2020 issue 2



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### **Aquatic Sciences Chronicle**

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### FEATURED AUDIO + VIDEO

### **New podcast**



Introducing "Introduced"

### seagrant.wisc.edu/audio/introduced

Once niche, podcasts have gone mainstream. According to figures cited in Forbes, 62 million Americans now listen to podcasts each week.

While Wisconsin Sea Grant and the University of Wisconsin Water Resources Institute have been involved in podcasting for years — from the current series Wisconsin Water News to older programs like Earthwatch Radio — there's a new kid on the block: a podcast called "Introduced" that will be devoted to aquatic invasive species (AIS).

# Our new podcast tells the stories of aquatic invaders in our changing waters.



"Introduced" is the brainchild of Sea Grant Digital Storyteller Bonnie Willison and student employee Sydney Widell, a UW-Madison geography and geosciences major from Shorewood, Wisconsin.

The series spans seven episodes, with one per week released since May 27. Listeners can find it on Apple Podcasts, Google Play, Spotify and on Sea Grant's <u>website</u>.

While the simple name for the series conveys a bit of mystery, it also makes perfect sense. Said Willison, "As Sydney and I started learning more about invasive species, we noticed that there is a tendency for people to villainize these species. But we also noticed that humans are the ones introducing all these species to new environments. The title for our series puts the agency on people, which is something that we focus on in the podcast."

Guests interviewed in the series include representatives from the Department of Natural Resources, U.S. Geological Survey, UW-Madison, the Fond du Lac Band of Lake Superior Chippewa and a rescue organization focusing on exotic animals. Several Sea Grant staff also make appearances.

Topics are wide-ranging, from Asian carp to the trade in invasive species on the Internet. Because the AIS field is so rich, Willison anticipates doing a second season of the "Introduced" podcast. Stay tuned. -JAS



# Ten Weeks for a Formative Experience, Summer Undergraduate Internships

Ten weeks can be fleeting. Even though the days may pass quickly, they can be momentous ones. At Sea Grant this summer, the hope is that for eight undergraduates, 70 days will be formative.

The eight students — Elise Ertl, Brenna DeNamur, Celeste Gunderson, Isabel St. Arnold, Sarah Schlitz, Eliza Suchan, Claire Finucane and Emma Holton — are participating in an inaugural internship program targeted toward underserved and indigenous communities, rich in mentoring and, in three of the five opportunities, focused on tribal issues.

"Mentoring is at the core of these internships," said Moira Harrington, Sea Grant's assistant director for communications.

Because students are paired with staff for intensive learning and exposed to interactions with other professionals, "We jumped at the chance to bring in a student to get real-world experience that will serve them in their careers. In communications, we're looking forward to offering Elise Ertl a meaningful situation where she can formulate aquatic invasive species messaging for tribal and non-tribal audiences," she said.

The junior majoring in biology and writing at the University of Wisconsin-Superior will hone her skills in science communication by assisting in the planning of the 2020-21 season of the RiverTalks. She'll also have opportunities for her writing to be shared broadly through Sea Grant's website, blog posts and this publication. In addition to Ertl, the other interns are tackling projects that interest them:

- DeNamur, Traditional Ecological Knowledge and Great Lakes Literacy
- Gunderson, Green Infrastructure, Climate Adaptation and Coastal Resilience
- St. Arnold, Foreground the Significance of Manoomin Through Education and Outreach
- Schlitz, Promoting Watershed Health With Citizen Science
- Suchan, Fish Guts: Understanding the Diets of Great Lakes Fish
- Finucane, Great Lakes Geospatial Data Visualizing
- Holton, Building Resilience Against Climate Effects

Harrington said the challenges posed by the pandemic were an unexpected factor in planning for the internships, but trusting in the resilience of the cohort, she and her fellow mentors decided to forge ahead, revising some of the opportunities. For example, the fish guts project had been designed for field sampling and will now shift, in part, to literature review.

