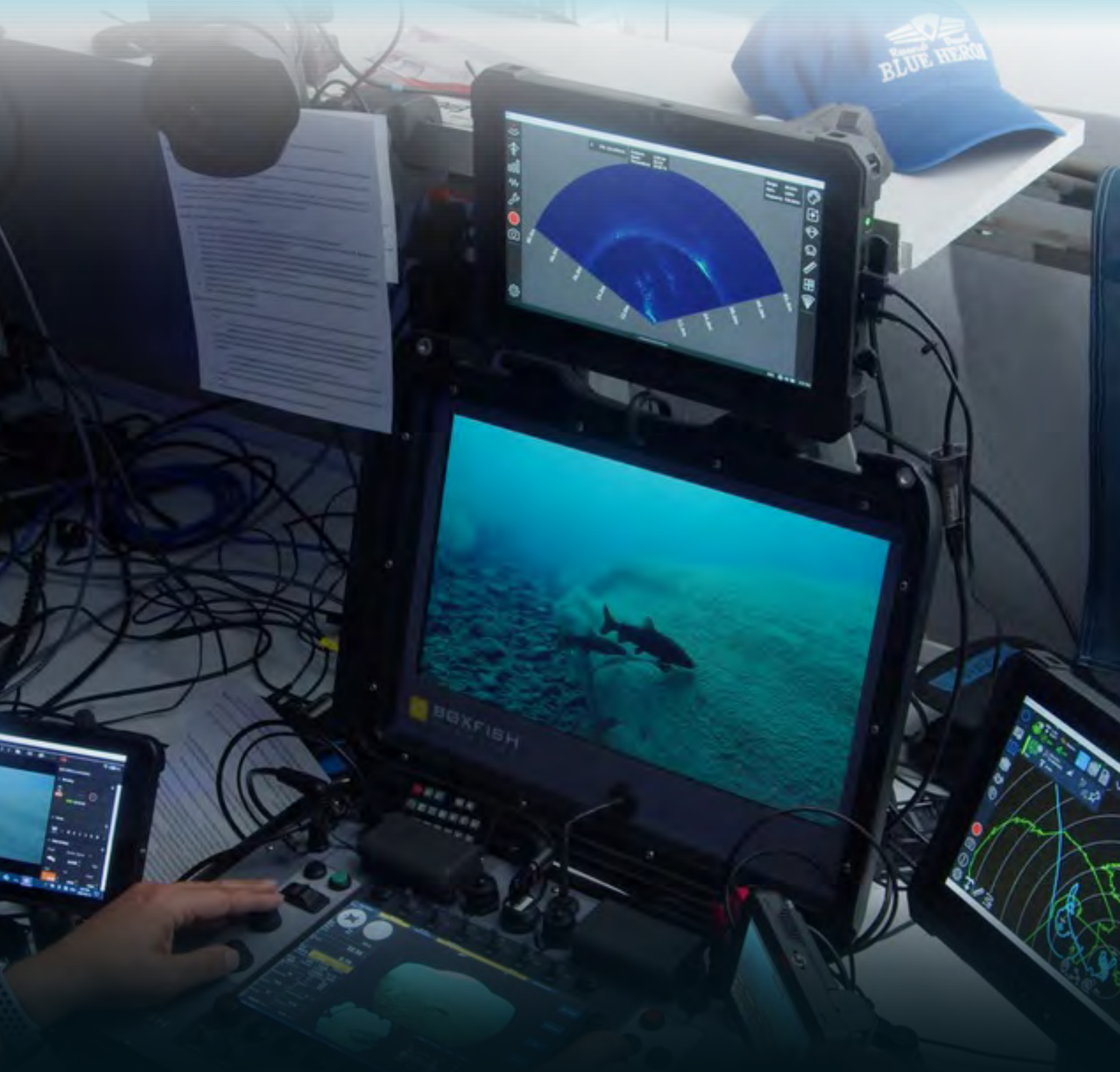




LAKE*S* Letter



Science & Innovation

Fall 2025, No. 27

LAKES Letter

Fall 2025, No. 27

iaglr.org/lakesletter

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EXECUTIVE DIRECTOR'S NOTE

Dear colleagues,

Despite the hurdles science faced this year, we should remember the innovative work that continued to thrive. In that spirit, we are pleased to bring you this new issue of *Lakes Letter*, which focuses on *Science and Innovation*. We also share an update on the association's activities since the summer.

As we entered a new fiscal year in October, the IAGLR Board of Directors met to review several important matters, including approval of the 2025–26 budget. In light of fiscal constraints in both the United States and Canada, this year's planning required careful consideration of our priorities and programs. Throughout this process, we remain committed to providing an inclusive, collaborative space for all scientists working on the large lakes of the world. With this in mind, we have initiated an update of our strategic plan for the next five years, and we look forward to your input as this document takes shape.

This summer, IAGLR was invited to submit a proposal to the Fred and Barbara Erb Family Foundation, and we are grateful to be one of the Legacy, Great Lakes and Democracy awardees officially announced in early October (see story, page 5). This three-year support will strengthen our operations, enhance our communications, and allow us to transform *Lakes Letter* into a more fully developed, searchable publication. It will also enable deeper engagement with members of Indigenous communities and provide needed support for their participation in our annual conference.

Planning is well underway for the 2026 joint conference in collaboration with our colleagues at IISD Experimental Lakes Area and the Society of Canadian Aquatic Sciences. Learn more about our conference hosts in this issue's member spotlight starting on page 10. We are excited to share that more than 70 sessions have been proposed—a record in recent years! The Call for Abstracts is now open through December 19, and we encourage you to submit your contributions.

Wishing you a productive end to the year and an enjoyable read of this issue of *Lakes Letter*.

Best regards,

Jérôme Marty



Reporting out at the collaborative adaptive management workshop (see story, page 5).

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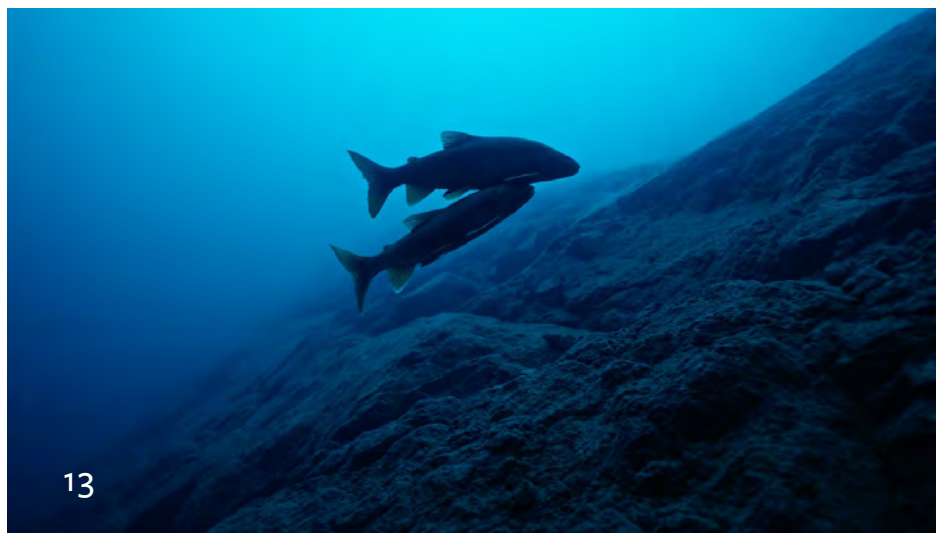
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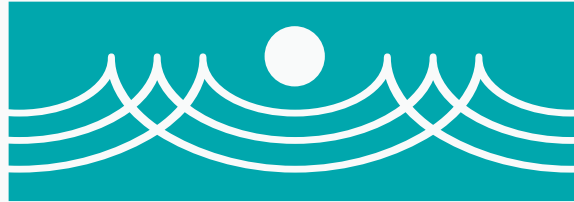
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Building a field-based PFAS detection tool in the Great Lakes region

By Vernon LaLone



CONNECTED WATERS



Bridging Communities & Ideas

Call for Abstracts

Present your work at the 2026 Joint Conference of the International Association for Great Lakes Research and the Society of Canadian Aquatic Sciences.

Abstract submission is now open for the conference, scheduled for May 25–29, 2026, in Winnipeg, Manitoba as a hybrid event. Seventy-seven sessions have been proposed to complement the theme *Connected Waters: Bridging Communities & Ideas*. We welcome abstract submissions for both oral and poster presentations.

iaglr.org/iaglr-scas26

May 25-29, 2026
Winnipeg, Manitoba

DUE FRIDAY, DECEMBER 19

Two-Eyed Seeing in practice

Insights from the collaborative adaptive management workshop

In October, IAGLR members joined Indigenous representatives from across the Colorado River Basin, California's Bay Delta, Australia, and Canada for a three-day workshop on "Braiding Knowledges in Water & Land: Collaborative Adaptive Management." Supported by CSIRO's AquaWatch Program and the Foundation for Food & Agriculture Research, the gathering focused on how Indigenous and Western scientific approaches can be braided through collaborative adaptive management, guided by the Mi'kmaq principle of Two-Eyed Seeing.

The workshop began with a visit to the Six Nations of the Grand River, including a cultural orientation, the Haudenosaunee Thanksgiving Address, and welcoming remarks from Chief Sherri-Lyn Hill, who emphasized the relevance of water security challenges facing her community.



Sessions held at the Native Canadian Centre of Toronto brought participants together to exchange experiences on collaborative management, Indigenous leadership, circular learning, and the braiding of knowledge systems. Key insights highlighted the need to build relationships before projects begin; the central roles of trust, respect, and reciprocity; research approaches that

empower rather than extract; and the recognition of Indigenous knowledge as a science in its own right. Participants also underscored the importance of creating supportive spaces, acknowledging intergenerational trauma, and honoring the resilience and strength of Indigenous cultures and communities in the shared work of advancing water and land stewardship.

IAGLR awarded Erb Family Foundation grant

Work will boost inclusion and impact in Great Lakes science and policy

IAGLR will receive \$665,000 over three years from the Fred and Barbara Erb Family Foundation to strengthen inclusive research, improve the flow of scientific information to policy makers, media, and the public, and support the next generation of Great Lakes scientists.

This award will allow us to expand our communication platform by transforming *Lakes Letter* magazine into a searchable, web-based format and launching a coordinated social media strategy to highlight breakthrough research. The grant will also support our operations to respond quickly to media inquiries and produce concise policy briefs, ensuring decision makers have timely access to the latest science.

Additionally, it will support a range of inclusion-focused activities. IAGLR and Indigenous leaders

will co-design culturally respectful opportunities for participation, expand our registration-waiver program for Indigenous and Black scholars attending our annual conference, and support the newly formed Student and Early Career Committee. These efforts aim to build lasting partnerships with historically underserved communities and provide mentorship, networking, and leadership opportunities for early-career researchers.

"We are grateful for the Erb Family Foundation's support at such a critical time for science," said IAGLR Executive Director Jérôme Marty. "This grant provides the timely resources we need to strengthen our operations, share research in ways that both inform policy makers and engage the public, and mentor the next generation of scientists working to protect the Great Lakes."

"Safeguarding the Great Lakes requires strong science and the inclusion of people from every background," said Melissa Damaschke, president of the Erb Family Foundation. "We appreciate and recognize IAGLR's essential role in building the region's scientific capacity while ensuring that diverse perspectives, including those from underserved communities, inform decision making. By bringing more voices to the table, we strengthen both science and stewardship of the lakes."

