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# Slippery Slope

THE EFFECTS OF REDUCED ICE COVERAGE ON GREAT LAKES MARINE TRANSPORTATION

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### **Aquatic Sciences Chronicle**

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The University of Wisconsin Sea Grant Institute is part of a national network of 34 universitybased programs funded through the National Sea Grant College Program, National Oceanic & Atmospheric Administration, U.S. Department of Commerce, and through matching contributions from participating states and the private sector.

The University of Wisconsin Water Resources Institute is one of 54 Water Resources Research Institutes nationwide authorized by the federal Water Resources Research Act and administered through the U.S. Geological Survey.

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Commercial fishing in Wisconsin is a tale of hard work, grit and passion. The people involved take pride in bringing a fresh, healthy product to area restaurants and markets. This summer, Wisconsin Sea Grant staffers Sharon Moen, Bonnie Willison and Jennifer Smith visited Lake Superior commercial fishers in Bayfield. From those visits, Willison produced a series of vivid, one-minute videos that allow viewers to meet the folks bringing fresh fish to their plates.

Said Bill Bodin of Bodin Fisheries, "One of the things that I wish people knew is the work and effort that goes into providing fish for them that is local, that is healthy, and that they would choose that fish more often" over imported products that may not adhere to the same stringent regulations that guide U.S. and Wisconsin fish and seafood.

At the Red Cliff Fish Co., owned and operated by the Red Cliff Band of Lake Superior Chippewa, Clarence Pratt oversees processing of species like whitefish, lake trout and lake herring. He seeks to train others in this skill. "The more that I learn, the more that I want to take it and teach other people and get them interested in it," said Pratt. The band operates a retail market that opened during the COVID-19 pandemic and also provides fish for elders in Native American communities.

Also featured in the Bayfield "EatWisconsin Fish" videos are Craig Hoopman of Hoop's Fish Market and Jessica Resac, an employee of Halvorson Fisheries. Both describe their zest for getting out on the waters of Lake Superior. -JAS

# **Chin Joins Tourism Council**

Natalie Chin, Wisconsin Sea Grant's climate and tourism outreach specialist based in Superior, was recently appointed by Gov. Tony Evers to the <u>Wisconsin</u> <u>Council on Tourism</u>.

"We're working to make sure our state and our economy continue to recover from the coronavirus pandemic, and the Wisconsin Council on Tourism will play an important role in advising the secretary of the Department of Tourism in the weeks and months ahead," said Gov. Evers. "Our tourism industry and workforce are a critical part of our state's economy, and I'm proud of the work we've done through my first two budgets and targeted federal assistance to help support tourism in Wisconsin and ensure this industry can bounce back from this pandemic."

Chin works on issues related to climate change, tourism and outdoor recreation within the context of the sustainable use of the Great Lakes. She also serves as one of the north central region representatives for the National Extension Tourism Network; is co-leading the Tourism and Outdoor Recreation Working Group for the Wisconsin Initiative on Climate Change Impacts; and is a member of the Wisconsin Department of Tourism's Diversity, Equity, Accessibility and Inclusion Committee.

"It's truly an honor to be appointed to the council," Chin said. "The Great Lakes are a key part of the state's tourism industry and will certainly play an important role in its recovery. I can't wait to contribute to the council's efforts to support and advise the Department of Tourism."

## "The Great Lakes are a key part of the state's tourism industry and will certainly play an important role in its recovery."

### NATALIE CHIN CLIMATE AND TOURISM OUTREACH SPECIALIST

Evers also reappointed Mary McPhetridge and Robert "Bert" Davis and appointed Denise Stillman as a new member to the council.

The 21-member council, which includes 14 gubernatorial appointees and seven ex-officio members, represents varied geography and wide-ranging expertise that includes, but is not limited to, recreation and attraction business owners, hospitality and service industry business owners, convention and visitor bureaus, economic development specialists, industry thought leaders, legislators, and leaders of arts, historic and cultural destinations. Despite the pandemic, the tourism industry supported more than 157,000 jobs and drove \$17.3 billion in total business sales in 2020. – MEZ



# Ice Loss Is a Slippery Slope

STUDY EXAMINES EFFECTS OF REDUCED ICE COVERAGE ON GREAT LAKES MARINE TRANSPORTATION

United States Coast Guard cutter in Lake Superior near Duluth, Minnesota. y the year 2050, which is only 30 years away, there are expectations that there will be relatively little ice on

the Great Lakes that will impede the navigation of vessels," according to Richard Stewart, director of the Transportation and Logistics Research Center at the University of Wisconsin-Superior (UWS).