Some constants remain, though, including matching with other undergraduate interns from around the nation as part of a wider Sea Grant undergraduate program, as well as with graduate and postgraduate students participating in the Sea Grant Knauss Fellowship. –MH



"Everyone in the world, including those in northern Canada and remote regions, all have substantial levels of PFAS in their bloodstreams."

- MARTIN SHAFER



### SEA GRANT ADDRESSES GROWING PFAS CRISIS

Wisconsin Sea Grant-funded project has helped improve the state's capability to test for PFAS (per- and polyfluoroalkyl substances) and led to the discovery of their widespread presence in rainwater across the country.

The project is led by Martin Shafer, senior scientist with the University of Wisconsin-Madison School of Medicine and Public Health and the Wisconsin State Laboratory of Hygiene (WSLH). Shafer is also a principal researcher with the National Atmospheric Deposition Program (NADP), the nation's longest-running program for monitoring the chemistry of precipitation, which is housed at the WSLH.

Shafer said the presence of PFAS in everything from the food supply, personal care products, lakes and the atmosphere is a "growing crisis." PFAS exposure is linked to human health concerns, including compromised immunity, low birth weight, endocrine disruption and cancer. "Everyone in the world, including those in northern Canada and remote regions, all have substantial levels of PFAS in their bloodstreams," Shafer said. "Some people believe PFAS are a significant threat to human health."

These chemicals get into the environment from point sources like firefighting foam and industrial processes. Shafer said an estimated 4,500 to 5,000 PFAS compounds exist, but federal regulations currently only target two: PFOS and PFOA.

With help from the Sea Grant funding, the WSLH can now measure levels of 36 PFAS compounds, which is the highest available testing target in the state.

"Two other labs in Wisconsin can test for PFAS, but they can't offer the breadth of compounds nor the breadth of matrices that the state lab can," Shafer said.

Rainwater is another source of PFAS that, until recently, has received limited study. In his researcher role with the federal



This precipitation map, including sampling sites, will be used to generate a map of PFAS deposition from rainwater.



NADP, Shafer is in an ideal situation to study the cycling of PFAS in the atmosphere and rainwater deposition.

Precipitation samples from 263 sites of the NADP National Trends Network across the country "appear" on his lab doorstep every weekday. Studying samples from 31 of those sites, Shafer found measurable levels of PFAS in almost all, some up to four or five nanograms per liter.

"Considering that Wisconsin just promulgated an action level of two nanograms per liter and a regulatory level of 20 for PFAS, that's not insignificant," he said. "We showed that deposition from rainfall events integrated over a year could represent and supply a large fraction of PFAS loading to large lakes, and similarly, to terrestrial environments that are not receiving any other point-source loadings of PFAS."

Shafer presented his rainfall study results at the American Geophysical Union meeting last fall in San Francisco, which

resulted in media interest from outlets like <u>the Guardian</u> and the Weather Channel. The U.S. Environmental Protection Agency also took note and will be using these data in their deposition models.

Shafer is now gearing up to study the role of wastewater treatment facilities in disseminating PFAS. Sea Grant is funding a graduate student to work on this project and the Wisconsin Department of Natural Resources (DNR) is providing funding for analysis at the WSLH. Samples of wastewater influents, effluents, biosolids and air emissions will be collected and analyzed.

Because the wastewater treatment facilities collect and concentrate wastes from many different sources, Shafer is concerned that they could unwittingly be a point-source for PFAS pollution. Spreading biosolids produced at the treatment plant

# wisconsinwaterlibrary

Learning at H.O.M.E.S.

(Huron, Ontario, Michigan, Erie and Superior)

During the unprecedented time of COVID-19, resources for educators, students and families for use at home have become essential tools for both learning and fun. Here are a few of our favorites, both old and new.

### **GREAT LAKES, GREAT READS**

#### go.wisc.edu/d75d61

A new, occasional feature from the library, with reading suggestions of some of our favorite on Great Lakes titles.

### **TAKE TIME TO #COLORTHEGREATLAKES**

go.wisc.edu/v3v69l Download our collection of Great Lakes coloring sheets and create a masterpiece.