"An inclusive research community is essential for resilient lake stewardship," added IAGLR President Donna Kashian. "By bringing Indigenous Knowledge, early-career talent, and underrepresented scholars into the conversation, we create solutions that are scientifically sound and socially equitable, ensuring the Great Lakes thrive for generations to come."

Together we can advance Great Lakes science

Now is a meaningful time to support the work of Great Lakes scientists. Whether through individual generosity or organizational partnership, your contribution helps strengthen research, collaboration, and the long-term health of our shared waters. We invite you to look at the range of giving opportunities below that allow individuals and organizations alike to invest in the science that protects and sustains our freshwater resources.

Season of Giving

December 2 kicks off a season of generosity with [Giving Tuesday](#), a day when people around the world make a donation to the organizations and causes they hold dear.

We invite you to join the community of members and friends who support IAGLR and make countless opportunities available to scientists and students from around the world. Together we can advance understanding of the world's large lake ecosystems to better manage and protect them for generations to come. To add your support, please view our [giving opportunities](#) and select the one that best fits your interests. Members can also make a donation when renewing or joining.

- Support student scholarships
- Sign up for the Sustainers Circle Monthly Giving Program
- Make a one-time general donation
- Foster diversity, equity, and inclusion in the large lake research community
- Strengthen organizational sustainability with a contribution to the endowment fund

No matter the amount or the option you choose, we appreciate your support!

iaglr.org/giving



Generous contributions help support students through our annual scholarship program. Visit [Giving Opportunities](#) on the IAGLR website to learn how you can add your support during this critical time for science. *Photo by Stephany Hildebrand.*

Conference opportunities

Gain visibility at the 2026 conference, scheduled for May 25–29 in Winnipeg, Manitoba. Check out [exhibitor](#) and [sponsorship opportunities](#) to highlight your organization and support aquatic science. You won't want to miss this [joint conference](#) of the International Association for Great Lakes Research and the Society of Canadian Aquatic Sciences—where global research on the world's large lakes meets Canada's rich tapestry of aquatic systems.



[Download the 2026 Prospectus for details](#)

Great Lakes Benefactors

Become a [Great Lakes Benefactor](#)—Enjoy sponsor and exhibitor benefits and more! Great Lakes Benefactors value large lake research and demonstrate their commitment to IAGLR and the research community through a significant ongoing annual contribution. For their commitment, Great Lakes Benefactors receive multiple conference benefits as well as other promotional opportunities throughout the year. Join us to help advance understanding of the world's great lake ecosystems.

We're hiring!

We're hiring a project coordinator to join our team. The project coordinator will support our initiative to create and sustain an inclusive Great Lakes research community. This remote, part-time contract role will center relationship-building with Indigenous Peoples by working closely with First Nations and Tribes, as well as historically underserved communities and the next generation of scientists. Preference will be given to Indigenous candidates within the Great Lakes basin. Look for the full job description on our website in December.

Call for IAGLR award nominations

We invite you to nominate worthy candidates for the following awards—it's your chance to recognize outstanding contributions in the large lake community. We encourage nominations of people from diverse identities, perspectives, and experiences.

Journal Awards

All are invited to nominate a notable paper from the *Journal of Great Lakes Research*, volume 51 (2025) for one of three awards given based on the career status of the lead author. Nominations due **January 15**.

Professional Awards

IAGLR members can nominate people for our three professional awards. Nominations due **February 1**.

- Lifetime Achievement Award
- Large Lake Champion Award
- John R. (Jack) Vallentyne Award

IAGLR, ACARE host webinar for international members

In early November, IAGLR hosted a webinar for international attendees to learn more about the association. More than 60 attendees joined panelists Ted Lawrence, executive director of the African Center for Aquatic Research and Education, IAGLR board members Neil Rooney, Ronald Semyalo, and Noel Urban, Margaret Docker, editor of the *Journal of Great Lakes Research*, and Executive Director Jérôme Marty.

"The session truly got people thinking and talking," noted Semyalo, who also serves as co-chair of IAGLR's International Committee. "I was particularly pleased that not only those from the continent but those who are doing work on the continent are just as interested."

We will build on this webinar to host an event for international members at the upcoming annual conference in Winnipeg.

Support to attend the IAGLR & SCAS-SCSA Joint Conference

Did you know IAGLR offers support to attend the annual conference? Learn more about the opportunities below. We hope to see you next May in Winnipeg!

- Student Travel Awards provide funds to IAGLR student members to help with travel costs. Conference registration will open in early March, and applicants are accepted through early bird registration. First come, first served as funds allow. Make sure to sign up for your 2026 membership to qualify!
- Our registration-waiver program supports Indigenous and Black scholars and others who historically may not have participated in the conference.
- IAGLR members enjoy discounted registration rates. To take advantage of best rates, join IAGLR or renew your membership before you register.
- Register early for the best rates! Everyone can take advantage of discounted early rates when registration opens next year.

CONNECTED WATERS



Bridging Communities & Ideas

IAGLR in the news

IAGLR remains committed to being a trusted voice for Great Lakes science. Check out these recent articles for examples.

- *Science on shaky ground: Canadian research shifts in the wake of US cuts.* Nature, Nov 19, 2025.
- *Science interrupted: How the Trump administration's cuts to U.S. science are derailing Canadian research.* Universities Affairs, Nov 12, 2025.
- *Science sous attaque.* Découverte, Radio-Canada, Sep 21, 2025.

See our [IAGLR in the news](#) page for more IAGLR media coverage.

MEMBER NEWS

Member Kudos

Our members are the driving force of the association, and their dedication and expertise make a lasting impact. From career milestones to distinguished honors, their successes showcase the strength and excellence of our community. We invite you to recognize and celebrate the accomplishments listed below.

Daniel Abiriga (Kabale University) for being awarded a TWAS-DFG Fellowship, which he completed in August 2025. He was hosted by Leibniz Institute for Freshwater Ecology and Inland Fisheries (IGB) at LakeLab in Stechlin, Germany. While at IGB, Abiriga participated in a joint mesocosm experiment and also conducted independent research on microbial colonization of plastics in freshwater.

Taylor Brown (Cornell University) for successfully defending her Ph.D. Her dissertation research focused on the early life history and recruitment dynamics of cisco and lake whitefish across the Laurentian Great Lakes. Taylor was a recipient of IAGLR's Norman S. Baldwin Fishery Science Scholarship in 2020.

Alex Duncan (University of British Columbia) for being nominated to serve as a fellow on **Chapter 2 of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services second global assessment of biodiversity and ecosystem services**.

Ayumi Fujisaki-Manome for being named associate director of the Cooperative Institute for Great Lakes Research (CIGLR). She has been a vital part of CIGLR for over a decade, leading research that improves predictions of hazardous weather, ice, and lake events to support community preparedness and resilience. In her new role, she'll strengthen partnerships with NOAA and other agencies, lead new directions in climate modeling and forecasting, and continue mentoring the next generation of Great Lakes scientists.

Lucinda Johnson (University of Minnesota) on her retirement after 38 years at the UM Natural Resources Research Institute, where she most recently served as senior research fellow. She will continue in her role as U.S. co-chair of the International Joint Commission's Great Lakes Science Advisory Board (Science Priority Committee).

Andrew Muir (Great Lakes Fishery Commission) for being named a fellow of the American Fisheries Society in recognition of his distinguished contributions to fishery science. His leadership encompasses groundbreaking projects such as FishPass (see story on page 29), the advancement of approaches that bridge Indigenous Knowledge and western science, and extensive mentorship of emerging researchers. A prolific communicator, Muir has testified before the Canadian Senate, produced influential outreach and photography, and served on numerous advisory panels and editorial boards. Peers praise his strategic vision, commitment to inclusive science, and steadfast dedication to advancing the fisheries profession.

Heather Stirratt (U.S. Department of State) retired as of October 1 with more than 24 years of U.S. federal civil service to proudly reflect upon. Stirratt most recently served as the International Joint Commission's Great Lakes Regional Office Director and prior to that with NOAA as the Great Lakes Regional Lead for the Office for Coastal Management. Stirratt remains an active supporter of IAGLR, and she continues to serve on a variety of nonprofit organization boards focused

on Great Lakes ecosystem research, observing systems, and managing visitor use of state parks and trails. Stirratt is actively considering opportunities aimed at advancing Great Lakes science, service, and stewardship throughout the region.

Les Warren (Purdue University) for successfully defending his dissertation. Warren's Ph.D. research focused on recruitment dynamics and the early life habitat utilization of alewife in Lake Michigan.

Submit a kudo

Do you have a recent achievement, award, or milestone you'd like to celebrate? Let us know! Submit a kudo to lakesletter@iaglr.org, and we'll share your accomplishment with the IAGLR community. Your success inspires us all!

Welcome new IAGLR members!

Please join us in welcoming the following members who joined the association between August and October 2025. We're glad to have you as part of the IAGLR community!

Sristika Adhikari

Amon Aine

Nick Barich

Valence Byaruhanga

Erin Ebert

Kaitlyn Fleming

Matthew Hirsch

Marissa Jablonski

Elissa Johnson

Gerald Kwikiriza

Kelly Morrison

Dennis Otieno

Emma Rice

Sam Schurkamp

Zak Slagle

Sahar Soltani

Signe VanDrunen

Edwin Wagah

Christopher Wilkie

Demetra Williams

Emily Yeung

2026 IAGLR membership drive is on

We're now accepting memberships for 2026! Make sure to join soon to enjoy a full year of the following benefits.

Our members hail from many countries and disciplines, and they come together to create a vibrant community to learn about and advance large lake science. This diversity is our strength, and we value each one of you as a member of the IAGLR community. Thank you for supporting IAGLR with your annual membership!

Renew your membership and enjoy the following benefits:

- ✓ **Conference registration discount**
We are looking forward to your participation in the 2026 conference in Winnipeg!
- ✓ ***Journal of Great Lakes Research***
Don't forget—your electronic archive dates back to 1975!
- ✓ ***Lakes Letter* magazine**
Our quarterly magazine connects and celebrate our members and the work they do. In 2026, we're transforming the magazine into a searchable, web-based format!
- ✓ **IAGLR E-Notes**
Our monthly email newsletter provides regular updates on news, jobs, events, and more.
- ✓ **Student opportunities**
We offer several awards and scholarships, three student positions on the IAGLR Board of Directors, subsidized conference attendance, as well as deeply discounted membership rates. Our commitment to students provides invaluable experiences early in their careers.
- ✓ **Member Directory**
The IAGLR Member Directory makes it even easier to network with other members. Make sure to opt in!

Why wait? Renew today!



Meet our 2026 conference hosts

Our 2026 conference in Winnipeg is a joint event of IAGLR and the Society of Canadian Aquatic Sciences and is hosted by IISD Experimental Lakes Area (IISD-ELA). On the following two pages, we introduce you to the local chairs.

Pauline Gerrard

2026 CONFERENCE SITE CHAIR

Executive Director

IISD Experimental Lakes Area

Describe your work or studies.

As executive director of IISD Experimental Lakes Area—the world’s freshwater laboratory—I oversee strategic direction and management of the facility and our research. With a background in ecology, I believe in large-scale collaborative research that brings together multiple partners and sectors to understand the complex environmental problems (including, of course, threats to fresh water) that we are facing in the world today.

What inspired you to enter this work?