A preponderance of climate studies on the Great Lakes predict a trend toward reduced ice cover. Ice is expected to form later and melt earlier. With Wisconsin Sea Grant funding, researchers at the UWS are looking into how this might impact the shipping industry on the Great Lakes.

Stewart is undertaking the yearlong study with Daniel Rust, UWS assistant professor of transportation and logistics. To begin, they conducted a literature review of Great Lakes climate studies on ice cover.

By collecting data on cargo movements from lake carriers along with data on the ship types and carrying capacities, they will create models that can be used by commercial ports and shipping companies. They plan to look at three main cargoes, taconite, coal and limestone, developing models first for a single vessel, then for a fleet and determining the operational and economic impacts if the shipping season is extended by 20 days. They will also conduct another analysis for a 50-day extension of the shipping season.

Stewart explained, "Say that with the existing fleet of ships, how many ships would be needed to carry

that same amount of cargo if they could operate instead of nine months per year — 10 months, 11 months and 12 months? If that cargo pie doesn't grow bigger, we believe our research will indicate a need for fewer ships."

A longer shipping season with fewer ships could have far-reaching ramifications, especially in Wisconsin, which is one of the nation's largest shipbuilding and ship-repair sites. Taconite, coal and limestone terminals may no longer need to store large buffer stocks of their products to carry them through the winter since they might be able to operate year-round. Ship maintenance usually takes place during winter when ice impedes navigation. Maintenance work could switch to a short two-week period because the ships might be operating year-round. That's what oceangoing ships do.

In fact, Stewart and Rust are looking to the Baltic Region shipping industry for guidance. "It has a similar geographic size to the Great Lakes and the same issues with ice," Stewart said. "They operate year-round and move cargoes. We've visited the Baltic for preliminary research. We're looking to see if there are similar cargoes and trade patterns that might have applicability on the Great Lakes."

Stewart and Rust will also assess what opportunities may arise for new cargoes if the shipping season is extended by 20 days and 50 days. It could be that some commodities would move from rail and truck transport to vessel transport, instead.

NOAA Great Lakes Environmental Research Laboratory

Deb DeLuca, director of the Duluth Seaway Port Authority, expects the study will provide significant information. She said the possibility of having shipping seasons that are essentially ice-free could mean less risk to ships from ice and less expense needed for icebreakers. DeLuca agrees that year-round shipping could attract new commodities.

"It might open up the entire waterway to greater usage, which is a good thing because shipping is environmentally beneficial," DeLuca said. "It takes trucks off the road. It would be a plus for all sorts of reasons, and the research allows us to plan ahead." The researchers are cooperating with many organizations on their study including the Lake Carriers' Association, the U.S. Coast Guard, the U.S. Army Corps of Engineers and the ports of Milwauke and Duluth-Superior, and Burns Harbor, near Gary, Indiana.

Rust will be collecting data and overseeing student workers on the project. "We've just begun to scratch the surface on this issue," he said. "Obviously, climate change is happening, and we need to be ready to adapt to whatever is coming and to take advantage if there are opportunities that arise." – MEZ

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## **Rivers2Lake Program** CONNECTING TEACHERS AND STUDENTS TO THE LAKE SUPERIOR WATERSHED

Teachers from northern Wisconsin and northern Minnesota received firsthand experience in their watershed recently, thanks to the <u>Rivers2Lake Education</u> <u>Program</u> run by the Lake Superior National Estuarine Research Reserve.

Six teachers took part in a weeklong Rivers2Lake Summer Institute where they traveled the upper reaches of the St. Louis River, trapping water bugs in nets, learning how to test water quality and developing a relationship with the river and Lake Superior. They gathered ideas and techniques to share with their students with the reserve's help.

This is the ninth year of the program, which has been funded in part by Wisconsin Sea Grant for four of those years. One activity during the institute involved a short canoe trip around Pokegama Bay in Superior, Wisconsin. The teachers learned why the area is important.

"Pokegama is our reference site," said Ryan Feldbrugge, education specialist with the reserve. "It's an example of an undisturbed or minimally disturbed ecosystem."

Feldbrugge explained how the reserve monitors conditions in the area with a meteorological station and water quality equipment. "The idea is to have baseline data so we can track how the wetlands are changing and how the plant communities are changing so that we can do stewardship or restoration efforts if that's what's needed."

