RAINY-LAKE OF THE WOODS WATERSHED 2026 FORUM

March 11 – 12, 2026

23rd Annual Forum

Proceedings Report

Forum Partners – Sponsors

The organizing committee thanks our 2026 sponsors for assisting with the 23rd annual International Rainy-Lake of the Woods Watershed Forum. This event would not be possible without them:

- Lake of the Woods Water Sustainability Foundation
- Grand Council Treaty #3
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- St. Cloud State University
- International Joint Commission
- Minnesota Pollution Control Agency
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- Lake of the Woods District Stewardship Association
- Rainy Lake Conservancy
- Rainy Lake Property Owners Association
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Recapping the 2026 International Rainy-Lake of the Woods Watershed Forum

This year marked the 23rd annual International Rainy-Lake of the Woods Watershed Forum. The event took place online, delivered on Zoom over two full days, March 11-12.

We are immensely grateful to Forum partner Saint Cloud State University for providing not only the Zoom space but also lending us the technical mastery of the incomparable Reuben Wagenius, the university's video conferencing expert in their Education Technology Innovations department. Reuben worked tirelessly behind the scenes to ensure a seamless, smooth delivery of more than 30 video and live presentations over the two days.

Lake of the Woods. Photo courtesy of Tom Thomson.

Forum presenters, likewise, deserve accolades not only for delivering talks of the exceptionally high caliber that we have all come to expect from this event, but for also being gracious and amendable to programming changes in the weeks leading up to the Forum. Many presenters obliged by pre-recording their talks, allowing Reuben to pre-load the videos into a presentation queue that ensured no time was lost to transitions between presenters. Reuben was able to record all the live presentations, as well, and all publicly sharable videos from the Forum will be available on the Lake of the Woods Water Sustainability Foundation's website (LOWWSF.com).

"Big Picture" Reflections from the Forum

The Forum is a space for showcasing, celebrating and interrogating science, research, and international, interagency cooperation for management and policymaking. It is the only professional symposium for scientists and resource managers working on research and management activities related to the multi-national Rainy-Lake of the Woods watershed. The Forum is a venue for presentations from all disciplines relevant to water quality, aquatic ecology and ecosystem health in the watershed. This year, with a Day 1 keynote and virtual 'fireside chat' with Dr. John Strauser, a social scientist with the Green Lake Association in Green Lake, WI and associate professor at the University of Wisconsin – Madison, our focus was expanded to begin to draw in social science considerations relevant for sustainable, long-term watershed planning and management.


Dr. John Strauser

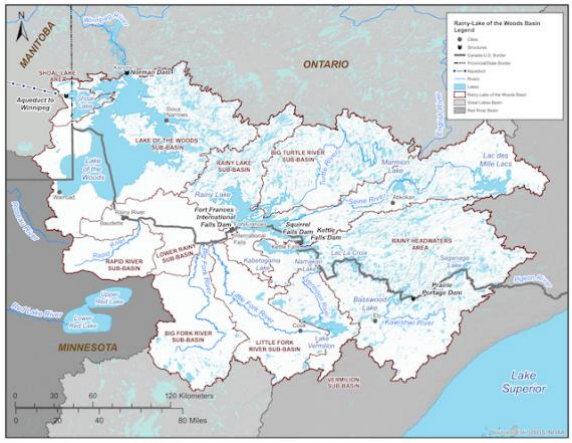
Over the years, the Forum has proven to be a crucial incubator for new ideas and for forging new partnerships, while reinforcing enduring collaborations. Groups regularly meet on the margins of the Forum – as happened on March 10, when the International Rainy Lake of the Woods Watershed Board and its Community and Industry Advisory Groups met throughout the day, as did the managers and technical experts from the International Multi-Agency Arrangement of international government agencies and civil society organizations active in the watershed. With the added scheduling flexibility that arose from hosting all meetings virtually this year, other watershed meetings took place in the days and weeks leading up to the Forum. Appendix B lists these meetings.

Collaborative projects emerge from the relationships cultivated and interests articulated during the Forum and its associated meetings. Partners work together to leverage capacities and resources, finding ways to ensure agency research and management mandates are fulfilled in ways that maximize transparency, public value, and contributions to open science.

During the Forum, we heard many presentations that reflected multi-party collaborations that have spanned borders, years, and research mandates. For example, bathymetric mapping of the lower Rainy River, done by AMI Consulting Engineers, and presented at last year's Forum, informed the development of a new digital elevation model for the Rainy River, discussed by Gabriel Poirier from Environment and Climate Change Canada's modelling team at this year's Forum. In turn, the models produced by ECCC inform USGS and Science Museum of Minnesota colleagues' nutrient studies, work presented this year by Anna Baker and Adam Heathcote. Similarly, we heard about different agencies' and groups' water quality monitoring efforts – each done under their unique mandates but contributing to an overall body of knowledge about water quality across the watershed.

These cross-border, open collaborations are noteworthy always, but perhaps even more so in these times of geopolitical uncertainties. We are not immune from outside forces, as Dr. John Strauser reminded us in his discussion of external, macro-economic and global social forces that influence local and regional land use decisions. Yet as the Forum reminds us year after year, the clear path to lasting ecological, social and economic vitality for Rainy-Lake of the Woods comes through collaboration that transcends what might divide us.

We continue to see at the Forum a collective of people who live and work in this place remaining doggedly committed to maintaining and strengthening the watershed, not just as an ecosystem or scientific geography, but as a governance unit whose physical boundaries are defined by nature. While this may seem a natural and unremarkably practical approach to water governance, in fact it is a somewhat radical frameshift. Rather than being defined by nationhood, politics, or other human constructs, in our region we genuinely are perfecting a system of scientific inquiry and resource management that increasingly reflects and respects the inherent organizational structures of nature. Such an approach holds remarkable promise for illuminating long-term, resilient solutions for ourselves and the world.



The Rainy-Lake of the Woods watershed

2026 Forum Synopsis

The Forum opened early on the morning of March 11 with a prayer and water teaching from Anishinaabe elder, Priscilla Simard, from Couchiching First Nation in Treaty 3. Elder Priscilla, who is likely familiar to regular Forum-goers as one of the co-creators of the Treaty 3 *Nibi Declaration*, reminded us of the living spirit of *Nibi*, and of our roles and responsibilities to it.


Elder Priscilla Simard


U.S. Consul Rebecca Molinoff


Canadian Consul Aaron Annable

After the traditional opening ceremony, Canadian Consul Aaron Annable, from the office of the Canadian Consulate General in Minneapolis (a long-time sponsor of the Forum) delivered remarks, celebrating the strength of the international relationships in this watershed. US Consul Rebecca Molinoff, from the US Consulate in Winnipeg, graciously provided recorded remarks as she had a previous commitment that prevented her from being able to join us live. Her address conveyed a similarly warm welcome, along with some suggested calls to action. We thank both Consulates for their continued support and engagement with the Forum.

As the final segment in the day's opening remarks, Todd Sellers and Brian Perrault, past chief of Couchiching First Nation and former Treaty 3 representative to the IJC watershed board, honoured the late Chief Lorraine Cobiness of Niisaachewan Anishinaabe Nation, a Treaty 3 community north of Kenora on the Winnipeg River. Chief Cobiness was instrumental in a wide variety of watershed governance initiatives, including championing the call for an international reference to examine governance in the Rainy-Lake of the Woods watershed – which resulted in the creation of the current watershed board, as well as projects aimed at repopulating lake sturgeon, a species at risk, in the Winnipeg River. Among other lasting contributions, Chief Cobiness was a driver of Indigenous leadership in regional resource management and forest stewardship. Chief Cobiness passed away in November 2025 at the age of 52. We honour her legacy and fondly remember her as a friend, mentor, colleague and true champion for the watershed.

Chief Lorraine Cobiness

The main symposium program was divided into eight sessions split across the two days, and during the breaks between sessions, participants were offered opportunities to extend discussions around a variety of topics that were of high relevance – watershed monitoring; nutrients, algae and cyanotoxins; watershed vulnerabilities (which focused primarily on concerns related to prospective mining developments and associated impacts to surrounding waters and ecosystems); and AIS and public engagement.

Session 1 focused on Water Governance and Planning. Moriya Rufer (Houston Engineering), spoke on behalf of numerous partners about watershed management and restoration efforts across the various subbasins on the U.S. side of the Rainy River. Kelly-Anne Fagan (Canada Water Agency) spoke of the Freshwater Ecosystem Initiative that is supporting work on the Canadian side of Rainy-Lake of the Woods, and Meghan Mills (LOWWSF) then presented an in-depth discussion of one such CWA-supported project, the development of a domestic phosphorous management plan for Canadian waters in Rainy-Lake of the Woods.

Session 2 included a trio of talks from researchers and staff at the IISD-Experimental Lakes Area, focused on public engagement, outreach, and training, wild rice studies, and the use of eDNA techniques in whole ecosystem research.

After the lunch break on Day 1, **Session 3** featured a keynote address from Dr. John Strauser (Green Lake Association), followed by an in-depth conversation with host, Teika Newton, and an open question and answer period with all Forum participants. The session focused on understanding and grappling with the challenges of achieving sustainable watershed planning in the face of larger, global, macroeconomic and social pressures that often inform policy design which, in turn, shapes land use plans and the activities taking place on local landscapes and watersheds.

Session 4, the last block on March 11, explored Nutrients and Algae, starting with talks by Anna Baker (USGS) and Adam Heathcote (Science Museum of Minnesota - St Croix Research Station) on Rainy River phosphorus dynamics and their implications for management on Lake of the Woods. Kui Hu (St Croix Research Station) then talked to us about *Dydimo*, a species of algae commonly known as 'rock snot' that can threaten low phosphorous trout streams. The day ended on a positive note, with Mark Edlund (St Croix Research Station) providing a heartening update, demonstrating that management and restoration efforts under Minnesota's TMDL, the state's phosphorus management plan for Lake of the Woods, is showing signals of having the desired effect, as nutrient loads have been declining and algae blooms diminishing in the studied areas of the south basin of Lake of the Woods.

Day 2, March 12, started with **Session 5**, focused on fish projects out of the St. Croix Research Station. Here, post-doctoral, graduate, and undergraduate researchers Erin Mittag, Grace Hemmelgarn, and Evelyn Yang, are contributing to studies to better understand historical stressors and population dynamics for walleye in northern Minnesota lakes. Cyndy Desjardins (Department of Fisheries and Oceans Canada) then walked us through the tools available and projects underway in that agency to support restoration of fish habitat and fish populations in the Rainy-Lake of the Woods watershed. Session 5 concluded with Gabriel Poirier, a member of the Environment and Climate Change Canada modelling team out of Jean Morin's lab in Quebec City, describing the development of an enhanced / new digital elevation and hydrodynamic model for Rainy Lake, Namakan Reservoir and the Rainy River.

Session 6 involved three talks focused on the Rainy Lake region. Students Eric Randall (Lakehead University) and Benjamin Erb (Bemidji State University) shared their work on, respectively, walleye population trends in Rainy Lake,

and enhancing adaptive management performance indicators for walleye and lake whitefish in Rainy Lake. Émile Chouinard and Marianne Bachand, also with the Morin lab at ECCC, concluded this session by presenting a new model for understanding the impacts of rule curve operations on submerged aquatic vegetation in Rainy Lake and the Namakan chain of lakes.

After lunch, **Session 7** saw four talks that explored modelling efforts across the watershed. The team of Zac Morris, Erv Kraft (AMI Consulting Engineers) and Craig Taylor (LimnoTech) provided updates on ongoing work to better understand the dynamics leading to erosion and reformation of the sandbar barrier islands at the mouth of the Rainy River in Lake of the Woods and the impacts of these dynamics on the vulnerable southern shore of the lake. Leif Olmanson (University of Minnesota) shared the impressive satellite-derived computational and analytical tools his lab is generating to track climate changes to water quality and temperature over time. Faith Fitzpatrick and Angus Vaughn (USGS) presented their FluOil model, adapted from historical studies of oil spill dynamics in rivers elsewhere to examine the potential fate and impact of a future oil spill on the Rainy River. Finally, Aliesha Krall (USGS) spoke about the now complete first phase and forthcoming second phase of study into mining vulnerabilities to lakes and streams across the watershed related to mining activities past, present and future.

The final session of the Forum, **Session 8**, included five talks on a range of topics related to monitoring, aquatic invasive species and ecological change. James Smith (Voyageurs National Park) talked about the risks to Voyageurs National Park lakes from invasive species like spiny water flea and zebra mussels. Kaitlyn Brougham (Department of Fisheries and Oceans Canada) followed up with a data-rich presentation of "Clean, Drain, Dry" AIS prevention compliance assessments done by the federal agency for watercraft entering and exiting the Lake of the Woods area between Ontario and Manitoba in the summer of 2025. Next, Michelle Anderson (Red Lake Department of Natural Resources) and Lienne Sethna (St. Croix Research Station) spoke of the Red Lake Nation's work to restore wild rice to traditional lands within Lake of the Woods by better understanding historical patterns of abundance and drivers of its decline. Diana Fred (Environment and Climate Change Canada) amused the audience late in the day with a whimsical re-enactment of her agency's annual lake survey to monitor water quality parameters on Lake of the Woods and ongoing, year-round stream surveys of Rainy River and the Winnipeg River. Finally, the Forum concluded with the Territorial Planning Unit team from Grand Council Treaty #3 – Laine Fyke, Michaela Novak, Benjamin Finlan, and Chris Herc, who provided a comprehensive synopsis of their extensive watershed monitoring program.

Kallemeyn Award

Cary Hernandez, winner of the 2026 Larry Kallemeyn Award

This year, although we did not have the usual evening banquet and awards reception, on behalf of the community of scientists and resource managers from the United States and Canada working in our watershed, the Lake of the Woods Water Sustainability Foundation presented Cary Hernandez with the Larry Kallemeyn Award. This award acknowledges the outstanding contributions made to water resources management and science in the Rainy-Lake of the Woods watershed.

Cary, a long-time employee of the Minnesota Pollution Control Agency, was recognized for many contributions over his lengthy career. In addition to his long list of technical contributions, Cary has been instrumental in finding and securing funding for needed projects working within his agency and across agencies and state sources to get work funded and started. Among his most noteworthy technical contributions, he led the synthesis of the 2021 Lake of the Woods TMDL document, working with 35 resource managers who contributed to the effort and leading the public comment throughout northern Minnesota and in Canada at Kenora. Cary has been a constant member of the International Multi-Agency Arrangement (IMA) working to secure a strong future for the watershed. He has demonstrated foresight on how we move forward on Lake of the Woods to protect its resources and meet the TMDL. The award was presented to Cary by his nominator, Mark Edlund, and a commemorative plaque has been sent to him to mark this recognition.

Meetings of Other Groups Co-Located at the Forum

While the Forum's science symposium is always the central event of the week, Forum Week is always a moment for additional meetings among watershed groups. This year, as with the virtual Forum, these meetings also took place online, and because there was a bit more flexibility in timing with the virtual delivery, these meetings extended over the first two weeks of March. Appendix B lists these meetings.