With parents who were ornithologists, ecology and environmental science have been part of my life since I was very young. I’ve been lucky enough to work in North America, Africa, Europe, and Southeast Asia over the course of my career, and this international experience has helped me understand the importance of connecting research and innovation in similar systems across the globe. I’m excited about connecting the work we have been doing at IISD-ELA on in-situ monitoring to similar systems that are being used in the North American and African Great Lakes. I feel that there is enormous potential to use these types of systems to fill data gaps across Canada, and, by bringing our

expertise and experience together, we can support needs in other parts of the country and around the world.

What are you most excited about for the upcoming conference?

I’m excited to learn from Indigenous partners around the great lakes about shared learning and experience. We have strong relationships with Treaty 3 communities close to IISD-ELA, but I’m interested in learning from others and expanding these relationships and learning.

What is something about yourself that you’d like to share with other IAGLR members?

I believe strongly in learning through hands-on experiences; it isn’t always easy these days, but getting out in the field and on the water puts perspective to what we are trying to do and why. The way to inspire the next generation of freshwater scientists is to give them the opportunity to experience it firsthand.



“International experience has helped me understand the importance of connecting research and innovation in similar systems across the globe.”



WINNIPEG | 2026

Vince Palace

2026 CONFERENCE PROGRAM CHAIR

Head Research Scientist
IISD Experimental Lakes Area



Describe your work or studies.

I am focused on conducting science that offers solutions for industrial, social, or community issues. That has led me to work with teams studying solutions for environmental issues like metal mining, pesticides, industrial chemicals and pharmaceuticals. More recently I have been interested in working with Indigenous Communities to find ways of protecting and reestablishing traditional food sources; specifically wild rice. There is something inherently satisfying in conducting science that has immediate impact for people. And having the chance to learn different ways of approaching an issue from the Community perspective has been an amazing opportunity.

What inspired you to enter this work?

I was fortunate to land a summer job with a crew at Fisheries and Oceans who did some field work at the Experimental Lakes Area. I had no idea you could do that sort of thing for a living. I loved the team atmosphere and the ability to look at big picture questions, so, from my first introduction, I worked toward building a career in environmental science. I don't think I thought I could actually pursue a job as an IISD-ELA scientist, but it has been a dream job. And the best part of it is still the collaboration with such a diverse group of researchers and topics.

What are you most excited about for the upcoming conference?

I'm excited for people to see the vitality of this city, obviously from a science perspective (we have an amazing program), but also because of its cultural and community focus. We know that "Winnipeg" is often a punchline in different parts of the country, but there is history and both a vibrant restaurant and arts scene. That's why when you speak to someone who's lived here for any length of time, they'll tell you it's routinely underestimated. I'd challenge delegates to make time to see the [Canadian Museum for Human Rights](#), the [Museum of Inuit Art \(Qaumajuk\)](#) at the Winnipeg Art Gallery, and our theatres.

What is something about yourself that you'd like to share with other IAGLR members?

With so much of our daily work focused on written communication, either reading, analyzing data, or writing, I find my off-work hours are focused on tangible goals: something where I can measure progress objectively. And so, I spend time working on home construction projects or sports. I love golf and I love/hate long-distance running—always with some goal in mind.

“I’m excited for people to see the vitality of this city, obviously from a science perspective (we have an amazing program), but also because of its cultural and community focus.”



WINNIPEG | 2026

The Journal of Great Lakes Research

Advancing understanding of the world's large lake ecosystems

Call for early career editors

The *Journal of Great Lakes Research* is seeking applications for two early career researchers (ECRs) interested in joining the editorial board as an ECR editor. This opportunity is intended to provide professional development for ECRs with strong interests in scientific publishing and peer review; to harness the enthusiasm and expertise of ECRs working in the natural and social sciences related to large lakes; and to more directly involve the next generation of large lake researchers in the peer review and editorial process. At least one of the ECR editors will be from outside of Canada and the United States.

APPLY BY JANUARY 31, 2025

Journal award nominations

Nominate a notable paper from the *Journal of Great Lakes Research*, volume 51 (2025) for one of three awards given based on the career status of the lead author.

- [Chandler-Misener Award](#)
- [JGLR/Elsevier Early Career Scientist Award](#)
- [JGLR/Elsevier Student Award](#)

NOMINATE BY JANUARY 15, 2025

Special sections

We welcome contributions for the following upcoming [special sections](#) in the journal. Interested authors can submit through the normal submission process and choose the relevant special section from the article types listed.

- Lake Baikal: Scientific approaches and environmental problems
- Lake Tanganyika - A Dr. Cohen Tribute
- Science Communication in Great Lakes Research

We're always open to ideas for new special sections. Submit a [Special Section Proposal Form](#) to share your ideas with us.

Editor's Choice articles

The new [Editor's Choice](#) initiative highlights an article from each issue of the journal that presents either particularly topical research or highlights early-career researchers, Indigenous Knowledge, or research on underappreciated large lakes of the world. Because the Editor's Choice articles are granted promotional access by Elsevier (i.e., are freely available for 60 days), articles are also selected that will particularly benefit from being made more widely accessible, helping to improve the flow of information to policy makers, media, and the public.

The latest Editor's Choice article is Freeman et al. 2025, [Day versus night relations between larval lake whitefish, cisco, and zooplankton onshore in Lakes Michigan, Huron, and Superior](#). This is the first paper by lead author Simon Freeman, who was an undergraduate student at the start of the work. This article represents a collaboration with academia (Lake Superior State University), state and federal governments, and a number of Tribes (Bay Mills Indian Community, Sault Tribe of Chippewa Indians, Little Traverse Bay Bands of Odawa Indians, and the Grand Traverse Band of Ottawa and Chippewa Indians).

Questions?
Contact Margaret
Docker, JGLR editor,
at editor@iaglr.org.

RISING FROM THE ABYSS

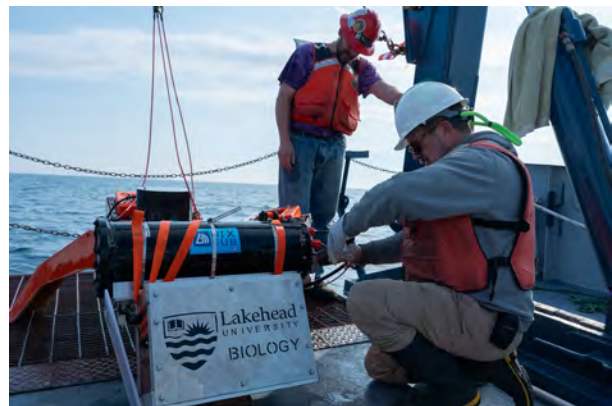
Discovering the role of lakemounts in Great Lakes

BY MICHAEL RENNIE

PHOTOS BY ZACH MELNICK & YVONNE DREBERT

Redfin trout on a glacier-scoured granite cliff of the Superior Shoal 60 meters below the surface of Lake Superior.

T WAS BY FAR one of the most indelible experiences of my career on the Great Lakes. In early September 2025, funded by the Government of Canada's Natural Sciences and Engineering Research Council and the Great Lakes Fishery Commission, I set out with researchers Bianca Possamai and Gwen Phillips (University of Vermont), Lydia Paulic (University of Windsor), and filmmakers Yvonne Drebert and Zach Melnick (Inspired Planet Productions) aboard the R/V *Blue Heron* on Lake Superior to explore the Superior Shoal. There, we hoped to test theories that we and others have developed to determine how physical and biological processes interact in these lakemount environments, as well as capture some incredible underwater video that would facilitate not just great footage but also scientific discovery. The voyage represents the first such expedition led by Lakehead University, located on the north shore of Lake Superior in Thunder Bay.



Michael Rennie prepares a stationary upward-looking hydroacoustic submersible to detect concentrations of fish above the shoal.

Lakemounts are underwater mountains that rise from the lakebed but do not break the surface.

For those unfamiliar with the term, lakemounts are underwater mountains that rise from the lakebed but do not break the surface. Seamounts, similar structures in the oceans, have long been documented to support high levels of biodiversity and biomass compared to either open water or coastal environments, to the extent that many now form the basis of significant marine sanctuaries (e.g., the Davidson Seamount off the coast of Monterey, California). Despite these findings, comparatively little investigation has occurred on lakemounts. Building off what is known about seamounts, we outlined a conceptual model (Possamai et al. 2024) that describes how these unique physical environments of steep rock faces could interact with underwater currents to support the biodiversity and productivity we expected to see on our expedition. Like seamounts, these lakemount environments likely represent biological oases that may support critical metapopulations for other more disturbed environments surrounding them. As such, understanding the role lakemounts play in the Great Lakes is important, especially given the swift alterations driven by climate change and other stressors.

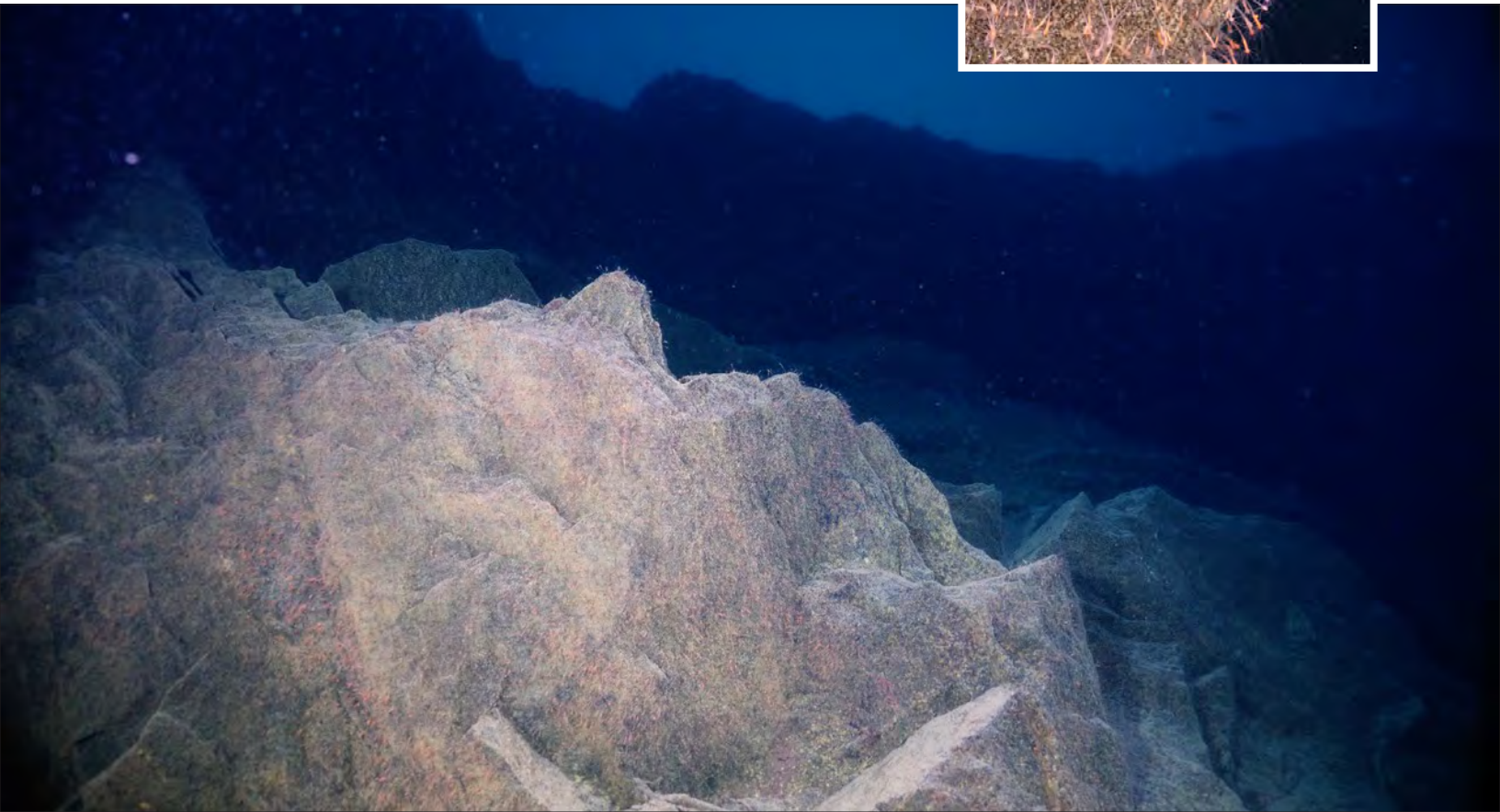
We were not disappointed by what we found. Rising from nearly 300 meters deep and cresting just 6 meters below the surface, the Superior Shoal is the underwater