Luciana Ranelli, reserve education coordinator, said the quiet, protected bay is also a good place for students to explore the St. Louis River Estuary. "You could imagine your tiny tykes or older students here, doing what we are doing," she said to the teachers. Plus, a new boat launch developed by the reserve, city of Superior and the Wisconsin Coastal Management Program provides easier access and vault toilets.

During that recent canoe trip, the teachers battled wind past the meteorological station and learned about purple loosestrife, a pretty but invasive plant scattered along the bay's shores. Feldbrugge said the reserve has been working closely with the Wisconsin Department of Natural Resources for several years to rear and release beetles that feed exclusively on loosestrife. They are slowly making progress in controlling the plant in the estuary.

Two guests joined the teachers: Noah Pinnsonault, a research and monitoring technician for the reserve, and Megan Hogfeldt, a water resources specialist with the city of Superior. Once out of the wind, the teachers rafted their canoes together to hear Pinnsonault describe work he's doing to address damage by the emerald ash borer beetle, which destroys black ash trees, a prevalent tree species in the estuary. He's determining survival rates for alternative tree species that were planted in 2015. These include hackberry, northern white cedar and red maple.

"In really low-lying sites, black ash is basically the only thing that will grow there. So, we're trying to figure out what besides the ash will work. If we can't save the black ash, we need to at least preserve the ecosystem function and keep it forested, otherwise, everything will change," Pinnsonault said.

Once back on shore, Hogfeldt described the stormwater control work she does for the city, while reserve staff loaded the canoes on their trailer. "If you haven't been through Superior, the city has about seven streams that go through it. We're always interacting with water in Superior and Duluth," Hogfeldt said.

She offers several programs that teachers and their classes can participate in, such as storm drain art, a stream monitoring program and an adopt-a-storm drain program.

Now that the institute is finished, the reserve offers teachers continued support to integrate Lake Superior science, history, research and stewardship into their classrooms.

"The effects have been transformative," Ranelli said. "Teachers appreciate the sustained support through the school year, and students in Rivers2Lake classrooms have improved learning and enhanced engagement. We're proud to support local teachers and students in learning about their watershed."

For at least two teachers on the paddle, this wasn't the only time they've been on the water with reserve staff. Melissa Hepokoski from Cooper Elementary School and Jasmine Haroldson from Northern Lights Elementary attended an Outdoor Learning Clinic last summer.

In her teacher institute evaluation, Haroldson offered, "The presenters were an amazing asset — so knowledgeable and excited! The nonthreatening, supportive community that was built in just four days will be so beneficial to me. I now have a huge library of resources — people and print — at my fingertips."

For more information about the reserve's work with Rivers2Lake students, see our story at <u>go.wisc.edu/54flx1</u>. – MEZ

### wisconsinwaterlibrary



# Ice! Amazing Ice!

Water as a solid - ice - influences our lives, most notably as an air conditioner for our planet. Ice cools our food and makes drinks refreshing in the hot summer. It is a great resource for winter recreation, and writers and photographers find it an inspiration for their works.

Brave New Arctic: The Untold Story of the Melting North by Mark C. Serreze. Princeton, N.J.: Princeton University Press, 2018.

The End of Ice: Bearing Witness and Finding Meaning in the Path of Climate Disruption by Dahr Jamail. New York: The New Press, 2019.

Fishing on Ice: A Complete Guide to Gear, Fish and Fun by Noel Vick. Champaign, Illimois.: Human Kinetics, 1999.

Gimaamaa-Akiiminaan Gimiigwechiwendaamin: Thankful for Our Mother Earth: Spearing Through the Ice Activity Booklet by Dylan Jennings. Odanah, Wisconsin.: Great Lakes Indian Fish & Wildlife Commission, [2016].

Ice: Portraits of Vanishing Glaciers by James Balog. New York: Rizzoli, 2012.

Ice! The Amazing History of the Ice Business by Laurence Pringle. Honesdale, Penn.: Calkins Creek, 2012.

The Melting World: A Journey Across America's Vanishing Glaciers by Christopher White. New York: St. Martin's Press, 2014.

**One Frozen Lake** by Deborah Jo Larson. St. Paul, Minn.: Minnesota Historical Society Press, 2012.

Vanishing Ice: Glaciers, Ice Sheets and Rising Seas by Vivien Gornitz. New York: Columbia University Press, 2019.

Please visit the Wisconsin Water Library's blog for more titles on this topic at waterlibrary.aqua.wisc.edu/blog.

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

# A Sweet Way to Protect a Little Slice of Heaven

DETECTING PHOSPHOROUS IN WASTEWATER

or many Wisconsin families, a lake home or cabin is a little piece of heaven. A corporeal necessity of that heaven is often a septic system.