In a fun innovation this year, several long-time participating groups hosted on site "watch parties", where staff and collaborators gathered in person to view the Forum talks and engage in additional, enriched side conversations. Among those known to LOWWSF to have hosted group watch parties were:

- St. Croix Research Station
- Grand Council Treaty #3 Territorial Planning Unit
- Voyageurs National Park
- Red Lake Department of Natural Resources with the U.S. Environmental Protection Agency
- Minnesota Pollution Control Agency

Program At A Glance

DAY 1 – MARCH 11

https://minnstate.zoom.us/j/95716910454

8:30	**Forum Opening: Traditional Welcome, Greetings & Opening Remarks**	
	Session 1: Water Governance & Planning	
9:20	0:20	One Basin, Six Plans: Unifying Watershed Management Across the Rainy River Basin Moriya Rufer
9:40	0:20	Canada Water Agency Lake of the Woods Freshwater Ecosystem Initiative Update Kelly-Anne Fagan
10:00	0:20	Developing a phosphorus management plan for the Canadian portion of the Rainy-Lake of the Woods basin: Update Meghan Mills
10:20	0:30	**BREAK (Optional Virtual Breakout Rooms or Offline)**
	Session 2: Education & the Experimental Lakes Area	
10:50	0:20	How science and youth education complement each other at IISD Experimental Lakes Area Cassidy Mazur
11:10	0:20	Monitoring changes in biodiversity and ecosystem health following cattail management and reintroduction of wild rice using environmental DNA Lisa Peters
11:30	0:20	Effects of Water and Competition Stress on the Growth of Two Varieties of Wild Rice (Manoomin) Vince Palace
11:50	1:00	**LUNCH (Optional: remain on the livestream as a lunch hour plenary conversation space, or lunch on your own offline)**
	Session 3: Feature: Watershed Management	
12:50	1:00	Balancing Tradeoffs – Lessons from a systems-level approach to watershed management Dr. John Strauser, Green Lake Association, Green Lake, WI Followed by moderated discussion with Teika Newton and audience Q&A
13:50	0:30	**BREAK (Optional Virtual Breakout Rooms or Offline)**
	Session 4: Nutrients & Algae	
14:20	0:40	Rainy River phosphorus – past legacy and present dynamics and their implications for management of Lake of the Woods algal blooms (Parts 1 & 2) Anna Baker and Adam Heathcote
15:00	0:20	Got Rock Snot? What We've Learned from Lake Superior Tributaries to Protect Minnesota's Trout Streams Kui Hu
15:20	0:20	Our Lake of the Woods TMDL: Current sediment P inventories and internal loading rates Mark Edlund
15:40	**End of Day 1**	

DAY 2 – MARCH 12 https://minnstate.zoom.us/j/95716910454		
8:20	**Day 2 Welcome and Introductions**	
Session 5: Lake of the Woods & Rainy River Studies		
8:40	0:20	The Walleye Lakes Project: Uncovering the Past to Protect Minnesota's Walleye Fisheries Erin Mittag
9:00	0:20	How Can We Use Zooplankton to Reconstruct the Impact of Multiple Stressors on Walleye (*Sander vitreus*) Fisheries? Grace Hemmelgarn
9:20	0:20	Examining the Relationship Between Zooplankton Structures and Total Length for Paleolimnological Reconstructions Evelyn Yang
9:40	0:20	Identifying fish habitat restoration priorities in the Rainy River - Lake of the Woods Watershed Cyndy Desjardins
10:00	0:20	A Sharper View of the lakes and river: Improved Digital Elevation and Hydrodynamic Models for the Rainy Lake, Namakan Reservoir and the Rainy River Gabriel Poirier
10:20	0:30	**BREAK (Optional Virtual Breakout Rooms or Offline)**
Session 6: Rainy & Namakan Studies		
10:50	0:20	A Multi-Survey Approach to Understanding Long-Term Walleye Population Trends in Rainy Lake Eric Randall
11:10	0:20	Improving Walleye and Lake Whitefish Performance Indicators for Lake Water Level Management on Rainy – Namakan System Benjamin Erb
11:30	0:20	A Next-Generation 2D Predictive Model for Mapping Submerged Aquatic Vegetation in the Rainy Lake and Namakan System Émile Chouinard and Marianne Bachand
11:50	1:00	**LUNCH: Presentation of annual Kallemeyn & Wilson Stewardship Awards**
Session 7: Modelling		
12:50	0:20	Lake of the Woods - Southern Shore Barrier Island Erosion Investigation –Phase II Update Erv Kraft, Zac Morris and Craig Taylor
13:10	0:20	Using Satellite-Derived Water Quality and Temperature Data from an Automated High-Performance Computing Environment to Identify and Model Cyanobacteria Blooms in the Rainy-Lake of the Woods Watershed Leif Olmanson
13:30	0:20	Modeling fate and transport of oil-particle aggregates from a potential oil spill in the Rainy River Angus Vaughn and Faith Fitzpatrick
13:50	0:20	Phase II of Assessing the Vulnerability of Waters to Mining in the Rainy—Lake of the Woods Watershed Aliesha Krall

14:10	0:30	**BREAK (Optional Virtual Breakout Rooms or Offline)**
		Session 8: Monitoring, AIS & Ecological Change
14:40	0:20	Vulnerability of lakes in Voyageurs to spiny water flea and zebra mussels James Smith
15:00	0:20	'Clean Drain Dry' compliance and travel patterns for watercraft crossing between Ontario and Manitoba along the TransCanada Highway Kaitlyn Brougham
15:20	0:20	Historical abundance and extent of wild rice: environmental drivers leading to its decline in Lake of the Woods and Red Lake Lienne Sethna, Michelle Anderson and Joshua Jones
15:40	0:20	2025 Environment and Climate Change Canada Lake of the Woods Annual Survey Diana Fred
16:00	0:20	Grand Council Treaty #3: 2025 Environmental Monitoring Updates Laine Fyke, Michaela Novak and Benjamin Finlan with Chris Herc
16:20	**Closing remarks and end of 2026 Forum**	

2026 Forum Breakout Rooms

As a new addition to the virtual program in 2026, we offered four optional conversational gathering spaces during scheduled breaks in the program. These followed currently popular themes in watershed resources discussions and were moderated by volunteers associated with groups working on themes discussed in each session. Questions suggested below were only provided as initial conversational prompts for Forum participants who were interested in pursuing more detailed conversation on the topic.

A: Watershed Monitoring (March 11 - 10:20 – 10:50)

Many across the watershed have been contributing toward designing a proposal for a long-term watershed monitoring program that would both inform annual water quality reporting obligations to the International Joint Commission and help us to better track water quality and aquatic ecosystem trends, emerging concerns, or vulnerabilities.
What should we be considering as we create this proposal? Parameters / issues, locations, timing, resources, capacity, techniques etc.

B: Nutrients, Algae & Cyanotoxins (March 11 – 14:50 – 15:20)

Over the past 10-1-5 years, we have definitely developed a better understanding of algae dynamics and how to manage harmful and toxic blooms (HABs), but where do we still have big questions or knowledge gaps? What hurdles stand in the way of our ability to reduce HABs in future?

C: Watershed Vulnerabilities (March 12 - 10:20 – 10:50)

There are some big environmental concerns on many people's minds at present, from the specter of copper-nickel mining in the Boundary Waters and associated risks of sulfide contamination of the Rainy Headwaters, to a proposed deep geological repository for Canada's nuclear waste at a location just north of the Rainy-Lake of the Woods watershed. Here's a space for asking questions, seeking answers, and connecting with like-minded folks who want to take action for watershed protection.

D: AIS & Public Engagement (March 12 – 14:10 – 14:40)

Lots of groups work on tracking aquatic (and terrestrial) invasive species in the watershed, educating the public, and taking action to prevent the spread of AIS.
What's working?
What's not working?
Where are there knowledge gaps or resource needs?
How can we do a better job of coordinating an international / transboundary approach to AIS management?

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Day 1 – March 11, 2026

Session 1 – Watershed Governance & Planning

One Basin, Six Plans: Unifying Watershed Management Across the Rainy River Basin

Moriya Rufer[1*], Mitch Brinks[2], Tara Solum[3], Anita Provinzino[4], Phil Norvitch[4], Andy Arens[5], Matt Gutzmann[5], Pam Tomevi[6], Jolen Simon[6], Mike Hirst.[7]

[1]Houston Engineering
[2]TSA8
[3]Lake SWCD
[4]North Saint Louis SWCD
[5]Itasca SWCD
[6]Koochiching SWCD
[7]Lake of the Woods SWCD

Abstract

The Minnesota side of the Rainy River Basin contains six watershed plans from upstream to downstream: Rainy River Headwaters - Vermilion River, Little Fork River, Big Fork River, Rainy River–Rainy Lake, Rainy River–Rapid River, and Lake of the Woods. As of 2026, these watersheds will all have completed comprehensive watershed plans. Looking at these plans from a basin perspective, they share a unified vision: protecting high-quality water resources and continuing progress on restoring past impacts, while building resilience for future conditions. All plans converge on six core goals: improving water quality through nutrient and sediment reduction; restoring hydrology to counter altered flow regimes; enhancing aquatic and riparian habitat and connectivity; managing forests and protecting land to sustain ecosystem health; safeguarding groundwater and drinking water sources; and integrating climate resilience into long-term strategies. Cumulative goal numbers and priority areas from the plans will be shared from a basin-wide perspective. This alignment of priorities demonstrates a shared commitment to collaborative, basin-wide conservation that transcends individual watersheds.

Brief Bio

Moriya Rufer's heart and her experience lie in northern Minnesota. As a resident, she understands the landscape, personally knows the lakes and rivers, and understands both the environmental and economic challenges. She brings this regional knowledge and experience to help clients better manage their natural resources. In her 20 years of experience serving the water resources community, she has assisted in data analysis, county water plans, comprehensive watershed plans, and meeting facilitation.

Location of Study: U.S. waters of the Rainy River basin

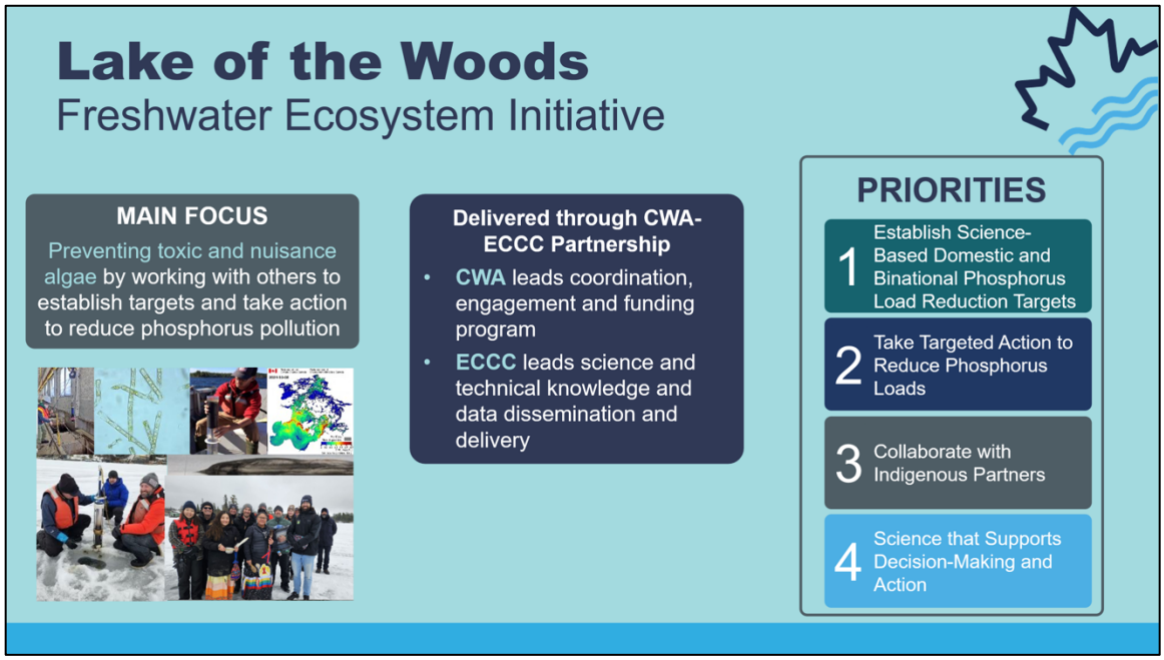
Canada Water Agency Lake of the Woods Freshwater Ecosystem Initiative Update

Kelly-Anne Fagan[1], Daniel Rokitnicki[2]

[1]Canada Water Agency, Toronto, ON, Canada
[2]Canada Water Agency, Burlington, ON, Canada

Abstract

The Canada Water Agency has coordinated the implementation of the Lake of the Woods Freshwater Ecosystem Initiative (LOW FEI) since 2023, building on a foundation of science, assessment, and engagement. In 2025, core programming emphasized federal collaboration and strengthened relationships with partners and supported projects aimed at reducing phosphorus loads to the lake. This presentation will provide an update on progress in the delivery of the program in Lake of the Woods and the initiative's goals and next steps.



Brief Bio

Kelly-Anne Fagan is an Environmental Program Coordinator/Officer in the Freshwater Management Directorate of Canada Water Agency (CWA). Kelly-Anne coordinates activities for the CWA's Lake of the Woods Freshwater Ecosystem Initiative (FEI) and Lake Simcoe Freshwater Ecosystem Initiative. In this role, Kelly-Anne coordinates activities related to program implementation, partner engagement, and administering funding streams that support taking action to reduce phosphorus loads to both basins.

Location of Study: Rainy-Lake of the Woods basin

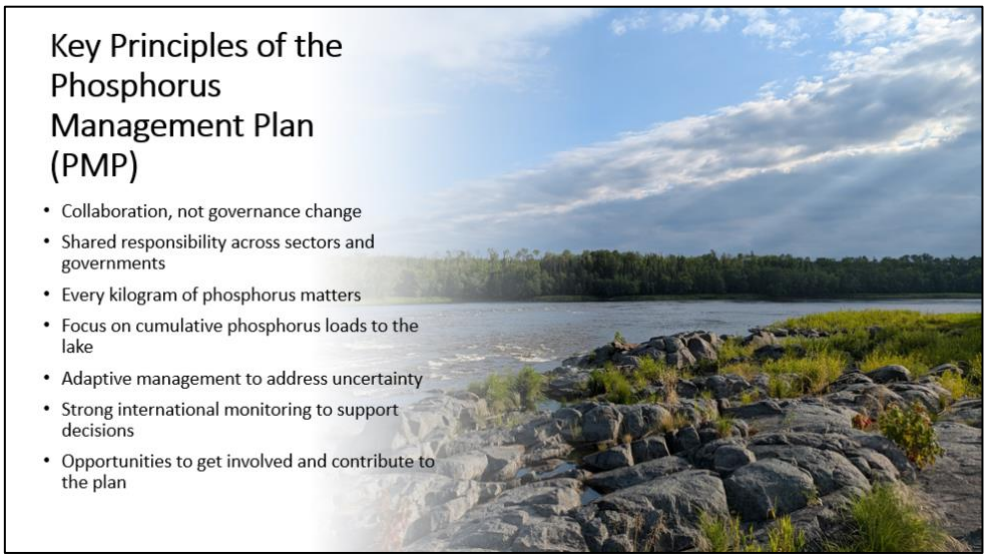
Developing a Phosphorus Management Plan for the Canadian Portion of the Rainy-Lake of the Woods Basin: Update

Meghan Mills

Lake of the Woods Water Sustainability Foundation

Abstract

Since late 2024, LOWWSF has been leading a collaborative project to develop recommendations for a phosphorus management plan (PMP) for the Canadian portion of the Rainy-Lake of the Woods watershed. LOWWSF is facilitating the planning process, based on the planning framework described in a *Framework for a Domestic Phosphorus Management Plan for the Rainy River and Lake of the Woods* (https://lowwsf.com/pmp-framework/). The project is developing consensus recommendations to support phosphorus load reduction to Lake of the Woods to meet goals (phosphorus concentrations, loads) drawing on phosphorus targets articulated in studies by ECCC (2016-2020) and the Minnesota Pollution Control Agency (2021), and recommendations for international water quality objectives for phosphorus developed through the International Joint Commission. Through the project, a network of interested parties (governments including Indigenous, industry, civil society) is assembling to support ongoing activities and future efforts, supporting an adaptive management plan for the Canadian portion of the watershed.



Brief Bio

Meg is the International Watershed Coordinator, splitting her time between the International Joint Commission in supporting the International Rainy-Lake of the Woods Watershed Board and the Lake of the Woods Water Sustainability Foundation, where she is leading the multi-year project to develop a collaborative phosphorus management plan for the Canadian portion of Rainy-Lake of the Woods.

Meg lives on Treaty 1 Territory in Winnipeg, Manitoba, and cherishes time spent off-grid at Pelicanpouch Lake, located on Treaty 3 Territory near Minaki, Ontario. She is currently completing her Master of Natural Resources Management at the University of Manitoba, with a focus on researching meaningful public participation and community engagement in resource management through a co-governance lens. Her background includes diverse environmental projects that blend science and storytelling. She has done community-based monitoring and project coordination work, equipping her with strong technical and communication skills. Continually learning the complexities of water governance, she is deeply committed to relationship-building and meaningful collaboration with diverse groups through empathic approaches to achieve impactful outcomes.