remnant of an ancient volcano and sandstones transported through geologic faults passing under Lake Superior's depths. Occupying an area of about 300 square kilometers and located in Canadian waters approximately 70 kilometers from any shoreline, it sits surrounded by a sea of freshwater. Despite this geographic isolation, this and previous expeditions found the shoal to be teeming with life. During our seven days on the shoal, we observed exceptionally high densities of several strains of lake trout (including leans, humpers, and redfins) around the lakemount crests where the expedition sampled. Using a remotely operated vehicle (ROV) equipped with a cinema-grade camera to observe these fish, we found them cruising along shoal surfaces and among dense mats of periphyton that persisted to about 15 meters, as well as on shelves along the sides of the shoal under steep drop offs. Further down, ROV deployments revealed high densities of hydra (pictured below), covering the vertical shoal surfaces of the lakemounts where sediments can't accumulate, observed down to depths of 140 meters and potentially deeper.

And that's just what we saw directly as part of the expedition. We have reams of hydroacoustic data (collected from the boat as well as from



Pictured below and at right, this underwater mountainside is covered in hydra at 88 meters.



both upward-looking stationary units and the slocum glider deployed as part of this expedition); acoustic Doppler current profiler (ADCP) data to assess currents around the shoals; glider conductivity, temperature, depth, and fluorimetry data; phytoplankton and zooplankton samples; nutrient chemistry samples; as well as biological samples for stable isotope analysis and a ton of high-resolution video to assess. Sample analyses are currently being prepared or underway with preliminary results hopefully forthcoming in the new year. And while a large part of the success of this mission can be chalked up to unbelievably good weather, it could never have happened without the dedication of both the scientific and ship crew on the University of Minnesota Duluth's R/V *Blue Heron*, who all went above and beyond to make sure we collected all the data we could in our time at the shoal.

Though the data generated from this expedition will certainly begin to provide greater insights into the mechanisms supporting the diversity and production of these shoal ecosystems, longer-term, moored deployments of ADCPs and hydroacoustics to evaluate currents and the distribution and densities of organisms over the winter, as well as more extensive biological sampling for organisms along shoal surfaces are things we hope to be able to accomplish in future expeditions. We are currently working up these data to support future grant proposals to help fill these gaps and hope to visit the Superior Shoal and potentially other Great Lakes lakemount environments again very soon.

For a firsthand glimpse of what we saw, you can watch the [Freshwater Everest livestream recording](#) (or search the Internet for "Freshwater Everest YouTube").

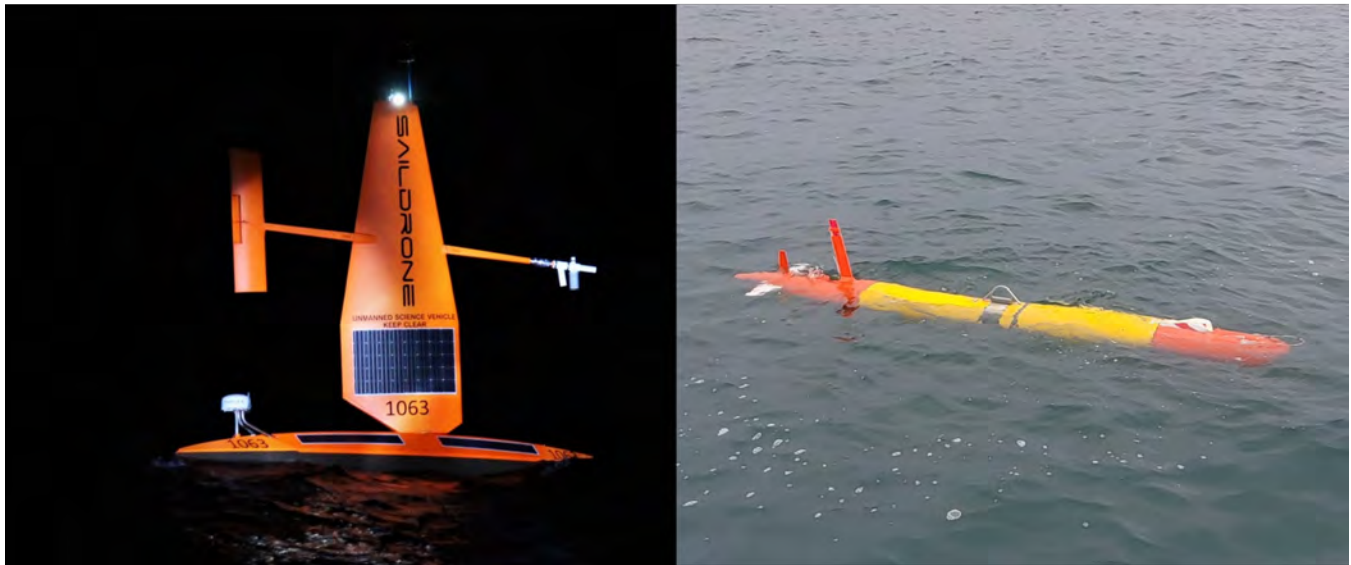
Zach Melnick flying an underwater drone equipped with a cinema-grade camera down the flank of Superior Shoal during a livestream in September.



Left to right: Zach Melnick and Yvonne Drebert (Inspired Planet Productions); Lisa Sundberg, Tom Frantti, and Jason Agnich (University of Minnesota Duluth); Gwen Phillips and Bianca Possamai (University of Vermont); Rual Lee and Ted Gephart (UMD); Lydia Paulic (University of Windsor), and Michael Rennie (Lakehead University).

Michael Rennie is an associate professor in the Department of Biology at Lakehead University. Filmmakers Yvonne Drebert and Zach Melnick are founders of the award-winning Inspired Planet Productions and are global leaders in the use of underwater drones to create extraordinary images for science and cinema.





At left: The Saildrone Explorer under the R/V *Kiyi* spotlight in Lake Superior, Summer 2022. *Photo by Ryan Grow.* **At right:** The Tethys Long Range Autonomous Underwater Vehicle during deployment preparing to receive instructions and dive to start surveying. *Photo by Hannah Blair.*

THE FUTURE IS NOW

*Autonomous vehicles enable enhanced views of fish and mysids
in the Great Lakes*

BY KAYDEN NASWORTHY, LARS RUDSTAM, JAMES WATKINS & PETER ESSELMAN

ACTIVE HYDROACOUSTICS are used worldwide to estimate fish abundance, including in the Great Lakes. This technology uses sound waves to detect fish, much like a bat does to find its next meal. Current surveys are done at night from ships by research agencies in both the United States and Canada. Recent advances in drone technology now allow surveys with uncrewed vehicles to cover large areas and to operate both day and night. These autonomous drones can collect more high-quality, active-acoustic data than ever before with the crewed research fleet, providing unprecedented insights into the fishes of the lake and how the lakes function.

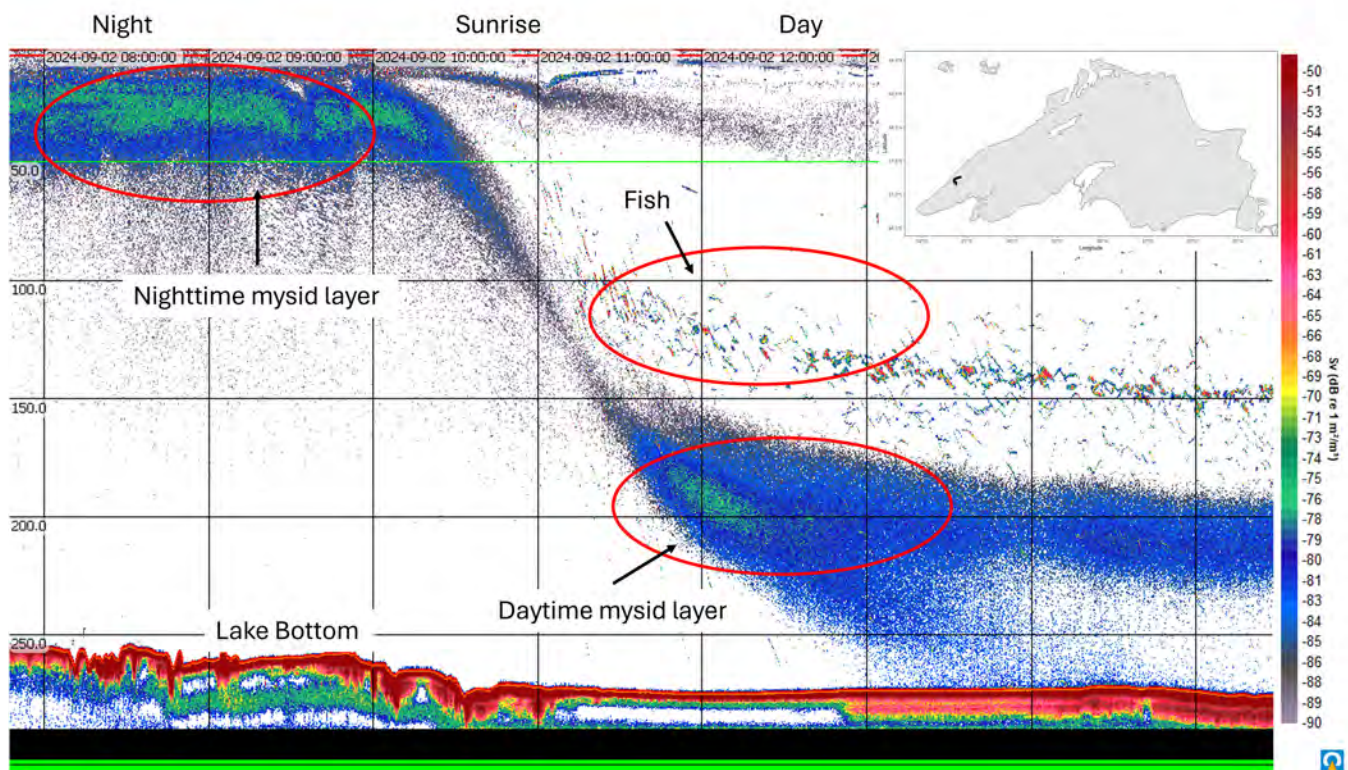
Through a collaboration with the United States Geological Survey Great Lakes Science Center and Cornell University, two of these new sampling platforms, pictured above, were deployed throughout four Great Lakes, covering more than 21,000 kilometers of sampling track—over half the Earth’s circumference—on lakes Michigan, Huron, Erie, and Superior (see figure at right). One was an uncrewed surface vessel developed and operated by Saildrone Inc. The second was a long-range autonomous underwater vehicle, developed by the Monterey Bay Aquarium Research Institute.