A team of researchers at the University of Wisconsin-Stevens Point Center for Watershed Science and Education, with funding from the Water Resources Institute, is exploring whether there is a connection between a septic system and a lake's water quality.

"Water quality in a lake is controlled by a lot of things, but one of the most important is the levels of, or the concentrations of, nutrients, particularly nitrogen and phosphorus," said Paul McGinley, director and research scientist with the center. He holds another appointment with the University of Wisconsin-Madison Extension. "Anything that contributes to an increase in the amount of nitrogen or the amount of phosphorus that goes into the lake is going to certainly influence the biological productivity in that lake and ultimately that leads to water quality challenges," such as algae growth. The "anything" he referenced could be phosphorus and nitrogen in water from septic systems moving through systems' drainfield soils into groundwater. That groundwater ultimately feeds streams and lakes. Previous studies have shown that wastewater treated in a tank to digest solids then passed to a drainfield for further chemical and biological reactions in the soil can still have nitrogen and phosphorus concentrations that are more than 50 times their concentrations in Wisconsin lakes.

McGinley said, "There really are a lot of unknowns with respect to how much phosphorous in particular gets into the lake from septic systems. We thought we could pair our interest in groundwater and lakes with this question and the need really to know what's going on with this interaction between septic systems and some analytical methods that we've been developing in our laboratory."

Current progress in developing those methods rests in the hands of Amy Nitka, organic laboratory supervisor with the center. She said, "The presence of artificial sweeteners allows us to distinguish contamination from human wastewater from other sources."

Although it is challenging to identify these molecules, Nitka and her students have been working to refine analytical methods for acesulfame and sucralose, two common artificial sweeteners. With these identifying markers, they are able to determine which lake water samples have likely been impacted by wastewater from septic systems.

As Nitka presides over the lab, its students and equipment array await the fruits of field collection. Using a small tube inserted into the lakebed as well as nearshore, McGinley's team is collecting water samples from several central Wisconsin lakes. These lakes are characterized by relatively calcareous glacial drift soils, areas where groundwater is moving into the lake and sandy lakebeds.

Just as the artificial sweetener signature is vital to this project, it's also been vital to the students' experience. They have presented research results at local and national conferences and some have gone on to graduate studies.

"It's been a great project for our students," McGinley said. "We have students that get involved in the analytical work and in the field work. Because this is kind of tricky analytical work, it's really been a great launching place for these undergraduates." It's a two-way street, he was quick to add, saying the students' contributions have also been vital to the lab's progress.

That progress will also result in a model to predict how septic systems influence phosphorus load to a lake over time, McGinley said. "One of our outcomes is to have a better understanding of how those septic systems might be influencing the lake. Then you can decide is that (septic systems) really something that's worthwhile focusing on or should we be working on some other problems. We need to at least quantify that before we can put into the assessment of what we should be developing for strategies."

A final angle to this project is its real-world applicability. McGinley said he and others on the research team will deliver presentations at conferences and will assist consultants in creating lake nutrient budgets.

He said he is also especially interested in sharing this knowledge with lake associations and lakeshore property owners. "The connection between a septic system and the lake is through groundwater. Groundwater is the water from rain and melting snow that moves downward through soil and eventually moves into lakes and streams," he noted.

Cabin dwellers are familiar with how some areas of the lakebed are cooler than others during the summer.These "springs" are areas of high groundwater inflow. Temperature measurements can be used to map the areas of highest inflow areas. As part of the lab's outreach and teaching, volunteer centralWisconsin cabin owners have been collecting temperature measurements with relatively simple probes fabricated as part of the project.

McGinley said the effort "helps us all understand how much the lake and the land are connected," and how the boundaries of these small heavens actually extend well beyond the shore. – MH The presence of two common artificial sweeteners, acesulfame and sucralose, acts as an identifying marker to determine which lake water samples have likely been impacted by wastewater from septic systems.

# Marine Sanctuary Protects Lake Michigan Shipwrecks

In August, the National Oceanic and Atmospheric Administration (NOAA) published an announcement in the Federal Register designating the Wisconsin Shipwreck Coast National Marine Sanctuary (WSCNMS or sanctuary). It is the 15th national sanctuary and only the second in fresh water.

