

# ASC

AQUATIC SCIENCES CHRONICLE

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## FEATURED PODCAST



# Introduced Returns

## New Stories From Wisconsin's Changing Waters

[seagrant.wisc.edu/audio/introduced](http://seagrant.wisc.edu/audio/introduced)

On a cold November morning, Bonnie Willison, equipped with an umbrella and a microphone, was waiting on the shores of Lake Michigan. She'd made this trip to see the salmon migrate back to their spawning grounds.

Salmon are not native to Lake Michigan, yet fisheries managers stock millions in the lake every year. Bonnie wanted to know what makes salmon different from the other introduced fish species in Lake Michigan — fish we generally think of as invasive. She found the answer has a lot to do with how highly salmon are valued by the people who fish for them.

Willison and her co-host Sydney Widell are the creators of Wisconsin Sea Grant's "Introduced" podcast, which explores captivating stories around the cultural, political and economic fringes of invasive species science. The trip to Lake Michigan is one of the stories listeners will hear on Introduced's second season.

As they've learned more about introduced species, Willison and Widell have gone on field trips, tangents and accidentally bought prohibited plants online. Along the way, they've also examined the norms around "belonging" and "native-ness" that travel with introduced species, and the assumptions about the past and future tied up in invasive species science.

In its second season, their podcast features guests from state and tribal agencies, fishing guides, community leaders, familiar Sea Grant specialists and many others.

Authors of the Tribal Climate Adaptation Menu share their understandings of *bakaan ingogi ga-ondaadag* (non-local beings), and a state of Wisconsin committee decides if feral hogs and red-eared sliders — a turtle — should be classified as invasive under law in the season's first episode, "Becoming 'Invasive.'"

Other highlights include the Midwest Conservation Dogs and their handlers, who use canine scent detection for invasive species efforts. Widell heads to Illinois to go bow fishing for invasive carp with Peoria Carp Hunters.

Season two listeners will also hear stories about smelt, snails, wild rice, spiny water fleas and climate change.

All seasons of Introduced are available to stream and download on Spotify, Apple Podcasts and Google Play, and at the web address noted under the headline above. —SW and BW

# Plastic-Free Program Targets Milwaukee

The statistics are daunting: 93% of water bottled in the Great Lakes region contains microplastics, 85% of trash found on Great Lakes beaches is plastic and 21.8 million pounds of plastics enter the Great Lakes each year.

Strolling through her Milwaukee community, Wisconsin Sea Grant's Social Science Outreach Specialist Deidre Peroff said the plastic problem is obvious. "I live a five-minute walk from Lake Michigan. I've seen a lot of plastic trash out there and participated in some of the cleanups in the past or even on my own — just walking along, bringing a bag to put trash in."

She worked with Leah Holloway from Milwaukee Riverkeeper, a science-based advocacy nonprofit, to develop a plastic project proposal because Peroff was aware of Riverkeeper's involvement in a Milwaukee initiative to reduce plastics, called [Plastic-Free MKE](#). The goal of the proposal is to reduce the amount of plastics that enter Lake Michigan. In 2020, the team was awarded two years of funding through the National Sea Grant-Marine Debris Special Projects Competition for "Plastic-Free MKE: Assessment and Education to Support Lake-Friendly Schools."

Peroff described the project. "We came up with the idea to do education, focusing on a student-led, civic action project where students would do an audit of their schools or their classrooms and figure out how much plastic they are using, and then assess the inventory and figure out if it's a problem or whether they are using more than they thought — and then come up with an action plan of how they could mitigate their impact on marine debris pollution."

The COVID-19 pandemic and distance learning for schoolchildren necessitated project modifications, turning the focus from the children's classrooms to their own homes. To help, the team hired Belle Pappalardo, a professional master's degree student at the University of Wisconsin-Milwaukee's School of Freshwater Sciences. She worked with a fifth-grade class at the Clement J. Zablocki Community School in Milwaukee and their teacher, Diallo Tyler. Pappalardo researched existing marine debris toolkits, education programs and curricula. Then she developed her own curriculum about the importance of fresh water and the issue of microplastics for the class, meeting with them every other Friday in a virtual session.

Pappalardo graduated this May and hopes to find an outreach job where she can work with students and provide scientific information to the public.

Next year, Peroff hopes to hire another intern who will broaden the project's scale and, COVID-willing, be able to work with the students for a longer time and in person.

