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Aquatic Sciences Chronicle

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

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WATER RESOURCES INSTITUTE

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University of Wisconsin Aquatic Sciences Center
1975 Willow Drive
Madison, WI 53706-1177
608-263-3259
Email: chronicle@aqua.wisc.edu
Web: seagrant.wisc.edu, wri.wisc.edu

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

ASSISTANT DIRECTOR FOR COMMUNICATIONS

Moira Harrington

EDITOR

Elizabeth A. White

WRITERS

Moira Harrington, Jennifer A. Smith, Elizabeth A. White, Morgan Witte and Marie Zhuikov

ART DIRECTOR

Yael Gen

DESIGNER

Yael Gen

CIRCULATION MANAGER

Linda Campbell

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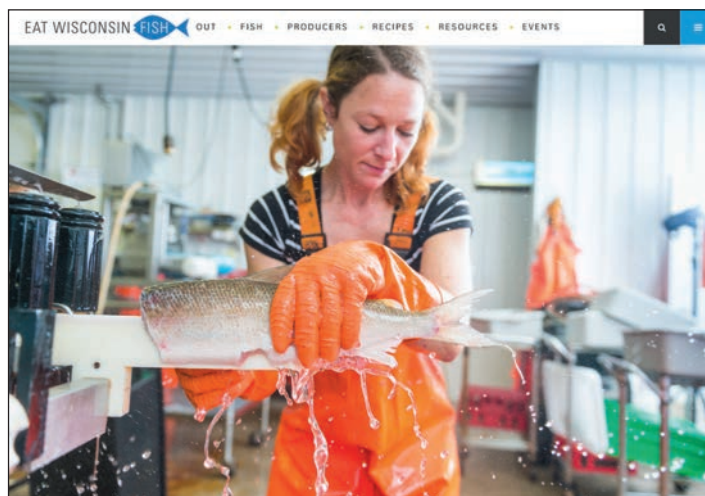
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FEATURED WEB



David Nevala

Fishing for Information?

eatwisconsinfish.org

In recent years, the "eat local" food movement has really taken root, with many consumers striving to purchase produce, meat and other foods grown and raised near where they live. Eating local reduces the distance food must travel, bolsters local economies and often builds a personal connection between the home cook whipping up dinner and the farmers who make that meal possible through their efforts.

But what about fish? It, too, can be a part of eating local. To share that important message with consumers, Wisconsin Sea Grant launched the Eat Wisconsin Fish campaign in 2014, and it's getting some renewed attention this year.

Eat Wisconsin Fish educates consumers about local, healthy and delicious Wisconsin fish — both wild-caught and farm-raised. Tasty recipes feature prominently on the website, from "spring salad with miso-maple Arctic char" to "smoked rainbow trout frittata."

Website visitors can also find information about producers, where to buy Wisconsin fish and why selecting fish farmed or caught locally is a smart choice that supports sustainability and Wisconsin jobs.

[Follow us on Facebook](#). Take a look, and you just might be inspired to cook something new for tonight's dinner! — JAS

Water Quality Knowledge

While University of Wisconsin-Madison Associate Professor Christina Remucal may be thousands of miles from home right now — she's on sabbatical in Switzerland — she's busy investigating an issue that has implications for the water Wisconsinites drink every day.

Through funding from the Water Resources Institute, Remucal is studying the impact that the composition of dissolved organic matter has on the formation of disinfection byproducts in groundwater when that water is treated for use.

(DBPs). Some of these byproducts, such as chloroform, can be cancer causing or otherwise detrimental to human health. It is a complex problem, and scientists have not identified all possible DBPs.

"It's a trade-off when we disinfect our water," said Remucal. "It means inactivating pathogens that will make us sick, and also forming these harmful compounds, which are of course regulated and generally present in low concentrations."