The surface drones are propelled by wind power and use solar panels embedded in the drone to charge batteries to power onboard sensors and equipment. This type was selected because they have no propellers, allowing us to

test the hypothesis that motorized research vessels alert fish to their approach, causing them to flee. The drones’ lower noise levels also result in cleaner data and increase our ability to detect fish and even mysid shrimps at greater depths—as deep as 250 meters. We explored fish avoidance of ships by comparing drone data with ship-based acoustics, finding that ship avoidance behavior is minimal



All sampling tracks generated by the Saildrones in the Great Lakes from 2021 to 2024. The drones sampled more than 21,000 kilometers of track in lakes Superior, Michigan, Huron, and Erie.



Visual display of the acoustic data collected from part of one night from a surface drone in Lake Superior in Summer 2024. The red line approximately 250 meters deep is the bottom of the lake. One of the major prey items of fish in the Great Lakes, mysids, can be seen high in the water column at night and then descending rapidly as the sun rises to remain hidden from the fish. Fish are seen chasing the mysids towards the bottom and then staying above them during the day.

(Evans et al. 2023, 2024). However, data collected from the underwater drone show that a substantial number of fish, especially smaller fish, are near the surface at night and are missed by surface-deployed acoustics. This type of drone travels underwater for long periods (several days), collecting hydroacoustic data with both upward- and downward-looking echosounders. It resurfaces at regular intervals to transmit data and receive new instructions before resubmerging.

In 2024, we explored whether surface drones could gather data at a lakewide scale, in lieu of ships. Two of these drones completed a whole-lake acoustic survey of Lake Superior, the first of its kind in the Great Lakes. This survey collected data continuously for 45 days, providing a unique look at the daily migrations of fish and invertebrates. Daily migrations are a common phenomenon in ocean systems and known in the Great Lakes, but the 2024 data allowed us to look deeper than previously possible due to the quietness of the drones and the ability to survey both day and night.

The data reveal a routine daily migration of both fish and mysid shrimps spanning several hundred meters throughout Lake Superior, as illustrated in the figure above. At dusk, the Kiyi, a coregonid that specializes on feeding on mysids, ascends from a daytime depth of around 150 meters, followed by mysids that move with a preferred light level and visit the thermocline at night. The reverse happens at dawn, with mysids descending first, followed by fish. Because we can observe mysids deeper than before, we found that mysids form a 20- to 30-meter-thick layer in the water column

Two of these drones completed a whole-lake acoustic survey of Lake Superior, the first of its kind in the Great Lakes.

around 200 meters depth, almost 50 meters deeper than the fish layer. Where water depth is shallower than 200 meters, mysids reside on the bottom, but even in 250-meter-deep water, some mysids appear to continue to the bottom rather than stay suspended. Whether mysids spend the day on the bottom has implications for the coupling between the benthic and pelagic zones in the Great Lakes.

These autonomous technologies provide a promising complement to conventional vessel-based surveys. By freeing crew time on already busy vessels, they enhance operational flexibility. Most importantly, they offer a way to increase spatial and temporal resolution in ecosystem monitoring, revealing patterns that were previously difficult or impossible to detect with conventional means.

Kayden Nasworthy is a graduate student, Lars Rudstam a professor in fisheries and aquatic sciences, and James Watkins a senior research associate in the Department of Natural Resources and the Environment at Cornell University. Peter Esselman is a research fishery biologist at the United States Geological Survey Great Lakes Science Center.



A digital partner for the Great Lakes

Navigating the ethical and scientific future of artificial intelligence

BY DANI JONES

Buoy photo credit: NOAA Great Lakes Environmental Research Laboratory.

IT IS AN EXCITING MOMENT for Great Lakes research, one that calls for thoughtful and responsible strategizing. The Great Lakes research and management community is gaining new power to apply advanced algorithms, data integration strategies, and cloud-scale infrastructure that can fundamentally enhance our ability to study, manage, and protect these complex inland seas. This progress is driven by both scientific curiosity and a commitment to ethical stewardship of the environment and the technologies we embrace.

Fueled by collaboration and the generous support of partners such as the National Oceanic and Atmospheric Administration (NOAA) and the Great Lakes Observing System (GLOS), the Cooperative Institute for Great Lakes Research (CIGLR) is launching the Great Lakes AI Lab as a regional hub for collaboration across the Great Lakes science community. Rather than replacing established science, this initiative unlocks our community's collective potential to build smarter, faster tools for managing the colossal streams of data produced by monitoring and modeling efforts across the world's largest freshwater system.

The Vision: Taming the data deluge

The Great Lakes generate vast amounts of information every day from satellites, buoys, remote sensors, and advanced computer models. Artificial intelligence (AI) and machine learning (ML) offer essential tools for managing this data deluge. These are methods that allow computers to detect patterns and make predictions from very large datasets, helping scientists uncover insights that would otherwise remain hidden.

Our vision, which took shape after the 2024 CIGLR summit titled [“Mapping Out How Machine Learning and Artificial Intelligence](#)

[Will Change Great Lakes](#)

[Observations, Modeling, and Forecasting](#),” is to build a

collaborative, open-source framework. Think of it like a shared digital workbench where researchers across the region can train, test, and deploy AI approaches. This framework moves beyond disconnected data and models. By integrating them for systemwide optimization, we can improve forecasting and make observing networks more adaptive and effective.

The arrival of ML and AI represents a fundamental shift, not just a new set of tools. Rather than reacting to change, our community must decide how to use this technology with focus and intention. To maintain the high standards of accuracy and reproducibility that the Great Lakes demand, domain expertise must remain in the driver’s seat. We are not simply training algorithms on numbers; we are embedding them in decades of scientific understanding and process knowledge. Realizing this vision depends on continued investment in our local experts, who form the human accountability layer for these powerful tools. This commitment is essential for moving toward systemic understanding and higher-order connectivity. It allows us to apply smarter, more holistic methods for assessing the interconnected Great Lakes system and to ask and answer more complex questions than ever before.

AI in Action: Extremes and efficiency

The power of this technology lies in its ability to address some of the region’s most pressing challenges.

1. Predicting water level extremes. Water levels on the Great Lakes fluctuate dramatically, from record lows to flood-inducing highs. Our data-driven approach identifies subtle, long-term patterns to provide probabilistic forecasts on subseasonal to annual timescales. One key example

is our NOAA-funded effort, supported by the Bipartisan Infrastructure Law, to provide the U.S. Army Corps of Engineers with advanced tools that extend the probabilistic water level forecast horizon beyond six months. This capability helps communities across the basin prepare and adapt to changing conditions.

2. Designing Smarter Observing Networks. Each year, considerable resources go toward deploying sensors and buoys across the lakes. Data-driven methods help us evaluate whether we are measuring the right things in the

right places. By blending model forecasts with sensor data, ML algorithms can test different observing strategies and highlight where new instruments or vessel missions would have the greatest impact. This work, supported through NOAA’s Synthesis, Observation, and Response program and GLOS, is being advanced through CIGLR summer fellowships that develop algorithms to guide future monitoring efforts.

The arrival of ML and AI represents a fundamental shift, not just a new set of tools. Rather than reacting to change, our community must decide how to use this technology with focus and intention.

The adjacent possible: What comes next

The applications we are developing today are only the beginning. As we master our current tools, new and unexpected breakthroughs will follow. Each success opens doors to new scientific territories, expanding what we can understand and predict.

This growing collaborative enterprise, made possible by NOAA and our regional partners, represents national-scale investment in the Great Lakes research community. It strengthens our collective capacity to support coastal resilience and environmental stewardship.

We are just beginning to chart this digital frontier. We invite colleagues across the Great Lakes community to collaborate, experiment, and help us harness the potential of AI. To get involved, connect with [our collaboration hub on GitHub](#) and contribute to the effort. We look forward to forging this path together.

To learn more, please see [“Mapping Out How Machine Learning and Artificial Intelligence Will Change Great Lakes Observations, Modeling, and Forecasting in the Coming Decade.”](#)

Dani Jones is an associate research scientist at the Cooperative Institute for Great Lakes Research, School for Environment and Sustainability, University of Michigan.



DataStream got its start in the Mackenzie River Basin 10 years ago and has since established hubs across Canada. Photo credit: Pat Kane.

Dawn of data sharing

Championing water quality data sharing for Great Lakes futures

BY KATHERINE BALPATAKY

WHEN YOU WALK THE SHORELINE of a great lake over days, years, or decades, you can't help pondering the changes you witness. For me, that great lake is Lake Erie. I grew up with Long Point in my backyard and now own a home near Port Colborne, Ontario. In my 48 years, I have seen shorelines transformed by the arrival of new species and the loss of familiar ones, as well as by algal blooms, plastic waste, and climate change. These changes have inspired curiosity and dismay, but also hope. More research and actions are needed to protect these precious lakes. Underlying all this is a need for greater availability of data.

At [DataStream](#), I collaborate with an incredible team bringing passion and expertise to address the freshwater data limitations we face across Canada. While numerous organizations, researchers, and industries collect water data, as a nation, we haven't pulled it together and used it effectively. Practically, we lack the evidence to make important decisions that will shape the health of our Great Lakes—now and into the future. It's a serious challenge that some regard as a [national security threat](#). DataStream is addressing this problem. In the U.S., there is greater integration of publicly available water quality data through



Katherine Balpatak and Crowley, the English Setter, exploring the shores of Lake Erie.

the [Water Quality Portal](#). However, due to a recent lapse in government funding, the portal's future is uncertain.

Northern exposure

DataStream is a registered charity supporting a comprehensive data literacy program and an open access platform for sharing western scientific water quality data.

DataStream's story includes hundreds of community groups, governments at all levels, Indigenous water guardians, and freshwater scientists committing their time to data stewardship. Water monitoring is the starting point of a lifecycle that includes working with a specialist to standardize data, prepping metadata, and sharing it for future analysis. As we say at DataStream, "open data is a team sport." The results are inspiring, and we're only beginning to understand its potential.

DataStream exists because 10 years ago, communities of the Mackenzie River Basin in the Northwest Territories were grappling with how to protect freshwater for future generations. They identified data gaps as a barrier. They needed a solution to assess the outcomes of a collaboration between five neighbouring jurisdictions and the Government of the Northwest Territories (GNWT).

To address this gap, the GNWT teamed up with the Gordon Foundation, a philanthropic foundation with a long-standing interest in freshwater protection. Their goal was to build a system to house community-based and government datasets. The resulting 2016 launch of Mackenzie DataStream became the prototype for the current system that houses surface water, sediment, and (soon-to-be) groundwater data, with over 340 organizations engaged, all in the name of freshwater protection.