Location of Study: Canadian portions of the Rainy River and Lake of the Woods basin

Session 2 – Education & Experimentation

How science and youth education complement each other at IISD Experimental Lakes Area

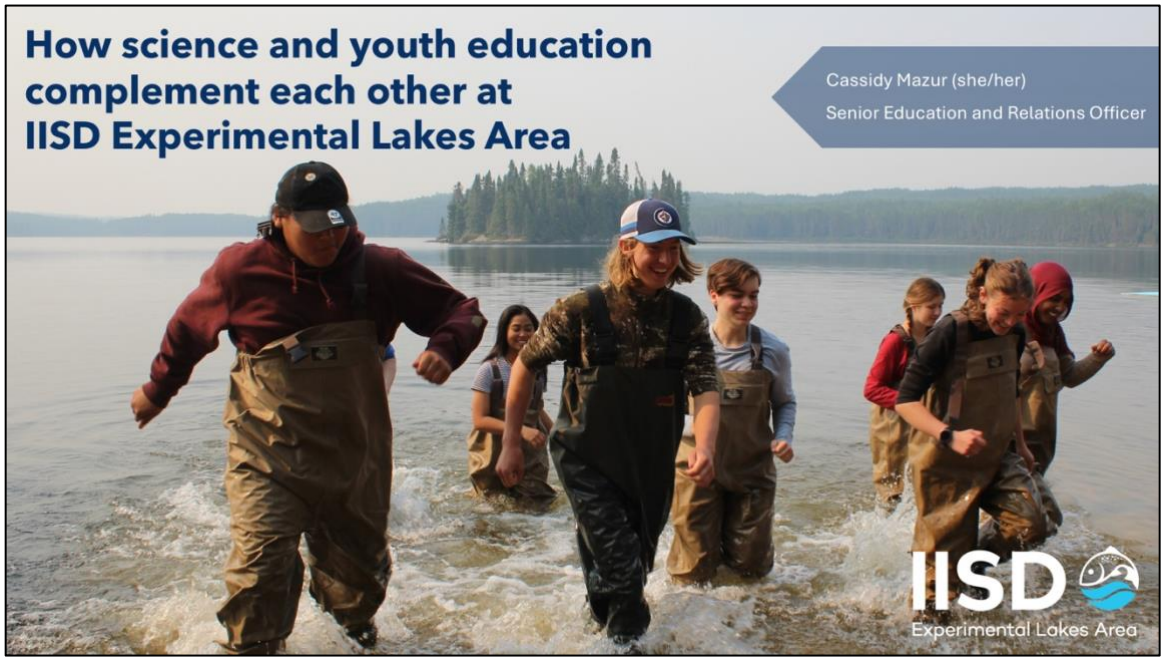
Cassidy Mazur

International Institute for Sustainable Development Experimental Lakes Area

Abstract

IISD Experimental Lakes Area is the world's freshwater laboratory. A series of 58 lakes and their watersheds in northwestern Ontario, Canada, IISD-ELA is the only place in the world where scientists can research and experiment on real lakes to build a more accurate and complete picture of what human activity is doing to freshwater lakes. Current studies include topics like microplastics, trout evolution and sized-based harvesting, quaternary ammonium compounds, wild rice, and eutrophication.

At IISD-ELA we believe in the power of engaging youth directly in hands-on science to inspire an interest and motivate youth to examine the world around them, kickstarting the process of lifelong learning and a passion for science. The learning journey that happened at IISD-ELA when the organization shifted to being a not-for-profit organization and jumped headfirst into offering education programming for youth for the first time has resulted in a unique and impactful approach to freshwater science education that benefits youth, staff, and the organization.



Brief Bio

Cassidy Mazur is IISD Experimental Lakes Area's Senior Education and Outreach Officer. Working primarily with youth, her work aims to inspire young people with environmental science and a connection to the natural world. The opportunities she facilitates for youth focus on making environmental science and stewardship accessible, equitable, and engaging. She has experience and passion for experiential learning, outdoor education, interpretation, science communications, environmental science fieldwork, and community relations.

Location of Study: IISD Experimental Lakes Area

Monitoring changes in biodiversity and ecosystem health following cattail management and reintroduction of wild rice using environmental DNA

Lisa Peters[1*], A. Guiliano[2], K. Robertson[1], M. Anderson[1], M. Stanley[1], V. Palace[1,2]

[1]International Institute for Sustainable Development – Experimental Lakes Area, Winnipeg, MB, Canada
[2]Department of Environment & Geography, University of Manitoba, Winnipeg, MB, Canada

Abstract

The spread of cattails *(Typha spp.)*, along with their invasive hybrid *(Typha x glauca)*, is negatively impacting wetland biodiversity and ecosystem health. When cattails invade wetlands, they compete with endemic plant species, reduce fish nursery areas and habitat, change the benthic invertebrate communities, and impact nutrient cycling. Cattail management and Northern wild rice (*Zizania palustris*) reestablishment are important to Indigenous communities because wild rice is a sacred food with historical, medicinal, and ceremonial importance. This study is a continuation of an ongoing collaboration with the Makate Waagamichiwanang Gakinaa'amaatiwin (MWG) Youth and Family Wellness Camp, to monitor aquatic community changes in response to the removal of cattails and reintroduction of wild rice and blends Indigenous knowledge with environmental DNA (eDNA) tools. Reintroducing wild rice can improve water and sediment quality, as well as restore ecosystem function by enhancing habitat and promoting biodiversity. Changes in benthic invertebrate species identified in eDNA samples are being compared to results from methods that use physical collection and identification of invertebrates. Water and sediment quality, and nutrient chemistry were collected to support the eDNA analysis, together with wetland vegetation surveys to monitor habitat improvements. This project was developed to investigate questions posed by Indigenous leaders, to support the interests of the Communities in the restoration of wetland health and Indigenous food sovereignty by blending of western science and Indigenous knowledge systems. We will discuss progress to date as well as interactive project development with Youth and Elders from the Communities, including MGW site selection, invasive species management and the planting ceremony.

Brief Bio

Lisa Peters is a research scientist in non-invasive assessments with IISD Experimental Lakes Area (ELA). She has over 25 years of aquatic assessment experience with a passion for developing non-lethal sampling methodologies and applying these techniques to conservation and biodiversity assessments. She has spearheaded the development of the environmental DNA (eDNA) program at ELA and is initiating several new projects and collaborations. Lisa has also worked on a variety of projects evaluating impacts of the oil and gas industry, agriculture, sewage and pulp and paper mills on aquatic ecosystems. Lisa is passionate about training the next generation of aquatic scientists. She is a mentor for the African Centre for Aquatic Research and Education's (ACARE) African Women in Science (AWIS) program. She also leads IISD-ELA's Monitoring eDNA and Learning Ecology with Youth (MeDLEY) program for high school students.

Location of Study: IISD Experimental Lakes Area

Effects of Water and Competition Stress on the Growth of Two Varieties of Wild Rice (Manoomin)

J. Wanke[1], M. Stanley[2], L. Timlick[2], V. Palace[1,2*]

[1]Department of Environment & Geography, University of Manitoba, Winnipeg, MB, Canada
[2]International Institute for Sustainable Development – Experimental Lakes Area, Winnipeg, MB, Canada

Abstract

Wild rice (manoomin) is culturally significant to Indigenous peoples in Canada, but harvests have declined due to changing habitat conditions related to anthropogenic influences, climate change, and competition from invasive wetland plants. A mesocosm study was performed at the IISD-Experimental Lakes Area in Northwestern, ON, Canada to address competition and water stress factors that may limit the growth of wild rice. Fifteen 1.6m diameter mesocosms were amended with 20 cm of garden soil. To simulate drought conditions, water levels were maintained level with the top of the soil in each mesocosm by an on-demand supply valve and a drain to prevent precipitation overfilling. To determine competitive growth, 5 mesocosms were planted with equal densities (n=100 seeds/mesocosm) of two varieties of wild rice (the cultivar, Franklin—University of Minnesota and a wild variety). To encapsulate a broad spectrum of plant competition growth 5 additional mesocosms were planted with cattail seeds and another 5 were planted with established cattail root (rhizomes). Throughout the growing season we measured plant height, number of leaves, presence of flowers and at the end of the season biomass of shoots, roots and seeds was determined. A mixed effects model examining growth of both varietals among all treatments revealed that competition from established cattail roots limits the growth of wild rice during early stages of growth prior to the seed development.

Wild rice seedling in alternative saturated soil conditions.

Brief Bio

Vince Palace has been the head scientist at the IISD-Experimental Lakes Area for 10y. He is an aquatic toxicologist with 25 years of experience evaluating potential impacts and developing mitigation strategies related to chemical and non-chemical aquatic stressors. He values working with industry, government and community stakeholders, and has led projects on the impacts of agriculture, hydroelectric power, the oil and gas industry, and mining on aquatic ecosystems. More recently, he has focused on the efficacy of minimally invasive methods of remediating oil spills and the power of wetlands for maintaining water quality. Vince is an Associate Professor at the University of Manitoba in the Department of Environment and Geography.

Location of Study: IISD Experimental Lakes Area

Session 3 – Feature: Watershed Management

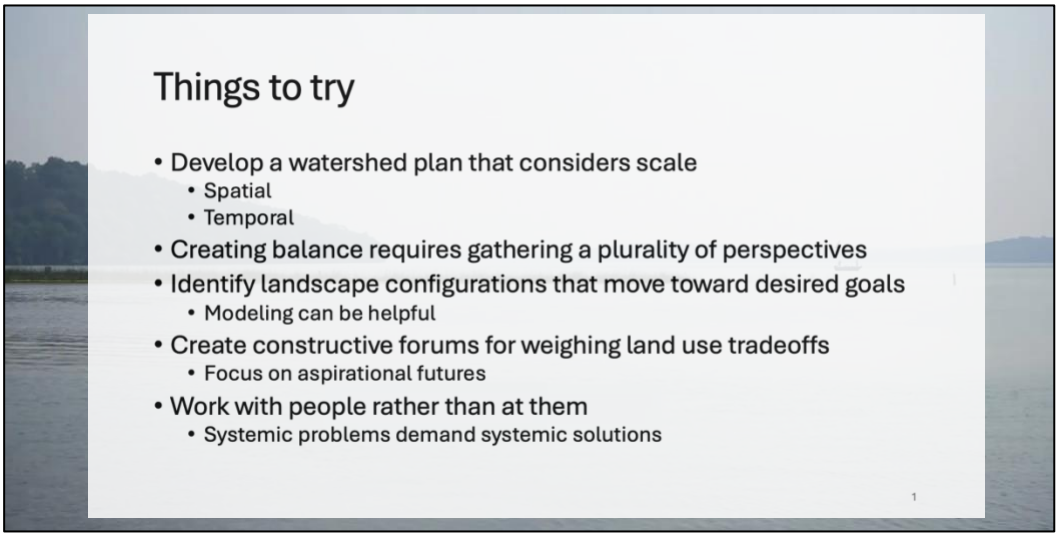
Balancing Tradeoffs – Lessons from a systems-level approach to watershed management

John Strauser

Green Lake Association, Green Lake, WI

Abstract

Despite years of watershed planning and implementation there has been little meaningful progress in improving socio-ecological outcomes throughout agricultural regions in the Upper Midwest of United States. The socio-ecological condition of our water and watersheds is indicative of our social systems and the ways in which they evolve through interactions occurring across spatial and temporal scales. Based on years of experience engaging in and researching collaborative land use planning I propose that watershed management will benefit from a systems level approach that considers land use tradeoffs in conjunction with an awareness that local and hyper-local management actions are influenced by external policy, social, and cultural events. By sharing these ideas and lessons from Wisconsin the intent is to spark a dialogue about ways to improve the ecological, social, economic, and cultural outcomes in the Lake of the Woods Watershed.



Brief Bio

John earned his PhD from the University of Illinois at Urbana-Champaign in Natural Resources and Environmental Sciences. He currently serves as the Program Manager for the Green Lake Association in Green Lake, WI. He is also the Grassland and Perennial Agriculture outreach specialist for the UW-Madison Division of Extension. His research and outreach focus on the social processes that drive bio-physical landscape change by employing the concept of place-making. His passion for agrarian landscapes traces its roots back to his childhood growing up in Memphis, Tennessee, and Champaign, Illinois, where he always felt a connection to the Mississippi River, Great Lakes, and Midwestern communities. In his free time, John loves fishing, swimming, biking, and casual conversations with friends and colleagues.

Location of Study: Green Lake, WI

Session 4 – Nutrients & Algae

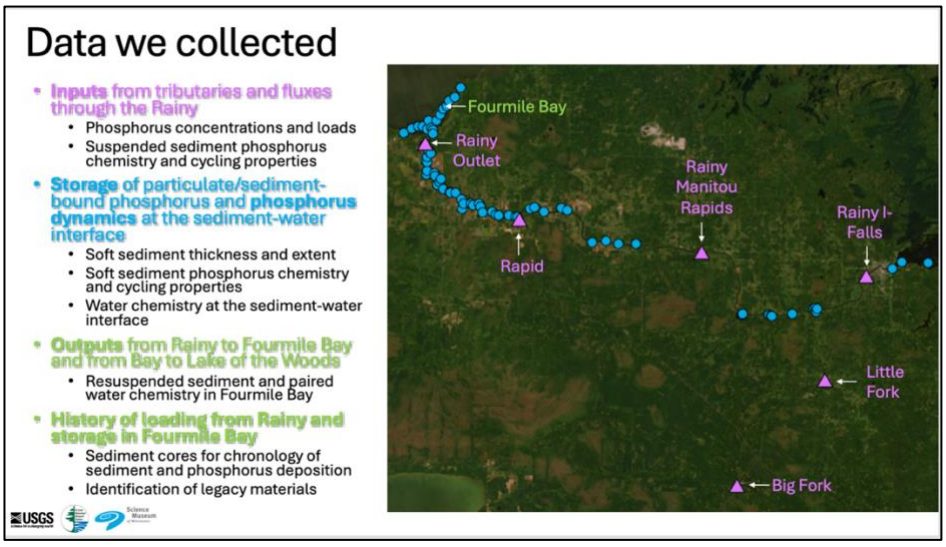
Rainy River phosphorus – past legacy and present dynamics and their implications for management of Lake of the Woods algal blooms

Anna Baker[1], Adam Heathcote[2], Faith Fitzpatrick[1], Mark Edlund[2], Lienne Sethna[2], Jesse Anderson[5], Sam Soderman[3], Joe Vrtacnik[4], Mike Kennedy[5], Kelli Nerem[5], Kevin Stroom[5]

[1]U.S. Geological Survey Upper Midwest Water Science Center
[2]St. Croix Watershed Research Station
[3]Koochiching County Soil and Water Conservation District
[4]Lake of the Woods Soil and Water Conservation District
[5]Minnesota Pollution Control Agency

Abstract

Harmful algal blooms in Lake of the Woods are strongly influenced by phosphorus inputs, and prior studies have shown Rainy River to be the primary source. While internal loading of phosphorus in Lake of the Woods has received previous study, the characteristics of phosphorus transported by the Rainy River and its role in bloom development remain poorly understood. To support targeted management to reduce blooms in Lake of the Woods, a multi-agency research team undertook a collaborative study to evaluate the characteristics of phosphorus in transport and in storage within the Rainy River network, as well as the history of phosphorus deposition in Fourmile Bay.



In this two-part presentation, the team will present results of analysis exploring the extent to which phosphorus moving in transport and stored within the Rainy River stream bed and in Fourmile Bay contributes to internal loading and to stimulating algal blooms in Lake of the Woods. In part one of this presentation, we will discuss results of analysis of phosphorus in transport and storage, detailing 1) the partitioning of phosphorus concentration and load between dissolved and particulate phases, 2) the potential for sediment-bound phosphorus in transport and in storage to become released and contribute to blooms, 3) dissolved oxygen conditions in the lower Rainy River and tributaries, 4) variation in these properties throughout the river network. In part two of this presentation, we will discuss the results of analyses of sediment cores that reveal the history of phosphorus loading in Fourmile Bay and provide context for how the river-mouth mixing zone stores and releases phosphorus and ultimately connects to the bigger picture of phosphorus and blooms in Lake of the Woods.

Brief Bios

Anna Baker is a hydrologist with the U.S. Geological Survey's Upper Midwest Water Science Center. Her work focuses on biogeochemistry, geomorphology, and harmful algal booms. In recent years she has worked on studies investigating sources of sediment in the Little Fork watershed and on phosphorus transport in Rainy River.

Adam Heathcote is the Director of the Science Museum of Minnesota's Department of Water and Climate Change St. Croix Watershed Research Station. He is a limnologist and biogeochemist who has been working on issues surrounding algae blooms in the Southern Basin of Lake of the Woods for the last decade.