Remucal's research will expand understanding of the chemical composition of dissolved organic



REMUCAL'S RESEARCH FURTHERS KNOWLEDGE ABOUT DRINKING WATER SAFETY, PARTICULARLY FROM GROUNDWATER

"This project is related to drinking water quality," explained Remucal. "When we have treated drinking water, one of the most important steps is doing disinfection to inactivate pathogens like viruses and bacteria. Most utilities in the U.S. and in Wisconsin use chlorine for disinfection."

While chlorine is highly effective, it also reacts with naturally present compounds that are found in all waters, and this can result in the formation of harmful chemicals called disinfection byproducts

matter (DOM) and how that composition can affect the types of disinfection byproducts that are formed during water treatment. While DOM is present in both groundwater and surface waters like lakes and rivers, its composition varies widely.

She'll place a special focus on groundwater, which is the source of most drinking water in Wisconsin and not well studied with regard to this issue. "We're looking at dissolved organic matter in groundwater, and how that compares to surface

Source photos: Reid Milstead

continued next page >>



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Climate Change and Humanity

Conversations about climate change are often filled with scientific data, facts and figures. Of course this scientific information is important, but it can be difficult to relate to on an individual level. The books below discuss how climate change affects humanity on global, local and individual scales for a more personal look at the impacts of climate.

STORMING THE WALL: CLIMATE CHANGE, MIGRATION, AND HOMELAND SECURITY

By Todd Miller. San Francisco: City Lights Publishers, 2017.

An intriguing piece of investigative journalism, this book explores connections between corporate crashes, environmental injustices and the militarization of borders by juxtaposing stories of hope and desperation.

FIELD NOTES FROM A CATASTROPHE: MAN, NATURE, AND CLIMATE CHANGE

By Elizabeth Kolbert. London: Bloomsbury Publishing PLC, 2007.

From scientific evidence to personal stories, Kolbert investigates the impacts of climate change with a focus on the already-altered north pole communities.

CLIMATE REFUGEES

By Collectif Argos. Cambridge, Mass.: The MIT Press, 2010.

The journalists at Collectif Argos met with climate refugees, people “forced into exile by global warming’s detrimental effects.” Nine geographical locations, each facing disaster due to climate change, are explored through personal interviews with and photography of those who have been displaced.

SCIENCE OF THE EARTH, CLIMATE AND ENERGY

By Milton W. Cole, Angela D. Lueking and David L. Goldstein. Hackensack, N.J.: World Scientific Publishing Co., 2018.

The authors begin with a discussion of the basics of what science is and how it works as a field of study. They then build upon this to discuss the Earth in a way that focuses on steps individuals and societies can take to mitigate the impacts of climate change.

Please visit the Wisconsin Water Library online at waterlibrary.aqua.wisc.edu for more information about the library’s resources on climate.

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

Water Quality Knowledge

water, and then we’re looking at how that organic matter — again in groundwater versus surface water — reacts with chlorine to form disinfection byproducts.”

The project was selected for WRI funding in 2018 and runs through 2020. It is made up of three main stages. The first is collecting water samples from various Wisconsin water utilities and running analyses. Reid Milstead, a graduate student of Remucal’s in the Environmental Chemistry and Technology Program within the Department of Civil and Environmental Engineering, is assisting with this process, and the Wisconsin Rural Water Association has helped connect Remucal and Milstead with local water utilities.

“We’re using traditional chemical approaches, but we’re also using some really state-of-the-art high-resolution mass spectrometry approaches to look at dissolved organic matter,” said Remucal.

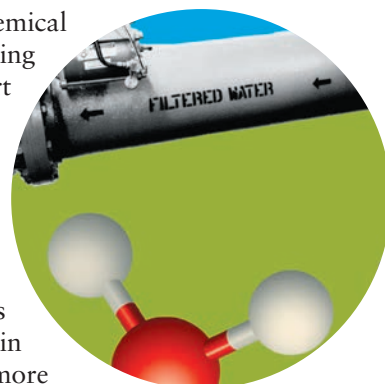
Phase two entails sorting through vast amounts of data and identifying trends that are related to water in Wisconsin but are also more broadly applicable.