Authorized by the National Marine Sanctuaries Act, the secretary of the U.S. Department of Commerce designates and protects sanctuaries of special significance for many reasons, including for their conservation, recreational, historical and educational qualities. The National Marine Sanctuaries Act aims to protect a sanctuary's biological and cultural resources such as historic shipwrecks and archaeological sites. The secretary has delegated sanctuary management to NOAA. The Wisconsin Shipwreck Coast NMS, which is located in state waters adjacent to Ozaukee, Sheboygan, Manitowoc and Kewaunee counties, will be co-managed by the state of Wisconsin and NOAA.

"The new sanctuary brings well-deserved focus to the history and resources of this part of the Great Lakes. I am looking forward to new opportunities to work with another NOAA group on future education and outreach programs," saidTitus Seilheimer, a Wisconsin Sea Grant outreach specialist based in Manitowoc. For more than seven years, Seilheimer has coordinated sanctuary siting efforts with community leaders.

Encompassing more than 22,000 square miles, Lake Michigan is the second largest of the five Great Lakes. The lake's water, and its fresh, cold temperatures are credited for playing a significant role in preserving 36 known shipwrecks and approximately 59 suspected shipwrecks with exceptional historical, archeological and recreational artifacts. The sanctuary has partnered with other groups to create web-accessible detailed maps of the lakebed, with potential for discovery of other wrecks. The documented ships wrecked within the 962 square miles of waters and submerged land of the sanctuary date back to as early as the 1800s. They represent a part of history during the 19th and 20th centuries, when vessels of the like sailed and steamed west throughout Lake Michigan carrying goods, raw materials and people. The Wisconsin Great Lakes Shipwrecks website (wisconsinshipwrecks.org) has details on Lake Michigan wrecks, along with those in Lake Superior and inland waters. There is also information on other maritime attractions.

The designation plans for the sanctuary are geared toward ensuring that it not only continues to exist, but also engages the community. For instance, the sanctuary is expected to boost the local economy. Some supporters have said it will attract 70,000 tourists from around the region, nation and globe each year and bringing in an estimated \$10 million.

Additionally, in response to community concerns, NOAA will establish a Sanctuary Advisory Council comprising a diverse group of community leaders to provide advice on management and protection. With an incredible and rich maritime story, the sanctuary will provide communities a platform for heritage tourism as they educate and organize around an underwater museum.

A mooring program is being instituted to create a balance between public access and resource protection. This is expected to take two years and at that time a prohibition on anchoring into shipwreck sites goes into effect.

After several years of relying on state laws and Lake Michigan's fresh cold waters as protection, the artifacts that lay on the lakebed will now enjoy more collaborative protections to help them survive for posterity. With history buffs and adventure seekers alike soon able to safely participate in regulated exploration and discoveries within her waters, the future of the Wisconsin Shipwreck Coast National Marine Sanctuary and all that she has to discover is bright.

Story contributed by Amiah A. Henry, research associate, National Sea Grant Law Center, edited for length and updated.

# Keillor Fellow to Focus on Climate Change Planning

For Nicole Ward, Wisconsin Sea Grant's current J. Philip Keillor Great Lakes Fellow, returning to Madison has brought her academic journey full circle.

Ward earned her bachelor's degree in biology from the University of Wisconsin-Madison just over a decade ago, then left the Badger State to obtain a master's degree at the University of Idaho in water resources and a Ph.D. in biological sciences from Virginia Tech.

Yet Ward was eager to get back to the Upper Midwest and work on Great Lakes topics — making the Keillor Fellowship, which began this summer, an excellent fit for the newly minted Ph.D.

She is based at the Wisconsin Department of Natural Resources (DNR) Office of Great Waters, where she works closely with Madeline Magee, monitoring program coordinator, and Cherie Hagen, the Lake Superior Basin supervisor. Ward is also active in the Great Lakes Working Group of the Wisconsin Initiative on Climate Change Impacts (WICCI).

Broadly speaking, her focus is on incorporating climate change resilience planning into the DNR's Great Lakes projects. The three main projects she's associated with are the WICCI Great Lakes Working Group report, Great Lakes coastal wetland assessments and the development of climate adaptation resources and information for DNR Office of Great Waters staff. A native of Rochester, Minnesota, Ward spent three years with the Minnesota DNR working on native mussels and stream ecology after earning her bachelor's degree.

Those years with the Minnesota DNR set her future direction in motion: "It was while snorkeling and scuba diving in the streams and rivers of Minnesota that I began seeing the effects of land management and decision-making that were far removed from the stream itself," she said. "I had an 'aha moment' while working there, when I decided I needed to learn more about how people make environmental decisions, and how those decisions may change in response to changing ecosystems. The everchanging and complex Great Lakes Basin is really the perfect place to apply my skills in understanding feedbacks between ecosystem change and human decision-making."