"We've needed to be flexible and patient to get this project going because of many pandemic-related challenges, but we were happy to be working with students, even virtually. Because plastic is such a huge contributor to pollution in Wisconsin's lakes and rivers, we figured anything we can do now to get children thinking about this issue will be a step in the right direction. The students seemed to enjoy learning about their watershed and how they can impact water quality," Peroff said. —MEZ







# Hot Spots and Not Spots

## Research Reveals Unpredictable Pattern of VHSV Infections

**W**isconsin Sea Grant-funded research is revealing a more detailed picture of the range of [viral hemorrhagic septicemia virus \(VHSV\)](#) in Wisconsin waters. This invasive pathogen can cause affected fish to die. Since the early 2000s, it has caused deaths in more than 30 fish species in the Great Lakes region.

The researchers' findings have been published in the *Journal of Aquatic Animal Health*, a publication of the American Fisheries Society. The findings show that VHSV in Wisconsin can be found further inland and in more bodies of water than previously known.

Authors of the research paper ("[Widespread Seropositivity to Viral Hemorrhagic Septicemia Virus in Four Species of Inland Sport Fishes in Wisconsin](#)") are Whitney A. Thiel, Kathy L. Toohey-Kurth, David Giehlbrock, Bridget B. Baker, Megan Finley and Tony L. Goldberg.

The key to discovering this new information was testing fish for the presence of antibodies to VHSV through a process known as enzyme-linked

immunosorbent assay (ELISA). While the general method of ELISA is not new, the particular ELISA for VHSV is, and it was developed with Sea Grant support. "It's a valuable tool in fish health testing," said Goldberg, an epidemiology professor at the University of Wisconsin-Madison School of Veterinary Medicine.

While other, more common testing methods look for the presence of the live virus, the new method detects past exposure to VHSV, which, said Goldberg, is "really useful for screening populations and looking back in time." Blood samples are collected from fish in a non-lethal way.

The research team focused on four sport fish that are economically important in Wisconsin: bluegill, brown trout, northern pike and walleye. Fish with VHSV antibodies were found in 37 of 46 inland water bodies tested, including water bodies far from known outbreak events. Sampling occurred in 2016 and 2017.

Researchers found the results surprising. Said Thiel, first author of the journal article, "I suspected we'd see it spread out in some of the inland water bodies connected to the Winnebago watershed or the Green



“The research team recommends vigilance against potentially spreading the virus. . .the best offense is a good defense.”



Bay area — where we already knew VHS was — but I didn’t expect we would see it so far inland.” Thiel completed a master’s degree in freshwater and marine sciences at UW-Madison in 2019 and is now a research scientist at the University of Idaho.

Another intriguing finding was what members of the team characterized as “hot spots” and “not spots,” which were often close together. Prior to the research, they expected that any additional instances of VHSV detected would be near bodies of water known to have problems. However, in a number of cases, a body of water with no evidence of VHSV could be found neighboring one with evidence of the virus.

Giehtbrock, fish culture section chief at the Wisconsin Department of Natural Resources, said that this new information was all the more reason for those using Wisconsin’s waters — like recreational boaters and anglers — to keep taking preventative steps against the spread of aquatic invasive species in general.

“We need to continue all those practices that have been in place for a long time, to mitigate any transfer of VHSV between bodies of water, which is what we were already asking people to do everywhere. From invasives like Eurasian watermilfoil to carp to VHSV, we’re already asking people to clean their boats, drain their live wells and not transfer water between bodies of water,” said Giehtbrock.

“What people should take away from this is, we want to keep it out of where it’s not,” echoed Goldberg.

Giehtbrock, who supervises DNR fish hatcheries around the state, does not foresee a change in fish

**COVER: Wisconsin Department of Natural Resources (DNR) fisheries technicians collect trout from a creek near Viroqua, Wisconsin. ABOVE Tony Goldberg (center), professor of epidemiology sciences at the University of Wisconsin-Madison, collects blood samples from trout collected by DNR staff members to test for emerging diseases in the fish population.**

stocking practices at this point. Citing both Department of Agriculture regulations and the DNR’s own policies, he said that managing the health of fish for stocking is already strictly controlled.

“VHSV is one big component of that,” explained Giehtbrock. “We do virus testing on all of the stocks prior to their departure from the hatchery for stocking. So in terms of actual stocking practice, I don’t see a change because we’re already doing all the testing and monitoring that is feasible to make sure that everything we put out there is healthy and not spreading disease.”

Where Giehtbrock does see a possible change, however, is on the demand side, if more fish are needed to maintain or supplement fisheries being affected by VHSV fish kills. However, such a situation has not occurred yet.