Location of Study: Rainy River and Lake of the Woods

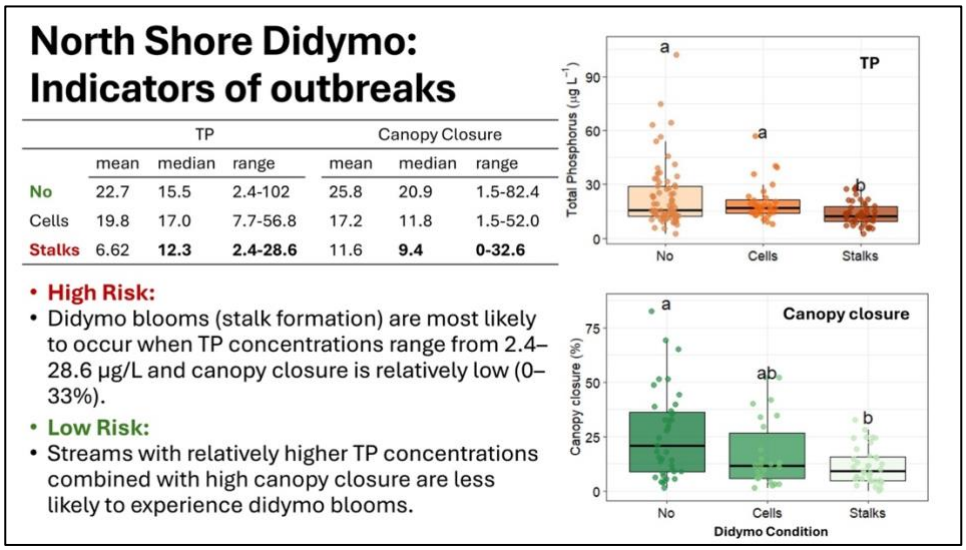
Got Rock Snot? What We've Learned from Lake Superior Tributaries to Protect Minnesota's Trout Streams

Kui Hu[1], Jackalyn Wyrobek[1*], Mark B. Edlund[1], Heidi Rantala[2], David R.L. Burge[1,3], Adam J. Heathcote[1], Robert Pillsbury[4], Mari Leland[1,5]

[1]St. Croix Watershed Research Station, Science Museum of Minnesota, Marine on St. Croix, Minnesota 55047, USA
[2]Minnesota Department of Natural Resources, Duluth, Minnesota 55804, USA
[3]Natural Resources Research Institute, University of Minnesota, 5013 Miller Trunk Hwy, Hermantown, Minnesota 55811, USA
[4]Department of Biology and Microbiology, University of Wisconsin Oshkosh, Oshkosh, Wisconsin 54901, USA
[5]Department of Biological Sciences, Michigan Technological University, Houghton, Michigan 49931, USA

Abstract

The freshwater benthic diatom *Didymosphenia geminata* ("rock snot" or didymo) can form thick, mucilaginous mats that alter streambed structure, displace native algae and macroinvertebrates, and ultimately affect coldwater trout fisheries. Although first documented along Lake Superior's shore in the 1960s, nuisance blooms were not observed in Minnesota until 2018, when dense growth occurred in the Poplar River on the North Shore. To better understand bloom timing and watershed conditions that promote nuisance growth, we conducted monthly periphyton and water chemistry surveys in six North Shore streams from 2021–2025, supplemented by single-season sampling of 16 additional streams each year. In addition, six trout streams were surveyed in September 2025 to evaluate the vulnerability of didymo blooms in the St. Croix River Basin. From 2021 to 2025, didymo detections on the North Shore increased from 8 streams to 14 streams, while no didymo was observed in the St. Croix Basin. On the North Shore, didymo preferentially grows on bedrock, boulder, and cobble substrates. Blooms typically peaked from July through October, with low nutrient concentrations and highlight availability strongly associated with high didymo density. Periodic high-flow events played a key role in limiting bloom persistence. These insights provide a foundation for assessing statewide trout stream vulnerability and identifying conditions under which didymo may expand beyond its current range. Overall, our findings highlight the importance of proactive monitoring, watershed protection, and public awareness to reduce the likelihood of rock snot establishment in Minnesota's coldwater streams.



Brief Bio

Dr. Kui Hu is a freshwater ecologist with expertise in diatom identification, limnological, paleolimnological sampling, and environmental research. Since January 2024, Dr. Hu has been a Postdoctoral Fellow at the St. Croix Watershed Research Station, leading field research, outreach events for the LCCMR-funded didymo research project in the North Shore. Her expertise in limnology and community ecology directly aligns with the objectives of this project.

Location of Study: Poplar River North Shore, St. Croix Basin

Our Lake of the Woods TMDL: Current sediment P inventories and internal loading rates

Mark B. Edlund[1], Hailey M. Sauer[1], Adam J. Heathcote[1], Shane Bowe[2], Kayla Bowe[2], Cary Hernandez[3]

[1]St Croix Watershed Research Station, Science Museum of Minnesota, 16910 152nd St. N, Marine on St Croix, Minnesota
[2]Red Lake Department of Natural Resources, Red Lake, Minnesota
[3]Minnesota Pollution Control Agency, St Paul, Minnesota

Abstract

Our 2021 *Lake of the Woods TMDL* (total maximum daily load), co-authored by a team of 35 basinwide resource managers, outlines a path toward meeting water quality goals through focused nutrient management, a fuller understanding of nutrient sources, a continued decline in internal loads to Lake of the Woods (LoW), and effectiveness monitoring. Toward these goals our group has been doing enhanced water quality monitoring in the southern basin, and will report on a reassessment of sediment phosphorus inventories and updated internal loading estimates.

To determine if active sediment phosphorus inventories have declined in LoW, sediment cores were collected from six sites (Sabaskong, Big Narrows, Little Traverse, Muskeg, Big Traverse 3, and Big Traverse 4) in 2024 to recalculate sediment phosphorus inventories across southern LoW. Cores were dated using Pb-210 and total phosphorus and phosphorus fractions were analyzed, corrected for whole southern basin accumulation, and compared to phosphorus inventories from the same sites sampled in 2012. Coupled with this approach has been a reassessment of sediment internal loading estimates from four sites in southern LoW (Four Mile Bay, Muskeg, Big Traverse 3, Big Traverse 4). Short cores were incubated under oxic or anoxic conditions and sediment phosphorus release rates calculated. We report changes in recent internal loading rates in comparison to rates first estimated by Bill James in 2012. Declines in sediment phosphorus inventories and internal phosphorus loading rates are necessary to meet our TMDL objectives and targets.

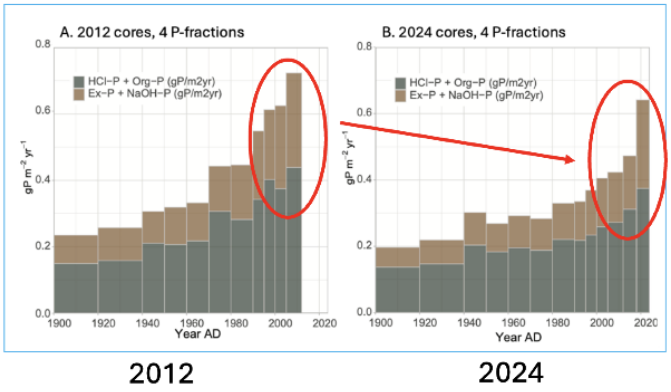


Figure 1. Between 2012 and 2024, we measured a greater than 20% drop in available phosphorus in southern Lake of the Wood sediments. This is helping improve water quality measures to meet our TMDL goals.

Brief Bio

Mark Edlund is a Senior Scientist at the Science Museum of Minnesota's St Croix Watershed Research Station. This team has been long invested in studying sediment and nutrient dynamics in Lake of the Woods and its watershed to develop and reach the TMDL goals.

Location of Study: Southern Basin of Lake of the Woods

Session 5 – Lake of the Woods & Rainy River Studies

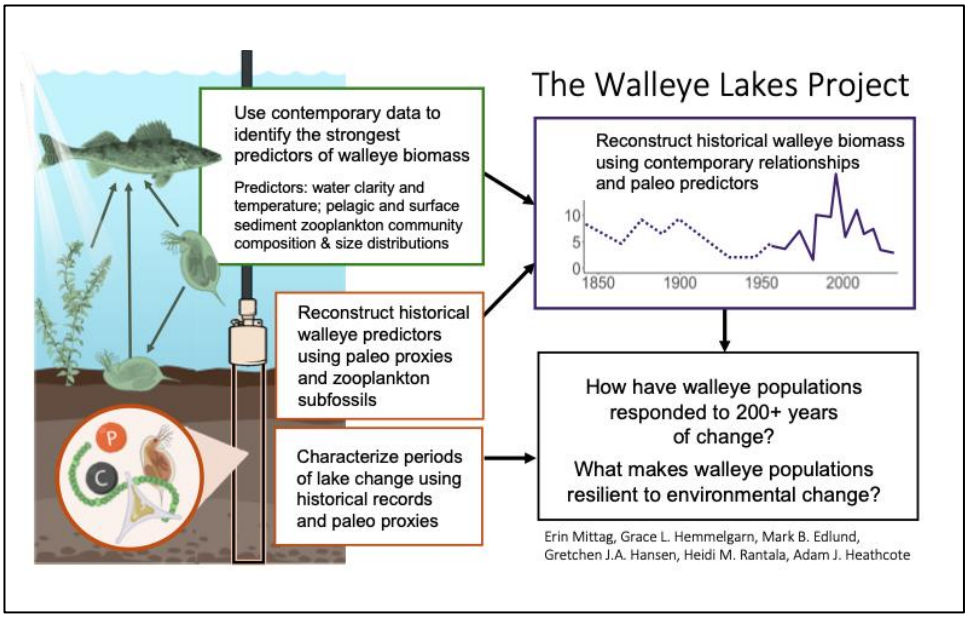
The Walleye Lakes Project: Uncovering the Past to Protect Minnesota's Walleye Fisheries

Erin Mittag[1 *], Grace L. Hemmelgarn[2], Mark B. Edlund[1], Gretchen J.A. Hansen[2], Heidi M. Rantala[3], Adam J. Heathcote[1]

[1] St. Croix Watershed Research Station, Science Museum of Minnesota
[2] Conservation Sciences Graduate Program, University of Minnesota
[3] Minnesota Department of Natural Resources

Abstract

Walleye (pickerel, doré, ogaa), which are critical cultural, economic, and environmental resources for local communities, are vulnerable to habitat loss due to warming, changing nutrient conditions, and invasive species. Here we present the primary objectives of the Walleye Lakes Project, a three-year effort to better understand how walleye populations respond to multiple stressors. This work focuses on 17 important Minnesota and tribal walleye lakes, including Lake Vermilion, which capture a range of fish communities and habitat conditions. We will 1) use paleolimnological techniques and a new predictive model of walleye-zooplankton relationships to reconstruct 200+ years of walleye populations and investigate how fisheries and food webs respond to environmental change and 2) link historical walleye populations to lake and food web characteristics to identify indicators of successful walleye fisheries in Minnesota and tribal lands. Our work will reveal where and when walleye have been most resilient to environmental change and inform successful fisheries management under present and future conditions.



Brief Bio

Erin Mittag is a postdoctoral fellow at the St. Croix Watershed Research Station. She completed her dissertation research on the sources and cycling of nutrients in diverse urban waters at the University of Minnesota.

Location of Study: 17 Minnesota Lakes including East and West Vermilion

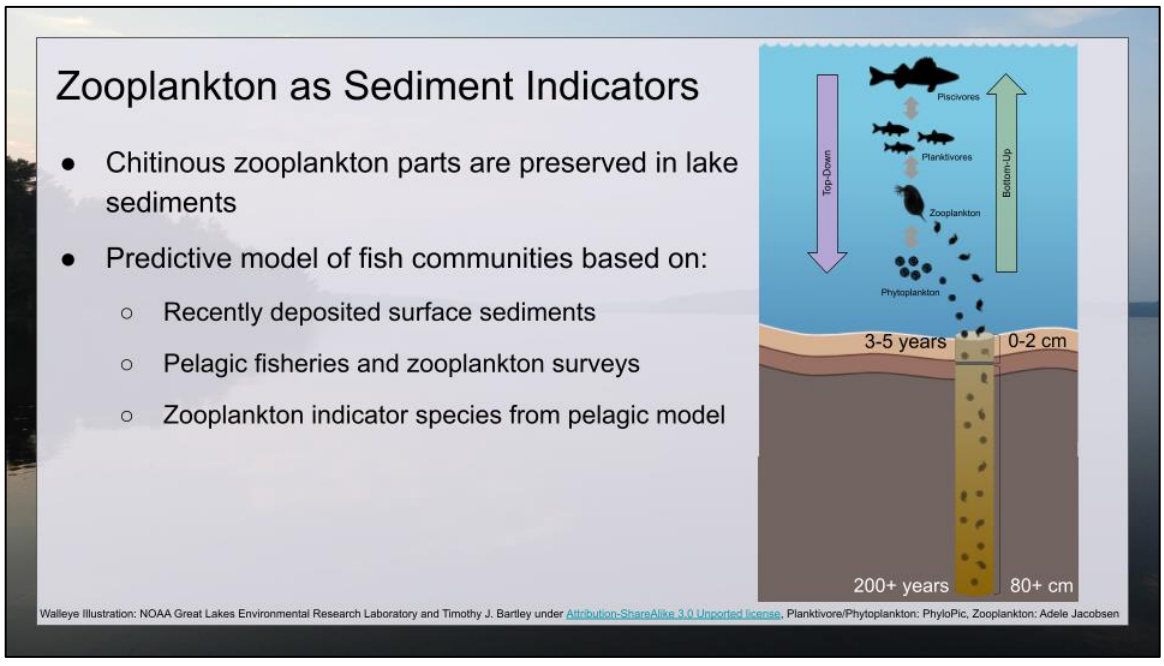
How Can We Use Zooplankton to Reconstruct the Impact of Multiple Stressors on Walleye (Sander vitreus) Fisheries?

Grace L. Hemmelgarn[1*], Adam J. Heathcote[2], Erin Mittag[2], Mark B. Edlund[2], Heidi M. Rantala[3], Denver Link[1], Kylie Cattoor[3], Adele M. Jacobsen[1], Evelyn Yang[1], Gretchen J.A. Hansen[1]

[1]Conservation Sciences Graduate Program, University of Minnesota
[2] St. Croix Watershed Research Station, Science Museum of Minnesota
[3] Minnesota Department of Natural Resources

Abstract

The Walleye Lakes Project relies on accurate reconstructions of historical fish communities over the last 200+ years, before modern monitoring programs began. Here, we present methods, progress, and preliminary results on the development of a new tool that predicts fish communities from zooplankton remains preserved in lake sediments. First, we used zooplankton and fish data collected in the same year from 43 Minnesota lakes, resulting in a total of 205 lake-years, to quantify the relationship between contemporary fish and zooplankton communities. We built a statistical model of co-occurrence patterns within and across zooplankton-fish communities while accounting for environmental drivers. This model provides new insights into the relationship between today's walleye populations, their food webs, and their environments. The results show a zooplankton-fish relationship that we will leverage in the next phase of the project, which uses modern fish community data and recently preserved zooplankton remains in surface sediments from 36 lakes, including Vermilion, Kabetogama, Sand Point, Rainy, Namakan, and Lake of the Woods, to build a transfer function that predicts fish communities from lake sediments. The resulting tool will be vital to the success of the Walleye Lakes Project as it seeks to inform resilient walleye management in the face of multiple stressors.



Brief Bio

Grace is a master's student in Gretchen Hansen's lab at the University of Minnesota who is using paleolimnology to explore walleye fishery resilience to multiple stressors. She works closely with collaborators at the St. Croix Watershed Research Station and the MN Department of Natural Resources.