### **EXPLORE LAKE STURGEON**

### go.wisc.edu/5g4c4e

Learn more about this ancient survivor by watching a librarian and two ichthyologists dissect a juvenile lake sturgeon specimen. Then test your knowledge with our activity sheet.

### **READING AND SCIENCE TOGETHER**

### go.wisc.edu/5o90n2

The library has a collection of interdisciplinary lessons primarily geared toward younger children that teach about water, fishing, weather and more, including suggested books, songs, art and science.

If we can be of any support during these challenging times, please reach out to **askwater@aqua.wisc.edu**. The library is here to help.

Please visit the Wisconsin Water Library online at waterlibrary.aqua.wisc.edu for more information about the library's resources on a wide range of aquatic topics.

Anyone in Wisconsin can borrow the books discussed here. Just email **askwater@aqua.wisc.edu**.

# Educator workshop shares Ojibwe culture and history



More than 230 Ojibwe dancers filled the event center in the Black Bear Casino Resort in Carlton, Minnesota, dressed in their finest regalia. A colorful rainbow, the dancers slowly progressed in a clockwise circle, swaying to the beat of drums and singing, bells on their clothing jingling with each step.

Watching the Gichi Manidoo Giizis Pow Wow were 19 educators from Wisconsin, Minnesota and Michigan. A few even joined the dance when audience members were invited.

The pow wow was just part of a daylong workshop the teachers attended after they braved a January snowstorm to arrive in Carlton. As a reward for their travel through inclement weather, they learned more about Ojibwe culture, treaty rights and water ecology.

Named after the pow wow, the Gichi Manidoo Giizis Educator Workshop means, "Great spirit moon" or January in Ojibwe. The workshop was organized by the Fond du LacTribal and Community College, the Fond du Lac Band of Lake Superior Chippewa, and the Minnesota and Wisconsin Sea Grant programs.

Megan Hogfeldt, a water resource specialist for the city of Superior, was one of the workshop attendees.

"What fascinated me was that this workshop is geared toward people who work in science and water quality education. A lot of what I do is communicating what my coworkers are working on or research that's being done in the community. I try and explain to people and school groups the importance of water quality, recognizing that a lot of those people are also indigenous. It's beneficial to me to have a framework for what I can include or language I can use for that audience."



Hogfeldt and the other educators spent their morning learning about tribal history and treaty rights from Christina Dzwonkowski, a Great Lakes Indian Fish and Wildlife Commission game warden. Later, Kelsey Taylor, who works for the Fond du Lac Band, offered information about invasive species and traditional knowledge.

The educators had a chance to test their treaty rights knowledge by taking a quiz on their phones, and a question arose about how the tribes manage their fishery.

"If a limit on a certain lake is 300 fish, the tribes don't fish 300 fish," said Dzwonkowski. "They have a nice big buffer, so they might fish 220 fish out of that lake, just to take into consideration things change and so they don't go over the limit. The tribes only visit that lake a single time to spear, and they only take a certain amount. Then they leave and don't go back fishing there, unless it's just plain hook and line like everyone else."

After lunch, the teachers attended the pow wow, an experience that Hogfeldt appreciated. "I really like pow wows. I've had nothing but a positive experience and it's very welcoming — very based on appreciation of community and nature," she said.

Back at the workshop, the teachers divided into teams. They played the Watershed Game, a hands-on simulation developed by Minnesota Sea Grant and University of Minnesota Extension that helped them learn how land use impacts water quality and natural resources.

Cynthia Hagley, recently retired environmental quality extension educator with Minnesota Sea Grant, explained their seemingly impossible task. "We want you to reduce pollution as much as you can without your team going broke. And you have about 15 minutes to do it. Today, we're focusing on sediment and why it's a bad thing to have in the headwaters of a stream."

In the evening, the teachers took their new knowledge and applied it to activities for a youth workshop held later that night, along with a traditional pow wow feast.