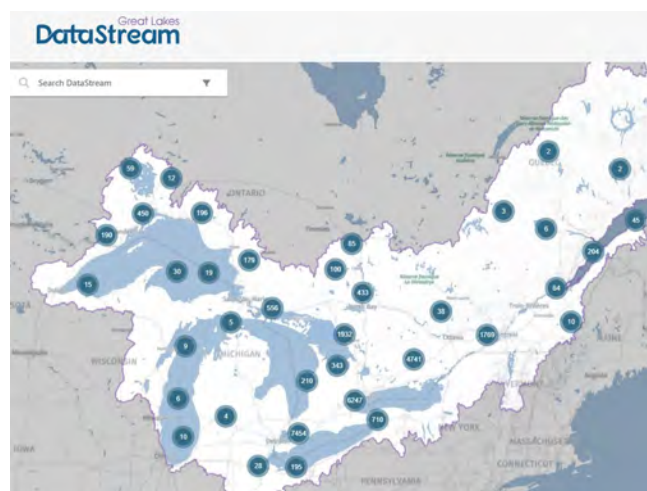
Dizzying days of data sharing

DataStream's cross-sector and cross-country data sharing has been conceptualized as the appropriate type of solution in literature on freshwater data. A 2025 article by Jess Kidd et al. in the journal *Water* synthesized insights from technology sector experts about Canada's freshwater data dilemmas. While our team wasn't mentioned, the results ring true to our experience and approach. The authors pointed to the need for 1) support of an open data culture, 2) enhanced use of data licenses, 3) increased data literacy skills and development, as well as 4) a freshwater data standard guiding collection and management. But there's more to do.

Data sharing is particularly relevant for environmental data and data collected in the public interest, using public funds.

The open data culture the authors speak of is a growing movement worldwide. DataStream talks to groups who are initially unsure about sharing data openly. However, data sharing is particularly relevant for environmental data and data collected in the public interest, using public funds. When we describe transboundary data uses or the time saved (by one researcher's estimation over 60%) by having data standardized in one place, monitoring groups get excited about the potential. Certainly not all data are suitable for open access, such as Indigenous Traditional Knowledge, but most water quality data are fair game.

The lion's share of the effort involved in fostering an open data culture comes from outreach and support. There are



DataStream has regional hubs in the Great Lakes, Lake Winnipeg, the Mackenzie River Basin, the Atlantic region, and the Pacific region.

hundreds, maybe thousands, of community-based monitoring groups aiming to improve freshwater health. They wish to contribute to science, policy, water management, and education efforts, but need help with their data. Although data may be captured by non-scientists, it's highly valuable and sometimes collected with expert advice or guidance in design protocols. It costs money (often taxpayers') to collect it, and it's essential for freshwater science and protection. Therefore, we support them in data formatting and management.

DataStream is growing into a one-stop-shop for making freshwater quality data discoverable, available, machine-readable, and ready for prime time. The platform provides free and open access data, aligns with international open data best practices, and all datasets are published under open data licenses, which provide clarity around ownership, attribution and reuse. Finally, data are shared in a standardized format, based on the WQX (Water Quality Exchange) schema, the most widely used water quality standard in North America.

Here are five inspiring examples of data collaborations from the Great Lakes:

- University of Waterloo researchers [crunch big data using AI to assess nutrient loads](#)
- Citizen scientists [gather nutrient data on Lake Erie to fight algal blooms](#)
- Volunteers with Ottawa Riverkeeper [advance chloride monitoring to advocate for smarter salt management](#)
- DataStream and the Great Lakes Observing System [develop an integration to make water data more accessible](#)
- Data Rescue intern [curates polyfluoroalkyl substances data from the Université de Montréal](#)

DataStream's efforts in the Great Lakes are supported by the Canada Water Agency.

Katherine Balpataky is the executive director of DataStream where she works with the team to foster strategic partnerships across Canada.



Lake whitefish. Photo by Ben Vasquez.

The kin within the catch

Using genetic relationships to inform lake whitefish conservation

BY EMILY TRYC & JARED HOMOLA

FOR MANY IN THE GREAT LAKES REGION, “up north” means fresh-caught, local fish. The fisheries supporting this pastime are deeply woven throughout the region’s culture. Towns along the lakes have built their livelihoods on commercial fishing. Leland, in the pinky of Michigan’s mitt-shaped lower peninsula, even has a district named Fishtown along the mouth of the Leland River that feeds into Lake Michigan. The original fishing shanties along the river are still standing, most now filled with small shops and businesses. Thousands of tourists from Michigan and the broader region visit Fishtown to enjoy the area’s rich history and, of course, the excellent fish it has produced for years.

One of the most emblematic of the Great Lakes fisheries focuses on lake whitefish (*Coregonus clupeaformis*), a large silvery fish that is known to be one of the best tasting of the region. This is not a new revelation; Indigenous Peoples have been harvesting lake whitefish since time immemorial, and it still plays a key role in their cultures. Lake whitefish’s taste and abundance have solidified it as a key pillar in the region’s US\$5.1 billion fishing industry.



At left: Graduate student Alicia Krause holds lake whitefish from Lake Michigan. *Photo by Alicia Krause.* **At right:** Fishtown, located in Leland, Michigan, is a surviving example of the fishing villages that once dotted the coastlines of the Great Lakes.

Despite their seemingly steady availability, lake whitefish are not an infinite resource. This is evident from the fishery's collapse in the 1950s, when the populations dwindled to unfishable numbers after the sea lamprey invasion. Thanks to the implementation of sea lamprey control, populations bounced back. Harvest regulations, continued monitoring, and invasive species control allowed the fishery to regain some stability. Continued co-management and collaboration between tribal and state agencies have been crucial in setting and maintaining harvest quotas. However, history seems to be repeating itself, with Great Lakes ecosystems being reshaped by new invasive species, like the round goby and dreissenid mussel species. Due to changes in the food web caused by these seemingly ubiquitous invaders, lake whitefish abundance has been declining since the early 2000s, with recent estimates causing alarm among fishers and managers alike. Understanding how fish populations are changing in response to these shifts is crucial for determining what can be done to restore them. Much of the data used to make abundance estimates comes from commercial fishers, so lowering harvest limits results in less data to make confident estimates.

This is where a genetic tool called close-kin mark-recapture (CKMR) can come in. Part of an expanding toolset of molecular techniques that help us learn more about wild populations, CKMR provides estimates of abundance using the frequency of related pairs of individuals to infer the size of a population. If considered in a human context, CKMR would operate on the idea that it is more likely to randomly find two related people in a small, rural community than in a massive city. The same logic can be applied to populations of lake whitefish and samples collected by fishers and management agencies. The number of relationships discovered within a sample can therefore provide the basis for estimating the size of a population. We're developing such a CKMR model for Great Lakes lake whitefish in collaboration with U.S. Geological Survey researcher Benjamin Marcy-Quay and with funding support from the Great Lakes Fishery Trust.

To find related fish, we can examine regions of the genome that are particularly well-suited for determining familial relationships. We have been developing a carefully tailored tool that targets certain locations in the lake

whitefish genome that allow us to determine whether sampled fish are either parent and child or half siblings. With Lake Michigan lake whitefish samples collected by the Michigan Department of Natural Resources and Grand Traverse Band of Ottawa and Chippewa Indians over the past two decades, we can use the CKMR tool to estimate population sizes from those years for comparison to current abundance estimation approaches. Discovery of half siblings also reveals the survival of fish over the years, as the shared parent must have survived between the births of the siblings.

Lake whitefish are divided into geographically defined units within the Great Lakes and managed separately. However, recent genetic analyses have confirmed what managers have long suspected; the fish themselves are unaware of the boundaries we have drawn for them. We have been able to better estimate where population borders lie thanks to patterns of genetic similarity, but with changing food availability, these boundaries may be changing. Knowing the source of fish we are analyzing is crucial to understanding what we are estimating; if we count fish that are not members of the study population, there is a risk of overestimating population size and thus setting harvest limits too high. With the genetic regions we are targeting with the CKMR analysis, we will be able to determine which unit each fish came from to help characterize the status of the fishery in each corner of Lake Michigan.

It is impossible to know the exact number of lake whitefish in Lake Michigan at any given time, but we can get close estimates of reality with tools like CKMR. Being able to properly assess the total number of fish can help managers set informed harvest limits and potentially take other measures to preserve or restore populations. Considering continued environmental changes and species invasions, CKMR offers a way to ensure our actions are effective. Continued economic success of places like Fishtown that make up the rich cultural tapestry of the Great Lakes region hinge on success of healthy fisheries. Tools like CKMR help us to preserve not only the fishery itself, but the legacy of towns that have been built around the fishery for generations.

Emily Tryc is a graduate student in the Department of Fisheries and Wildlife at Michigan State University, where Jared Homola is an assistant professor of conservation genetics.



At left: Preparing to deploy a real-time buoy in the Western Basin of Lake Erie. *Photo by Ed Verhamme.* **At right:** Volunteers receiving training on baseline water sampling at Turkey Creek in LaSalle, Ontario. *Photo by Colton Coomber.*

Integrating technology and collaborative monitoring in the Western Lake Erie Basin

BY EDWARD MILLAR, KATELYNN JOHNSON, ELIZABETH STRIANO & AARON FISK

BASED AT THE UNIVERSITY OF WINDSOR, the Real-time Aquatic Ecosystem Observation Network (RAEON) supports collaborative freshwater research by providing access to water monitoring instruments and infrastructure. The core of RAEON's mission centers on collaboration: providing a system through which emerging freshwater monitoring technologies are shared to improve research and management. Its suite of Slocum gliders (autonomous underwater vehicles), real-time buoys, and multiparameter sondes collect continuous, high-resolution data on a wide range of parameters, including temperature, oxygen, chlorophyll, phycocyanin, nitrate, and pH. This information improves understanding of the timing and severity of harmful algae blooms, changing food web dynamics, and the effects of increasing temperatures on lake health. Although these instruments serve as vital tools for tracking lake health, they do not always capture local and nearshore data. This missing information is crucial for connecting the scientific picture to public perceptions of how the lakes and waters are changing. That's where community science comes in.

With support from the Canada Water Agency, RAEON is integrating participatory science into its monitoring network by engaging volunteers, schools, and community organizations. Through this initiative, the network is engaging community members in data collection to expand monitoring while helping people learn about their local waters and shape how they are managed. The program provides opportunities to participate in monitoring baseline parameters like temperature, pH, conductivity, dissolved oxygen, and other water quality indicators in streams, rivers,

From a glider navigating Lake Erie to a student doing monthly testing at a local creek, every observation adds to our shared understanding of the health of the Great Lakes.

and shorelines throughout the Western Lake Erie Basin. By sampling at regular intervals, volunteers track seasonal trends and help identify local stressors. The data complement RAEON's high-tech sensor arrays, creating a more complete picture of watershed health. They also support university researchers modeling the flow of nutrients through the ecosystem and into the Great Lakes.

The program also helps connect volunteers with community science initiatives to build on work by established organizations and strengthen their presence in the Western Lake Erie basin. The team collaborates with Water Rangers, a Canadian nonprofit that provides simple water quality test kits and an open platform for sharing results. Data are also uploaded to DataStream, an open access platform developed by the Gordon Foundation that standardizes and shares water quality data from across Canada (see story, page 20). The program is integrated within the Lake Erie Volunteer Science Network, coordinated by the Cleveland Water Alliance, which links dozens of organizations conducting community-based monitoring across the basin. These partnerships ensure

Outreach activities are not just about raising the public's awareness of water quality issues, but also raising scientists' awareness of the public's concerns, and providing forums for researchers to listen and learn about what water issues resonate most.

community-based data are accessible and useful not only to researchers, but also to the public, civil society groups, government agencies, and other users.