Location of Study: 43 Minnesota lakes, including Vermilion, Kabetogama, Sand Point, Rainy, Namakan, and Lake of the Woods

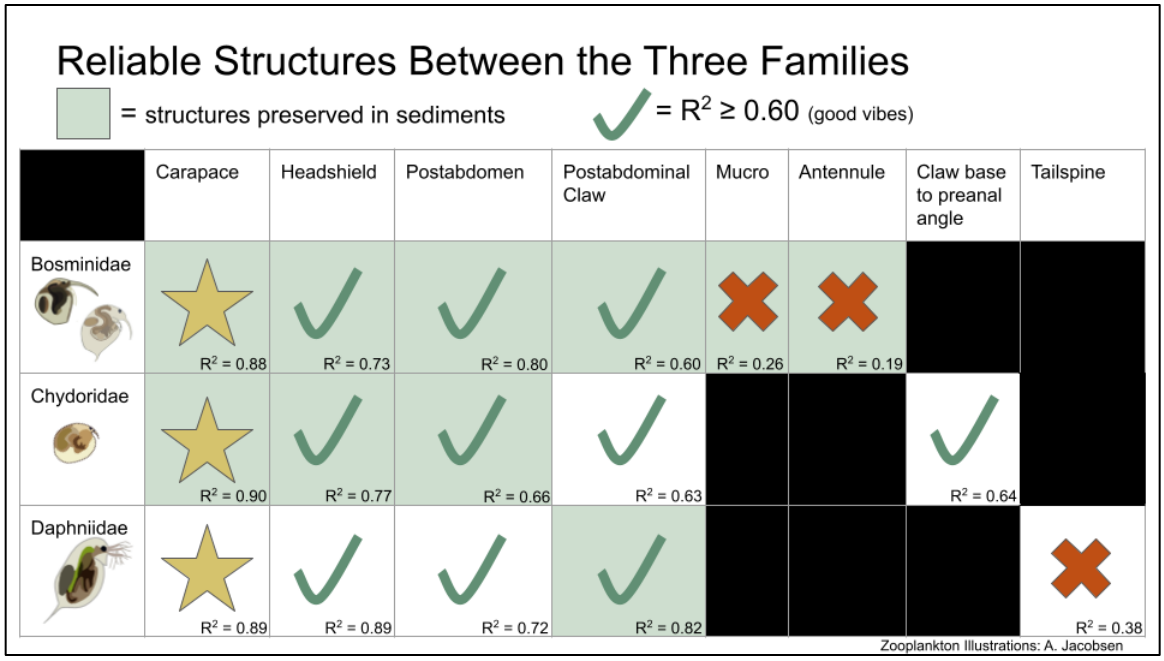
Examining the Relationship Between Zooplankton Structures and Total Length for Paleolimnological Reconstructions

Evelyn Yang[1*], Grace L. Hemmelgarn[1], Adam J. Heathcote[2], Gretchen J.A. Hansen[1], Jake Walsh[2]

[1] Conservation Sciences Graduate Program, University of Minnesota
[2]St. Croix Watershed Research Station, Science Museum of Minnesota

Abstract

The use of preserved subfossil zooplankton remains in sediment cores to reconstruct historical fish communities is currently being developed for Minnesota lakes as part of the Walleye Lakes Project. Given that both community composition and body size of zooplankton are relevant for these reconstructions, an estimate of total body length of preserved zooplankton is a useful tool. Current paleolimnological literature utilizes carapace length as a proxy for total body length; however, not all taxa have well-preserved carapaces. The purpose of this study is to examine the relationships between various preserved zooplankton structures and total length. From May to September 2025, monthly vertical zooplankton tows were collected from six different Minnesota lakes. For each lake-month, we measured total length and the lengths of structures preserved in sediments for 20 individuals in each of the three commonly preserved cladoceran zooplankton families: Bosminidae, Chydoridae, and Daphniidae. We used linear regressions to examine the relationship between 7 different zooplankton structures and total length to identify which of the structures that are preserved in lake sediments can be used for reliable total length reconstruction. This work supports a critical component of the Walleye Lakes Project.



Brief Bio

Evelyn is an undergraduate student in Gretchen Hansen and Jake Walsh's labs at the University of Minnesota - Twin Cities. She works closely with Grace Hemmelgarn, a master's student in the Hansen lab, and mainly works with zooplankton being used for paleolimnological research in the lab.

Location of Study: 6 Minnesota lakes: Pelican, Clear, Sturgeon, Green, Christmas, and Elephant

Identifying fish habitat restoration priorities in the Rainy River - Lake of the Woods Watershed

Cyndy Desjardins

Fisheries and Oceans Canada, Ontario and Prairie Region, Integrated Planning Operations Unit – Freshwater Institute

Abstract

Fisheries and Oceans Canada (DFO) published the Framework to Identify Fish Habitat Restoration Priorities(External link) in February 2023. This national policy framework outlines how DFO, in collaboration with members of the restoration community, will identify restoration priorities and factors to consider when selecting priority restoration goals and actions. DFO's Integrated Planning Operations Unit has engaged broadly in Northwestern Ontario and the Prairie provinces since 2023 and synthesized feedback into six broad fish habitat restoration goals aligned with DFO's mandate: i) in-water habitat improvements, ii) address passage barriers and flow, iii) riparian protection, iv) aquatic invasive species control, v) sediment imbalance, and vi) other supporting measures (e.g. monitoring, outreach, funding, etc.)

These goals and associated information are reported in a series of Fish Habitat Restoration Priorities documents pending release in 2026. In the Ontario and Prairie Region, has developed an online GIS-based *Restoration Action Dashboard*(RAD) to show fish habitat restoration priorities at watershed scales that can be used to inform prioritization planning and regulatory decision making. The RAD will be updated periodically to show new restoration sites submitted for screening and potential posting through the Ontario and Prairie Restoration Action Feedback Form.

DFO's Integrated Planning Operations unit is continuing engagement in the Ontario and Prairie Region to begin the process of planning and prioritization of fish habitat restoration actions. For more information contact Cyndy.Desjardins@dfo-mpo.gc.ca

Brief Bio

Cyndy Desjardins is a biologist with the Fish and Fish Habitat Protection Program – Integrated Planninng Unit at the Department of Fisheries and Oceans Canada. Previously, Cyndy worked in aquatic ecosystem research for about a decade, through the IISD Experimental Lakes Area, the University of Cambridge, the University of Ottawa and Concordia University. Since joining DFO, Cyndy has also worked in Aquatic Invasive Species and Species at Risk units.

Location of Study: Ontario and Prairie Region, Canada

A Sharper View of the lakes and river: Improved Digital Elevation and Hydrodynamic Models for the Rainy Lake, Namakan Reservoir and the Rainy River

Gabriel Poirier*, Rémi Gosselin, Patrice Fortin, Olivier Champoux

Hydrodynamic and ecohydraulic services, National Hydrological Services (NHS), Environment and Climate Change Canada (ECCC)

Abstract

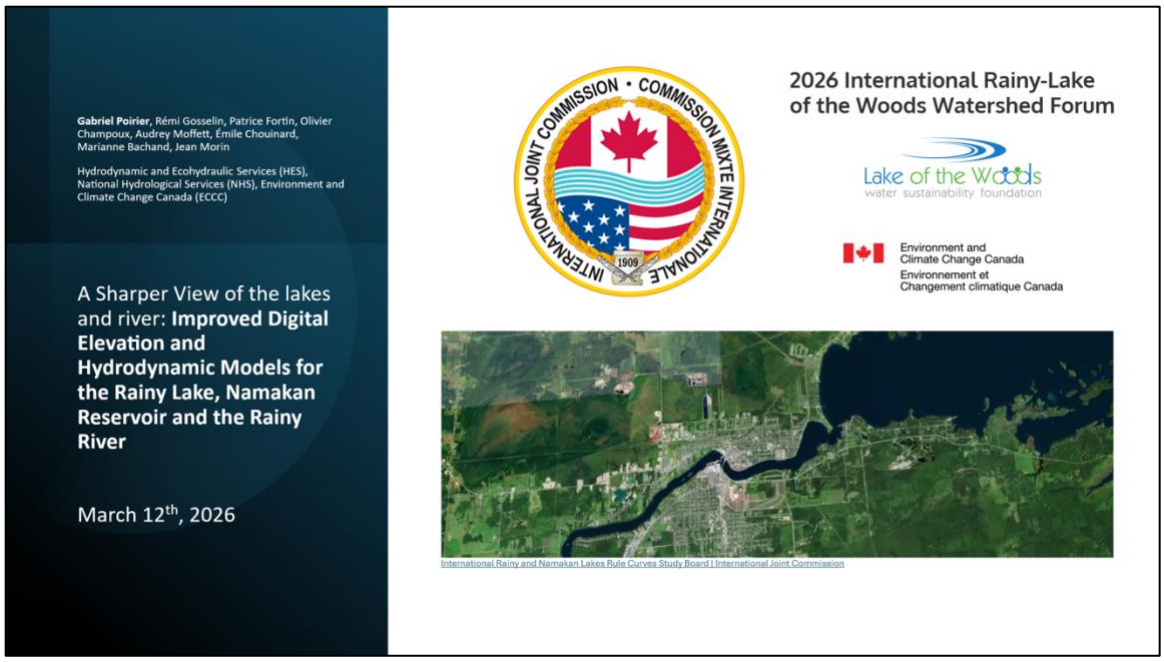
Accurate representation of elevation is essential for reliable hydrodynamic and ecological modelling, as it directly influences water levels and flows, flood modelling, and habitat distribution. The Digital Elevation Models (DEMs) developed for Rainy and Namakan Lakes and the Rainy River as part of the International Joint Commission (IJC) 2000 Rule Curves Study have been fully updated to support current hydrodynamic and ecological modelling work. These updates extend the DEM coverage into previously unmapped areas, including the Seine River system within the Rainy Lake basin. The first iteration of the Rainy River DEM covered the entire river, but its quality downstream of the Two Forks was limited due to a lack of precise bathymetric data. The updated DEM has now been improved and refined, providing full coverage of the river corridor all the way to the mouth of Lake of the Woods.

For Rainy Lake and Namakan Reservoir, the integration of 1-m resolution elevation products derived from high-precision LiDAR covering both sides of the border and most secondary sub-basins enabled substantial improvements in nearshore topography. In 2024, the NHS-ECCC modelling team further enhanced the DEM by incorporating bathymetric data from 18 wetlands surveyed recently in 2022 by the USGS, improving the representation of shallow areas that are critical for fish habitat modelling. The entire Rainy–Namakan system is now represented by a more coherent 10-m DEM, with several key nearshore sectors benefiting from locally available 1-m elevation detail. While the current product provides a robust foundation for hydrodynamic and ecological analyses, further refinements remain possible through future targeted field campaigns.

For the Rainy River, the DEM update relies on the same 1-m resolution topographic LiDAR products. These elevation products provide high-resolution topographic information along the riverbanks and in nearby areas that are subject to flooding. They were integrated with new high-resolution bathymetric surveys funded by the IJC, including sonar measurements acquired in 2024 in the lower section of the river by AMI consulting. Poorly mapped areas were improved using interpolation techniques adapted to riverine environments, to ensure a smooth transition between topographic and bathymetric data. The updated DEM now supports a significantly improved hydrodynamic model of the river and will also serve future applications such as fish habitat modelling and assessments of shoreline impacts, including flooded buildings.

Both DEMs are the basis of improved hydrodynamic models for the Lakes and the River. A scenario-based approach developed for the Great Lakes and the St. Lawrence River has been adapted to the Rainy-Namakan system to produce a more refined hydrodynamic time-series that will be used by ecological and economic impacts models. This novel approach will also allow for a relatively quick computation of different dam management rules and an evaluation of its impact on a set of performance indicators.

These upgrades directly support the NHS team's 2024–2026 work plan with the International Rainy Lake of the Woods Watershed Board's Adaptive Management Committee and reflect a genuinely binational effort. The result is a much more consistent and reliable elevation foundation that strengthens hydrodynamic modelling, ecological indicator development, and the broader analyses required for the IJC's ongoing Rule Curves evaluation.



Brief Bio

Since 2019, Gabriel has been working with NHS-ECCC, where he specializes in spatial modeling and the development of geospatial data processing tools to support hydrodynamic modelling and socio-environmental analysis. He holds a bachelor's degree in Geomatics Engineering from Université Laval, Québec, as well as a bachelor's degree in Forest Management and Environment. He is also a member of the Ordre des ingénieurs du Québec (OIQ) since 2023.

Location of Study: Rainy and Namakan Lakes, Rainy River

Session 6 –Namakan & Rainy Lakes Studies

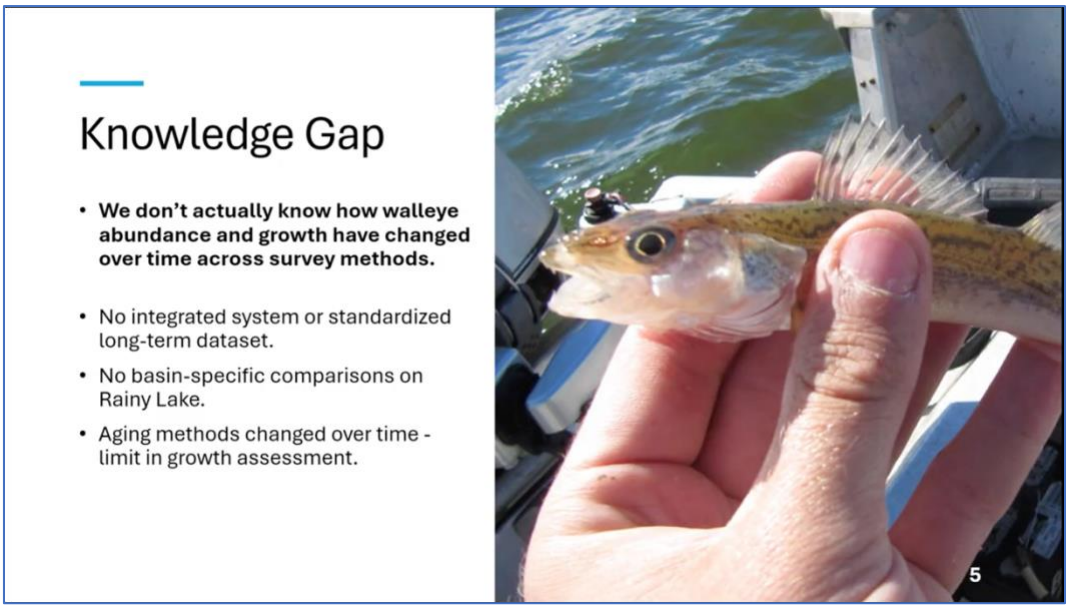
A Multi-Survey Approach to Understanding Long-Term Walleye Population Trends in Rainy Lake

Eric Randall*, Dr. Michael Rennie

Lakehead University

Abstract

Understanding long-term trends in fish populations is essential for effective management of fisheries. However, in large, multi-national waterbodies like Rainy Lake, differences in survey methods and sampling gears (both within and between agencies), and changes in primary ageing structures across time present challenges for interpreting long-term changes. This study compiles and integrates historical and modern monitoring records from both the Ontario Ministry of Natural Resources and the Minnesota Department of Natural Resources, which will include fishery-independent surveys, and size-at-age measurements for walleye (*Sander vitreus*). Multigear mean standardization (MGMS) and mixed-effects modelling will be used to evaluate long-term trends in relative abundance, and data will be filtered with appropriate standardization in mind to evaluate temporal changes in early growth rates (< age 6), mean size, and maximum size. Integrated datasets will allow assessment of basin-specific and whole-lake patterns across Rainy Lake's three major basins (North Arm, South Arm, Redgut Bay). Further, the influence of harvest (creel data, commercial harvest records), changes in recreational fishing regulations, species invasion (e.g. rainbow smelt) and climate change will be considered as potential drivers of long-term trends. This study aims to improve current walleye management strategies on Rainy Lake by contextualizing current patterns within observed historical changes in walleye abundance and life histories, as well as evaluate how fishing pressure and prey availability may have shaped these trends.



Brief Bio

Eric Randall is a MSc student in Biology at Lakehead University studying fisheries under the supervision of Dr. Michael Rennie. Eric's research focuses on long-term trends in walleye populations in Rainy Lake, integrating historical and contemporary monitoring datasets from both Ontario and Minnesota. Eric has field experience with the Ontario Ministry of Natural Resources working on the Broad-scale Monitoring Program with the Northwestern Biodiversity and Monitoring Crew. He also plans to conduct creel surveys on Rainy Lake in 2026 with the Ontario Ministry of Natural Resources.