The third and final phase is an ambitious one that takes a predictive approach. “The direction we’re moving in is to be able to predict — if this is my water sample, and this is its basic chemistry — how big of a problem disinfection byproducts are going to be,” said Remucal.

She will share research results with organizations like the Wisconsin Rural Water Association and the Wisconsin section of the American Water Resources Association.

While Remucal is enjoying her sabbatical year in Switzerland (she completed a postdoc there and is now splitting her time between two research institutes), she likes knowing that her Water Resources Institute study will benefit Wisconsinites by furthering what we know about drinking water safety.

“The work we’re doing is pretty fundamental, and so it has broader implications for drinking water everywhere, but it’s also tied to the state of Wisconsin,” said Remucal. “It will answer some questions locally in Wisconsin, and it’s nice to have that aspect to it.” — JAS





Graduate Assistant Seeks to Balance People, Planet and Prosperity

In her studies, master's degree student Megan Hoff pursues a balance between people, the planet and prosperity.

She foresees her career ultimately following that same philosophy and is working with Wisconsin Sea Grant's Julia Noordyk in Green Bay to make that possible.

Noordyk, water quality and coastal communities outreach specialist, hired Hoff last fall as the first-ever graduate assistant in one of Sea Grant's field offices. In this role, Hoff receives tuition, benefits and a stipend for two years at the University of Wisconsin-Green Bay.

"At Sea Grant, we're trying to integrate more of the social sciences into our program," Noordyk said. "Hoff had a social science policy background, and that's what made her application stand out. She has a high interest in being interdisciplinary."

Hoff earned her bachelor's degree from DePaul University in Chicago in environmental studies with an economics minor. In addition to attending graduate classes for her environmental science and policy degree, Hoff is working 20 hours per week on Sea Grant projects. The first is a community-based watershed plan for Mahon Creek and Wequiock Creek, which flow along and through the university campus into coastal wetlands along Green Bay. Both creek watersheds are part of the Lower Green Bay and Fox River, which is one of the most degraded aquatic ecosystems along the Great Lakes and has been designated as an Area of Concern by the U.S. Environmental Protection Agency.

In an approach that Noordyk characterizes as unique, Hoff is working in concert with the

Cofrin Center for Biodiversity at UW-Green Bay to involve university students and staff, state and federal agencies, citizen scientists, foundations, land trusts, several local governments and private landowners in creation of the watershed plan with hopes to improve habitat and water quality.

"I think it's very important to integrate the community's voice into conservation projects and planning," Hoff said. "This watershed plan is very much a public policy document in that it addresses policies that are related to everyday actions within the community. We hope to work with the various stakeholders to encourage practices within the watershed that are better suited for the environment and subsequently, human health."

The other project receiving Hoff's attention is the Green Infrastructure Code Audit, a workbook created by Noordyk and partners that shows communities how to review and update their city codes and ordinances to encourage practices that reduce stormwater pollution. Hoff will be helping Noordyk develop a companion resource to the workbook that features examples of code amendments.

Hoff is excited to work for Wisconsin Sea Grant. "Throughout my undergraduate program and the years leading up to my master's degree, I've looked up to the Sea Grant organization. I've aspired to work for it and I am thankful to now be part of it," Hoff said. — MEZ

Background: map showing part of the Brown County town of Humboldt within the Wequiock Creek and Mahon Creek watershed

Hidden Danger

Meteotsunamis Can Cause Unexpected Rip Currents

There are very few photos of meteotsunamis in the Great Lakes, but photographer Todd Reed captured these images on April 13, 2018. The Ludington, Mich., breakwater was submerged (left) when the meteotsunami struck and then exposed by low water levels only 9 minutes later (right) when the floodwaters swept back into Lake Michigan.

The storm on Lake Michigan lasted only 15 minutes, but the conditions it put into motion took seven lives.

It was Independence Day 2003, near Warren Dunes State Park along the Michigan coast when a storm hit, driving swimmers out of the water. When the storm passed and the sun emerged, they returned to the water even though no lifeguards were present and red flags flew their warning colors over the beaches.

