Connected Waters

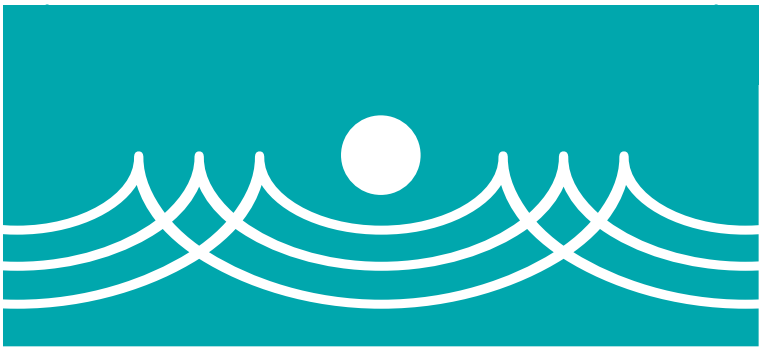
Bridging Communities & Ideas

MAY 25-29, 2026
WINNIPEG

ABSTRACTS

A joint conference of
the International Association for Great Lakes Research
and the Society of Canadian Aquatic Sciences

CONNECTED WATERS



Bridging Communities & Ideas

IAGLR & SCAS-SCSA
Joint Conference

Convened by the
International Association for Great Lakes Research
and the Society of Canadian Aquatic Sciences

May 25–29, 2026

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Conference logo by Jenifer Thomas

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ABSTRACTS

An alphabetical listing of abstracts presented at the Joint Conference of the International Association for Great Lakes Research and the Society of Canadian Aquatic Sciences, organized by first presenter's last name. Presenters are underlined.

A

Armaghan Abed-Elmdoust[1], Natalie Gervasi[2], Maximillian DeBues[3], Jamie Ward[4], Patricia Bye[4], Jennifer Jury[4], Ibrahim Tariq[5], Courtney Bayer[2] and Sergio Redondo[6], [1]United States Army Corps of Engineers, Buffalo, NY, USA, [2]National Hydrologic Service, Environment and Climate Change Canada, Dorval, QC, Canada, [3]National Hydrologic Service, Environment and Climate Change Canada, Cornwall, ON, Canada, [4]United States Army Corps of Engineers, Detroit, MI, USA, [5]National Hydrological Service, Environment and Climate Change Canada, Burlington, ON, Canada, [6]National Hydrological Service, Environment and Climate Change Canada, Gatineau, QC. Canada.
Modernizing Great Lakes Regulation and Routing Models: An Integrated Open-Source Python Framework.

The Great Lakes system, comprising Lake Superior, the middle lakes, and the Lake Ontario-St. Lawrence River, is managed using bi-national numerical models that simulate water levels and flows across the system. These regulation and routing models are critical for outflow regulation, plan evaluation, and operational decision-making. Previous modernization efforts to improve model functionality, maintainability, and flexibility focused on the Lake Ontario-St. Lawrence River system. Building on this foundation, the work is being extended to develop an integrated Great Lakes Regulation and Routing Model (GLRRM) Python package covering both Lake Ontario and the upper lakes. This effort is led by the Regulation and Routing Subcommittee, which operates under the Coordinating Committee on Great Lakes Basic Hydraulic and Hydrologic Data. The package will be open-source, extensible, and user-friendly, enabling end-users to test alternative water-management strategies, simulate diverse hydrological conditions, and integrate modules into custom workflows. The framework will support the review of Plan 2012 of the Upper Lakes Regulation and Routing Model, which is critical for ensuring effective regulation under current and future hydrological conditions.

Alfred Achieng[1], Robert Kayanda[2], Julius Manyala[3], Benard Opaa[4], Tracey Coffey[5], Jonathan Midwood[6], Nicole Turner[6], Marten Koops[6], Timothy Johnson[7], Nicholas Mandrak[1] and George Arhonditsis[1], [1]University of Toronto, [2]Lake Victoria Fisheries Organization, [3]Jaramogi Oginga Odinga University of Science and Technology, [4]Department of Natural Resources Management, National Land Commission, Kenya, [5]University of Nottingham, [6]Department of Fisheries and Ocean Canada, [7]Ontario Ministry of Natural Resources. **Great Lakes Ecology and Fisheries: Insights from the Laurentian and African Systems.**

The Laurentian and African Great Lakes exemplify freshwater ecosystems shaped by the Anthropocene, exhibiting parallel trajectories in the drivers of ecosystem change. To date, these lake systems have largely been studied independently, with emphasis on national and transboundary

management frameworks and region-specific chronologies of environmental perturbation. Since the 1970s, African Great Lakes (especially, Lake Victoria) has been characterized by intensive fisheries exploitation, cultural eutrophication, recurrent cyanobacterial blooms, invasive species, climate extremes, and, more recently, the expansion of cage aquaculture. In contrast, the Laurentian Great Lakes have experienced cultural eutrophication, hypoxia, fisheries decline, climatic variability, phosphorus abatement, and the recent proliferation of aquatic invasive species (the mussels). Despite these broadly comparable histories, no study has jointly synthesized these trajectories to evaluate shared ecological and fisheries responses, nor has there been a systematic comparison of governance frameworks and the knowledge gaps that emerge from them. These shared vulnerabilities highlight common pathways through which anthropogenic pressures disrupt ecosystem structure and function, particularly ecosystem engineering processes, and point to opportunities for transferable insights in research, policy, and adaptive management. This review seeks to bridge these gaps by synthesizing historical to contemporary ecosystem change across both Great Lake systems, assessing the impacts of key drivers on ecological structure, fisheries productivity, and food-web dynamics, and evaluating the effectiveness of governance responses through remedial actions and regulatory frameworks.

Amanda Ackiss[1], Alicia Alvarez[2], Katie Anweiler[1], Cory Brant[1], Evan Hill[1] and Ann Ropp[1], [1]United States Geological Survey, Great Lakes Science Center, [2]Lake Superior State University. **Recreating the historic landscape of Lake Michigan Cisco through genotyped archival fish scales.**

Lake Michigan was once the heart of coregonine diversity in the Laurentian Great Lakes, and its two major embayments, Green Bay and Grand Traverse Bay, served as critical habitat for large populations of shallow-water Cisco (Coregonus artedi). A suite of anthropogenic impacts over the past century, however, led to the total collapse of Green Bay Cisco and the near extirpation of Grand Traverse Bay Cisco. Today, many threats that led to the decline of Cisco in Lake Michigan have been mitigated, and there is growing interest in reestablishing Lake Michigan Cisco as a major forage base for piscivores. Preliminary genetic evidence from archival scale samples indicated that the remaining Grand Traverse Bay Cisco represent a fraction of the historic diversity that was once present in the lake. However, the samples used for this analysis were from non-spawning, mixed stocks and could not be confidently assigned to region. To provide a better understanding of the diversity and location of historic Cisco spawning stocks, we used GT-seq to genotype 950 archival scale samples of spawning period Cisco from across Lake Michigan collected between 1930-1974. We compared historic and contemporary genetic diversity and differentiation to evaluate the changes that have occurred in Lake Michigan Cisco over the past century. The archival data presented will inform the delineation of historic population structure and reproductive spawning habitat in upcoming spatial unit assessments for Lake Michigan.

Chris Adams[1], Mike Sutherland[2], Dylan Kensick[3], Gordon Goldsborough[4], Mark Myrowich[5], Armand Belanger[6], Chris Randall[7] and Danica Racicot[8], [1]Red River Basin Commission, [2]Peguis First Nation, [3]Brokenhead Ojibway Nation, [4]University of Manitoba, [5]ECB Verdyol, [6]East Interlake Watershed District, [7]Seine Rat Roseau Watershed District, [8]Northeast Red Watershed District. **Restoring Netley-Libau Marsh: A Collaborative Model for Recovery in North America's Largest Freshwater Coastal Wetland.**

This presentation outlines a broad partnership that brings together Indigenous communities, university researchers, watershed districts, and conservation groups to study and restore Netley-Libau Marsh. After a century of vegetation loss and shoreline simplification, partners are running a suite of small-scale restoration trials including biodegradable baffles, Indigenous-led wild rice

reintroduction, seeding of traditional plants, and willow and bulrush transplanting. Parallel research programs led by University of Manitoba collaborators are reconstructing sediment history with cores and using eDNA to map zebra mussel distribution. We hope to expand research collaborations to include fish and bird research in 2026 to better understand the marsh and inform a future larger-scale restoration plan.

Kevin Adeli[1], Vivian Nguyen[1], Steven Cooke[1], Scott Gibson[2] and Len Hunt[2], [1]Carleton University, [2]Ontario Ministry of Natural Resources. **Using angler characteristics to predict live baitfish use and release.**

Live baitfish are widely used by anglers across North America. The release of live baitfish into waterbodies where they were not harvested can facilitate the establishment of non-native fishes and pathogens. Accordingly, preventing live baitfish release is a common management objective. Education programs to increase awareness of the ecological consequences of releasing live baitfish are often at the forefront of these efforts. One way to increase the efficacy of such education programs is to target anglers who are most likely to use and release live baitfish. Here, predictive modeling on data from large-scale angler surveys in Ontario, Canada, revealed that certain characteristics, such as region and target species, were important predictors of anglers' frequency of using and releasing live baitfish. The results will be discussed as a case study to exemplify how social dimensions research can inform fisheries management.

Tori Agnew-Camiener[1], Matt Dellinger[2], Marc Habash[3] and Raj Bejankiwar[4], [1]IJC/GLC/Sea Grant, [2]Medical College of Wisconsin, [3]University of Guelph, [4]IJC. **Exploring the state of science and knowledge of Manoomin in the Great Lakes and beyond.**

The International Joint Commission's (IJC) Health Professional Advisory Board advises the Commission about current and emergent clinical and public health issues affecting transboundary environmental health. The board received feedback over the years to engage in Manoomin work throughout the Great Lakes basin. To inform future initiatives of the board, a scoping project was conducted to learn about research and community efforts for Manoomin throughout the Great Lakes and transboundary waters. The main goal of this project was to describe the scope of activities related to Manoomin research, restoration, and advocacy through a literature review and informal interviews of key informants with First Nations and Tribal affiliations, academics, NGOs, and state/provincial or federal agencies. The findings advance the board's understanding of important goals and/or gaps for Manoomin related to chemical pollution, climate change, non-local species, mapping, sampling, and restoration. Identified themes include data sovereignty concerns as well as tradeoffs between knowledge protection and open inquiry associated with barriers to scholarship on the topic of Manoomin. These challenges present novel opportunities to progress in Manoomin management and ecological research. This presentation will provide an overview of the main goals and gaps identified during this project, and potential next steps for the Health Professional Advisory Board, with an emphasis on community engagement and collaboration with First Nations and Tribal communities.

Tijana Aluloska[1, 2], [1]Center for Earth Observation Science, University of Manitoba, [2]Canadian Watershed Information Network. **Building Capacity for Indigenous Community-Based Monitoring: A Scalable Approach to Prairie Water Quality Assessment.**

Community based monitoring (CBM) is an important tool for water stewardship, but the diverse range of sampling and analysis options that are currently available can make it difficult for communities to compare data that is collected to other reputable datasets. This project addresses

that challenge by documenting existing CBM approaches used across the Prairies and providing communities with greater clarity around current monitoring options, as well as support for data analysis where needed. Working in collaboration with University of Manitoba researchers and non-governmental organizations, including the Lake Winnipeg Foundation and FortWhyte Alive, commonly used CBM methods were identified and assessed. Drawing from this work, a scalable and portable CBM monitoring kit was developed to support Indigenous led, community-driven water monitoring. The kit is designed to be flexible, allowing communities to select equipment and analysis methods that align with their capacity, goals, and local priorities. The approach is currently being applied in multiple communities, including Ebb and Flow First Nation, where a local high school student is leading a monitoring project, and Poplar River First Nation, where the kit is strengthening an existing Land Guardians program. Central to this work is a commitment to ensuring that all data remain fully owned by participating communities, supporting Indigenous data sovereignty and long term, community-driven water stewardship

Joshua Anderson[1], Joseph Zhang[2], David Cannon[3], Dan Titze[4], Yi Hong[3] and Chin Wu[1], [1]University of Wisconsin-Madison, [2]Virginia Institute of Marine Science, [3]Cooperative Institute for Great Lakes Research, [4]Great Lakes Environmental Reserach Laboratory. **Building a High-Resolution Flood Forecast Model for the Michigan-Huron-Erie System.**

This presentation describes the development of a high-resolution hydrodynamic flood forecasting model for Lakes of Huron- Michigan, Erie, and St. Clair Corridor (HuMiEdor). Central to the development includes the implementation of a seamless, region-wide 3-m digital elevation model that integrates bathymetry, coastal topography, floodplains, and connecting channels. This dataset enables automated generation of an unstructured computational mesh using tools such as RiverMapper and PySCHISM, supporting consistent and repeatable refinement across lakes, rivers, and tributary inflow regions. The resulting three-dimensional SCHISM model is coupled with the National Water Model that provides spatially distributed streamflow inputs. The HuMiEdor model system is calibrated and validated against observed water levels, major channel flows, and water temperatures during recent high-water periods. Results indicate the need of careful construction of the model mesh and bottom roughness to accurately simulate flow exchange through the Huron-Erie corridor and other hydraulically complex connecting channels. Model comparisons show promising performance relative to existing operational systems. The HuMiEdor model system is employed to examine key physical processes, including wind-driven upwelling and basin-scale seiche dynamics, that strongly influence coastal water levels and flows. Overall, the HuMiEdor model system provides a robust foundation for next generation of flood forecasting applications in the Great Lakes region.

Kenneth Anderson[1], Eileen Acosta[1], Christie Bahlai[1], Richard Becker[2], Ganming Liu[3], Helen Michaels[3], W. Robert Midden[3], Olivia Schloegel[1], Kevin McCluney[3], David Costello[1], Thomas Bridgeman[2], Kennedy Doro[2], Lauren Kinsman-Costello[1], Laura Johnson[4], Lauren Brown[3], Silvia Newell[5], Janice Kerns[6], Raissa Mendonca[1], Stephen Jacquemin[7] and Christopher Winslow[8], [1]Kent State University, [2]University of Toledo, [3]Bowling Green State University, [4]Michigan Department of Agriculture and Rural Development, [5]University of Michigan, [6]Old Woman Creek National Estuarine Research Reserve, [7]Wright State University, [8]Ohio Seagrant. **Connectivity drives nutrient retention by constructed wetlands in the H2Ohio Wetland Monitoring Program.**

The Ohio Department of Natural Resources has constructed, restored, or enhanced wetlands throughout the state with the goal of capturing nutrients to improve water quality , and mitigate harmful algal blooms in Lake Erie. The H2Ohio Wetland Monitoring Program was

developed to evaluate a subset of those wetlands, measuring inflowing and outflowing nutrient concentrations to understand both the amount of nutrients wetlands retain, and what drives that retention. The wetland monitoring program has produced three years of data on nutrient retention, with annual nutrient budgets for total phosphorus, total nitrogen, dissolved reactive phosphorus, nitrate + nitrite, and ammonia across 21 different wetlands. We will present preliminary analyses of the drivers of nutrient retention across those wetlands. Our analysis improves understanding of how differences in wetland design, seasonal flow patterns, vegetation, and storm events are related to nutrient retention across the variety of recently constructed, restored, or enhanced wetlands in watersheds of Lake Erie. Results can inform optimization of both management of current wetlands, and the implementation of new wetlands.

Morgan Anderson, Pauline Gerrard and Lisa Peters, IISD-Experimental Lakes Area. **Invisible DNA, Visible Impacts: Learning Environmental DNA Through MeDLEY.**

Environmental DNA (eDNA) has become an increasingly important tool for monitoring biodiversity, detecting invasive species, and tracking species distributions; however, its effective implementation also depends on public understanding of molecular approaches and the development of a skilled future workforce. The MeDLEY (Monitoring eDNA and Learning Ecology with Youth) program integrates citizen science within senior high school education by engaging Grade 11 and 12 students in molecular biology workflows that directly parallel classroom-appropriate laboratory exercises. Through guided participation in standardized field collection and laboratory analysis, students gain hands-on experience with aquatic and emerging aerial eDNA methodologies while contributing to real-world research objectives. Rather than emphasizing large-scale sample collection, MeDLEY prioritizes conceptual understanding, technical skill development, and exposure to authentic research practices. Students assist in the collection and analysis of eDNA samples used to detect invasive species, examine behavioural patterns, and identify species present at low abundances, thereby providing valuable context for assay development and validation. By aligning curriculum-based learning outcomes with applied molecular ecology, the program reinforces foundational biological concepts while introducing students to diverse career pathways in environmental science, conservation, and biotechnology. This education-focused citizen science framework demonstrates how structured high school programming can support eDNA research goals while cultivating scientific literacy and strengthening the pipeline of future practitioners in molecular monitoring and biodiversity conservation.

Morgan Anderson, Margaret Docker, Jim Roth and Gary Anderson, University of Manitoba. **Beyond Mitochondria: A Nuclear ITS-1 eDNA Assay for Detecting Lake Sturgeon Spawning Activity.**

Environmental DNA (eDNA) offers a sensitive, non-invasive approach for monitoring fish populations during critical life-history stages. Lake Sturgeon (Acipenser fulvescens), a species of conservation concern in the Winnipeg River system, undertake discrete spawning events that are difficult to document in remote areas using conventional survey methods. We developed a nuclear eDNA assay targeting the internal transcribed spacer-1 (ITS-1) region to detect Lake Sturgeon spawning activity in the Winnipeg River. Similar to mitochondrial markers, the ITS region provides high copy number and increased species-level resolution, but it offers the additional advantage of being especially well suited for detecting reproduction since gametes—particularly sperm—contain a high ratio of nuclear-to-mitochondrial DNA. Primer and probe sets were designed for optimum specificity and sensitivity through in silico, in vitro, and in situ validation. Assay performance was evaluated using tissue-derived DNA, laboratory studies in which milt was added to sterilized tanks,

and field samples collected upstream and downstream of known spawning sites during the spawning period. Temporal patterns in eDNA concentration were assessed to determine correspondence with spawning phenology and environmental conditions. The resulting assay reliably distinguished Lake Sturgeon eDNA from sympatric fishes and demonstrated elevated eDNA detections coincident with spawning. This nuclear eDNA assay provides a novel tool for monitoring Lake Sturgeon spawning dynamics in large river systems and contributes to improved management and conservation strategies by enabling non-invasive assessment of reproductive habitat use.

Sara Ang[1], Vivian Nguyen[2], Mahatub Khan Badhon[3], Emma Rice[3] and Elizabeth Nyboer[2], [1]self, [2]PI, [3]co-author. **Evaluating access perceptions and fish use practices of urban provisioning fishers on Lake Michigan.**

Recreational fishing is commonly defined in global fisheries management as an activity undertaken primarily for leisure and sport. This narrow framing, however, overlooks the multidimensional values, perceptions, and behaviors of a highly heterogeneous group of fishers, leading to underrepresentation of certain fishing communities or subgroups. Many fishers engage in recreational fishing for reasons beyond sport, including cultural traditions, community connection, and subsistence needs, yet these motivations are excluded from dominant management considerations. The provisioning fisheries framework calls attention to these "fuzzy boundaries" within recreational fishing and offers a lens for understanding factors that contribute to this underrepresentation, as well as pathways for more inclusive management. In this study, we plan to examine perceptions of access, fishing practices, and fish consumption among provisioning fishers in urban areas along Lake Michigan and compare them to sport-oriented anglers. Using a mixed-methods approach, we will collect quantitative and qualitative data through intercept-site surveys and focus groups with urban anglers to evaluate differences among urban fishing communities. We expect the results to reveal clear distinctions between sport-oriented and provisioning fishers, with each group having distinct motivations, fishing behaviors, and access perceptions. This research responds to the need for fisheries science and management frameworks to more accurately reflect the social complexity of recreational fishing and to better account for anglers whose access, practices, and motivations are not adequately represented in current policy and management approaches.

Grace Armstrong[1], Sarah Janssen[1], Ryan Lepak[2], Mike Tate[1] and Benjamin Peterson[3], [1]U. S. Geological Survey, [2]U. S. Environmental Protection Agency, [3]University of Wisconsin-Milwaukee. **The Role of Hypoxia in the Production of Methylmercury in Lake Erie.**

In the Great Lakes, mercury (Hg) continues to bioaccumulate in aquatic food webs as methylmercury (MeHg) which then serves as a vector for human and wildlife exposure. We have previously shown that aqueous Hg in offshore regions of the Great Lakes is largely delivered from rainfall; however, we have yet to identify how and where Hg methylation occurs in the water column of the Great Lakes. We hypothesized that Hg methylation may be occurring in hypoxic environments, like those observed in Lake Erie. Hypoxic and anoxic conditions can promote both redox conditions and the growth of microorganisms capable of Hg methylation. To assess potential regions susceptible to enhanced Hg methylation, we collected water column samples in August 2024 aboard the R/V Lake Explorer II from regions of Lake Erie exhibiting various redox conditions including oxic, hypoxic, and anoxic. Total Hg and MeHg measurements on suspended particles and dissolved phases were paired with sulfate, nutrient, and organic carbon analyses to develop a mechanistic understanding of Hg partitioning to particles, particle mineralization, and potential water column production of MeHg. Ultimately, this study provides information for understanding

drivers of Hg methylation and subsequent exposure in Lake Erie. The views expressed in this abstract are those of the author(s) and do not necessarily represent the views or policies of the U.S. Environmental Protection Agency.

Jeffrey Ashby and **Diane Henshel**, Indiana University. **A Bayesian Framework for Modeling Flood-Related Emergency Service Disruption Using CRASID.**

This study presents a methodological framework for assessing the impacts of floods on community resilience through the lens of emergency service accessibility in the Great Lakes region. The approach centers on the development and application of Bayesian Networks (BNs) to overcome limitations inherent in static, index-based risk models. Using the Community Resilience and Adaptation Spatial Infrastructure Database (CRASID), the study restructures normalized vulnerability metrics into probabilistic nodes linked by conditional dependencies. The BN is organized into interconnected domains representing flood hazard exposure, infrastructure sensitivity, socioeconomic vulnerability, emergency services access, and downstream health outcomes. The framework supports scenario-based inference, allowing users to simulate climate change projections, infrastructure interventions, and social policy adjustments. Sensitivity analysis is employed to identify variables that exert the most significant influence on emergency response delays, thereby informing the prioritization of resilience investments. By explicitly modeling interdependencies and uncertainty, the proposed Bayesian approach provides a reproducible and adaptable method for advancing flood risk assessment and emergency planning beyond traditional composite indices.

Natalya Assance[1], Friedrich Fischer[2], Michael Rennie[1] and Kyle Stratton[2], [1]Lakehead University, [2]Ministry of Natural Resources. **Walleye movement across the north shore of Lake Superior.**

Walleye are valued due to their recreational and indigenous importance. Black Bay operated a commercial fishery until the 1960s and has undergone various closures due to over-harvesting and habitat loss. To the east, Nipigon Bay has also experienced closures for Walleye, whereas Thunder Bay to the west has not. Previous evidence of both resident and summer-migratory Walleye behaviour outside Black Bay suggests that the current rehabilitation practice of closures in parts of these bays may only provide a partial refuge for this species, protecting resident Walleye while leaving migrants exposed to harvest. The objective of this study was to use acoustic telemetry to determine whether resident vs. migrant behavioural patterns observed in Black Bay are also observed in Thunder Bay and Nipigon Bay, as well as the extent of summer movements of fish tagged in each bay to inform management and conservation efforts for Walleye across the north shore.

Tia Attfield[1], Andrew Honsey[2], Trevor Krabbenhoft[3], Sarah Chang[3] and Clare Venney[1], [1]University of Alberta, [2]U.S. Geological Survey, [3]University at Buffalo. **The impact of captive rearing protocols on cisco (Coregonus artedi) epigenetics.**

Captive rearing is used in fish conservation and supplementation worldwide, though captive-reared fish display phenotypic abnormalities compared to wild conspecifics. These abnormalities can reduce survival and reproductive success after release into natural waterbodies, yet the persistence, heritability, and mechanistic cause of these differences are poorly understood. DNA methylation is one proposed epigenetic driver of this phenomenon, as its sensitivity to environmental conditions can alter gene expression, contributing to phenotypic variation in captive environments. Thus, employing rearing strategies that minimize epigenetic changes in captive fish could mitigate the consequences of captive rearing. Here, we compare wild cisco from Lake Huron to captive cisco

reared under three contemporary Great Lakes rearing protocols to understand the impact of rearing strategies on the cisco (Coregonus artedi) epigenome. Specifically, we will employ whole methylome comparisons for cisco (1) from wild populations, (2) naturally spawned in an artificial stream, (3) reared under simulated seasonal temperatures, and (4) reared under elevated hatchery temperatures, to evaluate which rearing strategies minimize the epigenetic effects of captive rearing. Differential methylation analysis will be used to identify genomic regions with targeted differences in DNA methylation between captive-reared and wild fish, and to assess the feasibility of epigenomic biomarkers of captive rearing. As DNA methylation can stably alter gene expression and phenotype within and across generations, minimizing the epigenetic effects of captive rearing could prevent long-lasting, detrimental impacts to wild populations.

Katrina Audet, Olga Francisco and Matt McDougall, Prairie Scientific Inc. **Advancing under-ice eDNA methods for monitoring fish biodiversity in the Canadian Arctic.**

Increasing water temperatures are expanding the northward range of southern fish species, altering Arctic fish communities and ecosystem dynamics. Despite this rapid change, few environmental DNA (eDNA) studies have been conducted under the ice, limiting our understanding of climate-driven shifts in winter fish communities and the impacts of habitat loss and resource competition on native species. The main objectives of Prairie Scientific Inc. (PSI)'s eDNA program are: (1) develop and test under-ice eDNA sampling methods; (2) determine fish inventories for Nunavut freshwater lakes using eDNA metabarcoding; (3) estimate sampling effort required to detect fish communities; (4) report findings to Nunavummiut communities.

Katrina Audet[1, 2], Arfa Khan[1, 3], Caleb Hasler[4] and Margaret Docker[1], [1]University of Manitoba, [2]Prairie Scientific Inc., [3]Fisheries and Oceans Canada, [4]Univeristy of Winnipeg. **Gillnetting vs eDNA: Lake Winnipeg fish stock monitoring using traditional vs non-invasive techniques.**

Lake Winnipeg fish stocks are annually monitored by the Province of Manitoba using gillnet index surveys to assess population size and health. However, gillnetting can be an invasive and biased (e.g., dependent on fish body size, habitat preferences, and activity patterns). Environmental DNA (eDNA) provides a less invasive alternative for detecting fish species. Seven species-specific TaqMan probe-based quantitative polymerase chain reaction (qPCR) assays (for walleye, sauger, yellow perch, trout-perch, spottail shiner, rainbow smelt, and Coregonus spp.) were developed and validated both in-silico and in-vitro. Species were selected based on their: economic value; importance to anglers; value as a prey species; or characteristics may make them harder to detect using gillnetting. This study aimed to compare gillnetting and eDNA techniques by: (1) assessing method-specific detection biases; (2) evaluating the influence of environmental factors on species detection; and (3) examining the relationship between gillnet-based abundance estimates and eDNA concentrations.

Jay Austin[1] and Daniel Titze[2], [1]University of Minnesota Duluth, [2]NOAA Great Lakes Environmental Research Laboratory. **What drives interannual variability in the onset of summer stratification in the Laurentian Great Lakes?**

Icy winters in the Great Lakes tend to be followed by late onset of summer stratification and cool surface waters the subsequent summer. This has, in the past, been attributed to an ice albedo effect, in which the large albedo of ice relative to that of open water reflects sunlight that would otherwise be absorbed by lake water. However, this hypothesis has been challenged and was never quantitatively verified. Ice plays an additional role in winter surface heat fluxes by reducing heat loss through sensible and latent fluxes. Using a variety of data sources, we show that these two effects

effectively cancel out, and that the true driver of variability in the onset of summer stratification is actually the heat content of the water column during the winter. Minimum winter heat content is correlated with ice cover, which led to the misleading link between ice cover and stratification onset.

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Marianne Bachand[1], Audrey Moffett[1], Émile Chouinard[1] and Vince Palace[2], [1]Environnement et Changement Climatique Canada, [2]ELA-IISD. **Advancing Wild Rice Habitat and Productivity Modelling for the Rainy-Namakan System.**

Wild rice (Zizania palustris) holds ecological and cultural importance in the Rainy Lake-Namakan Reservoir system, a system regulated by dams, yet its long-term resilience remains sensitive to shifting water-level regimes. Building on this context, and on the habitat suitability model developed by the NHS (Morin et al. 2016) to evaluate the impact of water level management on Wild Rice, we are refining and extending a modelling framework to capture both the conditions required for wild rice survival and the hydrological drivers that influence its yearly productivity. The original model integrated factors such as lake topography, wave action and water-level variation to identify areas meeting key thresholds for wild rice emergence, floating-leaf development, and survival. While this approach successfully delineated suitable habitat under past and current water-management conditions, it did not explicitly capture how intra-annual water fluctuations affect plant vigor or seed productivity. To address this gap, we are initiating a mesocosm experiment in collaboration with the IISD-Experimental Lakes Area to quantify wild rice responses to a range of water-level fluctuations. These results will be used to refine the habitat suitability model and support the development of a productivity module that can be applied across the Rainy-Namakan system. Ultimately, this work will provide water managers, Indigenous partners, and other stakeholders with a strengthened tool to evaluate proposed water-level management strategies and to safeguard wild rice ecosystems across the region.

Mahatub Khan Badhon[1, 2], Leandro Castello[1], M Aaron MacNeil[3], Vivian Nguyen[4], Marc Stern[1], Richard Clark Stedman[5], Katie Fiorella[5], Jeanne Coffin-Schmitt[5, 6], Christine Beaudoin[7], Matthew Louvet Jr[1] and Aaron Fisk[8], [1]Virginia Tech, [2]University of Dhaka, [3]Dalhousie University, [4]Carleton University, [5]Cornell University, [6]Great Lakes Fisheries Commission, [7]Université de l'Ontario français, [8]University of Windsor. **The Overlooked Role of Food and Cultural Dimensions in Recreational Fisheries.**

Recreational fisheries are widely conceptualized as leisure or sport, often obscuring non-recreational dimensions such as food provisioning and cultural practices that may characterize the wider angling community. This study examines whether these domains co-exist and how they structure angler diversity in urban, shore-based fisheries of the lower Great Lakes. We surveyed 443 shore anglers across 10 cities on Lakes Erie and Ontario to assess fishing characteristics (i.e. motivations, catch orientation, centrality to lifestyle, fish-use patterns), behaviors (i.e. effort, catch, consumption, etc.), and socio-demographics. We applied a range of clustering methods to reveal latent domains, classify anglers, interpret angler groups, and profile angler preferences; then applied multinomial models to relate group membership to individual fishing behaviors and socio-demographics. Variable clustering resulted into 5 coherent domains—food/consumption, cultural/traditional, leisure, challenge/performance, and social-financial centrality—indicating a multidimensional structure. A three-cluster solution provided the most interpretable and robust classification of urban shore-based anglers: Provisioning/food-reliant, Cultural/community-

oriented, and Leisure/sport-oriented, which was defined by CDA (Canonical Discriminant Analysis). CDA revealed a dominant provisioning-leisure axis (Can1 = 84.3% of among-group variation). We also found that higher catch rates were strongly associated with membership in the provisioning/food-reliant group relative to other angler groups. These findings provide empirical evidence that incorporating food provision and cultural practices as a core item of fishing motivations to study fishing preferences can improve our overall understanding of angler diversity.

Isabella Badon[1], Elizabeth Nyboer[1], Reid Pestana[1], Janessa Esquible[2], Susan Chiblow[3], Alex Duncan[4], Deborah McGregor[5] and Andrea Reid[4], [1]Virginia Polytechnic Institute, [2]Great Lakes Fisheries Commission, [3]University of Guelph, [4]University of British Columbia, [5]University of Calgary. **Strengthening Indigenous-Agency partnerships for the sea lamprey control program in the Great Lakes.**

The control of invasive sea lamprey in the Great Lakes, coordinated by the Great Lakes Fishery Commission, has reduced sea lamprey abundance by 90% since the 1950s. Recently, efforts to strengthen communication between sea lamprey control agencies and the Indigenous communities affected by the control program have increased, yet significant gaps persist. The Ginebigomeg Project seeks to address these gaps by understanding First Nation and Tribal involvement, perspectives, and experiences with sea lamprey control across the Great Lakes. To meet these objectives, two parallel surveys were conducted to establish baseline information on communication barriers, successes, and approaches to collaboration. The first survey, administered at the Sea Lamprey Annual Work Session (SLAWS) in January 2025, gathered input from government and agency personnel involved in control operations about their experience working with Indigenous communities. The second survey, administered at the Indigenous Great Lakes Network (IGLN) meeting in November 2025, captured the perspectives of First Nations and Tribal representatives. We compare responses and take both viewpoints into consideration to identify gaps in communication methods and priorities. These findings can help to guide more effective communication approaches by highlighting differing barriers, success, and approaches to collaboration. Understanding preferred communication methods and community interests will help guide future collaboration initiatives between control agencies and First Nations and Tribes for the sea lamprey control program in the Great Lakes.

Onur Bagoren and Katie Skinner, University of Michigan. **Autonomous Marine Robotics for Shipwreck Detection and Inspection in the Great Lakes.**

The Great Lakes host a rich collection of archaeological sites, including shipwrecks. In addition to their historical value, these sites offer a window into marine ecosystems and serve as a platform for environmental studies. However, underwater surveys of shipwrecks have significant operational costs and challenges. Autonomous marine robots offer a practical alternative to expand the scale, safety, and frequency of shipwreck inspection in the Great Lakes. In this talk, I will present two works that advance autonomous robotic shipwreck exploration. First, I will introduce AI4Shipwrecks, a dataset collected in the Great Lakes consisting of sidescan sonar imagery of 28 distinct shipwrecks, aimed at accelerating progress toward autonomous shipwreck detection and segmentation in large-area surveys. Second, I will present TURTLMap, a method for robot navigation in low-texture environments, enabling the navigation to, and close-up inspection of shipwrecks for building 3D reconstructions. Each approach is validated on real Great Lakes data, helping to broaden the access and understanding of the cultural and ecological resources.

Dariya Yu. Bakulina and Aleksandr V. Kucheryavyy, Institute of Ecology and Evolution, Russian Academy of Sciences. **Infection of European river lamprey Lampetra fluviatilis (Linnaeus, 1758) larvae with the digenea Diplostomum petromyzifluviatilis Müller (Diesing, 1850) in some rivers of the Leningrad Oblast, Russia (Baltic Sea basin).**

This study examined infection parameters in ammocoetes across 13 rivers. Infection metrics were null in 6 populations. Analysis revealed pronounced heterogeneity, with infection extensity ranging from 0 to 100% and an abundance index from 0 to 96.86. Maximum infection intensity reached 268 individuals per host, supported by a high aggregation parameter (0-62.07), confirming a strongly overdispersed parasite distribution. The coefficient of variation for intensity was also highly variable (0.49-3.87), indicating sites with stable burdens and others with erratic infection dynamics. Larval age structure, inferred from length groups, varied considerably across sites. The relationship between host size and infection showed both positive and weak negative correlations, suggesting that local ecological context, rather than host size alone, modulates establishment success. The substantial interannual fluctuations and extreme aggregation values underscore the system's ecological complexity. These patterns are likely driven by a confluence of local factors, including the availability of required gastropod hosts, sediment composition for filter-feeding ammocoetes, and broader hydrological connectivity influencing transmission pathways. The documented extremes in infection pressure could act as a significant selective force, potentially influencing host population dynamics and life history strategies. The stark contrast between heavily infected and uninfected sites highlights the need for future research targeting the precise local abiotic and biotic determinants that either facilitate or interrupt this parasite's life cycle. This work was supported by the Russian Science Foundation (project No. 24-14-00111).

Suzane O. Barboza[1], Nina G. Cordeiro[1], Nalbert F. Araújo[1], Thiago F. Barros[1], Bruno E. Soares[2] and Miriam P. Albrecht[1], [1]Universidade Federal do Rio de Janeiro, [2]University of Regina. **Ichthyofauna associated with aquatic macrophytes in an impacted Amazonian lake with different regeneration stages.**

Aquatic macrophytes form important habitats which serve as shelter and nursery areas for several fish species. We described the ichthyofauna diversity associated with wild rice (Oryza glumaepatula) macrophyte beds in an Amazonian lake impacted by bauxite tailings. Sampling was conducted in both March 2024 and 2025, in three areas: two with well-structured flooded forest (igapó), one of them unaffected by mining tailings and another that has undergone natural regeneration, as well as a third, silted area, where regeneration is still incipient and occurs under human intervention. Acrylic traps were deployed along the edges of macrophyte beds, with one trap placed at the water surface and another at the bottom. We recorded 31 species from the orders Characiformes and Cichliformes. Species richness ranged from 11 to 19 species per area, with no clear pattern among areas, however, the silted area exhibited the lowest evenness. The tetra Hemigrammus levis was the most abundant species, accounting for 87% of the individuals sampled across all areas. Areas with well-structured flooded forests showed greater similarity in species composition, whereas the silted area under human intervention displayed a distinct species composition, primarily driven by species turnover. Our findings suggest that the impacts of bauxite-induced siltation are not restricted to structurally degraded flooded forests but may also extend to other microhabitats associated with the lake limnetic zone, where macrophyte beds are found.

Danielle Baribeau[1], David Keith[2], Heather Bowlby[2] and Robert Lennox[1], [1]Dalhousie University, [2]Fisheries and Oceans. **A multispecies model of future demersal fish communities on the Eastern Scotian Shelf.**

Marine fish populations are typically assessed via single-species methods, which generally do not explicitly account for the effects of ecological interactions on a stock's ability to grow. This contrasts with new legislative requirements to integrate ecosystem-level perspectives into fisheries management, such as the Canadian Bill C-68 (revisions to the Fisheries Act in 2019) and Sustainable Fisheries Framework. To work towards integrating ecosystem-level perspectives into fisheries management, we have applied a new multispecies projection model (MPM) to a subset of demersal fish stocks on the Eastern Scotian Shelf (ESS). Data from Fisheries and Oceans Canada's Atlantic summer research vessel survey were used as inputs to the MPM. Within this projection model, stocks are categorized by functional group and linked together via predator-prey or competitive dynamics. Historical relationships within/between functional groups inform the strength of these interactions in the future projections of abundance. Different levels of fishing pressure can be applied to stocks throughout MPM projections to explore how fishing could shape future ESS demersal fish communities. The effects of these alternative fishing pressure scenarios can then be evaluated according to changes in biomass and productivity at the individual stock, functional group and community-wide levels. In this way, this application of the MPM generates valuable information that can support ecosystem-based fisheries management of demersal fish stocks on the ESS.

Andre-Marcel Baril, GeoProcess Research Associates. **Clarifying Roles and Responsibilities in Habitat Offsetting under the Fisheries Act.**

In Canada, offsetting residual effects from a project is last in the hierarchy of measures designed to achieve the goal of no net loss to fish and their habitat. Successful offsetting projects require effective collaboration across at least four pillars: Fisheries and Oceans Canada, Indigenous Peoples, proponents (and their consultants) and academia. Existing research, policies and guidance materials provide clear principles and processes for predicting losses, identifying offsetting opportunities, equivalency measures and monitoring the effectiveness of projects. However, there is less clarity regarding the governance structure and responsibilities of the groups that contribute to the regulatory process. This ambiguity can reduce the likelihood of project success, cause delays and result in ineffective offsetting. This presentation provides a consultant's perspective on roles and responsibilities in the offsetting process, discusses common pitfalls that impede progress and proposes a governance framework for consideration to help determine offsetting measures.

Cory Barstow[1], Chris T Parsons[2] and Adam G Yates[1], [1]University of Waterloo, [2]Environment and Climate Change Canada. **Phosphorus uptake and transformation by periphyton during a high concentration event: A microcosm study.**

Stream periphyton can take up large amounts of soluble reactive phosphorus (SRP) during high concentration events, facilitated by intracellular conversion of orthophosphate to polyphosphate. This mechanism alters the magnitude and timing of SRP loads, decreasing peak SRP loads and delaying delivery downstream. However, SRP uptake and transformation dynamics during pulse events are poorly described. A laboratory microcosm experiment was conducted to assess periphyton SRP uptake and polyphosphate storage during a 24-hour high concentration SRP event. Cobbles and attached periphyton were collected from Nissouri Creek, Ontario, Canada; a stream with an ambient baseflow SRP concentration of ~26 μg/L. Cobbles were placed in a recirculating microcosm filled with stream water enriched to 480 μg/L of SRP through the addition of KH_2PO_4. Water and periphyton samples were collected before the event and 3, 6, 12, and 24 hrs after the start of the event. SRP uptake was 3.16 mg P/hr during the first 3 hours, before declining by 87% to 0.40 mg P/hr at 24 hours. Further analyses will determine periphyton total phosphorus and polyphosphate content. It is predicted overplus uptake of SRP by periphyton will result in an

increase in the intracellular transformation of SRP to polyphosphate, a rate that will decline over the course of the event. Insight into periphyton phosphorus uptake and storage dynamics will enhance understanding and facilitate modelling of the mechanisms through which stream periphyton process event SRP.

Shelley Denny[1], Skyler Jeddore[1], **Caitlin Bate**[2], Robert Lennox[2] and Sara Iverson[2], [1]Unama'ki Institute of Natural Resources, [2]Dalhousie University/Ocean Tracking Network. **Pairing Etuaptmumk (Two-Eyed Seeing) and acoustic telemetry to track Ji'kaw (Striped Bass) in Pitu'pa'q.**

This presentation introduces Apoqnmatulti'k (Mi'kmaw for "we help each other"): a collaborative partnership that brings together Mi'kmaw, local and western scientific ways of knowing to better understand valued aquatic species in Pitu'pa'q, Unama'ki (Bras d'Or Lake, Cape Breton). Guided by Etuaptmumk (Two-Eyed Seeing), this research focuses on the movements of Ji'kaw (Striped Bass; Morone saxatilis). Ji'kaw are a culturally important species to the Mi'kmaq, a target of recreational fisheries, and are listed as Special Concern in the Southern Gulf of St. Lawrence. However, the winter ecology of Ji'kaw remains poorly understood, due in part to the complexity and diversity of their migratory behaviours. Through a co-developed acoustic telemetry program, we discovered that Ji'kaw are active during the summer in Pitu'pa'q, but overwinter from November to April. During this period, their distribution contracts dramatically as they become lethargic within coastal barachois ponds. This knowledge, when paired with patterns in annual Ji'kaw movement pathways, is important to inform shared stewardship of this aquatic species. Through collaborative research, Apoqnmatulti'k generates knowledge that can support Mi'kmaw-led governance of Pitu'pa'q's fisheries and conservation, while enhancing respect for the land, the Ji'kaw and Mi'kmaw sovereignty within traditional food systems. Learning to honour and bring together different ways of knowing is central to Apoqnmatulti'k's work. This research highlights how Mi'kmaw, local and western understandings of Ji'kaw's seasonal movements can co-produce enhanced and nuanced fisheries knowledge in Pitu'pa'q.

Sumeep Bath, IISD Experimental Lakes Area. **Doing Science Communication. Differently.**

It's all worth it at the end of the day. The rained out field days. The soggy sandwiches. The holes in the socks. All our field work ultimately matters once the results reach the right audiences who can bring about change. And this only comes about thanks to **robust science communication.** But, the world is moving on. In a landscape of AI bots and ever-changing social media tropes, freshwater scientists need to get creative about how to reach the right audiences effectively. In this sesson, I will explore some of the best—and most creative—uses of science communication out there and explain what you can apply these lessons and principles to your own work.

Heather Bauer Reid[1], Michael G. Fox[2] and Graham D. Raby[1, 2], [1]Environmental and Life Sciences Graduate Program, Trent University, [2]Department of Biology, Trent University. **Temperature effects on metabolism of pumpkinseed (Lepomis gibbosus) populations across a life history continuum.**

Intraspecific variation is an important aspect of biological diversity that has the potential to result in differential effects of climate change on species. The pumpkinseed (Lepomis gibbosus) is a warm-water sunfish species that is widespread in freshwater environments. In lakes and ponds across southeastern Ontario, pumpkinseed exhibit remarkable life history variation. These life histories fall along a continuum, with faster-growing and early maturing populations having a fast-

paced life history and slower-growing populations with later maturation having a slow pace. Changing growth and reproductive capacity can lead to metabolic changes, and thus we sought to explore how pumpkinseed populations with the most extreme life histories vary in their metabolic responses to changing temperatures. Pumpkinseed from eight Ontario lakes were collected and dissected to confirm life history traits, including age-at-maturity, length-at-maturity, and gonadosomatic index. Live fish were also collected from six of those lakes and brought to the laboratory. Fish were split into two groups and acclimated to 21˚C or 27˚C and were then placed into respirometry chambers to measure maximum metabolic rate (MMR) and standard metabolic rate (SMR). Following respirometry at their acclimation temperature, fish were acutely exposed to the other treatment temperature and evaluated for MMR and SMR again. Determining the relationship between life history and metabolism, and how this relationship is affected by temperature, will provide insight into how life history variation relates to climate change resilience.

Helen Baulch, Richard Helmle, Nadia Sedaghat and Danielle Spence, University of Saskatchewan.
Managing agricultural phosphorus loads in the Lake Winnipeg basin.

Agriculture is a major source of phosphorus to Lake Winnipeg and other prairie lakes. Yet attaining reductions in phosphorus loading from agriculture is challenging for myriad reasons. Here, we report on opportunities to reduce phosphorus loading to Lake Winnipeg and other prairie lakes, informed by expert surveys (Delphi method). Respondents characterized impact, context, and co-benefits of varied beneficial management practices (BMPs), helping inform best uses and priorities for BMPs in the prairie context, and define characteristics of successful BMPs for phosphorus management. Next phase work, including interviews to explore individual understandings of controls on phosphorus cycling and the function of BMPs will be discussed, with updates on new biophysical research. Through cooperative definition of defining features of successful BMPs for the prairie region, expert review of options, and defining co-benefits of BMPs, we hope to support capacity for continued strategic interventions to improve water quality, compatible with agricultural goals and other environmental goals.

Daniel G. Beach[1,2], William Alger[3], Shannon Jumbo[4], Mike Low[5], Rebecca Gasman[6], Yannan Huang[2], Sarah MacDonald[2], Emma Wilkie[1,2], Jeffrey Cederwall[7,8], Rob Jamieson[2], Jennifer B. Korosi[6], Arthur Zastepa[9] and Heidi Swanson[10], [1]Metrology Research Centre, National Research Council Canada, Halifax, Nova Scotia, [2]Department of Civil and Resource Engineering, Dalhousie University, Halifax, Nova Scotia, [3]Dehcho Guardian, Fort Simpson, Northwest Territories, [4]Sambaa K'e First Nation, Northwest Territories, [5]Dehcho AAROM, Fort Simpson, Northwest Territories, [6]Faculty of Environmental and Urban Change, York University, Toronto, Ontario, [7]Canada Water Agency, Yellowknife, Norwest Territories, [8]Government of the Northwest Territories - Department of Environment and Climate Change, Yellowknife, Northwest Territories, [9]Environment and Climate Change Canada, Burlington, Ontario, [10]Department of Biology, Wilfrid Laurier University, Waterloo, Ontario. **Cyanobacteria and Cyanotoxins in Great Slave and Dehcho-Region lakes of the Subarctic Northwest Territories.**

The increasing prevalence of algal blooms has been documented in the subarctic Northwest Territories. This is attributed to a rapidly changing climate in the region and is of concern as an indicator of broader ecological change and because of potential risks from toxin-producing cyanobacteria in water used for drinking, fishing and recreation. We aimed to answer questions from communities and regulators, including whether observed blooms are dominated by potentially toxic cyanobacteria, if/where cyanotoxins are present and which tools are suitable for ongoing monitoring in the region. Dense, near-shore surface scums observed in Great Slave Lake (traditionally known as

Tinde'e, Tucho, and Tu Nedhé) have mostly been dominated by Dolichospermumn, with the notable absence of Microcystis or microcystins. A survey of 13 remote lakes in the Dehcho region (2023-2025) has revealed the presence of potentially toxic cyanobacteria (e.g. Planktothrix, Aphanizomenon) in some lakes but the absence of liver toxins (microcystins). Passive toxin samplers deployed in the region have shown near-ubiquitous detection of trace-levels of cyanobacterial neurotoxins (anatoxins), suggesting a benthic source, but at levels well below those associated with animal mortalities elsewhere. Results from the remote Dehcho community of Sambaa K'e, whose drinking water reservoir was impacted by a bloom containing toxin-producing Microcystis in 2024, will also be presented. Finally, we evaluated portable microscopes and microcystin test kits for use in monitoring in the region, with encouraging results.

Renaud Serre and **Beatrix Beisner**, University of Québec at Montréal. **Phytoplankton diversity strongly related to mixotroph prevalence in North American lakes.**

Mixotrophic nanophytoplankton adopt a flexible nutritional strategy that could be advantageous to overall phytoplankton community diversity by relieving competitive pressure via niche partitioning. We examined the influence of mixotroph prevalence (biomass of known mixotrophs) on phytoplankton community diversity across more than 1500 North American lakes using large-scale spatial data (Canadian Lake Pulse Network, U.S. National Lakes Assessment) and long-term temporal data (Experimental Lakes Area). We applied an Extreme Gradient Boosting model and demonstrated that mixotroph prevalence influenced phytoplankton diversity after statistically accounting for effects of other limnological variables. In both spatial and temporal datasets, mixotroph prevalence was the most important predictor of diversity independent of lake geographic position or sampling date. Cyanobacteria biomass was the secondary factor, likely owing to its inverse relationship with mixotrophs. Diversity was greatest at intermediate mixotroph prevalence, where we predicted ecological niche partitioning to be highest. Reduced diversity observed at either end of the mixotroph gradient reflected dominance of strict phototrophs or strict mixotrophs. Thus, our study demonstrated reduced diversity where functional specialization occurred, measurable through a single biotic variable: mixotroph prevalence. Our results suggest that the capacity for a mixotrophic strategy should be better incorporated into limnological models, as this functional trait is essential to understanding lake phytoplankton diversity.