Location of Study: Rainy Lake

Improving Walleye and Lake Whitefish Performance Indicators for Lake Water Level Management on Rainy – Namakan System

Benjamin Erb[1*], Andrew Hafs[1], Marianne Bachand[2], Audrey Moffett[2], Ryan Maki[3]

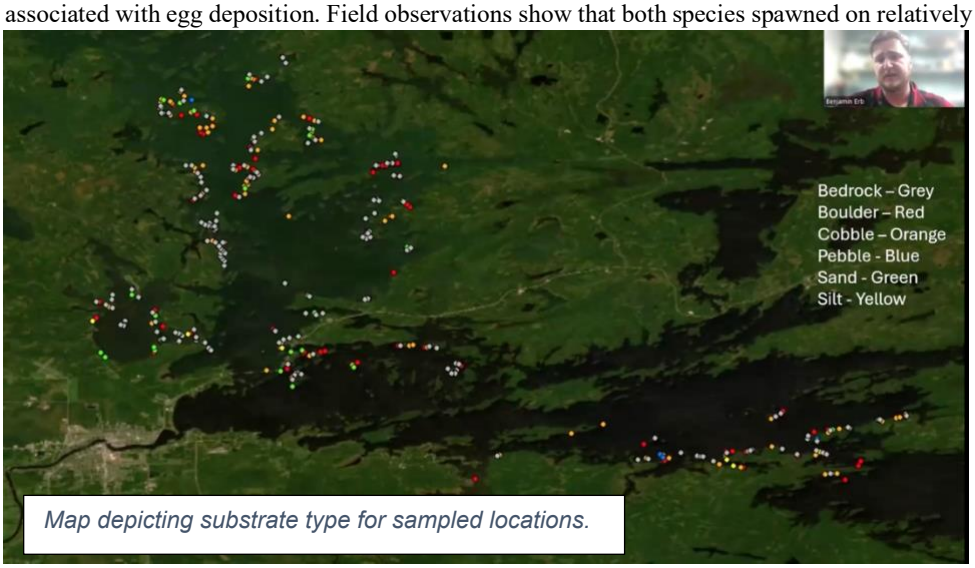
[1]Bemidji State University
[2]Hydrodynamic and ecohydraulic services, National Hydrological Services (NHS), Environment and Climate Change Canada (ECCC)
[3]Minnesota Department of Natural Resources

Abstract

Rainy Lake and Namakan Reservoir are reservoirs on the border of Minnesota and Ontario. This project exists to validate and enhance upon models provided by Environment and Climate Change Canada (ECCC) which predict spawning sites for Walleye and Lake Whitefish in the Rainy-Namakan System.

Inputs for the ECCC model include wave energy, slope of the lake bottom, depth, and water temperature. Model validation was accomplished by sampling for fish eggs (Walleye in the spring, Lake Whitefish in the fall) and comparing sample data to the predictive model. Walleye eggs were sampled on Rainy Lake only, and Whitefish data was collected from both Rainy Lake and Namakan Reservoir. A total of 60 sites each (30 per year) were selected for Walleye and Whitefish egg sampling, covering both Minnesota and Ontario waters. Walleye eggs were sampled between 25 cm and 1 m of water using a scap net, and Lake Whitefish eggs were sampled using egg mats in 2 – 4.5 m of water using egg-mats. Model performance differed largely between predictions of egg presence and absence.

The model predicts mostly suitable/unsuitable spawning habitat. For both species, the models performed substantially better at predicting egg absence (70.9% for Walleye and 60% for Lake Whitefish) than egg presence (24% and 31.6%, respectively), indicating a greater ability to identify unsuitable spawning habitat than conditions associated with egg deposition. Field observations show that both species spawned on relatively steep lake bottom slopes (10–38 ° for Walleye; 8–26 ° for Lake Whitefish), and that depth was a key predictor, like in the model, for Walleye, with 92% of eggs sampled within 25 cm of water. Spawning occurred within relatively narrow temperature ranges for both species, peaking between approximately 5 and 7.5 °C. In contrast, wave energy was not a reliable predictor of egg presence in this study, contrary to model expectations, although it may still be useful as a proxy for substrate. The low success rates for egg presence suggest that important habitat characteristics, particularly substrate, are not adequately represented in the current models, and that further investigation and refinement are needed as additional results become available.



Map depicting substrate type for sampled locations.

Brief Bio

Benjamin Erb is a graduate student under Dr. Andrew Hafs at Bemidji State University. His thesis project involves testing and expanding upon a model provided by Environment and Climate Change Canada which predicts spawning sites for Walleye and Lake Whitefish in Voyageurs National Park. He also received his undergraduate degree from Bemidji State University in 2019.

Location of Study: Rainy and Namakan Lakes

A Next-Generation 2D Predictive Model for Mapping Submerged Aquatic Vegetation in the Rainy Lake and Namakan System

Marianne Bachand, Émile Chouinard, Audrey Moffett

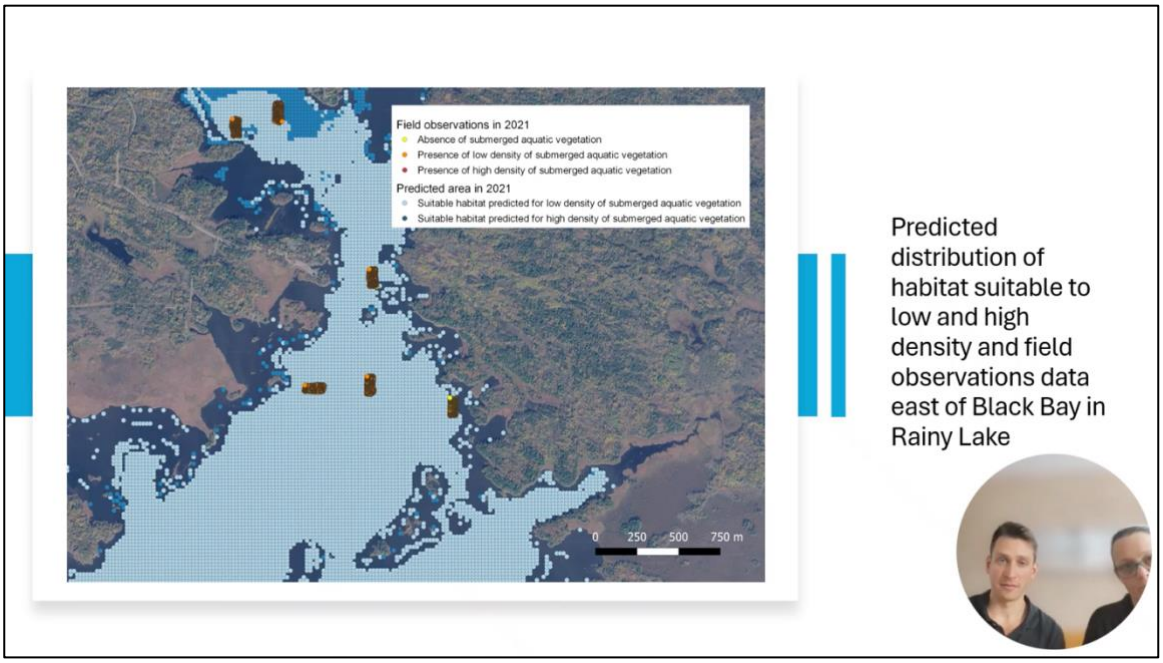
Hydrodynamic and ecohydraulic services, National Hydrological Services (NHS), Environment and Climate Change Canada (ECCC)

Abstract

Understanding and predicting the spatial distribution of submerged aquatic vegetation (SAV) is essential for evaluating habitat availability, ecosystem health, and long-term ecological change in freshwater systems. In the Rainy Lake and Namakan Reservoir system, SAV supports critical fish habitat, stabilizes sediments, and contributes to water quality. Earlier SAV models for this system provided useful insights but relied on simplified light-availability estimates and coarse Secchi depth interpolation, limiting their ability to assess the impacts of water-level management. Given the need to improve legacy tools for Rule Curve evaluation, a new two-dimensional (2D) predictive SAV model has been developed to map SAV density classes across both water bodies under present and future hydrological conditions.

A key improvement of the new SAV model lies in the treatment of Secchi depth. Whereas the previous model interpolated Secchi depth from only a few observations collected by Voyageurs National Park (VNP), the updated framework now predicts Secchi depth using three separate random forest regressors, one for each season (spring, summer, and autumn). These models leverage long-term transparency measurements (1981–2024), expanded spatial and temporal coverage from VNP datasets, and satellite-derived surface reflectance from Sentinel-2 MSI, Landsat-8 OLI, and Landsat-5 TM. Seasonal mean water depths were also incorporated as predictors. This approach provides substantially more accurate estimates of water clarity and thus bottom light intensity, identified as one of the most influential drivers of SAV distribution.

The SAV model itself was calibrated and validated using a BioBase biovolume dataset collected in August 2021 on behalf of Voyageurs National Park (VNP). The model employs a random forest classifier to predict the distribution of three SAV density classes based on biovolume: high SAV density (biovolume ≥ 0.25), low SAV density (0 < biovolume < 0.25), and absence of SAV (biovolume = 0). The most influential predictor variables identified by the model include the maximum summer depth (June–September), the ratio of incident light at the bottom during spring, the total summer wave energy, and the mean total summer wave energy from the two preceding years. Model performance is strong and consistent, with 99% accuracy on the



training dataset and over 85% on validation. High sensitivity and specificity, both over 90%, along with a Cohen's Kappa around 0.75, indicate robust predictive ability and reliability across all SAV classes.

Once completed, this SAV model will serve as a powerful decision-support tool. It will help managers assess habitat quality, support long-term monitoring, evaluate alternative Rule Curve scenarios under both historical and projected conditions, and provide key inputs to wildlife-habitat models, including those focused on northern pike spawning and early-life-stage habitat.

Brief Bio

Dr. Marianne Bachand is the Project Coordinator for the Hydrodynamic and Ecohydraulic Section within the National Hydrological Services at Environment and Climate Change Canada (ECCC). She holds a Ph.D. in plant biology from Université Laval and pivoted to ecohydraulic modelling during her postdoctoral research at ECCC. Dr. Bachand has led the development of plant and faunal habitat models for several major transboundary water systems—including the Rainy Lake–Namakan Reservoir System, Lake Champlain–Richelieu River Basin, St. Marys River, St. Lawrence River, and Lake Ontario. Her work supports decision-making for water-level management, climate change adaptation, and flood mitigation across these large systems.

Émile Chouinard is a project officer in hydrodynamic and ecohydraulic modeling at Environment and Climate Change Canada, where he develops environmental performance indicators from biological, hydrological, and topographic data, participates in the comparison of water level management scenarios, and collaborates with experts to validate proposed approaches.

Location of Study: Rainy Lake and Namakan Reservoir

Session 7 – Modelling

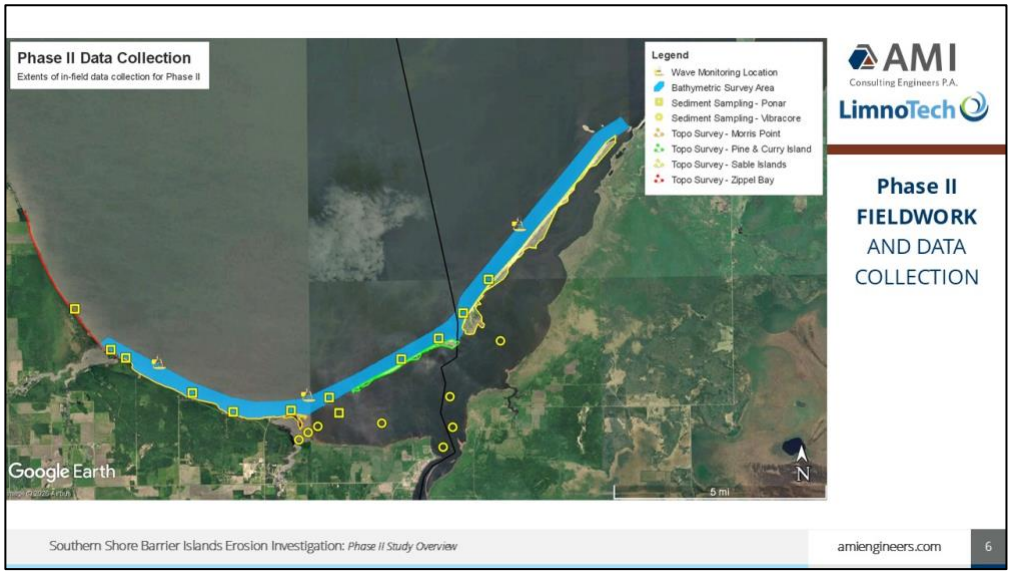
Lake of the Woods - Southern Shore Barrier Island Erosion Investigation – Phase II Update

Zachary Morris[1], Craig Taylor[2], Erv Kraft[1]

[1]AMI Consulting Engineers, P.A.
[2]LimnoTech

Abstract

This presentation will provide an update on the funding and work plan for Phase II of the Southern Shore Barrier Islands Erosion Investigation. The erosion investigation covers the Pine & Curry, and Sable Islands located in Lake of the Woods. These barrier islands have degraded over the last century and there is significant community interest in determining cause(s) for the erosion, as well as providing options on ways to restore the islands. This presentation will focus on the next steps for the second phase of the investigation, especially focusing on the need for community engagement over the next year. Phase II is currently in the planning phases and is anticipated to kick-off in summer of 2026.



Brief Bios

Zac Morris has extensive experience designing waterfront structures and stabilizing shorelines. He has a deep understanding of coastal designs given his hands-on construction experience and design expertise. He frequently leads scientific studies such as wave and sediment transport analyses, seafloor mapping, and underwater inspections. Zac has a knack for applying theoretical concepts and models while remaining practical to ensure constructability. He enjoys challenging projects and serves as the Coastal and Riverine Department Manager for AMI.

Craig Taylor is a hydraulics and restoration specialist. Craig has over 15 years of professional experience in restoration design, physical hydraulics, sediment transport, and H&H modeling. Craig has a passion for water and has been a long-time fan of Lake of the Woods. Craig also serves as an instructor at the University of Virginia's Landscape Architecture graduate program.

Erv Kraft is a Water Resources Engineer with experience in hydraulic and hydrodynamic modeling, sediment transport, and shoreline stabilization. He specializes in riverine and coastal system modeling, using tools such as HEC-RAS and the MIKE Suite to support resilient and data-driven design. Erv has contributed to modeling efforts for dam safety, harbor tranquility, outfall protection, and sediment management across lake, river, and coastal environments. His technical agility and strong field-to-model coordination allow him to support both design and permitting needs for FEMA- and agency-funded infrastructure projects.

Location of Study: Lake of the Woods & Four Mile Bay

Using Satellite-Derived Water Quality and Temperature Data from an Automated High-Performance Computing Environment to Identify and Model Cyanobacteria Blooms in the Rainy-Lake of the Woods Watershed

Leif Olmanson[1*], David Porter[2]

[1]Remote Sensing and Geospatial Analysis Laboratory, University of Minnesota, MN, USA
[2]Minnesota Supercomputing Institute, University of Minnesota, MN, USA

Abstract

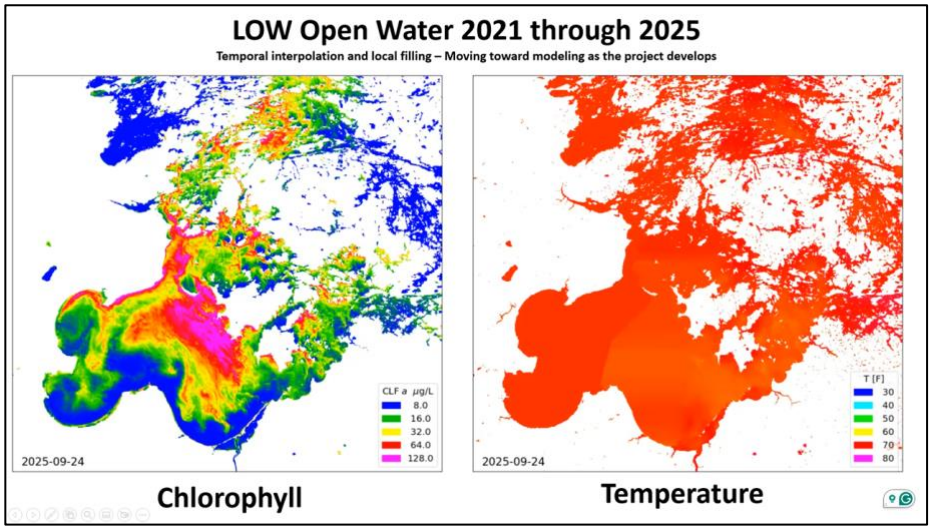
Recent advances in satellite technology, along with improvements in atmospheric correction, cloud detection, machine learning, and supercomputing capabilities, have enabled near-real-time regional-scale monitoring of water quality. These enhancements provide valuable opportunities to improve lake and fisheries management by allowing more frequent measurements of a broader range of variables.

The Minnesota LakeBrowser is an interactive tool that offers near-real-time data for all lakes across the state. It shows how clear and accessible data visualization can support effective lake management, enhance fisheries oversight, and inform broader water policy and conservation efforts. This research provides a unique statewide perspective on water quality trends over time and across locations, enabling the identification of areas experiencing significant changes.