Beyond data collection, RAEON's participatory science efforts are also focused on public outreach and engagement. This work includes setting up information booths at community festivals and environmental events, making public demonstrations of monitoring tools and platforms, giving public talks, talking with residents about local water issues, and bringing hands-on freshwater science into classrooms. These outreach activities are not just about raising the public's awareness of water quality issues, but also raising scientists' awareness of the public's concerns, and providing forums for researchers to listen and learn about what water issues resonate most.

RAEON is also conducting qualitative survey research to explore how community members prioritize different aspects of water monitoring, and how these priorities align or differ from those of scientists engaged in community-based research. The results of this work will help guide the next phase of RAEON's participatory science program, ensuring that monitoring efforts reflect both scientific and community interests. By aligning these perspectives, the network hopes to strengthen mutual trust and make freshwater science more responsive to the people it serves.

The program aims to expand its reach and scope over the next three years by working with new partners to identify and fill data gaps to better understand the links between offshore, nearshore, and tributary monitoring. From a glider navigating Lake Erie to a student doing monthly testing at a local creek, every observation adds to our shared understanding of the health of the Great Lakes. High-resolution glider and buoy data reveal the dynamics of algal blooms offshore; community-based data provide context at the land-water interface, and open platforms like those created by DataStream and Water Rangers make those datasets visible and interoperable. Researchers gain new data and local insights, communities gain tools and confidence to understand their environment, and the lakes themselves gain a growing network of people invested in monitoring and stewardship.

Established in 2018 and led by Science Director Aaron Fisk and Research and Operations Director Katelynn Johnson, the RAEON network links universities, municipalities, and government institutions to share equipment, expertise, data, and logistical capacity to accelerate Great Lakes research.



In August 2025, RAEON set up a public display booth at the Visitor Centre of Point Pelee National Park to engage with the public about the real-time data collected by the buoys installed near the park. Photo by Grace Colomba.

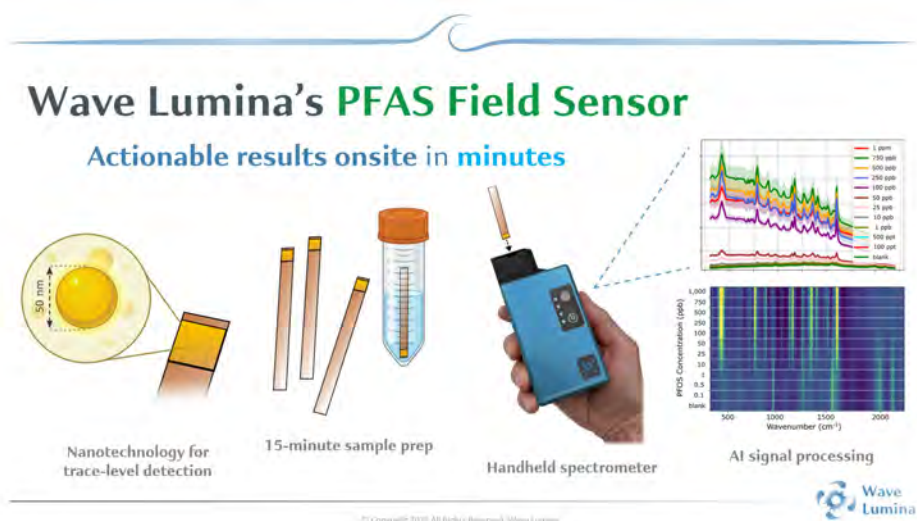
In 2023, RAEON joined [Global Water Futures Observatories \(GWFO\)](#), a national network led by the University of Saskatchewan that operates 64 instrumented research sites across Canada. RAEON serves as GWFO's Great Lakes node, providing real-time monitoring and open access environmental data of changing ecosystems within a national network. The team works collaboratively with partners, such as the [Great Lakes Observing System](#), to ensure that high-resolution buoy and glider data are publicly accessible and supports binational research, forecasting, and management efforts across the Great Lakes.

Edward Millar is the community science coordinator, Katelynn Johnson the project co-lead and research and operations director, Elizabeth Striano the communications director, and Aaron Fisk the science director for RAEON at the University of Windsor. Striano is also the communications director for Michigan Sea Grant, and Fisk is a professor and Tier 1 Canada Research Chair in Changing Great Lakes Ecosystems at the University of Windsor.

SENSING THE FUTURE

Building a field-based PFAS detection tool in the Great Lakes region

BY VERNON LALONE



PER- AND POLYFLUOROALKYL SUBSTANCES

(PFAS) have become the poster children for the challenges of modern water pollution: persistent, invisible, and costly to track. For the past two years, we've been working to solve one of the biggest barriers in PFAS management: the time and cost required to measure them in the field.

From our lab in Traverse City, Michigan, Wave Lumina is developing a portable field screening technology that uses laser light and artificial intelligence (AI) to rapidly detect PFAS at the parts-per-trillion levels, no large lab or lengthy turnaround required. Our goal is to enable environmental engineers, water utilities, and PFAS-impacted site managers to make data-driven decisions on-site, in real time.

A new approach to an old problem

Traditional PFAS analysis requires samples to be shipped off-site to specialized laboratories for liquid chromatography-mass spectrometry (LC-MS/MS) analysis, often taking weeks and costing several hundred (sometimes over a thousand) dollars per sample. Our approach leverages Raman spectroscopy enhanced with nanotechnology, specifically, surface-enhanced Raman scattering (SERS), to detect the unique molecular “fingerprints” of PFAS compounds.

Paired with proprietary sample preparation chemistry and machine-learning algorithms, the technology translates these complex optical signals into clear quantitative results within

minutes. Think of it as the field-ready cousin of a laboratory mass spectrometer that is smaller, faster, and deployable at contaminated sites.

Celebrating science and discovery

As a scientist-turned-founder, I believe innovation thrives when we connect fundamental discovery with practical tools that serve society. Wave Lumina's work is part of that continuum, bridging advanced spectroscopy and AI with hands-on environmental protection. The company was founded on the idea that translating rigorous research into accessible field technology can multiply the reach and impact of science.

That philosophy has been validated through national support: Wave Lumina is backed by the National Science Foundation's Small Business Innovation Research program and the Activate Fellowship, a nonprofit that empowers

**Innovation thrives when we connect
fundamental discovery with practical
tools that serve society.**



At left: Stephanie Baklarz, research scientist with Wave Lumina, testing PFAS levels in the field with the PFAS field sensor prototype under development. **At right:** Wave Lumina CEO Vernon Lalone with the PFAS field sensor prototype.

scientists and engineers to turn research breakthroughs into scalable solutions. These programs invest in teams who are tackling some of the most pressing challenges of our time, such as environmental contamination, public health, and climate resilience. And they have allowed us to pursue PFAS detection not just as a technical milestone, but as a public mission.

Science isn't just about data; it's about empowerment. Every test run by a field engineer, every dataset shared by a researcher, every student learning to apply spectroscopy to water quality, all of it contributes to our collective capacity to safeguard freshwater ecosystems. In a time when environmental challenges can feel overwhelming, stories of scientific progress remind us why this work matters and how it can tangibly improve lives.

Innovation rooted in the Great Lakes

Wave Lumina's story is inseparable from the Great Lakes community that surrounds it. Our partnership with Northwestern Michigan College and the Freshwater Research and Innovation Center has provided access to chemistry and photonics lab space, enabling us to design and test prototypes just blocks from Lake Michigan's Grand Traverse Bay (see story, page 29). Collaborations with regional engineering firms, environmental consultants, and municipal water utilities allow us to validate our technology on real-world groundwater and PFAS-impacted samples across Michigan.

Growing up in northern Michigan, I've seen firsthand how intertwined our livelihoods are with clean water. It's not just an environmental issue; it's an economic and cultural one. Developing advanced water-testing technology here is convenient, but it's also symbolic of the Great Lakes leading the way in freshwater innovation.

From lab bench to field kit

Today, Wave Lumina's third-generation prototype integrates optical hardware, advanced chemometric analytics, and a compact reagent kit into a system that fits in a single field case. We are testing the device on samples provided by field partners from remediation sites to evaluate its performance alongside standard laboratory results. Early data show promising measurements at trace-level PFAS concentrations, with results produced in under 10 minutes.

We see this as a complementary tool to laboratory methods, not a replacement. By providing immediate screening data, our device helps identify which sites and samples need confirmatory testing, thereby saving both time and money and accelerating cleanup decisions.

The next wave of collaboration

As the environmental challenges facing large lakes grow more complex, so too must our tools. Wave Lumina's mission is to ensure that the next generation of water scientists and engineers (especially those here in the Great Lakes) have access to technology that keeps pace with the problems they're solving.

In 2026, we plan to expand our pilot network across the Great Lakes basin and are seeking collaborators interested in integrating rapid PFAS field testing into ongoing monitoring or remediation projects. We believe these early adopters, including scientists, consultants, and utilities, will help shape a new model for environmental testing that's faster, more accessible, and more responsive to the needs of the field. If you're interested in collaborating in our pilot network next year, please [contact us](#).

Vernon LaLone is founder and CEO of Wave Lumina.

New research center takes root along the shores of Lake Superior

The Burke Center for Ecosystem Research is a new nonpartisan center founded to continue the work of the Mary Griggs Burke Center for Freshwater Innovation after Northland College closed in May 2025. The Burke Center's high-profile water-related work and applied student research opportunities were signature programs at Northland for nearly a decade. The new Burke Center has a slightly different name, allowing for non-water-related researchers to join the new center, which is a stand-alone science and policy research center in Ashland, Wisconsin.

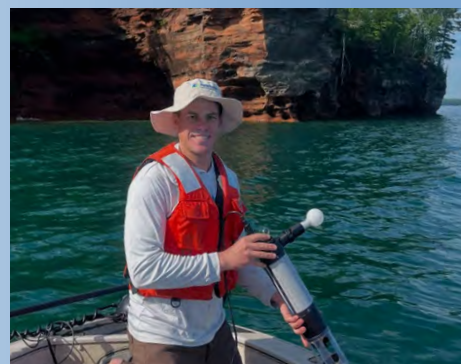
The Burke Center's team of expert staff and affiliated scientists is dedicated to advancing knowledge of freshwater and terrestrial environments, developing innovative solutions to ensure the long-term sustainability of these vital

ecosystems, and training the next generation of freshwater stewards.

The Burke Center has two primary focal areas—Science and Communications/Policy. Science initiatives focus on research and restoration projects centered in the Great Lakes and inland regions of northwest Wisconsin.

By contrast, communications and policy initiatives have a much broader geographic focus, highlighting natural resource issues—especially regarding water—from a national and international perspective.

The Burke Center also has a highly competitive summer research program for undergraduates, recent graduates, and graduate students. Students are engaged in all aspects of Burke Center programs as they gain applied, real-world experience in



natural sciences, environmental policy, and communication.

By Matt Hudson, Associate Director-Great Lakes, Burke Center.

AquaAction's new U.S. headquarters in Detroit

AquaAction made waves in early October with the official launch of its office in Detroit's Urban Tech Xchange. A charity that solves critical water challenges by launching and supporting water-tech startups, AquaAction is dedicated to building a thriving water-tech community in Michigan. They've already helped launch fast-growing Michigan companies like MotMot, which uses miniature submarine robots to spot leaks in aging infrastructure for repair. Leaky pipes are a major municipal issue, with up to 30% of all drinking water lost to leakage. This is just one example of the kinds of innovations AquaAction fosters for better use and access of our precious water resources.