In one case, members of a religious group had driven 80 miles from Chicago to the beach. Under clear skies, many hit the water immediately. Several men and young boys went out deep, although they stayed within the swimming area buoy markers. Then they felt the strong current carrying them away from shore.

News accounts at the time called the current a rip tide and undertow, but scientists now know it was a rip current. Two boys, ages 12 and 15, were in distress and a group of adults swam out to help them. The men pulled the 12-year-old to shore but were unable to rescue the 15-year-old. Two of the rescuers were pulled away by the current.

The young boy survived, but the older boy and two rescuers drowned. On other parts of that Lake Michigan shoreline, four other people drowned in separate incidents over the deadly holiday.

IDENTIFYING A METEOTSUNAMI

These incidents came under scrutiny recently by Wisconsin Sea Grant scientists who are studying a storm-induced wave called a meteotsunami (a contraction of the term meteorological tsunami, which means a wave caused by weather).

Their results were published on Feb. 14 in “Scientific Reports.” The article, “Unexpected rip currents induced by a meteotsunami,” details findings that the storm formed a moderate-height (less than 10 centimeters) meteotsunami, which went on to cause the unexpected rip currents.

Although these conditions may not be rare, this is the first time researchers have verified a meteotsunami-generated rip current (or meteo-rip, for short).

“No one in the world has ever documented this before,” said Chin Wu, professor of civil and environmental engineering at the University of Wisconsin-Madison. “Meteotsunamis are a new generation mechanism for rip currents.”

Wu explained that rip currents formed by the one-time wave of a meteotsunami can last for hours afterward. Beachgoers need to be cautious after a storm passes.

“Please do not go back to the beach because that’s the most dangerous time. The water might look calm, but underneath, there’s a hidden danger,” Wu said.

Eric Anderson, physical oceanographer with the National Oceanic and Atmospheric



Administration's (NOAA) Great Lakes Environmental Research Laboratory, is a member of the research team headed by Wu's Ph.D. student Alvaro Linares.

"It wasn't explained before exactly what happened that day to connect all these different swimmers together into one event," Anderson said. "People maybe weren't even aware that a storm had passed a couple of hours earlier, and they decided to go to the beach because things had cleared up. They went in the water and this caught them off guard. When you see clear skies and calm conditions, you don't expect dangerous conditions on the shoreline.

"In this paper, we see how a relatively small wave height of the meteotsunami translates into dangerous currents. It comes from the wavelength being so long. The wave may be short but when it's a kilometer long, that's a lot of water that comes to the shore and then retreats back over a few minutes. When that much water moves that fast, you get some dangerous currents," Anderson said. The water pushed by the wave escaped the shore by forming rip current channels.

To document the meteo-rip formation, Linares, who recently graduated from UW-Madison and is now working for a consulting company in the United Kingdom, performed feats of forensic computing. Through powerful hydrodynamic modeling, he was able to reveal what was happening

on the beaches at the time of the 2003 incidents, going from a grid scale of several kilometers down to one meter. He also used eyewitness reports of the events.

EFFECTS ON HAZARD WARNINGS

The National Weather Service (NWS) currently issues beach hazard statements, which include conditions for rip currents but not for meteotsunamis. This journal article has forecasters considering how to include this new type of hazard.

meteotsunami *noun*. mē-tē-o-soo-NÄ-mē
a contraction of the term meteorological tsunami, which means a wave caused by weather.

"As an operational forecaster for the National Weather Service, my thought is, how can I put this into action with a warning for people before the event?" said Robert Dukeshere, senior forecaster for the NWS in Grand Rapids, Mich. "Meteotsunami-induced rip currents are something that will require an education effort and then we're going to need data in real time to try to be able to forecast them while they're going on."