In northern Minnesota, a region known for its abundant lakes, wetlands, and forests, many lakes are becoming less clear, likely due to rising temperatures and increasingly intense rainfall events. The Rainy-Lake of the Woods Watershed is one of the fastest-warming areas in the continental United States. Water temperature is a critical physical property of aquatic ecosystems, influencing various chemical and biological processes. As lake temperatures rise, suitable fish habitats decrease, while conditions become more favorable for cyanobacterial blooms. Increasing air temperatures, longer open-water seasons, and more intense storms that deliver higher nutrient loads to lakes are contributing to more frequent harmful algal blooms (HABs) and degrading fish habitats.

This insight has led to our current project, funded by the Environment and Natural Resources Trust Fund (ENRTF), which focuses on integrating lake temperature data into our automated water quality monitoring system. This initiative aims to develop a comprehensive database spanning a decade and incorporating multiple sources of environmental information. The database will combine satellite-derived measurements of water quality and surface temperature with additional datasets on local weather patterns, watershed characteristics, and lake morphology. By integrating these diverse data streams with machine learning techniques, we aim to enhance predictive models of future lake conditions across various climate scenarios, thereby improving our ability to detect patterns, reduce uncertainty, and anticipate ecological shifts driven by climate change. Ultimately, our goal is to support more effective management and mitigation strategies to address the challenges posed by climate change. Some examples from the Rainy-Lake of the Woods Watershed will be discussed.

This still image can be visualized as an animation by using the QR code below.



Brief Bio

Leif Olmanson is a Research Scientist at the University of Minnesota with 30 years of experience in developing remote sensing applications. His work focuses on creating precise temporal and spatial datasets to characterize large ecosystems, particularly water and land resources. He is particularly interested in developing field-validated image-processing methods for use in automated geospatial analysis systems, such as Google Earth Engine and the supercomputers at the Minnesota Supercomputing Institute.

Olmanson leads a team of researchers and computer scientists developing a system for near-real-time monitoring of water quality and surface temperature across Minnesota's more than 10,000 lakes. This system uses satellite imagery to provide critical information on water quality and temperature, essential for managing lakes and fisheries. Recently, the system has been expanded to include regions in the Upper Midwest and Lower New England states. You can explore and visualize the data using the Minnesota LakeBrowser (https://lakes.rs.umn.edu/).

Location of Study: Minnesota lakes including Rainy-Lake of the Woods

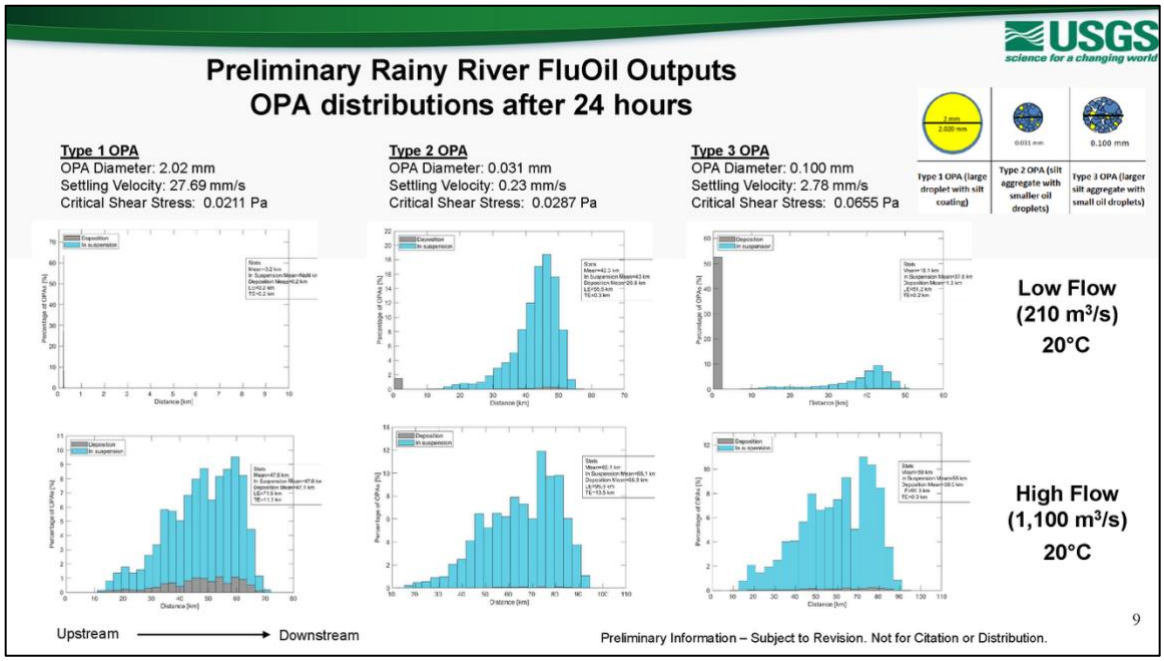
Modeling fate and transport of oil-particle aggregates from a potential oil spill in the Rainy River

Angus Vaughan[1,2], Faith Fitzpatrick[1*], Collin Roland[1]

[1]U.S. Geological Survey, Upper Midwest Water Science Center
[2]U.S. Geological Survey, Upper Midwest Environmental Sciences Center

Abstract

The Rainy River is exposed to oil spill risk at the rail crossing at Ranier, MN, which carries an estimated greater than1000 cars of crude oil or other petroleum products daily. A FluOil model for the fate and transport of an oil-particle aggregate (OPA) component was developed to assist with spill planning and early response. OPAs form when turbulence of flowing water in a channel causes an oil slick to break into small droplets, mix in the water column, and collide and stick to sediment or organic detritus. The FluOil model estimates advection, dispersion, settling, and resuspension of OPA through a random walk particle tracking algorithm. Model inputs include one-dimensional channel geometry and hydraulics and predetermined OPA characteristics of size, settling velocity and critical shear stress. Flow velocity, shear stress, and discharge were adapted from an existing two-dimensional hydrodynamic model. Modeled scenarios included a high and low flow condition, warm and near-freezing temperature conditions, and a large set of OPA characteristics that spanned their expected range of size, settling velocity, and critical shear stress. OPA distribution and travel time were strongly related to flow conditions and OPA type. At high flow conditions, OPAs were transported downstream primarily in suspension, with the leading edge of the OPA plume reaching 70-90 km downstream depending on OPA type and reaching Lake of the Woods after approximately 2 days. In contrast during low flow, significant OPA deposition was predicted below the International Falls Dam and remaining OPA were deposited about 100 km downstream after 2 days. Model results were weakly sensitive to water temperature but strongly sensitive to higher values of OPA critical shear stress corresponding to cohesive sediment.



Brief Bio

Faith Fitzpatrick is a research hydrologist with the U.S. Geological Survey at the Upper Midwest Water Science Center. Faith has spent much of her career studying geomorphic, flood, and sediment dynamics of rivers.

Location of Study: Rainy River

Phase II of Assessing the Vulnerability of Waters to Mining in the Rainy—Lake of the Woods Watershed

Aliesha Krall

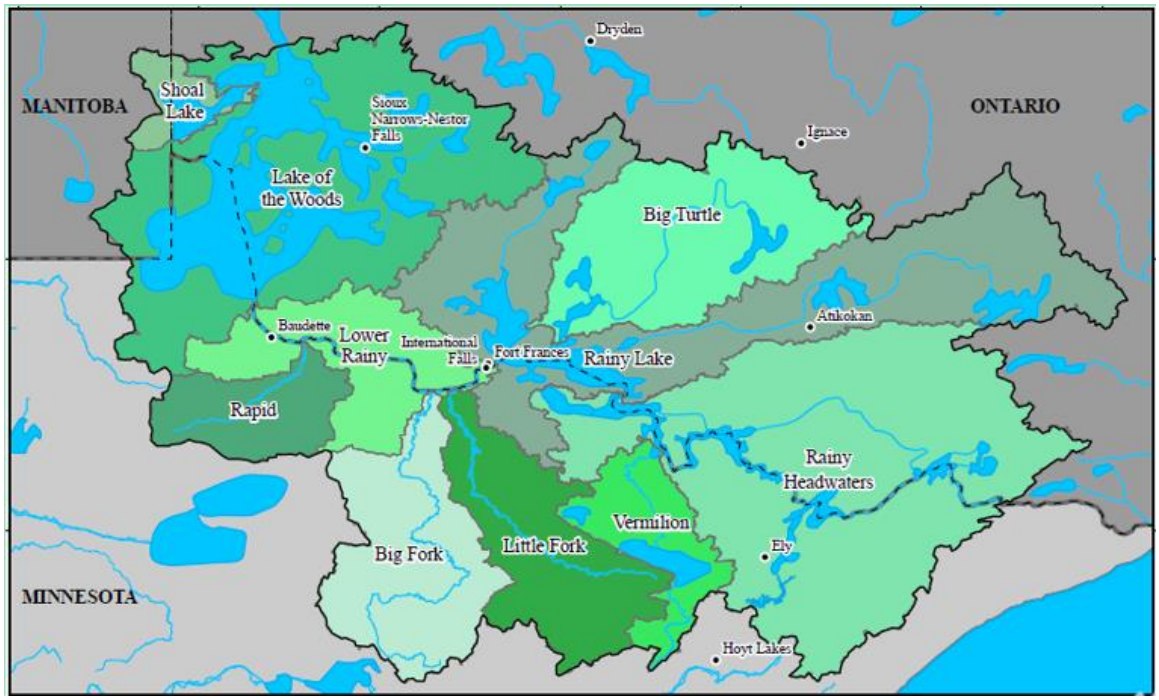
U.S. Geological Survey – Upper Midwest Water Science Center

Abstract

The impacts of mines, both active and inactive, on water bodies within the RLOW basin have not been holistically analyzed from a transboundary point of view. Phase I of this study was completed in 2024 and focused on identifying elements needed to support a risk identification framework and both securing and harmonizing relevant data sets in preparation for Phase II.

The purpose of this presentation is to provide an update on the progress of Phase II of the project. Phase II aims to advance towards a comprehensive, sub-basin- scale assessment of water vulnerability to mining within the RLOW basin. Its objectives include: (1) identifying priority areas for risk assessment based on datasets defined in Phase I; (2) identifying key data gaps through targeted literature review and parameter evaluations; (3) conducting risk assessments in areas with sufficient information by developing criteria to rank mining potential and vulnerability, and by applying paired-basin analyses to compare mined and unmined sub-basins; and (4) determining where additional monitoring is needed to support future assessments.

By integrating harmonized binational datasets and targeted analytical approaches, Phase II will provide the first structured, transboundary evaluation of mining-related vulnerabilities in the RLOW basin. This work will support informed decision making and resource management across jurisdictions as the region continues to address the cumulative impacts of mining on shared waters.



Brief Bio

Aliesha Krall is a physical scientist with the U.S. Geological Survey – Upper Midwest Water Science Center focusing on water-quality and environmental contaminant analysis and interpretation that informs environmental and public-health understanding.

Location of Study: International Rainy—Lake of the Woods Watershed

Session 8 – Monitoring, Aquatic Invasive Species & Ecological Change

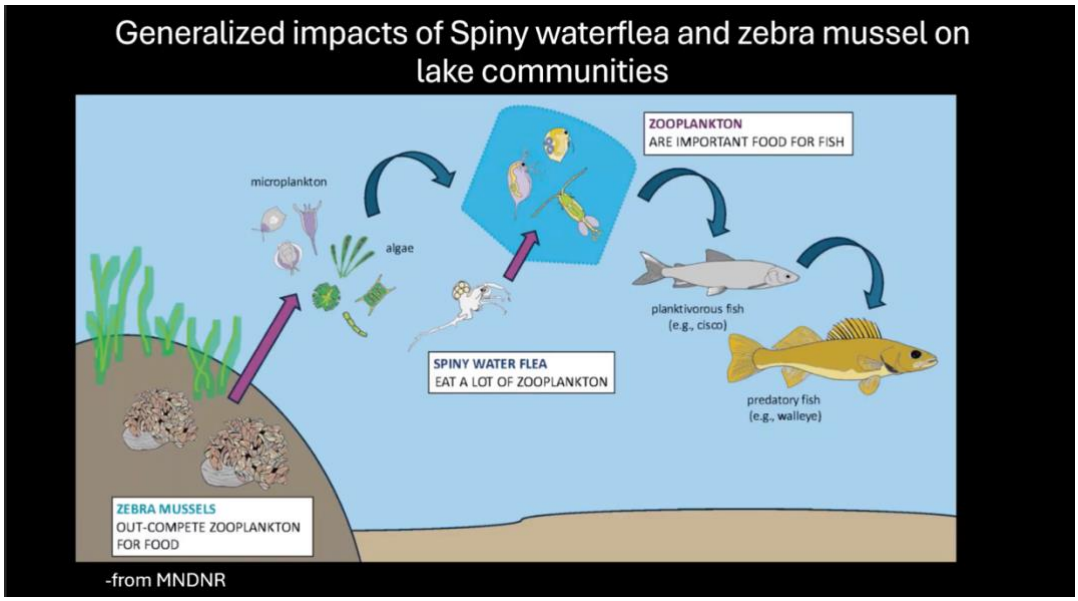
Vulnerability of lakes in Voyageurs to spiny water flea and zebra mussels

Heidi M. Rantala[1], Kylie Cattoor[2], Donn K. Branstrator[3], Ryan P. Maki[4], James Smith[4*], Brenda Lafrancois[5]

[1]MNDNR Fisheries Research, Duluth, MN
[2]MNDNR Lake Ecology Unit, St. Paul, MN
[3] University of Minnesota-Duluth, Duluth, MN
[4] Voyageurs National Park, Grand Rapids, MN
[5] National Park Service, Ashland, WI

Abstract

The landscape at Voyageurs National Park (VNP) is a complex mosaic of large and small lakes where water-based activities are the priority for many visitors. Given the importance of these lakes and the services they provide, protecting them from stressors, including invasive species, is a primary issue for park managers. Unfortunately, spiny water fleas have long been established in the large lakes in the park, and larval zebra mussels have been detected in several of the large lakes. Understanding the vulnerability of each of the 26 smaller, upstream interior lakes in the park to these invasive invertebrates is important for prioritizing protection efforts. We used a published conceptual framework to guide our assessment of the relative vulnerability of the interior lakes to establishment and adverse impacts of spiny water flea and zebra mussels. We found that the risk of establishment of individual lakes to these invaders varied, but the adverse impacts to all the lakes is potentially large if populations become self-sustaining. Using the output of the two vulnerability assessments will allow managers to weigh the relative risk of activity in the park at an individual lake level.



Brief Bio

James Smith is a biological science technician at Voyageurs National Park. James' position is shared between the park, where he works on long term water quality monitoring in the waters in and surrounding Voyageurs, and the Great Lakes Network where he assists in region wide aquatic ecosystem monitoring. James is originally from Anchorage, Alaska where he grew up paddling, camping, and snowboarding. James started his career at Izembek National Wildlife Refuge in Alaska and has worked in south Texas, New Mexico, and Oregon. James is thrilled to be at Voyageurs and is most excited to enjoy evenings paddling calm waterways and collecting popular hot dish recipes to make his own.