This new information paints a more accurate and complex picture of VHSV in Wisconsin than previously understood. The research team recommended vigilance against potentially spreading the virus or other invasives. The best offense is a good defense, such as adhering to current advice promoted by the “[Clean Boats, Clean Waters](#)” campaign and similar initiatives. —JAS





## Where Do Poetry and Science Intersect?

Consider the patterns in both poetry and science. Or consider how each discipline uses observations to make sense of the world. Certainly, both use their own techniques and require creativity and even problem-solving. Perhaps the two disciplines are not so very different.

Try sharing some poems with the young people in your life.

**Flutter & Hum: Animal Poems = Aleteo**

**Y Zumbido: Poemas de Animales** by Julie Paschke. New York: Henry Holt and Company, 2015.

**Firefly July: A Year of Very Short Poems.**

**Selected** by Paul B. Janeczko; illustrated by Melissa Sweet. Somerville, Mass.: Candlewick Press, 2014.

**I Heard It from Alice Zucchini: Poems about the Garden**

by Juanita Havill; illustrated by Christine Davenier. San Francisco: Chronicle Books, 2006.

**Iguanas in the Snow and Other Winter Poems/ Iguanas in la Nieve Y Otros Poemas De Invierno**

by Francisco X. Alarcón; illustrated by Maya Christina Gonzalez. New York: Children's Book Press, an imprint of Lee & Low Books Inc. 2012.

**Thank You, Earth: A Love Letter to Our Planet** by April Pulley Sayre. New York: Greenwillow Books, 2021.

**Sail Away: Poems** by Langston Hughes; illustrated by Ashley Bryan. New York: Atheneum Books for Young Readers, 2015.

**Water Sings Blue: Ocean Poems** by Kate Coombs; illustrated by Meilo So. San Francisco: Chronicle Books, 2012.

Please visit the Wisconsin Water Library's blog to see more titles on this topic at [go.wisc.edu/k3qnic](http://go.wisc.edu/k3qnic)

Anyone in Wisconsin can borrow these books. Just email [askwater@aquawisc.edu](mailto:askwater@aquawisc.edu).

## The Co\$ of Water

Safe water is priceless.

Yet putting a price on water is just what environmental economist James Price is doing as part of a University of Wisconsin Water Resources Institute-funded study. Specifically, Price is comparing the relative costs of protecting groundwater at its source versus treating that water at a plant.

"The overarching objective here is to understand the relationship between source water quality and the cost of treating drinking water," said Price, an assistant professor at the University of Wisconsin-Milwaukee School of Freshwater Sciences.

This work will help groundwater community water systems in Wisconsin make smart, cost-effective decisions.

Over the course of his two-year study, which is in its early stages, Price will consider both short-term costs at treatment plants (such as labor and chemicals needed for water treatment) and long-term costs (like capital expenses). He'll also factor in the connections between source water quality and the choice of specific treatment technologies.

Francesca Sanchez, a graduate student in the professional master's degree track at the School of Freshwater Sciences, is aiding in the data cleanup that will make the project possible. That data may be supplemented by an internet-based survey sent to specific contacts at water treatment plants.

The study appears to be the first of its kind looking solely at groundwater (other cost-related studies on drinking water have looked at surface water, or a combination of surface and groundwater).

For more information, see the full version of this article at [go.wisc.edu/pm72n9](http://go.wisc.edu/pm72n9). – JAS







## Great Lakes Quests

Great Lakes Quests are virtual learning activities about coastal topics in Wisconsin that use interactive story maps. Wisconsin Sea Grant and the University of Wisconsin-Madison's Upham Woods Outdoor Learning Center collaborated to develop these activities.

The quests are inspired by the century-old British tradition of letterboxing, in which clue-driven activities encourage people to get out in nature to find a container that holds a notebook and a stamp.

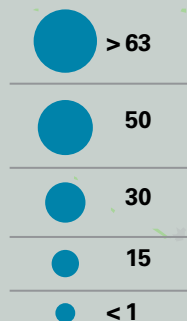
In our virtual format, a story map provides the narrative interspersed with multimedia, an online survey form provides the clues, and there is a certificate of completion at the end.