Lakshan Beligala[1], Kevin McCluney[1], Angélica Vázquez-Ortega[1], Jay Martin[2], Carlos Soto López[1], Michael Brooker[2], Saratendra Bajal[1], Salim Shamsu-Deen Mohammed[1] and Katarina Kieffer[1], [1]Bowling Green State University, [2]Ohio State University. **Assessing Biogeochemical Processes Governing Phosphate Sequestration in Legacy Phosphorus Fields.**

Agricultural fields with legacy phosphorus (≥100 ppm P Mehlich-3), accumulated from past over-application of fertilizers and manure, remain persistent sources of phosphorus (P) loading into the Western Lake Erie Basin. This study focused on assessing biogeochemical processes governing PO_4^{3-} sequestration in Ohio legacy-P fields, emphasizing the role of soil texture, organic matter, and mineral phases. Three fields with contrasting textures: Sandy, Sandy Loam, and Clay Loam were sampled at depths of 0-5, 5-15, and 15-30 cm and subjected to extensive bulk soil characterization, followed by a four-step sequential extraction to analyze different geochemical parameters of three specific redox-sensitive pools including water-extractable, Mn-(oxy)hydroxides, amorphous Fe-(oxy)hydroxides, and crystalline Fe-(oxy)hydroxides. Results revealed that Mn- and Fe-(oxy)hydroxide minerals play a key role in PO_4^{3-} adsorption in legacy-P soils. Unexpectedly, Sandy field exhibited the highest bioavailable-P across depths (370-760 mg kg^{-1}), and the highest mass percentages of PO_4^{3-} in both the Mn- and amorphous Fe-(oxy)hydroxide pools (26.79%-57.50%

and 20.64%-37.03%, respectively). High bioavailable-P did not align with expectations based on soil texture or organic matter, nor did Sandy field show higher Mn and Fe release in the sequential extraction, suggesting lower concentrations of redox-sensitive minerals. This suggests that other factors such as waterlogging, anoxia, redox processes, and mineral reactivity may influence legacy-P accumulation, despite not being directly measured. These findings improve understanding of P dynamics in legacy-P fields and highlight soil-specific management strategies.

James Bence[1], Richard Clark[1], Mark Ebener[1], Stephen Lenart[2] and Jason Smith[3], [1]Quantitative Fisheries Center, Department of Fisheries and Wildlife, Michigan State University, [2]Tribal Coordination Unit, Fisheries Division, Michigan Dept. of Natural Resources, [3]Great Lakes Fisheries, Bay Mills Indian Community. **Stock assessment and evaluation of management procedures on the Great Lakes: constantly crossing boundaries.**

We recount lessons in developing and applying stock assessment methods and evaluation of fishery management procedures on Great Lakes. This work involved constantly working across boundaries: political and geographic ones, across the gulf of academia and in the trenches of fisheries management, and across disciplines. The largest common challenge is addressing some very different perspectives, some just due to more people, some because different agencies have different objectives and constraints. Several examples will be provided. One of the largest challenges was the different currencies of success between academics and management agencies. University professors get judged mainly on active grants and publications, not so much on helping people use their past work. Managers are less keen on published work they can't get updated. We ended up bridging that divide through the creation of the Quantitative Fisheries Center at MSU. A second challenge often faced is knowing when to cross lanes and when to stay in your lane. The issue is that sometimes the management decision appears to run contrary to the science you worked long hours over. Examples of going to that line in salmon stocking and harvest management will be discussed. Despite challenges, success in fishery management requires work across boundaries, so they should be identified and confronted.

Raven Bennett[1], Analisa Lazaro-Côté[1], Andrew Chapelsky[2], Brennan Romaniuk[2], Travis Durhack[2], Neil Mochnacz[2] and Ken Jeffries[1], [1]University of Manitoba, [2]Fisheries and Oceans Canada. **Thermal stress impacts on gene expression, plasma, and growth in juvenile bull trout (Salvelinus confluentus).**

Bull trout (Salvelinus confluentus) is a cold-water stenotherm that occupies a cold thermal niche relative to many freshwater fishes in North America. Consequently, populations at the southern range extent have been impacted by warming streams and many are listed as Threatened or Vulnerable; however, it is unclear if populations further north will respond similarly. This study investigates the effects of thermal stress on gene expression, plasma lactate, and osmolality in juvenile bull trout from a source population in Smith-Dorrien Creek, Alberta. One-year-old bull trout were acclimated to three ecologically relevant temperatures (9°C, 15°C, and 21°C) for 60 days. Transcript abundance of genes involved in stress and general fish health were measured as cellular stress indicators in gill and liver tissues using high-throughput qPCR, while plasma lactate and osmolality were assessed as physiological stress indicators. Preliminary results showed a decrease in osmolality with increasing temperature, highest at 9°C and lowest at 21°C, suggesting compromised osmoregulatory function at elevated temperatures. Plasma lactate peaked at 15°C, indicating increased reliance on anaerobic metabolism. Sex-specific differences in plasma parameters appear minimal and inconsistent across treatments. Early findings suggest 15°C elicits sub-lethal stress, while 21°C leads to adverse effects over 60 days. Integrating molecular and physiological responses

improves our understanding of thermal stress on bull trout and is an important metric for conservation strategies under climate warming scenarios.

Thais Bernos[1], Alex Duncan[2], Amanda Handziak[3], Ryan Lauzon[4], Gary Michaud[5], Jason Smith[6] and Eglee Zent[1], [1]University of Vermont, [2]University of British Columbia, [3]Malcolm Jr/Sr High School, [4]Chippewas of Nawash Unceded First Nation Fisheries Assessment Program, [5]Little Traverse Bay Bands of Odawa Indians Fisheries Enhancement Facility, [6]Bay Mills Biological Services. **Developing indicators capturing social, ecological, and cultural information for fishery stewardship.**

Stewards of inland fisheries must address unprecedented challenges to the health of water, fishes, and Peoples. Despite best intentions to measure progress towards halting or reversing ongoing trends, most fishery management plans are not designed to capture the dynamic connections between Peoples and nature and have, traditionally, missed opportunities to consider diverse voices. Because cultural, social, and economic connections with nature are paramount to their cultural identity, many Indigenous Nations are defining new sets of indicators (i.e., biocultural indicators) capturing social, ecological, and cultural information for more holistic stewardship. To identify patterns and inform ongoing and future efforts, we review case studies where sets of biocultural indicators were developed to manage fisheries in rapidly changing environments and inform interventions prioritizing both nature and Peoples' health. Additionally, we explore ways to bridge locally developed biocultural indicators to those in use at regional or national levels. This review is timely as it will highlight some of the key actions steps required to transition from traditional fishery management practices to achieve more just and sustainable futures.

Joshua Berry[1], Marcia Chiasson[1], Yingming Zhao[2] and Josef D. Ackerman[1], [1]University of Guelph, [2]Ontario Ministry of Natural Resources. **Interaction of temperature and turbulence on the swimming ability of larval Coregonus clupeaformis.**

The interaction between temperature and turbulence on the swimming ability of larval fish is a significant knowledge gap, particularly given temperature-driven changes in growth rates (i.e., size-related swimming ability). Turbulence reduces swimming ability when eddies are of similar length scale to larvae, suggesting an interaction between temperature and turbulence. We investigated the effect of rearing temperature and turbulence on the swimming ability of larval lake whitefish (Coregonus clupeaformis) spawned in a hatchery and reared at three different temperatures (8, 11, 14°C). Critical swim speed tests of larvae were conducted in a recirculating flow chamber weekly using a factorial design. The experiment was conducted over 11 weeks to determine how rearing temperature and turbulence influence the ontogeny of swimming ability. Results were obtained for 1781 larvae ranging in total length from 14.17 to 46.50 mm over this time period. A strong positive relationship between rearing temperature and growth rate was observed and the analysis of critical swim speed is underway. Larval swimming ability is increasingly recognized as a determinant of recruitment success, and the results of this study will improve our understanding of how physical factors like temperature and turbulence influence fish during this critical life stage, with implications for predicting climate change impacts on freshwater fish populations.

Miranda Bilous[1], Margaret Docker[1], Jaakko Erkinaro[2], Ken Jeffries[1], Darcy McNicholl[3], Tricia Ramey-Balci[1], Eva Thorstad[4], Ola Ugedal[4] and Karen Dunmall[3], [1]University of Manitoba, [2]Natural Resources Institute Finland, [3]Fisheries and Oceans Canada, [4]Norwegian Institute for Nature Research. **Species shifts in a warming Arctic: Assessing establishment potential of invasive pink salmon.**

Pink salmon, already invasive in northern Europe, continue to expand their Arctic range, raising concerns about their impact on native species and watersheds. Determining the colonization potential of pink salmon and possible interactions with ecologically and culturally important native Arctic species is vital for management. One key gap is a need for improved understanding of pink salmon freshwater environmental tolerances to better identify suitability of novel environments. A systematic literature review was supplemented with recent in situ temperature data from Atlantic drainages containing pink salmon to summarize habitat requirements for each freshwater life stage of pink salmon in both their native Pacific and introduced Atlantic and Great Lakes ranges. Pink salmon demonstrate a large range of observed temperature usage across life stages, including freezing or near-freezing water temperatures throughout winter for pink salmon in northern Europe. Observations from Norway and Finland indicate that extremely cold water temperatures (0-4°C) do not preclude successful incubation of pink salmon through their expanding invasive range. Understanding variations in thermal tolerances and habitat parameters for pink salmon across latitudinal ranges and ocean basins will help predict rivers vulnerable to establishment and will also highlight potential habitat overlap with Atlantic salmon and Arctic char. In the Canadian Arctic, this information will focus monitoring efforts to key areas potentially suitable for invasive pink salmon and inform co-management decisions regarding conservation of key Arctic species.

Thomas Binder[1], Christopher Holbrook[1] and Charles Krueger[2], [1]Great Lakes Fishery Commission, [2]Michigan State University (retired). **Great Lakes Acoustic Telemetry Observation System: A research network founded on multijurisdictional cooperation and collaboration.**

Fish movements do not recognize jurisdictional boundaries. Geographic delineation of fish populations (stocks) is a critical knowledge gap limiting management of many commercially and recreationally important fishes. Advances in electronic fish tracking technologies (e.g., acoustic telemetry) in the late 20th Century enabled individual fish to be tracked over long time periods (e.g., 10 years) but the cost and complexity required to achieve meaningful receiver coverage was a major obstacle to implementation in systems as vast as the Great Lakes. The Great Lakes Acoustic Telemetry Observation System (GLATOS) is a multinational network of telemetry researchers that work collaboratively using acoustic telemetry to understand fish behavior related to Great Lakes ecology and provide information useful to fish managers in their decision making. The network, administered by the Great Lakes Fishery Commission, was established in 2010. Over the last 15 years, the network has grown to a community of 403 researchers from 93 agencies, organizations, and academic institutions. Collectively, the network maintains over 3500 receiver stations and has tracked the movements of more than 30,000 fish from 58 species. The main functions of the network are detection sharing, equipment coordination, knowledge transfer, and project support. Here, we demonstrate how multijurisdictional collaboration benefits fisheries science in the Great Lakes and describe some of the challenges encountered while building and maintaining a large collaborative research network.

Caren Binding[1] and Arthur Friesen[2], [1]Environment and Climate Change Canada, [2]Canada Water Agency. **Lake Winnipeg algal bloom status, trends and spatio-temporal response to climate and watershed drivers.**

Lake Winnipeg continues to experience severe recurring algal blooms. Environment and Climate Change Canada's EOLakeWatch was developed to deliver a suite of satellite-derived products to support bloom monitoring on Lake Winnipeg and other large Canadian lakes. Algal bloom indices describing bloom spatial extent, intensity, duration, and severity will be reported from 2002 to present as an update on bloom status and trends on Lake Winnipeg. Bloom conditions can

be impacted by both climate and watershed drivers, including external and internal (legacy) nutrient loads, and weather patterns that contribute to favourable growth conditions. This study seeks to improve understanding of how these factors combine to shape seasonal and interannual variability in bloom conditions. Regional weather data were analysed to highlight the bloom's day-to-day response to wind mixing, rain events and prolonged periods of warm stable conditions. Daily nutrient loads and concentrations for Lake Winnipeg's four major tributaries were estimated using Weighted Regression on Time, Discharge, and Season (WRTDS). Cumulative loads were then used in a spatio-temporal analysis of the bloom response to external nutrient delivery, assessing regional variability and potential time-lags in system response.

Paul Blanchfield[1], Lee Hrenchuk[2], Tazi Rodrigues[1], Gibson Rieger[3], Victor Papiaz[4], Michael Paterson[2], Mike Rennie[5] and Graham Mushet[4], [1]Fisheries & Oceans Canada, [2]IISD-ELA, [3]University of Manitoba, [4]Queen's University, [5]Lakehead University. **The response of lake trout to an experimental reduction in oxythermal habitat.**

Reductions in the delivery of dissolved organic carbon (DOC) to lakes from their watersheds, through the drying of upstream inputs, is one scenario associated with climate warming. Predictions of lower DOC inputs to freshwater lakes include greater water transparency and deeper thermocline depths, which in turn can limit the amount of available oxythermal habitat for cold-water fish, like lake trout (Salvelinus namaycush). We undertook at whole-catchment manipulation at the IISD Experimental Lakes Area that isolated Lake 626, originally a 4th order lake, from its upstream watershed (in fall 2010), resulting in >90% decrease in water inputs to the experimental lake. Consistent with our predictions, observed reductions in DOC were associated with increases in water transparency and deeper thermocline depths. Lake trout habitat use and behaviour have been monitored in Lake 626 and nearby reference Lake 373 for the past 17 years (2008-2025) using acoustic telemetry. Preliminary analyses show that oxythermal habitat declined in Lake 626 following the manipulation, and that lake trout responded to the initial deepening of the thermocline by occupying deeper depths in the water column. Lake trout spatial positioning data and accelerometer data have also been collected and will be presented to provide a fulsome understanding of how the cascading effects of watershed inputs to lakes can alter the ecology and behaviour of an apex predator.

Anna Boegehold, International Joint Commission. **Science communication as a pillar of great lakes research.**

Science communication is often a hidden requirement of great lakes research, yet it can still be treated as a hobby or "side-hustle" resulting in inadequate training, funding, and recognition. To promote global great lakes literacy, we must invest in communications training among scientists. Member driven sci-comm activities have been successful during recent IAGLR conferences, demonstrating their utility to conference goers. During the 2025 IAGLR conference in Milwaukee, WI, we hosted a sci-comm session which drew a lot of energy and excitement from presenters and audience members alike. After the sci-comm session, we held an improv workshop to practice comfortable communication in uncomfortable situations. Based on positive feedback from both the session and workshop, we felt energized to continue finding ways to professionally integrate sci-comm into IAGLR and great lakes science. We are currently curating a special section of the Journal of Great Lakes Research to highlight the stories and methods of global great lakes sci-comm. Annual conferences offer a space to host workshops where attendees can learn technical skills or sign up for local sci-comm related field trips. Looking ahead, we hope to build a community of great

lakes sci-comm so we can act as bridges between science and society for the benefit of large lake ecosystems.

Madison Bond and Linda M. Campbell, Saint Mary's University. **Assessing Food Web Shifts During Early Establishment of Invasive Crayfish in Nova Scotia.**

Invasive crayfish are known to alter freshwater ecosystems through burrowing, grazing, competitive displacement of native species, disease transmission, and food web disruption (Barbaresi et al., 2004; Lodge et al., 1994; Pintor & Sih, 2008; Jussila et al., 2015; Ficetola et al., 2012). These impacts can be amplified in regions without native crayfish, where local biota lack a coevolutionary history with crayfish (Gherardi, 2007; David et al., 2017). Procambarus clarkii was first detected in Three Mile Lake, Nova Scotia, in 2022 and because the province does not have native crayfish, little is known about how this species may alter local food webs. Stable isotope sampling was conducted across Three Mile Lake in 2024 to evaluate trophic interactiions during the early invasion stage. Isotope biplots show P. clarkii overlapping with multiple aquatic macroinvertebrates and occupying two distinct trophic levels. MixSIAR diet models indicate ontogenetic dietary shifts in adult crayfish and demonstrate that they draw from multiple basal pathways. Damselfly nymphs exhibited spatial dietary shifts: individuals from crayfish-invaded areas showed increased reliance on pelagic carbon sources, relative to nymphs from non-invaded areas, which maintained benthic-dominant diets. These findings are early indicators that P. clarkii are now incorporated into the littoral food web structure. We highly recommend continued monitoring of Three Mile Lake as the crayfish become further integrated into the ecosystem.

Joseph Bottoms[1], James A Crossman[1], Alf Leake[1], Michael Power[2], Eduardo G Martins[3], Felix Eissenhauer[4], Shuhong Shi[4] and Steven J Cooke[4], [1]BC Hydro, [2]University of Waterloo, [3]University of Northern British Columbia, [4]Carleton University. **Applying the CEMPRA framework to streamline effects mitigation and management at BC Hydro.**

Environmental decision making in regulated rivers is a dynamic challenge that must balance infrastructure constraints, demands for power, social values, and potential environmental impacts spanning lotic and lentic environments and aquatic species with overlapping and diverging habitat requirements. While these challenges emerge at individual facilities, at the provincial scale, these challenges compound as growing uncertainties and variable data gaps can hamstring efforts to make the right decisions for management and restoration objectives. Cumulative Effects Modeling for Prioritizing Recovery Actions (CEMPRA) is a modelling framework developed to link standardized user-defined stressor-response functions to environmental attributes, system capacity, and productivity of a target species or system. This framework is intended to prioritize recovery actions for data-limited species and species-at-risk, with the flexibility to accommodate both data-rich and data-poor study systems. Here we discuss BC Hydro's application of CEMPRA as a science-based approach to manage its operational effects and mitigation programs at a provincial scale. This initiative leverages consultative committee feedback, monitoring program data, primary and grey literature, and rigorous uncertainty analysis to enable effective restoration efforts and provide future direction for watershed management programs.

Stephanie Boudreau, Joseph Barss, Joël Chassé, Tobie Surette and Adam Drozdowski, Fisheries and Oceans Canada (Gulf Region). **Thermal habitats of southern Gulf of St. Lawrence snow crab under climate change scenarios.**

Snow crab (Chionoecetes opilio), a commercially valuable species in the southern Gulf of St. Lawrence, are strongly associated with cold bottom waters and are vulnerable to ocean warming. We

quantified favourable and preferred thermal ranges for different sex and maturity groups using 28 years of survey data (1997-2024) and species distribution models (fit using sdmTMB) that incorporate spatial and spatiotemporal random fields. Mature crabs were most abundant between -1 and 3 °C, while immature crabs tolerated up to 5 °C; preferred ranges were narrower (e.g., 0-1.5 °C for mature males). Habitat area defined by these ranges has declined since the early 1990s and is projected to shrink further under climate change. Using downscaled bottom temperature projections from climate models under RCP 4.5 (low emission) and RCP 8.5 (high), we preliminarily estimate that habitat with an upper thermal limit of 3 °C could disappear by 2099 under RCP 8.5. Even with a more permissive 5 °C limit, habitat loss remains substantial. These results underscore the importance of incorporating thermal habitat dynamics into stock assessments and management strategies, particularly as marine heat waves and long-term warming threaten the persistence of this commercially valuable species.

Rebecca Bowen[1], **David Karpovich**[1] and Rod Lammers[2], [1]Saginaw Valley State University, [2]Central Michigan University. **Saginaw Bay Monitoring Consortium: Land use and nutrient transport in the Saginaw Bay Watershed.**

Land use in the Saginaw Bay Watershed is diverse, with the most significant uses being agricultural, forest, urban and wetland. Certain regions of the watershed have characteristic uses, such as forests in the north, agriculture in the central and thumb regions, and urban/industrial near the large cities. Both agricultural and urban land uses can impact water quality by affecting transport of nutrients. Preliminary results from two years of monitoring show that relative loadings are not consistent for nitrogen and phosphorus. Smaller rivers in the ag-intensive thumb region show relatively high nitrate loading, likely from the high density of field tile drainage. On the other hand, the larger rivers in in the south and central regions (especially the Flint River) show the highest relative phosphorus loading, potentially due to large point source contributions. This poster will present these data and how they may guide decisions aimed at improving water quality in the region.

Rebecca Bowen and **David Karpovich**, Saginaw Valley State University. **The Saginaw Bay Monitoring Consortium: Findings and implications from the initial two years.**

The Saginaw Bay Monitoring Consortium (SBMC) established a coordinated and comprehensive monitoring framework in 2023 for nutrient and sediment transport in the Saginaw Bay Watershed. Weekly samples have been collected at 18 tributary sites and analyzed for multiple water quality parameters. The sampling sites are co-located with USGS gaging stations which provide concurrent discharge measurements to enable calculation of nutrient and sediment loading. It is notable that some of the streams have never been monitored before on a consistent basis. Additionally, the tributary monitoring is coordinated with NOAA's monitoring at 10 open water sites in Saginaw Bay. From the first two years of data, we have performed preliminary nutrient loading calculations which are useful for comparing relative contributions from each tributary, effects of land use, and importance of point and non-point sources. However, two years of data are not sufficient to accurately evaluate annual loading to Saginaw Bay. At this time, our results likely underestimate annual nutrient loading due to lower-than-average precipitation in many of the sub-watersheds. Additional monitoring is planned, which will help average annual variations in watershed precipitation amounts and improve loading estimates.

Jacob Bowman[1], Trevor Middel[2], Dak de Kerckhove[2] and Mark Ridgway[2], [1]Environmental and Life Sciences Graduate Program, Trent University, [2]Harkness Laboratory of Fisheries Research, Aquatic

Research and Monitoring Section, Ontario Ministry of Natural Resources and Forestry. **Autumnal cooling: Transitions in the movements of brook trout in response to expanding thermal habitat.**

Climate change is dramatically altering the seasonal timing of ecological events. In lakes, autumnal cooling has been delayed in recent decades, and the implications of this shift are largely unappreciated. Since brook trout need cold water (< 20°C), they may be particularly threatened by delayed autumnal cooling. This study aimed to identify how the movements of brook trout change with autumnal cooling, to understand how delays in cooling may influence these fish. Using an acoustic telemetry array in Algonquin Park, Ontario, we tracked the spatial patterns, depth, and body temperature of brook trout in relation to lake temperatures using data from 2009-2011 and 2023-2025. We used changepoint analysis to identify the thermal thresholds where seasonal habitat transitions occurred. Using these thresholds and climate models, we projected the timing of transitions by 2100. We found that brook trout make dramatic changes in their habitat use, moving from deep offshore habitats in summer to shallow littoral habitats in autumn, corresponding to surface temperature thresholds. These habitat changes may have ecosystem-level effects, with the shallows free from top predators during summer. We found that by 2100, brook trout habitat transitions may be delayed by 14-32 days. Autumnal cooling is an important period of transition, where brook trout capitalize on favourable thermal environments. This work improves our understanding of the response of lakes to climate change and will inform conservation efforts.

Evan Bowness, western university. **Seeing Rivers Together: An Unconference Photovoice Activity for River Caretaking.**

This contribution invites participants to collectively experiment with photovoice as a relational storytelling practice over the course of the Rivers are Connectors of Land, Water & People session and the broader conference. Rather than presenting completed research, this activity creates space for participants to engage directly in the work of noticing, documenting, and reflecting on their relationships with rivers. Participants will be invited to photograph moments, encounters, and traces of connection with the Red and Assiniboine Rivers, as well as with rivers they carry with them from other places. Through brief prompts and shared reflection, we will explore how images and stories can surface diverse ways of knowing rivers, including scientific observation, stewardship practices, memory, care, and responsibility. The activity is designed to support dialogue across disciplines and roles, and to ask what river health, recovery, and connection look like when they are defined collectively rather than solely through expert metrics. By the end of the session, participants will have been invited to contribute to a shared visual and narrative record that can seed ongoing conversation, collaboration, and a riverkeeper community of practice beyond the conference.

Evie Brahmstedt[1], Roxanne Razavi[2], Sujan Fernando[3], Lisa Cleckner[4], Abigail Hullihen[2] and Emily Arsenault[2], [1]New York State Water Resources Institute at Cornell University, [2]State University of New York College of Environmental Science and Forestry, [3]Clarkson University, [4]Finger Lakes Institute at Hobart and William Smith Colleges. **An Ecosystem Health Assessment Using Aquatic Insects Across the Beaver Dam Life Cycle.**

Streams throughout the Great Lakes face numerous anthropogenic disturbances, including impacts from climate change, invasive species, pollution, and engineered structures, often simultaneously. In New York State (NYS), dams have created sites of disturbance in streams for decades to hundreds of years. As many dams age and no longer serve their original purposes, removal is considered as an opportunity to restore stream habitat and connectivity. However, dam removal can release trapped sediment containing nutrients and contaminants that may be

detrimental to adjacent ecosystems. Beaver dams are likewise widespread across NYS and offer a natural comparison to artificial dams. Specifically, they present an opportunity to examine consequences to aquatic ecosystems associated with the trapped sediment and stagnation of upstream water. Using a space-for-time substitution approach, we aimed to use observations of the "beaver dam life cycle" to quickly understand the impacts of small dam removal on ecosystem health and function over time. We assessed lower food web contamination across stages of the beaver dam life cycle (i.e., active dam, recent collapse, and recovery phase) in the headwaters of the St. Lawrence River Watershed. Aquatic invertebrates above and below dam sites were analyzed for mercury (Hg), fatty acids, and stable isotopes to compare contamination and nutritional value to higher trophic level consumers. The results of this study aim to improve our understanding of aquatic ecosystem impact and recovery from disturbances.

John Bratton, LimnoTech. **Asking the right questions: Critical unknowns and recent progress in the fight against harmful algal blooms.**

Although substantial progress has been made in recent years in understanding why harmful algal blooms occur and how they can be managed effectively, substantial gaps remain. New tools, data, and ways of thinking hold promise to push back the frontiers of HAB knowledge. Among the most important unknowns are the controls and mechanisms of HAB toxin production, the details of HAB organism life cycles and competition within lakes and sediments, and the most impactful technical and policy approaches to nonpoint nutrient loading reduction and HAB control. Researchers in the U.S. and Canada are making progress in all of these areas independently and collaboratively. New projects and developments in the areas of genomics, remote sensing, in-situ sensors, and farm management systems will be highlighted to illustrate promising approaches to improving understanding and mitigating the impacts of HABs.

Cindy Breau, Tyler Tunney, Nellie Gagne, Francis LeBlanc, Aaron Krick and Valerie Belliveau, Fisheries and Oceans Canada. **Striped Bass eggs and larvae in the Miramichi River estuary: A resource pulse detectable only with molecular tools?**

Spawning events can provide resource pulses that can fuel food webs when other resources are limited, yet their utilization by fish communities is poorly understood. We combined traditional visual examinations and qPCR analysis of stomach content DNA (scDNA) to evaluate consumption of Striped Bass (Morone saxatilis) eggs and larvae by 21 fish species collected before and during the Striped Bass spawning period in the Northwest Miramichi River estuary. Striped Bass was present throughout the study, with higher catches coinciding with peak eggs and larvae densities, which was a better predictor of scDNA compared to catches of Striped Bass. Visual inspection revealed eggs in only one American Eel (Anguilla rostrata), whereas scDNA showed widespread increases in detections during spawning compared to the pre-spawning period, suggesting that Striped Bass reproduction generated a detectable community-level resource pulse. This study reveals hidden pathways of energy flow not detectable through traditional methods, emphasizing the value of molecular tools for resolving cryptic trophic interactions. These findings advance understanding of the ecological role of Striped Bass spawning for the fish community of the lower Northwest Miramichi River and provides novel insights into the detection and understanding of resource pulses associated with spawning events in aquatic ecosystems.

Paige Breault[1], Patricia Voyer[2], Christina Semeniuk[2], Ken Jeffries[3], Analisa Lazaro-Côté[3] and Daniel D. Heath[2], [1]British Columbia Conservation Foundation, [2]Department of Integrative Biology and the Great Lakes Institute for Environmental Research, University of Windsor, [3]Department of

Biological Sciences, University of Manitoba. **Omics Science Transfer: Applications in Fishery Management and Conservation.**

The potential for genomics, transcriptomics, proteomics, and metabolomics (collectively referred to as "'omics") applications in fisheries science and management is enormous. Despite the potential for 'omics to provide managers with novel information to guide management and conservation decisions, the uptake of 'omics technologies to facilitate real-world decisions has lagged compared to other recently developed genetics tools (e.g., eDNA). Therefore, it was our objective to "translate" the potential benefits of 'omics technology for fisheries management and conservation applications into accessible language. We combined 'omics, fisheries, and conservation expertise with information from the literature to provide visual infographics, published resources, and decision-guiding tools suitable for fisheries managers. Here we describe; 1) infographic and video material developed based on an assessment of knowledge gaps among fishery managers; 2) supporting published materials and expert resources; and 3) a synthesis of the current state and future potential of 'omics in fisheries management and conservation. The ultimate goal of this exercise was to facilitate the inclusion of the rapidly evolving 'omics technologies into fishery management practices to reduce costs and improve evidence-based decision making. Those benefits are critical, given the multiple stressors and pressures facing fishes of conservation and management concerns, especially in the freshwater ecosystems of the Great Lakes and the world.

Julianne Breton[1], Olivier Morissette[1], Marie-France Barrette[2] and Maxime Boivin[1], [1]Chaire de recherche sur les espèces aquatiques exploitées, Université du Québec à Chicoutimi, [2]Direction principale de l'expertise sur la faune aquatique, ministère de l'Environnement, de la Lutte contre les changements climatiques, de la Faune et des Parcs. **Petits cours d'eau et cours d'eau intermittents : habitats clés pour l'omble de fontaine.**

Les petits cours d'eau jouent un rôle essentiel dans les écosystèmes aquatiques, notamment pour l'omble de fontaine (Salvelinus fontinalis), une espèce importante pour la pêche sportive au Québec. Ces habitats, qu'ils soient permanents ou intermittents, semblent particulièrement utilisés pour la croissance des alevins et la reproduction des adultes. Pourtant, les cours d'eau intermittents demeurent peu étudiés et sont souvent mal identifiés. De plus, le régime forestier québécois accorde un statut de protection moindre aux cours d'eau intermittents qu'aux permanents. Dans ce contexte, cette étude vise à mieux comprendre les caractéristiques influençant l'utilisation de ces milieux par l'omble de fontaine. Plus précisément, elle vise à décrire l'utilisation des cours d'eau permanents et intermittents et à identifier les variables déterminant la présence de l'espèce à deux échelles spatiales : large échelle (province du Québec) et petite échelle (des sites locaux). Pour ce faire, deux modèles de distribution d'espèces sont développés : le premier à partir de données de présence provenant d'inventaires gouvernementaux par pêche électrique. Le second modèle se base sur des échantillonnages de petits cours d'eau boréaux. Ces analyses permettront de mieux comprendre les conditions favorables à la présence de l'omble de fontaine dans les petits cours d'eau et d'identifier les facteurs clés influençant sa répartition. Ce travail contribuera à une meilleure intégration de ces habitats dans les stratégies de gestion et de conservation des cours d'eau.

Thomas Bridgeman[1], Justin Chaffin[2], Reagan Errera[3], Mark Rowe[3] and Craig Stow[3], [1]University of Toledo, [2]Ohio State University, [3]NOAA GLERL. **Extreme Hypoxia in Lake Erie's Western Basin During a 2025 Heat Wave.**

The shallow western basin of Lake Erie typically experiences short-lived stratification and hypoxia during summer, with minimal ecological impact. In 2025, an extreme hypoxic event followed a mid-June heat wave that rapidly elevated surface temperatures and induced prolonged

stratification under calm conditions. This state persisted for nearly a month, documented through continuous sensor data and weekly vessel profiles. A bowl-shaped thermocline formed 0.5-1.0 m above the lakebed, and near-bottom dissolved oxygen dropped below 1.0 mg/L for up to 12 days at depths greater than 8 m. Dissolved reactive phosphorus concentrations were only slightly elevated, and no hypoxia-related intensification of the cyanobacterial bloom was observed. However, benthic stress was evident, as large numbers of amphipods were observed swimming near the surface. The event ended in mid-July when increased winds and wave activity restored mixing and oxygen levels throughout the water column. These findings highlight the potential for rapid development of hypoxia in warm, productive areas of the Great Lakes and the importance of timing and duration of these events. The consequences of extreme hypoxic events for benthic communities may extend into subsequent years, underscoring the need for continued monitoring and assessment of these communities as lake ecosystem health indicators.

Katelyn Brown, Jon LeBlanc, Christopher Weisener and R. Michael McKay, Great Lakes Institute for Environmental Research. **Microbial community composition and biogeochemical potential response to extended hypolimnetic hypoxia in the Lake Erie western basin.**

The central basin of Lake Erie is host to recurring oxygen depletion in late summer that leads to the formation of a hypoxic hypolimnetic 'dead zone' that may persist for several months. Comparatively, the western basin is well-mixed, and warms uniformly throughout the water column preventing strong seasonal stratification with only transient periods of hypoxia recorded. Throughout July 2025, stratification and hypolimnetic hypoxia were observed in the western basin coincident with a rapid increase in surface water temperatures. Surface temperatures exceeding 26ºC and dissolved oxygen concentrations as low as 2.3 mg L^{-1} were reported near Leamington, Ontario, extending across the lake to Port Clinton, Ohio. During this event, we sampled the surface water and below the thermocline twice at RAEON Buoy 5 and OMECP Buoy 2 (July 10 and 14), and one additional time on July 28 at RAEON Buoys 2 and 6. Here, we describe 16S and 18S rRNA gene amplicon sequencing with additional 'omics to evaluate the community composition and differences in biogeochemical functional potential between the layers. As hypoxia poses concerns due to the release of sediment-bound phosphorus and generation of greenhouse gases, these sampling efforts highlight impacts to biogeochemical cycling during extended periods of hypoxia and stratification.

Katelyn Brown[1], Damon Stanwell-Smith[2], Jack Buckingham[2], Meghan Goggins[2], Kimberly Galvez[2], Jason Hayden[2], Joshua Pons[2], Jolien Claes[2], Jessica Brice[2], George Bullerjahn[3] and R. Michael McKay[1], [1]University of Windsor, [2]Viking, [3]Bowling Green State University. **Characterization of Great Lakes phyto- and bacterioplankton communities leveraging a community science approach.**

Water quality monitoring in the Great Lakes over wide spatial scales and across seasons remains a challenge. Dedicated science platforms are limited and staging missions are resource intensive. Addressing this gap in Great Lakes science capacity, creative partnerships are being forged adopting a community science approach that extends both broad spatial coverage and temporal frequency to surveys. Since 2022, the cruise line Viking has operated Great Lakes expeditions from May through August. The MV Viking Polaris and Viking Octantis are fitted with modern laboratories that facilitate hands-on guest engagement. Here we share the outcomes of a partnership engaging Viking science personnel and cruise guests who collect water samples and physico-chemical data across the Great Lakes. Targeting collection at long-term monitoring locations of federal agencies, samples were collected over two years through an onboard FerryBox whilst underway or via Zodiac excursions. Cruise guests and staff scientists collected and filtered water

samples, with filtrate used to measure nutrients and filters preserved for DNA extraction and eDNA sequencing to characterize phyto- and bacterioplankton communities across trophic gradients. These efforts complement federal, state and provincial monitoring programs while increasing awareness to participants of the importance of this transnational resource.

Helen Michaels[1], Kevin McCluney[1], Steve Hovick[2], **Lauren Brown**[1], Trevor DeGroote[1], Ethan Glassman[1] and Ewan Isherwood[1], [1]Bowling Green State University, [2]Ohio State University.
Assessing the Nutrient Function of Plant Traits to Guide Wetland Construction and Management.

Guidance for selecting and managing wetland vegetation to optimize nutrient retention remains limited. This study leverages recently restored wetlands through the statewide H2Ohio initiative to identify plant traits that enhance nutrient capture and storage. We focused on 12 native species commonly found in these wetlands and quantified physiological traits linked to nutrient uptake. Field sampling measured nutrient content across summer, fall, and spring to assess resorption and overwinter storage. Decomposition rates were evaluated using litter bags and sediment deposition was measured during flow events within species patches. Soil redox was evaluated using iron rods. Preliminary findings indicate that wetlands benefit from vegetation with diverse functional traits, supporting multiple pathways for nutrient retention. These results can inform species selection and management strategies to build resilient wetlands with enhanced nutrient removal capacity.

Taylor Brown[1,2], Lars Rudstam[1], Suresh Sethi[3], Jason Smith[4], Ji He[5], Jory Jonas[5], Sarah Beech[6], Erin Dunlop[6], Steven Pothoven[7], Zachary Amidon[8], John Sweka[9], Dray Carl[10], Scott Hansen[10], Bo Bunnell[11], Brian Weidel[11] and Andrew Honsey[11], [1]Cornell University, [2]Great Lakes Fishery Commission, [3]Brooklyn College, [4]Bay Mills Indian Community, [5]Michigan Department of Natural Resources, [6]Ontario Ministry of Natural Resources, [7]National Oceanic and Atmospheric Administration, [8]University of Toledo, [9]United States Fish and Wildlife Service, [10]Wisconsin Department of Natural Resources, [11]United States Geological Survey. **Biophysical drivers of coregonine recruitment across space and time in the Great Lakes region.**

Understanding the drivers of Lake Whitefish (Coregonus clupeaformis) and Cisco (C. artedi) recruitment can advance stewardship of populations and fisheries across the Laurentian Great Lakes. Long-term, cross-lake comparisons can help disentangle regional- to local-scale drivers and clarify divergent responses to ecosystem change. We characterized and compared important biophysical drivers of long-term Lake Whitefish and Cisco recruitment among each of the Great Lakes and Lake Simcoe. Important driver-response relationships varied across lakes spanning ecosystem gradients; for example, climatic processes such as warming temperatures and decreasing ice cover were important regional drivers of Lake Whitefish recruitment, but with differing consequences across lake morphology and latitude. Important driver-response relationships were dissimilar between species, highlighting the relative importance of pelagic versus benthic ecosystem change and when recruitment bottlenecks may occur. Notably, oligotrophication was associated with stronger Cisco recruitment but weaker Lake Whitefish recruitment. For Lake Whitefish, results suggest that benthic food web perturbations resulting from oligotrophication and dreissenid mussels have reduced juvenile growth and survival across multiple lakes. For Cisco, climatic processes had high explanatory power but dissimilar driver-response relationships among lakes, suggesting that regional climatic forcing does not consistently regulate recruitment to the adult population across lakes. Overall, this study provided novel insights into the underlying mechanisms by which biophysical

drivers act to regulate Lake Whitefish and Cisco recruitment across ecosystem gradients and regime shifts.

Robert Brua[1], Amy White[2], Kristin Painter[3], Patricia Chambers[1], Joseph Culp[4] and Adam Yates[2], [1]Environment and Climate Change Canada, [2]University of Waterloo, [3]University of Saskatchewan, [4]Wilfred Laurier University. **How it started, how it's going: Source, transport, and fate of nutrients in the Lake Winnipeg Basin.**

Understanding the source, transport, and fate of nutrients in the Lake Winnipeg Basin is critical to mitigating eutrophication effects within Lake Winnipeg. Spanning 15 years, our Lake Winnipeg Basin research on streams draining the Red River Valley and other subcatchments that feed the lake has substantially advanced understanding of nutrient dynamics, ecological drivers, and land-to-lake linkages. Our early foundational work quantified nutrient production from human activities, including synthetic fertilizer application, livestock manure, and human wastewater in subcatchments of the Red River watershed. Subsequent research established the relative seasonal contributions of nutrient sources to aquatic systems, nutrient uptake, and implicated residual human wastewater in tributaries as an important contributor to Lake Winnipeg eutrophication. Building on this, our research has developed multiple indicators of ecosystem health and explored several ecosystem processes that determine the fate of nutrients, both temporally and spatially, along gradients of human nutrient-producing activity. More recently, we established baseline nutrient concentrations and loads for long-term monitoring, highlighting how climatic and hydrologic conditions modulate nutrient export patterns to downstream waters. We also continue our nutrient fate research by examining nutrient uptake and storage in Red River Valley streams. Collectively, our body of work informs long-term watershed management by quantifying nutrient sources and fate, transport processes, and ecological responses within the Lake Winnipeg Basin, laying a scientific foundation for targeted nutrient reduction strategies to mitigate eutrophication and harmful algal blooms.

Shanan Brun-Dabbagh[1], Verena Kalter[1], Britton Ranson-Olson[2], Bo Liu[2], Ashley Moerke[2] and Uta Passow[1], [1]Ocean Sciences Center, Memorial University of Newfoundland, St John's, NL, Canada., [2]Centre for Freshwater Education, Lake Superior State University, Sault-St-Marie, MI, United States of America. **When Oil Meets Freshwater: In Situ Biodegradation and Microbial Shifts in the Straits of Mackinac.**

Concerns about pipeline breaches and accidental oil spills in the Great Lakes are increasing, yet the persistence and biodegradation dynamics of petroleum in large freshwater systems remain poorly understood. This study examines biodegradation of crude oil and marine diesel in the Straits of Mackinac, a region where the Enbridge Line 5 pipeline crosses between Lakes Michigan and Huron. It highlights the role of native microbial communities in driving oil degradation processes. Two mooring frames, holding oil and non-oil amended mesh, were deployed in the Straits of Mackinac during a 7-week spring period to assess oil biodegradation in situ. Microbial communities were profiled using 16S rRNA sequencing, and oil chemistry changes were analyzed with gas chromatography mass spectrometry (GC-MS). Preliminary community analyses indicate that Betaproteobacteria dominate across all treatments and timepoints, closely followed by Alphaproteobacteria, with both groups increasing in relative abundance over time in the oil treatments and the control. At the genus level, clear selective patterns emerged, Aquabacterium appeared exclusively in the oil-amended treatments and increased in relative abundance over time, whereas Rhodoferax exhibited a stronger affinity for crude oil and remained scarce in the marine diesel and control treatments. These microbial responses will be interpreted in conjunction with the

temporal changes in alkanes and polycyclic aromatic hydrocarbons (PAHs) to evaluate petroleum persistence in a freshwater environment concurrent with microbial responses to a spill.

Samantha Brunner[1], Steven Fong[1], Kim Scribner[1], Travis Brenden[1], John Robinson[1], Nicholas Johnson[2] and Jared Homola[1], [1]Michigan State University, [2]United States Geological Survey. **GT-seq SNP panel streamlines pedigree-based genetic monitoring of sea lamprey.**

Restriction-site associated DNA (RAD) sequencing methods have become a key technique in fisheries conservation given their ability to genotype hundreds of thousands of loci at a relatively low cost. However, many of those loci are subsequently discarded during downstream analyses that require unlinked markers, such as assessments of population structure and pedigree reconstruction. Genotyping-in-Thousands by sequencing (GT-seq) offers a more time- and cost-efficient approach to genotyping compared to RAD-seq. While GT-seq panels are commonly designed from RAD data to target specific sets of loci, there are many considerations when selecting loci and designing primers. We demonstrate a step-by-step approach to convert RAD-seq SNP data to a GT-seq SNP panel using a sea lamprey example. This approach to primer design includes using a sliding window to prioritize priming regions, navigating software options, power assessments, and avoiding potential pitfalls. We illustrate our approach using RAD discovery data to develop a GT-seq panel optimized for pedigree-reconstruction in sea lamprey. Our GT-seq primers target regions containing microhaplotypes, or sets of closely linked SNPs, which increases allelic diversity and heterozygosity, thereby increasing statistical power when assigning larvae to family groups. Using multi-year collections of sea lamprey larvae from 13 spatially heterogeneous streams, we highlight how our GT-seq genotyping approach supports management efforts in the Great Lakes tributaries through in-stream monitoring of annual number of successful spawners, sibling group size, and spatial distribution of sibling groups.

Kennedy Bucci[1], Erin Moir[2], Ashley Priem[2] and Michael Rennie[1], [1]Lakehead University, [2]EcoSuperior Environmental Programs. **Collecting litter and data in Thunder Bay's storm drains.**

Plastic pollution threatens aquatic ecosystems worldwide, and freshwater lakes are particularly vulnerable given their tight link to urban landscapes. Every year, an estimated 70,000 pounds of plastic waste ends up in Lake Superior. One of the predominant pathways of plastic pollution into aquatic ecosystems is stormwater runoff, where precipitation travels over impervious surfaces into storm drains and eventually into local waterways. Previous efforts to quantify plastic in stormwater runoff have typically used grab samples from outflow ports at a single point in time**,** usually during rain events. Here, we are employing a novel stormwater filtration device installed in storm drains to passively capture physical pollutants. This method allows us to capture time-integrated samples that are more representative of stormwater runoff. In partnership with a local non-profit and municipal authorities, these devices were installed in city storm drains across different land-use types in Thunder Bay, Ontario. We aim to use these data to inform local messaging and solutions. For instance, 60% of litter captured in storm drains were cigarette butts and tobacco-related products, and city parks were a major hotspot. Working with local municipal authorities, we hope to improve waste management in city parks and improve location-specific messaging. In addition to sharing the results of the project, we will share insights on using data from the city storm drains to inform local waste management strategies and community education.

Richard Budnik, Ohio Environmental Protection Agency. **Assessment of PFAS in Fish Tissue from Lake Erie's Ohio Waters.**

Per- and polyfluoroalkyl substances (PFAS) are persistent contaminants that accumulate in aquatic ecosystems, posing risks to ecological and human health. In Lake Erie, PFAS in fish tissue is a concern due to the lake's ecological importance and its role in recreational and commercial fisheries. We quantified PFAS concentrations in 117 fish tissue samples from commonly harvested and ecologically important species, including common carp (Cyprinus carpio), channel catfish (Ictalurus punctatus), freshwater drum (Aplodinotus grunniens), largemouth bass (Micropterus salmoides), smallmouth bass (Micropterus dolomieu), white bass (Morone chrysops), white perch (Morone americana), walleye (Sander vitreus), and yellow perch (Perca flavescens). Skin-on fillet composites were collected from the Western and Central basins of Lake Erie in 2024 and 2025. Samples were analyzed for 40 PFAS compounds using U.S. EPA Method 1633. Fourteen PFAS analytes were detected, with perfluorooctane sulfonate (PFOS) being the most prevalent. Median PFOS concentrations for each species were below the Great Lakes Consortium for Fish Consumption Advisories threshold of 10 ng/g, which corresponds to "one meal per week," with several species falling into categories allowing more frequent consumption. These results indicate that following Ohio's existing Lake Erie fish consumption guidance, which considers mercury and PCB levels, provides adequate protection against PFOS exposure. This work establishes a baseline dataset of PFAS concentrations in Lake Erie fish, supporting future ecological risk assessments and informing management decisions to protect human health and aquatic ecosystems.

Mary-Claire Buell[1], **Clarance Trapper**[2] and William Tozer[3], [1]Trent University, [2]Moose Cree First Nation, [3]Camp Onakawana. **Beyond Mercury: Community-Led Risk Assessment of Cumulative Impacts on the Moose River and Her Tributaries in Moose Cree First Nation Territory.**

The Ililiwaskiy (Moose Cree First Nation Territory) in the James Bay region of northern Ontario, Canada, has experienced decades of industrial activity that continue to influence aquatic ecosystems and Indigenous food systems. Community concerns regarding mercury contamination in culturally important fish initiated a community-led research collaboration. As the project evolved, chasing the story of mercury revealed broader environmental concerns and impacts exposing limitations of conventional risk assessment approaches that fail to account for Indigenous food sovereignty, and relational impacts. This interdisciplinary work integrated western scientific analysis with Moose Cree knowledge through workshops, fish sampling training, youth outreach, interviews, and surveys focused on fish consumption, harvesting practices, and relationships with the river. Over 180 fish were collected, including walleye (Sander vitreus), northern pike (Esox lucius), and lake sturgeon (Acipenser fulvescens). Walleye exhibited the highest mercury concentrations, with many samples exceeding Health Canada guidelines, particularly for fish over 15 inches and for subsistence consumers, women, and children. Elevated contaminant levels and uncertainty around cumulative impacts from the current water management regimes have constrained harvesting choices, disrupted knowledge transmission, and undermined access to traditional foods. This project demonstrates the need for risk assessment frameworks that move beyond single-chemical thresholds to reflect Indigenous food systems, cumulative impacts, and culturally defined risk. Community-led monitoring and interpretation offer a pathway toward more just, and protective environmental health decision-making grounded in Indigenous stewardship and relationships with the river.