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Joining Forces for Aquaculture

Attendees at the 24th annual Wisconsin Aquaculture Conference not only heard a keynote address from Steve Summerfelt, chief science officer at Superior Fresh, they also dined on salmon and greens from the state-of-the-art aquaponics facility located in Hixton, Wis. Superior Fresh is the United States' first land-based Atlantic salmon producer and the world's largest aquaponics operation. It's also a Wisconsin success story, one example from a growing aquaculture industry.

The conference, held Feb. 15-16 in Eau Claire, brought together current aquaculture producers both large and small, those looking to enter the field, journalists, researchers and others. The conference was co-presented by the Wisconsin Aquaculture Association and the University of Wisconsin-Stevens Point Northern Aquaculture Demonstration Facility (UW-Stevens Point NADF), a national leader in aquaculture research. Roughly 155 people attended.

UW-Stevens Point NADF, based in Bayfield, played a pivotal role as point of connection between the Wisconsin Aquaculture Association, Superior Fresh and other entities behind the conference. Emma Wiermaa, who works for both UW-Stevens Point NADF and Wisconsin Sea Grant, helped organize the conference, as did UW-Stevens Point NADF Facility Manager Greg Fischer.

At the conference, Wiermaa, an aquaculture outreach specialist stationed at UW-Stevens Point NADF, presented research on raising walleye intensively in indoor systems. Titus Seilheimer, Wisconsin Sea Grant fisheries specialist, outlined the variety of ways in which Wisconsin Sea Grant supports aquaculture.

Fischer presented data on several ongoing Sea Grant-funded research projects addressing questions about raising walleye and saugeye intensively. Fischer feels that walleye is poised for a bright future. "We're changing the future for aquaculture

species with walleye. It will be the next big food fish for aquaculture in the Midwest, probably in the next five years," he said.

Consumer opinions were a theme that arose several times during the day. Don Schreiner of Minnesota Sea Grant, who played a key role in bringing Minnesota representation to the conference, noted that aquaculture still needs to gain acceptance with some consumers.

Schreiner's observations were echoed later in the day by Bret Shaw, a UW-Madison associate professor of life sciences communication who leads a research team investigating consumer attitudes towards Wisconsin farm-raised fish. Wisconsin Sea Grant is funding the study. Others on the research team include Wisconsin Sea Grant Social Scientist Deidre Peroff and Professor of Fisheries Biology Chris Hartleb of UW-Stevens Point.

While Europeans generally view aquaculture positively, Shaw said, a significant chunk of Americans have negative perceptions of the industry and prefer wild-caught over farmed fish. But that can change, noted Shaw, because research shows that Wisconsin consumers trust Wisconsin aquaculture producers.

"Wisconsin fish farmers are well positioned to be trusted advocates for their own products," stated Shaw.

Further research during 2019 by Shaw and his team will test a variety of social media messages with consumers to gauge how they respond to various points about Wisconsin-farmed fish.

TO LEARN MORE

A wealth of conference information is available online, including slides from many of the presenters, located at go.wisc.edu/r1u99k.

For more information about the Wisconsin Aquaculture Association or to join, visit its website at wisconsinaquaculture.com. — JAS



Emma Wiermaa / UW-Stevens Point NADF

Meteotsunamis and Dangerous Rip Currents

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Megan Dodson, a NWS meteorologist in northern Indiana, said this study, “Gives us the green light to say, ‘Yeah, we’re pretty confident that meteotsunamis impact current development and we should issue a warning.’”

The 2003 events sparked Dodson’s passion for studying rip currents. Both she and Dukeshner are involved in the Great Lakes Water Safety Consortium, which works to make people aware of rip currents and other beach hazards. She finds the study’s results validating.

“We didn’t even think rip currents could happen on the Great Lakes until the late 1990s,” Dodson said. “It was the subject of debate all the way through the early 2000s. Even after we started doing the forecast warnings, not everybody was totally convinced that it was rip currents. A lot of people were saying it was just waves. So this study scientifically supports speculation of rip currents in the Great Lakes. Now we know there was something else going on!”