There are two different types of quests. The first type addresses coastal issues facing a community on the Great Lakes, [go.wisc.edu/06xy3p](https://go.wisc.edu/06xy3p) such as building resilience to coastal hazards or ecological restoration. The second type features Wisconsin coastal counties [go.wisc.edu/99h73z](https://go.wisc.edu/99h73z); those quests were guided by interactions with Wisconsin 4-H Clubs. —JAS

**Clockwise from top:**  
Hoan Bridge, Milwaukee County; downtown Two Rivers, Manitowoc County; and Kemper Center, Kenosha County.



Number of Projects



Interactive map  
details nearly  
475 Wisconsin  
groundwater  
research projects

# Water Research, Water Research, Everywhere

A recently completed interactive map of Wisconsin lays out, county by county, projects funded through the Wisconsin Groundwater Research and Monitoring Program (WGRMP) since 1985. [go.wisc.edu/35707y](https://go.wisc.edu/35707y).

The Wisconsin Groundwater Coordinating Council established WGRMP to select and fund annual groundwater research projects. It ensures collaboration and coordination on groundwater issues between the University of Wisconsin System as represented by the University of

Wisconsin Water Resources Institute (WRI) and the Wisconsin Geological and Natural History Survey, both of which are based at the University of Wisconsin-Madison.

Integral to WGRMP's success is also participation from state agencies with groundwater



oversight, including the Wisconsin departments of Agriculture, Trade and Consumer Protection (DATCP); Transportation; Safety and Professional Services (DSPS); and Natural Resources (DNR).

Clicking on each of Wisconsin's 72 counties within the map reveals the number of projects out of 474 that have happened in that location during the last 36 years.

The map is also a visual representation of where groundwater challenges have been particularly pronounced through the decades. This includes conditions such as naturally occurring radium — which has adverse human health effects — in Waukesha County (27 projects), a greater susceptibility to contamination in Door County thanks to a thin layer of topsoil covering porous bedrock (25 projects) and water quality and quantity challenges in Portage County (51 projects).

"This map shows the broad impact of the research program that serves people all over Wisconsin. I find it meaningful that for decades, we have been able to draw on the collective strengths of scientists and state agency leaders to deepen our understanding of our groundwater and then devise evidence-based management tools and strategies for best managing our resources," said Jennifer Hauxwell, who is the associate director for the Aquatic Sciences Center, the administrative home for WRI.

Results from at least 120 projects can be applied broadly to groundwater issues, affecting much, if not all, of the state. Others of these hundreds of projects only involved laboratory explorations and that is why they did not factor into the county-by-county breakdown. Examples of these projects are investigating emerging contaminants or legacy chemicals used in agriculture in many corners of Wisconsin, assessments of petroleum spills that resulted in contamination and the effects of leaching landfills.

Details from the projects — investigators, the specific locations of the research, methods and findings — can be found on the WRI website here [wri.wisc.edu/wgrmp-repository](http://wri.wisc.edu/wgrmp-repository). Anne Moser, senior special librarian at the Wisconsin Water Library, applies her organizational and cataloging skills to these gathered reports and ensures their accessibility. "It's essential to maintain this incredibly valuable collection of groundwater research reports in the Wisconsin Water Library, in both print and digital formats. The breadth of the collection shows a deep commitment to investing in groundwater research in Wisconsin since 1985.

"The map is a great way to visualize that investment and to see its statewide reach. Looking ahead, we will enhance it by interactively linking

the project reports to each county. That's the next step in this and one I hope to tackle in the coming months," she said.

Many of the researchers who conducted the projects have been based at university system schools. Other investigations have, and continue to, involve DNR experts. That department has been funding groundwater projects for more than 30 years, and recent work has focused on timely issues of concern such as naturally occurring arsenic, groundwater quantity, and emerging contaminants like viruses or antibiotics fouling the water.

DATCP has a history of funding research on pesticides and in recent research cycles has maintained its ability to support a few projects.

Finally, in the 1990s DSPS funded research on wastewater treatment. For many years since then, it has lacked the budgetary wherewithal to fund projects. However, departmental expertise is valuable to research proposal reviews.

According to the map, the largest number of field-based projects took place in Dane County (63). In numerous instances, field work done in Dane County can also be extrapolated to other parts of the state. Further, being able to do research close to the flagship campus has been a cost-effective way to gather data without incurring overnight travel expenses.

While this map shines a light on research past, the future of groundwater science in Wisconsin is continually evolving. The selection process for funded projects that would kick off in 2022 begins with a call for proposals through a joint solicitation that WRI coordinates. That call will be released in late July, according to Hauxwell.