William Bugg[1, 2], Wesley Greentree[3], Katie Innes[2], Priyanka Kahlon[3], Sam James[2], Jamieson Atkinson[4], Francis Juanes[3], Andrew Bateman[2], Kristina Miller[5] and William Duguid[2], [1]University of

british columbia, [2]Pacific Salmon Foundation, [3]University of Victoria, [4]BC Conservation Foundation, [5]Fisheries and Oceans Canada. **Assessing Drivers of Early Marine Mortality for Juvenile Chinook salmon.**

Along Canada's Pacific coast, in the early marine environment cumulative stressors interact to limit the survival of individual juvenile Chinook salmon. In this period, patterns of survival are likely critically influential, working to shape population-level recruitment dynamics and long-term returns. The early juvenile period in the marine environment has long been a 'black box' where it was difficult to investigate environmental and physiological impacts. However recent advances in capture methods such as microtrolling and the application of mRNA based molecular profiling tools now allow us to investigate these factors like never before. We used microtrolling to non-lethally capture, sample, and PIT tag juvenile Chinook salmon throughout their early marine migration in the Strait of Georgia and their first marine winter. We then assessed mRNA signatures of environmental stressors such as thermal stress, osmotic stress, hypoxia, and food deprivation as well as pathogens and imminent mortality in the gill from individually sampled fish. Finally individual adult returns were assessed by PIT tag returns and related to environmental stressors and pathogens at the time of capture. Results will be discussed in the context of yearly and seasonal impacts of environmental stressors and pathogens as well as their interactions and impacts on adult returns. Together these methods and molecular tools can provide new insights into the drivers of mortality and can be applied broadly to investigate stressor interactions for salmon species coast-wide.

Karter Burgdorf, Illinois - Indiana Sea Grant. **Cosplay and science communication: Dressing up as a dragon biologist to talk about invasive species.**

Humans have been telling stories to one another for as long as they have existed. The ways we connect with those stories have changed from oral traditions by the campfire to video games and other modern media; however, the emotional response we have to these stories remains true. Effective science communication requires us to tap into our natural storytelling ability to convey the importance of the matters we discuss. Cosplay, a combination of the words "costume" and "play," has become another way for storytelling as well as a way for fans of a media to connect with one another over favorite fictional worlds and characters. By dressing up as a fictional character, barriers to communicating real world science can be broken down as the public realizes that they have secretly been interacting with science the whole time. In this talk, I provide an example of how cosplay can be used to discuss Great Lakes science through a collaboration between Illinois-Indiana Sea Grant and Cosplay For Science. I will explain how dressing up as an elf from Dungeons & Dragons can make your messages more palatable, how to connect big stories to real science, and the story of how fictional alien bacteria inspired my community to care more deeply about Lake Michigan.

Lyubov Burlakova, Alexander Karatayev and Nikolai Barulin, Great Lakes Center, SUNY Buffalo State University. **Video imaging for assessment of Great Lakes benthoscapes.**

Mapping the benthic landscape, or "benthoscape," structure and dynamics provides the spatial framework for many scientific and management activities. Enhanced with video imaging, benthic mapping can offer non-destructive, spatially explicit methods for assessing stressed or critical benthic habitats and communities. Our benthic and video surveys conducted within the Cooperative Science and Monitoring Initiative over the last decade demonstrated that high-resolution video reliably detects the presence, coverage, and distribution of keystone species such as dreissenids and macrophytes, providing estimates of abundance and patchiness across variable substrates. Studies of several Great Lakes hypoxic zones further indicate that video imaging can

support rapid identification of environmental stress. Distinct biogenic features and the absence of sensitive species consistently indicated hypoxic habitats. Video data also enable detailed delineation of benthic habitats, capturing transitions in substrate type, biota, and structural complexity that are frequently missed by traditional grab sampling. Our next objective is to extend benthoscape delineation to broader spatial scales by integrating video surveys with complementary environmental and biological datasets. Understanding linkages between major habitat features and benthic community composition can facilitate lake-wide habitat classification, with important implications for advancement in benthic ecology, invasive species assessment, habitat protection, management, and monitoring.

Valence Byaruhanga[1], Molly Atkins[2], Mark Olokotum[3] and Elizabeth Nyboer[1], [1]Department of Fish and Wildlife Conservation, Virginia Tech, 310 W Campus Dr, Blacksburg, VA 24060, USA, [2]Countryside and Community Research Institute, University of Gloucestershire, UK, [3]National Fisheries Resources Research Institute (NaFiRRi), P.O. Box 343, Jinja, Uganda. **Gender-based vulnerability and adaptive capacity to fishing regulations of small pelagic fishes in Uganda's Great Lakes.**

Fisheries resources are critical to global food and nutritional security, particularly in developing countries where fish contribute substantially to livelihoods. In Uganda, small pelagic species (SPS), notably Rastrineobola argentea (Mukene), are among the most accessible and affordable animal-protein-source foods for low-income households. Women play a dominant role in post-harvest activities, making the sustainability of SPS fisheries closely tied to gender equity and community resilience. In early 2024, Uganda's fisheries authorities banned the small seine ("hurry-up") gear used to harvest SPS in Lakes Victoria, Kyoga, and Albert to reduce bycatch of juvenile Nile perch (Lates niloticus). While aligned with conservation objectives, the sudden enforcement of the ban had a significant impact on fishing-dependent households. This study examines the gendered impacts of the gear ban, evaluates adaptive capacity and strategies among fisheries-dependent households, and identifies pathways toward more equitable fisheries governance. Guided by commons theory and the adaptive capacity framework, the study employs a longitudinal mixed-methods design. Data were collected from nine landing sites across three lakes, where a high proportion of the population depends on fishing for SPS and Nile perch, using household surveys, focus group discussions, and key informant interviews with individuals involved in fisheries governance. Preliminary findings indicate that women experienced disproportionately severe economic, food security, and social impacts, reflecting lower adaptive capacity. The study highlights the need for participatory, equity-centered fisheries governance to support sustainability and social resilience.

Patricia Bye[1], Lauren Fry[2], Yi Hong[3], James Kessler[2] and Jonathan M Waddell[1], [1]US Army Corps of Engineers, Detroit, MI, [2]Great Lakes Environmental Research Laboratory, NOAA, Ann Arbor, MI, [3]Cooperative Institute for Great Lakes Research, University of Michigan, Ann Arbor, MI.
Integration of Subseasonal-to-Annual Meteorological Forecasts into Operational Great Lakes Runoff Prediction.

The interpolation of surface observations has been a backbone of Great Lakes water balance monitoring, notably for models incorporated into the Great Lakes Seasonal Hydrologic Forecast System (GLSHyFS), which is used for monitoring and seasonal water level forecast applications by the U.S. Army Corps of Engineers. While interpolation is reasonable when gauge densities are large, the approach is challenged when surface observations are sparse. This study evaluates leveraging the NOAA Climate Forecast System (CFS) as an alternative input dataset for operational use of the

Large Basin Runoff Model (LBRM), which is the rainfall-runoff model within GLSHyFS. Although previous work has shown limitations in applying this model to decadal-scale predictions due to the evapotranspiration method used, this approach, modified to approximate the Clausius-Clapeyron relationship (LBRM-CC) remains in use for historical simulation and seasonal-scale prediction. To address the challenge of maintaining an operational system relying on surface observations alone, we recalibrate LBRM-CC using CFS Reanalysis (CFSR) data and evaluate its ability to ingest CFS forecast meteorology to generate seasonal runoff predictions. We describe the recalibration methodology, the integration of CFSR variables, and present results demonstrating that CFS-driven LBRM-CC simulations reproduce key hydrologic behaviors across Great Lakes basins. This modeling framework offers a viable pathway to restoring operational runoff forecasting capacity, while also supporting the development of emerging subseasonal-to-annual net basin supply forecasts.

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Rachel Cable[1], Kennedy Bucci[2], Desiree Langenfeld[3], Rachel McNamee[4], Cody Veneruzzo[5], Chelsea Rochman[2, 3] and Melissa Duhaime[1], [1]University of Michigan, [2]University of Toronto, [3]IISD-ELA, [4]University of Waterloo, [5]Lakehead University. **Microplastics concentration differentially affects pelagic microbial communities in a large-scale lacustrine mesocosm experiment.**

Microplastics inputs into aquatic environments are increasing rapidly, on track with plastics production. Yet microplastic effects on microbial communities, the base of aquatic food webs in these environments, is poorly understood. To address this knowledge gap, we conducted a large-scale mesocosm experiment in Lake 378 at the International Institute for Sustainable Development Experimental Lakes Area (IISD-ELA). Each mesocosm was stocked with lake water, including native microbes, plankton, and fish. Microplastics (polyethylene, polystyrene, and polyethylene terephthalate) were added at concentrations spanning current and projected freshwater levels, ranging from 0 to 29,240 microplastics/L. We monitored the pelagic microbial communities over a 70-day period. We found that the taxonomic diversity of bacteria associated with particulate matter increased with microplastic concentration in the first 6 days post-addition, with the highest concentrations sharing the most similar community compositions, and no significant effect was seen for the remaining 70 days. In contrast, the diversity and composition of free-living bacteria showed no significant response to microplastic concentration, suggesting that the microplastic particles are a novel environment that selects for microbes distinct from those that colonize natural particles. As the rate of microplastic inputs increases, these shifts in microbial diversity and composition may become more prevalent and persistent. These results reveal the short-term impacts of microplastics on the microbial community within a natural freshwater environment, providing insights into changes induced throughout the food web and ecosystem.

Paxton Calhoun[1], Sierra Sullivan[2], Lauren Jarvis[3], Matthew Bayly[4], Aimee Fullerton[1], Morgan Bond[1] and Jordan Rosenfeld[5], [1]NOAA, [2]University of British Columbia, [3]University of Toronto, [4]M.J., Bayly Analytics Ltd., [5]B.C. Ministry of Environment. **Authoring stressor-response functions and the role of an e-library in salmonid science and management.**

Stressor-response functions provide quantitative relationships that link environmental stressors to biological responses. They are foundational to life cycle models, restoration planning, regulatory policy, and cumulative effects assessment. Despite their importance, stressor-response functions are widely scattered across the literature and reported in inconsistent ways: some provide

equations, others only show plotted curves without underlying data available, and many use different units, scales, or models. This fragmentation makes it difficult to compare across studies or incorporate published relationships into population models. Here we outline best practices for authoring stressor-response functions, identify common challenges, and highlight how an open-source stressor-response e-library can transform their application. We show how the e-library supports major domains of practice including life cycle and population models, cumulative effects and multi-stressor assessments, restoration prioritization, and environmental policy and regulation. Drawing from recent advances in stressor-response theory, empirical analysis, and governance perspectives, we argue that a curated, collaborative stressor-response e-library enhances transparency, comparability, and efficiency in salmonid management. We conclude that such a repository is crucial infrastructure for bridging ecological science and applied decision-making.

Javad Javaherian[1], Hazem Abdelhady[2], **David Cannon**[3], Jia Wang[4], Ayumi Fujisaki-Manome[3] and Lei Zuo[1], [1]University of Michigan, NAME, [2]Texas A&M University, Department of Geography, [3]University of Michigan, CIGLR, [4]NOAA GLERL. **Assessing Ice Risks for Offshore Engineering in the Great Lakes.**

Offshore wind farms are being explored as a potential green energy source in the Laurentian Great Lakes, with applications anticipated to improve regional decarbonization, energy security, and economic development. While the region's wind energy potential is substantial (>700GW), harsh winters and seasonal lake ice pose unique challenges for year-round offshore structure deployments. The ice environment introduces unique engineering and operational risks, and there is limited climatological ice data available to inform cost-effective engineering designs. In this study, we address this gap using a fully coupled three-dimensional hydrodynamic-ice model (FVCOM-CICE), generating spatial and temporal distributions of ice concentration, ice thickness, and ice velocity across all five Great Lakes between 1940 and 2022. Simulations are validated against satellite and in-situ measurements, highlighting strong model performance for all variables of interest. Ice hindcasts are used to inform major engineering design challenges, including ice momentum, locked-in ice risks, and icing severity. Locked-in risks (i.e. ice pressure) dominate in Lake Erie, while icing risks (i.e. ice growth on structures) are most extreme in Lake Superior. Ice momentum risks are highest in eastern Lake Huron and Lake Erie, where maximum ice velocities sometimes exceed 1m/s. Variable risk-types are integrated to develop a spatially explicit ice intensity index. This index enables site-specific quantification of overall ice hazards to support more robust offshore structure siting, design, and risk mitigation.

Sara Cannon[1], Jared Connoy[1], Janessa Esquible[2], Lawrence Ignace[3], Jonathan Moore[4], Nigel Sainsbury[4] and Andrea Reid[1], [1]Centre for Indigenous Fisheries, University of British Columbia, [2]Great Lakes Fishery Commission, [3]University of Victoria, [4]Salmon Watersheds Lab, Simon Fraser University. **Cumulative Injustices in Pacific Salmon Governance.**

Pacific salmon (Oncorhynchus spp.) underpin the ecosystems, cultures, and economies of the Pacific Northwest, yet they face a convergence of threats that largely emerged or intensified with settler colonialism in North America. This review examines wild Pacific salmon governance through an explicit justice and equity lens. We apply four forms of equity widely recognized in the peer-reviewed literature—recognitional, procedural, distributional, and contextual—and extend this framework to include epistemic equity, addressing injustices imposed on Indigenous Peoples and their knowledge systems. We synthesize evidence showing how cumulative stressors rooted in colonial management regimes—including mixed-stock marine fisheries, climate change, invasive species, land-use change, pollution, and aquaculture—are driving salmon declines while

simultaneously producing cumulative injustices for Indigenous Salmon Peoples who have stewarded these populations for millennia. Spanning diverse ecological and socio-economic contexts from California to Alaska and beyond, this review highlights both shared governance failures and place-based pathways for reform. We argue that salmon governance represents a critical opportunity for transformative justice, and that advancing equitable conservation requires centering Indigenous rights, knowledge, and leadership alongside ecological integrity. Reframing salmon management through a justice-oriented lens is essential for sustaining both salmon populations and the human communities who depend on them.

Luca Cargnelli and Stacey Cherwaty-Pergentile, Canada Water Agency. **Engaging Great Lakes Residents Through Community-Based Science: Collecting Data and Driving Action.**

Community scientists have an important role to play in safeguarding the health of the Great Lakes - collecting important data, sharing insights, and taking meaningful action to protect and restore these waters. Through the Great Lakes Freshwater Ecosystem Initiative, the Canada Water Agency (CWA) is supporting eleven community-based science projects that are actively collecting water quality and ecosystem health data along the shores of the Great Lakes, expanding monitoring efforts and helping to address priority science issues including nutrients, toxic chemicals, nearshore ecosystem health, and climate adaptation and resiliency. The funded projects are advancing public knowledge and understanding on Great Lakes issues and improving the sharing and availability of data to support research, environmental reporting, and indicator assessments, to advance broader application of new technologies, and to support restoration efforts in the Great Lakes. Community-based science plays a significant role in supporting research and informing decision-making in the Great Lakes. It also serves an important educational function, building environmental awareness and knowledge while fostering long-term stewardship. This presentation will highlight early results and future plans of the funded projects, as well as the ways the data being collected are already being applied. The CWA will continue to support the growth of community-based science in the Great Lakes, focusing on efforts to address priority science issues and increase the value and impact of community-based science.

Kellie Carim, Dan Isaak, Michael Young, Dona Horan, Dave Nagel and Gwynne Chandler, U.S. Forest Service - Rocky Mountain Research Station. **Broadscale eDNA sampling to define historical, current, and future Pacific lamprey distributions.**

Pacific lamprey (Entosphenus tridentatus) were once abundant in Pacific Northwest streams. Like many anadromous species, they have declined over the last century due to habitat loss and fragmentation throughout their historic range. In response, numerous Tribal, federal, and state and natural resource agencies have initiated conservation projects focused on improving habitat quality and connectivity, as well as reintroductions in historically occupied habitat. Given the breadth of these activities, information on the current species' distribution and suitability of current and future habitat is needed to prioritize conservation efforts and increase long-term conservation success. To address this need, we led a broadscale eDNA sampling effort to assess current distributions and develop habitat suitability models for Pacific lamprey throughout the Columbia River basin and coastal subbasins of Oregon and Washington. Over 2,600 unique locations were surveyed using eDNA with support from over three dozen Tribes, natural resource agencies, local governments, and NGOs. Subsequent presence/absence data from eDNA was analyzed in a spatial stream network modeling framework to identify predictors of Pacific lamprey occurrence. Results indicate that Pacific lamprey occurrence is positively correlated with temperature, and negative correlated with elevation, stream slope, road densities and prevalence of agriculture in a subbasin. This model

was then used to develop historical distribution maps based on habitat quality in the absence of human activities, and to identify areas for targeted conservation efforts.

Amy Carlson[1], Dane Roberts[2], Nicole Balk[3], Kurt Heim[4], Brooke McConnell[1], Trevor Pitcher[2] and Christine Madliger[1], [1]Algoma University, [2]University of Windsor, [3]New York State Department of Environmental Conservation, [4]U.S. Fish and Wildlife Service. **Does soft release allow physiological recovery from transport in stocked Atlantic Salmon (Salmo salar)?**

Given the precipitous losses facing freshwater fish populations, reintroduction is becoming an increasingly important conservation approach. Transport is an unavoidable component of this process and introduces stress that may hinder the ability of fish to survive and establish in their new environment. Most transport events involve direct stocking procedures where fish are immediately introduced to the release waterbody. Soft release is an alternative approach where fish are given an acclimation period that may promote recovery from transport-induced stress, therefore improving overall success of fish reintroduction programs. Working in conjunction with a stocking project for Atlantic salmon (Salmo salar) that provides a 3-week acclimation period using net pens, we examined 1) how stress physiology changes from pre-transport to post-transport; 2) whether soft release allows for recovery to baseline physiological levels and over what timeframe; 3) how stress levels of fish undergoing soft release compare to directly stocked fish. We quantified measures of the physiological stress response including cortisol, glucose, and lactate via non-lethal blood sampling. We found significant differences in physiological metrics between non-transported and transported fish, an attenuation over the holding period, and a subsequent increase on full release from the net pens. Our results inform stocking programs on whether soft release methods promote recovery for Atlantic salmon. We provide further recommendations for fish management practices related to soft release processes, which in turn may bolster sustainable fish populations.

Tyanna Carpenter, University of Toronto. **Embodying Anishinaabeg Water Relational Obligations for Collective Futures.**

I will highlight the efforts and structures of Anishinaabeg ways of doing and responsibilities to inform how I approach key questions guiding this research, including: how do Anishinaabeg rebuild human and non-human relations under the imposition of settler colonial violence that is facilitated and legitimized through colonial jurisdictions that are imposed on Treaty #3? Relatedly, how do conceptions of Anishinaabeg relationality help to understand how relational obligations can be extended to include our kinship networks and other anti-colonial communities in joint struggle? By engaging with the work of those who have come before me in Anishinaabeg activism and resistance in Treaty #3, I respond to pathways shared, rooted in active engagements, guided by ceremonies that aim to fulfill our original instructions; 1) honor the autonomy of the land and waters Anishinaabeg are caretakers of; 2) to offer a (re)mapping of how our relational obligations are embodied and how they extend beyond federal reservation or treaty lines; 3) to highlight the continued resistance of Anishinaabeg community, land and water relations, as we continually work to maintain who we are as Anishinaabeg. Through relationship building, we have a duty to respond to our broader anti-colonial kinship networks as Anishinaabeg, for mobilization in community organizing that extends our territory lines as an embodied practice. How well we embody them, individually and collectively, reflects the strength and protection of our lands and waters.

Paloma Carvalho[1], Kelsey Johnson[1], Kyle Elliott[2], Steven Ferguson[1], Aaron Fisk[3], Grant Gilchrist[4], Kevin Hedges[1], Oliver Love[3], CJ Mundy[5], Andrea Niemi[1], Wesley Ogloff[5], Bruno Rosenberg[1], Cortney Watt[1] and David Yurkowski[1], [1]Fisheries and Oceans Canada, [2]McGill University, [3]University

of Windsor, [4]Environment and Climate Change Canada, [5]University of Manitoba. **2D to 3D: Exploring variation of niche dimensionality across consumers in a coastal Arctic ecosystem.**

Quantifying trophic interactions and resource partitioning is key to defining species niches and understanding ecosystem structure and function. However, climate change is altering species distributions, predator-prey dynamics, and resource use, with pronounced effects in the Arctic. Stable isotope analysis of carbon ($\delta^{13}C$) and nitrogen ($\delta^{15}N$) has been widely used to estimate isotopic niches and quantify niche overlap among species, a two-dimensional approach (2D). However, $\delta^{13}C$ is not always sufficient to differentiate habitat and resource use among species. Incorporating sulfur stable isotopes ($\delta^{34}S$) can enhance resolution in such cases. Using an Arctic coastal food web as a model, we applied a three-dimensional isotopic niche approach (3D: $\delta^{13}C$-$\delta^{15}N$-$\delta^{34}S$) to 717 individuals across 69 species spanning multiple taxonomic groups (invertebrates, fish, seabirds, and marine mammals) that utilize benthic and pelagic resources. We compared traditional 2D with 3D niches estimates to assess changes in niche size and overlap. Benthic-associated species, such as common eider (Somateria mollissima) and various benthic invertebrates, exhibited greater changes in niche size with the addition of $\delta^{34}S$ than pelagic-associated species. Moreover, overlap among benthic-associated taxa decreased with the 3D approach, indicating better resolution of habitat use and resource partitioning. This finding likely reflects the greater ecological diversity, foraging specialization and more complex food web structure characteristic of benthic ecosystems. We recommend incorporating $\delta^{34}S$ for aquatic studies that involve benthic habitats and emphasize the value of multidimensional approaches in niche analysis.

Nora Casson[1], Darshani Kumaragamage[1], Inoka Amarakoon[2], Viranga Arachchilage[1], Karl Friesen-Hughes[3], Doug Goltz[1], Srimathie Indraratne[1], Nelum Jayarathna[2], Hansika Lewkebandara[1], Chelsea Lobson[3] and Henry Wilson[4], [1]University of Winnipeg, [2]University of Manitoba, [3]Lake Winnipeg Foundation, [4]Agricultural and Agri-food Canada. **Understanding and mitigating snowmelt phosphorus loss from agricultural soils within the Red River Basin.**

Snowmelt phosphorus (P) runoff from agricultural areas across the Red River Basin vary substantially among years and across the region, making it challenging to target management practices. During the snowmelt period, croplands are flooded for up to several weeks, with multiple freeze-thaw events, and dissolved and bioavailable P losses from the soil to overlying floodwater are substantial, meaning that management practices in this region need to account for these environmental conditions. Our research has two main objectives: 1) to develop a risk indicator for snowmelt P runoff based on soil properties across the Red River Basin; and 2) to evaluate the effectiveness of the co-application of chemical soil amendments to mitigate snowmelt P loss from hotspot locations. In Fall 2025, we installed collected soil samples from 117 sites across the Red River Basin south of Winnipeg. At 20 of the sites, we installed snowmelt collectors, where snowmelt runoff will be collected daily in Spring 2026. At 2 sites, gypsum and ferric chloride were co-applied to 1m x 1m plots at 1:1 and 1:2 ratios to assess the effectiveness of these amendments at reducing snowmelt P concentrations compared with control plots. Soil samples from all sites were analyzed for Olsen P and other basic properties. The results of this study will help us provide targeted, practical advice for mitigating snowmelt P runoff at areas from hotspots across the Red River Basin.

Jeffrey Cederwall[1, 2], Arthur Zastepa[3], Daniel Beach[4] and Pete Cott[2], [1]Canada Water Agency, Yellowknife, NT, [2]Government of Northwest Territories, Environment and Climate Change, Yellowknife, NT, [3]Environment and Climate Change Canada, Canada Centre for Inland Waters, Burlington, ON, [4]Metrology Research Centre, National Research Council Canada, Halifax, Nova

Scotia. **Emerging cyanobacteria blooms in Great Slave Lake: Observations from Indigenous, local, and scientific knowledge.**

The subarctic waters of Great Slave Lake (also known as Tinde'e, Tucho, and Tu Nedhé) have long been considered too cold and too unproductive to support cyanobacteria blooms. However, cyanobacteria blooms, typically associated with warm, eutrophic lakes, are increasingly being observed in colder temperate lakes. Here, we combine Indigenous, local, and scientific knowledge to document new and increasing cyanobacteria blooms in Great Slave Lake. Local land users reported no cyanobacteria blooms in Great Slave Lake before 1989. The first suspected blooms were small and observed near point-source sewage effluent in an isolated area of the North Arm. Over the last 15 years, new blooms have spread in size, density, and locations and have been observed as far as the deeper East Arm in 2024 and 2025. These dense floating blooms were usually observed along shorelines in late summer and were short-lived. Dolichospermum is the dominant cyanobacterial genus. Our initial testing did not detect the production of potent liver toxins (microcystin) but does confirm that blooms possess the genetic potential to produce microcystins and other cyanotoxins. By analyzing information across knowledge systems, we establish a foundation for collaborative research and monitoring in our rapidly changing northern water bodies. This knowledge bridging may be particularly important in the north, where scientific research and surveillance have been greatly limited by resources and the remoteness of these regions.

Justin Chaffin[1], Thomas Bridgeman[2], Amber Beecher[2] and Judy Westrick[3], [1]The Ohio State University, [2]University of Toledo, [3]Wayne State University. **Anabaenopeptins in Lake Erie.**

Lake Erie cyanobacterial bloom research and advisory limits have focused on microcystins. However, with recent detections of non-microcystin toxins, researchers are beginning to investigate other bioactive peptides produced by cyanobacteria. One such group of peptides are the anabaenopeptins. We conducted a two-year investigation into anabaenopeptins in the western basin of Lake Erie during the 2024 and 2025 bloom season and compared anabaenopeptins to microcystins. We analyzed 163 samples for anabaenopeptins collected weekly to biweekly (June through mid-October) from waters near the Maumee River to the Bass Islands. Anabaenopeptins were detected before microcystins, and anabaenopeptins' peak concentrations were four times higher than microcystins. Anabaenopeptins were primarily in the cellular phase. Collectively, these suggest that anabaenopeptins can serve as an early warning for microcystins, and that removing intact cells is the best approach for water treatment. The congener anabaenopeptin-F accounted for more than 90% of all anabaenopeptins; therefore, previous studies that did not include anabaenopeptin-F could have drawn misleading conclusions. In five incubation experiments conducted throughout early to late bloom, anabaenopeptins concentrations were not affected by enrichments of phosphorus and/or nitrogen. However, in the same experiments, the highest cyanobacterial biomass and microcystin concentrations occurred in treatments with phosphorus and nitrogen enrichment, suggesting that the environmental trigger for microcystins and anabaenopeptins differs. Further research and monitoring of the anabaenopeptins are needed.

Gillian Champoir[1] and Christopher Ward[1, 2], [1]Bowling Green State University, [2]University of Massachusetts Dartmouth. **Microbes Meet Microplastics: How Plastics Shape Freshwater Microbial Communities.**

Containing nearly 90% of the United States' surface freshwater, the Great Lakes constitute one of the few freshwater systems that simultaneously support large-scale shipping, industrial activity, agriculture, and municipal drinking-water supplies, making them a unique point of study across many disciplines. This system is increasingly burdened by plastic pollution, which delivers an

estimated 10,000 metric tons of waste to the lakes each year. Beyond the physical presence of microplastics and fibers, the chemical additives that leach from plastic debris are also of concern and how they may alter freshwater ecosystem function— particularly the base of the freshwater food web— has not been thoroughly studied. Here, we performed a multipronged study to examine the effects of plastics on phytoplankton and microbial communities. First, we assessed the toxicity of leachates made from plastic preproduction pellets of commonly used plastics on freshwater phytoplankton, Scenedesmus dimorphus and Microcystis aeruginosa. Surprisingly, the highest leachate concentrations of all plastic types resulted in increased algal growth compared to unamended cultures. Second, we characterized microbial community assembly on plastic pellets incubated in Lake Erie water over eight-week periods in late spring-summer (diatom bloom) and midsummer-fall (cyanobacterial bloom). Clear successional patterns were observed in which distinct heterotrophic groups associated with organic matter degradation appeared at early, intermediate, and late stages.

Andrea Chandler[1], Michael Wilkie[2] and Ken Jeffries[1], [1]University of Manitoba, [2]Wilfrid Laurier University. **Comparing Key TFM Detoxification Genes Across Fish Taxa.**

The lampricide 3-trifluoromethyl-4-nitrophenol (TFM) is widely used in the Laurentian Great Lakes to manage invasive sea lamprey (Petromyzon marinus) populations. TFM targets lampreys because of their lower capacity to detoxify TFM compared to jawed fishes. A key part of the TFM detoxification process involves the UDP-glucuronylsyltransferase (UDPGT) family of enzymes, which converts TFM to a more hydrophilic molecule that can be effectively eliminated from the body. The efficiency and variety of UDPGT enzymes vary by species, with TFM tolerant species exhibiting a more diverse and responsive set of ugt genes. Our work will compare ugt genes across a variety of fishes with varying tolerance to TFM and different phylogenies. Diet may also influence an organism's detoxification ability, as several hypercarnivorous animals have a pseudogene of a key UGT enzyme used to detoxify phenolic compounds. This suggests that animals that evolved to exclude plants from their diet may have reduced ability to detoxify various chemicals often found in plants, such as phenols. We will compare conserved ugt gene sequences in publicly available, annotated transcriptomes to quantify the diversity of ugt genes across species and investigate the phylogenetic variation in TFM sensitivity and carnivory. Comparing the diversity of ugt genes will allow us to predict a non-target fish's sensitivity to TFM as well as further our understanding of the evolutionary mechanisms driving the detoxification processes across fish taxa.

Xuexiu Chang[1, 2], Hugh MacIsaac[2, 3], R. Michael McKay[2], George Bullerjahn[4], Christopher Aura[5] and Kefa Otiso[4], [1]Yunnan Collaborative Innovation Center for Plateau Lake Ecology and Environmental Health, College of Agronomy and Life Sciences, Kunming University, Kunming 650214, China, [2]Great Lakes Institute for Environmental Research, University of Windsor, Windsor, ON N9B 3P4, Canada, [3]School of Ecology and Environmental Science, Yunnan University, Kunming 650091, China, [4]Department of Biological Sciences, Bowling Green State University, Bowling Green, Ohio, USA, [5]Kenya Marine and Fisheries Research Institute, 1881-40100, Kisumu, Kenya. **Bridging the aquatic continuum across continents: challenges and benefits of a multi-national collaboration on cyanobacterial blooms under One Health Framework.**

Navigating the complexities of harmful cyanobacterial blooms (cHABs) in large lake systems demands transcending geographic and disciplinary silos. Beginning with the establishment of the Sino-Canadian Plateau Lakes Alliance, our collaborative framework has evolved from a bi-national partnership between China and Canada to a multi-continental network now including U.S. and Lake Victoria in East Africa. Our partnership was initially solidified through the first joint workshop in

Kunming (2015). It was further strengthened by extensive faculty/students exchanges and shared field campaigns, such as participation in the 2019 Lake Erie HABs Grab. Recently, these efforts expanded globally, exemplified by the July 2024 "Horizon Scan" workshop in Kunming, which convened 23 of the world's leading scientists to address priorities in freshwater cHABs research. By adopting an "aquatic continuum" perspective, our team now integrates limnology, fisheries science, and agriculture to examine how cHABs translate into One Health risks. This is supported by concrete milestones, including coordinated field sampling in Lake Victoria, Kenya, in November 2025. Building on this decade-long collaboration, we have conquered specific challenges, such as differing regulatory contexts and diverse priorities, alongside significant benefits. Cross-system comparisons have strengthened our inferences on the shared risks of cyanobacterial toxicity and supported a "One Health" perspective. We conclude this presentation by offering practical strategies for sustaining effective international research teams, demonstrating how experience-based partnerships can accelerate progress in managing lake ecology and environmental health worldwide.

Karolina Charczynska and Patricia Chow-Fraser, McMaster University. **A volunteer-friendly method to screen for eutrophication in nearshore waters based on TP-periphytic chlorophyll relationship.**

Nearshore zones and embayments in large lakes are particularly vulnerable to anthropogenic phosphorus (P) inputs, making long-term water-quality monitoring essential for preventing eutrophication. Due to funding cut-backs, governments are becoming reliant on community-based volunteers to maintain these programs, necessitating development of simpler monitoring methods that do not require expensive, specialized tools and extensive volunteer training. We developed the "Periplate" method to quantify periphytic algal biomass (CHLperi) that colonize clean glass slides during a standardized incubation period. Minimum of 12 periplates can be suspended approximately 50 cm below the water surface inside a periphytometer for 14 days. Assuming that P is the only limiting variable, we can relate the amount of CHLperi to ambient P concentrations. To enhance accessibility and scalability for community-based programs, CHLperi extracts were also analyzed with a NIX colour sensor to measure red, green, and blue (RGB) values. We obtained CHLperi at 42 nearshore sites in Lake Erie, Lake Ontario, southeastern Georgian Bay and several recreational inland lakes. We found a highly significant relationship between CHLperi and total P(TP) ($R2=0.328$, $p<0.0001$). B-values obtained by the NIX colour sensor were highly correlated with CHLperi concentrations ($R^2=0.480$, $p<0.0001$). Differences in CHLperi among TP categories (<10, 10-20, and >20 μg/L) demonstrate that this bioassay provides a reliable, low-cost method for assessing trophic status in nearshore environments, with potential for detecting long-term changes in water quality and identifying localized nutrient hotspots.

Emily Chase[1], Parkirat Saggi[1] and Steven Wilhelm[2], [1]University of Winnipeg, [2]University of Tennessee Knoxville. **Tales of Lake Erie viruses using TALE/GALE.**

Publicly available sequencing data is often an underused resource for broad questions within ecology. The efforts of multiple research groups can be ethically combined to investigate larger questions within complex environments where species interactions, biogeochemical cycling, and anthropogenetic inputs, and other factors, heavily influence the environment's dynamics. At the microbial level large lake ecology holds many untold stories, and we can explore these (and validate other findings) by amalgamating previous sequencing efforts spanning a single environment temporally and spatially. We have combined past sequencing projects of Lake Erie into two subsections, the metagenomes and metatranscriptomes. Metagenomes provide information on species genomic potential, relatedness, and when possible whole species genomes.

Metatranscriptomes provide information on the expression of genes, therefore, what processes are being carried out by microbes in their environment and confirms the usage of "genomic potential" within metagenomes. We have called the metagenome section Genomes Assembled from Lake Erie (GALE), and the metatranscriptome section Metatranscriptomes Assembled from Lake Erie (TALE). This presentation will provide a look at Lake Erie viruses using TALE/GALE: showcasing diversity and ecological tales.

Samuel Chasse[1], Caleb Hasler[1], Imogen Bellinger[1] and Eric Mullen[2], [1]University of Winnipeg, [2]Government of Manitoba. **Monitoring a Stocked Muskellunge (Esox masquinongy) Population Using Photo-Identification and Angler Submitted Data.**

The current methods used to assess recreational fish stocks require substantial time and monetary investment. The rising popularity of online angling platforms presents an opportunity for fisheries managers to expand monitoring effort beyond the limits of traditional field sampling. Photo-identification using computer assisted pattern recognition software leverages unique natural skin markings to identify individuals within a population. This technique offers a cost effective and non-invasive alternative for monitoring recreational fisheries from angler submitted photographs. Currently, only a handful of fishes have been identified as successful candidates for photo-identification and long-term pattern stability remains uncertain in most species. We examined the effectiveness of this approach in a stocked population of muskellunge (Esox masquinongy) in West Watjask Lake, Manitoba. We evaluated the accuracy of photo-identification by tagging and photographing muskellunge over two consecutive summers. Using a freely available pattern recognition program, we were able to correctly match all images of recaptured fish to a reference database of initial captures (n = 170). We then examined angler submitted images of muskellunge occurring over the same period from a mobile angling application. By incorporating angler submitted data, we improved the precision of our population estimates and uncovered additional insights into the population status. Our results demonstrate the potential for integrating citizen science data into cost-effective monitoring programs for recreational fisheries.

Phoolman Chaudhary, Asian Indigenous International Network. **Wisdom of Indigenous Peoples: Protecting Lakes, Life, and the Future.**

"Wisdom of Indigenous Peoples: Protecting Lakes, Life, and the Future" highlights the vital role lakes play in ecosystems and Indigenous cultures, where they are regarded as sacred, living entities central to spiritual, cultural, and ecological well-being. Facing growing threats from climate change, pollution, and unsustainable development, the initiative emphasizes Indigenous knowledge systems rooted in stewardship, reciprocity, and holistic management as essential solutions for protecting freshwater ecosystems. By elevating Indigenous voices and fostering cross-cultural collaboration, it promotes Indigenous-led lake stewardship through wisdom gatherings, case studies, ceremonies, policy dialogues, and youth storytelling. Targeting communities, policymakers, researchers, and the public, the initiative seeks to strengthen Indigenous water rights, advance inclusive co-governance, preserve traditional ecological knowledge, and inspire a just, sustainable future for lakes and the life they support.

Val Klump[1], Jerome Marty[2], Bill Mattes[3], Gail Krantzberg[4], Samir Qadir[5], John Bratton[6] and **Matthew Child**[7], [1]University of Wisconsin-Milwaukee (Emeritus), [2]International Association for Great Lakes Research, [3]Great Lakes Indian Fish & Wildlife Commission (Retired), [4]McMaster University (Emeritus), [5]Potomac-Hudson Engineering, [6]LimnoTech, [7]International Joint

Commission. **Great Lakes Decadal Science Plan: The Science We Need for the Lakes We Want.**

Despite the Great Lakes' significance as a vital source of freshwater supporting one of the largest regional economies in the world, there has never been a comprehensive, basin-wide assessment of the science needs required to support their long-term stewardship. Building on its 2022 Great Lakes Science Strategy, the Science Advisory Board of the International Joint Commission has drafted the Great Lakes Science Plan to guide the research, coordination, and capacity needed to enhance scientific understanding and enable resilient, adaptive management across the basin. Developed with guidance from a 33-member project Collaborative and informed by six thematic workshops and extensive engagement - including with Indigenous partners and other community voices - the Science Plan identifies priority science gaps and needs, examines management and governance requirements, and estimates the level of investment necessary to meet future challenges. This presentation will outline the case for a decadal-scale expansion of the Great Lakes science enterprise. It will highlight the need for strengthened foundational research, enhanced monitoring and long-term observational records, advanced modeling and forecasting systems, investments in human capital and workforce development, research infrastructure such as Centers of Excellence, and integration of socio-economic perspectives into science and management. We welcome participant input on these elements and invite discussion on how increased investment in management- and policy-relevant Great Lakes science can better prepare the region for the emerging stressors and threats of the coming decades.

Carolyn Chinguo Munthali[1, 2], [1]AWIS, [2]Department of Fisheries, Malawi. **Bridging policy and practice: Gender responsive climate change adaptation in Malawi's Fisheries Sector.**

Women play key roles in the small-scale fisheries value chain, yet they are overlooked in national policies and development interventions and underrepresented in formal governance processes, including decision-making. This study integrated policy and community-level analysis to assess gender responsiveness in Malawi's fisheries sector under the pressures of climate change. The study used the Gender in Agricultural Policies Analysis (GAPo) tool developed by FAO, to analyze the gender responsiveness of nine climate change-related policies in relation to Malawi's fisheries sector. Results showed that although Malawi's climate policy frameworks demonstrate moderate gender inclusion (60%), operational mechanisms remain weak. Out of the reviewed policies, 22% were considered gender blind, 22% gender sensitive, 22% gender accommodative, 11% were gender responsive, and 22% were gender transformative. Community-level results show that women dominate post-harvest roles, with 95.7% of female respondents engaged in fish processing or trade. However, only 10% of the women participate meaningfully in community-level fisheries decision-making bodies. Even though 52% of the respondents interviewed reported joint adaptation decisions, men retained control over financial investments and resource access. Furthermore, there was low awareness of supportive government policies, with 72.5% of the respondents indicating they had no knowledge. Gender-responsiveness therefore requires bridging the gap between policy and practice by including gender indicators in climate change interventions, enhancing institutional accountability and enabling women's participation in community-level structures.

Patricia Chow-Fraser, McMaster University. **Tecta B-16 and community-based monitoring methods for monitoring fecal bacterial contamination in surface waters.**

The Tecta B-16 (Tecta, Idexx Laboratories) has been described as a "lab in a box", an accurate and automated detection system) that is more rapid and reliable over traditional manual culture methods for quantifying Escherichia coli (EC), but is also a very expensive option for

community-based monitoring (CBM) programs, which tend to choose simpler and inexpensive options such as Coliplate (Bluewater Biosciences) and R-CARDs (Roth Biosciences). Here, I compare the performance of CBM methods against those of the Tecta for samples collected in tributaries and nearshore regions of several Laurentian Great Lakes in 2022 and 2025. In uncontaminated sites (<100 colony forming units (CFU)/100 mL), $\log_{10}$ EC obtained by Tecta was significantly related to $\log_{10}$ EC obtained by Coliplate; Tecta results were consistently and slightly higher than Coliplate values in parallel trials. When concentrations of EC were high (>5,000 CFU/100 mL) and in uncontaminated sites such as those in Georgian Bay, both 1-mL and 3-mL R-CARDS, the Coliplate and the Tecta yielded similar results. At sites with intermediate conditions, however, the Tecta tended to be significantly higher. It would be very beneficial to develop calibration curves relating results of various CBM methods with those of the Tecta so that datasets can be comparable for meta-analyses.

Alycia Chubaty[1, 2], Kevin Hedges[2] and Margaret Docker[1], [1]University of Manitoba, [2]Fisheries and Oceans Canada. **Estimating Greenland Shark abundance to better understand the ecosystem of a Greenland Halibut fishery.**

Greenland Sharks are the primary bycatch species in the Greenland Halibut fishery in Cumberland Sound, Nunavut. Greenland Sharks have long lifespans, slow growth rates, and delayed maturation, making their populations extremely sensitive to any declines. Since they are highly mobile top predators, a reduction in their abundance could be detrimental to Arctic ecosystems in Canada, which support Inuit communities through commercial and subsistence harvesting. Previous studies highlighting the ecosystem-wide impacts of the loss of a top predator should elicit a precautionary response regarding the protection of Greenland Sharks as top predators of Arctic ecosystems. Despite their direct ecological and indirect economic importance, Greenland Shark abundance in Cumberland Sound is currently unknown. The continued improvement of Baited Remote Underwater Video (BRUV) technology provides a non-invasive method to study fragile environments. BRUV footage will be used to estimate the abundance of sharks in Cumberland Sound and their distribution relative to habitat features. A mark-recapture population estimate will be conducted after identifying individual sharks using unique morphological features. A second abundance estimate using the elapsed time before the first shark is observed, bottom current speed, and mean shark swimming speed will also be used, and methods will be compared. Greenland Shark abundance estimates will provide baseline data on these top predators that will support an ecosystem approach to managing Cumberland Sound's Greenland Halibut stock and ensuring the sustainability of this fishery.

Kathleen Church[1], Adriana Aguilar-Melo[2], Hugo Asselin[3] and Katrine Turgeon[2], [1]Missouri State University, [2]University of Quebec at Outaouais, [3]University of Quebec at Abitibi Temiscamingue. **Fish Habitat Compensation in Eeyou Istchee: Is Trying Enough?**

Industrial activity is prevalent in Eeyou Istchee, the traditional home of the Cree people in the James Bay region of Northern Quebec. Since the mid-1980s, industry proponents must outline plans for fish habitat compensation to receive authorization from Canada's Department of Fisheries and Oceans to engage in any development activity that will result in the harmful alteration, disruption or destruction of fish or fish habitats. The goal of these fish habitat compensation projects is No Net Loss of Canada's fish habitat productivity, with fish habitat compensation serving as a compromise between continued industrial development and the preservation of Canada's fisheries resources. Here, we outline five recent industrial development projects and their associated fish habitat compensation projects in Eeyou Istchee. These projects include a hydropower project,

two mining projects, a road extension project, and the repair of two existing roads. Overall, we found that the priority for these five fish habitat compensation projects was their structural integrity and potential ability to function as designed, rather than any proven beneficial effects on fish reproduction and fish population dynamics. In cases where fish populations continued to decline despite the habitat compensation projects, nothing further was done. Proponents were only held accountable for the completion of the planned compensation work, but not for the consequences of their fish habitat compensation projects.

Jan Ciborowski[1], Erik Biederstadt[1], Jean Birks[1], Evan Bishko[1], Elizabeth Gillis[1], Peter Dunfield[1], Gillian Donald[1], John Headley[2], Hunter Jackson[1], Scott Ketcheson[3], Murdoch McKinnon[1], Ashlee Mombourquette[1], Felix Nwaishi[4], Hannah Porter[1], Mir Mustafiz Rahman[1], Jabed Tomal[5], Ian Vander Meulen[2], Michael Wendlandt[1], Christopher Weisener[6] and Frederick Wrona[1], [1]University of Calgary, [2]Environment and Climate Change Canada, [3]Athabasca University, [4]Mount Royal University, [5]Thompson Rivers University, [6]University of Windsor. **Vegetation and aquatic invertebrate colonization/persistence in landscapes reclaimed from open pit mining.**

Traditionally, wetlands are classified according to the form and composition of their vegetation communities, which both reflect and influence the extent and distribution of surface and subsurface water within the delineated area of a catchment of indeterminate age. The concept of 'permanence' relates to the intra-annual duration and amount of surface water available to sustain those communities. Standard wetland permanence classification systems may not pertain to young, early successional wetlands forming in newly created landscapes. We developed an index of wetland permanence based on the morphometric, hydrological, biogeochemical and biological community features of 60 wetlands (age 3-40 years) forming or created in areas reclaimed from oilsands open pit mining and 60 wetlands of equivalent age in surrounding 'reference' locations that had been hydrologically influenced by disturbances unrelated to mining. Trends in the appearance or disappearance of plant species and aquatic invertebrate families were assessed with respect to wetland age, permanence index and salinity. Measures of permanence, salinity and their interaction were stronger determinants of community composition than wetland age or landscape.

Jeanne L Coffin-Schmitt[1], Vivian Nguyen[2], Richard Stedman[3], Amelia Grainer Safi[3] and Kathryn Fiorella[3], [1]Great Lakes Fisheries Commission, [2]Carleton University, [3]Cornell University. **What is a minnow for? Culture, fishing, and fish consumption in urban Buffalo's Niagara River.**

Urban freshwater fisheries are increasingly recognized as providing valuable multi-dimensional services, including recreation but also food sovereignty, nutrition, cultural practice, and nature access. This case study examines emergent findings on diverse uses of emerald shiners (Notropis atherinoides), colloquially "minnows," in the upper Niagara River from an iterative, mixed methods study understanding risk and benefit perceptions of local fishing and fish consumption in the context of legacy industrial contamination. Intercept semi-structured interviews (n=49, summer 2022) were followed by a 2024 validation focus group with seven community members of Karen ethnicity. Participants described minnows as an important forage fish, a reliable baitfish, and - controversially - part of some fishers' diets. All participants had positive perceptions of minnow use for bait. Interviewees justified negative perceptions of minnow consumption with fluctuating minnow populations, conservation of a "keystone fish", and high perceived contaminant levels. Focus group participants considered minnows safe to eat, acknowledging tensions between others' perceptions and their own preference for minnows as a fresh, small-bodied fish in cultural foods. However, scientific literature and management indicate stable local emerald shiner populations contiguous with Lake Erie. There appears to be space for multidimensional minnow uses, despite

reported tensions. Policy could support safer, harmonious multidimensional use by: (1) monitoring emerald shiner contamination for (2) inclusion in fish consumption advisories, and (3) establishing clearer, predictable community-based communication on minnow populations including emerald shiner conservationists, researchers, and officials.

Paris Collingsworth[1], Craig Stowe[2], Richard Kraus[3], Spencer Gardner[4], Erica Yang[5] and Cal Buelo[5], [1]Purdue University and Illinois-Indiana Sea Grant, [2]NOAA - GLERL, [3]USGS-GLSC, [4]UM-CIGLR, [5]EPA-GLNPO. **Comparing metrics and monitoring programs to quantify hypoxia in Lake Erie.**

Seasonal hypoxia occurs regularly in the bottom waters of the central basin of Lake Erie and is driven, at least partially, by nutrient loading. To develop mitigation strategies, accurately tracking extent and severity of hypoxia is required. We compared hypoxia metrics derived from three different central basin monitoring programs. First, we used data from the EPA Lake Erie Dissolved Oxygen Monitoring Program to evaluate long-term trends in the duration and severity of hypoxia based on vertical temperature and dissolved oxygen profiles from 10 offshore stations. Second, we used data from a network of dissolved oxygen loggers collected in cooperation with the USGS-GLFC-led Great Lakes Acoustic Telemetry Observing System to provide a high-resolution estimate of the spatial extent of near-bottom hypoxia. Finally, we used data from a network of dissolved oxygen loggers suspended along 8 nearshore and offshore moorings as part of the NOAA's Coastal Hypoxia Research Program to provide high resolution estimates of hypolimnetic thickness and dissolved oxygen concentrations. Collectively, our results indicate that the hypoxic zone is dynamic, particularly along nearshore areas where rapid intrusions of hypoxic water are common. Using data from multiple sources, accurate estimates of the extent, severity and duration of hypoxia in the central basin can be generated. This methodology may be useful for resource managers to measure the response of hypoxia to mitigation efforts in Lake Erie and monitor seasonal hypoxia in other systems.

Annie Scofield[1], David Depew[2] and **Paris Collingsworth**[3], [1]EPA-GLNPO, [2]ECCC, [3]Purdue University and Illinois-Indiana Sea Grant. **Overview of the 2024 Lake Erie CSMI activities.**

The Science Annex of the Great Lakes Water Quality Agreement (GLWQA) coordinates the Cooperative Science and Monitoring Initiative (CSMI) in support of Great Lakes ecosystem assessment and management. The CSMI process includes enhanced monitoring and science-based field activities conducted in one Great Lake per year, implemented in support of science priorities identified by the Lake Partnerships established under the GLWQA Lakewide Management Annex. The 2024 Lake Erie CSMI investigations by federal agencies and partners addressed key knowledge gaps among four science priority themes including nutrient and bacterial pollution, habitat and native species, invasive species, and contaminants. Here, we will provide an overview of the CSMI five-year cycle that involves the development of science priorities, field year planning, intensive field year science and monitoring, analysis, and reporting to the GLWQA Lake Partnerships. A summary of field activities that took place during the 2024 Lake Erie CSMI field year will be shared, and next steps for reporting results will be highlighted.