SPREADING THE WORD

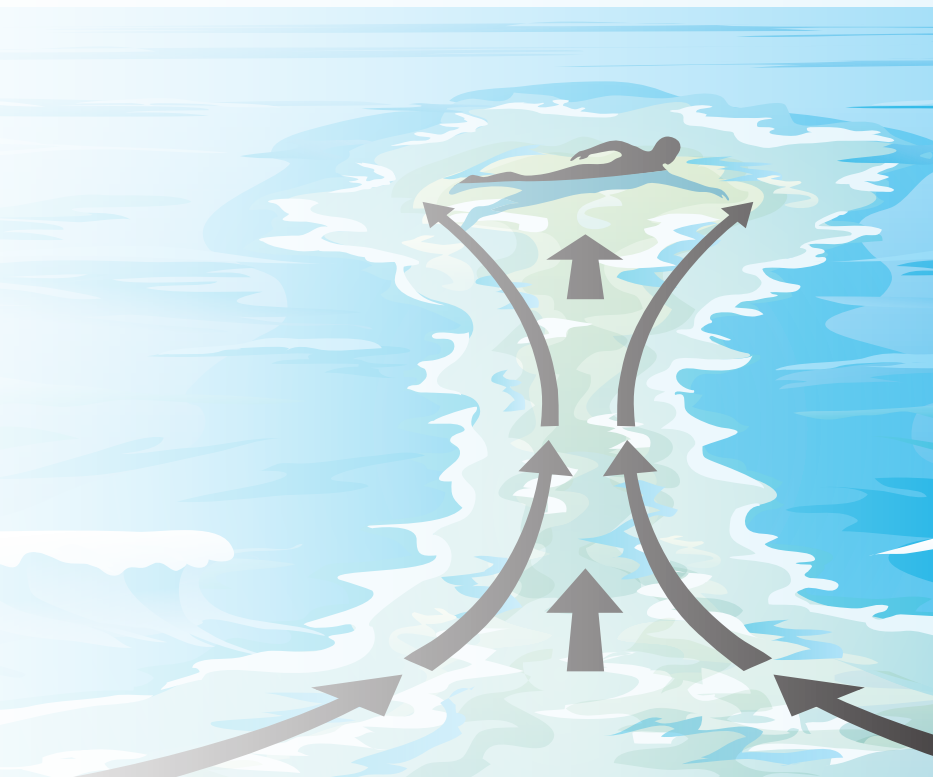
Public education is also needed on the topic, Wu said. “I believe that everyone should talk to their parents, to their people, about this. After a storm is the time we should pay great attention to rip currents. The highest risk occurs when people pay no attention.”

Statistics from 2018 attest to the need for education about water safety. With 117 drownings, last summer was the deadliest on record for the Great Lakes, according to the Great Lakes Surf Rescue Project.

Anderson thinks public understanding of meteotsunamis has progressed, but still faces challenges. “A lot of people picture those big tsunami waves from a Hollywood movie, and that’s not what these things look like.”

Dukeshner said many people mistake meteotsunamis for seiches. “They’re two very distinct things. A seiche is a sloshing in a bathtub that is rhythmic. There’s a rise and fall on each end. A meteotsunami is if you put your hand in a bathtub and just rammed it from one side to the other,” Dukeshner said.

Other members of the research team included Adam Bechle with Wisconsin Sea Grant and



HOW TO SURVIVE A RIP CURRENT

- Don't fight the current
- Swim even with the shore until the current weakens, then swim to shore
- If you can't escape, float or tread water
- If you need help, call or wave for assistance
- Never swim alone

More information at ripcurrents.noaa.gov

David Kristovich with the University of Illinois at Urbana-Champaign.

This project was supported in part by the NOAA Coastal Storms Program, Wisconsin Sea Grant, the Cooperative Institute for Great Lakes Research, the National Science Foundation's Graduate Research Fellowship Program, the Wisconsin Coastal Management Program, NOAA Great Lakes Environmental Research Lab and the Illinois State Water Survey-University of Illinois. —MEZ

Re-Quall-ifying the Clean Marina Program

Theresa Qualls

Theresa Qualls is returning to her work roots as the Clean Marina Program coordinator for Wisconsin. Qualls, who has an undergraduate degree in zoology from the University of Wisconsin-Madison and a master's degree from the University of Wisconsin-Green Bay in environmental science and policy, worked for the program with former coordinator Victoria Harris.