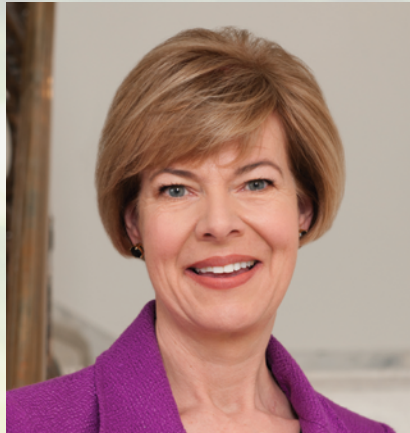
To be added to an email list that will circulate a message about this funding opportunity, and others through WRI, send an email to [rfp\\_aqua+subscribe@g-groups.wisc.edu](mailto:rfp_aqua+subscribe@g-groups.wisc.edu). As Hauxwell noted, you do not need to add a subject or message to the email but will need to respond to an automated reply to your request confirming that you would like to join.—MH



Sara Stathas

**Well drilling in Havenwoods State Forest in Milwaukee.**





Left to right: Dean Haen, U.S. Sen. Tammy Baldwin and Congressman Mike Gallagher

## Fellows Convocation and Award Event

### A CELEBRATION OF FRIENDS, FELLOWS AND UNDERGRADS

In February, Wisconsin Sea Grant and the University of Wisconsin Water Resources Institute (WRI) conducted a fellows convocation and award event that conferred recognition on a group ranging from graduate students to lawmakers to undergraduate students — unified by their contributions to Great Lakes and Wisconsin water research.

“It’s not news that COVID-19 has disrupted every part of our lives. Our biennial fellows convocation is just one of innumerable events that could not be held in person, but we were not prepared to let a pandemic stand in the way of honoring student accomplishments and the contributions of U.S. Sen. Tammy Baldwin and Congressman Mike Gallagher who see the value of investing in, conserving and celebrating our amazing Great Lakes and other Wisconsin water assets,” said Jim Hurley, director of both Sea Grant and WRI.

Hurley acted as emcee of the virtual event that drew more than 70 participants from cities across the Badger State, as well as from spots such as Guam, Washington, D.C., and St. Petersburg, Florida.

“This is the third time we have held a fellows convocation. It was the first time we needed to conduct it in a virtual setting. Of course, we wish it could have been in person, but the enthusiasm

and well wishes made up for that loss of in-person conviviality. I’m pleased that so many people from near and far could join to celebrate water scholarship and positive impacts in our coastal communities,” he said.

See the full article at [go.wisc.edu/7k37d7](https://go.wisc.edu/7k37d7) for more information about these talented people and their work.

#### AWARDS AND FELLOWSHIPS

##### Friend of Wisconsin Sea Grant Award

U.S. Sen. Tammy Baldwin  
Congressman Mike Gallagher

##### Wisconsin Sea Grant Great Lakes Champion Award

Dean Haen

##### Wisconsin Sea Grant Actionable Science Award

Vicky and Hallet J. “Bud” Harris

#### DEAN JOHN A. KNAUSS FELLOWS

Stephanie Houser

Rachel Johnson

Joe Naughton



## FELLOWS

Partner state agencies include the Wisconsin Coastal Management Program, Wisconsin Department of Administration, Wisconsin Department of Natural Resources, and the Wisconsin Department of Health Services

Carolyn Voter

Lydia Salus

Adam Arend

Jackson Parr

Dana Lapides

Bryan Maitland

Gavin Dehnert

Nicole Ward

### U.S. Environmental Protection Agency

Ryan Lepak

Sally Mayasich

Nate Pollesch

Prarthana Shankar

### University of Wisconsin-Stevens Point Northern Aquaculture Demonstration Facility Fellow

Patrick Blaufuss

### University of Wisconsin-Madison Fellow

Sarah Balgooyen

### NOAA Coastal Management Fellow

Chelsey Willetts

### NOAA Coastal Management Fellow

Emma Cutler

### Carl J. Weston Scholarship

Celeste Gunderson

### Summer 2020 interns

Eliza Suchan

Elise Ertl

Celeste Gunderson

Breanna DeNamur

Isabel St. Arnold

Claire Finucane

Emma Holton

# Wisconsin Mercury Researcher Wins ASLO Award

Former University of Wisconsin Water Resources Institute researcher, and now a post-doctoral fellow at the U.S. EPA Mid-Continent Ecology Division in Duluth, Minnesota, Ryan Lepak has been awarded the 2021 Raymond L. Lindeman Award from the Association for the Sciences of Limnology and Oceanography (ASLO). It is the leading professional organization for researchers and educators in the field of aquatic science.