Eric Collins, University of Manitoba. **Metagenomic Analysis of Microbial Ecosystem Services in Lake Winnipeg.**

Microbes provide vital ecosystem services in aquatic environments including regulating, supporting, provisioning, and cultural services. In collaboration with local communities and First Nations we used metagenomic eDNA monitoring with Oxford Nanopore sequencing to describe

the functional and taxonomic diversity of the Lake Winnipeg watershed. We found multiple distinct community structures related to source river and watershed characteristics as well as seasonal changes in Lake Winnipeg over several years of sampling. Over 50 High Quality metagenome assembled genomes were obtained for the dominant bacteria in the watershed, including several Cyanobacteria implicated in Harmful Algal Blooms. New web-based visualization tools were developed to enable rapid identification of diversity and function in these organisms.

Lyndsie Collis and James Hood, The Ohio State University. **How do multiple stressors influence zooplankton production and trophic transfer efficiency in western Lake Erie?**

One impediment to Great Lakes management is a lack of understanding of how multiple stressors (climate change, invasive species, cyanobacteria harmful algal blooms [cHABs]) influence ecosystem processes. Important ecosystem processes include zooplankton production and trophic transfer efficiency (TTE), which represents the transfer of energy from primary producers into zooplankton and energy availability to higher trophic levels. Here, we ask how these stressors have influenced the production of herbivorous cladocerans and TTE. We calculated cladoceran production in western Lake Erie from 1995 to 2022 during two seasons: May to mid-July (before cHAB season) and mid-July to September (cHAB season). Then, we examined how cladoceran production and TTE varied with food availability, cHAB intensity, predators, including the invasive spiny water flea (Bythotrophes longimanus), and temperature in each season. Before cHAB onset, cladoceran production surprisingly increased with B. longimanus biomass and Leptodora kindtii biomass (a native predatory cladoceran), while TTE declined with increasing primary production. During the cHAB season, cladoceran production and TTE exhibited a hump-shaped relationship with percent cyanobacteria— zooplankton production peaked when cyanobacteria comprised approximately 30% of the phytoplankton community. During the cHAB season, cladoceran production and TTE also increased with L. kindtii biomass and declined with planktivorous fish abundance. Changes in total cladoceran production and TTE were associated with shifts in the cladoceran community. Our results indicate that ecological "stressors" can have unexpected positive associations with zooplankton production and TTE.

Ben Collison[1], Anthony Taylor[2], Lisa Doucette[3] and Alana Westwood[1], [1]School for Resource & Environmental Studies, Dalhousie University, [2]Faculty of Forestry and Environmental Management, University of New Brunswick, [3]Wildlife Division, Nova Scotia Department of Natural Resources. **Drivers of summer thermal regimes in Atlantic salmon (Salmo salar) headwater streams.**

Headwater streams in the Wabanaki/Acadian forest are fed by rainfall, snowmelt, wetlands, and groundwater. These upper reaches of watersheds provide critical rearing habitat and thermal refugia for Atlantic salmon (Salmo salar) that are increasingly stressed by climate change. Research from the Pacific temperate rainforest and boreal regions suggests that intact forests can mitigate warming of headwater streams, but the exact nature of microclimate and temperature regulation varies based on many factors such as geology, topography, and climate. The transferability of findings from other well-studied regions is limited due to the uniqueness of the drainage basins in Mi'kma'ki, including relatively small and sparsely populated watersheds along Nova Scotia's Eastern shore. Here, we examine the relative contribution of biophysical and climatic factors that are driving thermal regimes in headwater streams of the Napu'saqnuk (St. Mary's) River. This study area allows for the unique opportunity to investigate what effect forestry-related activities may have on thermal regimes using intensely monitored tributary catchments where timber harvesting and road building can be isolated as the primary human-induced landscape disturbance. We use time series data and mixed-effects models to investigate how much variation in headwater stream thermal regimes can be

explained by biophysical watershed characteristics versus interannual weather patterns. The results from our study can be used to inform approaches to conserve and restore salmon habitats that are threatened by climate and land cover change.

Ty Colvin[1,2], Anthony Ricciardi[1] and Zofia Taranu[2], [1]McGill University, [2]Environment and Climate Change Canada. **Dreissenid mussel and round goby interactions structuring epilithic macroinvertebrate communities in the St. Lawrence River.**

Dreissenid mussels (the zebra mussel Dreissena polymorpha and the quagga mussel D. rostriformis bugensis) are ecosystem engineers that have direct and indirect effects on benthic macroinvertebrate communities. Dense clusters of dreissenid mussels on rocky substrates can exclude large grazing invertebrates while simultaneously providing complex physical habitat for small invertebrates. Another potential structuring force is the round goby (Neogobius melanostomus), an invasive fish whose voracious consumption of benthic invertebrates can reduce their total abundance and diversity. Understanding how these co-occurring invasive species interact is essential for predicting benthic community structure and biodiversity in systems experiencing multiple biological invasions. To determine the interactive effects of these invaders, we conducted a field experiment using artificial substrates with intact empty mussel shells attached in various patch topographies, with and without round goby exclusion cages. These treatments were deployed at a field site in the upper St. Lawrence River near Montreal and left undisturbed for three months over summer. Benthic invertebrates that colonized the substrates were collected and identified to compare community composition and taxonomic/functional diversity among the treatments. We tested the hypothesis that the patchiness of mussel colonies creates heterogeneous environments that promote greater diversity on rocky substrates and provide refuge that may dampen the impacts of round goby predation. Preliminary results indicate that dreissenid mussel patch topography has a larger effect on local macroinvertebrate diversity and community structure than goby exclusion.

Jared Connoy, Gretchen MacNaughton and Andrea Reid, UBC Centre for Indigenous Fisheries. **New problems, old solutions? Using night fishing to minimize bycatch mortality of Pacific salmon.**

Indigenous Peoples of the North Pacific watershed have long sustained salmon (Oncorhynchus spp.) through active management. The Canadian Fisheries Act (1868) outlawed many critical cultural practices, limiting Indigenous stewardship while settler industrial and recreational fisheries expanded. Today, climate change and warming rivers are increasing Pacific salmon mortality, especially among migrating females, highlighting the need for adaptive management. We assessed whether night fishing, a longstanding First Nations fishing practice, could reduce post-release mortality in Fraser River salmon fisheries using hourly temperature records (2018-2025) from 19 sites and mortality risk functions from post-release mortality literature. Across rivers and years, fishing periods that included non-daylight hours (i.e., night fishing) consistently reduced predicted mortality compared to daylight-only fishing, with average reductions of 3-5%, exceeding 10% in some systems at high temperatures. Benefits were greatest in midsummer and increased with higher temperatures. Night fishing thus represents both a cultural right and a conservation opportunity, with meaningful potential to improve outcomes for vulnerable salmon stocks in some river systems.

Steven Cooke, Carleton University. **Failing forward in research on freshwater life.**

Have you had a research project or management intervention totally flop? If so, welcome to a not-so-exclusive club! In this presentation I reflect on various failures I have encountered in my

career as a scholar working largely on freshwater life. It has been my experience that failures are common but are truly only failures if one does not learn from such experiences. At the level of the individual, learning from failures means being humble and reflective with a focus on personal growth and development. At the level of a project, learning from failures means embracing adaptive research designs (and adaptive management) such that failures lead to refinements in future project outcomes. Using examples drawn from research on freshwater ecosystems across Canada and beyond, I share lessons that will hopefully aid others in getting the most out of their failures!

Jyles Copenace[1] and Vince Palace[2], [1]Anishinaabe Aki, [2]IISD-Experimental Lakes Area.
Reintroducing manoomin in Treaty 3 Communities; iterative collaborative approaches to understand limitations.

Wild rice, manoomin, is a culturally important resource and source of nutrition for Indigenous Communities in northwest Ontario. In fact, manoomin is central to the Anishinabek creation story, but unfortunately harvests have declined over the past several decades because of water level regulation and other anthropogenic influences. There is an interest among Treaty 3 Communities to reintroduce manoomin to areas where it has historically been harvested but there is evidence to suggest that continued water stress and competition from invasive wetland plants (eg. hybrid cattails, Typha × glauca) may limit success. We have used experimental approaches to examine questions posed by Indigenous leaders to examine the effects of altered water levels, nutrient additions and competition from other wetland plants on the growth of manoomin. An iterative process was used to collaboratively plan and perform studies, discuss results and observations, and consult with Community members to determine next steps.

Patricia L. Corcoran[1], Marlene Evans[2], Liisa Jantunen[2] and Kelly Evans[1], [1]Western University, [2]Environment and Climate Change Canada. **Drivers of Microplastic Pollution in Fishes of Great Slave Lake, Northwest Territories.**

Microplastics (MPs) and their sorbed pollutants have been proven to negatively affect the health of numerous organisms. Fishes are crucial indicators of ecosystem health and are also important food sources for Indigenous peoples. Although found in fishes globally, MPs in Arctic freshwater fishes remain a poorly investigated pollutant type. To address this gap, we investigated 435 stomachs and gastrointestinal tracts for MPs in Canadian Arctic fishes. The results from 7 different species show an average 2.22 ± 3.51 MPs per fish. Of the five regional capture locations (Great Slave Lake, Cornwallis Island, Kitikmeot east, southwest Yukon, Fort Good Hope), the Great Slave Lake fishes contained the greatest mean concentration of MPs (3.41 ± 4.40 per fish). This finding is best explained by the relatively high human population around the lake. We found no relationships between stomach/GI tract mass and microplastic abundance; however, significant differences were found between fishes of different habitats and species. Northern pike (Esox lucius), captured from Great Slave Lake, contained the highest mean abundance (3.59 ± 5.09 MPs/fish) and greatest percentage of individuals containing MPs (86%) compared with all other species studied. Our study provides a crucial baseline for long-term monitoring of microplastic pollution in a key Arctic fish food source.

Kaitlyn Cothran[1], Meredith Purcell[2], Andrew Lang[1] and Kathryn Hargan[1], [1]Memorial University of Newfoundland, [2]NunatuKavut Community Council. **Use of Sediment Cores to Reconstruct Historical Populations of Northern Atlantic Eiders.**

Common eiders (Somateria mollissima) have significant economic and cultural value in sub-Arctic regions, and their population declines raise concerns for reductions in food and down feather

availability in sub-Arctic communities. Eider nesting habitat is sensitive to changes in environmental conditions, and their populations are affected by climate change and potentially increasing competition from double-crested cormorants (DCCO). While DCCO and common eiders do not currently overlap greatly in their ranges, there have been many reports and concerns of DCCO moving northward and establishing nesting colonies on islands traditionally used by nesting common eiders. On seven coastal islands, identified by local southern Labrador communities, we used multiple paleolimnological proxies to reconstruct historical timelines of common eider presence. Eider population dynamics were inferred via direct biomarkers released from eiders (e.g., stable nitrogen isotopes and metal(oid)s), and indirect biomarkers linked to seabird presence (e.g., chlorophyll a and diatom assemblages). Overall increases in chlorophyll a were observed in six sediment cores, suggesting increased primary productivity potentially caused by excess nutrient input from seabirds. Greater eider presence over the last ~100 years to present was suggested by the overall decreases in C:N ratios and increases in $\delta^{15}N$ values of three cores, while two cores showed evidence of eider declines. Results from this study provide insight into sea duck population responses when faced with environmental change, thereby offering guidance in developing future conservation efforts.

Greg Courtice[1] and Liv Hundal[2], [1]Applied Ecohydraulics, [2]WSP. **Offsetting Opportunities through Channel-Floodplain Systems: A Case Study in the Sheep River Watershed.**

We present a case study of a series of offsetting activities from the Sheep River watershed in southern Alberta that demonstrate how multiple, independent projects can build on one another when offsetting is viewed through a channel-floodplain systems perspective. Offsetting measures were developed and implemented on the Sheep River and one of its tributaries (Threepoint Creek) in response to independent drivers: flood response, preventative flood mitigation, and the construction of watercourse crossings for a major infrastructure corridor. Rather than pursuing isolated, piece-meal offsetting projects, a broad understanding of channel-floodplain interactions and the interdependence of tributary and mainstem processes within the Sheep River watershed revealed interconnected opportunities that could build on one another synergistically. This understanding led to a simplified process for identify opportunities for offsetting thousands of square meters of in-stream fish habitat based on quantifiable improvements to nearly 60 hectares of riparian corridor on Threepoint Creek and Sheep River. We present how this framing informed project selection, design, and approval under the Fisheries Act. Lessons learned will be discussed, from both successes and unanticipated circumstances, which shaped the successful outcome of these projects. Findings may be used to improve practical approaches for identifying offsetting opportunities through an understanding of channel-floodplain dynamics and watershed-scale systems.

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Canada, [9]Department of Biology, Lakehead University, Thunder Bay, Ontario, Canada, [10]Department of Biology, Acadia University, Wolfville, Nova Scotia, Canada, [11]School of Mathematics and Statistics, Rochester Institute of Technology, Rochester, New York, United States.
Exploring the effects of microplastic pollution on a full lake food web.

Microplastics are pervasive in aquatic food ecosystems, yet we lack understanding on how they impact the structure and functioning of food webs, where a complicated exposure and species interaction landscape can create complex outcomes. Using a before-after-control-impact design, we exposed a full lake to microplastic pollution for three years at the International Institute for Sustainable Development's Experimental Lakes Area, while monitoring a nearby reference lake. We are using stable isotope analysis to explore how microplastic exposure affects trophic structure in the lake, and fatty acid analysis to determine effects on the composition and transfer of these important nutrients across trophic levels. We collected samples of fish, zooplankton, and macrobenthic invertebrates in the lakes for two years before and three years during microplastic exposure. Here, we will present the study design and goals, as well as preliminary data from some of the analyses and years.

Irena Creed[1], Ben DeVries[2], Aaron Berg[2] and Pascal Badioiu[3], [1]University of Toronto, [2]University of Guelph, [3]Ducks Unlimited Canada. **Prairie Potholes at Risk: Science and Policy Implications of Alberta's 17-Week Wetland Exemption.**

Prairie potholes are small wetlands scattered across the Canadian Prairies. Though small, they play a large role in reducing floods, improving water quality, storing carbon, and supporting biodiversity. In 2025, Alberta introduced reforms that allow certain "low-impact" farming activities, including cultivation, direct seeding, and spraying, in temporary wetlands on private farmland without Water Act approval when basins hold water for fewer than 17 weeks per year. This policy change raises an important question: which wetlands can be altered with little impact, and which ones are critical to watershed health? To address this question, we mapped wetlands across Alberta's agricultural landscapes and used 40 years of Landsat data to measure how long each wetland held water. Our analysis shows that the 17-week threshold could affect many wetlands across many sizes. The wetlands that fall below this threshold also shift from year to year as climate conditions change. A wetland that meets the threshold in one year may not meet it in another. These findings matter at the watershed scale. Prairie potholes function as connected networks rather than isolated features. Small losses spread across many wetlands can add up, altering runoff patterns, increasing downstream pollution, and reducing habitat across entire landscapes. We examine the likely consequences of gradual wetland degradation or loss and outline practical policy options that support evidence-based decisions.

Judith Cristobal, Liezel Mari Abaya, Veronica Barbosa, Alyssa Warrior, Shannon Seneca and Diana Aga, University at Buffalo. **Pharmaceuticals, Personal Care Products, and Antimicrobial Resistance in Wastewater: Implications for the Great Lakes Ecosystem.**

Pharmaceuticals and personal care products (PPCPs) are increasingly detected in global water sources, raising significant environmental concerns for large freshwater systems like the Great Lakes. Many PPCPs are not entirely removed by conventional wastewater treatment plants (WWTPs), persisting in aquatic environments where they can disrupt endocrine systems, bioaccumulate in biota, and, importantly, promote the spread of antimicrobial resistance (AMR). Monitoring AMR in water systems is essential, as the persistence and dissemination of antimicrobial resistance genes (ARGs) present a growing threat to both ecosystem and human health across the Great Lakes basin. This study investigates the occurrence, seasonal variation, and removal efficiency

of selected PPCPs, as well as the dynamics of AMR in wastewater from three WWTPs over a 1-year sampling period. Results show that analgesics, antibiotics, antidepressants, and psychoactives are consistently detected at high frequencies (≥90%), indicating steady chemical inputs. Seasonal trends include persistently high levels of drug residues and their metabolites, as well as acetaminophen, while some antibiotics and antidepressants fluctuate seasonally, likely due to varying illness rates. Although some PPCPs are effectively removed, others persist due to their chemical stability. Notably, qPCR analysis identified ARGs, including ermB and ermF, underscoring the need to monitor antimicrobial resistance in wastewater discharges. These findings highlight the considerable risk of ARG development and spread from WWTPs into the Great Lakes, with implications for water quality, ecosystem health, and public safety.

Carolyn Currie[1], Ashley Tripp[1], Hannah Murphy[2] and Gail Davoren[1], [1]University of Manitoba, Winnipeg, MB, Canada, [2]Fisheries and Oceans Canada, St. John's, NL, Canada. **Determining natal origins of Atlantic herring (Clupea harengus) in coastal Newfoundland using otolith chemistry.**

For marine fish, larval exchange among different regions determines if depleted populations can be replenished, making tracking larval dispersal critical for stock delineation and management. Herring (Clupea spp.), key forage fish in the Pacific and Atlantic, support commercial fisheries and transfer energy to higher trophic levels. In Newfoundland, the management structure for Atlantic herring (Clupea harengus) is based on tagging studies showing adults return annually to the same spawning grounds. Due to challenges tracking larval dispersal, however, it is unknown whether larvae are retained or if adults spawn in their natal bay. Otolith chemistry provides a record of environmental conditions experienced by fish, offering a potential tool for assessing natal origins and larval dispersal. To determine the suitability of otolith chemistry as a tool, we first examined the influence of ambient water chemistry on the pre-hatch otolith chemistry by experimentally increasing concentrations of non-essential trace elements during embryo incubation (1x, 2x, 3x, 4x, 5x ambient Strontium, Barium, and Strontium + Barium). Second, we sampled larvae from five Newfoundland bays to investigate bay-specific otolith chemical signatures. Trace element concentrations were quantified (n=20/bay or treatment) via laser ablation inductively coupled-plasma mass spectrometry. Findings will determine whether distinct bay-specific chemical signatures exist, indicating whether otolith chemistry is a suitable tool for assessing natal origin of dispersing larval herring, thereby contributing to an updated delineation of herring stock structure in Newfoundland.

Kristen Cyr[1], Christina Semeniuk[1], Fielding Montgomery[2], Holly Mosco[1], Isabelle Tormasi[1], Shelley Denny[3], Edmund Halfyard[4], Kenneth Drouillard[1], Margaree Salmon Association[5], Meagan Scott[6], Frankiesha Wright[7], Sinead Addis[8] and Aaron Allen[9], [1]University of Windsor, [2]Canadian Wildlife Federation, [3]Unama'ki Institute of Natural Resources, [4]CarbonRun, [5]Margaree Salmon Association, [6]University of Montana, [7]Grieg Seafood, [8]Dalhousie University, [9]Ocean Tracking Network. **Risky Refugia? Using acoustic telemetry and underwater video to assess effects of aquatic invasive species on juvenile Atlantic salmon (Salmo salmar) within thermal refugia.**

Cold-adapted fishes are increasingly overlapping with warm-adapted invasive species as habitats warm under climate change, and must therefore contend with heat stress, predation-, and or competitive stress. In Nova Scotia, management strategies for Atlantic salmon (Salmo salar) prioritize creating/protecting cold-water refugia, despite the impacts of invasive species, such as brown trout (Salmo trutta) and Smallmouth bass (Micropterus dolomieu), on juvenile salmon within these habitats remaining poorly understood. We deployed a VPS acoustic telemetry array and V3

acoustic transmitter within one of the smallest study sites described to date (50m^2), paired with underwater cameras to examine species interactions within a thermal refugium in the Southwest Margaree River, Cape Breton. We tested whether salmon parr altered activity, space use, or use of in-stream cover in the refugium in response to elevated temperatures and invasive-species presence and interactions (e.g., attempted predation or competition). We also measured condition metrics (weight, length, growth rate) to determine whether these habitat-use behaviours conferred a fitness advantage, comparing salmon condition between refugium and non-refugia sites with varying invasive species pressure. Our findings provide new insights into how juvenile salmon cope with the combined and interacting stressors of warming water and aquatic invasive species. This knowledge can inform more targeted management and policy actions, such as the protection of cold-water refugia, and invasive species mitigation, by identifying strategies that support adaptive behaviors of salmonids under climate change.

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Sophia D'Aurora[1], Camilla Ryther[2], Justin Trumpickas[2], Warren Zeinstra[2], Chris Davis[2], Ryan Lauzon[3], Cavan Harpur[4] and Erin S Dunlop[2], [1]Trent University, [2]Ontario Ministry of Natural Resources, [3]Chippewas of Nawash Unceded First Nation, [4]Parks Canada. **Defining lake whitefish home ranges in Lake Huron to inform fisheries management.**

The native lake whitefish (Coregonus clupeaformis) is experiencing population collapses in Lake Huron from declining recruitment. The lake whitefish fisheries are managed in Lake Huron using a quota system that assumes populations don't move beyond zone boundaries. Yet, little is known about lake whitefish home ranges and the extent to which populations move between management zones, basins, or across international boundaries. To better understand the movement ecology of lake whitefish (known as dikameg in Anishinaabemowin) in Lake Huron, a collaborative Two-Eyed Seeing research study, named Together with Giigoonyag, was initiated between the Saugeen Ojibway Nation, Ontario Ministry of Natural Resources, and Parks Canada. An acoustic telemetry array was established across Lake Huron to remotely track 380 acoustically tagged lake whitefish. Here, we describe the seasonal home ranges of six lake whitefish populations in Lake Huron. The Main Basin lake whitefish demonstrated larger home ranges compared to the Georgian Bay and North Channel lake whitefish, where individuals remained much more local. Seasonal spatial patterns were consistent among years for all populations. Most individuals remained inside the management zone where they were tagged, however, were not confined to these zones, exhibiting movement across zones and overlap with neighbouring populations. These results demonstrate unique distribution patterns among lake whitefish populations in Lake Huron. Our improved understanding of this species' movement ecology can better inform their fisheries management and conservation efforts.

Diego O. Da Silva[1], Jocilaine S. Jesus[2], Cíntia P. Targueta[1], Marcio R. Pie[3], Rhewter Nunes[4], José A. F. Diniz-Filho[1], Bruno E. Soares[5] and Mariana P. C. Telles[6], [1]Universidade Federal de Goiás, [2]Universidade de Brasília, [3]Universidade Federal do Paraná, [4]Universidade Estadual de Goiás, [5]University of Regina, [6]Pontifícia Universidade Católica de Goiás. **Spatial patterns of phylogenetic alpha and beta diversity of fish assemblages in the Araguaia River basin revealed by eDNA metabarcoding.**

Home to a wide variety of fish, the Araguaia River basin has been increasingly impacted by anthropogenic pressures, highlighting the need for improved understanding of ecological patterns.

Thus, this study applied cutting-edge tools (environmental DNA [eDNA] and metabarcoding) to evaluate the alpha and beta phylogenetic diversity among lakes in the region. Water samples were collected from 132 lakes during the flood season and sequenced targeting the 12S rDNA gene. Phylogenetic relationships among detected taxa were reconstructed, allowing the estimation of phylogenetic alpha diversity (PD and NRI) and beta diversity and their turnover and nestedness components. To disentangle the role of environmental conditions and spatial processes, phylogenetic metrics were related to local environmental variables and spatial filters (Asymmetric Eigenvector Maps, AEMs), which capture patterns of connectivity and spatial structuring among lakes. Phylogenetic alpha diversity showed clear spatial organization (PD = 4.49-16.16), with most lakes exhibiting phylogenetic clustering (NRI > 0), suggesting non-random community assembly. Spatial filters explained a substantial proportion of the variation in phylogenetic structure, indicating that dispersal-related processes and spatial connectivity play a major role in shaping fish assemblages across the floodplain. Phylogenetic dissimilarity ranged from 0.136 to 0.686 and turnover dominated beta diversity. Overall, our results highlight the potential of eDNA metabarcoding to reveal ecologically meaningful spatial patterns in fish phylogenetic diversity and emphasize the importance of spatial processes in structuring floodplain lake communities.

Soham Dalal[1,2], [1]gener8tor, [2]NOAA. **Turning Freshwater Innovation into Impact: Scaling Solutions for the Great Lakes.**

Cutting-edge freshwater technologies are transforming water management across the Great Lakes. Real-time monitoring systems provide continuous basin-wide visibility. AI wastewater treatment solutions give operators unprecedented biological insights. Autonomous underwater inspection vehicles reveal infrastructure vulnerabilities. Quantum sensors enable contamination detection in challenging conditions. Advanced PFAS destruction technology integrates into existing systems at scale. Atmospheric water generation harvests clean water from air in water-scarce regions. These breakthrough innovations address critical environmental and infrastructure challenges—yet face significant commercialization barriers: inadequate capital for early-stage ventures, industry risk aversion, and unclear paths to adoption. The gener8tor Great Lakes Innovation Accelerator, supported by NOAA and the Department of Commerce, accelerates these innovations to market impact. Through $100K in non-dilutive funding, intensive mentorship, and strategic partnerships with corporate leaders and investors, we enable rapid scaling and real-world deployment. Our model focuses on five companies per cohort, ensuring each innovation receives dedicated support through critical development phases. This approach has proven effective at removing commercialization barriers and accelerating adoption. Join this session to discover the cutting-edge freshwater solutions emerging from the Great Lakes, understand the barriers they overcome, and learn how strategic support drives innovation toward lasting environmental and economic impact.

Haley Dalian, National Oceanic and Atmospheric Administration (NOAA) Marine Debris Program. **The Plastic Bullet: How Curiosity and Conversation Drive Behavior Change in Place-Based Marine Debris.**

Often, the most apparent solutions to systemic problems are shrouded by overlooked observations and forgone conversations. Marine debris—any solid, human made material that ends up intentionally or unintentionally in the marine environment—is one such systemic problem that is seemingly ubiquitous yet uniquely tied to spatial and temporal variables. In other words, marine debris is a place-based issue requiring place-based investigation and collaboration. For this reason, adequately addressing different types of marine debris means pursuing leads of discovery at the hyper-local level, while also looking broadly across regions—across space and time—to avoid

reinventing tested solutions. Easier said than done, but nonetheless possible. This presentation will delve into such stories of possibility, where unassuming conversations ultimately led to inspired marine debris projects and lessons well worth sharing. From shotgun shells along Lake Erie beaches to discarded syringes near the tributaries of Lake Ontario, connections are found in unlikely places; thus, curiosity, conversation, and coordination are the creative fuel necessary to make connections that solve wicked problems.

Lauren Damphousse[1, 2], Larisa Renaud[1, 2], Todd Morris[1, 3] and Catherine Febria[1, 2], [1]University of Windsor, [2]Healthy Headwaters Lab, [3]Department of Fisheries and Oceans. **Assessing Early Outcomes of an Experimental Freshwater Mussel Translocation in the Sydenham River, Ontario.**

Freshwater mussel mitigation translocations are increasingly used as conservation tools in Great Lakes tributaries, yet post-translocation monitoring often emphasizes relocated mussel persistence with limited integration of broader benthic community assessments. In August 2023, an experimental freshwater mussel translocation was conducted in the Sydenham River, Ontario, which supports several Species at Risk. Follow-up surveys in 2024 and 2025 were designed to evaluate early responses of unionid populations and benthic macroinvertebrate communities using a pre-post study framework. Mussel monitoring was conducted at both the excavation site, where individuals were removed, and the relocation site implementing quadrat surveys. Translocated individuals were also affixed with passive integrated transponder (PIT) tags, improving detectability and allowing minimally invasive monitoring. Benthic macroinvertebrates were sampled before and after translocation at the excavation and relocation sites, as well as at an upstream reference site, to assess whether benthic communities reflect mussel presence and to evaluate potential community changes following mussel removal. Preliminary mussel surveys indicate that PIT-tagging translocated individuals improves detectability in the two years post-release, and that the mussel assemblage of the excavated area remains impacted. Analyses of benthic macroinvertebrate communities are ongoing and will examine changes in community composition, functional structure, and potential indicator relationships with mussel assemblages. This study highlights the value of multi-trophic monitoring and enhanced detectability methods for evaluating freshwater mussel translocations and informing conservation and river management in Great Lakes tributaries.

Raegan Davis[1], Sarah Glowa[2], Steven Cooke[1], Haitham Ghamry[2] and Karen Smokorowski[2], [1]Carleton University, [2]Fisheries and Oceans Canada. **Estimating fish stranding mortality downstream of a hydropeaking dam in northern Ontario.**

Hydropeaking is an operating regime that is used to meet real-time energy demands, however, associated daily flow fluctuations may result in fish becoming stranded. Here we investigated factors that drive fish stranding. We deployed cameras at random and strategic locations downstream of Scott Falls Generating Station (GS) in Wawa, Ontario, from June to October in 2023 and 2024, to remotely capture occurrences of fish stranding. Fish stranding density were higher at strategically placed locations in comparison to randomly deployed cameras, but were similar to those found via the same methods below the E.B. Campbell GS on the Saskatchewan River. The probability of fish stranding was highest in early spring, and more probable at locations with finer substrates and slower horizontal ramping rates ($cm \cdot h^{-1}$). To estimate the number of fish stranded annually on the studied reach of the Michipicoten River, we used a River2D hydrodynamic model to estimate the area subject to daily drying. We then used our observed fish stranding densities and the calculated daily dried river reach, to estimate the number of fish stranded annually. Given the area subject to daily drying is much smaller than the studied reach below E.B. Campbell GS, the

estimated annual number of fish stranding was considerably smaller. These methods will allow for comparison among global hydropeaking systems to better understand the factors driving fish stranding and the annual mortality associated with hydropeaking.

Carolyn Currie, Gibson Rieger, Ashley Tripp and **Gail Davoren**, University of Manitoba, Winnipeg, MB, Canada. **Atlantic herring spawning locations, timing, and habitat characteristics in coastal Newfoundland, Canada.**

For many marine fish, spawning location and essential habitat characteristics remain unknown. Addressing these knowledge gaps is crucial for effective protection of spawning habitat, especially in exploited species. Atlantic herring (Clupea harengus) is a commercially and ecologically important forage fish species that is critical for energy transfer from lower to higher trophic levels. However, in coastal Newfoundland, their spawning locations and habitat requirements are largely unknown. Our objective was to describe spring herring spawning locations and timing and characterize key spawning habitat characteristics throughout coastal Newfoundland. Informed by citizen scientist reports of herring spawning, we surveyed 5 spawning sites in 3 bays during May-June 2024 and 2025. At each spawning site, we recorded egg density, habitat characteristics (e.g., sediment grain size, composition of macroalgae) and environmental variables (depth, temperature, salinity). Herring spawned across all reported locations between May 13-June 10 across both years. Herring eggs were primarily found adhered to a variety of macroalgae species (multiple species of red, brown, and green algae), but not sediment. Egg densities varied among macroalgae species, suggesting some species provide more suitable structural habitat for spawning. These findings fill a knowledge gap on the spawning ecology of Atlantic herring in Newfoundland and will inform future management efforts and conservation.

Susan Debreceni, Chelsea M. Rochman, Hayley McIlwraith and Hannah De Frond, University of Toronto Trash Team. **Sharing science beyond academia to increase waste literacy through community outreach, education and research.**

While both scientific knowledge and local action are necessary to tackle environmental issues such as plastic pollution, there often remains a gap in collaboration between scientists and communities. This inspired us to form the University of Toronto Trash Team, a science-based community outreach organization fuelled by the work of students, researchers, local volunteers and staff. Our programs take place across three interconnected workstreams: solutions-based research, education, and community outreach. Utilizing a holistic approach, we connect science with society, collaborating with diverse community partners to increase waste literacy, motivate engagement and inform actions to reduce plastic pollution. Examples include co-creating the Toronto Inner Harbour Floatables Strategy, a multi-stakeholder collaboration to clean-up plastic pollution from Lake Ontario, while collecting and sharing data to inform preventative solutions. We also built a relationship with the Toronto District School Board, training university students to facilitate elementary school lessons about plastic pollution. As well, we train youth ambassadors to deliver community presentations and workshops, making science accessible and fun for all ages. Across this holistic approach, we have removed over 1,000,000 pieces of plastic, engaged more than 10,000 community members, visited more than 200 classrooms and informed policies to prevent plastic pollution in the Great Lakes. Our local work aims to protect our Great Lakes, while building capacity globally through creating shared resources and collaborative networks that can inform scaled-up methods to tackle global plastic pollution.

Tariq A. Deen[1], Daniel Mutton[1], Daniel Princz[2], Bruce Davison[2] and M. Altaf Arain[1], [1]School Of Earth, Environment & Society, McMaster University, [2]National Hydrology Research Centre, Environment and Climate Change Canada. **Assessing climate change impacts on water and carbon fluxes in the Grand River (Canada) and Maumee (US) watersheds using MESH-CLASSIC model.**

In this study, we employed a newly coupled hydrologic and biogeochemical modeling framework, MESH-CLASSIC, integrating the Modélisation Environnementale Communautaire Surface and Hydrology system (MESH) with the Canadian Land Surface Scheme Including Biogeochemical Cycles (CLASSIC), to assess water and carbon fluxes in two major Great Lakes watersheds: (i) the Grand River in southern Ontario, Canada, and (ii) the Maumee River in northern Ohio, United States. Both watersheds are predominantly agricultural, interspersed with managed or afforested forests and urban areas. Model simulations were validated against observed eddy covariance fluxes and meteorological data from multiple flux tower sites, including Oak Openings (U.S.), and Elora and Turkey Point Observatory (Canada), and hydrological data. Results demonstrated satisfactory performance in simulating water and carbon fluxes as well as streamflow across both watersheds. The analysis provided insights into how land use and ecosystem management practices influence carbon exchanges and hydrological dynamics. Furthermore, it quantified the potential impacts of future climate change and extreme events on water and carbon cycles at the catchment scale, including associated feedbacks. This work supports the development of innovative land restoration and water management strategies and enhances understanding of eco-hydrological processes in Great Lakes watersheds. Ultimately, these findings contribute to adaptive strategies aimed at strengthening ecosystem resilience under future climatic stresses. This research is part of the Global Centre for Climate Change Impacts on Transboundary Waters (GCTW) initiative.

Trevor DeGroote[1], Helen Michaels[1], Kevin McCluney[1], Steve Hovick[2], Lauren Brown[1], Angelica Vazquez-Ortega[1], Ethan Glassman[1], Michael Weintraub[3] and Fausto Machado de silva[3], [1]Bowling Green State University, [2]Ohio State University, [3]University of Toledo. **Assessing Wetland Plant Responses to Variable Hydrology Using a Trait-Based Approach.**

Wetlands offer the beneficial ecosystem service of water filtration, preventing nutrients from causing eutrophication and harmful algal blooms in lakes and rivers. Around Ohio, wetlands are created and restored for this service. A large part of this service is provided by wetland vegetation, which captures and stores nutrients in biomass. However, understanding on which plant traits contribute to this activity is limited. This study aims to increase our understanding of how traits influence wetland plant growth and nutrient function under hydrological stress, an understudied topic important in the face of increased climatic variability. We targeted 12 species commonly found within Ohio wetlands and quantified the inter/intraspecific variation for 7 traits (biomass allocation, root architecture, leaf traits) across low (drought), medium (control) and high (flooded) water conditions in experimental mesocosms. Traits were measured before, during, and after the experimental period of 2 months. Weekly measurements of chlorophyll concentration index within leaf tissue were collected and quantified as a proxy to link traits to fitness. Measurements of plant nutrient concentration and stock linked traits to nutrient uptake and storage. Preliminary analysis shows that biomass allocation, a known stress response and nutrient function trait, varied between species. Results like this indicate different tolerance of drought and flooded conditions between species, suggesting climate-smart planting mixes that could sustain nutrient function in the face of climate variability.

Emily DeJaegher[1], Meghan McBride[2], Ian Bradbury[3], Claudio DiBacco[2] and Patricia Ramey-Balci[1], [1]Department of Biological Sciences, University of Manitoba, [2]Bedford Institute of Oceanography, Fisheries and Oceans Canada, [3]Northwest Atlantic Fisheries Center, Fisheries and Oceans Canada. **Genetic structure of a recent invader to Atlantic Canada, the Asian shore crab (Hemigrapsus sanguineus).**

Marine invasive species cause significant economic costs and negatively impact biodiversity. Environmental change and human-mediated transport have increased the frequency of non-native species introductions. Genetic and environmental factors can together influence a recently introduced species' ability to establish, adapt and spread. The Asian shore crab, Hemigrapsus sanguineus, is an invasive species in coastal rocky intertidal areas, including along the east coast of the United States, where it was first reported in New Jersey in 1988. The species was first observed in Nova Scotia, Canada in 2017. By 2021, H. sanguineus occupied ~ 475 km of coastline in Nova Scotia and had increased in abundance. This study examines patterns of genetic variation across parts of the native and invasive range of H. sanguineus. It also identifies environmental factors that may affect population structure and drive local adaptation. We hypothesize that variation in sea surface temperature drives population structuring in H. sanguineus. To test this, single nucleotide polymorphisms (SNPs) were genotyped using restriction-site-associated DNA sequencing (RADseq) to assess relationships between allele frequencies and environmental variables. Preliminary results describing H. sanguineus population structure will be discussed. Understanding this population structure may help identify the source of its introduction to Nova Scotia and determine whether this range expansion is associated with adaptation to environmental conditions. Insights into the invasion trajectory of H. sanguineus can also inform monitoring and mitigation efforts for marine invasive species.

Adam Delage[1], Gabrielle Faucher[1], Pascale-Laure Savage[1], Emily Fields[1] and Tom Johnston[2], [1]Laurentian University, [2]Ontario Ministry of Natural Resources. **Trophic and life history diversification in lake trout across a gradient of ecosystem size.**

Lake trout exhibit considerable ecological and phenotypic plasticity across their native range. They inhabit lakes that vary widely in size (tens to millions of ha surface area) and other physical-chemical characteristics. This habitat variation is associated with variation in biological features such as community composition and food web structure. We explored variation in both trophic ecology and life history traits of lake trout across a gradient of ecosystem size using extensive stable isotope and fish attribute databases from northern Ontario lakes. Regarding trophic ecology, we hypothesized that the greater diversity and abundance of prey types in larger lakes would result in relatively elevated trophic niche positions and larger trophic niche sizes. Regarding life history traits, we hypothesized that these same features of larger lakes would result in faster growth rate, larger maximum body size, and larger size (and/or greater age) at maturity. We also hypothesized that within-population (interindividual) variation in growth rate would be positively related to within-population variation in food web position. This study will allow us to better understand the impressive phenotypic plasticity of lake trout, a key asset in ensuring the protection of this species in a rapidly changing landscape. Our models will inform future management of lake trout fisheries and may also be applied to other fish species.

Jason Delborne[1], Morgan Pincombe[1], Jill Furgurson[2] and Nourou Barry[2], [1]University of Wisconsin-Madison, [2]North Carolina State University. **Exploring Sea Lamprey Genetic Biocontrol: Report on a Workshop with Diverse Stakeholders/Rightsholders.**

Advances in genetic biocontrol research and development offer the possibility of highly specific and scalable management - or even eradication - of invasive species, but such technologies are controversial and raise important governance questions as research moves from the laboratory to field trials to potential environmental releases. As part of a Great Lakes Restoration Initiative-funded social science project, we convened a workshop on sea lamprey genetic biocontrol during April 2026. We invited stakeholders and rightsholders including state and provincial resource managers, representatives from angler and fishery associations, experts from environmental and conservation NGOs, regulators at state/provincial and federal levels, representatives from First Nations and Native American Tribes, and scientists. We structured this "upstream" engagement to explore perspectives on responsible governance of emerging genetic biocontrol technologies for sea lamprey management and to facilitate dialogue between scientific developers and diverse experts and knowledge-holders. This presentation addresses key findings from this workshop in terms of both process and substance.

Kahsennar`o:roks Deom and **Gretchen MacNaughton**, University of British Columbia.
Governance and Relationality in Indigenous Fisheries: Community, Leadership, and Learning.

The Centre for Indigenous Fisheries (CIF) at the University of British Columbia is a team of researchers, staff, and faculty that support Indigenous-led fisheries research in communities across Canada. The CIF centres fish, people, and place (Centre for Indigenous fisheries, not Centre of Indigenous fisheries) - emphasizing long-term, sustainable, and supportive relationships between the CIF and community. A key goal of the CIF is to create space for teaching and learning outside of academic spaces, learning from our human and non-human relatives alike. In order to do so, the CIF has initiated a course called "FISH 506i: Governance and Relationality in Indigenous Fisheries", creating space to learn with and from Indigenous instructors (Dr. Andrea Reid and Kii'iljuus Barbara Wilson) and staff. FISH 506i welcomes undergraduate and graduate students (UBC and beyond) and non-degree students interested in learning about place-specific fisheries governance. In previous years, this course has been offered on Haida Gwaii and in Nisga'a territory in the Nass Valley. In this talk, we aim to emphasize the importance of Indigenous-led and centered research and learning, showcasing the collective work of the CIF.

Simon DePasquale[1], Travis Durhack[2], Douglas Watkinson[2], Christine Lacho[2], José Vargas-Solano[3], Mark Pegg[4], Eva Enders[5], Caleb Hasler[1] and Lee Gutowsky[2], [1]University of Winnipeg, [2]Fisheries and Oceans Canada, [3]University of Calabria, [4]University of Nebraska-Lincoln, [5]Institut National de la Recherche Scientifique. **Lake Sturgeon movement patterns in an impeded lake-river system and an unimpeded river within Western Canada.**

Lake Sturgeon (Acipenser fulvescens) are one of the largest freshwater fishes in North America. Historic commercial overharvesting and ongoing habitat fragmentation have threatened populations and led to an endangered status for some populations. Despite being found in both lake and river environments, Lake Sturgeon movement ecology remains poorly understood. Using acoustic telemetry, we examined the seasonal movement patterns, habitat-use, and home range sizes of two sturgeon populations living in lake and river environments with contrasting levels of aquatic connectivity. In the South Saskatchewan River, individuals had access to a long, unimpeded stretch of river. In contrast, fish in the Winnipeg River were restricted to a short reach downstream of a hydroelectric dam with further downstream access to Lake Winnipeg. While sturgeon in Lake Winnipeg displayed consistent seasonal migratory patterns, movements were characterized by short forays between lake and river habitat, with high residency in Traverse Bay and waters immediately

downstream of the generating station. Sturgeon in the South Saskatchewan River displayed residency near the Bow River confluence, however movements were otherwise extensive and unrestricted in distance and direction. In both systems a minority of individuals undertook large-scale movements. This study advances understanding of the movement behaviours in endangered and understudied sturgeon populations, provides comparative insights into how connectivity and access to lacustrine habitat shape spatial ecology, and highlights considerations and challenges for interpreting and comparing results across acoustic telemetry studies.

Julie DePauw, Merrin Macrae and Helen Jarvie, University of Waterloo. **Contrasts in river eutrophication metrics within Lake Winnipeg and Lake Erie basins.**

The Canadian Great Lakes are facing intensifying eutrophication pressures, with riverine nutrients frequently exceeding water quality thresholds. Each Great Lake basin has distinct climate, hydrology, land use and biogeochemistry regimes that impact the sources, transport and transformation of nutrients along the land-river-lake continuum. This presentation explores regional patterns in river eutrophication metrics within the Canadian Lake Winnipeg and Lake Erie basins, by comparing nutrient concentrations, stoichiometry and eutrophication potential for streams and rivers in southern Manitoba and southwestern Ontario watersheds. This research identifies key contrasts in nutrient water quality and eutrophication metrics, and their drivers, between these two major agricultural regions of Canada. The study also highlights differing regional nutrient dynamics in a changing climate and a need for regional-based approaches to addressing eutrophication within the Canadian Great Lake basins.

Emilie DeRochie[1] and Abraham Francis[2], [1]River Institute, [2]Aronia Collective. **The River Strategy: A framework for more inclusive and equitable communication and collaboration along the St. Lawrence River.**

The need for more innovative and inclusive approaches to collaboration for environmental protection is particularly relevant in the context of multi-jurisdictional systems, like that of the Kaniatarowanenneh (St. Lawrence River), which spans the borders dividing Canada, the United States, Indigenous nations, and three states/provinces. The development of environmental governance frameworks and the production of environmental knowledge to inform these processes have long excluded Indigenous nations and communities, as well as many non-Indigenous communities. This exclusion has compounded environmental injustices associated with industrial contamination, inundation for the construction of the seaway, and other forms of environmental degradation. In response, various Indigenous and non-Indigenous groups, including government agencies, academic researchers, community groups, and non-profit organizations, have been involved in monitoring and restoration activities along the river. For over a decade, these organizations have indicated a need for new, more inclusive and flexible framework for cooperation and participation to address environmental challenges, particularly along the upper section of the river. The Kahnekarónnion (River) Strategy was formed in 2022 to help address this need, with the overarching goal of facilitating inclusive and equitable communication and collaboration along the St. Lawrence River and beyond. This presentation will describe the development of this initiative with its basis in Haudenosaunee approaches to collaboration, in addition to some emergent guiding principles which prioritize inclusive and equitable practices.

Leif DeVaney, Métis Nation of Ontario. **Do we need a lake ethic? Lessons from Leopold's land ethic.**

Aldo Leopold's land ethic marks a significant achievement in the history of ethical thought. It primarily does so by extending moral consideration from individual human relations to the land community as a whole, bringing increased credibility to the emerging discipline of environmental ethics. While hugely influential since its initial articulation in the 1940s, comparatively little attention (with some noteworthy exceptions) has been paid to the development of a water ethic - somewhat odd given that water covers roughly 71% of the earth's surface. Even less focus has been placed on this issue as it relates more specifically to lakes. In this presentation, I begin to explore possibilities for advancing a version of a lake ethic, especially as it might pertain to large lakes. This exploration includes identification of both helpful analogies and disanalogies with Leopold's classic land ethic. As an ecocentric view, the land ethic has shaped and defined modern ecology and conservation. I argue that some of the implications Leopold mentions in this piece are particularly well-suited to the construction of a lake ethic. Moreover, I contend that such an ecocentric ethic is at least as temporally pressing as the adoption of a land ethic.

Navjot Dhaliwal[1, 2], [1]York University, [2]Toronto Metropolitan University. **Beyond Integration: Epistemological Plurality in Systems-Based Water Governance.**

Contemporary environmental management has increasingly turned to systems theory and ecosystem-based governance as a corrective to the limitations of reductive, single-issue scientific management. Frameworks such as the ecosystem approach seek to address complexity by integrating social, ecological, and institutional dimensions of freshwater systems. Yet, in practice, these approaches often remain constrained by the epistemological foundations within which they are operationalized. This paper examines how attempts at inclusive, systems-based environmental management can inadvertently reproduce epistemic exclusion when diverse knowledge systems are required to be translated, validated, and reconciled within a dominant scientific episteme. Drawing on critiques of ecosystem approach-based governance in freshwater management, this presentation argues that co-governance efforts between state institutions and Indigenous peoples are frequently mediated through epistemological boundaries that remain unacknowledged. While Indigenous knowledges are increasingly "included" within governance processes, they are often positioned as supplementary inputs rather than as constitutive ways of knowing and governing water. As a result, environmental management practices risk perpetuating subtle forms of cultural assimilation and settler-colonial governance, despite their stated commitments to holism and inclusivity. This presentation opens space for dialogue on what epistemological plurality in freshwater governance might look like in practice by highlighting how epistemological boundaries are produced within systems-based environmental management. By emphasizing reflexivity as an ongoing practice, the presentation explores how multiple ways of knowing water might coexist without being subsumed into a single epistemic framework.

Margaret Docker[1] and Richard Beamish[2], [1]University of Manitoba, [2]Fisheries and Oceans Canada. **A giant in the Great Lakes and lamprey community: A tribute to Bill (F.W.H.) Beamish.**

Dr. Bill Beamish, an internationally recognized fisheries scientist and authority on lampreys, passed away in June 2025, one month shy of his 90th birthday. Choosing research over a professional career with the Toronto Argonauts, the 6-foot-6 offensive tackle received his PhD from the University of Toronto, studying the influence of environmental factors on fish standard metabolism under the supervision of Dr. F.E.J. Fry. During his long tenure as a professor at the University of Guelph, Bill became an authority on numerous aspects of lamprey biology—e.g.,

abundance, habitat, feeding, growth, and gonadogenesis in larval and metamorphosing lampreys, techniques to determine age, and the feeding and bioenergetics of juvenile lampreys. As a Great Lakes Fishery Commissioner from 1988 to 2004, he served the Great Lakes community well. His career achievements were recognized by the F.E.J. Fry Medal in 2001, the highest honour awarded by the Canadian Society of Zoologists. Retiring from the University in Guelph in 2001, he started a second career at Burapha University in Thailand, where he taught and carried out fisheries research until 2018. Bill never really retired. He was a hands-on field biologist that knew where fish lived, and he and his students discovered their secrets of survival. This talk—although far too short to do full justice to Bill's life and career—will highlight his career achievements, as well as his lasting legacy of mentorship, friendship, and good humour.