“We actually helped get the Clean Marina Program started,” said Qualls. “One of the big things I worked on was development of the program guidebook. I also was able to go on marina site visits. I always really liked this project — it’s a voluntary program.

The marina operators like it and it’s good for the boaters, plus it’s good for the environment. It’s great to be back!”

The Clean Marina Program (wisconsinmarine.org/clean-marina-program) is designed to reduce pollution from marinas to protect Wisconsin’s waterways. To become certified, marinas adopt a list of best-management practices. Program staff conduct site visits to verify marina practices and provide training to marina and boatyard managers.

The program has certified 21 marinas since its start in 2009. With another three certifications pending and 14 more marinas interested in the program, Qualls will have plenty to do in her part-time position.

Her hire is thanks to a \$200,000 grant from the Fund for Lake Michigan. Julia Noordyk, Wisconsin Sea Grant’s water quality and coastal communities outreach specialist and coordinator for this grant, said the funding allows for increased one-on-one support between the clean marina coordinator and marinas that are interested in the program.

Qualls plans to increase the number of marina certifications and recertifications. “I’ll also be updating the guidebook — there’s been new regulations and things have changed since I wrote it in 2012. And I’ll be coming up with more boater education programs and tip sheets” Qualls said.

The Clean Marina Program is administered by Wisconsin Sea Grant in partnership with the Wisconsin Marine Association and the Wisconsin Coastal Management Program. Additional partners include the Wisconsin Department of Natural Resources – Office of Great Waters, SmithGroup and the U.S. Coast Guard.

Interested in participating in the Clean Marina Program? You can contact Qualls at quallst@uwgb.edu or (920) 465-5031.

— MEZ

Vintage Science Demonstration

1988 was a very good year for Wisconsin Sea Grant-funded research papers. Project Assistant Molly Daniels surveyed 48 years’ worth of peer-reviewed journals — going back to 1970 — and identified 1988 as having the greatest number of citations: 1,857.

The popularity of one particular paper accounts for most of 1988’s good vintage. That was Thomas J. Miller and team’s seminal work on the larval size and recruitment mechanisms in fishes, published in the “Canadian Journal of Fisheries and Aquatic Sciences.” The paper promoted the idea of using the body size of larval fishes as a predictor of survival success — a measure useful to fisheries managers.

Miller et al.’s paper generated 876 citations. Coming in second with 687 citations was Adrian J. Hill and team’s 2005 paper on zebrafish as a model vertebrate for investigating chemical toxicity, published in “Toxicological Sciences.” Next was James F. Kitchell and colleagues’ 1977 paper on applications of a bioenergetics model to yellow perch and walleye, with 644 citations.

“The 15 most highly cited papers demonstrate the breadth of expertise that Wisconsin Sea Grant-funded researchers have contributed to their fields, particularly in the areas of fisheries, toxicology and contaminants, lake ecology and aquatic invasive species,” said Jennifer Hauxwell, Wisconsin Sea Grant’s research coordinator.

In total, since the 1970s, Sea Grant researchers published more than 930 papers, which have been cited more than 33,850 times.

“It’s important for researchers to publish in peer-reviewed journals because it means their work is high quality,” Hauxwell said. “It also means that the world has access to the details of their studies in perpetuity, and it lays the foundation for the next set of scientific questions. Over time, researchers can build off the work that came before them as they continue to explore how our world works and functions.

“We are proud of the scientific legacy associated with over 900 published papers cited over 33,000 times in a wide array of scientific journals. It means our researchers are conducting top-notch work on a number of different topics and getting their work out there for others to use. That is the foundation of our mission,” Hauxwell said.