"I am thrilled that our team was selected for this prestigious award. It represents work that would not have been possible without strong monitoring efforts like those at the Great Lakes Fish Monitoring and Surveillance Program at the EPA," Lepak said. "Across the board, at UW-Madison's Environmental Chemistry and Technology Program, the U.S. Geological Survey Mercury Research Lab and the Great Lakes Toxicology and Ecology Division Laboratory at EPA, this work exemplifies the innovative and multidisciplinary approaches requisite to creating impactful science. I am honored to tell this story alongside these colleagues."

Each year, ASLO recognizes a young scientist for leading an outstanding peer-reviewed, English-language paper in the aquatic sciences. Lepak's paper, on which he was the lead author, is "[Mercury source changes and food web shifts alter contamination signatures of predatory fish from Lake Michigan](#)," published in Proceedings of the National Academy of Sciences of the United States of America.

For more information, see the full version of this article at [go.wisc.edu/106sr0](https://go.wisc.edu/106sr0).



# New Sea Grant Advisory Council members help guide program with their expertise

Four new members joined the [Advisory Council of Wisconsin Sea Grant](#) in fall 2020. Invited to serve by the organization and officially appointed by the University of Wisconsin-Madison chancellor, these individuals help shape Sea Grant's future, enabling it to better serve the people of Wisconsin. The four new members are Deb DeLuca, Madelyn Leopold, Becky Sapper and Lori Tate.

With 15 members total, Wisconsin Sea Grant's Advisory Council brings together individuals from academia; state, tribal and local governments; private industry; and the public at large. Members'

## DEB DELUCA

Executive director, Duluth Seaway Port Authority,  
Duluth, Minn.



For Deb DeLuca, the University of Wisconsin-Madison, where Wisconsin Sea Grant is headquartered, is in her blood. She earned her master's degree at what is now the Nelson Institute for Environmental Studies on campus. Said DeLuca, "I was very aware of the Sea Grant program while I was in graduate school," having crossed paths with former Sea Grant Director Anders Andren, who taught water chemistry. DeLuca's graduate research focused on the occurrence of pesticide degradation products in groundwater contaminated by the parent product, and the implications for health-risk-based standards for those pesticides.

Now, years later, DeLuca is the parent of a recent UW-Madison graduate, and her father is an emeritus professor there. "Serving on the Advisory Council keeps me close to my Wisconsin and UW roots, and it lets me return service to the University of Wisconsin system."

DeLuca leads the bustling Duluth Seaway Port Authority, the Great Lakes' largest port, as its executive director — the first woman in that role in the port authority's 60-year history.

## MADELYN LEOPOLD

Private landowner and retired attorney,  
Madison, Wis.



Madelyn Leopold found her way to the Advisory Council through another body on which she serves, Madison's Board of Park Commissioners. There, she met Sea Grant Assistant Director for Communications Moira Harrington, a fellow commissioner.

Said Leopold, "Moira always brings a broad, science-based perspective to the board discussions; it was clear that her lens was much broader than most, and I credited some of that perspective to her work with Wisconsin Sea Grant. I was curious to know more about her organization and the work that it does."

Leopold finds Sea Grant's emphasis on "engaging young people of diverse backgrounds in science-based projects" especially appealing. As she observed, "We need to broaden the community of people who care and are smart about managing our waters."



varied viewpoints and experiences help ensure Sea Grant's responsiveness and accountability to its constituencies.

Sea Grant is grateful to these individuals for contributing their time to address challenges and opportunities facing our Great Lakes. To learn more about our new Advisory Council members, including their favorite spots on the Great Lakes, follow the Wisconsin Sea Grant blog at [seagrant.wisc.edu/blog](https://seagrant.wisc.edu/blog).

## BECKY SAPPER

Director, Wisconsin Master Naturalist Program,  
University of Wisconsin-Madison, Division of  
Extension, Ashland, Wis.



For Becky Sapper, the waters of Lake Superior are her lodestar; she has lived near them for 25 years. Based in Ashland, she directs the Wisconsin Master Naturalist Program, which in 2020 was honored with the Dave Engleson Award from the Wisconsin Association for Environmental Education. That award recognizes significant contributions to the field of environmental education having statewide, regional or national impact.

As a new Advisory Council member, Sapper looks forward to making an impact with Sea Grant as well. The organization has long been on her radar, and, in 2010 (while she was in a previous Extension role), she collaborated with several Sea Grant staff during the designation of the Lake Superior National Estuarine Research Reserve.