Margaret Docker[1], Arfa Khan[1, 2], Jessie Ogden[1], Roger Bull[3], John Eydt[4], Tamber Figurski[4] and Geoff Green[4, 5], [1]University of Manitoba, [2]Fisheries and Oceans Canada, [3]Canadian Museum of Nature, [4]Gatineau Fish & Game Club, [5]SOI Foundation. **Using eDNA and a multisector partnership to search for the elusive deepwater sculpin in Quebec.**

Deepwater sculpin Myoxocephalus thompsonii is found in the Laurentian Great Lakes and deep, cold, oxygenated, oligotrophic lakes from the Gatineau region of Quebec to Great Slave and Great Bear lakes in northwestern Canada. Its distribution along the path of glacial retreat is patchy, although unknown populations may exist given the challenges of sampling deep lakes, especially in remote locations. Deepwater sculpin is of conservation concern, with two of four known populations in Quebec having been extirpated due to eutrophication, and the Great Lakes-Upper St. Lawrence population is listed as Special Concern under Canada's Species at Risk Act. In this highly collaborative project, we tested the ability of an eDNA assay designed by Cecilia Hernandez, Louis Bernatchez, and colleagues to detect this species in 31 Mile Lake, Quebec, where it is known to occur. We then applied these methods to test for potential novel detections in Lac Pémichangan, which is adjacent but not connected to 31 Mile Lake. Deepwater sculpin eDNA was consistently detected in water collected below the thermocline in August or September in 31 Mile Lake. However, although detections in 2/162 qPCR replicates were recorded in Lac Pémichangan in 2022, follow-up qPCRs suggested contamination. These eDNA protocols could be used to survey other candidate lakes for the presence of this elusive deepwater species and to monitor lakes where it is threatened by eutrophication, climate warming, or invasive species.

Paul Draus[1], Asia Dowtin[2], Jacob Napieralski[1], Ben Gaydos[3], Brodrick Wilks[4], Zenaida Flores[4] and Tharmond Ligon[4], [1]The University of Michigan-Dearborn, [2]Michigan State University, [3]The University of Michigan-Flint, [4]Rescue MI Nature Now. **Strengthening ecosystem services at the hyperlocal scale through urban acupuncture methods.**

Rescue MI Nature Now (RMNN), a community-based organization based in Detroit, MI, USA, is working to revitalize neglected landscapes using a strategic approach known as "urban acupuncture" (UA), a design and management approach focused on targeted, hyperlocal interventions that stimulate larger changes in community ecology and resilience. Through retrofitting and reimagining post-urban landscapes with guidance from residents, RMNN seeks to maximize social, ecological, and economic benefits, advance equity, and foster biodiversity, all while building scalable methods for neighborhood-centered water management and green infrastructure (GI) and nature-based solutions (NbS). In collaboration with academic workers from Michigan State University, the University of Michigan-Dearborn and the University of Michigan-Flint, RMNN is developing granular analysis of local hydrology while building narratives around community relationships with water, climate change, and water infrastructure services. The project seeks to

address critical community needs by connecting academic expertise with current resident knowledge, local histories, and cultural values to co-develop adaptive strategies that address flooding in the short term and promote healthy, resilient communities in the long term. The presentation will describe a collaborative process that places the narrative and experience of Detroiters at the center, illuminating gaps in water governance, identifying site-specific management challenges, and guiding the selection of GI and NbS approaches that truly respond to community priorities.

Yvonne Drebert[1], **Zachary Melnick**[1] and Michael Rennie[2], [1]Inspired Planet Productions, [2]Lakehead University. **Broadcasting from the Deep End: Underwater Livestreaming from Remote Great Lakes Waters.**

Science communication often happens after the field work is done, once the data are clean, the socks are dry, and the story is safely packaged. But what if audiences were invited into the messier parts of the scientific process in real time? In September 2025, our small documentary and research team undertook a live, offshore science expedition broadcast from the middle of Lake Superior. In practice, this meant turning an active science vessel into a live broadcast studio between filtering zooplankton, extracting otoliths, and running deck operations. Graduate students and postdocs were enlisted to switch video feeds and filter audience questions. Using an underwater ROV and a patchwork of low-cost livestreaming tools, we streamed a deepwater mission exploring Superior Shoal, an underwater mountain rising nearly 300 metres from the lakebed, complete with commentary from onboard scientists. As tools become smaller, cheaper, and more accessible, offshore livestreaming is no longer limited to large institutions. This presentation shares lessons from our first attempt at low-cost, remote livestreaming as a science communication tool. We discuss what worked (strong audience engagement and curiosity), and what didn't (bandwidth limitations and the challenge of juggling many moving parts while operating equipment at depth). We also reflect on the unexpected value of humour and imperfection, and how showing science as it happens can build trust and connection in ways traditional outputs often cannot.

Ken Drouillard[1], Derek Muir[2], Heidi Swanson[3], Naomi Stock[4], Hui Peng[5], Lu Zhe[6], Geoff Koehler[2], Liisa Jantunen[2], Patricia Corcoran[7] and Marlene Evans[2], [1]Great Lakes Institute for Environmental Research, [2]Environment and Climate Change Canada, [3]Wilfred Laurier University, [4]Trent Unversity, [5]Unversity of Toronto, [6]L'Université du Québec à Rimouski, [7]University of Western Ontario. **Spatial and long-term trends in persistent organic pollutants and metals in lake trout and burbot from Great Slave Lake.**

This project investigates time trends (1993-2024) of mercury (Hg) and persistent organic pollutants (POPs) in lake trout, burbot and northern pike in the West Basin (WB) and lake trout and burbot from the East Arm (EA) of Great Slave Lake. Lake trout were obtained at Lutsel K'e (EA) and the Hay River (WB) commercial fishery and contaminants measured in fillet. Burbot and northern pike were obtained from Fort Resolution (WB) and burbot from Lutsel K'e with fillet analyzed for Hg and liver for POPs. Hg show slow increasing time trends at WB sites for lake trout, burbot and northern pike (half lives of 46 - 67 years) and for burbot ($t1/2 = 69$ years) at the EA site. PCBs show declining trends in lake trout and burbot from EA and WB sites. PBDE's were declining at WB in locations in both species but insufficient data available to evaluate trends at EA. Chemical signature analysis indicate distinct patterns of POPs in lake trout between the East and West basin locations hypothesized to reflect producivity induced dilution in the WB. Contaminants in Lake Trout from Great Slave are contrasted against size adjusted concentrations in Lake Superior fish for context to Laurentian Great Lakes contamination.

Thomas Drover and Kathryn Hargan, Memorial University. **Inferring long-term forage fish and coastal ecosystem dynamics from estuarine sediments.**

Capelin (Mallotus villosus) are keystone forage fish in the northwest Atlantic, with the stock in NAFO divisions 2J3KL historically among the largest. This stock collapsed in 1990-1991 and has remained depressed, with limited recovery. Because systematic monitoring began only shortly before the collapse, knowledge of long-term population dynamics to inform management is lacking. Paleoecology provides a means to reconstruct historic stock dynamics from sediment records associated with coastal spawning habitats. Bellevue Beach, Trinity Bay, Newfoundland, is a critical capelin spawning site that partially encloses an embayment containing fine-grained, organic-rich, and relatively undisturbed sediments suitable for paleoecological analysis. Tides draw capelin into the embayment, so their biological traces are likely preserved in the sediments. Here, we integrate biological proxies (sedimentary environmental DNA and diatom assemblages) with biogeochemical indicators ($\delta^{13}C$, $\delta^{15}N$, CHNS elemental composition, and chlorophyll a) to reconstruct long-term changes in forage fish presence alongside estuarine-coastal dynamics. Preliminary results from two sediment cores show congruent down-core trends in $\delta^{13}C$ and $\delta^{15}N$ values and C:N ratios that are consistent with shared diagenetic and source-related influences across the embayment, while differences in the magnitude of these trends and contrasting chlorophyll a profiles between cores indicate fine-scale spatial heterogeneity in organic matter inputs and productivity. Diatom assemblages are highly diverse, featuring many brackish and marine epiphytic and benthic taxa.

Véronique Dubos[1], Les Harris[2], Daniel Fortin[1], Nathan Furey[3], Brendan Malley[2] and Jean-Sébastien Moore[1], [1]Université Laval, [2]Fisheries and Oceans Canada, [3]University of New Hampshire. **Are you on Fishbook too? Quantifying social interactions and territoriality of two Arctic fish species: Arctic char and lake trout.**

Anadromous Arctic char (migratory) and lake trout coexist in many Arctic lakes. While Arctic char fast throughout the winter, lake trout continue feeding. How do these two salmonids, which share a similar environment under extreme conditions but have different bioenergetic needs, interact with their conspecifics? Does winter resources limitation generate territoriality among lake trout? Individuals of both species have been equipped with acoustic transmitters in two High Arctic lakes (Cambridge Bay, Nunavut). Their fine scale movements were recorded over one year using a VPS (Vemco Positioning System). The high-resolution data enabled analysis of fish behavior when in proximity to conspecifics through network analysis and Step Selection Functions (SSF). The results reveal distinct social dynamics by season and species. During the spawning period, all tagged Arctic char encountered one another, whereas social interactions among tagged lake trout were limited to certain individuals. In winter, individuals of both species used partitioned territories, but lake trout showed lower level of spatial overlap, suggesting a potential territorial behavior. However, inter-individual interactions were generally not agonistic, which could be due to sufficient food availability relative to the fish density. This study is among the first to apply tools typically used in terrestrial animal behavior, to the social behavior of fish. Considering interactions and territoriality provides new insights into the winter ecology of salmonids and could inform fisheries management and conservation strategies.

Erin Dunbar, Province of Mantioba - Fisheries Branch. **Key Influences on the Management of Commercial Fisheries in Manitoba.**

The Manitoba government strives to apply a science-based approach to fisheries policy development and decision-making, ensuring that commercial fisheries across the province are managed responsibly and sustainably. These fisheries contribute significantly to Manitoba's

economy, food security, and community well-being, making their effective management a priority. Achieving this requires more than scientific data, it demands adequate resources, technical capacity, and meaningful engagement with resource users, including fishers, communities, and industry stakeholders. Collaboration helps align ecological objectives with social and economic realities. However, fisheries managers operate in a dynamic environment where external factors often complicate decision-making. Climate change and shifting environmental conditions can alter fish populations and habitats, while political priorities, market fluctuations, and evolving relationships among governments, Indigenous communities, and industry add layers of complexity. These influences require managers to balance conservation goals with economic opportunities and community needs. As conditions continue to change, whether due to environmental variability, market pressures, or social expectation, decision-makers must remain adaptable, transparent, and committed to evidence-based strategies. By combining science with inclusive dialogue and flexible policies, Manitoba has improved and protected fish stocks to create healthy fisheries and support the communities that depend on them.

Ryan Lauzon and **Alexander Duncan**, Chippewas of Nawash Unceded First Nation. **Intentional introduction of invasive species: A Summary of Saugeen Ojibway Nation Knowledge and Perspectives of Fish Stocking with some Western Science Additions.**

Stocking of non-native salmonines remains a prominent management tool in Lake Huron, justified largely through recreational fishery objectives and assumptions about ecosystem benefits (e.g., forage control). From the Saugeen Ojibway Nation (SON) perspective, the central question is not whether any single study proves harm, but whether the combined evidence, together with SON knowledge of local change, indicates a credible risk of cumulative impacts to culturally, spiritually, and economically important native fishes and food-web function, with important implications for community health, safe traditional foods, and Indigenous food security.We present a SON-led risk synthesis that integrates (1) peer-reviewed Great Lakes food-web and salmonine ecology literature and (2) SON knowledge-holder observations regarding long-term shifts in prey availability, predator-prey dynamics, and fishery outcomes in SON waters of Lake Huron/Georgian Bay. We organize evidence around decision-relevant pathways: (i) prey limitation and "bottom-up" constraints, (ii) bioenergetic demand from added predators, (iii) diet overlap and predation/competition potential with native species and coregonines, and (iv) equity considerations, who receives benefits and who bears ecological and rights-based costs. Across these lines of evidence, we find that uncertainty does not equate to safety: in a prey-limited system, additional predator demand can plausibly amplify risks to native prey fishes and impair recovery objectives. We conclude with some ideas for practical decision frameworks suited to co-governance.

Ruth Duncan[1], Juliette Barnaby[2], Jaime Malone[3] and Mary-Claire Buell[1], [1]Trent University, [2]Migmawei Mawiomi Secretariat, [3]odonaterra. **More Than Contaminants: Understanding Risk, Knowledge, and Food in Mi'gmaq Territory.**

From the ocean's coast to the headwaters of the St. Lawrence, waters that eventually flow into the Great Lakes, lies Gespe'gewa'gi. In Gespe'gewa'gi, relationships to water, fish, and harvesting practices are inseparable from health, identity, and governance. Yet legacies of industry, climate disruption, and institutional decision-making have contributed to uncertainty about the safety of traditional foods and water and the erosion of access to territory. In response, we are working with the communities of Listuguj, Gespeg, and Gesgapegiag to shape social environmental health assessments that reflect their priorities, knowledge, and environment. This presentation shares insights from one of these assessments, co-developed with Mi'gmaq leadership and community

members, that brings together environmental monitoring, risk perception research, and community engagement. Rather than applying external frameworks, the project was built relationally: community knowledge informed sampling questions and data ownership and communication pathways were designed for the community. While chemical analyses identify potential threats, community knowledge reveals how risk is lived through mistrust of industry, loss of confidence in harvesting, and disruptions to relationships with environment. These lived understandings highlight that addressing contamination alone is insufficient; meaningful environmental health work requires honouring social, cultural, and lived dimensions carried by communities. By centring Indigenous knowledge, this work offers pathways for research practice that support food safety, build capacity, and strengthen Indigenous leadership over monitoring, decision-making, and responsibilities to land and water.

Natalie Dupont[1], Brent Wilson[2], Matt Black[2], Alanah Bartlett[3], Tim Robinson[3], Alex Morrissey[1], Kurt Samways[1], Mike Stokesbury[4], Jason Daniels[5], Rob Lennox[6], Jim Hawkes[7], Chris McKindsey[2], Tommi Linnansaari[1] and Marc Trudel[2], [1]University of New Brunswick, [2]Fisheries and Oceans Canada, [3]Fort Folly Habitat Recovery, [4]Acadia University, [5]Atlantic Salmon Federation, [6]Dalhousie University, [7]National Oceanic and Atmospheric Administration. **Early Marine Movement Ecology of Endangered Atlantic Salmon (Salmo salar) in the Bay of Fundy.**

The Inner Bay of Fundy (iBoF) Atlantic salmon (Salmo salar) is the only population of salmon listed under Canada's Species at Risk Act. It is a genetically distinct population that typically remains in the Bay of Fundy and the Gulf of Maine during the marine portion of the life cycle. Many conservation efforts including supplementation programs have helped the population persist in the rivers since its collapse in the late 1980s. But regardless of the number of smolt salmon migrating out to sea from the rivers, almost none survive to return and spawn the following year. Thus, high marine mortality is currently the primary factor limiting the recovery of iBoF salmon. Little is known about the first year at sea of iBoF salmon, and the causes of this marine mortality still unclear. Today, academic, federal, and indigenous organizations are working together to investigate their marine habitat use, migration patterns and causes of mortality. Smolts migrating out of four iBoF rivers (Point Wolfe, Upper Salmon, Pollett and Gaspereau) were tagged with temperature-sensing acoustic tags in May 2024 and 2025, and their movements were tracked on acoustic receivers throughout the Bay of Fundy. This movement information will identify iBoF salmon critical marine habitat and causes of mortality in support of Fisheries and Oceans Canada's Action Plan for iBoF Atlantic salmon. This can then inform effective marine conservation effort.

Snigdhodeb Dutta[1, 2] and Dylan Fraser[1, 2], [1]Concordia University, [2]GRIL (Groupe de Recherche Interuniversitaire en Limnologie). **Hydrology Mediates Cumulative Thermal Stress to Drive Nonlinear Population Declines in Brook Trout across Years.**

Climate change is increasingly threatening freshwater biodiversity, with cold-water species like brook trout (Salvelinus fontinalis) particularly vulnerable due to their narrow thermal tolerances. While acute thermal thresholds (e.g., >19°C reduced growth, >22°C recruitment failure) are well-documented, the effects of chronic, sublethal warming in natural systems remain poorly understood. Using an 14-year dataset (2012-2025) from nine hydrologically diverse streams in eastern Canada, we quantified how cumulative warming and precipitation variability drive population declines. Our results reveal a critical cumulative thermal threshold of 11.6°C-years (95% CI: 10.2-13.1), beyond which brook trout abundance declines nonlinearly, demonstrating that prolonged sublethal stress can collapse populations before acute thresholds are reached. Hydrological regime mediated responses: groundwater-fed streams buffered warming initially but showed delayed declines (e.g.,

LC: -13.6% abundance/°C), while rainfall-dependent systems exhibited boom-bust dynamics tied to extreme events (e.g., UO summer spikes >19°C). Wet-season precipitation exacerbated declines (β = -16.4 fish/mm), likely due to hydrological stress during biologically sensitive periods. Small populations were disproportionately vulnerable to extremes (93% declines in hot years), suggesting demographic and genetic constraints. These findings redefine climate vulnerability for cold-water fishes by emphasizing cumulative stress over acute extremes, with direct implications for conservation: protecting groundwater recharge, prioritizing rainfall-stream restoration, and using the 11.6°C-year threshold as a management benchmark.

McKayla Dzyngel[1], Colleen Cosgrove[2], Nathan Manning[2], Ashley Burtner[1] and Silvia Newell[1, 3], [1]University of Michigan, [2]Heidelberg University, [3]Michigan Sea Grant. **Nutrient Loads Alone Can Predict Microcystin in Lake Erie Harmful Algae Blooms.**

Western Lake Erie (WLE) experiences annual toxic cyanobacterial blooms that negatively impact freshwater resources and ecological functioning of the system. The primary driver of these toxic blooms is agricultural nutrient runoff, particularly from the Maumee River watershed. Understanding the role of nutrient loads from the Maumee River in promoting toxic blooms in WLE is critical for decision making and informing the public of potential hazards in a timely manner. Past and current studies often use Bayesian models and total bioavailable phosphorus loads to predict bloom biomass but lack the ability to directly predict concentrations of microcystin, the primary toxin produced by these blooms. Existing models that attempt to predict microcystin typically rely on lagged toxin concentrations from the previous week rather than nutrient loads alone. This study models microcystin concentrations in WLE using lagged nutrient loads from the Maumee River as predictor variables. We developed a Seasonal Auto Regressive Integrated Moving Average Exogenous Regressors (SARIMAX) model using Total Phosphorous (TP), Nitrate/Nitrite (NO_x), and Total Kjeldahl Nitrogen (TKN) loads to model median microcystin across WLE. Results show that this model can effectively capture seasonal variability and nutrient-driven patterns in microcystin concentrations (Spearman's rho = 0.75 for observed to modeled median microcystin values). Continued effort will go into confirming the model's ability to predict microcystin. Accurately modeling and predicting microcystin is important to support early-warning systems and improve nutrient management strategies.

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Madison Earhart[1], Ian Bouyoucos[1], William Bugg[1, 2], Kelly Scott[3], Noah Kussin-Bordo[4], Sarah Schreier[5], Colin Brauner[1], Patricia Schulte[1], Erika Eliason[6] and Steve McAdam[7], [1]university of british columbia, [2]Pacific Salmon Foundation, [3]Tsawwassen First Nation, [4]Lower Fraser Fisheries Alliance, [5]Fraser River Sturgeon Conservation Society, [6]Fisheries and Oceans Canada, [7]Ministry of Water, Land, and Resource Management. **Evaluating climate change stressor resilience in wild white sturgeon populations.**

The ability to understand and predict the impacts of human-altered environments on aquatic animals is critical in order to create impactful conservation strategies and management plans, particularly for species at risk. Sturgeon are prehistoric, long-lived fishes that make up one of the most endangered groups of fishes globally with species distributed across the Northern hemisphere. White sturgeon (Acipenser transmontanus), one of the largest and most ancient freshwater fish in North America, are threatened or endangered throughout their range in British Columbia (BC) including populations in the Fraser and Nechako Rivers, which are facing collapse due to a variety of

anthropogenic stressors. The population declines in these rivers are concerning to rights, title, and shareholders throughout BC, and in order to aid the recovery of white sturgeon we must first identify the causes of population declines, low juvenile recruitment, and mortality events. To do this, we created novel mRNA biomarker panels that assess climate change stressor resilience, or lack thereof, in wild sturgeon populations. Specifically, we have assessed physiological status and the impacts of climate warming, food limitation, and pathogen burden on hundreds of wild sturgeon in multiple BC populations through minimally invasive sampling and community science. Results will be discussed in the context of yearly and seasonal effects of climate stressors and pathogen abundance on wild sturgeon resilience, metabolic rate, growth rate, habitat use, and recreational angling impacts.

Madison Earhart, University of British Columiba. **Implementing department-wide equity, diversity, and inclusion training initiatives.**

There is a desperate need for ground-breaking, evidence-based conservation solutions in response to climate change; however, the systemic exclusion of diverse perspectives limits attempts to meet this need. Evidence shows that diverse and supported teams perform better, generate innovative ideas, and produce higher-impact research. Given these positive outcomes, diversity, equity, inclusion, and accessibility (DEIA) are essential for successful and impactful science in our discipline. Inclusion of systemically under-represented students and faculty must go beyond hiring diverse individuals, and typically requires a shift in departmental culture to create and foster spaces where all people are empowered. This presentation will focus on trainee-led initiatives focused on DEIA within our department emphasizing the planning and implementation of department wide training. These community-based seminars focused on creating inclusive, respectful working environments for trainees and faculty, highlighting the importance of language, making inclusive spaces, and the co-creation of lab expectations. I will further discuss the long-term implementation of these successful initiatives and future pathways forward in a time where DEIA is increasingly under threat.

Adam Lepage[1], **Brie Edwards**[1, 2], Thomas Johnston[1, 3], Elizabeth Favot[1], Michael Rennie[4], Mark Mallory[5], Andrew Paterson[2], John Smol[6] and Jacqueline Litzgus[1], [1]Vale Living with Lakes Centre, Laurentian University, [2]Ontario Ministry of the Environment, Conservation, and Parks, [3]Ontario Ministry of Natural Resources, [4]Department of Biology, Lakehead University, [5]Department of Biology, Acadia University, [6]Paleoecological Environmental Assessment and Research Laboratory (PEARL), Department of Biology, Queen's University. **Conservation and Restoration of Aquatic Diversity in the face of Legacy and Emerging Stressors.**

Aquatic ecosystems in the Sudbury region of Ontario are still recovering from decades of severe industrial acidification. The biodiversity responses to these improving conditions, from population to ecosystem scales, are variable and potentially impacted by contemporary stressors. The Conservation and Restoration of Aquatic Diversity in the face of Legacy and Emerging Stressors (CRADLES) program was launched in 2025 to assess recovery trajectories and emerging stressors across lakes, streams, and wetlands in the Sudbury damage zone. Using an integrated, multi-indicator approach that combines fish and invertebrate surveys, automated acoustic monitoring of anurans, high-resolution paleolimnology, environmental DNA analysis, and semi-automated plankton imaging, CRADLES collected coordinated datasets spanning multiple trophic levels and environmental gradients. Initial results show widespread chemical improvement yet uneven biological recovery, highlighting the influence of legacy impacts, altered food webs, and new stressors such as climate change, invasive species, and road salt. The program supports eight

graduate research projects that together advance understanding of long-term ecosystem change, at taxonomic scales from microbes to food webs, and temporal scales dating back to pre-industrial times. By integrating historical baselines with contemporary monitoring, CRADLES is generating new tools and evidence to refine restoration targets, strengthen long-term monitoring programs, and guide biodiversity recovery and protected area management. This work provides a regional model for assessing ecological resilience in recovering northern landscapes and contributes directly to broader conservation goals in Ontario and around the world.

Jena E. Edwards[1], Danni L. Harper[2], Cornelia E. den Heyer[2] and Robert J. Lennox[1], [1]Dalhousie University, Department of Biology, 6283 Alumni Crescent, Halifax, Canada, [2]Fisheries and Oceans Canada, Bedford institute of Oceanography, Dartmouth, Nova Scotia, Canada. **Tracking ontogenetic shifts in Atlantic halibut residency and migration.**

The Atlantic halibut (Hippoglossus hippoglossus) is Canada's most valuable commercial groundfish and serves as a rare example of population recovery following effective fisheries management. To maintain the current stability of Atlantic halibut stocks and fisheries, management strategies must respond to shifts in population dynamics and stock structure, particularly under rapidly changing climatic conditions. This requires continued monitoring and a deeper understanding of the processes underlying patterns in distribution, connectivity, and space use, which ultimately shape spatial and temporal variability in fish abundance. Previous studies identified an ontogenetic shift in the migration strategies of Atlantic halibut, with juveniles exhibiting localised residency within defined nursery areas and adults undertaking seasonal migrations across a range of spatial scales. However, the timing of the transition between life-stage-specific behaviours, and the factors influencing dispersal from nursery habitats, remain poorly understood. Our study uses a combination of acoustic and satellite telemetry to examine migration strategies across halibut life stages, with a focus on identifying the onset of migration and drivers of dispersal from a known nursery area. Using large-scale telemetry infrastructure and long-term monitoring, we aim to quantify changes in space use, residency, and movement behaviour as individuals grow, and evaluate the influence of size, season, and environmental context on dispersal dynamics. By linking fine-scale residency to broader-scale movements, this work provides new insight into the life-history processes shaping halibut population structure.

Chris Elvidge, Sheri Fritzsche and Alejandro DeMaio-Sukic, Fisheries and Oceans. **15-Year Catch and Effort Trends in Three Canadian Atlantic Seafisheries.**

A 27% decline in Canadian commercial fish landings occurred between 2008 and 2022 and continues through 2024, even as landed values have increased by 174% in 2008-adjusted dollars. Declining landings may be cause for concern with respect to the health of fish stocks as well as the viability of the fishing industry and the economic well-being of fisheries-reliant communities. Focusing on three of the top ten most valuable Atlantic species (Northern shrimp, Greenland halibut/turbot, and Atlantic herring, representing Shellfish, Groundfish, and Pelagics, respectively) that have each demonstrated significant decreases in landings, we compared catch and fishing effort variables recorded in DFO's Integrated Catch and Effort Reporting System (ICERS) database to annual fisheries quotas from the Atlantic Quota Monitoring System (AQMS). Declines in these three species alone can account for the overall decline in all landings, with additional declines offset by increased landings of other species. Further, declining landings of these three species are directly proportional to decreasing quotas. With the exception of Northern shrimp in more recent years, catch per unit effort (CPUE) has generally been increasing along with landed values, indicating that conservation and management restrictions on fishing may have been successful thus far at mitigating

fishing impacts on these species while rising prices have allowed the fisheries to remain profitable for remaining participants-a possible bright spot in fisheries management.

Erik Emilson[1], Karen Kidd[2], Roxane Maranger[3], Madison McCaig[1], Colin McCarter[4], Michael Stastny[1] and Lisa Venier[1], [1]Natural Resources Canada, Canadian Forest Service, [2]McMaster University, [3]Universite de Montreal, [4]Nipissing University. **Consideration of land-water linkages in managing outbreaks of defoliating insects in forests.**

Forest insect outbreaks are the most prevalent agents of natural disturbance in Canadian forests, with the annual area affected by Eastern Spruce Budworm (Choristoneura fumiferana) alone surpassing that of fire and harvest combined. Despite being a natural disturbance agent, forest management often includes outbreak control to prevent tree mortality and preserve valuable wood to minimize ecological, social, and economic impacts. While there is a history of considering potential impacts of insecticides on freshwaters, the importance of land-water linkages and role of natural disturbances in shaping freshwaters has not been given much consideration in decisions on whether or how to control forest insect outbreaks. To explore the role of forest defoliation in shaping freshwater ecosystems, we experimentally manipulated a gradient of defoliation among 12 watersheds in the Gaspésie Peninsula, Québec and collected several measures of ecosystem structure and function in affected headwater streams. We found defoliation to cause increases in streamflow and temperature, changes to water quality and carbon fate, and alterations to benthic and microbial community structure and function, affecting aquatic food web dynamics. We present these results with a focus on how to inform forest management decisions, especially with consideration of natural variation and whether we should or should not be controlling natural disturbances.

Craig Emmerton[1], John Orwin[2], Cristina Buendia[3], Michael Christensen[4], Jennifer Graydon[2], Brian Jackson[2], Elynne Murray[2], Stephanie Neufeld[4], Brandi Newton[2], Ryan Ozipko[2], Rick Pickering[2], Nadine Taube[2], Chris Ware[2], Wes Greenwood[2] and Claire Classen[2], [1]Government of Alberta; University of Alberta, [2]Government of Alberta, [3]Agència Catalana de l'Aigua, [4]EPCOR Water Canada. **A network approach to river monitoring and management in the diverse North Saskatchewan River basin.**

Northern rivers are valuable indicators of cumulative landscape and climate change effects and are best understood using thoughtfully designed, consistent, multi-annual monitoring of water quality and river flow throughout their basins. We use this network approach in the North Saskatchewan River (NSR) basin of western Canada to understand how indicators of river pollution (i.e., total suspended sediment [TSS] and dissolved organic carbon [DOC]) change in response to different landscape and hydrometeorological conditions, and river types. These indicators, and their associated pollutants, have potential impacts on aquatic ecosystem health and cost-effective production of safe drinking water for over one million people. During wet years, we observed disordered, threshold-type, erosive mobilization of TSS through the basin within both pristine and impacted tributary catchments of the NSR, as well as in its mainstem channel. During dry years, mobilization of TSS through the network was substantially lessened as landscape and mainstem erosion processes declined. In contrast, DOC mobilization increased and decreased more predictably with changes in runoff. Consequently, in a future warming and wetting climate, we expect TSS and DOC transport to intensify with sediment transport being more difficult to predict compared to DOC. This integrated and consistent monitoring approach is a basic but key tool for managing cumulative effects on rivers resulting from human land use and climate and change.

Ann Elizabeth Enova[1], Dylan Szucs[1], Veronica Barbosa[1], Judith Cristobal[1, 2], Susan Daniel[3], Kaira Kamke[3], Nikolai Barulin[3], Lyubov Burlakova[3], Alexander Karatayev[3] and Diana Aga[1, 2], [1]Department of Chemistry, University at Buffalo, Buffalo, NY, [2]Research and Education in Energy, Environment and Water (RENEW) Institute, University at Buffalo, Buffalo, NY, [3]Great Lakes Center, Buffalo State University, Buffalo, NY. **PFAS analysis reveals different accumulation patterns across Great Lakes water, sediment and biota.**

The Great Lakes are a crucial water & food source for USA and Canada, but face increasing threats from persistent contaminants such as per- and polyfluoroalkyl substances (PFAS). This study presents a multi-matrix analysis evaluating PFAS partitioning and accumulation patterns in water, sediment, and Dreissena in the Great Lakes. Forty PFAS were quantified using liquid chromatography-mass spectrometry (LC-MS/MS), allowing assessment of spatial variability and bioaccumulation patterns. PFOS and PFOA were consistently detected in bottom waters, with Lake Michigan showing highest concentrations (2.6-4.5 ng/L), likely due to stratification and stagnant conditions. Lake Erie exhibited the lowest concentrations, consistent with shallow depth, high turnover, and mixing. Lake Ontario exhibited intermediate levels, possibly associated with higher flow, while Lake Huron contained 6:2 FTS. Lake Superior waters were free of detectable PFAS, though some compounds persisted in sediments. Matrix-specific PFAS profiles revealed PFBS, PFOS, PFHpA, and PFOA in bottom water; PFOS and PFOA accumulation in mussels; and enrichment of longer-chain carboxylic acids (C7-C14) and 6:2 FTS in sediments. The absence of 6:2 FTS in mussels suggests metabolic transformation of partially fluorinated compounds. Dreissena primarily accumulated C8 PFAS (1.6-14.6 ng/g), reflecting species-specific feeding and metabolic traits, underscoring the need to examine PFAS profiles in other benthic taxa to resolve trophic-level transfer pathways. These findings highlight the importance of multi-matrix monitoring for understanding PFAS sources, distribution, bioaccumulation, ecological risk, and contaminant persistence in large freshwater ecosystems.

Milena Esser[1], Brittany Perrotta[2] and Karen Kidd[1], [1]McMaster University, [2]U.S. Geological Survey. **Metamorphosis and pollution shape aquatic insect-associated microbial communities.**

Aquatic insects harbour microbiomes that are crucial for digestion, immunity, and ecological interactions. These communities may undergo dramatic changes during metamorphosis, as aquatic larvae develop into terrestrial adults. In addition, wastewater effluents, which contain microbes, nutrients, and contaminants, disrupt larval insect microbiomes, but it remains unclear whether such effects persist across development or transfer to terrestrial predators. To address this question, we analyzed microbiomes of larval and adult aquatic insects (Hydropsychidae, Chironomidae, Heptageniidae) and riparian spiders (Araneidae, Tetragnathidae) collected up- and downstream of four wastewater treatment plants along the Grand River, Ontario. Whole-body bacterial communities were profiled using 16S rRNA amplicon sequencing. Microbial composition differed strongly between life stages. Larvae were dominated by anaerobic, gut-associated taxa, whereas adults and spiders harboured more aerobic microbes, reflecting the active larval gut compared to the reduced adult gut and the external digestion used by spiders. Wastewater exposure led to an increase in wastewater-associated taxa and a decrease in core endosymbionts, such as Wolbachia and Rickettsiella, in both larvae and adult insects. In contrast, spider microbiomes showed no significant differences between up- and downstream sites, suggesting limited propagation of wastewater-induced changes into terrestrial predators. Overall, metamorphosis was the primary driver of microbiome restructuring, while wastewater introduced additional taxon- and stage-specific shifts. These findings show how development and contamination jointly shape host-associated microbiomes, influencing host-symbiont relationships and microbial transfer across ecosystems.

Marlene Evans[1], Ken Drouillard[2], Heidi Swanson[3], Arthur Zastepa[1], Shuqi Lin[1], Xinhua Zhu[4], Robin Staples[5], Derek Muir[1], Kathleen Ruhland[6] and John Smol[7], [1]Environment and Climate Change Canada, [2]University of Windsor, [3]Univeristy of Waterloo, [4]Department of Fisheries and Oceans, [5]Government of the Northwest Territories, [6]Queen's Univeristy, [7]Queen's University.

Environmental challenges facing Great Slave Lake and critical unknowns.

Great Slave Lake (GSL) has faced many environmental challenges which are accelerating. Here we summarize past, current, and future major threats facing this unique lake. Concerns with pollution from mining activities grew in the 1970s with the expansion of gold mining activities at Yellowknife; lead-zinc mining at Pine Point; and uranium mining exploration at Stark Lake; the reentry and disintegration of the Cosmos 954 nuclear power satellite over GSL in January 1978 increased local concerns. In the early 1990s concerns focused on the long-range atmospheric transport of persistent organic contaminants and pollution from the Slave River, the conduit of contamination from pulp and paper mills, agriculture, municipalities and oil sands activities via the Athabasca and Peace Rivers. Legacy organic contaminant concentrations are declining but mercury concentrations are increasing, possibly driven by climate change with greater rates of increase in smaller lakes. Cyanobacteria blooms are being more commonly observed, possibly because of warming trends which also are affecting the onset of thermal stratification and its intensity with consequences to lake food webs. Warming also is affecting ice thickness, duration of cover, and lake level with consequences to local travel. Increasing demands for water in the south and continued warming impacting glacier melt and river flow, may place major stresses on the GSL water budget. Hence the strong need to expand current programs to better protect the future of the GSL ecosystem

Nia Everson[1], Samantha Federici[1], Mason Schmitt[1], Benjamin Akande[1], Audrey Allen[1], Valeria Hernandez[1], Madalyn Zimmerer[1], Nicole Berry[2], Danielle Cleveland[3], Michael Lowe[2], Mark Krekeler[1], Matthew Saxton[1] and Jennifer Schumacher[1], [1]Miami University, [2]US Geological Survey Great Lakes Science Center, [3]US Geological Survey Columbia Environemntal Research Center.

Buffalo Reef stamp sand exposure affects hatching time and neuromast development in Zebrafish (Danio rerio).

The historical copper mining waste product, stamp sand, was deposited into Lake Superior along upper Michigan's Keweenaw Peninsula in the early 1900s. Stamp sands have since migrated south to Buffalo Reef, a critical spawning habitat of the economically and culturally important Lake Whitefish (Adikameg; Coregonus clupeaformis). Reports from tribal fisheries indicate a decline in the juvenile Lake Whitefish population in the area, potentially due to stamp sand encroachment. Each stamp sand grain contains remnant copper that can leach potentially hazardous concentrations into the water. Copper is specifically deleterious to neuromasts — sensory organs that are essential for orientation in the water column. Zebrafish (Danio rerio) are a highly tractable aquatic model organism, producing significant quantities of eggs year-round from laboratory-reared breeding pairs. Their rapid development and transparent embryos, along with the use of molecular tools, allow for efficient toxicity testing. We exposed Zebrafish to different concentrations of stamp sand to assess the effects on embryonic development. Our results show that greater concentrations of stamp sand resulted in (1) a notable hatching delay, (2) the absence or reduction of neuromast hair cells, and (3) neuromast hair cell regeneration post exposure. Ongoing research includes assessing the effect of stamp sand exposure on Zebrafish rheotaxis. Ultimately, our findings provide insight into the potential effects that the legacy stamp sand may have on native larval fish.

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Marianne Falardeau[1] and Véronique Dubos[2], [1]TELUQ university, [2]Laval university. **From rivers to sea and well-being: Iqaluppik community-based research to support sustainable fisheries in the changing Ungava Bay.**

Arctic char (Salvelinus alpinus; Iqaluppik in Inuktitut) is available year-round and constitutes a key, stable component of Inuit food systems, supporting well-being, health, culture, subsistence livelihoods, and local economies. The overall objective of this project is to contribute to community-led sustainable fisheries management by gathering information on migration routes, feeding habitats, marine diet, and flesh quality. We are working in partnership with the local Hunters, Trappers and Fishers Associations (Anguvigait) of Kangirsuk, Aupaluk, and Kangiqsualujjuaq, three communities in Nunavik (Northern Quebec). Distinct objectives and methods have been developed in each community to reflect local interests and concerns. In Kangirsuk, Arctic char have been tagged in multiple rivers with the strong involvement of the local Anguvigaq. In Aupaluk, we also collaborate with the provincial wildlife ministry (MELCCFP) and the Aupaluk Anguvigaq to study migrations in relation to reproduction phenology using otolith microchemistry. In all three communities, we are contributing to the establishment of a community-based monitoring program to assess fish condition and flesh nutritional quality. We will weave conventional scientific methods and Inuit Knowledge to co-produce knowledge on fish health. Following data collection, joint workshop(s) will be held with Inuit experts from the three communities. The objective is to share monitoring and management experiences and co-create future pathways toward Inuit-led fisheries governance in Nunavik.

Lana Fanberg, Michael Nagel, Christine Polkinghorne and Matthew TenEyck, University of Wisconsin Superior, Lake Superior Research Institute. **Reduction in Zooplankton Density in Ballast Water After Treatment Using Shipboard Ballast Water Management Systems.**

Ballast water transport contributes to the introduction and spread of aquatic invasive species. The Great Lakes Ballast Water Research and Development Plan was developed and implemented by the Great Waters Research Collaborative (GWRC) in conjunction with the U.S. Department of Transportation Maritime Administration to identify approaches, methods, and best available technologies to reduce the secondary spread of nonindigenous aquatic species by reducing propagules in ballast water within the Laurentian Great Lakes. GWRC examined ballast water treated by existing market-ready ballast water management systems (BWMS) to determine if they effectively reduce organisms ≥50 µm in minimum dimension (nominally zooplankton) given the challenges of Great Lakes water quality (e.g., low salinity, low temperature, high turbidity) and the unique operations of Laker vessels (e.g., high ballast flow rates, large ballast volumes, short hold times). Shipboard BWMS trials were conducted onboard Laker vessels in a variety of Great Lakes commercial ports over multiple shipping seasons. Paired uptake and discharge ballast water samples were collected using Environmental Technology Verification protocol methods to assess the biological efficacy of the systems in reducing zooplankton propagules.

Lauren Fanick[1], Michael Power[1], Jacob Burbank[2] and Andrew Drake[3], [1]University of Waterloo, Department of Biology, [2]Gulf Fisheries Centre, Department of Fisheries and Oceans Canada, [3]Canadian Centre for Inland Waters, Department of Fisheries and Oceans Canada. **Ontogenetic Dietary Shifts of Silver Shiner (Notropis photogenis) in a Canadian watershed.**

Ontogenetic dietary shifts are common in freshwater fish. As fish grow and their gapes widen, the breadth of dietary options available often expand as well. Identifying when ontogenetic shifts occur can help in quantifying and measuring energetic and resource demands between life stages. This knowledge is especially important for species-at-risk fishes, as it can inform on the fundamental habitat features and resources necessary to preserve and protect for a species. Silver Shiner (Notropis photogenis) is a small-bodied minnow species-at-risk, present in a limited number of Ontario urban drainages whose ontogenetic dietary information is largely under-defined. In Sixteen Mile Creek, it currently experiences habitat threats due to intensifying urbanization. Here, stable isotope analyses (SIA) and gut content analysis (GCA) are used to investigate potential dietary shifts amongst four age/size classes of Silver Shiner in the creek. We hypothesized that Silver Shiner experiences ontogenetic niche shifts related to age/size which would be reflected in differing size-class isotope values and gut contents. Findings indicated definite ontogenetic dietary shifts occurring by size-class, with trophic compression occurring at the smallest and largest size-classes, suggesting increased feeding specialization. The greatest dietary overlap and similarity were observed amongst intermediate size-classes and were lowest at both ends of the size range. Although generalist feeders, larval Silver Shiner may start with reduced prey options, which diversify throughout development, and then narrow again at adulthood due to specialization.

Gabrielle Faucher[1], Adam Delage[1], Emily Fields[1], Chris Therrien[2], Jasmine Louste-Fillion[1] and Tom Johnston[3], [1]Laurentian University, [2]University of Waterloo, [3]Ontario Ministry of Natural Resources. **Functional diversity in food webs of acid-recovering Lake Trout lakes in northeastern Ontario.**

Historic smelting activities caused acidification of over 7000 lakes, and the loss of 119 Lake Trout (Salvelinus namaycush) populations across northeastern Ontario, making this species the game fish most affected by acid deposition. While the impact of acidification on Lake Trout abundance is well-documented, far less is known about its long-term effects on aquatic food web structure and function, particularly at higher trophic levels. We examined the legacy effects of acidification on food webs along an acid impact gradient of 42 Lake Trout lakes in northeastern Ontario. Food web structure at the community level and trophic niches at the population level are being characterized through stable isotope ratio metrics. Preliminary analyses indicate that Lake Trout trophic niche size increases with indices of acid impact, suggesting populations may shift to more generalist foraging modes as prey diversity and availability decline. In contrast, at the community level, we found that niche space occupied by functional groups decreased with indices of acid impact, primarily due to lower species richness per functional group. Ongoing analyses will examine food chain length, niche overlap, and trophic niche shape at both scales in these lakes. This research will improve our understanding of the legacy effects of acidification, and guide continued restoration efforts on acid-damaged lakes by identifying key food web components that may require targeted supplementation

Kiyomi Ferguson[1], Andrew Allyn[2], Cornelia den Heyer[1], Jamie Tam[1], David Keith[1], Brad Hubley[1], Danni Harper[1], Alida Bundy[1], Blair Greenan[1] and Nancy Shackell[1], [1]DFO, [2]GMRI. **Distribution Shifts Assessment to describe the spatio-temporal redistribution of a shifty fish stock.**

The distribution of marine species is changing as a result of the climate crisis, with implications for fisheries allocation decisions and livelihoods, within and across jurisdictional borders. However, stock assessments typically only use data from within jurisdictional borders, thus focusing on local trends in abundance, which may differ from the broader stock status. Atlantic halibut (Hippoglossus hippoglossus) is an example of a stock that spans multiple jurisdictions, from

Cape Hatteras in the United States (US), across eastern Canada, San Pierre Miquelon, and into the High Seas. In Canadian waters, abundance and biomass have been increasing over the past 20 years, and the halibut fishery is sustainably certified, while in the US is designated as "overfished". Using Atlantic halibut as an example, we present a tool that can identify, assess, and categorize the nature of spatial and temporal changes in abundance of marine species, and flag regions where climate-induced changes carry implications for management. These methods can be worked into a "Distribution Shifts Assessment framework" to support spatial allocation for other species and regions (both within and across jurisdictional borders).

Timothy Fernandes[1], Kayla Hale[1], Brett Studden[2], Royce Steeves[3], Kevin McCann[1], Brian J. Shuter[2, 4], Tyler D. Tunney[3] and Bailey C. McMeans[5], [1]University of Guelph, [2]University of Toronto, [3]Fisheries and Oceans Canada, [4]Ontario Ministry of Natural Resources and Forestry, [5]University of Toronto Mississauga. **Fish spawning events can stimulate multi-trophic hotspots.**

Mass-reproductive events are often captivating and ecologically-significant, synchronizing food webs and potentially attracting mobile species and galvanizing intense but not well studied food web interactions. Yet, these events can be cryptic and the consumption of reproductive material is difficult to quantify. Here, we combine molecular techniques with telemetry, literature review, and natural history observations to investigate how synchronized reproduction in freshwater fishes influences food webs. First, we demonstrate that spawning white sucker introduce a resource pulse exploited by diverse aquatic and terrestrial consumers. White sucker spawning events attract consumers across trophic levels and ecosystems to feed on eggs, spawning adults, and aggregated egg predators, instigating a hotspot of food web activity. Then, we show that egg provisioning and predation is documented across north-temperate freshwater fish species, suggesting similar hotspots may be introduced by spawning fishes across north-temperate freshwater systems. Resource pulses from synchronized reproductive events may provide a critical yet underappreciated structuring force behind freshwater food webs.

Philippe Fernandez-Fournier[1, 2], Leithen K. M'Gonigle[2], Luke O. Frishkoff[3] and Arne Ø. Mooers[2], [1]University of Regina, [2]Simon Fraser University, [3]University of Texas at Arlington. **Tropicalized by distant relatives: ocean warming reshapes the evolutionary makeup of fish assemblages.**

Marine fish assemblages are rapidly changing in response to human-mediated changes in ocean temperatures. While evidence for shifts in fish species assemblages is growing, less is known about how these changes are reshaping the evolutionary composition of local assemblages. Using a time-series database (BioTIME), we examined how species' thermal affinity and evolutionary relatedness is changing in local fish assemblages as temperatures change. We found that assemblages experiencing faster warming consistently showed stronger increases in the presence of warmer-affinity species. Concurrently, we found that species with higher local evolutionary distinctiveness were more likely to increase in presence in assemblages experiencing faster rates of ocean warming, contributing to a decrease in average assemblage relatedness. Our findings provide the first evidence that, at a global scale, local species turnover under climate change is not only altering species identities but also reshaping the evolutionary composition of marine fish assemblages.

Dawit Amana[1], **Akewake Feyyisa**[1], Tadesse Fetahi[1] and Johanna Irrgeher[2], [1]Addis Ababa University, [2]University of Leoben. **Tracing Anthropogenic and Natural Lead Sources in the Akaki River, Ethiopia: Isotopic Forensics and Multivariate Insights for Policy-Relevant Water Management.**

Lead contamination in urban rivers poses urgent challenges for water security and ecosystem health. The Akaki River in Ethiopia, a critical urban waterway, receives inputs from natural geology, industrial discharges, and urban gasoline legacy. To disentangle these sources, we applied isotopic forensics (207Pb/206Pb, 208Pb/206Pb, 87Sr/86Sr) integrated with elemental profiling (Cr, Ni, Zn, Cu, Sr, Ba) across 30 sites. Principal Component Analysis with confidence ellipses and three-end-member mixing models revealed clear source separation; natural carbonate baselines (Sr, Ba), industrial hotspots (Cr, Ni, Co, Pb), and urban gasoline/garage legacies (Zn, Cu, Pb isotopes). Fractional apportionment showed downstream dominance of urban Pb (>70%), while industrial corridors remained influential in mid river reaches. Outlier analysis identified a garage density hotspot with extreme Pb and As loads, isotopically urban but concentration-driven. Sensitivity tests confirmed robust apportionment when cluster-average end-members anchored the model. This study demonstrates the power of isotope-element coupling for transparent source apportionment in complex river systems. By linking geochemical signatures to policy-relevant categories, our findings provide actionable evidence for targeted pollution control, improved urban water management, and strategic planning under climate stress. The approach offers a replicable framework for applying forensic geochemistry to vulnerable aquatic ecosystems across Africa and other rapidly urbanizing regions.

Deanna Fielder[1], Lauren Fry[2] and Frank Seglenieks[3], [1]U.S. Army Corps of Engineers, Detroit District, [2]National Oceanic and Atmospheric Administration, Great Lakes Environmental Research Laboratory, [3]Environment and Climate Change Canada, National Hydrological Service.
Hydrometeorological Influences on Water Supplies used to Evaluate Regulation Plans.

The International Joint Commission (IJC) established the International Lake Superior Board of Control by the 1914 Orders of Approval and the International Lake Ontario - St. Lawrence River Board by the 2016 Orders of Approval. The main duty of both Boards is to ensure that outflows from Lake Superior and Lake Ontario are prescribed based on their respective regulation plans. For Lake Superior, the Board uses Plan 2012, implemented in January 2015, and for Lake Ontario, the Board uses Plan 2014, implemented in January 2017. A requirement of the IJC Orders is to review the regulation plans within 15 years of implementation. To assist with these efforts, the IJC created the Great Lakes - St. Lawrence River Adaptive Management (GLAM) Committee, which supports the Boards in evaluating the regulation plans. The GLAM Committee's Hydroclimate group has been tasked with understanding the water supplies that were used to develop the plans and evaluate the water supplies that have occurred since the plans have been in place to aid in determining the effectiveness of the plans. This presentation will provide background on water supply scenarios used to test the plans, explore the water supply sequences that have occurred since plan implementation, and investigate the hydroclimatic factors that have impacted the water supply to the region during that time.