If you're an educator and would like to get on a list for notifications about opportunities like this, please contact Anne Moser with Wisconsin Sea Grant by email at <u>akmoser@aqua.wisc.edu</u> or Marte Kitson with Minnesota Sea Grant at <u>mkitson@d.umn.edu</u>. –MEZ



### WATER RESOURCES RESEARCH

nsightly and potentially toxic algal blooms have grabbed headlines in Wisconsin. Such blooms are driven by excessive levels of phosphorus or other nutrients. This can result in eutrophication, a process in which oxygen becomes depleted from a body of water, causing ill effects for fish and other aquatic life and harming human activities like tourism and commercial fishing.

While agricultural runoff is a frequent source of excess phosphorus, <u>research funded by</u> <u>the University of Wisconsin Water Resources</u> <u>Institute (WRI)</u> looks at a complex example in western Wisconsin where the answers are not so clear.

Researchers from the University of Wisconsin-Eau Claire are investigating the possibility that naturally occurring phosphorus deep in the aquifer is the driver behind elevated levels of phosphorus in both surface water and groundwater. The study is regional and includes a case study focused on the Mud Lake area in Barron County, about 45 miles north of Eau Claire.

The study's principal investigators are <u>Assistant</u> <u>Professor Sarah Vitale</u> and <u>Professor J. Brian</u> <u>Mahoney</u>, both of the UW-Eau Claire Geology Department. They received funding in WRI's 2019-20 cycle for the study assessing the source and mobility of phosphorus in the hydrologic system in western Wisconsin. Joining them as a collaborator is Anna Baker, a hydrologist with

# Phosphorus Issues

Is naturally occurring phosphorus deep in the aquifer the driver behind elevated levels of phosphorus in both surface water and groundwater?

# **Run Deep**

the U.S. Geological Survey's Upper Midwest Water Science Center.

Five UW-Eau Claire geology majors are gaining valuable hands-on experience by assisting the research team with fieldwork, collecting and interpreting data, and giving presentations at professional meetings.

In fact, three of those undergraduates — Emily Finger, Evan Lundeen and Jacob Erickson had a scientific poster accepted to the annual "Posters on the Hill" event hosted by the Council on Undergraduate Research in Washington, D.C. While the April 2020 event was canceled due to the COVID-19 pandemic, the students' selection to present their research to members of Congress and their staffers remains a badge of honor.

### BUILDING ON EARLIER WORK TO ADDRESS "RED FLAGS"

While the WRI-funded portion of this project began in summer 2019, the work had its beginnings three years earlier.

Said Vitale of her colleague, Mahoney: "Brian initially started the foundations of this project in 2016. He started having students look at water quality in western Wisconsin because there was a lot of concern over what the increase in silica sand mining would do to water quality in this part of the state."

At the time, Mahoney and his students analyzed water from a variety of sources, like municipal wells and streams. They were surprised to find a large amount of phosphorus in both groundwater and surface water in the area.

"That stood out as a really big red flag, because everybody says there's not supposed to be phosphorus in groundwater. It's just always been assumed it will absorb onto sediment surfaces — and so the fact that there were really high concentrations of phosphorus in groundwater led to this project's current form," said Vitale.

This sparked curiosity about possible natural sources of phosphorus and how that phosphorus might be moving through the system.

In 2018, Vitale and Mahoney began a case study investigating groundwater discharge into Mud Lake, a lake known to have eutrophication problems. "The way we wrote this [WRI] proposal was to help continue the investigation. It's been able to fund a second season of investigation for Mud Lake, as well as continued investigation of regional water quality." Vitale and her collaborators plan to use the funding to draw conclusions about where naturally occurring phosphorus is coming from.

Summarized Vitale, "We hope to wrap up the regional investigation and to really constrain which aquifers seem to be the biggest problem. Where is phosphorus concentrated the most in different aquifers? And in these deeper aquifers, the phosphorus is probably sourced from the rock itself, so which rocks are the main contributors to that?"

The team's WRI funding runs through June 2020. Other funds supporting this work have come from UW-Eau Claire's Office of Research and Sponsored Programs. In addition, backing from the UW System Water Research Fellowship Program has allowed the project to expand to Lake Altoona in Eau Claire County.