The human dimension of environmental decisions is a through line in her work. Ward said, "A foundational part of how I think about myself as a scientist is to fully recognize that people make environmental decisions based on much more than just scientific evidence. Water issues are never actually about the water, they're about the underlying values and priorities of people, and people have more shared values than we often recognize." —JAS



Ward enjoying the marsh of the West Twin River near the Woodland Dunes Nature Center and Preserve in Manitowoc County as part of a tour given by Fisheries Specialist Titus Seilheimer.

# **EPA Fellows Follow Different Paths to the Same Destination**

Wisconsin Sea Grant welcomes two fellows through the partnership between the Environmental Protection Agency's Great Lakes Toxicology and Ecology Division in Duluth, the University of Wisconsin-Madison and its Aquatic Sciences Center. The goal of the three-year <u>U.S. Environmental Protection Agency Human Health and the Environment Research Fellows program</u> is to train the next generation of scientists in environmental and ecosystem health.

Nontraditional student charts her own path

With a master's degree already under her belt, Sally Mayasich had worked as an environmental consultant for three companies: "One went bankrupt, the other downsized and in another, I was working part time and not making much money, so I decided I had to do something different," Mayasich said.

At an age when most people are comfortably ensconced in their careers, Mayasich enrolled in the University of Minnesota Duluth (UMD) to earn her Ph.D. Her work paid off.

Working with mentor Carlie LaLone and the "fathead minnow group," Mayasich is evaluating the effects of chemicals across species, from humans to frogs, to fish, to insects. Using bioinformatics and computer molecular models, they can predict how sensitive a particular species might be to pesticides or other potentially harmful chemicals.

Mayasich explained, "If you have wetlands near a farm field and frogs live in the wetland, and the frogs are more sensitive to a particular pesticide, this knowl-

edge helps regulators consider whether to restrict use of that pesticide in that area. Some people in our group are working on a new group of pesticides called neonicotinoids. They can affect bees. Making sure that we understand how these pesticides affect pollinators is important because pollination by bees is a huge part of our natural ecosystems and also the economics of farming. If you don't have pollinators, you won't have crops."

Mayasich grew up on the Iron Range in northern Minnesota. She credits time at her family's cabin on Lake Vermilion for her love of science and nature. She graduated from Bemidji State University with a bachelor's degree in environmental studies, and continued her education at the University of Maryland, where she earned her master's in marine and estuarine environmental science.

After her eventful time in the workforce, Mayasich was accepted into the Integrated Biosciences Program at UMD where she studied sea lamprey hormones, specifically, vasotocin — the lamprey equivalent of the human "love hormone," oxytocin. She investigated whether the genes in lamprey that control the vasotocin system work in the same way as the oxytocin system in mammals.

Mayasich said she would not change the path she took to obtain her degree. "I'm still very excited about having gone back to school and starting an entire new chapter in my life. Even though I'm not going to have another 30 or 40 years to my career, I'd like to think that what I'm doing in the moment is important. The work I've published wouldn't have been done without me, and it's being cited by other researchers. That wouldn't have happened if I hadn't gone back to school. I'm very happy to be able to contribute to scientific progress."

### World travels lead to Duluth

Prarthana Shankar goes the distance — in the name of science. She has moved from tropical southern India to California to Oregon. Her next stop? The Environmental Protection Agency's Great Lakes Toxicology and Ecology Division in Duluth, Minnesota.

Along with her EPA mentors Gary Ankley and Dan Villeneuve, Shankar has been working to understand the risks that per- and polyfluorinated alkyl substances (PFAS) pose to freshwater fish and ecosystems. She is using fathead minnows and zebrafish in her studies.

"I've developed an interest in understanding the thyroid system," Shankar said. "PFAS have been shown to have negative effects on the thyroid system, so I'll



be testing that and also seeing if they have higherlevel impacts such as on the growth of the fishes."

PFAS are a class of chemicals of emerging concern. PFAS exposure is linked to human health concerns, including compromised immunity, low birth weight, endocrine disruption and cancer. These chemicals get into the environment from sources like firefighting foam and industrial processes.

Shankar credits her dentist father for her love of science. "He was the kind of person who would look through my school biology books and talk to me about the concepts," she said.

After growing up in India, Shankar had an opportunity to come to the U.S. to study, which she did. It was then she realized she loved the environment and wanted to be involved in ecological research. She eventually enrolled in California State University-Fullerton, where she majored in biology with a minor in chemistry.