Michael Fienen[1], Aaron Pruitt[2], Ty Ferre[3] and Howard Reeves[1], [1]USGS Upper Midwest Water Science Center, [2]Wisconsin Department of Natural Resources, [3]University of Arizona. **Beyond streamflow: managing tradeoffs between economy and ecology in high-capacity well evaluation.**

In the Great Lakes region, water is abundant. Streamflows and lake levels, however, are often in a tenuous balance with the shallowest portion of the groundwater system. Small reductions in groundwater levels may leave plenty of water volume in place but may interrupt supply to streams and lakes. This condition motivates US states in the region to use surface water impacts as key legal considerations when evaluating requests for high-capacity well withdrawals for public supply,

industry, and agriculture. The cumulative effect of multiple wells in a watershed can be estimated using superposed analytical solutions. The python package pycap-dss implements analytical solutions and can simulate many wells in a watershed efficiently, enabling multi-objective formal optimization that quantifies a Pareto frontier, delineating the tradeoff between the amount of pumping in managed wells and the streamflow response in a river. Using the Little Plover River in Wisconsin, USA as a test case, we demonstrated the use of this analysis. Additionally, we converted streamflow to brook trout probability of occurrence and quantified the agriculture receipts in US Dollars as supported by agricultural pumping. These Pareto tradeoffs compare model results with management options in terms that are relevant to the societal decisions at hand. Such tradeoffs have the potential to enhance understanding and negotiations about responsible water use serving all needs.

Kerri Finlay[1], Jessica Smith[1], Jessica Lerminiaux[1], Erin Ennis[1], Sydney Jensen[1], Emilee Wagner[1], Kat Kavanagh[2] and Gabrielle Parent-Doliner[2], [1]University of Regina, [2]Water Rangers. **Seven Years of Community-Based Water Monitoring in Saskatchewan: Trends, Applications, and Lessons Learned.**

Community-Based Water Monitoring (CBWM) initiatives have gained increasing traction across Canada over the past two decades, offering benefits such as enhanced citizen engagement in water stewardship, expanded water quality datasets, experiential learning opportunities, and strengthened relationships among diverse stakeholders. Despite this potential, CBWM programs continue to face challenges related to data quality, timely interpretation, and integration with government and academic monitoring efforts. In partnership with Water Rangers, we initiated a CBWM program in Saskatchewan in 2019 to address these limitations. To date, the program has engaged over 70 volunteers and generated more than 1,700 water quality observations. This presentation evaluates the quality of the collected data, assessing accuracy and examining spatial and temporal trends in provincial water quality. The resulting data have been used for community education through public presentations and to support local lake management decisions, including eutrophication management in several recreational lakes. A key contribution of this work is the targeted adaptation of water quality testing kits to address region-specific agricultural water quality concerns, coupled with program modifications designed to fill identified gaps in provincial government monitoring networks. Together, these innovations demonstrate how CBWM programs can be tailored to produce locally relevant, policy-aligned data. Future work will further refine data collection protocols and analytical approaches to strengthen the role of CBWM in effective water quality education and management.

Britney Firth, Afifa Shaukat and Clare Venney, University of Alberta. **Impact of intergenerational enrichment on juvenile westslope cutthroat trout methylome and phenotypic traits.**

Captive breeding is used worldwide to supplement salmonid populations; however, barren captive environments negatively affect phenotypes and post-release survival. Captivity can alter phenotypic traits, gene expression, and the epigenome, but these negative consequences can be mitigated with environmental enrichment. Enrichment likely changes phenotype through modifications of DNA methylation, an epigenetic mechanism, which can alter gene expression. DNA methylation signatures can be altered by rearing conditions, and often is passed from parent to offspring. However, the importance of parental versus offspring enrichment (i.e., epigenetic inheritance versus acclimation) on phenotype and DNA methylation remains unclear. Westslope Cutthroat Trout (Oncorhynchus clarkii lewisi), a threatened salmonid, is part of a captive breeding

program to supplement depleted populations. To assess the effect of enrichment and epigenetic inheritance, parents were split between barren and enriched (i.e., substrate, shelter) environments, bred, and offspring from each family were split between the same treatments. Alevin and fry life-stage were sampled for whole-organism DNA methylation sequencing using enzymatic methyl-seq. Fry anti-predator behaviour and metabolic rate were also assessed to determine if identified changes in the methylome impact phenotypic traits important for post-release survival. This data will determine whether parental or offspring environmental enrichment has the greatest benefits for phenotypes in captivity. Characterizing life stage specific environmental influences on methylation and subsequent phenotypic consequences will delineate enhancements to captive breeding programs that can minimize adverse epigenetic modifications to improve survival post-release.

Britney Firth[1], Abbey Holsopple[2], Bernie Kuhajda[2], Anna George[2], Andrew Drake[3] and Michael Power[1], [1]University of Waterloo, [2]Tennessee Aquarium Conservation Institute, [3]Fisheries and Oceans Canada. **Intra- and inter-specific variation in upper thermal limits of five sand darters (Ammocrypta).**

Thermal tolerance is a species-specific attribute that may vary significantly within a genus and between populations across latitudes. However, conservation decision-making often uses surrogate species and single population data, which can lead to inaccurate inferences about thermal risks. In this study, we assessed the intra- and inter-specific variation of thermal tolerance (CT_{max}) and agitation temperature (T_{ag}) between two eastern sand darter (ESD; A. pellucida) populations and among five of six Ammocrypta species. Ammocrypta spp. are small benthic fishes occupying similar environmental niches. Field based CT_{max} trials were conducted stream-side across seasons (April-August 2019 and 2023) to encompass a range of ambient water temperatures (12-28 °C). CT_{max} was not significantly different between ESD populations but T_{ag} was significantly higher at cooler temperatures and lower at higher temperatures for the ESD southern population. CT_{max} and T_{ag} both showed minimal inter-specific differences among Ammocrypta species. Naked and Florida Sand Darter (A. beanii and A. bifascia) had significantly lower CT_{max} compared to the other three species. Southern Sand Darter (A. meridiana) had the lowest acclimation capacity. The three species, therefore, face the greatest risk under climate change scenarios. Overall, results provide a better understanding of differences in upper thermal limits within the Ammocrypta genus and emphasize the need for estimates of population- and species-specific tolerances as inputs for conservation decision-making.

Agoston Fischer[1], Greg McCullough[1], Madison Harasyn[2] and Jens Ehn[1], [1]Centre for Earth Observation Science, University of Manitoba, [2]Superwake Ltd., Toronto, ON. **Application of remote sensing to monitoring water quality in urban stormwater retention ponds.**

Stormwater retention ponds filter pollutants and reduce the burden on storm sewer systems during heavy rain events, although they are prone to eutrophication. Two nearby ponds in Winnipeg, Manitoba with contrasting designs (traditional gravel vs. naturalized wetland) were regularly sampled for a suite of water quality parameters, including phosphorus and nitrogen, from spring to fall for two years. Remote sensing measurements of water reflectance were collected using a near-surface spectroradiometer and a multispectral sensor mounted to a drone. Linear regressions between selected waveband ratios in the optical spectrum showed that both remote sensing methods were viable for estimating chlorophyll-a and total suspended solids, even under suboptimal conditions (windy and/or cloudy). The waveband ratios that performed best included red-edge to red (R_{717}/R_{668}), red-edge to green (R_{717}/R_{560}), and near-infrared to red (R_{842}/R_{668}). Results showed that the naturalized pond was typically less polluted, although both ponds were hypereutrophic by

mid-summer each year. Chlorophyll-a in the traditional pond was measured as high as 783.3 ug L^{-1} during a cyanobacterial bloom event. Orthomosaic multispectral imagery from the naturalized pond showed that the senescence of green algae and pondweed on the water's surface coincided with a decrease in water quality. Compared to more established remote sensing methods, drones are a relatively new technology with the potential to fill a niche for monitoring areas of interest at high spatial and temporal resolution.

Lindsay Fitzpatrick[1], Dani Jones[1], Matt McAnear[2], Yi Hong[1] and Lauren Fry[3], [1]Cooperative Institute for Great Lakes Research, [2]Department of Statistics, University of Michigan, [3]Great Lakes Environmental Research Laboratory. **The Great Lakes NBS-Predictor: An Open-Source Tool for S2S Forecasting of Net Basin Supply Components.**

Accurate prediction of subseasonal-to-seasonal Great Lakes net basin supply (NBS) remains essential for anticipating and preparing for extreme water level events. Building on our previous study, which established a basic machine learning (ML) framework for 9-month NBS predictions, we now present the advanced Great Lakes NBS-Predictor tool. This open-source application breaks down NBS predictions into individual components—precipitation, evaporation, and runoff—further refines ML models, and extends the forecast horizon to 12 months. The tool leverages atmospheric inputs from the Climate Forecast System (CFS), which provides a 9 month forecast 4 times a day. To capitalize on this, the updated NBS-Predictor now ingests the complete 9-month forecast for atmospheric inputs rather than relying on the earlier step-wise, month-to-month approach and generates a forecast ensemble.This transition improves seasonal representation of key components, particularly evaporation. Additional initial-condition variables, including current snow water equivalent values and lake surface temperatures, further enhance predictive skill. Among the ML models evaluated, the Gaussian Process Regressor demonstrates the highest accuracy, lowest variability, and minimal bias across training and validation. The latest version of the NBS-Predictor is currently undergoing evaluation by the U.S. Army Corps of Engineers (USACE) and has been integrated alongside existing operational forecasting systems. By transitioning this work from a research-focused workflow to a flexible, scalable, open-source product, we aim to promote transparency, build on collaboration, and support long-term adaptability for future water-resource management partners.

Kaitlyn Fleming[1], David Ruffo[2], Steven Murphy[2] and Mary-Claire Buell[1, 3], [1]Trent University School of the Environment, [2]Michipicoten First Nation Lands and Environmental Stewardship, [3]Trent University Department of Forensic Science. **From Harvest to Model to Consumption: A Decision Framework for Mercury in Community Fish Monitoring.**

Community-based fish monitoring programs generate critical data for assessing mercury exposure, yet most advisory systems rely on default Power Law regression models to predict mercury from fish length, despite ecological variability across species and lakes. Mercury bioaccumulation in fish does not occur in isolation, it is modulated by interacting stressors including climate-driven changes in water temperature and ice cover, nutrient loading, dissolved organic carbon dynamics, and habitat degradation, all of which influence methylmercury production and trophic transfer. This presentation introduces a decision-based modelling framework designed to improve the accuracy and transparency of mercury estimates for fish consumption guidance. The framework systematically evaluates multiple candidate models using predefined performance criteria and sensitivity diagnostics to identify fragile or unstable relationships. Applying this approach to our co-developed community-based monitoring program data from Michipicoten First Nation revealed substantial heterogeneity in length-mercury relationships, with no single model type proving

universally optimal. In several cases, default regressions would have imposed weak or ecologically unsupported relationships, whereas the decision-tree method provided defensible alternatives or reverted to group means when criteria were unmet. By embedding model stability checks and transparent fallback strategies, this approach enhances methodological rigour, reduces bias in cumulative exposure estimates, and supports culturally relevant, precautionary advisories. The framework is broadly applicable across freshwater systems facing compound stressors, offering a reproducible alternative to conventional modelling that supports food sovereignty and trust in advisory systems.

Peter Flood[1], Katelyn King[2], Cory Brant[3] and Karen Alofs[1], [1]University of Michigan, [2]Institute for Fisheries Research Michigan Department of Natural Resources, [3]United States Geological Survey Great Lakes Science Center. **Using the past to inform the future of bloater restoration in Lake Ontario.**

Bloater (Coregonus hoyi) were a once abundant native fish species that inhabited deep, offshore habitats in Lake Ontario. Efforts to restore bloater in Lake Ontario include stocking bloater raised from eggs collected from Lake Michigan, however, initial assessments have shown low post-stocking survival. Our understanding of historical Lake Ontario bloater population dynamics is limited since the species was infrequently targeted in commercial fisheries. More information is needed on historical observations and suitable spawning habitat in order to better focus restoration efforts. We used observational data from a newly published historical spawning dataset CORHIST, to predict bloater spawning habitats using Maxent models. Due to the scarcity of data, we leveraged Lake Michigan observations for modelling. We used the historical Lake Ontario observations to test the model built using only Lake Michigan data. The most important variables in the model were bathymetry, historical substrate, bottom slope, and circulation magnitude, with spawning habitats being most likely to occur in depths of 30-100m, with low bottom slope, high circulation, and muddy substrate. We show that information from other Great Lakes can be used to inform stocking and restoration efforts in lakes where data are sparse.

Dylan Fraser, Concordia University, Montreal. **A giant of research with a giant heart: celebrating the career and mentoring of Louis Bernatchez.**

This talk commemorates the career of Louis Bernatchez, a pioneering figure in the field of molecular ecology whose research transformed our understanding of biodiversity in aquatic systems. Louis championed the integrative use of population genetics, genomics, evolutionary biology and ecology. He was a visionary leader with an unparalleled ability to harness the latest molecular technologies to advance entire research fields. Among his innumerable accolades, Louis made pivotal advances in our understanding of how historical processes and contemporary selection shape fish populations and speciation in the aquatic realm, providing empirical foundations for defining conservation units and evidence-based management. Louis's down-to-Earth approach and infectious enthusiasm inspired people wherever he went, and he genuinely wanted the best for everyone who crossed his path. His scientific spirit lives on in the hundreds of graduate students, postdocs, research professionals and research assistants that he mentored over nearly four decades. His passion for the people that fish support was also unmistakable, holding a particular soft spot for Cree communities along the James Bay coast, where he did some of his earliest research. Louis's exceptional career is distinguished by innovation, mentorship, and enduring research contributions that continue to guide aquatic research and conservation, and will inspire for generations to come.

Gregory Frie[1], Tim Jardine[1], Iain Phillips[2], André Martel[3] and Markus Brinkmann[1], [1]School of Environment and Sustainability, University of Saskatchewan. Saskatoon, SK, Canada., [2]Ecological and Habitat Assessment Services, Water Security Agency. Saskatoon, SK, Canada., [3]Canadian Museum of Nature, Zoology Department, Canada. **Identifying mussels and host-parasite relations using metabarcoding in the Lower Qu'Appelle River, SK.**

River mussels (Unionidae) are keystone species, providing valuable ecosystem services, but are easily impacted by water quality decline. Impacts from pollution, damming, and invasive species make populations of river mussels especially vulnerable to declines. Despite their positive impact on rivers, native mussels remain largely understudied, with uncertainties surrounding their presence and specific reproductive behaviour, specifically the obligate role of host fishes in distributing larval mussels, called glochidia. The Qu'Appelle River in Saskatchewan is a major tributary of the Assiniboine River. Within it, 8 of the 12 river mussel species known to the Assiniboine drainage have been documented. Records for several other mussel species in the drainage come exceedingly close to Saskatchewan - including the threatened Mapleleaf (Quadrula quadrula). We conducted mixed-method sampling on 16 large-bodied fish species in spring and summer 2024/25 in the Lower Qu'Appelle River. We are identifying mussel glochidia present on fish using species-specific and Unionidae-specific primers. We can uncover details about Saskatchewan's river mussel populations by identifying mussel species in Saskatchewan, and identifying existing or novel host-parasite relationships that mussels share with fishes. By specifically targeting the known-host channel catfish, we are assessing if threatened Mapleleaf are present in Saskatchewan. By using molecular tools, we can more thoroughly understand the mussel community's reproductive patterns in the Lower Qu'Appelle River, useful in protecting mussel assemblages in this river, and providing another method to identify prairie mussels.

Caitlyn Friesen[1], Darcy McNicholl[2], David Yurkowski[2], Gail Davoren[1] and Karen Dunmall[2], [1]University of Manitoba, [2]Fisheries and Oceans Canada. **Sockeye salmon Oncorhynchus nerka marine resource use in the Beaufort Sea.**

Climate change has led to a shortened sea-ice season, facilitating the expansion of subarctic fish, such as sockeye salmon (Oncorhynchus nerka), into the Beaufort Sea. Subsistence harvesters reported higher occurrences of sockeye salmon harvests in 2017 and 2019, years associated with higher temperatures and reduced sea ice. Harvest location patterns suggest that sockeye salmon follow offshore rather than coastal pathways eastward through the Beaufort Sea to communities in the western Canadian Arctic. Inuvialuit harvesters are concerned about potential interactions between these range-expanding species and key endemic Arctic species, including Arctic char (Salvelinus alpinus). To determine Arctic feeding ecology of sockeye salmon and potential for diet overlap with Arctic char in the Beaufort Sea, we used stomach contents, stable isotope, and highly-branched isoprenoid analyses to determine prey species composition and whether marine resource use was more benthic, pelagic, or sympagic, as well as coastal or offshore, in nature. Findings will help understand movements of range-expanding species through the Beaufort Sea and assess potential interactions among range-expanding and Arctic endemic species. These efforts will also directly address the concerns of Inuvialuit communities related to rapid biodiversity shifts and impacts of climate change on Arctic char.

Karl Friesen-Hughes[1], Chelsea Lobson[1], Fallon Moreau[1], Nora Casson[1, 2] and Greg McCullough[1, 3], [1]Lake Winnipeg Foundation, [2]The University of Winnipeg, [3]University of Manitoba. **Phosphorus Hotspots in the Lake Winnipeg Watershed: Exploring a Decade of Data.**

Excess phosphorus loading remains a substantial problem for Lake Winnipeg, causing algal blooms to become more frequent and severe. To reduce phosphorus loading to Lake Winnipeg, we need to understand how, when, and from where phosphorus is entering the lake. The Lake Winnipeg Community-Based Monitoring Network (LWCBMN) began in 2016, a collaborative phosphorus monitoring program designed to identify persistent landscape phosphorus hotspots to more effectively target remedial action. Lake Winnipeg Foundation coordinates the LWCBMN, and we will share what we have learned from 10 years of data, the advances we've made along the way, and what the future of this continuing dataset is.

Lauren Fry, NOAA GLERL. **Leveraging IAGLR to advance research into applications by the Great Lakes - St. Lawrence River Adaptive Management Committee.**

Despite over 100 years of transboundary Great Lakes water management, incorporating research advancements into operational applications remains a key challenge. To address this challenge, the Great Lakes - St. Lawrence River Adaptive Management (GLAM) Committee's Hydroclimate Workgroup has convened a session at the International Association for Great Lakes Research (IAGLR) annual Conference on Great Lakes Research since 2023. The 2025 session, co-convened with academic research partners, targeted highlighting challenges and successes related to transitioning research results into operational applications, including a panel discussion led by water resources practitioners and researchers. Challenges were presented related to data sharing, navigating funding pathways, building awareness of Great Lakes water management practices and stakeholder impacts, and new opportunities for research studies resulting from advancement of artificial intelligence. These challenges were all underscored by the need for clearly articulated research priorities from the Great Lakes water management community. In this presentation, we will describe work that is planned or underway as follow-up to the 2025 IAGLR session and panel discussion, highlighting research priorities that support ongoing and periodic review of Lake Superior and Lake Ontario outflow regulation. In addition, we will share recent efforts by the GLAM hydroclimate workgroup related to the development of a Great Lakes water management community of practice and improving data accessibility and discoverability.

Vincent Fugère[1], Melissa Gingras-Dubreuil[1], Louis Astorg[1], Olivier Morissette[2], Guillaume Côté[3] and Vani Mohit[3], [1]Université du Québec à Trois-Rivières, [2]Université du Québec à Chicoutimi, [3]Ministère de l'Environnement, de la Lutte contre les changements climatiques, de la Faune et des Parcs du Québec. **Impacts of land use on stream multitrophic diversity assessed with morphological and molecular methods.**

Watershed land use threathens stream biodiversity, yet most studies documenting these impacts have focused on 'horizontal communities' (e.g. only fishes, only benthic macroinverterbates). While sampling entire food webs and quantifying diversity across trophic levels is both time and resource-intensive, assessing 'multitrophic diversity' is important for conservation prioritisation and to understand community-mediated impacts on ecosystem functioning. The amplification and sequencing of multiple marker genes from environmental DNA (eDNA) samples could provide a higher-throughput method to assess multitrophic diversity, as a single water sample contains eDNA from diverse groups. Working in an area of intensive agriculture in Southern Québec, we used a multi-marker eDNA metabarcoding approach to assess impacts of land use on stream diatoms, benthic macroinvertebrates, and fishes. For each group, we compared community composition obtained via molecular and morphological methods and we identified the factors that drive composition and diversity. We found that: 1) the correspondence between eDNA and morphology was high for fishes but low for the other two groups; 2) irrespective of the specific taxa

identified by eDNA and morphology, both methods were equally good at detecting impacts of land use on streams; and 3) each group responded differently to land use and had distinct physico-chemical drivers of community composition. Together, these results confirm the relevance of multitrophic approaches in stream ecology and suggest that eDNA metabarcoding is an efficient tool to complement resource-intensive morphological assessments.

Nathan Furey[1], Adam Kanigan[2], Andrew Lotto[2] and Scott Hinch[2], [1]University of New Hampshire, [2]University of British Columbia. **Feeding, physiological, and behavioral responses of a predatory fish to salmon-based trophic hotspots.**

Pacific salmon migrations represent large resource pulses for consumers to exploit. Consumers can respond to resource pulses via movement, from localized aggregations when resources are abundant, to large-scale tracking or migrations to maximize exploitation (i.e., migratory coupling). Chilko Lake, British Columbia, is home to a large sockeye salmon population, where downstream migrations by juvenile smolts have been studied extensively using acoustic telemetry. We examined the feeding of endemic bull trout across seasons to quantify dietary linkages to sockeye salmon life history. Bull trout feed extensively on smolts during the emigration, as well as spawned salmon eggs and carcasses in the fall. Further, these predators exhibit digestive flexibility, with organ sizes increasing in seasons with high salmon availability. To further reveal the investment and benefits to bull trout provided by Pacific salmon, we used acoustic telemetry at fine and broad scales to assess bull trout movements. At broad scales, small but consistent contingents (~30%) of bull trout migrated up to 60 km to the lake outlet during the fall sockeye salmon spawning and spring smolt emigration events, exhibiting migratory coupling between predator and prey. A fine-scale acoustic telemetry positioning system determined bull trout activity increased at night, corresponding with smolt migrations. These results reflect important predator-prey interactions that may affect the energy budgets of bull trout and underscore the importance of sockeye salmon life history events to their food webs.

Jill Furgurson[1] and Jason Delborne[2], [1]North Carolina State University, [2]University of Wisconsin. **From Engagement to Ethical Space and Two-Eyed Seeing: Lessons from Tribal/Researcher Partnerships on Genetic Biocontrol.**

Proposed genetic biocontrol to manage aquatic invasive species represents a high-stakes, future-oriented technology that exposes the limits of current public engagement models. In the case of emerging biotechnologies, "educating communities" is insufficient - and often inappropriate. And although many researchers and managers want Indigenous input, institutions lack mechanisms and approaches to collaboration that foreground sovereignty, justice, and reciprocity. Our collaborative research demonstrates that ethical approaches to inclusion and governance are paramount to environmental stewardship in the Great Lakes region. Guided by a Tribal Steering Committee, we explore how Ethical Space and Two-Eyed Seeing reorient engagement across knowledge systems - from transactional exchange into a practice that actively shapes governance. Rather than simply informing decisions, such engagement reconfigures how environmental governance questions are defined in the first place. Participant observations and insights shared connect ecological change, cultural histories, and technological anticipation in ways agencies rarely capture. And lessons and challenges in data sovereignty and community reciprocity shed light on how research practices can center Indigenous communities and how funding structures can undermine or enhance equity goals.

Matthew Futia[1], Jacques Rinchard[1] and Ellen Marsden[2], [1]SUNY Brockport, [2]University of Vermont. **Diet patterns differ between naturally- and hatchery-produced lake trout across life stages.**

Hatchery-reared fish often have behaviors suited for hatchery conditions and can maintain those behaviors after being stocked in natural environments. Diet-related behaviors that differ between stocked and wild fish can include feeding patterns and prey selection. Here, we tested the hypothesis that hatchery rearing has lifetime effects on foraging success and diet composition by comparing diet patterns between stocked and wild lake trout (Salvelinus namaycush) in Lake Champlain across sizes that include juveniles and adults. Lake trout foraging success was assessed using lipid content and stomach content analyses, including frequency of empty stomachs, stomach fullness by count, and reconstructed mass of prey fish consumed. Diet composition was evaluated using frequency of occurrence for each prey item and fatty acid profiles. Stocked lake trout consumed significantly fewer prey fish by count (27 % average modeled reduction) and had significantly lower lipid content (21 % average modeled reduction) compared to wild fish across all sizes. Stocked fish also tended to have empty stomachs more frequently (19 % average modeled increase) and lower reconstructed mass of prey fish consumed (25 % average modeled reduction) compared to wild fish. Diet composition was similar, however, between stocked and wild fish with most lake trout primarily consuming alewife (Alosa pseudoharengus). Together, these results suggest that the population of stocked lake trout (juveniles and adults) had lower foraging success and energy consumption compared to wild fish.

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David Gallagher[1], Thomas Hrabik[1], Michael Seider[2], Jared Myers[3], Courtney Larson[1], Jason Coombs[2] and Aaron Maloy[2], [1]University of Minnesota-Duluth, [2]United States Fish and Wildlife Service, [3]United States Geological Survey. **Evaluating eDNA metabarcoding for fish community sampling on a remote freshwater archipelago.**

Environmental DNA (eDNA) metabarcoding is a promising tool for surveying remote fish communities, often detecting rare species with less sampling effort than conventional methods. However, biases and contamination throughout the metabarcoding pipeline can complicate filtering threshold selection and interpretation of results. We evaluated the performance of eDNA metabarcoding for six lakes on Isle Royale, Michigan, USA. Our objectives were to 1) evaluate the effects of different thresholds on species richness, 2) optimize lake-specific thresholds using species' geographic distributions to minimize false positives while retaining true detections, and 3) compare eDNA metabarcoding with conventional sampling methods in characterizing fish biodiversity. Species richness immediately declined with increasing threshold stringency and then stabilized, although lake-specific responses varied. Optimal thresholds differed among lakes, with minimum read frequency ranging from 0.03-1.66% per species per sample and detections required in two to eight samples. This variability indicates that global thresholds may increase false positive and false negative error rates. Metabarcoding detected 80.8% (42/52) of species incidences recorded in the most recent conventional surveys, plus six incidences of historically documented species and four incidences of species from nearby waters. Ten incidences across eight species were detected only by conventional methods, likely reflecting habitat use, low abundance, and conservative threshold selection. Overall, our results highlight the complementarity of eDNA metabarcoding and conventional sampling while underscoring the importance of context-dependent threshold selection in remote freshwater systems.

K. Leora Gansworth[1], Nicolas Lapointe[2], Jane Mcmillan[3] and Chris Bowser[4], [1]Vassar College, [2]Canadian Wildlife Federation, [3]St. Francis Xavier University, [4]Cornell University Water Resources Institute. **Eels Back: Confronting Decades of Mismanagement.**

The marginalization and exclusion of Indigenous peoples in small and large scale water stewardship and decision making about fish habitat has detrimental legacy impacts to multiple ecologies and countless species. Key examples of egregious damage include impacts to the American eel, a culturally important fish who is understood as a medicine and a relative, held sacred by Native people across the eastern continent. This presentation will share insights from Eels Back, an initiative that aims to revive and invigorate connections between Indigenous nations and collaborators, focused on supporting the lives of fishes. The group includes educators, legal experts, youth and elders, scientists and technicians, artists and knowledge keepers catalyzed by the plight of eels who have experienced extreme population decline and social apathy, among other threats. Eels Back is an evolving project that centers Indigenous interests and perspectives, combining shared human responsibilities to honor, heal and steward aquatic habitats for future generations. There is a public need to respect the lives of eels for the sacred medicine that they bring to river systems and human communities. Eels Back welcomes other Indigenous ways of thinking, being, and doing. Our group dreams big and works collaboratively to enhance opportunities for multi scalar transformative change that would benefit the suite of wicked problems that harm American eels.

Spencer Gardner[1], Helen Powley[2], Kevin Flynn[2], Ricardo Torres[2, 3], Mark Rowe[4], Casey Godwin[1], Pengfei Xue[5] and Chuyan Zhao[5], [1]Cooperative Institute for Great Lakes Research, University of Michigan, [2]Plymouth Marine Laboratory, [3]Bolding & Bruggeman, [4]Great Lakes Environmental Research Laboratory, NOAA, [5]Dept. of Civil, Environmental, and Geospatial Engineering, Michigan Technological University. **Simulating harmful algal blooms in Lake Erie with an advanced physical-biogeochemical numerical model.**

Coastal communities around Lake Erie continue to experience degraded water quality owing to seasonal harmful algal blooms, hypoxia, and their associated ecological and economic impacts. Under the Great Lakes Water Quality Agreement, the United States and Canada adopted an adaptive management approach that, in part, leverages process-based numerical models to iteratively compare predictions with empirical observations, with the objective of developing improved predictions of ecosystem response to management scenarios. To advance these efforts, we introduced a new member to the ensemble of coupled hydrodynamic-biogeochemical ecosystem models for Lake Erie — European Regional Seas Ecosystem Model (ERSEM) — and incorporated the Dynamic Resource Acquisition Modulated Activity (DRAMA) framework to simulate cyanobacteria (Microcystis) dynamics. In DRAMA, organismal responses to multiple stressors emerge from cellular homeostatic physiology and behavior, where resource availability and satiation initiate (de)repression processes that regulate metabolic activity, buoyancy, and growth. As a detailed biogeochemical model simulating complex lower trophic level dynamics, ERSEM and its DRAMA components require careful calibration for Lake Erie. Here, we investigate the emergent properties of harmful algal blooms and hypoxia in Lake Erie, evaluating model performance through targeted parameterization and fine-scale calibration of key submodules. Preliminary analyses demonstrate the ability of the ERSEM and DRAMA frameworks to simulate emergent features of a large lake ecosystem. Future work will extend the historical assessment period, expand comparisons with existing models, and apply the model to assess management scenarios.

Kiersten Garside, Kat Kavanagh and Gabrielle Parent-Doliner, Water Rangers. **Lake Erie Rangers: Building Trusted Community Data Through User-Informed Tools.**

Community science is most effective when monitoring tools, quality assurance, and interpretation frameworks are designed and tested by the people who use them. To put this approach into action, the Lake Erie Rangers program works with volunteers, watershed organizations, conservation authorities, and research partners to develop and test field methods, thresholds, and data workflows across the Lake Erie basin. Volunteers pilot community-accessible methods for measuring E. coli, nutrients, and winter road salts, providing feedback that directly informs tool refinement for use across Lake Erie. These methods are now being scaled through collaborations supported by the Canada Water Agency, including partnerships with the St. Lawrence River Institute and cross-border relationships with the Lake Erie Volunteer Science Network. Data are managed and shared openly on the Water Rangers' new data platform. The platform strengthens interpretation and trust through enhanced metadata, automated quality checks that allow volunteers to identify and self-correct issues, increasing transparency, consistency, and scientific reliability. Complementary stewardship activities, such as shoreline erosion, ice tracking, and restorative plantings, add ecological context. Results are shared through the Great Lakes DataStream, enabling interoperability with institutional datasets and supporting basin-scale analysis. With nearly 20,000 datapoints from over 300 locations, Lake Erie Rangers demonstrates how aligning tool design, quality assurance, and interpretation with users produces trusted, decision-relevant community data, reducing barriers for researchers seeking to integrate community science into freshwater research, management, and policy.

Shikshya Gautam, Angélica Vázquez-Ortega, Zhaohui Xu, Jyotshana Gautam, Carlos D Soto and Mira Luna Ebersole, Bowling Green State University. **Analyzing Soil Microbial Diversity in Organically Managed Fields Amended with Dredged Material in Northwest Ohio.**

Each year, about 1.5 million tons of sediment are dredged from Toledo Harbor, formerly disposed of in open-lake area. After the ban of open-water disposal, using this dredged material (DM) as a soil amendment offers a sustainable alternative for managing DM. Previous research has shown the DM can improve soil physio-chemical properties in greenhouse settings; current research will focus on investigating the impact of DM on the microbial community in an organic field in Northwest Ohio. This study aimed to characterize the taxonomic diversity of microbial communities in the fields amended with DM. Using 16S rRNA gene sequencing analyzed through QIIME2, we profiled the microbial community structure. The study includes three organic fields: Field 1 received 40 tons/acre of DM, Field 3 received 80 tons/acre, and Field 2 did not receive DM. Alpha diversity metrics (Shannon index) did not show significant differences among the fields ($p > 0.05$) suggesting that the microbial richness and evenness remained relatively stable regardless of the addition of DM. Principal component analysis (PCoA) based on Bray-Curtis dissimilarity revealed clear cluster among the three treatments indicating compositional differences in microbial communities. The study further suggests studying the relation between specific microbial taxa and functional pathways involved in nitrogen metabolism, phosphorus cycling, carbon cycling, and stress response which will provides valuable insights into the complex interactions between microbial diversity and function in soil.

Emma Geffros[1], Cindy Chu[2] and Alyssa Murdoch[3], [1]Trent University, [2]Fisheries and Oceans Canada, [3]Ontario Ministry of Natural Resources. **Exploring broad-scale relationships between environmental change variables and lake fish community trends.**

Northern freshwater ecosystems are undergoing significant environmental changes including increasing temperatures, altered precipitation, changes in water quality, and increasing habitat loss. Understanding how these pressures impact fish species is essential for developing effective conservation strategies and informed fisheries management. Long-term monitoring provides the opportunity to detect patterns of change across spatial and temporal scales. Ontario's Broad-scale monitoring program has been collecting standardized data on inland lakes and fisheries since 2008, and this robust dataset can be used to evaluate trends in fish abundance and community composition over time. Using this dataset, species and community-level indicators (e.g., area-weighted catch per unit effort) were used to determine trends in fish communities over time and across different spatial scales. When focusing on key sport fishes, preliminary results suggested province-wide increases in relative abundance for Walleye, Northern Pike, and Smallmouth Bass over the past 15+ years, while Lake Whitefish exhibited declining trends. These observed trends will be evaluated in relation to environmental and anthropogenic drivers, including climatic variables, to better understand how environmental change may influence fish community composition. These findings will contribute to the development of an evidence-based aquatic stress index that will be used to make informed decisions in fisheries management and conservation decision making in Ontario's inland lakes.

Caleb Geister[1], Matthew Futia[2], Jarrod Ludwig[3], Freya E. Rowland[4], David M. Walters[4], Craig Stricker[5], Brian O'Malley[6], Shawn Sitar[7], Daniel Yule[8], Dimitry Gorsky[9], Kyle Morton[9], Dray Carl[10], Ben Michaels[11] and Jacques Rinchard[1], [1]State University of New York - Brockport, [2]University of Vermont - Rubenstein Ecosystem Science Laboratory, [3]New York State Department of Environmental Conservation - Lake Erie Fisheries Research Unit, [4]U.S. Geological Survey - Columbia Environmental Research Center, [5]U.S. Geological Survey - Fort Collins Science Center, [6]U.S. Geological Survey - Lake Ontario Biological Station, [7]Michigan Department of Natural Resources, [8]U.S. Geological Survey - Lake Superior Biological Station, [9]U.S. Fish and Wildlife Service - Lower Great Lakes Fish and Wildlife Conservation Office, [10]Wisconsin Department of Natural Resources, [11]Great Lakes Indian Fish & Wildlife Comission. **Comparing fatty acid signatures of lake trout and their prey from Lakes Ontario and Superior.**

Fatty acid analyses are a robust approach for estimating predator diets by comparing the signatures of predators and their prey. In this study, we analyzed fatty acid composition of lake trout and their potential prey species from two Great Lakes, Ontario and Superior, to estimate lake trout diets in both systems. Lake Ontario's prey base has been heavily modified by recent invasions of non-native species, whereas Lake Superior's prey base has remained relatively unchanged. Fatty acid signatures from female lake trout belly flap tissue differed significantly between lakes (ANOSIM, Global $r = 0.311$, $P = 0.001$), suggesting different diet composition. Fatty acids contributing most strongly to these differences were all unsaturated fatty acids, including: 16:1n-7, 18:1n-9, 18:3n-3, 20:5n-3, 22:5n-3, and 22:6n-3. These lake-specific fatty acid signatures will be compared with those of prey species to estimate lake trout diet and assess differences in food web structure between systems. This approach complements traditional gut content analyses by assessing the nutritional contributions of prey and provides an integrated, longer-term perspective on the dynamics of trophic interactions. Overall, characterizing fatty acid signatures of lake trout, and their prey, in these two contrasting systems will improve our understanding of the biochemical and ecological consequences of food web alterations in the Great Lakes.

Sara Gharouni Saffar[1], Milena Esser[1], Jose Luis Rodriguez Gil[2], Lauren Timlick[2] and Karen Kidd[1,2], [1]1McMaster University,, [2]2International Institute for Sustainable Development, Experimental

Lakes Area. **Effects of Benzalkonium Chloride on Aquatic Insect and Spider Microbiomes in a Whole-Lake Experiment.**

Benzalkonium chlorides (BACs) are widely used antimicrobials that enter freshwater ecosystems through municipal wastewater effluents, yet their effects on host-associated microbiomes in food webs remain poorly understood. Host microbiomes influence nutrition, immunity, and survival. As part of a whole-lake manipulation at the IISD-Experimental Lakes Area, we are assessing how chronic BAC exposure affects the microbiomes of aquatic insects and their riparian spider predators. Larval macroinvertebrates (Aeshnidae, Zygoptera, Heptageniidae, Chironomidae) and riparian spiders (Tetragnathidae, Araneidae) were collected from the experimental (Lake 375) and reference (Lake 373) lakes in late August-early September, before (2024) and during (2025) weekly BAC additions. Individual invertebrates were collected from littoral, profundal and nearshore habitats and flash frozen on dry ice, and host bacterial communities were characterized using amplicon sequencing targeting the V3-V4 region of the 16S rRNA gene. Baseline analyses revealed strong host-driven structuring of microbiomes across taxa and lakes. Larval insects generally exhibited higher Shannon diversity and more even bacterial communities than spiders, which frequently contained elevated abundances of intracellular endosymbionts such as Spiroplasma and Wolbachia. Beta-diversity analyses showed clear separation among host taxa and modest lake-specific differences prior to exposure. Analyses of BAC-exposed samples are ongoing to evaluate whether chronic dosing alters host microbiome composition, diversity, or endosymbiont prevalence. This work provides new knowledge on how antimicrobial contaminants influence invertebrate host microbiomes and supports broader assessments of the risks they pose to freshwater ecosystems.

Colin Gibson[1], **Rohini Patel**[1], **Sara Smith**[2], **Tariq Deen**[1] and **Kelly Fran Davis**[3], [1]McMaster University, [2]Six Nations Environment Department, [3]Brock University. **Panel on Haudenosaunee-led Research and Training for Water Protection and Climate Resilience.**

Climate change and environmental degradation threaten the socio-ecological well-being of Six Nations of the Grand River. Addressing these challenges requires prioritizing Indigenous-led, capacity-building models that transcend conventional academic research. This panel explores the development of a Haudenosaunee-led Research and Training Institute (RTI) at Six Nations Polytechnic; an institution structured by Indigenous pedagogies to interface STEM and TEK in areas of climate resilience and land-water guardianship. We first establish the environmental urgency, presenting warming scenarios—including projected 32-38% winter streamflow increases and rising water scarcity—specific to the reserve. We then detail the methodological scaffolding of the RTI, facilitated by post-doctoral liaisons and "Knowledge Fellows"—in-community Knowledge Holders hired on to ensure Haudenosaunee knowledge, values, and pedagogies guide program curricula development. The RTI-building process is informed by collaborative community-led "Think Tank" workshops and pilots like the 2025 TEK-STEM youth Summer Camp at McMaster University. Central to the RTI is its embedding in community practice, such as water monitoring for McKenzie Creek, Boston Creek, and the Grand River. This work utilizes Haudenosaunee linguistic frameworks—specifically concepts of investigating and supporting the health of rivers—to guide the interfacing of TEK with Western scientific monitoring to identify water quality and restoration pathways. By aligning educational programming with the Six Nations Environment Department, the RTI builds capacity and empowers the next generation of Haudenosaunee environmental practitioners as guardians of their ancestral waters.

Monica Giesbrecht[1], Michael Paterson[2, 3] and Michael Rennie[1, 2], [1]Lakehead University, [2]International Institute for Sustainable Development Experimental Lakes Area, [3]University of Manitoba. **Behavioural Responses of Lake Trout to Prey Reintroduction.**

Though recovery from acidification has been observed in aquatic systems, in most cases chemical recovery long precedes biological recovery, often justifying the case for human-assisted re-establishment efforts. At the International Institute for Sustainable Development Experimental Lakes Area, the freshwater shrimp Mysis diluviana was extirpated during an acidification experiment in the late 1970s from a lake that also supports lake trout (Salvelinus namaycush). Both organisms occupy the profundal zone of lakes during summer stratification. Despite recovery of other ecosystem components in the lake, lake trout abundance and growth rates were lower than before acidification, and Mysis did not re-establish until their human-assisted reintroduction to the system in 2018. Using acoustic telemetry and stable isotope analysis, we will investigate the resource and habitat use of lake trout (e.g., use of offshore and nearshore areas) in years where Mysis were absent (2015-2017), compared to a period after the Mysis population was re-established (2023-2025). We predicted that lake trout will shift towards increased reliance on offshore habitat and resources after Mysis has been re-established. Preliminary analysis indicates that prior to Mysis re-establishment, lake trout had a 50-55% reliance on littoral resources, which we predict to decline following the establishment of Mysis. Our results will inform the development of restoration plans for other lakes to ensure that community composition and ecosystem function properties match desired management outcomes.

Alexandra Giuliano[1], Lisa Peters[2], Krista Robertson[2], Morgan Anderson[2], Madeline Stanley[2] and Vince Palace[2], [1]University of Manitoba, [2]IISD-Experimental Lakes Area. **Validation of an eDNA tool to evaluate invertebrate communities with wild rice restoration.**

Recent findings suggest that invasive cattails must be completely removed for wild rice to successfully grow to harvestable seed heads. Reintroduction of wild rice is not only important to Indigenous communities but improves biodiversity and habitat for other traditional foods such as fish and waterfowl. Morphology-based macroinvertebrate community evaluations are often used in biodiversity and water quality assessments. These analyses are expensive and time consuming, which limits sample numbers and reduces study replication. Environmental DNA (eDNA) techniques can be rapid, accurate, and cost-effective for determining community composition, but validation in field settings is needed. This project will determine the feasibility of using water and sediment eDNA metabarcoding analysis to evaluate changes in invertebrate communities before and after cattail management and wild rice reintroduction. Benthic invertebrate metabarcoding results will be compared to and validated using morphometric analysis, identifying invertebrates collected from leaf litter bags deployed in the six experimental plots. Six mesh bags containing a known mass of dry leaf litter from around the site were weighed and randomly deployed at the bottom of each plot at the beginning of May. Three bags from each plot were retrieved in both July and September. Invertebrates that colonized the leaf litter were counted and identified. Baseline data was collected using both methods through the open water seasons. Results, details of cattail management and next steps will be discussed.

Hillary Glandon, University of Illinois. **Cross-border academic consortiums: opportunities and challenges.**

The Great Lakes Higher Education Consortium (GLHEC) was formed in 2020 with support from the Council of the Great Lakes Region (CGLR) to facilitate cross-border collaboration between Canadian and U.S. academic institutions. Founding members included the University of

Toronto, Queens University, McGill University, the University of Michigan, the University of Wisconsin system, and the University of Illinois system. A primary goal of the GLHEC was to leverage existing CGLR corporate and governmental relationships to promote sustainability, create a pipeline of talent and innovation, and ensure the region's long-term competitiveness. Despite the identified need for a formal cross-border network, the GLHEC initially struggled to facilitate meaningful collaborative opportunities between member institutions. However, starting in 2024 significant strides towards increased collaboration between member institutions were made, largely due to increases in support from the University of Illinois and enthusiasm from GLHEC-affiliated researchers. This talk will provide lessons learned from initial challenges to involve consortium-affiliated researchers in GLHEC activities and insights into the factors contributing to recent successes towards achieving the goals of the GLHEC.

Enrique Gomezdelcampo and Madeline R. Stouges, Bowling Green State University. **Connected Infrastructure, Competing Demands: AI Data Center Growth and the Challenge of Binational Great Lakes Water Governance.**

Rapid growth in artificial intelligence is starting to drive expansion of large-scale data centers in the Great Lakes region due to freshwater availability, energy infrastructure, and favorable cooling conditions. These facilities rely on water-dependent cooling systems that result in substantial withdrawals, consumptive use, and thermal discharges, yet their cumulative impacts on shared binational water resources remain poorly characterized. This research presents a basin-scale assessment of potential AI data center water footprints across the Great Lakes. Water use estimates were spatially linked to watersheds and nearshore areas to identify potential geographic hotspots. Seasonal patterns were evaluated relative to historical conditions and climate projections, emphasizing summer low-flow periods when competing agricultural, municipal, and industrial demands are most acute. Regulatory framework analysis reveals significant variation in permitting thresholds, thermal discharge standards, and data availability across jurisdictions. There is a need to identify critical gaps in binational governance mechanisms for monitoring and regulating this emerging infrastructure class, including enhanced cross-border coordination bridging technical communities, Indigenous stakeholders, regulatory agencies, and industry partners. The findings support the need for improved reporting and coordinated, basin-scale approaches to managing emerging water demands associated with AI development in the Great Lakes region.

Mia-May Grabovac[1, 2], Patricia Ramey-Balci[1], Kristen Westfall[3] and Andrea Niemi[2], [1]Department of Biological Sciences, University of Manitoba, [2]Arctic Region, Fisheries and Oceans Canada, [3]Pacific Biological Station, Fisheries and Oceans Canada. **The efficacy of metabarcoding for monitoring early life stages of seafloor invertebrates in the Western Canadian Arctic (WCA).**

The Arctic seafloor contains diverse assemblages of invertebrates integral to ecosystem processes such as carbon cycling. Seafloor invertebrate populations are influenced by environmental variability, requiring monitoring programs to understand responses to ongoing climate change. However, traditional monitoring overlooks environmentally sensitive pelagic early life stages (meroplankton), despite their importance in influencing distribution and composition of adult seafloor invertebrates. Morpho-taxonomic assessments of meroplankton are limited due to microscopic size, lack of morphological features, and dissimilarity to adult forms. Thus, this study incorporated molecular approaches (metabarcoding) to increase understanding of meroplankton composition and possible links to adult communities in the WCA. Meroplankton communities were assessed using community DNA extracted from plankton nets and environmental DNA extracted from water samples at ten sites during August in the WCA. Polychaetes, Echinoderms, and Molluscs

were the most common taxa found in all sample types, and within-group taxon richness was highest in plankton samples. Community composition based on each method differed, but all showed lower taxonomic resolution than morpho-taxonomy (no species identified). Meroplankton communities also differed from adult communities (box cores/trawls) likely driven by habitat-specific oceanographic conditions. Assessments on environmental variables driving distribution of meroplankton within the WCA is ongoing. This study has increased our knowledge of meroplankton communities and relationships to adult life stages in the WCA relative to morpho-taxonomic surveys, demonstrating the necessity of integrated monitoring approaches for a comprehensive understanding of seafloor invertebrate communities.

John Gray[1], Eduardo Martins[2], Scott Hinch[1] and Eliseu Peixoto[2], [1]University of British Columbia, [2]University of Northern British Columbia. **Drivers of spawning habitat selection in Threatened Nechako River Chinook salmon (Oncorhynchus tshawytscha).**

Climate change is rapidly warming freshwater ecosystems and altering the availability of preferred thermal habitats of all life-stages of Pacific Salmon (Oncorhynchus spp.). This is especially a concern on the Nechako River in central B.C. where rapid warming has exacerbated changes in flow and temperature regimes from water impoundment and altered land-use. As a result, preferred and metabolically optimal temperatures of all life-stages of Threatened Nechako River Chinook salmon (Oncorhynchus tshawytscha) are being routinely exceeded in the summer months. As summer migrants, rising summer water temperatures pose a particular threat to adult spawners who return to the river to spawn when water temperatures tend to be highest. In response, spawners may exploit natural thermal variability by selecting spawning habitat that offers some thermal refuge to promote their own survival even if such habitat is not optimal for the survival of their eggs. Alternatively, spawners may select spawning habitat that promotes the survival of their eggs. To explore drivers of Chinook salmon spawning habitat selection, we examined the influence of habitat features on redd distribution. An array of loggers deployed along 4-kilometres of the spawning grounds documented spatiotemporal variations in surface and sub-surface water temperature and dissolved oxygen concentrations. This data was paired with drone-based visual surveys during peak-spawn to document spawning habitat selection by Chinook salmon. This understanding will be essential to inform effective conservation and management priorities.

Veronica Groves, Erin Francispillai, Jessica Reemeyer and Lauren Chapman, McGill University. **Chemical risk cues impact fish behavior and thermal tolerance, but effects vary with predation experience.**

Using two experiments and lake-side assays, we asked whether inter- and intraspecific experience with an invasive predator affected behavior and thermal tolerance of prey fishes in Lake Nabugabo, Uganda, a lake that experienced the introduction of the predatory Nile perch (Lates niloticus) in the early 1960s. In doing so, we evaluated how warming and predation risk can interact to impact prey fishes as both stressors may impact metabolism and energy use. We predicted that thermal tolerance would decline in the presence of predator risk and that shoaling behavior would increase with predator risk and conspecific disturbance cues. We first found that even 60 years post-invasion, three prey fishes in Lake Nabugabo failed to recognize Nile perch predator odors as risky and did not alter shoaling behaviors nor thermal tolerance. In contrast, in our second experiment, we compared the thermal tolerance of a population of the cichlid Pseudocrenilabrus multicolor that overlapped in the habitat with Nile perch to a population that had no habitat overlap with the predator. P. multicolor that co-occurred with Nile perch responded to Nile perch predator odors like predator odors from a native catfish predator, whereas predator-naïve cichlids failed to respond.