The team has also recently been awarded a fiscal year 2021 grant from the <u>Wisconsin Groundwater</u> <u>Research and Monitoring Program</u>.

### **THREE EXPERTS, WORKING TOGETHER**

Vitale, Mahoney and Baker all bring different areas of expertise to the study. Vitale is a hydrogeologist who specializes in aquifer flow characterization (how water moves through various types of geology). Mahoney brings a background in rock chemistry, and so his primary focus is on understanding what the chemistry of the geology looks like and the likelihood of its influencing the water quality.

Baker's primary expertise is in phosphorus migration through sediment transport. Because phosphorus does migrate through sediment runoff and other surface processes, Baker is helping the team understand, in Vitale's words, "What do we need to look at to understand which components of this might be the water side, and which components might be the sediment influence? Anna is bringing that nutrientloading background."

Last spring, Vitale shared some results from this project at the meeting of the American Water Resources Association-Wisconsin Section. As the research progresses, findings are also being shared with key stakeholders like the Wisconsin Department of Natural Resources, U.S. Geological Survey, Wisconsin Geological and Natural History Survey, and organizations local to the Eau Claire area. – JAS



Jacob Erickson (UW Water Research Fellow) preparing to collect a water sample from a mini well at Mud Lake.



Emily Finger, Maddie Palubicki and Evan Lundeen (left to right) collect a water sample from Lake Altoona after installing a new mini well.





## What's in Store for Great Lakes Water Levels? Find Out Online

Wisconsin Sea Grant's outreach specialists are used to traversing the state, sharing information of relevance directly with impacted communities. In this year marked by a global pandemic, however, it hasn't been so easy—yet staff are finding ways to get the job done.

In mid-March, Coastal Engineering Outreach Specialist Adam Bechle had planned, along with a variety of partners, to deliver three nights of back-to-back information on high Great Lakes water levels in three Lake Michigan coastal communities: Manitowoc, Somers and Mequon. Yet due to the rapidly evolving COVID-19 situation, those in-person sessions were replaced by a single online one March 18.

The Zoom session featured Bechle along with speakers from the U.S. Army Corps of Engineers-Detroit District, National Weather Service Forecast Office in Milwaukee/Sullivan and the Wisconsin Department of Natural Resources. The Wisconsin Coastal Management Program and local governments also played a role in putting the session together.

"People in our Lake Michigan coastal communities have been hungry for information about what's in store for water levels and what options they may have for dealing with some of the negative impacts," said Bechle. "If people missed the live webinar, they can still get this information online, where they can hear directly from a variety of experts all in one place."

Topics covered include forecasts for water levels through the summer, emergency management activities being undertaken by the Army Corps of Engineers, the local impacts of recent storms, how coastal processes in the water affect what's happening on land and the permitting process for constructing erosion control structures.

The archived webinar is available on <u>Wisconsin</u> <u>Sea Grant's YouTube channel</u>.

Further questions may be directed to Bechle at <u>bechle@aqua.wisc.edu</u>. –JAS



## Maritime Archaeology Offers Boatloads of Learning Opportunities

A century ago, Lake Michigan was a busy water highway for the lumber trade, connecting merchants in northern Wisconsin and Michigan with customers in bustling cities like Milwaukee and Chicago. While this Great Lakes lumber trade persisted into the 1920s and '30s, it peaked in the late 1800s. At one time, about 500 vessels traversed Lake Michigan as part of this trade, before rail and eventually trucking took over.

Shipwrecks help tell the story of this lumber trade. The Wisconsin Historical Society's (WHS) highly active program in maritime archaeology documents these and other wrecks and shares its findings through a variety of educational efforts.

Now, through funding from Wisconsin Sea Grant, WHS is embarking on a new, two-year project called "Boatloads of Lumber." One key outcome will be online learning resources tailored to a range of ages. WHS Maritime Archaeologists Caitlin Zant and Tamara Thomsen will lead the project, which also involves Wisconsin Sea Grant's Anne Moser.