Location of Study: Voyageurs National Park

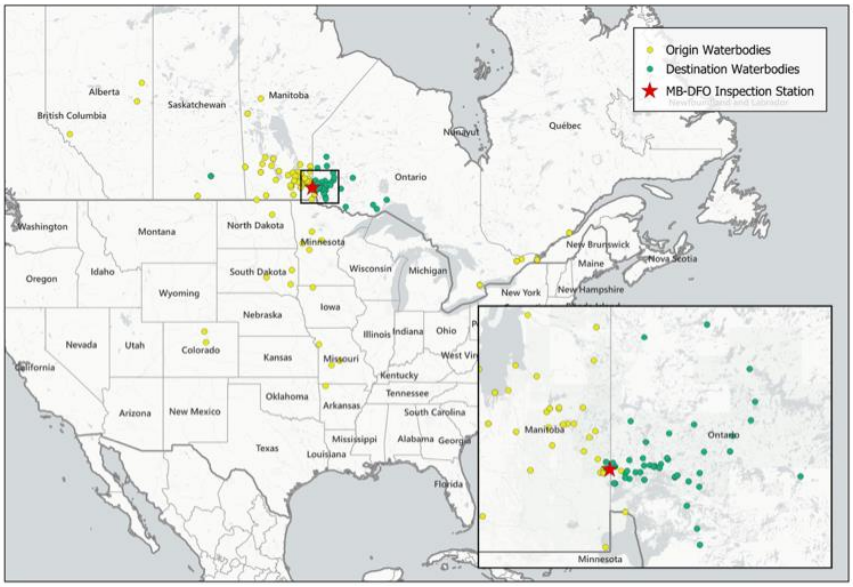
'Clean Drain Dry' compliance and travel patterns for watercraft crossing between Ontario and Manitoba along the TransCanada Highway

Kaitlyn Brougham*, Brendan Spearin, Elaina Waters, Kirsten Rebillard

Aquatic Invasive Species National Core Program, Fisheries and Oceans Canada

Abstract

The stowaway pathway – or the overland transport of watercraft and water-related equipment – has been linked to new introductions of aquatic invasive species (AIS) across North America. To address this pathway, agencies across North America implement watercraft inspection and decontamination programs to detect and prevent the spread of AIS that may be transported on watercraft as they move between waterbodies. In 2024 and 2025, Fisheries and Oceans Canada and the Manitoba Government partnered to run a roadside watercraft inspection station along the TransCanada Highway near the Manitoba-Ontario provincial border to ensure watercraft were free of AIS and Clean Drain Dry. The station was run over two blitz weekends each year to capture watercraft traffic travelling between the two provinces. This interjurisdictional program intercepted over 2,000 watercraft over 12 days of operation across the two years, decontaminating 170 watercraft and detecting 8 watercraft harbouring Zebra Mussel. With over 30% of watercraft travelling either to or from Lake of the Woods alone, program findings highlight the risk posed by watercraft travelling throughout northwestern Ontario and southeastern Manitoba. This presentation will explore trends in compliance, the awareness of Lake of the Woods boaters to Clean Drain Dry requirements, and the patterns of watercraft movement as they travel across central Canada.



Map showing inspection locations, origin and destination waterbodies.

Brief Bio

Kaitlyn Brougham is an Aquatic Invasive Species (AIS) Biologist for Fisheries and Oceans Canada's AIS National Core Program. Based out of the Winnipeg, Manitoba, Kaitlyn's team focuses on AIS prevention, detection, response and management initiatives throughout the Canadian Prairies. Since 2022, Kaitlyn has been a part of the planning and implementation of a pilot watercraft inspection and decontamination program at an international border crossing in southern Manitoba. In addition to her work on the inspection program, she regularly collaborates with federal, provincial, Indigenous and non-government partners on coordinated AIS management initiatives throughout Canada. Before this, Kaitlyn worked for Canada's Invasive Carp Program, where she supported various prevention initiatives and early detection sampling in the Canadian Great Lakes. With a Master in Environmental Science from the University of Toronto, Kaitlyn has experience in aquatic biology and the conservation of Canadian biodiversity and aquatic ecosystems.

Location of Study: Inspection station at 49.738109, -95.168708

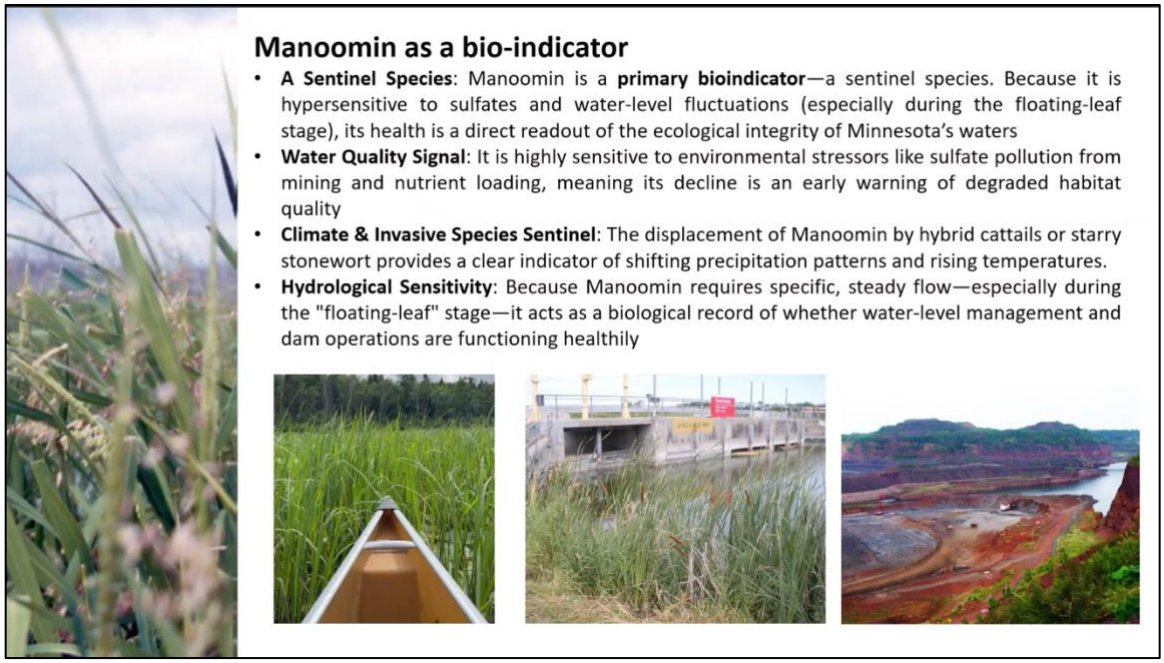
Historical abundance and extent of wild rice: environmental drivers leading to its decline in Lake of the Woods and Red Lake

Lienne Sethna[1*], Michelle Anderson[2*], Joshua Jones[2]

[1]Science Museum of Minnesota – St. Croix Watershed Research Station
[2]Red Lake Department of Natural Resources

Abstract

The migration of the Ojibwe people to the upper Great Lakes region was guided by the purpose to find "the place where food grows on water". This food, called manoomin in Ojibwe and wild rice in English, holds immense cultural and dietary significance for native peoples in Minnesota to this day. The health and abundance of wild rice across the region is in decline due to multiple environmental stressors including lake water levels, increasing organic matter inputs, warming winter temperatures, and an increase in the frequency and intensity of storms. In this study, we will examine the impacts of damming and organic matter accumulation on the abundance of wild rice on Red Lake and Lake of the Woods. Oral history from the Red Lake community tells of abundant wild rice in these areas that were severely impacted by damming, which raised water levels and, as a result, altered their basin morphology. By examining historical changes recorded in sediment cores, we will be able to reconstruct past environmental conditions such as nutrient levels, organic matter inputs, lake level, and wild rice abundance. The relationships between environmental variables and wild rice allow us to characterize the factors contributing to wild rice decline and inform decisions on lake management. A key aspect of our study is the use of wild rice environmental DNA to quantify historical abundance. Our use of this technique will help demonstrate its effectiveness in future studies, as long as they are tribally led. The main goal of our study is to quantify the historical abundance of wild rice and its relationship with lake level rise in Red Lake and Lake of the Woods. This study will inform future research practices as well as lake management strategies for the protection and restoration of wild rice in Minnesota.



Brief Bio

Lienne Sethna is an assistant scientist at the St. Croix Watershed Research Station studying river and lake ecosystems.

Michelle Anderson and Joshua Jones are members of Red Lake Nation and are wild rice researchers at the Red Lake Department of Natural Resources.

Location of Study: Lake of the Woods and Upper Red Lake

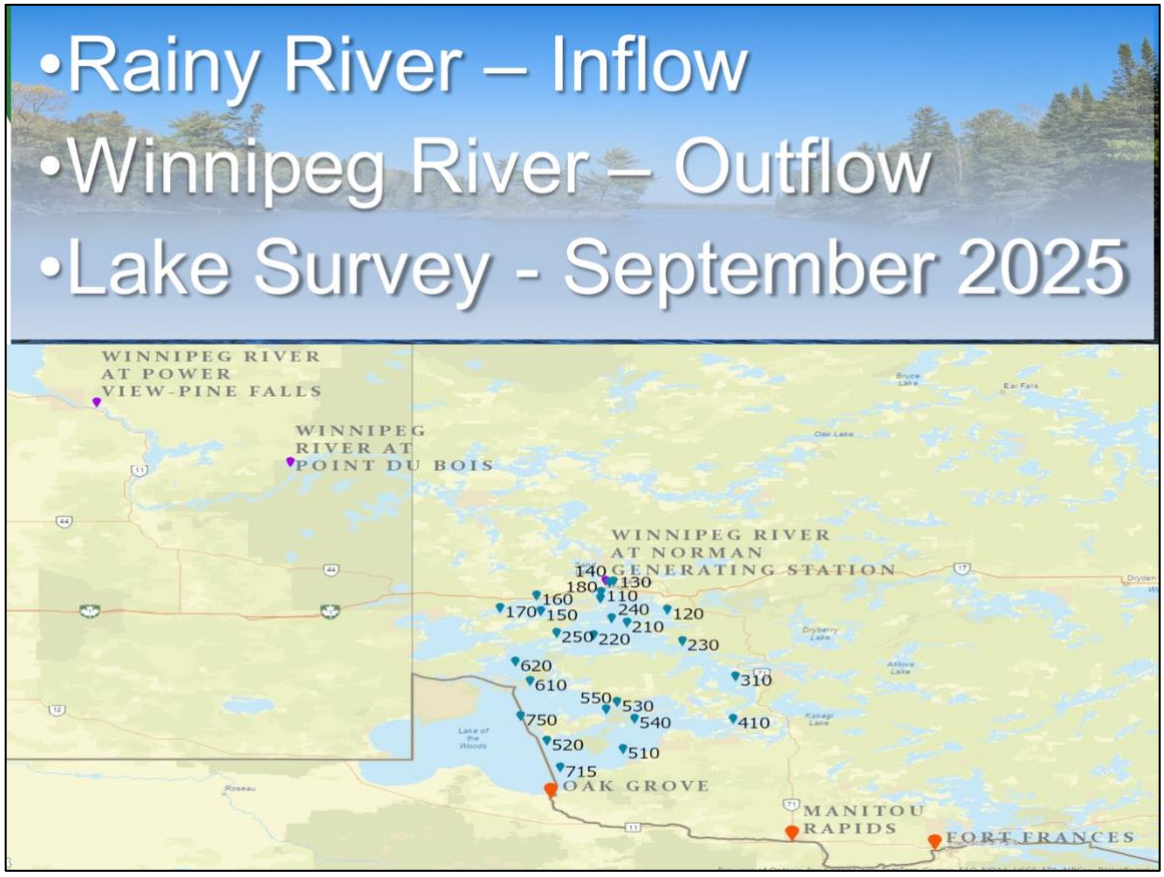
ECCC 2024/25 Water Quality Monitoring Update

Diana Fred

Environment and Climate Change Canada, Winnipeg, Manitoba

Abstract

In this presentation, we will share an update of the 2024/25 monitoring in the Rainy/Lake of the Woods watershed conducted by Environment and Climate Change Canada. The presentation will look at parameters of interest with reference to suggested water quality objectives, including discussion of observations of note.



Brief Bio

Diana Fred is the Environment and Climate Change Canada Water Quality Monitoring Program Lead for the Rainy River/Lake of the Woods watershed.

Location of Study: Lake of the Woods and Rainy River

Grand Council Treaty #3: 2025 Environmental Monitoring Updates

Michaela Novak, Laine Fyke, Benjamin Finlan

Territorial Planning Unit of Grand Council Treaty #3

Abstract

The Territorial Planning Unit (TPU) of Grand Council Treaty #3 works to protect and preserve the traditional lands and waters of the Anishinaabe Nation of Treaty #3. The TPU leads environmental monitoring programs for water quality, climate impacts, invasive species, species at risk, and microplastics with Treaty #3 communities. This past summer, the TPU deployed 5 long-term water monitoring stations in Treaty #3 communities to track baseline water quality parameters continuously throughout the entire open-water season. These stations are the first to be deployed, with the goal to create a network of long-term water monitoring stations across Treaty #3.

In 2025, the TPU took 90 samples from Treaty #3 communities and popular boat launches across the territory to test for Zebra Mussel veligers. Additionally, the TPU operated a boat decontamination station this past summer to prevent the spread of aquatic invasive species in the territory, and the second boat decontamination station was acquired in the fall. The TPU has also been developing a guidebook to aquatic invasive species specific to the Treaty #3 territory, which will be available in both Anishinaabemowin and English.

New to 2025, the TPU collected water samples for microplastics from Lake of the Woods, Wabigoon Lake, and Rainy Lake. Sediment samples and fish samples were collected this past summer, continuing the 2024 microplastic monitoring efforts. The objective is to collect a baseline of microplastics in the Treaty #3 territory over the next two years.

Brief Bios

Michaela Novak is the Invasive Species Coordinator for Grand Council Treaty #3. Since 2022, she has been working with the 28 First Nation communities of Treaty #3 to protect and preserve the traditional lands and waters of Treaty #3. Her work includes leading monitoring for terrestrial and aquatic invasive species across Treaty #3 Territory and deploying watercraft decontamination units.

Laine Fyke is the Environmental Manager of the Territorial Planning Unit (TPU) of Grand Council Treaty #3. She oversees the TPU's monitoring initiatives and has worked with the TPU collecting baseline water and climate data with Treaty #3 communities across the traditional lands and waters of Treaty #3 territory.

Benjamin Finlan is an Environmental Monitoring Technician with the Territorial Planning Unit of Grand Council Treaty #3. He coordinates microplastics sampling with Treaty #3 communities and across the territory townships. He also assists with the Community-Based Monitoring Program, invasive species sampling, and species at risk monitoring. Ben worked two summers as an Environmental Monitoring Summer Student and became a full-time Environmental Monitoring Technician in September 2024.

Location of Study: Lake of the Woods, Wabigoon Lake, Rainy Lake, Lac Seul, Island Lake, Winnipeg River, and many other waterbodies across the Treaty #3 territory

Appendix A: Organizations Represented at the Forum

93.1 The Border/Acadia Broadcasting
AMI Consulting Engineers, P.A.
Bemidji State University
Board of Water and Soil Resources
Canada Water Agency
CLEARWATER BioLogic LLC
Cook County SWCD
Environment and Climate Change Canada
Fisheries and Oceans Canada
Fort Frances Times
Friends of the Boundary Waters
Global Affairs Canada
Grand Council Treaty #3
Green Lake Association
Houston Engineering, Inc
IISD-Experimental Lakes Area
International Joint Commission
International Rainy-Lake of the Woods Watershed Board
IRLWWB-Community Advisory Group
IRLWWB/US Army Corps of Engineers
Itasca Soil and Water Conservation District
Koochiching County Environmental Services
Koochiching SWCD
Lake County (MN) Soil & Water Conservation District
Lake of the Woods Boatworks LLC
Lake of the Woods Control Board Secretariat
Lake of the Woods County
Lake of the Woods County Land and Water Planning
Lake of the Woods District Stewardship Association
Lake of the Woods Water Sustainability Foundation
Lakehead University
Marvin
MiningMinnesota
Minnesota Department of Natural Resources
Minnesota Pollution Control Agency
Nature Conservancy of Canada (NCC)
North St. Louis SWCD
Ontario Ministry of Natural Resources
Ontario Ministry of the Environment, Conservation and Parks
Rainy Lake Conservancy
Rainy Lake Property Owners
RLB, Inc.
Science Museum of MN
The Great Northwoods Corporation
Toronto Metropolitan University
Township of Emo
Trent University
Trent University - School of the Environment
U.S. Geological Survey
University of Minnesota
US Army Corps of Engineers
US Consulate
US Environmental Protection Agency
USGS Upper Midwest Water Science Center
Vermilion Lake Association
Voyageurs National Park
Wetlands Action Group
White Iron Chain of Lakes Association

Appendix B: Meetings of Other Groups Co-located Around the Forum Program

In 2026, most meetings typically physically co-located with the Forum were, like the Forum itself, held online in the days leading up to the Forum. These included:

Friday, February 20 - International Rainy-Lake of the Woods Watershed Board Aquatic Ecosystem Health Committee

Monday, March 2 - International Rainy-Lake of the Woods Watershed Board Water Levels Committee Pre-Spring Engagement (Virtual Information Session)

Tuesday, March 3 - International Rainy-Lake of the Woods Watershed Board Engagement Committee

Tuesday, March 10 - IJC International Rainy-Lake of the Woods Watershed Board, and its Community and Industry Advisory Groups

Tuesday, March 10 - International Multi-Agency Arrangement and its Technical Advisory Committee

The International Rainy-Lake of the Woods Watershed Board Adaptive Management Committee was scheduled to meet later in March, following the Forum.

In addition, Environment and Climate Change Canada's modelling team, led by Dr. Marianne Bachand, scheduled in person project meetings with several Forum participants in Fort Frances during the week of the Forum.