Taken together, our experiments illustrate the importance of experience with a predator in the perception of predator odors.

Sharon Gubamwoyo[1, 2, 3], Najib Lukoya Bateganya[4], Andrew Muhwezi[2], Enos Malambala[2], Thomas Hein[1] and Tanja Radu[5], [1]Institute of Hydrobiology and Aquatic Ecosystem Management, Department of Ecosystem Management, Climate and Biodiversity, BOKU University, Gregor-Mendel-Straße 33, 1180 Vienna, Austria, [2]National Water and Sewerage Corporation, Kampala Uganda, [3]African Center for Aquatic Research and Education, 2200 Commonwealth Blvd, Suite 100, Ann Arbor, MI, USA, [4]Gates Foundation, [5]School of Architecture, Building and Civil Engineering, Loughborough University, Loughborough, Leicestershire LE11 3TU, United Kingdom. **Alum Sludge Management Using Constructed Wetlands: A Case Study from Lake Victoria, Uganda.**

The increasing demand for safe drinking water has led to rapid expansion of water treatment plants (WTPs) globally. Uganda's 3% annual population growth has intensified water demand. WTPs abstract raw water from lakes and rivers using conventional treatment with aluminium-based coagulants. About 2% of treated water becomes alum sludge (AS) waste. Treatment residuals management remains challenging, with disposal methods including recycling, sludge drying beds, landfilling, and discharge into wetlands, posing environmental risks. This study investigated subsurface constructed wetlands (CWs) for AS management; quantified and characterized alum sludge and assessed CWs' suitability for treatment. Vertical flow (VF) and horizontal flow (HF) CW mesocosms were designed with a planted unit with Phragmites spp. and unplanted control. Influent and effluent samples were analyzed using standard procedures, with data processed using RStudio. Results showed the WTP generated 1,555 m^3 day^{-1} of alum sludge, non-compliant with National Environment Management Authority (NEMA) standards, while CW effluents met regulatory limits. VF systems showed higher removal efficiencies than HF systems, though differences were not significant. All mesocosms achieved 100% total suspended solids removal, with total solids removal of 75-85%. Residual aluminium decreased from 6.70 ± 0.47 mg L^{-1} to 0.01-0.44 mg L^{-1}, with highest removal in planted VF systems. The findings show constructed wetlands provide an effective solution for alum sludge management, with potential for integration into water treatment infrastructure in Uganda and similar contexts to p wetlands.

Charlotte Guest[1], Dak de Kerckhove[2, 3], Graham Raby[1] and Alyssa Murdoch[1, 2], [1]Trent University, [2]Ministry of Natural Resources, [3]University of Toronto. **Effects of wildfires on boreal lake fish communities.**

In recent years, escalating wildfire disturbance on ecosystems has become an increasing concern for natural resource managers. Knowledge of how wildfires may influence lake ecosystems, including higher trophic species such as fish, remains a key data gap. A series of wildfires occurred in Quetico Provincial Park in 2021, providing a unique opportunity to examine the effects of fire on lake ecosystems using a before-after-control-impact study design. Our objective for this project is to understand how wildfire is affecting lake ecosystems including water quality, plankton, and fish communities. We predict that the increase in nutrients from surrounding wildfires will cause a bottom-up effect, promoting primary productivity with potential impacts on fish fitness (e.g., higher growth rates) and community composition. Thirteen lakes were sampled in total with seven control and six fire-impacted lakes following Ontario's Broad-scale Monitoring gillnetting protocol. In addition, water quality and plankton samples were collected seasonally. Based on preliminary results, nutrient levels (phosphorus, nitrogen, and dissolved organic carbon) have changed minimally in the impact lakes when comparing samples before and after the fires. Future work will include examining

effects on plankton and fish species indicators (e.g., community composition, relative abundance, and fish growth). As the risk of wildfire continues to escalate with climate change, our results will provide an improved understanding of the vulnerability of lake ecosystems to surrounding wildfire disturbance for informing improved fish and wildfire management strategies.

Rachel Gumpper, Laura Bourgeau-Chavez, Dorthea Vander Bilt, Michael Battaglia and Jeremy Graham, Michigan Tech Research Institute. **Multi-Decadal Wetland Change Dynamics of Coastal Lake Huron.**

Wetland-focused land classification maps of the Lake Huron coastline were created using remotely sensed imagery from three different time periods in which the historical lake water levels varied; 1998 with high water levels, 2010 with low water levels, and 2018 when water levels returned to high. Maps were created by implementing multi-seasonal Synthetic Aperture Radar (SAR) and optical-infrared satellite imagery. Both field validation and aerial interpretation training data were used with a random forests machine learning classifier program to create the maps with ~85-90% overall accuracy. Wetland ecosystems were mapped with class divisions for invasive plants such as Phragmites australis and Typha spp.. Wetland change dynamics between the three mapped years were then identified using a hybrid change detection model that utilized both categorical and radiometric change of each classified pixel to reduce errors. Coastal and inland wetlands were analyzed separately by integrating existing coastal wetland connectivity maps from hydro-enforcement of DEMs in a hydrological model for low, average, and high water levels. The connectivity maps for high or low water were used for the corresponding classification map years. Change results show general patterns of wetland loss and phragmites gain during times of low water level and wetland gain and diversification during times of high water level. Knowing how wetlands change over time is important for wetland management and informing about nutrient exchange in regard to lake health.

Geoffrey Gunn, Ximena Lopez-Pereyra and Jim Young, Canada Water Agency. **Informing Canada's Water Security: Update on the National Freshwater Data Strategy.**

The newly-established Canada Water Agency has been developing a National Freshwater Data Strategy to enhance data accessibility and interoperability across the country. Following engagement with hundreds of experts as well as community leaders and representatives, this presentation will share insights and details of the draft strategy.

Rohini Gupta, Katie Kim, Giancarlo Richardson and Scott Steinschneider, Cornell University. **An Indigenous-Led Mapping Tool for Community-Based Drinking Water Assessment.**

Indigenous communities continue to face disproportionate risks from degraded drinking water quality, with implications for health, well-being, and self-determination. In partnership with Ohneganos, we developed an Indigenous-led, interactive mapping tool designed to support the visualization and interpretation of community-based water quality data collected across Six Nations of the Grand River reserve during 2019-2020. The tool enables users to spatially explore contaminant concentrations measured primarily in cisterns and private wells, including mercury, lead, E. coli, and other constituents of concern. In parallel, the platform integrates household survey data describing water use practices, such as whether water is used for drinking, cooking, or washing, allowing users to directly examine how water quality conditions intersect with everyday exposure pathways. By co-locating environmental measurements with community-defined indicators of water use, the mapping tool supports a more holistic understanding of current water quality threats to residents' health while respecting local priorities and knowledge systems. Beyond retrospective

analysis, the tool is designed to inform future monitoring strategies by identifying spatial data gaps, guiding targeted sampling efforts, and helping articulate new research questions grounded in community needs. We further envision this platform as an educational resource that can support curriculum development for emerging programs in Indigenous Knowledge and STEM, fostering technical capacity while centering Indigenous perspectives on water stewardship.

Cale Gushulak[1], **Claire Herbert**[2], **Tijana Aluloska**[2], **Jocelyn Plouffe**[2], **April Malcolm**[3] and Edward Koe[3], [1]Department of Biological Sciences, University of Manitoba, [2]Centre for Earth Observation Science, University of Manitoba, [3]Ebb and Flow High School Teacher. **Ecological and Cultural Impacts of Zebra Mussel Invasion in Ebb & Flow Lake, Manitoba.**

The impact that zebra mussels have had on my community is devastating. The beach at Eagle Island is a very important spiritual gathering place to the members of Ebb & Flow First Nation. It is now rarely used and left mostly abandoned. I am a grade 11 student at Ebb & Flow High School. My project explores the ecological impact of recent zebra mussel invasions on the water quality of Ebb & Flow Lake, which is a shallow, eutrophic lake located in western Manitoba, Canada. Ongoing investigations include sampling for water chemistry (nutrients, ions, pH) and turbidity (Secchi Disk), and the distribution of zebra mussels e-DNA at several sites across the lake. In addition, sediment core samples are presently being analyzed for markers of historical lake production to compare to the current and rapidly changing state of the lake. It is my hope that my project will help inform and educate my community on the impact of zebra mussels. The changes happening in Ebb & Flow lake show how easily invasive species can harm our water, and how quickly both the lake and our culture can be affected. By sharing what I learn, I hope to encourage my community to take action now, so that Ebb & Flow Lake remains a healthy and respectful place, not just a memory that we lost.

John Gustincic, Central Michigan University. **The Builder's Path: A Scalable Framework for Advancing Freshwater Technology Adoption in the Great Lakes.**

Despite rapid progress in freshwater sensing, autonomous platforms, and AI-driven analytical tools, many emerging technologies in the Great Lakes region fail to progress beyond small-scale demonstrations. Persistent barriers, including heterogeneous regulatory environments, limited access to operational testbeds, uncertain technology readiness assessments, and institutional resistance to unproven systems, continue to impede large-scale deployment. This presentation introduces The Builder's Path, a structured, four-stage framework developed to improve the transition of freshwater technologies from prototype to operational use. The Innovation stage emphasizes problem definition, parameter selection, and prototype design consistent with field and hydrological constraints. Validation incorporates iterative technical testing, data quality assurance, interagency coordination, and early evaluation of operational compatibility within existing monitoring networks. Monetization examines how technology performance aligns with procurement structures, cost models, and policy drivers that influence agency and industry uptake, with attention to funding mechanisms and risk-transfer considerations. Execution focuses on integration requirements, data interoperability standards, and scaling strategies supported by testbed networks and regional partnerships. Case studies from Great Lakes pilot deployments illustrate how applying this framework can reduce adoption latency, improve system reliability, and strengthen collaboration between researchers, regulatory bodies, and end users. By situating technical development within a practical deployment architecture, The Builder's Path offers a repeatable approach for accelerating the implementation of next-generation freshwater technologies and supports regional efforts to enhance monitoring capacity, early warning capabilities, and long-term ecosystem resilience.

Manuela Gutiérrez Ospina[1], Michael Paterson[2] and Karen Kidd[1, 2], [1]McMaster University, Department of Biology, Hamilton, ON, [2]International Institute for Sustainable Development - IISD-Experimental Lakes Area, Winnipeg, MB. **Zooplankton community responses to a mitigation strategy for harmful algal blooms.**

Harmful algal blooms (HABs) are increasing in frequency and duration in Canadian lakes, prompting research to test the mechanisms driving them. At the IISD-Experimental Lakes Area, a whole-lake study is being conducted to assess whether calcium nitrate additions can mitigate HABs in phosphorus-enriched lakes. Herein we examined whether the diversity and abundance of zooplankton shifted in response to calcium nitrate additions by comparing monthly samples collected in two experimental lakes (L303,L304) before (2015,2017,2019,2022-23) and during (2024-25) amendments, and with samples from two reference lakes (L114,L442). Phosphorus was added to L303 and L304 in 2019 and 2022-24 to maintain a ~13µgP/L; calcium nitrate was added to L303 in 2024 and to both lakes in 2025 to reach 2-3mg/L. Before calcium nitrate additions, zooplankton in L303 were numerically dominated by calanoid copepods (Leptodiaptomus minutus, Skistodiaptomus spp.), cladocerans (Bosmina spp., Daphnia dubia) and rotifers (Keratella spp., Kellicotia longaspina). During calcium nitrate additions the community shifted towards cladocerans (Bosmina spp., Daphnia dubia, Chydorus sphaericus) and cyclopoid copepodites (C1-3). In L304, communities shifted from dominance by Bosmina, Skistodiaptomus spp., Keratella spp. and, Kellicotia longaspina to early-season Mesocyclops edax, followed by late-season Skistodiaptomus spp. Despite these shifts, zooplankton diversity did not increase with calcium nitrate additions. Ongoing multivariate analyses will examine whether zooplankton dynamics co-vary with phytoplankton biomass and lake chemistry, to understand the factors underlying zooplankton community shifts due to this mitigation strategy.

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Lloyd Haambiya[1], Kabunda Malukutila[2], Lwabanya Mabo[3], Oliver Hasimuna[4] and Precious Siakapanga[5], [1]Lake Tanganyika Science Advisory Group, [2]Nsumbu Tanganyika Conservation Programme, [3]Kapasa Makasa University, [4]Palabana University, [5]Victor Braun Special School. **Drivers of Fishing Verses Participation in Fisheries Management: Case of Lake Tanganyika, Zambia.**

Overfishing and the continued use of unsustainable fishing practices persist on Lake Tanganyika in Zambia despite the presence of a co-management fisheries governance system. Previous studies have reported a decline in fish catches of more than 50% over the past 25 years, widely attributing this trend to weak compliance and ineffective enforcement of fisheries regulations. To further clarify these conclusions, this study investigated the underlying causes of fishing overcapacity and the factors influencing low fisher participation in co-management. Data was collected from 370 fishers sampled from Mpulungu and Nsama districts. A Binary Logistic Regression Model was applied to assess socio-economic determinants influencing: i) an individual's decision to enter the fishery, and ii) a fisher household's participation in fisheries management. Results showed that education level, sex, age, land ownership, place of residence, having a relative who is or was a fisher, family size ($p < 0.05$), and access to credit ($p < 0.1$) significantly influenced entry into fishing. Participation in fisheries management was significantly influenced by sex, age, ethnic group, alternative income-generating activities, family size, awareness of fisheries laws, regulatory pressure, and involvement in decision-making ($p < 0.05$). These findings highlight the critical role of human dimensions in shaping both recruitment into fishing and participation in

management. The study recommends stronger integration of socio-economic considerations into fisheries policy and co-management strategies to enhance compliance, reduce overcapacity, and support sustainable fisheries governance.

Gillian Haig and Neil Rooney, University of Guelph. **Investigating Temporal Food Web Dynamics in Georgian Bay: A Multiple-Biotracers and Tissue Analysis.**

Growing human populations and increasing demand for food pose significant economic, environmental, and food-security challenges globally. Proposals to substantially expand aquaculture production in the Great Lakes could help address these challenges by increasing food supply to meet consumer demand. However, a key barrier to aquaculture expansion in the Great Lakes is limited understanding of how net-pen operations influence freshwater food web structure and function across seasonal timescales. This project examines the spatial (within-system) and temporal (within-season) effects of aquaculture subsidies on Cisco (Coregonus artedi), a keystone open-water consumer in the Georgian Bay food web. Wild Cisco were sampled in May, August, and November, capturing seasonal variation in environmental conditions, prey availability, and fish farm inputs. Fish were collected from sites differing in proximity to the fish farm, enabling evaluation of how spatial gradients interact with seasonal environmental variability. Stable isotope and fatty acid biotracer analyses were conducted on fin, muscle, and liver tissues, which integrate dietary inputs over different temporal windows due to tissue-specific turnover rates. Biotracer signatures of wild Cisco will be compared with those of natural food web baselines (zooplankton and benthic invertebrates), aquaculture feed, and farmed rainbow trout to assess spatial and temporal variation in assimilation of farm-derived inputs. This research will provide critical data to inform lake managers on the environmental effects of aquaculture and the feasibility of responsible, sustainable expansion.

Ara Hakim and David Watkins, Michigan Technological University. **Snow Variability in the Great Lakes.**

Global declines in snowpack conditions are well documented, yet regional analyses often reveal more complex patterns. The Great Lakes basin, affected by strong lake-effect processes, represents this spatial and temporal variability: snowbelt regions downwind of the lakes have experienced increases in snowfall and snowpack, while most other areas show declining trends. This research identifies and characterizes these contrasting patterns using HUC8 watershed boundaries as the primary spatial unit, making the findings applicable to water resources management. A recently developed Snow Water Storage (SWS) metric, defined as the time-integrated Snow Water Equivalent (SWE), will be employed as the main indicator of snowpack behavior. SWS will be evaluated alongside traditional snow metrics (peak SWE and snow cover duration) to demonstrate its added value for characterizing snowpack dynamics in low-elevation and lake-effect-dominated regions. Basin-wide and lake-specific analyses of annual SWS and its monthly variability will be conducted to assess spatial heterogeneity and temporal change across the region. Potential drivers of observed snowpack changes will also be examined. Together, these results will provide new insight into evolving snowpack regimes in the Great Lakes basin and support improved adaptation strategies for regional water resource management.

Jose S Halafo, WorldFish. **Potamodromous fishes of Lake Niassa: what are the chances to save them?**

Fishes that live in the lake and use the rivers for spawning, known as potamodromus fishes, are disappearing from rivers of Lake Niassa. The very special method of exploitation of this species through intensive gillnetting of individuals on breeding migrations and traps over the rivers, and

degradation of lands in river catchments lends itself more than in the case of any other lake fish to a very considerable danger of overfishing and consequent destruction of the stocks. Some species like Opsaridium microleps, a large commercially valuable cyprinid endemic to Lake Niassa have virtually disappeared, now facing local extinction. The Mozambique side of Lake Niassa, is one of the few places where potamodromus fishes still contributes to the artisanal fishery. It is possible that the Mozambican waters represent the best chance to introduce conservation practices to protect potamodromous fishes as their habitats, spawning grounds and river catchments are less disturbed when compared to Malawian and Tanzanian sides. The study based on two species (Labeo mesops and Labeobarbus jonstonii), discusses and recommends what would be the best practices, including managing the fishery and managing the river catchment to protect the breeding times and breeding areas of these fishes.

Julia Hambleton, Lakehead University. **Exploring the theory and practice of blue justice: a case study of the St. Marys River.**

Unchecked growth of marine-based economies risks increasing displacement of coastal peoples, environmental degradation, loss of livelihood and access to marine resources, and exclusion from decision-making and governance. In response, blue justice is an organizing framework rooted in social and environmental justice that recognizes the meaningful involvement and fair treatment of small-scale fisheries and allied coastal groups in how marine resources are used, managed and enjoyed. The scholarship and practice of blue justice, while established in ocean fisheries, is underdeveloped in freshwater fisheries. This study applies the theory and practice of blue justice to the Lake Superior watershed through a case study of the St. Marys River, a 125 km connecting passage situated between Lake Superior and Lake Huron by way of several different channels currently listed as a Great Lakes Area of Concern. Included in this study is a literature review and data collected through semi-structured interviews with key decision-makers and stakeholders in the St. Marys River using a blue justice framework that highlights three analytical areas - recognitional, procedural and distributive justices. Findings reveal challenges that constrain social and environmental health in this Area of Concern and inform actions towards more equitable and sustainable decision-making. This research contributes to blue justice scholarship and offers a potential model for further exploration of blue justice in the Great Lakes basin.

Ilias Hani, Taha B.M.J Ouarda and André St-Hilaire, Institut National de la Recherche Scientifique. **Compound hydrological and thermal extremes: A nonstationary risk modeling approach for riverine ecosystems.**

The increasing frequency and severity of compound hydro-climatic extremes pose a growing threat to cold-water aquatic ecosystems. This study develops a nonstationary multivariate risk modeling framework to assess the joint behavior of extreme summer river water temperature (Tw) and concurrent low flow (Q) in six unregulated Atlantic salmon rivers in eastern Canada. A dynamic additive copula approach is employed to model both the structure dependence and nonstationarity, with time-varying effects modeled via large-scale climate oscillation indices (teleconnections) and a temporal trend representing climate change. The proposed joint nonstationary model (JNS) is benchmarked against a joint stationary model (JS) and a univariate nonstationary model (UNS). Results show that JNS systematically outperforms both alternatives across all study sites. Temporal trends significantly increased Tw extremes at most rivers, while teleconnections emerged as dominant drivers of variability. Negative phases of the Southern Oscillation Index (SOI, El Ni˜no conditions) and the North Atlantic Oscillation Index (NAO) increase the variability of Tw and low-flow events, respectively, while positive phases of the SOI (La Ni˜na conditions) and NAO are

associated with elevated joint and conditional exceedance probabilities, rising by up to 66% in the Restigouche River and 45% in the Highland River. By linking joint extremes to both long-term warming and oscillatory climate patterns, the study provides a predictive framework for anticipating compound risks and protecting thermally sensitive aquatic habitats under ongoing climate change and variability.

Laura Haniford[1], Jack Hollins[2], Brendan Malley[2], Lee Gutowsky[2] and Graham Raby[3], [1]Trent University, Fisheries and Oceans, [2]Fisheries and Oceans, [3]Trent University. **Exploring Fish Movement and Connectivity in Great Slave Lake Using Acoustic Telemetry.**

Large northern lakes are experiencing rapid environmental and socio-ecological change, yet remain underrepresented in aquatic telemetry research due to their size, remoteness, and logistical complexity. Great Slave Lake (Northwest Territories, Canada) is one of the world's largest lakes and supports culturally, ecologically, and economically important fish populations. We deployed a large-scale acoustic telemetry array in the southwestern basin of Great Slave Lake and key riverine corridors to examine fish movement, habitat use, and connectivity across seasons and management zones. Telemetry detections from multiple species and tag types are being used to characterize spatial and temporal patterns of residency and migration, while explicitly accounting for environmental and array-related factors that influence detection efficiency (e.g., ice cover, noise, and thermal regimes). Ongoing analyses are exploring how movement dynamics vary among species, seasons, and regions of the lake, and how these patterns relate to management-relevant spatial boundaries. This work demonstrates the potential of integrated telemetry approaches in large northern lake systems and highlights both the opportunities and challenges of conducting telemetry research at scale in remote environments. Results from this study will contribute to improved understanding of fish spatial ecology and provide a foundation for adaptive fisheries management in Arctic and sub-Arctic freshwater ecosystems.

Patrick Hanington, University of Alberta. **Tracking Prussian Carp Across Connected Urban Stormwater Ponds Using Environmental DNA.**

Prussian carp (Carassius gibelio) and goldfish (Carassius auratus) are invasive cyprinids of growing concern in urban aquatic systems in Alberta. Prussian carp exhibit extreme environmental tolerance, rapid population growth, and a unique gynogenetic reproductive strategy that facilitates rapid colonization from a single individual. Early detection is challenging due to morphological similarity with goldfish and the cryptic nature of low-density populations. Urban stormwater management facilities constitute an important invasion pathway, as ponds are frequently connected via engineered drainage networks and experience environmental conditions that favour these species. We used environmental DNA (eDNA) and environmental RNA (eRNA) to monitor the presence and connectivity of Prussian carp and goldfish across stormwater pond networks in Edmonton and Calgary. Species-specific qPCR assays were applied to assess detection frequency, co-occurrence, and spatial patterns consistent with movement through stormwater infrastructure. Our results demonstrate widespread detection of invasive Carassius spp. in urban ponds. The combined use of eDNA and eRNA provides enhanced resolution for distinguishing presence from potential recent activity. This work highlights the value of molecular surveillance for early detection, risk assessment, and targeted management of invasive fishes in urban stormwater systems. It has helped us understand the importance of interconnected urban stormwater management facilities as routes for the invasion of Prussian carp and goldfish.

Dalal Hanna[1] and Andrea Reid[2], [1]Carleton University, [2]UBC. **Land-based learning as a catalyst for freshwater stewardship.**

Land-based learning practices centre around land as first teacher, while honouring the long-standing relationships Indigenous Peoples have with Land. These practices can help foster sense of place as well as values linked to stewardship. Yet, in Western systems, many of the spaces in which youth are provided intentional learning opportunities do not incorporate Land as a teacher. During this talk, we discuss how Land-based learning can and should act as an important catalyst for freshwater stewardship. We share stories of our experiences running Riparia - a freshwater stewardship-focused organization that has been offering free multi-day Land-based learning programs to groups of young Indigenous and non-Indigenous women since 2019. We detail the approaches Riparia utilizes to help foster stronger connection to freshwaters in program participants. We then highlight how these approaches link to positive shifts in participant perceptions of the interconnections between their wellness and that of Land, as well as their role as protector and steward of water. We finish by discussing the important role of organizations and initiatives that are utilizing Land-based learning approaches, and how various actors can get involved in leading or supporting this work.

Dalal Hanna, Carleton University. **Introducing MacroBlitz - inspiring and empowering people of all backgrounds to document aquatic macroinvertebrates using iNaturalist.**

MacroBlitz is a National Geographic funded project focused on inspiring and empowering people of all backgrounds to document aquatic macroinvertebrates using iNaturalist. The goal of MacroBlitz is more science and learning about aquatic macroinvertebrates through public contribution to iNaturalist. The aquatic macroinvertebrate observational data uploaded to iNaturalist results in more science while the MacroBlitz resources, training, and program framework developed for formal and informal educators result in more learning. MacroBlitz resources are freely available through Google classroom to anyone with a gmail account and targeted to high school teachers, faculty of undergraduate courses, environmental educators at nature centers, zoos, aquaria, botanical gardens, and parks, and volunteers such as Master/Volunteer Naturalists. In this talk, MacroBlitz team member and session co-organizer Dalal Hanna shares an overview of what MacroBlitz is, and provides the resources necessary for those attending to get involved both during and beyond the conference. All it takes it a cell phone and the curiosity to visit a stream or river. Let's get more people caring about aquatic insects! After all, they are really cool.

Danika Harland[1], Aashiya Sharma[1], Jose Luis Rodriguez Gil[1, 2], Mark Hanson[1] and Braedon Humeniuk[1], [1]University of Manitoba, [2]International Institute for Sustainable Development - Experimental Lakes Area. **The Chronic Effects of Wetland Salinization on Emergent Insect Communities.**

Anthropogenic sources of chloride contribute to freshwater salinization and are of special concern for ecosystems in colder climates, where increased road salt usage elevates exposure risk. Chloride salts are directly toxic to freshwater organisms and disrupt the structure and function of food web dynamics. To address the effectiveness of current Canadian water quality guidelines for chloride, we conducted a mesocosm study to evaluate the impacts of elevated chloride concentrations (via NaCl) on wetland ecosystems. We established 12 outdoor mesocosms (~3000 L volume) to simulate prairie wetlands and applied a gradient of 9 chloride treatments in a regression design (linear on a logarithmic scale, n=1), with controls (no salt added, n=3). Treatments ranged from 22 $mgCl^-/L$ to 2000 $mgCl^-/L$, encompassing the acute and chronic Canadian Water Quality Guidelines (120 $mgCl^-/L$ and 640 $mgCl^-/L$), and environmentally relevant levels documented across

Canada. Multiple variables were monitored for 707 days (2023-2025), including emergent insect communities. Emergent insects are important to aquatic and terrestrial ecosystems by linking lower trophic levels to higher-level predators. Findings indicate that in 2023, there was increased abundance with greater exposure but decrease in richness and diversity measures. In 2024, total abundance decreased in the highest treatment (2000 $mgCl^-/L$) with no impact on sex ratios of chironomids across all treatments. Our findings suggest that current Canadian water quality guidelines might not fully capture the complexity of aquatic insect response to salinization.

Meagan Harper, Trina Rytwinski and Steven Cooke, Carleton University. **A systematic review of the effectiveness of invasive aquatic plant control methods in Canada.**

Invasive aquatic plants can have major adverse ecological effects on the systems where they are introduced. In Canada, invasive aquatic plant management is an essential component of protecting and restoring freshwater systems; once these species are established, they can be difficult to eradicate or control. There are many techniques that have been used to control the populations of invasive aquatic plants, but it remains unclear how effective biological, chemical and physical control methods can be for different plants and in different freshwater systems. To ensure the selection of control techniques that will meet management goals, Parks Canada sought to understand how effective existing control techniques are at reducing or eliminating invasive aquatic plant populations. To address this question, we conducted a comprehensive systematic review to quantify plant population responses to different control techniques and to determine technique effectiveness. Following guidelines from the Collaboration for Environmental Evidence (CEE), we identify and describe the available evidence for over 20 species of invasive aquatic plants of concern in North America from over 600 sources. We found gaps in the available evidence for several species (e.g., Trapa natans and Hydrocharis morsus-ranae), and clusters of evidence that allow for further assessment of effectiveness (e.g., for chemical and non-chemical treatments of Phragmites australis or Myriophyllum spicatum). We discuss the implications of this evidence to future research and management surrounding invasive aquatic plant management in Canada.

Caleb Harris, **Hannah Parisella**, **Paul Ruggiero** and **Nicolas Tesler**, Worcester Polytechnic Institute. **Improving Water Quality Prediction Models for Ballast Water Management in the Great Lakes.**

Ships rely on filling and emptying their ballast tanks to stay balanced, but this routinely practice comes with hidden risks. When ballast water is released in new locations, it can carry non-native species that out-compete local wildlife, disrupt food chains, and harm ecosystems that nearby communities and industries depend on. The goal of this project was to create a probabilistic model to predict the UV transmittance, by fulfilling the following objectives: -Compare the geography of Great Lakes ports. -Investigate impacts of invasive species from ballast water discharge on Great-Lakes communities -Creation of a probabilistic predictive model. The team achieved each objective through the following methodology: -Reviewing existing data to compare the geography of open vs. closed Great Lakes ports. -Conducting interviews with IAGLR, International Joint Commission (IJC), African Center for Aquatic Research and Education (ACARE), and Michigan Sea Grant (MSG) for a thorough comprehension of invasive species' direct impact on Great Lakes ecosystems and surrounding communities.-Downloading and processing data obtained from Arc-GIS. By reviewing existing literature on methods for creating prediction models, Bayesian hierarchical linear regression was decided. Findings show that closed ports generally have UVT below 60%, and limited data reduces model accuracy. Interviews emphasized collaboration and the global threat of invasive species. Recommended actions include monitoring emerging species, engaging binational

partners, and expanding data collection to strengthen the protection of the Great Lakes from invasive species.

Philip Harrison, Chris Ryan Hill, Felix Eissenhauer, Hilary MacLean, Tommi Linnansaari and Allen Curry, University of New Brunswick. **New Brunswick Ecosystem Study: Fish telemetry to support a catchment wide fish passage management plan.**

The New Brunswick Aquatic Ecosystem Study is a long-term, multidisciplinary collaboration between the Canadian Rivers Institute and NB Power. The project is designed to generate the science to support the sustainable operation, renewal, and removal of the varied facilities that make up NB Power's province-wide hydropower generation. In this talk we highlight the practical applications of some of the telemetry studies that have occurred in Phase 2 (2020-2025) of the project. These include assessments of anadromous fish passage at the current upstream trap and truck fish passage at Mactaquac Dam (Wolastoq/Saint John River) using a combination of PIT, radio, and acoustic telemetry; an evaluation of downstream passage at a smolt bypass at the Tobique Dam (Wolastoq/Saint John River) using acoustic and radio tracking; and a radio-tracking study of passage at a decommissioned dam site on the Skutik/St Croix River. Our results provide some of the first estimates of passage efficiency and duration for these systems, with varying levels of efficiency and delay among species and systems. These findings are accompanied by a series of operational and design recommendations to mitigate passage limitations. We conclude with a discussion of our plans to integrate these data into a quantitative fish passage model to support the development of a catchment wide fish passage management plan, during Phase 3 of the project (2026-2031).

Lauren Hart[1], Brittany Zepernick[2], Katelyn Brown[3], Colleen Yancey[4], Anders Kiledal[1], Carol Rosenbaum[5], Michael McKay[3], Kefa Otiso[6], George Bullerjahn[7], Mark McCarthy[8] and Greg Dick[9], [1]Department of Earth and Environmental Sciences, University of Michigan, Ann Arbor, MI, USA, [2]Department of Biology and Marine Biology, University of North Carolina Wilmington, Wilmington, NC, USA, [3]Great Lakes Institute for Environmental Research, University of Windsor, Windsor, Ontario, Canada, [4]Research Division, New England Biolabs Inc., Ipswich, MA, USA, [5]Department of Integrative Biology, Michigan State University, Lansing, MI, USA, [6]School of Earth, Environment & Society, Bowling Green State University, Bowling Green, OH, USA, [7]Department of Biology, Bowling Green State University, Bowling Green, OH, United States, [8]Chair of Hydrobiology and Fisheries, Estonian University of Life Sciences, F.R. Kreutzwaldi 5, 51006, Tartu, Estonia, [9]Cooperative Institute for Great Lakes Research (CIGLR), University of Michigan, 4840 South State Road, Ann Arbor, MI 48108 USA. **Understanding Harmful Algal Blooms Across Latitudinal Gradients Through Integrated Science and Cross-Sector Collaboration.**

Water quality challenges such as harmful algal blooms (HABs) are intensifying threats to human and ecosystem health worldwide. These challenges are particularly acute in transboundary freshwater systems spanning diverse ecosystems, where effective management requires coordinated action across political, cultural, and institutional boundaries. Addressing HABs in these complex systems demands not only international collaboration, but also the integration of scientific disciplines. Here, we present insights from a series of multidisciplinary, transnational projects spanning Lake Erie (USA-Canada), the Lake Victoria Basin (East Africa), and Estonian lakes. Across these systems, we assembled collaborative teams integrating limnological, molecular, chemical, and One Health approaches to answer complementary questions: which organisms are driving bloom formation, what biosynthetic potential they possess, which metabolites threaten human and ecosystem health, and how environmental conditions regulate their production and impact. We

demonstrate how layered, multi-omics frameworks, coupled with classical taxonomy and biogeochemical approaches, enable a more holistic understanding of HAB dynamics than any single approach alone. We employ these efforts to explore the practical challenges and benefits of coordinating across academic, governmental, non-profit, and private-sector partners, including collaborative grant writing, shared infrastructure, and cross-cultural project planning. Collectively, these case studies demonstrate how bridging borders and disciplines is not merely advantageous, but essential for generating globally actionable science to protect shared freshwater resources in a rapidly changing world.

Riley Versluis[1], Lee Gutowsky[2], Doug Watkinson[2], Chelsey Lumb[2], Eva Enders[3] and **Caleb Hasler**[1], [1]The University of Winnipeg, [2]Fisheries and Oceans Canda, [3]INRS. **Long-term trends of young-of-year walleye (Sanders vitreus) recruitment in Lake Winnipeg, Manitoba, Canada.**

Walleye is an important species in Lake Winnipeg, MB, supporting one of Canada's largest inland fisheries. It is heavily targeted by commercial, recreational, and sustenance fishers. Recruitment is variable and influenced by complex environmental interactions. Making an accurate prediction of recruitment is essential for sustainable management. In this study, We examined long-term trends in young-of-year (YOY) walleye abundance using pelagic trawl data collected between 2002 and 2022 (excluding 2005, 2020, 2021). We applied a random forest model to evaluate the influence of 13 environmental variables in the lake's North and South Basin. Model performance was strong, explaining 67% of the variation in the North Basin and 80% in the South Basin. Key drivers varied by basin: the Southern Oscillation was the most significant in the South Basin, while hydrological influence (spring discharge and water level) and growing degree days also contributed. Total phosphorus and maximum water level were the top contributors in the South Basin. Winter severity, spring river discharge, southern oscillation index, and minimum water level were also identified to influence recruitment. These findings highlight basin-specific environmental controls on walleye recruitment and identify the importance of considering climate, hydrology, and nutrient dynamics in fisheries management strategies for Lake Winnipeg.

Imogen Bellinger, **Caleb Hasler** and Samuel Chasse, University of Winnipeg. **Biological responses of juvenile brook trout (Salvelinus fontinalis) to the interactive effects carbon dioxide and temperature.**

Two major threats to fish in aquatic ecosystems are increasing temperatures and rising levels of carbon dioxide (CO_2). While many studies examine the independent effects of CO_2 or temperature on fish, few investigate their combined impacts, despite these stressors occurring simultaneously in nature. Limited research has focused on freshwater ecosystems, which are highly variable and can experience abrupt elevations in CO_2, which may be substantially higher than those in marine environments. Here, we assessed the interactive effects of CO_2 and temperature on juvenile brook trout (Salvelinus fontinalis). To do so, 1200 brook trout were divided into four treatments, including: control (~ 1000 uatm, 13°C), elevated temperature (~ 1000 uatm, 19°C), elevated CO_2 (~5000 uatm, 13°C), and elevated CO_2 and temperature (~ 5000 uatm, 19°C). Each group was exposed to their treatment for 34-days, and growth, metabolism, thermal tolerance, and behaviour were measured throughout. We found growth rates were highest in our control treatment and lowest in our elevated CO_2 and temperature treatment. Standard metabolic rate increased in brook trout exposed to elevated temperature at the beginning of our exposure, but returned to baseline by the end. This was not observed under elevated CO_2. Thermal tolerance increased over the 34-day exposure under elevated temperature; however, thermal tolerance was slightly reduced

under elevated CO_2. Together, our results provide insight into what conditions will be suitable for brook trout as their environments change.

Charles Hatry[1], Mitchell Shorgan[1], Derek Irwin[2], Bruce Kilgour[1], Cam Barth[3] and Laura Henderson[3], [1]Kilgour & Associates Ltd., [2]Qaumajuq Environmental Limited, [3]North/South Consultants. **Collaborative approaches to fish salvage projects in semi-remote Arctic lakes.**

Compliance with Fisheries Act Authorizations (FAAs) typically requires meeting conditions related to mitigation measures, offsetting, monitoring, reporting, timelines, and performance metrics for offsetting success. This case study focuses on the first condition: implementing mitigation measures to reduce harm to fish and fish habitat. In 2024, we partnered with Inuk entrepreneur Derek Irwin to establish Qaumajuq Environmental Limited (QEL), a majority Inuit-owned company created to provide environmental services to industry and government agencies in Nunavut, with an emphasis on employing Inuit staff. During 2024 and 2025, we collaborated with QEL on several projects, the largest being fish salvage operations at the Meliadine Mine near Rankin Inlet, undertaken to meet the requirements of a Fisheries Act Authorization issued to Agnico Eagle Mines. To facilitate mine expansion, fish removals were completed in 15 waterbodies, some large (90 hectares). While DFO provides guidance on conducting fish salvages in the North, these methods are not always practical for every situation. Through consultation with DFO fisheries protection biologists, adaptive solutions were developed to complete the work efficiently. Across both years, QEL employed 20+ Inuit as environmental technicians. Many were from Rankin Inlet, with additional team members drawn from recent graduates and current students of Nunavut Arctic College's Environmental Technology Program. QEL also presented project findings to community Elders, ensuring local awareness of the salvage efforts and highlighting the meaningful involvement of community members in the work.

Scott Higgins[1], **Sonya Havens**[1], Michael Paterson[1], Michael Rennie[2] and Patrique Bulloch[1], [1]IISD Experimental Lakes Area, [2]Lakehead University. **Darkening waters: climate-induced shifts in precipitation and DOM reduced phytoplankton but not zooplankton in dimictic boreal lakes.**

This study examines the extent to which temporal (1980 - 2019) increases in precipitation drove dissolved organic matter (DOM) loads and lake concentrations, and evaluates implications to physical, chemical and biological variables within dimictic boreal lakes at the IISD Experimental Lakes Area, Canada. Long-term increases in precipitation (c. +27%) were associated with increased DOM loads and lake concentrations (c. +9%). Increased DOM within dimictic lakes over time was associated with shallower thermocline depths (c. -17%) and euphotic depths (c. -13%), reduced mean light intensity in the water column (c. -20%), reduced depth-integrated phytoplankton biomass (c. -32%) but increased epilimnetic chlorophyll a concentration (c. + 27%), and we detected no significant temporal declines in crustacean zooplankton. Our results confirm earlier observations that caution should be exercised when using epilimnetic chlorophyll a as an indicator of phytoplankton responses to DOM. However, once corrected for photoadaptation depth-integrated chlorophyll a was a useful indicator of depth-integrated biomass and its response to DOM.

Kiran Hazra and Bryan Neff, Western University. **Phylogeographic history of rainbow smelt (Osmerus mordax) in the St. Lawrence Valley.**

The biogeography of North America has been shaped by cyclical glaciations which periodically rendered the north and interior of the continent uninhabitable. Prior work by Louis

Bernatchez and others has identified the role of postglacial dispersal from multiple ice-free refugia in creating geographic patterns of genetic variation in rainbow smelt (Osmerus mordax), lake whitefish (Coregonus clupeaformis) and other North American fish species. I used mitochondrial DNA sequences from rainbow smelt collected across the East Coast and St. Lawrence Valley to create a detailed phylogeny of the species and estimate the timing of periods of population expansion. The study identified a previously undescribed riverine dispersal corridor between the Atlantic and the Great Lakes, which allowed Atlantic Coastal Plain species to recolonise North America's interior following the retreat of the ice sheets. The results also indicate that smelt survived the last glaciation in southern refugia below the margins of the ice sheets, rather than in northern refugia such as Newfoundland's Grand Banks. Additionally, differences in allele frequencies between native smelt and introduced populations in the Great Lakes indicate selection acting on invasive populations. These findings highlight the critical role of glacial cycles in shaping the evolution of aquatic species, and help to explain the ecological differences between different smelt populations.

Nadine Heck, East Carolina University. **Integrating Human Dimensions into Great Lakes Fishery Management- Revisiting the 2014 Human Dimensions Theme.**

Fishery management inherently requires the integration of ecological and social science knowledge to effectively manage both the fish resource and the people using it. The integration of social science data into fishery management decision-making though is often challenging. Available data on human dimension issues, for example, might not necessarily match information needed by fishery managers. In addition, the integration of social and ecological data in decision-making processes can be difficult. This talk will provide insights into human dimension information needs identified by Great Lakes fishery managers that informed the development of the Human Dimensions Research Theme for the Great Lakes Fishery Commission in 2014. By looking back at the identified research needs, this presentation will provide a starting point for discussions on how the integration of human dimensions in Great Lakes fisheries management has evolved over the past decade.

Drew Heckman[1], Ed Verhamme[2], Greg Cuttrel[2], Heidi Purcell[3], Zachary Gordon[2], Hari Kandel[1] and Ashley Moerke[1], [1]Center for Freshwater Research and Education, Lake Superior State University, [2]Limnotech, [3]Cooperative Institute of Great Lakes Research, University of Michigan. **Evaluation of low-cost in situ hydrocarbon sensors to support early detection of oil spills in the Great Lakes.**

Solutions for early detection of oil spills in freshwater systems are essential for protecting natural resources in the Laurentian Great Lakes region. To support this need, we are evaluating low-cost in situ hydrocarbon sensors as a complementary approach to traditional remote sensing and aerial methods, with a focus on conditions characteristic of northern freshwater systems. Earlier laboratory tests evaluated multiple low-cost sensor models with marine diesel, light crude oil, and other compounds in different challenge scenarios, including varied turbidity and temperature conditions. Current work extends sensor evaluations to more realistic conditions and additional challenge scenarios. This work includes trials conducted in a 30-foot long wave tank environment, which are used to examine sensor performance during spills in turbulent conditions, and data from ongoing real-world in situ deployments are also examined. Further examinations of conditions that may affect sensor performance are also included, such as comparisons in light and dark environments. Results from these combined efforts will inform the development of an early warning system for freshwater oil spills, supporting early detection, spill modeling, and post-spill monitoring scenarios.

Kevin Hedges, Cortney Watt, Wojciech Walkusz and Caitlin Meyer, Fisheries and Oceans Canada.
Adopting an Ecosystem Approach to Fisheries Management in the Canadian Arctic.

Fisheries and Oceans Canada (DFO) is actively adopting an Ecosystem Approach to Fisheries Management (EAFM) in all three oceans, and the Arctic provides unique challenges and opportunities for stock assessments and management decisions. The history of single-species assessments has produced time series of abundance data for many harvested fish, invertebrate, and marine mammal populations, but associated environmental data have been limited. Broadscale climate indices and remotely collected data can provide environmental context for stock assessments, but it has been challenging to include these data in assessment calculations and models, and subsequent uptake into management decisions is limited if ecosystem data do not "make it into the math". Indigenous co-management bodies are helping drive broader inclusion of ecosystem information in assessments and management decisions, bringing a wholistic world view, elevating the importance of EAFM. Recent ecosystem surveys are providing broader, consistent data that can be included in assessment models. To adopt EAFM in the Arctic, DFO has been conducting ecosystem surveys to collect broader data that can support assessments of multiple species or stocks. The Beaufort Sea, Great Slave Lake, and Davis Strait are focal areas where efforts are being concentrated to improve understanding of ecosystem drivers of harvested species, to aid adoption of EAFM in the Arctic. This presentation will provide an overview and history of EAFM efforts in the Canadian Arctic.

Philippe Hénault[1,2], Raphaël Bouchard[1,2], Brendan K. Malley[3], David A. Boguski[3], Éric Normandeau[1,2,4], Charles Babin[1,2], Louis Bernatchez[1,2], Xinhua Zhu[3] and Jean-Sébastien Moore[1,2], [1]Université Laval, [2]Institut de biologie intégrative et des systèmes, [3]Fisheries and Oceans Canada - Arctic Fisheries and Mammal Science Division, [4]Plateforme Bio-Informatique de l'IBIS.
Intraspecific Diversity and Stock Structure of Lake Whitefish in Great Slave Lake : A Genomic Perspective.

Lake Whitefish is a culturally, economically and ecologically important fish in a lot of North American lakes. Throughout their range, they support many subsistence, recreational and commercial fisheries. For instance, in Great Slave Lake, Lake Whitefish has supported one of the largest freshwater fisheries in northern Canada since the 1940s. In this lake, commercial stocks have been managed through quotas in six management areas. However, management has never accounted for the biocomplexity of stocks, which are probably composed of multiple distinct populations. Using a combination of low-coverage whole-genome sequencing data and a GT-seq SNP panel, our study aimed to assess the genetic structure of Lake Whitefish populations and estimate their contribution to mixed-stock commercial fisheries. First, we found that Great Slave Lake supported at least eight genetically distinct Lake Whitefish populations. Then, using a GT-Seq panel, we found that only a few populations accounted for most commercial catches in some management areas, with stocks in the westernmost and most heavily fished area (IW) dominated by a single population. Furthermore, our results suggest potential divergent space use between Lake Whitefish populations in the Lake, with one population being found mostly in the littoral zone during the feeding season. Overall, our findings provide new perspectives for the management of distinct Lake Whitefish populations in this large subarctic ecosystem.

Isaac Henderson[1], Caleb Hasler[1], Marianne Geisler[1], Todd Morris[2], D. Andrew R. Drake[2] and Anas Usoof[1], [1]University of Winnipeg, [2]Fisheries and Oceans Canada. **Using functional trait diversity to identify conservation priority regions for freshwater fishes and mussels.**

Decision-makers often face limited resources for conservation, and must therefore prioritize regions where investments will yield the greatest ecological benefits. Conservation prioritization often relies on identifying biodiversity hotspots, usually quantified using taxonomic diversity indices. However, functional trait diversity provides a complementary perspective by capturing the ecological roles species play within ecosystems and degree of functional redundancy among communities. In the present study, we used the functional diversity metrics of freshwater fish and mussel communities in southwestern Ontario, a well-known freshwater biodiversity hotspot, to identify priority watersheds for conservation. Functional diversity in each watershed was calculated using species-level functional trait data for fishes and mussels, and was integrated with a human impact index to generate a composite conservation priority score for watersheds. Comparisons between functional trait-based priority rankings and hotspots identified using taxonomic diversity alone revealed notable differences, highlighting cases where high taxonomic richness coincided with substantial functional redundancy. These results demonstrate that reliance solely on taxonomic metrics may overlook ecologically important systems that support unique or vulnerable functional roles. Our findings highlight the value of incorporating complementary conservation values describing taxonomic and functional diversity in systematic conservation planning, offering a more nuanced and ecologically meaningful framework for guiding freshwater conservation efforts under resource-limited conditions.

Diane Henshel[1], J Allen Heise[2], Angelina Mark[1] and Daniel Schoonmaker[2], [1]Indiana University - Bloomington, [2]Michigan Sustainable Business Forum. **The evolution of the 'imposter participant' in the age of AI: a Great Lakes focus group case study.**

We were contacted by a series of suspicious respondents ("imposters") during recruitment for Michigan-centric in-person flooding-resilience focus groups through the social-media networks of collaborating southwest Michigan organizations. After an unexpectedly large subset of these previously unknown individuals failed to attend scheduled in-person sessions and requested virtual alternatives, we conducted a dedicated online focus group (as they requested) to examine this subgroup more closely. Using indicators identified in prior deception- and fraud-communication literature, we identified the most likely imposter respondents based on clustered email activity (multiple addresses emailing within minutes of one another), highly similar email phrasing and address naming patterns, repeated requests for virtual participation, and the fact that most messages originated from a single IP address associated with multiple global locations and were listed in the criminalip.io database. We then analyzed the video recording of the virtual session to compare the same participants' behavior when discussing Michigan (their claimed place of residence) versus flooding (an experience they might genuinely have had elsewhere). Statistically significant differences emerged across several behavioral domains, including filler-word frequency, pause patterns, eye-contact behavior, and body posture. These findings suggest that the increasing availability of rapid online information retrieval and artificial-intelligence tools may be expanding the strategies used by imposter respondents in online community-research settings.

Diane Henshel, Angelina Mark and Brittany Sanders, Indiana University - Bloomington.
Developing Practical Flood Preparedness Guidance for Great Lakes Communities.