Said Zant, "Our program [at the Historical Society] does a lot of outreach and education, but a lot of it is focused on public presentations to a broad audience, and not really working as closely as we might with museum educators to create programming and activities for kids of all ages."

Although this project, a part of Sea Grant's 2020-22 funding cycle, has been in the planning stages for quite some time, the current COVID-19 pandemic and rapid shift to online instruction has made it even more relevant. Said Zant, "Especially with recent events, everyone's clamoring for this kind of content that anyone can teach to kids, to keep education going no matter what the age or no matter what the circumstances."

The online resources will be developed in concert with museum educators, including those at museums devoted to maritime history. Collaborators include the Wisconsin Maritime Museum in Manitowoc, the Port Exploreum in Port Washington and the Door County Maritime Museum's locations in Sturgeon Bay and Gills Rock.

Sea Grant's Moser, who directs the Wisconsin Water Library, will help ensure that the tools convey a cohesive message in terms of Great Lakes literacy. Shipwrecks can be a way for learners of all ages to connect with other issues affecting the Great Lakes, from aquatic invasive species and water quality to currents and sand movement.

A second aspect of the "Boatloads of Lumber" project is a field school to help recreational divers and archaeology enthusiasts learn techniques to survey and document wrecks they may find. This learning experience will focus on the wreck of the Sidney O. Neff, a wooden vessel that sank in 1939 and now lies in about 12 feet of water near the Marinette lighthouse.

To read a longer version of this story, visit go.wisc.edu/lw3t7x. – JAS

Clockwise from right: Caitlin Zant, doing shipwreck and aquatic sciences outreach with a group of Girl Scouts at the Wisconsin Maritime Museum. Field school students participate in onland training in underwater mapping techniques, 2018.



# **Environmental improvements coming to Barker's Island**



Barker's Island in Superior looks different than it did a year ago. Construction on the island's public beach rearranged and added structures to improve water quality and provide a better experience for swimmers.

More changes are in store for the next two summers, all designed to reduce stormwater runoff and protect water quality in the Superior Bay and ultimately, Lake Superior.

Conceptual designs for work at Barker's Island Marina and for areas around Barker's Island Inn were completed in 2020, thanks to several grants and cooperation among the two businesses and Sea Grant programs in Wisconsin, Michigan and Ohio, as well as the city of Superior, the Wisconsin Coastal Management Program, the Ohio State University and the Wisconsin Marine Association.

Several projects will begin this summer at the marina, and more will begin at the inn in 2021.

Improvements at the marina include creating a stormwater wetland, redesigning an existing stormwater pond so that it functions properly and, if funds allow, installing a large cistern to catch water off the roof of the marina maintenance building, delaying its flow into the bay. The water could be used for rinsing tanks and other water supply needs by the marina.

These activities are supported by a grant designed to advance stormwater management at <u>Great Lakes marinas</u> through the Great Lakes Protection Fund. As part of this project, a tool is being developed that will help marina owners and operators choose the best green infrastructure projects for their operations. Barker's Island Marina is one of three marinas in the states of Wisconsin, Michigan and Ohio chosen to test the tool and install green infrastructure. Researchers from the Ohio State University and the Lake Superior National Estuarine Research Reserve will monitor the site before and after installation to record changes in water quality.

After completing the projects and adopting other best-management practices, Barker's Island Marina will become a certified Clean Marina in the state of Wisconsin. <u>The Clean Marina</u> <u>Program</u> is designed to reduce pollution from marinas to protect Wisconsin's waterways. Program staff conduct site visits to verify marina practices and provide training and technical support to marina and boatyard managers.

The city was recently awarded a grant for just under \$500,000 from the National Fish and Wildlife Foundation's Sustain Our Great Lakes Program to improve stormwater storage and reduce runoff impacts on Barker's Island, including a "green" parking lot around Barker's Island Inn. Conceptual plans call for installing infiltration medians and pervious surfaces around the lot edges in 2021 and planting native trees and shrubs. Plans also include replacing the eroding unofficial catamaran launch site with an official launch featuring grass paving.