While there, she was chosen for the Southern California Ecosystems Research Program (SCERP), which allows scholars to work on independent projects and present their work at conferences, concluding with a thesis.

"The SCERP program is what really got me into doing research and gave me my first experience in a lab setting," Shankar said.

Shankar then moved onto Oregon State University in Corvallis, where she completed her Ph.D. program earlier this year. She studied the effects of polycyclic aromatic hydrocarbons (PAHs) (a class of chemicals that occur naturally in substances such as coal, oil and gas) on zebrafish. — MEZ

### Share Your Sea Grant Memories, Be Part of Sea Grant's 50th Anniversary

2022 marks 50 years since Wisconsin Sea Grant was federally designated as a Sea Grant College Program. It's been 50 years of discovery and applying Great Lakes science to benefit coastal residents and the ecosystems of these amazing inland seas.

# Sea Grant

As we kick off a yearlong celebration on Jan. 1, 2022, we invite you to share in the recollections and festivities.

Visit <u>go.wisc.edu/1724pf</u> to submit your memories, along with hopes and suggested directions for the future of our program. If you have photos from 1972 and onward, you can upload them and we'll add them to a photo album posted on our Flickr page.

Next, keep an eye on our social media channels and website for possible in-person regional 50th-anniversary celebrations, if it is safe, given the ongoing pandemic. At a minimum, we'll be celebrating virtually with video and other online storytelling.

# GREAT LAKES SCIENCE FOR OUR FUTURE



# **Campbell Serving as Federal AIS Liaison**

Wisconsin Sea Grant's Aquatic Invasive Species Outreach SpecialistTim Campbell will serve as the AIS liaison as part of a cohort of six new Sea Grant Federal Partnership Liaisons.

The Sea Grant Federal Partnership Liaisons integrate Sea Grant extension expertise with science, products and services from NOAA labs and other publicly supported scientific research programs. The jointly funded positions expand a key component of Sea Grant's work, extending science to end users through collaborative partnerships.

"The Sea Grant liaisons provide strong connection points between emerging research and interested parties to tackle some of coastal and Great Lakes communities' most pressing issues," stated Jonathan Pennock, director of NOAA's National Sea Grant College Program. "By engaging user communities around the country, Sea Grant's Federal Partnership Liaisons program harnesses the Sea Grant network's strengths to inform the work of federal science and service agencies." Focus areas for the new liaisons include aquatic invasive species, climate resilience, offshore wind energy, aquaculture opportunity areas, harmful algal blooms and community science for underserved communities. They join three existing Sea Grant partnership liaisons who work in ocean acidification, tsunami and coastal resilience, and Great Lakes research with NOAA's Pacific Marine Environmental Laboratory and NOAA's Great Lakes Environmental Research Laboratory.

Campbell will serve in this capacity part time while continuing his current role with Wisconsin Sea Grant. As a liaison, he will work broadly on AIS outreach coordination for the Aquatic Nuisance Species Task Force, co-chaired by the U.S. Fish and Wildlife Service and NOAA. He will also work to strengthen Sea Grant connections with the regional aquatic nuisance species panels and assist with AIS work in the National Sea Grant Office.

Learn more at seagrant.noaa.gov/liaisons. - JAS

Four students from Wisconsin have been chosen as Knauss finalists in the 2022 class through a competitive process that includes comprehensive review at both the state Sea Grant program and national levels.



### Four Wisconsin Finalists for Knauss Fellowship

Four Wisconsin students — Becky J. Curtis, Elizabeth McNamee, Samm Newton and Theresa M. Vander Woude (left to right) — are among this year's 74 finalists for the 2022 class of the Sea Grant John A. Knauss Marine Policy Fellowship program.

The one-year fellowship places early career professionals in federal government offices in Washington, D.C.The finalists in the 2022 class represent 28 of the 34 Sea Grant programs. Since 1979, almost 1,500 fellows have completed the program, becoming leaders in science, policy and public administration roles.

Executive appointments for the 2021 Knauss fellows included placements throughout NOAA as well as with the Department of Energy, Federal Emergency Management Agency, National Science Foundation, U.S. Army Corps of Engineers and other agencies. Legislative placements included the Senate Committee on Environment and Public Works (majority), the House Committee on Natural Resources (Majority), the Senate Committee on Commerce, Science, and Transportation (majority and minority) and several placements in both majority and minority personal offices (House and Senate).

