hurley.

Top center: Julie Kinzelman.

Bottom center: Alison Mikulyuk with summer research scholars Ryan Waln, Samantha Krueger and Chloe Mellgren.

Top right: J. Val Klump.

Middle right: Larry MacDonald.

Bottom right: Melissa Scanlan, Director of the Center for Water Policy at the UW-Milwaukee School of Freshwater Sciences.

Event celebrated Great Lakes friends, champions, researchers and students

By MOIRA HARRINGTON | Images by ERON LABER

The recent 2023 Sea Grant and University of Wisconsin Water Resources Institute (WRI) Fellows Convocation and Awards Event brought together people ranging from undergraduate students to lifelong professionals who have spent their time engaging in water science and sharing that science through policymaking, communication, education and extension.

Congresswoman Gwen Moore received a 2023 Friend of Sea Grant Award. Moore has served the 4th District of Wisconsin for 19 years in the U.S. Congress, and prior to that she was a member of the Wisconsin Legislature.

Another influential woman, Julie Kinzelman, was named Wisconsin Sea Grant Great Lakes Champion for 2023. This former public health official from Racine stood out to judges because of her sustained and far-reaching efforts to ensure access for everyone to coastal spaces.

The 2023 Wisconsin Sea Grant Actionable Science Award went to J. Val Klump, and Larry MacDonald took home the 2023 Wisconsin Sea Grant Distinguished Service Award.

The many post-graduate and undergraduate students represent a bright future for water science in labs, the field, halls of policymaking and private industry. The group includes:

- Five Dean John A. Knauss Fellows.
- Twenty-one post-graduate fellows.
- Three winners of the Carl J. Weston Scholarship.
- Ten undergraduates in 2022 and 11 in 2023.
- Nine undergraduates in 2022 and 31 in 2023.

At the conclusion of the event, former Sea Grant and Water Resources Institute Director Jim Hurley reflected on the dedicated and talented honorees: "Thank you for attending. Thank you for recognizing all of these people. Based on their work and commitment, we are all going to be OK."

It's likely that the Great Lakes will be as well. ■

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Sea Grant-hosted water quality panel discussed solutions on phosphorus use

"So, the Clean Water Act from 1972 addressed these sources quite nicely. The amount of phosphorus coming from those types has gone down a lot, and now what we are left with is agricultural and urban runoff from the landscape," he said.

Agriculturally targeted solutions discussed included:

- Subsidizing not cropland but grassland that holds on to phosphorus and carbon and promotes biodiversity. This involves planting cover crops such as switchgrass and following no-till practices.
- Adopting agricultural practices such as avoiding manure spreading if the ground is frozen or if rain is predicted.
- Using alum treatments. Alum is a chemical that binds phosphorus. There are examples from around the world where alum was added to polluted waters. Vander Zanden said, "It sort of sucks up the phosphorus and sort of holds it. That's a technical solution that may or may not be financially viable here."

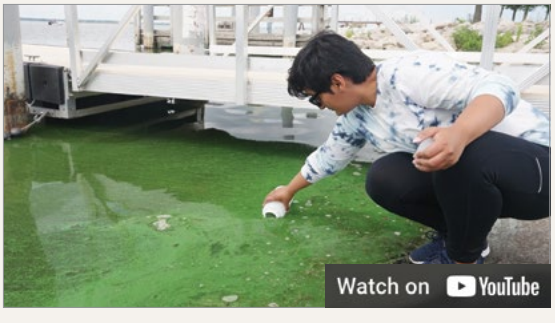
The speakers also said the collective use of these solutions, holistically, could be a good approach to make progress.

Keying off that holistic approach, Jackson stressed the actors in the phosphorus-use cycle are "not nefarious. They are just reacting to the system we have set up."

He offered a rallying cry, "The system only changes when we come together as a community and embrace the idea of collective action. This is how a lot of big things have happened in the world. Civil rights is an example of this. People come together in communities and engage in collective action so that the powers actually have to listen."

Egan put a Badger State spin on it, "We have a license plate that shows a barn and water. Both are things that define this great state and should not be working at cross purposes. Often, they are. I think everybody values what's on the right side, the barn. Everybody eats…but everybody also needs water, and you know, there's no reason why we can't have both." ■

WATCH THE VIDEO



What accelerates harmful algal blooms in the Great Lakes?

Algal blooms due to cyanobacteria have been increasing in the Great Lakes over the past few decades. Associate Professor Todd Miller and Ph.D. student Anjana Adhikari at the UW-Milwaukee are researching the causes of cyanobacterial harmful algal blooms in Green Bay (Lake Michigan), Lake Erie and Lake Superior. **go.wisc.edu/2y4qiu**

Moen wins national communications award

By MOIRA HARRINGTON

Sea Grant's Sharon Moen won the 2023 Communications Service Award from the National Sea Grant Communicators Network in a virtual ceremony during the summer.

Moen has been a part of the Sea Grant community for 24 years, beginning as an editor for Minnesota Sea Grant and now serving as the food-fish outreach coordinator for Wisconsin Sea Grant. Throughout the years, her skills at conveying messages about the study, conservation and economic importance of the Great Lakes have been front and center.

"Science communications work can be terrifying, funny, riveting and maddening, but it is certainly important," Sharon Moen said. "I'm honored my colleagues recognized my terror and joy with this award. I continue to be inspired by the Sea Grant Network and the innovative ways its communicators are extending information to enhance the use and conservation of coastal, marine and Great Lakes resources."

This award is presented every two years to an individual from one of Sea Grant's 34 programs, recognizing creativity, vision and a commitment to the Sea Grant mission. Moen's accomplishments include:

- Publishing a book in 2015 that detailed the founding of the national Sea Grant program by Athelstan Spilhaus.
- Taking on national leadership roles that improved the effectiveness of the overall program.
- Leading a communication planning effort for an aquatic invasive species prevention campaign.
- Preparing a Great Lakes research symposium report, and another about ballast water, coordinating work between U.S. and Canadian scientists and other international professionals.
- Creating an award-winning podcast series focused on Lake Superior.

In selecting her for the award, one judge said, "Sharon has had a remarkable impact on state, regional and Sea Grant network communications throughout her career. Her ability to relay scientific information in a creative and engaging way has set a standard for science communication." ■

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