Read an expanded version of this story <u>here</u>. –MEZ

## **2020-21 Projects** New Decade, New Research Funded by the Water Resources Institute

Living up to its mission of coordinating research that works to address present and emerging water quality, quantity and management challenges, the University of Wisconsin Water Resources Institute (WRI) will fund five projects for the new decade beginning on July 1.

"We look forward to the findings from this latest group of projects that address emerging issues," said Jim Hurley, WRI director. "Each project advances our understanding of Wisconsin's buried treasure, our groundwater."

The projects will:

- Investigate in-season cover crops for reducing nitrate loss to groundwater below potatoes. Kevin Masarik at the University of Wisconsin-Stevens Point will lead the project. His colleague Jacob Prater on that campus will also participate in the work that will inter-seed the crops and assess the positive and/or negative interactions on potato yield, quality and ease of harvest.
- Formulate a cost-function analysis of Wisconsin water utilities to place a value on groundwater. James Price is this investigator, based at the School of Freshwater Sciences, UW-Milwaukee.

- Conduct further research on the issue of arsenic in southeastern Wisconsin groundwater. Eric Stewart, bedrock geologist at UW-Madison, will correlate bedrock fold and fractures with the detection of this naturally occurring but carcinogenic chemical in drinking water. Esther Stewart is a co-investigator.
- Provide insight into the sources of salinity associated with radium and strontium in the parts of the aquifer underlying eastern and northeastern Wisconsin. The study will provide an understanding of the transport of these contaminants to municipal wells. UW-Madison's Matt Ginder-Vogel is the principal investigator and he has pulled onto the team Patrick Gorski and Sean Scott, both with the Wisconsin State Laboratory of Hygiene.
- Investigate naturally occurring phosphorus in western Wisconsin surface and ground waters. (See story on page 8.) Sarah Vitale and co-investigator J. Brian Mahoney at UW-Eau Claire and Anna Baker with the U.S. Geological Survey Upper Midwest Water Science Center are tackling this issue as part of a project that kicked off in 2019.

"Each project advances our understanding of Wisconsin's buried treasure, our groundwater."

— JIM HURLEY, WRI DIRECTOR



## New watershed education program uses mentoring and collaboration to share information with communities along Lake Michigan

As the state of Wisconsin's population grows and water issues gain in complexity and number, demand for skilled water workers is expected to increase. According to the Wisconsin Department of Workforce Development's 2016-2026 occupation projections, demand for hydrologists and environmental scientists with bachelor's degrees will rise 6.5% and 12.6%, respectively. members recognized similarities in their goals and developed the project together.

Many moving parts make up the project. Two of them are an annual Lakeshore Water Summit and a stormwater messaging resource hub.

The Lakeshore Water Summit is held during fall each year at UW-Green Bay, Manitowoc

"The faculty are going to be mentoring the undergraduates. The undergrads are going to mentor the high school students. The graduate students are mentoring the undergraduates."

—DEIDRE PEROFF

A new Wisconsin Sea Grant-funded education project addresses this need by engaging undergraduate students at the UW-Green Bay, Manitowoc Campus, in research and connecting the students to their communities. A graduate student from the UW-Milwaukee School of Freshwater Sciences will also complete development of a water resource hub used by regional water organizations

to provide cohesive stormwater messaging along Lake Michigan's Wisconsin coastline. Even high school

students are included in the project.

"One of the objectives is to retain students in water-related STEM pathways and careers," said Deidre Peroff, Wisconsin Sea Grant social science outreach specialist. "We are focusing on watershed education and helping students strengthen their skills to make them more marketable ideally, to have a career in water, whatever that may look like."