Want to learn more about the Knauss Fellowship? The Knauss Blog at <u>seagrant.noaa.gov/knauss-</u> blog shares stories from the 2021 Knauss class on fellowship experiences and their journeys to D.C.

Placement of Knauss finalists occurs in February of 2022 and is contingent on adequate funding in fiscal year 2022. - JAS





Daniel Grooms (left) and Clarence Pratt (right) of the Red Cliff Fish Co., operated by the Red Cliff Band of Lake Superior Chippewa. See page two for a video of commercial fishers, including the Red Cliff Fish Co.

# NOAA Funding Will Aid Commercial Fishing

Three grants totaling more than \$334,000 were awarded to Wisconsin Sea Grant through a NOAA Sea Grant national competition to support the state's commercial fishing and aquaculture industries, particularly in the areas of career development and resilience planning.

The first grant of \$186,000 is meant to increase the resilience of the seafood sector to respond to future disruptions, like the COVID-19 pandemic. Sharon Moen, Wisconsin Sea Grant's Eat Wisconsin Fish outreach specialist, is the project lead.

A second grant of \$98,000 will enable the Michigan and Wisconsin Sea Grant programs to collaborate on building the framework for a Great Lakes commercial fisheries apprenticeship program over the next six months. Project leads for this effort are Titus Seilheimer, Wisconsin Sea Grant fisheries specialist, and Lauren Jescovitch, a Michigan Sea Grant extension educator in the Upper Peninsula. Moen will also be a key player. Together, the team will assess apprenticeship program needs among both tribal and nontribal fishers.

A third grant of \$50,000 enables the Eat Wisconsin Fish initiative to continue to grow its outreach potential over the next year. Moen also leads this project.

The commercial fishing side of the projects focuses on developing the Great Lakes region's first-ever apprenticeship program in fishing and fish processing. "Commercial fisheries across the country are graying as the older generation gets older, but who will take the wheel to keep these fisheries going?" said Seilheimer, "Our work will build the framework for a program based on the needs of tribal and state fishers. We hope to create a program that will provide an experienced workforce for tribal and commercial fisheries for years to come to support sustainable Great Lakes fisheries."

While the pandemic has been tough all-around, noted Moen, "It has had a disproportionate impact on Indigenous commercial fishers." One partner in this project is the Red Cliff Band of Lake Superior Chippewa, which operates the Red Cliff Fish Co. The fish market prioritizes local retail sales and supplying Lake Superior fish to Native American elders.

The aquaculture side of the projects will include efforts to inform fish consumers and the general public about fish-farming methods.

"Aquaculture in the U.S. has come a long way in the last several decades, and public perceptions have not kept up with reality," said Moen. "Regulations in the U.S. as a whole are quite strict, and even more so here in Wisconsin, which should give consumers confidence that they're choosing a safe product that has been raised responsibly."

At their core, the three grant-funded projects are responding to challenges faced by Wisconsin fish farms and commercial fishers, from pandemics to workforce issues. "In the end," said Moen, "We want to create a stronger food network and food systems so that when future disruptions happen, we'll be better prepared." – JAS



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### Aquatic Sciences Chronicle a joint newsletter from UW Sea Grant and Water Resources Institutes

# **Protect Property and Shorelines** TWO NEW GUIDES BENEFIT PROPERTY OWNERS AND COMMUNITIES





Protecting Your Bluff

Coastal homeowners, do you know if water that drains from your property is causing issues with your bluff? Did you know that lawn-care practices may help with bluff stability? Beach managers, would you like to protect your shoreline while increasing biodiversity, wildlife habitat and aesthetic appeal, with potentially less expensive and more adaptable methods?

"A Property Owner's Guide to Protecting Your Bluff" explains all the factors to consider when assessing your bluff's stability and how to manage them from the top of the bluff down to the shoreline. Also included is an extensive guide to selecting shoreline plants that can improve your bluff in terms of stability, appearance and wildlife/pollinator habitat.

"Nature-Based Shoreline Options for the Great Lakes Coast" offers full descriptions and comparisons of different techniques that use or mimic natural features you can use to protect your shoreline. Case studies illustrate each technique in realworld situations.

Sea Grant Coastal Engineer Adam Bechle said, "These guides gather together the most current information on protecting property and shorelines on the Great Lakes coasts. We've heard from stakeholders that they want to see what their peers are doing, so we've made sure to include a wealth of photos and examples. They're a great resource for a number of different groups, from property owners to landscaping companies to communities that want to improve their beaches."

Download at no cost at publications.aqua.wisc.edu.