Sapper said she finds Sea Grant's emphasis on both research and education/outreach compelling. "It's important that we continue to learn more about our Great Lakes, but we also need to understand why it's important and how that impacts local communities," she noted.

## LORI TATE

Section chief, Fisheries Management Bureau,  
Wisconsin Department of Natural Resources,  
Madison, Wis.




Lori Tate, of the Wisconsin DNR's Fisheries Management Bureau, came to Wisconsin in 2009, after growing up and spending her career until to that point in Canada. A fisheries biologist, she has experience with freshwater systems, as well as some exposure to aquaculture farms.

Tate is eager to grow connections between the DNR's Fisheries Management program and the organizations it partners with, such as Sea Grant and its sister program, the University of Wisconsin Water Resources Institute (WRI). She's already a mentor to a postdoctoral fellow jointly supported by the Bureau of Fisheries Management and WRI (Bryan Maitland, a Wisconsin Water Science-Policy Fellow).

Said Tate, these collaboratively supported fellowships are "a great model for helping to answer research and management questions, and they provide fantastic opportunities for young scientists!"

Tate appreciates Sea Grant's active outreach efforts to connect Great Lakes stakeholders with research and management decision-making. —JAS





# Freshwater steel corrosion occurring beyond Lake Superior harbors

Owners of steel structures on inland lakes and a river in northern Minnesota are reporting the same kind of corrosion as seen in the Duluth-Superior Harbor and other harbors along Lake Superior. A structural engineering firm reported it has designed and overseen replacement of gates on dams along the St. Louis River, far removed from Lake Superior water, because of the corrosion.

Along with partners, Gene Clark, retired Wisconsin Sea Grant coastal engineer, devoted considerable energy into ferreting out the causes of and ways to mitigate this corrosion, which can lead to costly harbor infrastructure replacement.

The accelerated corrosion of steel pilings in the Duluth-Superior Harbor was first noticed in 1998. Researchers funded in part by the Wisconsin and Minnesota Sea Grant programs eventually identified microbes as the culprit combined with a complicated interaction between water and the steel. Bacteria form small lumps, or tubercles, on the steel. The lumps limit oxygen and allow small amounts of copper in the water to interact with and dissolve the steel, which results in pockmarks and holes that compromise steel structures.

Experts brought together to investigate the issue blamed water chemistry specific to Lake Superior. However, those still tracking the issue have discovered this microbially influenced corrosion problem is more widespread.

Chad Scott, principal at AMI Consulting Engineers, initially alerted harbor industries about the corrosion issue in 1998 when he was a diver inspecting structures in the Duluth-Superior Harbor. Scott said during the past few years his company has worked with the U.S. Army Corps of Engineers to place steel samples (or coupons) in the St. Louis River at the Thompson Dam, Scanlon, Cloquet and near Cotton.

"At every single location along the river, the steel had the same tubercles on them," Scott said. "So, what that tells me is, what's coming to the harbor is coming down naturally from inland in Minnesota."

**A steel dock post on Wilson Lake near Cotton, Minnesota, shows the same biocorrosion tubercles as those found in the Duluth Superior Harbor.**

Scott said his firm designed and oversaw replacement of gates on the Fond du Lac Dam and the Sappi Dam in Cloquet.

"They were all heavily pitted. It looked just like harbor corrosion," Scott said. He's also had friends report biocorrosion on their docks on Fish Lake, Island Lake and Grand Lake. He's seen firsthand the dock posts covered by corrosive tubercles on those lakes.

Randall Hicks, professor emeritus at the University of Minnesota Duluth, has worked for years to understand the microbiology behind the corrosion. He said he has seen the tubercles on his own dock on Barrs Lake near Two Harbors. He has also identified them in photos from a dock on Wilson Lake near Cotton.

"I don't think it's just a regional problem," Hicks said. "I think it's been happening all along for a long time in places where conditions are right." Those conditions include the presence of sulfate-reducing bacteria and iron-oxidizing bacteria, a source of dissolved sulfate and iron, and low-oxygen conditions such as those sometimes found in spring water.

Hicks described how the process begins when a clean sheet of steel is placed in water. "Different bacteria will attach to the surface and form a biofilm first." Dental plaque is a common example of a biofilm. Microorganisms multiply and create a thin but tight layer on teeth. In this case, the biofilm layer is on steel.