Peroff is part of a project team that involves representatives from the <u>Southeastern Wisconsin</u> <u>Watersheds Trust, Inc.</u>, (nicknamed Sweetwater, for short); UW-Green Bay, Manitowoc Campus; and the <u>Lakeshore Natural Resource Partnership</u>. Although initially inspired separately, the team Campus. It offers college students the chance to practice research presentations. For this project, freshman and sophomore interns will collect weekly measurements on Lake Michigan tributary streams during the summers of 2020-2022. Data include pH, temperature, flow, turbidity, dissolved oxygen and *E. coli*, among others. The interns operate with guidance from UWGB biology professors Rebecca Abler and Rick Hein.

Funding from this project will allow the inclusion of high school students in the summit, as well. Mentored by the undergraduate interns and their teachers, the high school students will also learn how to present scientific information from their water quality studies. They'll have the opportunity to create scientific posters for the summit or give informal presentations.

"This project is going to really enhance the realworld aspect of science for our students," said Abler. "They won't just be collecting data. They'll be learning how to communicate to various audiences. They're not just doing this for faculty members they're doing this for the community — which is our goal at the university. So it's just really exciting."

The graduate

intern who will be

#### **COVER STORY**

# **PFAS RAIN**

>> Continued from page 5

mentoring the undergraduate students will also work on the stormwater messaging resource hub with advisement from Jacob Fincher, acting executive director of Sweetwater, and Peroff.

The hub is a web-based clearinghouse of information related to stormwater pollution prevention. Sweetwater has created a <u>framework for</u> <u>the hub</u> and plans to have the graduate student work with the Lake Michigan Stakeholders Communication Committee to pick the most applicable stormwater education materials. Once those are all loaded into the website, Fincher said the intern will remind stormwater groups along the coast when certain messages should be publicized and how to do that.

Fincher offered a fictional example of a billboard as an explanation of the concept. "If I were to drive from Kenosha and see a billboard about stormwater pollution prevention ... and see the logo of a certain organization in the corner, then drive up past Milwaukee and see that same message but with a different logo, all the way up to Port Washington to Door County to Green Bay and Marinette, and continue to see that same message provided by different organizations that takes coordination and facilitation. That's where the intern will help us," Fincher said.

The graduate student will also work with Peroff to develop a science data communication toolkit, which will be used to mentor the undergraduate interns at UW-Green Bay, Manitowoc Campus. The toolkit will help the students present their findings at the summit in an understandable way.

Peroff summed up the complex project with this: "The faculty are going to be mentoring the undergraduates. The undergrads are going to mentor the high school students. The graduate students are mentoring the undergraduates. We're (project staff) mentoring the graduate students. So, it's this broad connection of mentorship, and then the key is having students share what they learned so communities can gain knowledge as well." –MEZ

Left to right: Rebecca Abler, Joshua Fincher and Deidre Peroff



on agricultural fields could result in further dissemination with potential for contamination of water resources and crops.

With funding and collaboration with the DNR, Shafer will also be studying how PFAS are distributed and transformed in the atmosphere. He will be collecting PFAS precipitation samples from seven NADP sites in Wisconsin every week for a threeand-a-half-month period.

"That will be one of the more intensive studies of PFAS done anywhere," Shafer said. He's also working with several northeastern states to establish a similar project.

"We need to understand what is driving the distribution pattern of PFAS in the atmosphere — what compounds are contributing to the load, how can we fingerprint sources — a whole list of things where further work would need to be done," Shafer said. —MEZ



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### **Aquatic Sciences Chronicle**

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### **Peruse the Projects**

Every two years, Sea Grant releases a call for research proposals. That first step toward a final research portfolio is a demonstration of rigor, rigor that ensures alignment with the program's strategic plan and harvests input from stakeholders and partners about the best use of research dollars.

Employing the same principles of discipline and relevance to Wisconsin's needs, rigor then carries through the whole process. From preproposal and full proposal review to evaluation by Sea Grant's Advisory Council and scrutiny by the National Sea Grant College Program, the rigorous process resulted in funding for 15 research projects probing timely Great Lakes topics.

Download the 2020-22 Directory of Projects and People to peruse the projects.

### **CALENDAR** OF EVENTS



**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** or **wri.wisc.edu** or follow our social media channels.