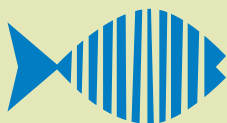
An archive of Sea Grant-funded journal articles is available on a searchable website: seagrant.wisc.edu/research/archive-of-scientific-papers. — MEZ

Research Impacts



1,857

That's the highest number of citations received by Wisconsin Sea Grant-funded research papers in a single year.



876

The number of citations generated by Adrian Hill's team's 2005 paper on zebrafish as a model invertebrate for studying chemical toxicity.



More than

930

papers have been published by Sea Grant researchers since the 1970s.



More than

33,000

That's the number of citations received by Wisconsin Sea Grant-funded research papers.

New education coordinator Ginny Carlton

Ginny Carlton joined Wisconsin Sea Grant in March as the new part-time education outreach specialist. Carlton, who has a Ph.D. in curriculum and instruction and environmental resources from the University of Wisconsin-Madison, will work out of the Sea Grant office in Madison.

Carlton has a depth of experience in the educational field and will keep her other part-time job as a training coordinator

for the UW-Madison Division of Extension. In that position, she oversees planning and development of a dozen online professional development courses offered through the Natural Resources Conservation Service. The courses are designed to enhance the knowledge and skills of conservation planners. She has also worked as an environmental education instructor for UW-Stevens Point and was on the staff of the Wisconsin Environmental Education Board.

"Ginny brings a wealth of experience together with a passion for environmental education to our program," said David Hart, Wisconsin Sea Grant's assistant director for extension. "We have a wide range of educational activities — from Grandparents University to collaborations with other Sea Grant programs on Great Lakes literacy. We are excited to have Ginny on board."

Carlton, who fills the position vacated by Kathy Kline last year, will help with teacher training programs such as those aboard the schooner Denis Sullivan, and she will work closely on outreach programs with Wisconsin Water Librarian and Education Coordinator Anne Moser.

Carlton began her academic career in the natural resources field and then combined that with education. She earned her bachelor's degree in forest biology at the State University of New York and her master's in natural resources from UW-Stevens Point.

"I'm looking forward to the opportunity to work with colleagues across the state who are doing important work in water education," Carlton said. "The opportunity to work with teachers in K-12 settings as well as in informal education settings like nature centers and parks attracted me to this position as well as the opportunity to include cutting-edge education research that others are doing and sharing."

Carlton enjoys swimming and canoeing. She has taught education classes centered around water in the past and is thankful to live in Wisconsin with its rich water resources.

You can contact her on Mondays and Wednesdays (all day) or Friday mornings at either gcarlton@aqua.wisc.edu or 608-262-0645. — MEZ



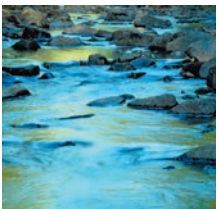
Bonnie Willison / Wisconsin Sea Grant



University of Wisconsin Aquatic Sciences Center
1975 Willow Drive
Madison, WI 53706-1177

Aquatic Sciences Chronicle

a joint newsletter from UW Sea Grant and UW Water Resources



CALENDAR OF EVENTS

SEPT. 29 – OCT. 3, 2019

**American Fisheries Society and the Wildlife Society
Joint Annual Conference**

Reno, Nev.
afstws2019.org

OCT. 16 – 19, 2019

**North American Association for Environmental
Education Conference**

Lexington, Ky.
naaee.org/conference



Timothy T. Wenzel



Raise Your Voice

You value the Great Lakes and what they mean economically and culturally for this region. The National Sea Grant College Program is a cost-effective — currently funded at \$80 million annually with a 185 percent return on federal investment — way to promote the sustainable use of these national treasures. The federal administration, however, has proposed eliminating Sea Grant. You could contact members of Congress to let them know you value Great Lakes research, outreach and education. For the House of Representatives, check house.gov/representatives/find, and for the Senate, check senate.gov.

If you would like to include details on Wisconsin Sea Grant's impacts, visit go.wisc.edu/64y3b0 for examples and ideas.