"As that biofilm grows, we see a lot of iron-oxidizing bacteria — they're aerobic microorganisms," Hicks said. He explained that as the iron-oxidizing bacteria next to the steel surface use up oxygen, sulfate-reducing bacteria, bacteria that can live without oxygen, become common. "It's really their activities in combination with activities of the iron-oxidizers in the biofilm that accelerate the loss of steel from the surface of the metal."

How can we protect steel structures from corrosion? Read an expanded version of this article at [go.wisc.edu/zzf8g6](http://go.wisc.edu/zzf8g6). —MEZ



# Sea Grant Hires New Emerging Contaminants Staff Scientist

To address contaminants of emerging concern that pose threats to Great Lakes ecosystems and public health in Wisconsin, Sea Grant created an emerging contaminants scientist position. After a nationwide search, Gavin Dehnert was hired, and he began work on May 3.

Emerging contaminants include pharmaceuticals, personal care products, perfluoroalkyl and polyfluoroalkyl substances (PFAS) and pesticides. Although many of these compounds are detected at low levels in surface waters, they may have adverse impacts on aquatic ecosystems.

“Wisconsin Sea Grant has long funded researchers who strive to increase knowledge about contaminants affecting Great Lakes ecosystems,” said David Hart, Wisconsin Sea Grant assistant director for extension. “The National Sea Grant Office has identified contaminants of emerging concern in aquatic environments as needing increased investment. Gavin brings a wealth of experience that will help us build research partnerships addressing emerging contaminants and bridge research with outreach and education efforts.”

If Dehnert’s name sounds familiar, it’s because he has a history with Wisconsin Sea Grant. Dehnert completed a Wisconsin Water Resources Science-Policy Postdoctoral Fellowship, where he worked with the Wisconsin Department of Health Services (DHS) to develop groundwater standards for 22 drinking water contaminants, including 16 forms of PFAS. He also helped create a hazard index risk assessment, which offers guidance when mixtures of PFAS are found in water.

Additionally, Dehnert gained outreach experience through his fellowship. The PFAS drinking water standards were released through the governor’s office last year. “That was an experience like none other,” Dehnert said. “Giving a press conference — I felt like a TV star. I would definitely not have done something like that if I hadn’t been in the fellowship.”

His emerging contaminants position will put all these skills to use through the lens of actionable science — sound science guided by strong relationships with stakeholders, coupled with effective outreach

and communication. Dehnert met many of those stakeholders during his fellowship.

“That network is one of the best things the fellowship gave me,” he said. “I’m also excited to continue both research and outreach. There’s no point in doing the research if you’re not able to share it or help move forward with actionable science. I’m excited to learn



“There’s no point in doing the research if you’re not able to share it or help move forward with actionable science.”

more about the different emerging contaminants that are coming to light and use science to further inform how we make decisions.”

Dehnert has undergraduate degrees in marine science and biology from the University of Miami, and a Ph.D. in integrative biology with a focus on toxicology from the University of Wisconsin-Madison where he studied the effects of herbicide 2,4-D exposure on the development and behavior of fish at different life stages.

Connect with Dehnert via email at [dehnert2@aqu.wisc.edu](mailto:dehnert2@aqu.wisc.edu) or (608) 263-5348. — MEZ

OUTREACH

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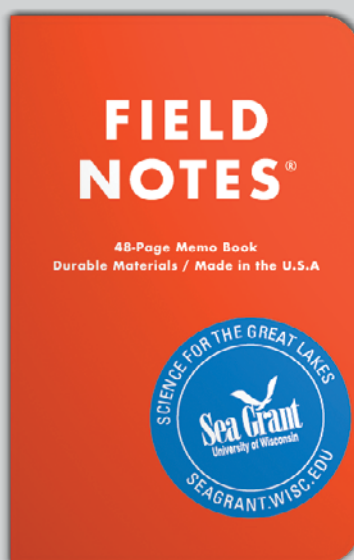
## Aquatic Sciences Chronicle

a joint newsletter from UW Sea Grant and Water Resources Institutes

## Check Online for Calendar Updates

Due to the disruption caused by the spread of coronavirus and public health guidelines to maintain social distancing, large public meetings focused on water science have been postponed or outright cancelled.

Check the websites of organizations you are interested in for updates regarding scheduling. For the latest on Sea Grant and University of Wisconsin Water Resources Institute functions and other news, visit [seagrant.wisc.edu](http://seagrant.wisc.edu) or [wri.wisc.edu](http://wri.wisc.edu) or follow our social media channels.



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