Now, AquaAction is bringing its flagship water leadership development program to the U.S. The 2026 AquaHacking Great Lakes and St. Lawrence Binational has a goal of attracting 1,000 aspiring water tech entrepreneurs. We're expecting teams of three to five innovators drawn largely (but not exclusively) from post-secondary institutions to propose a business, usually applying their science and engineering expertise. That's when AquaAction does their magic to support this field of innovators to ensure those ideas swim, not sink, in the marketplace. Participants gain access to mentorship, technical guidance, business coaching, seed funding, investor networks and so much more. Registration starts in early 2026. The program culminates when the field of innovators is narrowed to the best five, who will deliver their pitches in a grand finale event next fall.



A broad spectrum of leaders in water welcomed AquaAction's new offices in Detroit.

Interested parties are invited to be part of this movement. Whether you're a student, a sponsor, or a strategic partner, AquaAction wants to hear from you. Visit [our website](#) to learn more and let's shape the future of freshwater, together.

By Oliver Anderson, VP of Communications and Growth, AquaAction.

Freshwater hub growing in northern Michigan

After years of planning, a community in northern Michigan saw welcome physical progress this year on its quest to become a freshwater bluetech hub.

The Freshwater Research and Innovation Center broke ground September 12 on the shores of Grand Traverse Bay in Traverse City, Michigan. The 38,000-square-foot facility is the centerpiece of a collaborative effort to advance entrepreneurship, industry partnerships, and business attraction to grow the state's BlueTech innovation economy in northern Michigan. Partners in Michigan's BlueTech Innovation Hub include Discovery Pier, Northwestern Michigan College, Traverse Connect, Michigan Technological University, 20Fathoms, and FishPass.

Located on the Discovery Pier campus, the \$28.9 million facility will have wet labs, technical maker space, wet bay space with mesocosm tanks, pier access for research vessels, and more. With an expected opening in Spring of 2027, more than half the building is already spoken for by a range of tenants, including startups and established businesses, academic partners, federal agencies, and more. "If anyone is interested in being a part of the Freshwater Center, now is the time to get on the list," said Matt McDonough, the center's executive director. "There is still time to customize spaces to fit tenants' needs."

One of those tenants will be Wave Lumina, a startup that is developing a field-based PFAS detection tool (see story, page 26). Company CEO Vernon Lalone noted, "Together, we can make Traverse City and the Great Lakes region a hub of freshwater innovation that protects our most vital shared resource."

This year also saw progress on FishPass, a project on the Boardman/Ottaway River in downtown Traverse City led by the Great Lakes Fishery Commission. As reported in our Summer 2024 issue, "the Great Lakes Fishery Commission and its partners are developing an approach to selective fish passage that integrates fish ecology and biology with engineering at FishPass. The FishPass project will replace the last of four legacy barriers on the [river] with an improved barrier and adaptable fishway designed to develop and test tools to selectively pass desirable fish while blocking and/or removing undesirable fish, like the invasive sea lamprey."

Phase 2 of FishPass construction is well underway, after crews installed a sheet pile cofferdam along the north side of the river and dewatered the area early this summer to safely build the 400-by-30-foot fish-sorting channels. The original Union Street Dam, built in the late 1800s, has been removed from the site. Sediment and silt were cleared to prepare for new construction.

Before the area was fully drained, staff from the Great Lakes Fishery Commission and the Grand Traverse Band of Ottawa and Chippewa Indians carefully relocated fish from the cofferdam pools back into the river, below the new arc labyrinth weir. Species included rock bass, round goby, smallmouth bass, yellow perch, brown trout, and rainbow trout.

In-stream construction is expected to finish in 2026, with the full project—including an outdoor pavilion, native landscaping, and a research and education building—completed by late 2027.

By Matt McDonough, CEO of the Freshwater Research and Innovation Center, and Leah McCallum, FishPass Public Affairs Specialist, Great Lakes Fishery Commission.



Construction of the fish-sorting channels underway at FishPass. Photo courtesy of Team Elmers.



Left: Matt McDonough, CEO of the Freshwater Research and Innovation Center, speaking at the groundbreaking ceremony in September. **Right:** Architectural rendering of the facility. Photos courtesy of the Freshwater Research and Innovation Center.



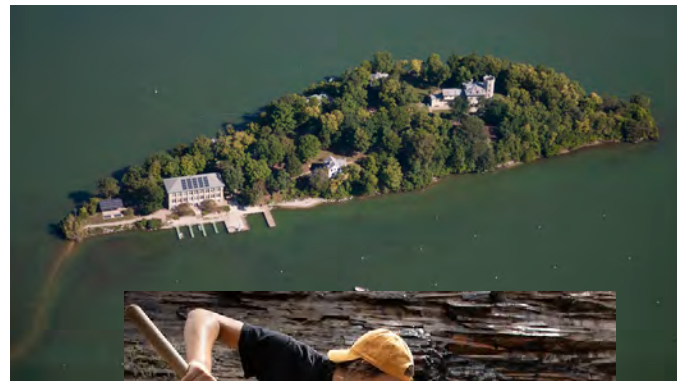
Congratulations to Stone Lab for 100 years!

If you're doing research on Lake Erie, Franz Theodore Stone Laboratory's setting in the lake's Western Basin is the ideal location. *Stone Lab*, its nickname, is Ohio State University's island campus on Lake Erie, pictured at right. Created as "the Lake Laboratory" in 1897, it is the longest running freshwater biological field station in the country. The lab was renamed in 1925 when its footprint expanded from South Bass Island to include the 6.5-acre Gibraltar Island. Yes, Stone Lab is celebrating its 100-year anniversary at its current location. This expanded footprint and new name occurred after Gibraltar island was purchased and gifted to the university by businessman and OSU Board of Trustee member Julius Stone. The lab is named after his father Franz.

Today Stone Lab hosts researchers investigating water quality issues, coastal resilience and environmental variability, the fishery, invasive species, harmful algae blooms, chemicals of emerging concern, and numerous other limnological and ecological questions. Annually, the lab hosts approximately 30 institutions, 30 grant-funded projects, and 60 researchers. The lab's campus boasts

a nearly 1,900-square-foot wet lab with myriad aquariums and six 950-liter lake-water, flow-through experimental tanks. In 2022, a state-of-the-art, open-air mesocosm facility was added to enable researchers, via the use of 15 2,200-liter tanks, to mimic Lake Erie conditions on a larger scale. Research can control water conditions in these tasks by using various filters. Stone Lab also maintains several research vessels to support visiting researchers; 42-foot R/V *Gibraltar III* and 37-foot *BioLab* are trawlers capable of deploying trawl nets and heavy equipment, while two 25-foot enclosed-cabin aluminum vessels (*Erie Monitor* and *GS-3*) provide long-distance sampling, SCUBA, and remotely operated vehicles.

In addition to abundant research opportunities, the lab's three-story classroom building, dormitory, dining facility, numerous cottages and various labs support high school and college classes for science students, training seminars and workshops, elementary school field trips, and numerous stakeholder outreach events. Stone Lab is part of the OSU's College of



Food, Agricultural, and Environmental Sciences and is supported by the National Oceanic and Atmospheric Administration Sea Grant.

By Christopher Winslow, Director, Ohio Sea Grant College Program and Stone Lab.

CALL FOR PROPOSALS

<https://www.glfc.org/call-for-proposals.php>

The Great Lakes Fishery Commission
is soliciting pre-proposals and pilot project proposals for the
Fishery Research and **Sea Lamprey Research** programs.

Fishery Research Special Topics

Indigenous-led research

Lake Whitefish, Dreissenid mussels, and lower food web change

Emerging Contaminants

Sea Lamprey Research Special Topics

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Improved understanding of granular Bayluscide effectiveness

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January 15, 2026

Questions? Contact
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Canada's weather service at a crossroads as AI, climate change, and geopolitics reshape the landscape



As the Great Lakes region faces more frequent and severe weather events, the systems that track, forecast, and communicate environmental change are under increasing pressure to evolve. A new expert report from the Council of Canadian Academies (CCA), *The Future of Hydrological and Meteorological Services in Canada*, examines how Canada's national weather service can adapt to meet these growing challenges

and seize emerging opportunities in an era defined by climate change, artificial intelligence (AI), and shifting geopolitical realities.

Commissioned by Environment and Climate Change Canada's Meteorological Service of Canada (MSC), the assessment explores how the country's public hydro-meteorological service—responsible for monitoring, understanding, and forecasting weather, water, and climate—can continue to protect Canadians while advancing scientific and operational excellence.

"We're facing a critical moment for hydro-meteorological services in Canada and an opportunity to ensure that Canada's weather service continues to serve the public interest," said Jim Abraham, chair of the expert panel that developed the report.

The report highlights the MSC's vital role as a cornerstone of national safety, economic stability, and environmental resilience. For communities surrounding the Great Lakes, where hydrological and meteorological conditions are deeply intertwined with regional economies, ecosystems, and cross-border management, this work is particularly relevant. Reliable forecasts and integrated water data underpin everything from navigation and energy production to agriculture, fisheries, and emergency response.

At the same time, the study underscores the pressures facing the MSC: rapidly evolving technologies, rising user expectations, and tightening fiscal constraints. AI and machine learning are revolutionizing global forecasting capabilities, creating both opportunities and risks for Canada's weather enterprise. The expert panel concluded that while AI can dramatically enhance predictive accuracy, continued investment in foundational infrastructure—such as observation networks, data stewardship, and modelling systems—remains essential.

"Weather, water, and climate monitoring and forecasting are some of the most indispensable government services in Canada," said Tijs Creutzberg, president and CEO of the CCA. "This report can inform the important work of the public weather service to ensure it continues to support decision-making across sectors, communities, and industries."

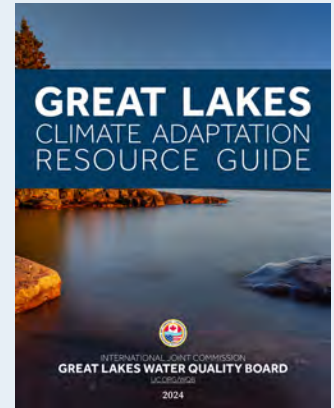
Climate adaptation strategies for Great Lakes communities

A new resource aims to help small and medium-sized communities integrate Great Lakes water topics into their climate adaptation and resilience strategies.

In September, the International Joint Commission's Great Lakes Water Quality Board released the *Great Lakes Climate Adaptation Resource Guide* with materials to help

Great Lakes communities use a common framework to create their own climate change adaptation and resilience strategies. The guide lists tools, strategies, materials, and training resources. The guide is useful for any community to engage with its resources, no matter where it is at in the planning process.

According to board Canadian Co-chair Chris McLaughlin, the guide focuses on supporting and engaging individuals and organizations in local communities to help them connect with resources, policies, and programs. "That's where the work really gets done," he said in a [webinar announcing the report](#), adding that the board's project was uniquely aimed at providing useful and imaginative resources to communities and promote peer learning and networking across the basin.



The panel also emphasized the importance of strengthening and diversifying domestic and international partnerships to ensure coherence across jurisdictions and avoid fragmentation of services. For the Great Lakes region—shared by two nations, two provinces and eight states—enhanced coordination among agencies, researchers, and data providers is critical to anticipating and responding to complex transboundary challenges such as lake-effect storms, flooding, and ice dynamics.

Ultimately, the report concludes that by embracing common standards, building strong partnerships, and exercising leadership in areas where national coordination is essential, the MSC can maximize its impact and efficiency while safeguarding Canadian sovereignty, safety, and prosperity.

By Heather Ennis, Director of Communications, Council of Canadian Academies.



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