The Great Lakes watershed is facing increased risk of flooding due to changes in weather patterns superimposed on natural cycles. During a flood, or other storm-related event, people are on their own for hours to days before outside (municipal, state, federal or NGO) help can get to them. An earlier Great Lakes watershed survey addressing storm and flood risk history and risk perception indicated that many individuals and municipalities are not well prepared for severe storm and

flooding consequences. We therefore developed guidance and related decision-support tools to help individuals better prepare and make their home more storm and flood resilient, with a goal of helping individuals be better prepared for more severe impacts than "expected" based on recent history. We ran focus groups in southwest Michigan to get feedback on how to make the guidance and tools more "user friendly" and likely to be adapted and used. The main recommendation that came out of the focus groups is that many people do not want to read or are not comfortable with information-heavy guidance. Information needs to be presented in short bullets, with icons to help users recognize the recommendations. Many participants prefer less information and being told what to do (top five actions to implement) rather than be given a process to make the recommendations better fit each family's situation. Social media is apparently having an impact.

Diane Henshel[1], **Nathan Parr**[2], Jeffrey Ashby[1], Kristen Bashen[2], Keyan Li[2], Angelina Mark[1], Jenny Miller[2], Adriana Nieto[2], Riley Pohlman[2], Brittany Sanders[1] and Mike Shriberg[2], [1]Indiana University, [2]University of Michigan. **Neighborhood Resiliency Must Come First: Bottom-up Approaches to Flood Infrastructure and Risk.**

Current changes in weather patterns, combined with changes in emergency management support at the federal level (affecting resources and readiness at dependent state and municipal levels), are increasing the vulnerability and potential impact of future flooding within the Great Lakes watershed. With uncertain federal pass-through resources, the resources that municipalities can muster need to be wisely allocated to maximize effective protections and future resilience at the community level. We propose that from a flooding perspective, efforts to develop resiliency must start at the neighborhood level and below, and then be integrated at the municipal level. Dual projects centered on Lake Michigan approach this hypothesis by centering the work on community-based data using focus groups and a data survey, compared and contrasted with a stakeholder interview process. Both projects emphasize a socioeconomic analysis methodology in developing recommendations for municipal and community action. The first approach emphasizes community-driven development of guidance and decision-support tools to help residents improve their own (and their home's) resilience. The second approach used stakeholder interviews, flood models, and socioeconomic data to identify challenges and opportunities for flooding infrastructure incorporating community co-benefits. Together, these methodologies integrate community partnerships and data into the solution and policy-making process and build solutions for flooding from the bottom up and represent a new, more community-centric approach to data gathering for local resilience and adaptation decision-making.

Claire Herbert, University of Manitoba. **An overview of water quality and phytoplankton distribution in the Upper Manitoba Great Lakes.**

Freshwater eutrophication in Canada poses significant threats to ecosystem health and community wellbeing, particularly in large lake systems like the upper Manitoba Great Lakes (upperMBGL). Lakes Winnipegosis, Waterhen, and Manitoba form a critical buffer system within the Nelson River watershed, processing nutrients before they reach Lake Winnipeg and ultimately Hudson Bay and the arctic. Despite their importance, these lakes remain severely understudied, with minimal spatial and temporal data available about nutrient dynamics and phytoplankton communities. This knowledge gap hinders evidence-based management decisions necessary to protect these valuable freshwater resources from eutrophication driven by modern challenges such as land use management and accelerated climate change. This results of this study provide the first spatially comprehensive, multi-year assessment of offshore water quality in the upperMBGL system.

I will discuss the general nutrient and phytoplankton patterns from north to south across this ecosystem, and provide recommendations for future research.

Max Herzog, Cleveland Water Alliance. **Great Lakes Participatory Science Resource Hub Network.**

With communities increasingly at the front lines of water challenges and institutional capacity stretched thin, agencies and researchers are taking steps to more substantively engage with participatory science for mutual benefit. Since 2021, the International Joint Commission's (IJC) Research Coordinating Committee (RCC) has been leading this charge by funding the development of a framework for institutional support of and collaboration with local data collection efforts. This session will explore early outcomes of this work and examine how a series of publicly and/or privately funded resource hubs could elevate the impact of participatory science and effectively integrate these efforts into Great Lakes management. It will also showcase the Lake Erie Volunteer Science Network, a regional collaboration of local water quality monitoring groups, as a model hub from which a regional network.

Cecilia Heuvel[1], Ashley Moerke[1], Michael Twiss[2], Mike McKay[3], Bo Liu[1], Britton Ranson-Olson[1], Jonathon Doubek[1], Chris Weisener[3], Peter Jobin[3], Allison Snider[4] and Kevin Kapuscinski[1], [1]Lake Superior State University, [2]Algoma University, [3]University of Windsor, [4]U.S. Coast Guard. **A synthesis and review of oil spills in the Laurentian Great Lakes between 2015-2024.**

Accidental oil spills into the Great Lakes are a growing concern, yet reported incidents in the U.S. and Canada are inconsistently described and often incomplete. We compiled oil spill reports from 2015-2024 into a binational dataset to investigate patterns across the Great Lakes. Data from the U.S. National Response Center and Ontario's Environmental Occurrences and Spills database were filtered for liquid hydrocarbon incidents affecting Great Lakes surface waters. Duplicate reports were removed, and incidents were categorized into standardized spill origins and oil types. We quantified annual spill counts, density (spills/1000 km^2), and volumes for each waterbody. Spill counts remained stable year-by-year, with more incidents occurring in the lakes than connecting waters. Spill densities were higher in connecting waters than the lakes, reflecting their role as major transportation corridors and nodes of industrial activity, and critical areas for monitoring and management. Only 35% of incidents in the U.S. database reported spill volume, and Canadian spill volume reporting began only in 2023. Reported volumes were highly skewed, with a few large volume events dominating totals. Common spill origins differed by country; shipping-related spills were most common in the U.S., whereas facility-related were most common in Canada. This study provides the first standardized, binational assessment of spill occurrence and reporting in the last decade, offering a foundation for evaluating risk, prioritizing prevention efforts, and improving oil spill reporting.

Claire Herbert[1, 2] and **Aiden Hindmarch**[1, 2, 3], [1]Canadian Watershed Information Network, [2]University of Manitoba, [3]The Centre for Earth Observation Science. **Indigenous Community-Based Monitoring and Data Sovereignty: Collaborating with Poplar River First Nation.**

My presentation will focus on a community based water monitoring partnership involving Poplar River First Nation, the Centre for Earth Observation Science and the Canadian Watershed Information Network. The aim of this work is to support locally driven monitoring, improve data transparency, and build long term data pathways that remain under Poplar River ownership and direction. I am a Poplar River First Nation student working with both groups, and this project connects to my academic work and my home community. CEOS contributes scientific guidance and

research capacity and plans to continue expanding this partnership to make monitoring results clear, understandable, and accessible for community members and future users. CanWIN provides data infrastructure to organize and share environmental information in support of clarity and accessibility while respecting community authority. In November 2025 CEOS and CanWIN travelled to Poplar River to support community monitoring led by the Poplar River Land Guardians, focusing on listening, learning, and relationship building. Being from Poplar River this work feels meaningful and has helped bridge community knowledge with academic support. The project highlights the importance of transparent data pathways and reinforces that all environmental information produced will remain under Poplar River governance. My presentation will share early reflections from this partnership, focusing on trust, transparency, community voice, and the value of data systems shaped by Indigenous priorities, and will consider how this relationship may guide future monitoring.

Timothy B. Johnson[1], Michael Rennie[2], Steve Pothoven[3], Charles Madenjian[4], James Breck[5], David Deslaurries[6], Steve Chipps[7], Mark Kershner[8], Brett Johnson[9] and **Benjamin L. Hlina**[10], [1]Ontario Ministry of Natural Resources, [2]Lakehead University, [3]NOAA, [4]US-Geological Survey, [5]University of Michigan, [6]Université du Québec à Rimouski., [7]South Dakota State University, [8]Kent State University, [9]Colorado State University, [10]University of Windsor. **Great Lakes Aquatic Tissue Analysis Repository (GLATAR).**

Great Lakes Aquatic Tissue Analysis Repository (GLATAR) is an open-access, web-based resource containing aquatic fish and invertebrate energy density, proximate composition, stable isotope, thiamine, fatty acid, mercury and PCB data. GLATAR is a comprehensive, quality-controlled database that aggregates published and unpublished records from tissue analyses and their associated biological and environmental metadata (e.g., life stage, body size, sample location, season, measurement type, etc.). Furthermore, GLATAR contains simple tools for searching (e.g. taxa, location, publication), visualizing sampling locations (i.e., interactive map) and raw data through several plotting functions (i.e., histograms and scatterplots), and summarizing aquatic tissue data. The GLATAR database presently contains over 20,000 records on 120 aquatic species compiled from over 250 unpublished sources and publications (primary literature, government reports, theses, and unpublished documents). New data and existing publications that are quality controlled by the user can easily be added to the database through a data entry template (i.e., standard format) and stringent upload function allowing for increased contributions and collaboration. This tool is intended to grow and develop through community contributions and will serve as a long-term resource for advancing aquatic energetic analysis and ecological modelling (e.g., fish bioenergetics modelling). Together, the database and toolbox provide a unified platform that enhances reproducibility, improves accessibility of trophic relationship data, and supports evidence-based decision-making in fisheries science, ecological modelling, and resource management.

Elaine Ho-Tassone[1], Kiki Vetrie[1], Ajaz Shaikh[1], Corrina Barrett[2], Gerard Lavoie[2] and Anjum Amin[2], [1]NORDIK Institute, [2]Sault Ste Marie Region Conservation Authority. **A Framework for Community-based Water Quality Monitoring in the Northern Great Lakes.**

Northern Ontario, home to the Northern Great Lakes, encompasses about 88% of Ontario's land area with only 6% of its population. Here, community-based water quality monitoring requires modified protocols compared to CBM practices common to more populated regions of North America. Widely-used citizen science tools are often not as effective in colder climates, and common practices are usually not sufficient in more sparsely populated regions. Communities are nearly always small, rural, and sometimes remote, with limited resources and

science capacity. Infrastructure - including internet connection, cell phone service, roadways, and public access to Great Lakes shorelines - are limited. Yet, the Northern Great Lakes and their connecting and contributing waterways are vast, with immense, increasing pressures from industry and other uses. In this session, we present an early framework that may be applied in colder, less densely populated regions of the Great Lakes basin and other boreal areas around the world. The framework is based on five years of developing and coordinating community monitoring programs in Canadian and First Nation communities of the Northern Great Lakes area. We highlight the data and capacity gaps we fill, the challenges we have faced, how they were overcome, and the broad benefits and outcomes we have achieved. Pathways to decision-making are considered. Finally, we open discussion about the framework's components and how it may be adaptable to other, similar (cold, rural) contexts.

Ryan Hodgson[1], Steve Cooke[1] and Jacob Brownscombe[1,2], [1]Carleton university, [2]Department of Fisheries and Oceans Canada. **Energetic Cost of Catch and Release Angling in Brook Trout (Salvelinus fontinals) at Two Temperatures.**

Catch and release (C&R) angling is a common practice in recreational fisheries, which can involve a range of acute stressors for fish that lead to physiological and behavioural impairments. Following a C&R event, energy is expended to fuel recovery while a cessation in feeding can limit energy intake. While the impacts of C&R have been extensively studied, the extent of bioenergetics impacts has rarely been characterized. This study aimed to assess the energetic impacts of C&R stressors on brook trout (Salvelinus fontinalis) — a cold-water salmonid sensitive to temperature perturbations and air exposure. Adult brook trout were subjected to simulated angling events at 10℃ and 15℃. A respirometry experiment measured their energy expenditure through excess post exercise oxygen consumption (EPOC), and a feeding experiment determined time to return to feeding. Combined both changes in energetic expenditure and reductions in energy consumption were incorporated into a bioenergetics model to predict growth outcomes following captures (1, 5, 10) over 120 days. The stressors simulated here resulted in a mean overall simulated growth reduction of 1.49% per angling event. Overall, the moderate simulated C&R stressors tested here within the optimal temperature range of brook trout resulted in relatively small energetic consequences, even with numerous simulated events.

Tim Hollinger[1], **Dale Hardy**[2], Rob Stewart[1], Nathan Wilson[1] and **Adam Kowtiash**[1], [1]Lakehead University, [2]Rock Bay First Nation. **Lake Nipigon Rocky Bay Fisheries Unit: Community-Based Monitoring for Lake-wide Management.**

The community of Biinjitiwaabik Zaaging Anishinaabek (BZA - Rocky Bay) has observed dramatic changes to the Lake Nipigon fishery over the past century. Although BZA has been involved in local fisheries management, Lake Nipigon has largely been excluded from Great Lakes research and management programs. With no settler communities directly on the lakes shores, Indigenous peoples are the dominant subsistence and commercial fishermen and therefore directly rely on the health of the fishery. The development of dams and diversions on major river systems, large-scale mining within the watersheds and the collapse of a commercial Walleye fishery have prompted BZA to take action in monitoring and managing Lake Nipigon's resources through The Rocky Bay Fisheries Unit and Guardians Program. Through knowledge co-production, using community-based knowledge combined with western science, the Fisheries Unit works collaboratively to monitor the health of Lake Nipigon with hopes to inform lake management. This talk outlines a range of historical efforts and modern day fisheries monitoring programs including

fish contaminants, acoustic telemetry, fish population studies and lake-wide meetings led by BZA in order to elevate their role in fisheries management.

Ebie Holst, Cleveland Water Alliance. **Water Accelerator Testbeds: Enabling the Next Generation of Innovative Technology.**

Cleveland Water Alliance has outfitted the Lake Erie Watershed with a state-of-the-art IoT monitoring infrastructure, making it the largest digitally connected freshwater body in the world. This network provides a "testbed" platform for trialing, evolving, and commercializing new technologies. Close collaboration with utilities, natural resource managers, and industry leaders enables Cleveland Water Alliance to arrange field trials at water intakes, within treatment processes, in the environment, and beyond. These pilots not only enable real-world performance evaluation benchmarked by our sensor data, they also ensure that solutions are developed with customer needs in mind. With 80+ trials from 13 countries completed to date, our waitlist for future deployments is growing rapidly. This presentation will cover success stories and lessons learned as well as inroads into industrial and agricultural markets.

Jodie Houck[1, 2], Patricia Ramey-Balci[1], Ramona Muster[3], Christopher McKinsey[4] and Kimberly Howland[2], [1]Department of Biological Sciences, University of Manitoba, [2]Arctic and Aquatic Research Division, Fisheries and Oceans Canada, [3]Environment and Geography, University of Manitoba, [4]Demersal and Benthic Sciences Division, Maurice Lamontagne Institute, Fisheries and Oceans Canada,. **Do habitat and environment affect coastal mobile benthic assemblages in Qikiqtarjuaq, Nunavut?**

The Canadian Arctic is undergoing a period of unprecedented change, warming at three times the global average and projections estimate ice free summers by 2040. Climate warming and sea ice loss are expected to alter coastal seafloor communities and their ecological functions such as nutrient recycling through bioturbation and trophic energy transfer from primary producers through to culturally important harvested taxa such as fishes and marine mammals. Baited Remote Underwater Video systems (BRUVs) technology was used to provide the first characterization of mobile benthic assemblages in understudied nearshore habitats of Qikiqtarjuaq, Nunavut. BRUVs were deployed at 270 sites randomly selected from previously mapped locations, stratified by substrate type and macroalgae cover in nearshore areas (<60 m depth) in the vicinity (within ~ 10 km) of Qikiqtarjuaq during August of 2025. Preliminary results examining spatial patterns in community composition in relation to habitat and physical environmental conditions such as substrate type, macroalgae type and colour, depth, current velocity and direction and salinity will be discussed. Baseline data in shallow water Arctic ecosystems is lacking despite its vital role in informing our understanding of how climate change will affect community dynamics, nutrient cycling, and trophic energy transfer in arctic systems; this study aims to fill some of those gaps.

Jeff Houghton and Juliane Baquiran, Ramboll. **Interactive Ecological Rendering as a Visualization Framework for Advancing Nature-Based Solutions Across Connected Watersheds.**

The 2026 IAGLR-SCAS Joint Conference theme, Connected Waters: Bridging Communities & Ideas, highlights the need to integrate diverse knowledge systems and communication tools to support cross-watershed understanding and collaborative decision-making. In this presentation, I introduce an innovative ecological visualization framework that uses real-time rendering engines—similar to those used in CGI filmmaking and video-game development—to model, animate, and

communicate watershed processes and nature-based solutions (NBS) with high visual fidelity and scientific accuracy. Using projects from Sault Ste. Marie, Buffalo Niagara Waterkeeper program areas, the St. Lawrence River, and Cradle Beach as case examples, this framework transforms hydrodynamic model outputs, habitat assessments, and watershed process data into immersive, interactive environments. Rather than relying on static maps or time-averaged graphics, these GPU-accelerated visualizations depict ecological processes as dynamic, navigable 3D scenes that update and respond instantly to user interaction. This approach enhances stakeholder engagement by making complex environmental dynamics intuitive and visually compelling, helping bridge communication gaps between scientists, managers, Indigenous partners, and community members. By combining scientific rigor with cinematic visualization techniques, this work demonstrates how interactive rendering can accelerate NBS planning, improve shared understanding of ecosystem responses, and strengthen resilience across freshwater systems connected throughout the Great Lakes and beyond.

Bradley E. Howell[1], Christina A.D. Semeniuk[2], Kathleen D.W. Church[3], Felix Eissenhauer[4], Jaime Grimm[5], Robert M. Hechler[5], Silviya V. Ivanova[2], Sandra Klemet-N'Guessan[1], Christine L. Madliger[6], Jessica Reid[7], Kendra A. Thompson-Kumar[2], Ivan Arismendi[8], Brooke E. Penaluna[9], Andrea E. Kirkwood[10] and Catherine M. Febria[2], [1]Trent University, [2]University of Windsor, [3]Institut des Sciences de la Forêt Tempérée, [4]University of New Brunswick, [5]University of Toronto, [6]Algoma University, [7]Carleton University, [8]Oregon State University, [9]United States Department of Agriculture Forest Service, [10]Ontario Tech University. **Advancing equitable conference and networking opportunities for early-career aquatic scientists in Canada.**

As early-career professionals navigate their education and professional development in the aquatic sciences, many seek to build a network to help guide their entrance into the field. As influential organizations, scientific societies play a vital role through hosted conferences, where early-career professionals can meet and share ideas with others, and find mentors to facilitate their colleagues' journey within the profession. However, not all early-career professionals are the same, and those from marginalized backgrounds face unique challenges. Here, we provide a perspective on ways scientific societies can ensure all members are provided with equitable opportunity to discover, access, and build career-defining networks at conference events, including the critical role of mentors in navigating obstacles to success. Our recommendations originate from an early-career networking workshop in 2022 at a Canadian fisheries and aquatic sciences conference. The day-long hybrid event comprised interactive activities and discussions on how societies and their conferences can foster and promote inclusive networking for all, including suggestions on maximizing inclusivity for online attendees. This perspective serves as a call to action for scientific societies and senior-career professionals to meaningfully engage with early-career professionals and marginalized members to promote transformative science.

Bradley E. Howell[1], Mitchell B. Shorgan[1], Leah C. Howitt[1], Christian J. Bihun[1], Aaron T. Fisk[2], Steven J. Cooke[3] and Graham D. Raby[1], [1]Trent University, [2]University of Windsor, [3]Carleton University. **Predation on behavioural phenotypes maintains individual variation independently of trait integration.**

The pace-of-life syndrome (POLS) hypothesis predicts that metabolic rate integrates physiology, behaviour, and life history along a single slow-fast continuum, with predation maintaining variation along it. We tested these predictions simultaneously on free-ranging individuals by combining lakeside intermittent-flow respirometry, predation-sensing acoustic telemetry, stable isotope analysis, and scale-based aging to measure five pace-of-life traits and track confirmed

predation fate in 78 prey (bluegill Lepomis macrochirus, n = 31; pumpkinseed L. gibbosus, n = 47) and their predator (largemouth bass Micropterus nigricans, n = 25) in a north temperate lake in Ontario, Canada. The five traits did not covary as an integrated syndrome. Instead, daily movement distance and home range size clustered independently of metabolic rate, growth, and trophic position, forming what we term behavioural pace. Predation selected strongly on this dimension in pumpkinseed, with slow-paced individuals suffering twice the predation hazard of fast-paced conspecifics (Cox HR = 0.446, p = 0.0004). Both prey species shared identical covariance structure despite differing in predation outcomes. Fast-paced prey shifted into structurally complex vegetation, which independently reduced predation risk. In the predator, behavioural pace predicted trophic position and dietary specialisation, indicating consequences across trophic levels. Predation maintains behavioural variation through differential mortality without requiring the trait integration the POLS hypothesis assumes.

Leah Howitt[1], Bradley E. Howell[1], Steven Cooke[2], Aaron Fisk[3] and Graham Raby[1], [1]Trent University, [2]Carleton University, [3]University of Windsor. **Effects of artificial light at night on the behaviour of wild fishes: a whole-lake experiment.**

As the human population continues to grow, artificial light at night (ALAN) is steadily increasing in both urban and rural areas. ALAN disrupts the natural day-night cycles that wildlife depends on to regulate their daily and seasonal activities like feeding, growth, and reproduction. While there is growing research on how ALAN affects terrestrial species, much less is known about its impact on fishes, particularly in the wild. This study investigated how Northern pike (Esox lucius), Largemouth bass (Micropterus nigricans), Pumpkinseed (Lepomis gibbosus), and Bluegill (Lepomis macrochirus) responded to ALAN by monitoring their behaviour in a small, private lake equipped with a whole-lake fish positioning system (acoustic telemetry). Large LED lights were installed around the lake on a one-night-on, two-nights-off schedule and positioning of tagged fish was used to assess changes in activity levels and habitat use under ALAN. The results reveal how fish behaviour varies across lit and unlit areas of the lake and species-specific responses to light pollution, while highlighting patterns in activity and space use on nights with the lights on compared to those where the lights were off. These patterns provide insight into potential behavioural responses to ALAN and factors influencing how different species may adjust to artificial lighting.

Kimberly Howland[1], Jaqueline Twilley[1], Heather Clark[1], Colin Gallagher[1] and Edward Reeves[2], [1]Fisheries and Oceans Canada, [2]Deline Renewable Resources Council. **A long term community-based monitoring program to assess the effects of harvest and climate change on the Great Bear Lake aquatic system.**

Over the past two decades Indigenous, Government and University partners have been conducting long term research to assess the effects of harvest and climate change on the Great Bear Lake aquatic system. This program involves annual biological and environmental data collection at fixed community monitoring sites near Délı̨nę, NT, the only community on the lake, and at a wider spatial scale through random depth-stratified sampling using standardized protocols. This program has generated spatially and temporally extensive data sets on water quality, primary productivity, invertebrate/fish assemblages and biological traits in harvested fish species. The project has maintained a strong level of community involvement, including youth through the Indigenous Guardians Program, to facilitate capacity building and a gradual transition to greater community leadership with field programs being solely community-led over the past two seasons. Here we describe the program and highlight results with potential drivers for changes in fish community composition, population (demographic) trends/status of key harvested fish stocks, and climate-

related changes in water quality over the past two decades on this large lake system. This information adds to our understanding of the cumulative impacts of climate change and harvest on the functioning of large northern lake ecosystems, particularly with respect to fish production, and provide a benchmark for monitoring further change. Results will be important for developing effective strategies for maintaining community-led aquatic monitoring and sustainably managing natural resources, particularly fish.

Xuhui Huang[1], Emily E. Chase[2], Brittany N. Zepernick[2], Robbie M. Martin[2], Lauren E. Krausfeldt[2], Helena L. Pound[2], Hanqi Wu[1], Zheng Zheng[1] and Steven W. Wilhelm[2], [1]Fudan University, [2]University of Tennessee, Knoxville. **Black Queen Dynamics and Morphology-Dependent Phage Infection in Microcystis.**

Cyanobacterial blooms dominated by Microcystis often consist of both free-living single cells and dense colonies, yet how these contrasting morphologies influence host-virus interactions in natural systems remains poorly resolved. Here, we integrated metatranscriptomic datasets from two independent bloom events in Lake Taihu (2018 and 2023) to compare community composition, functional activity, and phage infection strategies between colonial and single-cell Microcystis. To enable robust cross-sample comparisons, we constructed both Microcystis and Microcystis-infecting phage pangenomes and mapped transcriptomic data to these references. Across both years, colonial samples were characterized by strong transcriptional dominance of Microcystis and reduced activity of associated microbiota, consistent with Black Queen-like dynamics, where dominant organisms reduce reliance on community-shared functions while dependent taxa lose costly functions and rely on others. In parallel, viral infection strategies diverged sharply with morphology: colony-associated Microcystis showed elevated expression of lysogeny-associated phage genes, whereas single cells exhibited signatures of more frequent lytic infection. These consistent patterns across years suggest that colony formation creates localized high-density microenvironments that favor lysogen formation, potentially through enhanced superinfection immunity. Together, these findings highlight how microbial morphology structures virus-host interactions and bloom persistence, and demonstrate the value of integrating datasets across time, systems, and research contexts to advance understanding of harmful algal bloom dynamics.

Raina Hubley[1], Theresa Warriner[1], Eva Cyril[1], Jose Luis Rodriguez-Gil[2, 3], Karen Kidd[4] and Denina Simmons[1], [1]Ontario Tech University, [2]International Institute for Sustainable Development Experimental Lakes Area, [3]University of Manitoba, [4]McMaster University. **Effects of Benzalkonium Chloride on the Fathead Minnow (Pimephales Promelas) Proteome.**

Benzalkonium chloride (BAC) is an antimicrobial compound often integrated into household personal care products, surface cleaners, and cosmetics. When these chemicals are released into water bodies they become a threat to aquatic species. Although researchers have identified BACs in environmental water samples at μg/L concentrations, few studies have examined their toxicological effects on fish. When fish are exposed to contaminants, they may develop molecular changes within their tissues and biofluids. Scientists use proteomics to determine the effects of contaminants on protein abundance and examine potential protein biomarkers that are tied to adverse outcome pathways. We determined the effects of BAC on the fathead minnow (Pimephales promelas) proteome by exposing mixed-sex fathead minnows to environmentally relevant concentrations of a BAC mixture (0.5, 1, and 15μg/L) and solvent control (0μg/L) over a 28-day period. Following the flow-through exposure, we anaesthetized fish with 100 mg/L buffered tricaine methanesulfonate to collect biofluid and tissue samples. Next, proteins were sequenced with liquid chromatography-tandem mass spectrometry. In this presentation, we will highlight the plasma,

gill, liver, and mucus proteomics results. We found that liver samples collected from the BAC-exposed fish had the highest proportion of significantly impacted proteins. Our preliminary findings suggest that BAC-exposed fish developed impacted proteins related to neurotoxicity, pulmonary toxicity, and inflammation. The present study supports an ongoing whole-lake BAC exposure at the International Institute for Sustainable Development Experimental Lakes Area.

Braedon Humeniuk[1], Jose Luis Rodriguez Gil[1, 2] and Mark Hanson[1], [1]University of Manitoba, [2]International Institute for Sustainable Development - Experimental Lakes Area. **Characterizing the Impact of Salinization on Wild Rice (Zizania palustris) to Inform Ecological Risk Assessment.**

Freshwater salinization is an ongoing global ecological threat and is of pressing concern for aquatic systems within the temperate regions of North America. To address the effectiveness of current Canadian Water Quality Guidelines (CWQGs) for chloride, we investigated the impacts of NaCl on freshwater ecosystems by using wetland mesocosms that were monitored for 707 days (2023-2025). Outdoor mesocosms (~3000L) were treated along a gradient of 9 chloride concentrations in a regression design (linear on a logarithmic scale, n=1), with controls (n=3). Treatments ranged from 22 to 2000 mg Cl^-/L, which included the short- and long-term CWQGs of 640 and 120 mg Cl^-/L, respectively. The responses of wild rice (Zizania palustris) were assessed as part of the study, including root, shoot, panicle, seed, stage, and fluorescence endpoints. Aquatic plant data are often underrepresented in risk assessment, as only one free-floating species was used in the derivation of the long-term CWQG for chloride. In addition, a 7-day germination assay was performed to assess the sensitivity of wild rice to road de-icing salts. Increasing chloride concentrations significantly reduced the growth and development of this annual species, as the 7-day laboratory and 120-day mesocosm root mass EC_{50} values were 485.2 and 41.9 mg Cl^-/L, respectively, suggesting that the current CWQGs may not be sufficiently protective of wild rice. This data will improve our understanding on the impacts of salinization and inform ecological risk assessments.

David AGA Hunt[1, 2] and Diane S Srivastava[1, 3], [1]Canadian Institute of Ecology and Evolution, [2]McGill University, [3]University of British Columbia. **Data rescue: the cheap solution to a billion dollar problem.**

Historically, datasets have had an annual mortality of approx. 17%, or a half-life of less than four years (Vine et al. 2014). Given conservative estimates based on publicly available data, this likely represents hundreds of millions of dollars worth of data each year in Canada alone. Even more pertinent than cost is the irreplaceability of many datasets, representing historical baselines or comparisons that are impossible to collect again. The value these datasets represent, both scientific and monetary, is many times larger than than cost to preserve them, but this is still seldom done. In this presentation, we discuss the experiences of the Living Data Project, an initiative of the Canadian Institute of Ecology and Evolution, in rescuing aquatic datasets in conjunction with data partners such as the IISD Experimental Lakes Area, Fisheries and Oceans Canada, and Canadian academics.

I

Nicole Iliuk[1], Romullo G. S. F. Lima[2] and Bruno E. Soares[3], [1]Universidade Estadual do Paraná, [2]Universidade Federal do Ceará, [3]University of Regina. **Phylogenetic structure and evolutionary distinctiveness of freshwater fish assemblages in Brazilian semi-arid ecoregions.**

Phylogenetic diversity captures the evolutionary history represented within biological communities and provides insights beyond species counts alone. We assessed phylogenetic diversity (PD), mean pairwise distance (MPD), mean nearest taxon distance (MNTD), and evolutionary distinctiveness (ED) in freshwater fish assemblages from four ecoregions of the Brazilian semi-arid region. To incorporate phylogenetic uncertainty, we used a global Actinopterygii backbone and inserted missing species using a hierarchical genus-family algorithm, generating 100 alternative phylogenetic trees. Total phylogenetic diversity was highly consistent across iterations, indicating robustness to uncertainty in species placement. Absolute PD varied strongly among ecoregions and was largely explained by species richness, suggesting that richer regions concentrate more evolutionary history. In contrast, observed MPD and MNTD showed clear differences in phylogenetic structure among ecoregions. Using null models controlling for richness, all regions exhibited phylogenetically clustered species pools. However, the scale of clustering varied, with some ecoregions dominated by deep evolutionary clustering, consistent with long-term environmental filtering, and others showing stronger terminal clustering, suggesting the influence of more recent ecological or selective processes. Evolutionary distinctiveness was positively correlated with PD and richness, yet regional differences persisted after controlling for richness. Together, these results indicate that conservation strategies in the Brazilian semi-arid region should be regionally tailored, prioritizing areas with high PD to preserve evolutionary history while also protecting habitats that sustain both ancient lineages and recent evolutionary diversification.

Katriina L. Ilves[1], André L. Martel[1], Tim Haxton[2], Sarah E. Steele[1], Noel Alfonso[1], Anita LeBaron[3], Elise Millar[2], Roger D. Bull[1], Shauna Fulton[1], Stéphanie Tessier[1], Annie Paquet[4], Marie-Hélène Fraser[4] and Hans-Frédéric Ellefsen[5], [1]Canadian Museum of Nature, [2]Ontario Ministry of Natural Resources, [3]Ontario Ministry of the Environment, Conservation and Parks, [4]Québec Ministère de l'Environnement, de la Lutte contre les changements climatiques, de la Faune et des Parcs, [5]Pêches et Océans Canada - Région du Québec. **Determination of mussel-fish connections in nature: what are the host fish(es) of Hickorynut in Canada?**

Understanding the obligate relationship between freshwater unionid mussels and the host fish(es) of their larvae (glochidia) is key to the conservation of this generally threatened fauna. A significant challenge in determining these relationships is demonstrating the connection in nature. This study aimed to make a definitive link in the wild between the endangered Hickorynut mussel and its putative host fish the Lake Sturgeon, while also examining other potential fish-mussel connections. Hundreds of Lake Sturgeon and other fishes were captured over three field seasons (summer & fall) between 2021-2023 in the Ottawa River (lac Coulonge region) and the fluvial St. Lawrence (lac St. Pierre area). Glochidia were confirmed on 17 wild-caught fishes of five species from the Ottawa River: Burbot, Lake Sturgeon, Sauger, Walleye, and Yellow Perch. Morphological and genetic "keys" for glochidia were developed in-house from expert-identified adult females of the 10 mussel species distributed in the lac Coulonge region. Individual (not pooled) control and encysted glochidia on wild-caught fishes were quantified for four linear measurements and a larval hinge character and sequenced for mtDNA COI. Morphological identifications were confirmed using PCA and 3D plotting while genetic identifications were confirmed with phylogenetic and distance-based methods. Approximately one-third of all freshwater mussels in Canada are at risk; identifying the life history requirement of which fish species can harbor their developing larvae in nature is critical to the development of conservation plans.

J

Lauren Jarvis[1], Jordan Rosenfeld[2], Sierra Sullivan[3], Eva Enders[4], Matthew Bayly[5], Anas Usoof[6], Christina Czembor[2], Hugo Gallier[4] and Joseph Bottoms[7], [1]University of Toronto, [2]BC Ministry of Water, Land and Resource Stewardship, [3]University of British Columbia, [4]Institut National de la Recherche Scientifique, [5]M.J. Bayly Analytics, [6]University of Winnipeg, [7]BC Hydro. **A typology of cumulative effects modeling tools.**

The application of cumulative effects modeling tools are becoming routine for managing ecological systems. However, the exponential growth of scientific publications on cumulative effects in recent decades has created an overwhelming space for new users to navigate. Our work addresses the need for a typology of cumulative effects modeling tools to help natural resource managers, stakeholders, and local communities find the right tool for their research needs. This will be a step towards making cumulative effects research more accessible to a wide range of users and bridging gaps between sectors and governing bodies, so that future research can pull from existing efforts rather than starting anew.

B. D. G. Samadhi H. Jayathissa[1], Peter R. Leavitt[2] and Cale A.C. Gushulak[1], [1]Department of Biological Sciences, University of Manitoba, Winnipeg, Manitoba R3T 2N2, [2]Department of Biology, University of Regina, Regina, Saskatchewan S4S 0A2. **Historical changes in the water quality of large, shallow, peri-boreal Lake Winnipegosis (Manitoba, Canada).**

Freshwater systems across the Canadian Prairies have undergone long periods of nutrient enrichment linked to agricultural expansion, but less is known about lake response to anthropogenic stressors on the prairie-boreal boundary. Lake Winnipegosis, Manitoba's second-largest lake, is located at this ecotone and is understudied despite Indigenous concerns over declining water quality and fisheries health. Its large size, complex hydrology, varied land use, and location across a climate gradient makes it ideal for studying the effects of climate and land use on water quality in large, shallow lakes. We used sediment cores from four depositional basins across Lake Winnipegosis to quantify evidence of historical water-quality decline. Sedimentary pigment records suggested that long-term increases in lake primary production began ca. 1900, in line with agricultural development of the region. However, variation among individual cores indicate spatial differences in the magnitude of production change, suggesting that local hydrological inputs, land use, and climate conditions also influenced lake production. On-going analyses of sediment biogeochemical markers of water quality (e.g., $\delta^{13}C$, $\delta^{15}N$) and organic matter content will test whether past biogeochemical cycling varied concomitant with primary production. This study is the first comprehensive paleolimnological assessment of Lake Winnipegosis and will offer critical environmental information to local First Nation and Métis communities that depend on the lake's health for their livelihoods.

Aaron Boyd[1], Danielle Molenaar[2], Shira Joudan[2] and **Ken Jeffries**[1], [1]University of Manitoba, [2]University of Alberta. **Dietary risks of persistent contaminants in softshell clam Mya truncata near Qikiqtarjuaq, Nunavut.**

Many remote communities in the Canadian Arctic face contamination challenges from persistent pollutants through long-range transport, local anthropogenic activities, and legacy sources such as the Distant Early Warning (DEW) line. Persistent contaminants pose a risk to the health of Northern communities through the consumption of local species such as clams, fish, and marine mammals for food (i.e., country foods), and can also threaten food security by disrupting normal ecosystem processes. This study quantified contaminants in clams from several locations

surrounding Qikiqtarjuaq, Nunavut, to assess contaminant inputs from sources such as glacial melt, local sources, and a DEW Line radar station to provide data on the health of country food sources in the region, which were compared to clams from an urban environment near Iqaluit, Nunavut. The levels of 41 polychlorinated biphenyls (PCBs), 17 organochlorines (OCs), 24 polybrominated diphenyl ethers (PBDEs), 37 per- and polyfluoroalkyl substances (PFAS) and 18 metals were within Health Canada guidelines for human consumption in both Qikiqtarjuaq and Iqaluit. Aluminum, lead, arsenic, and methylmercury levels in Qikiqtarjuaq exceeded safe consumption limits with as little as 4 clams a day. Overall metal concentrations were 50% greater near glacial melt inputs, indicating that some harvest locations may be less desirable for long-term food consumption. This work is part of a larger baseline project to characterize persistent contaminant levels in lower trophic animals that are consumed by communities in Nunavut.

Ken Jeffries[1], Analisa Lazaro-Côté[1], Ben Kissinger[2] and Neil Mochnacz[3], [1]University of Manitoba, [2]fRI Research, [3]Fisheries and Oceans Canada. **Collaborative Research Across Sectors with the Goal of Bull Trout Conservation in Canada.**

Bull trout (Salvelinus confluentus) are a priority species for protection in Canada because this cold-water fish has experienced population declines due to numerous factors such as increasing temperatures, invasive species, pathogens, historical over-fishing and habitat degradation. Therefore, understanding the causal factors leading to declines in different populations is complex, and exacerbated by the fact that traditional monitoring approaches (i.e., lethal sampling) cannot be used to gain an understanding of the health of populations due to the species' protected status. To gain a better understanding of the physiology of bull trout from wild populations, we have been conducting collaborative studies combining researchers from academia, government (Fisheries and Oceans Canada) and a not-for-profit corporation (fRI Research) with a common goal of generating information to aid in bull trout conservation. In this talk, we will outline our approaches from developing a lab-reared population to conducting thermal physiology research from the cellular level to the whole organism across different life stages. Through this work, we have developed a high-throughput qPCR "chip" that can be used to monitor stress in wild populations using non-lethally sampled tissues, such as epidermal mucus. Thermal stress profiles developed in the lab are now being tested in wild populations. Our work highlights the benefits of cross-sector collaborations to tackle challenging conservation problems.

Allie Johnson[1], **Carena J. van Riper**[1], Elizabeth Golebie[2], Austin Happel[3] and Len Hunt[4], [1]University of Illinois Urbana- Champaign, [2]The Ohio State University, [3]Shedd Aquarium, [4]Ontario Ministry of Natural Resources. **Water-based recreation in degraded urban blue spaces: A social-ecological-technological systems perspective.**

Rivers act as arteries that facilitate the bi-directional flow of ecosystem services between recreationists and urban centers worldwide. The use of rivers as urban blue spaces can improve human well-being and build more resilient communities; however, urban water-based recreation depends on infrastructure and is thus subject to the legacies of industrial pollution and inequitable development. We therefore applied the Social-Ecological-Technological Systems (SETS) framework to understand the range of factors that shaped access to a degraded waterway in Chicago, IL, USA. Specifically, we conducted a mixed-mode survey that included a participatory mapping exercise to generate spatially explicit information about water-based recreation. Results from an average nearest neighbor analysis demonstrated that recreational use was clustered along the waterway and differed by activity type. Higher activity diversity was observed upstream and dominated by non-consumptive uses (e.g., kayaking), whereas our downstream clusters showed lower activity diversity

and greater consumptive use (e.g., angling). Through Maximum Entropy modeling, we integrated participatory mapping data with ecological (e.g., water quality, fish species richness, tree cover) and technological landscape conditions (e.g., park amenities, public transportation, heavy industry) to build a more comprehensive understanding of access to urban blue spaces among water-based recreationists. These findings advance knowledge of how a SETS framework can be applied to enhance research with low income and racially diverse communities and provide decision support for sustaining safe and equitable recreational opportunities on urban rivers.

Kelsey F. Johnson[1], Reyd Dupuis-Smith[2], Lauren Burke[1], Paloma C. Carvalho[1], Jean-Pierre Desforges[3], Steven H. Ferguson[1], Kevin J. Hedges[1], Tracey N. Loewen[1], Cortney A. Watt[1] and David J. Yurkowski[1], [1]Fisheries and Oceans Canada, [2]Carleton University, [3]University of Winnipeg.
Trophic structure and isotopic niche dynamics of Tasiujaq (Eclipse Sound, Nunavut, Canada) marine food web.

Rapid warming in the Arctic is causing reduction in sea ice extent, resulting in shifts in primary production which can have cascading bottom-up trophic influences on marine food web structure and function. Understanding trophic interactions and the structure of food webs across the Canadian Arctic remains fragmented, yet is essential to inform conservation efforts and provide a comparative reference to assess future food web shifts. We used stable isotope analysis ($\delta^{13}C$ and $\delta^{15}N$) to determine the isotopic niche dynamics,and trophic positions among invertebrates, fishes, and marine mammals sampled from 2015-2019 to quantify the trophic interactions and trophic structure of the Eclipse Sound food web. Mean trophic positions ranged from 2.0 for copepods to 4.4 for sea tadpoles, with some individuals, such as narwhal and ringed seals, occupying a trophic position of 5.3 indicating a marine food web that spans at least 4 trophic levels. Isotopic niche size was largest in the invertebrate taxonomic group (7.87‰^{2}), followed by fishes (3.26‰^{2}) and marine mammals (2.03‰^{2}). The core isotopic niche overlap between taxonomic groups ranged from no overlap between invertebrates and fishes, or between marine mammals and invertebrates and 44% overlap between fishes and marine mammals. Overall, we present the marine food web structure of over 50 species of invertebrates, fish, and mammals during the open water period and provide a reference point for future assessments of food web dynamics and conservation goals.

Lydia Johnson[1], **Heléna Mauti**[1], Barbara Moktthewenkwe Wall[1, 2] and Mary-Claire Buell[1, 3], [1]Indigenous Great Lakes Network, [2]Chanie Wenjack School for Indigenous Studies, Trent University, [3]School of Environment and Department of Forensic Science, Trent University. **The Indigenous Great Lakes Network: From Vision to Action.**

In 2021, Great Lakes Observing System (GLOS) co-chairs and researchers from Trent University's Indigenous Environmental Institute recognized that the voices and knowledges of Indigenous peoples, specifically Native American Tribes in the US and First Nations and Métis in Canada, were a critical component missing from Great Lakes research and monitoring spaces. Following a review of the current landscape of work and initiatives that addressed the lack of engagement of Indigenous people and communities, the team began to gauge interest and desire for the creation of a collective initiative that would address this gap. For two years, work was done in the form of webinars and in-person gatherings that brought Indigenous peoples from the Great Lakes together to hear their interests and priorities. These meetings created a network that offers community and connection, training and capacity building, funding support for research and monitoring, and intergenerational knowledge transfer opportunities. Today, the Indigenous Great Lakes Network (IGLN) is creating action from years of visioning as it establishes an anti-colonial space for relational, reciprocal Indigenous-led science. Our session will share our story and the

IGLN's current initiatives to bring action to this network, highlighting the importance of a space by- and for- Indigenous communities, Nations, Tribes and organizations around the Great Lakes to enact their responsibilities to the water by helping support their environmental research and monitoring priorities and needs.

Ollie Johnson, Kerri Finlay and Ryan Rimas, University of Regina. **Diffusive and ebullitive fluxes across a salinity gradient of lakes in the northern great plains.**

Salinity has a strong inhibitory effect on methane production and despite the prevalence of saline lakes across the Great Plains, they are poorly understood when it comes to their role in greenhouse gas emissions. Ebullition is often the dominant pathway for methane release in lakes, contributing up to 80% of atmospheric methane fluxes from inland waters. Scaling ebullitive methane releases across the landscape, however, is challenging as ebullition fluctuates widely over spatial and temporal scales and is severely under reported and under measured. For this study we measured diffusive and ebullitive fluxes from eight lakes spanning a salinity gradient of 0.17-95 ppt. Measurements of daily concentrations and diffusive and ebullitive flux rates allowed us to assess how methane dynamics varied based on the presence of salt. We found that lakes with a salinity >1ppt exhibited minimal ebullitive gas evolution - often <1mL over a 24hr period - suggesting that salinity poses a critical constraint on methanogenesis. This was supported by the observation that freshwater lakes (salinity < 1ppt) had daily ebullitive volumes that were often greater than 60mL. By refining our understanding of methane dynamics to site specific saline systems such as these, we are expanding the foundational knowledge needed to scale emissions estimates across the prairie landscape.

Peter Johnson, Great Lakes St. Lawrence Governors & Premiers. **The Importance of Quantifying Groundwater Resources for Sound Regional Policy.**

As noted in the Great Lakes St. Lawrence River Regional Body and Compact Council's Science Strategy, "A continually improved understanding of groundwater flow to the Great Lakes and tributaries, and groundwater - surface water interactions is needed to better determine what type of water management is needed," which is why Quantifying groundwater resources was identified as a research priority for 2026. This presentation will focus on setting the stage on how the States and Provinces cooperatively manage the waters of the Great Lakes St. Lawrence River System, and how the systems and processes contained in the Compact and Agreement will incorporate science and research into policy responses and collective actions.

Tom Johnston[1], Adam Delage[2], Gabrielle Faucher[2], Ashley Ehrman[2], Pascale-Laure Savage[2], Alexandra Sumner[2], Pete Cott[3], Gretchen Lescord[4] and John Gunn[2], [1]Ontario Ministry of Natural Resources, [2]Laurentian University, [3]Government of the Northwest Territories, [4]University of Florida. **Trophic diversification in north temperate freshwater food webs: habitat generalists vs habitat specialists.**

Fish assemblages of north temperate lakes are composed of species that vary widely in relative abundances and ecologies. Species that are found in a diversity of waterbodies across the landscape are often classified as generalists, and their widespread distributions are attributed, in part, to flexibility in their habitat requirements and trophic ecologies. We hypothesized that the purported trophic flexibility of generalist species at the landscape scale (among northern Ontario lakes) would also be evident at the ecosystem scale (among individuals within lakes). Trophic niche positions and sizes of co-habiting generalist and specialist species were compared using stable isotope niche metrics. Benthivores tended to have larger trophic niches (greater among-individual variation in

food web positions) than piscivores, and niche sizes tended to increase with indices of ecosystem size in both functional groups. Within each group, generalist species tended to occupy food web positions that were more reliant on benthic primary production and at lower trophic elevation. In addition, as predicted, generalist species had relatively larger trophic niches than specialist species. The propensity for trophic diversification seen in generalist species at the ecosystem scale may contribute to their success in occupying a broad range of aquatic habitats at the landscape scale and provide greater resilience in the face of environmental change.

Jason Jones, Taking it Global. **Nibi Wenjiimagak (Where Water Comes From) - Listening to Nibi through Anishinaabemowin.**

This presentation explores how Anishinaabemowin (Ojibwe language) carries knowledge about nibi (water) through its structure and meaning. Rather than approaching water as a resource, the language expresses water as a living relation, with responsibilities embedded in how it is spoken and understood. Drawing on recordings of fluent speakers whose language use remains grounded in pre-residential school knowledge systems, this work highlights how meaning is conveyed through verbs, animacy, and relational frameworks. By engaging directly with the language, the presentation invites audiences to consider how these ways of knowing offer a distinct starting point for understanding water—one rooted in relationship, accountability, and continuity. Breakdowns of several Ojibwe words will be used to explore meanings, including place names and reflections on their origins. This work is offered in support of ongoing efforts by Elders, knowledge keepers, and language helpers to revitalize and carry forward Anishinaabemowin.

Nicole Jung[1], Lais Chaves[2], Neil Fowler[2], Bridget Irving[2], Evan Plett[2], Shae Harding[2], Orion Giles[2], TJ Child[2], Dion Joseph[2], Jennifer Claxton[2], Floyd Pelkey[2], Cason Truss[2], Ernie Meyer[2] and Andrea Reid[1], [1]University of British Columbia, [2]Tsawout First Nation. **Crabs and Community: Relational Visions of Á,ĆEX (Dungeness Crab, Metacarcinus magister) Stewardship in Tsawout First Nation's QEN,T Indigenous Protected and Conserved Area.**

Although Dungeness crab (Metacarcinus magister) are central to one of North America's most lucrative single-species fisheries, formal fisheries-independent stock assessments of the species are lacking and limited to select regions. In the absence of such assessments, Dungeness crab landings have been widely regarded as a reliable index of abundance. However, with predicted shifts in environmental conditions due to climate change and recent increases in fishing effort, this index may prove insufficient. In partnership with Tsawout First Nation, this work focuses on re-envisioning Dungeness crab or Á,ĆEX stewardship in Tsawout's QEN,T Indigenous Protected and Conserved Area - reflecting, not only on the need to rethink the scientific approaches that inform crab management, but also on the very foundations of what motivates care for our other-than-human kin. Here, we participate in the resurgence of Tsawout Laws, teachings, and worldviews, working alongside Tsawout knowledge holders and youth to develop culturally-grounded Á,ĆEX stewardship protocols. This presentation will focus on how we weave together art, science, storytelling, intergenerational learning, and community-held wisdoms to support Tsawout, as signatories of the Douglas Treaty, in ending 170 years of exclusion from stewarding their traditional territories. This work ultimately models a way forward for those looking to engage in resilient, socially- and ecologically- just fisheries management.

K

Lulu Tunu Kaaya[1, 2], Bahati Mayoma[3], Blandina Lugendo[3] and Jerry Mang'ena[3], [1]ACARE, [2]University of Dodoma, [3]University of Dar es Salaam. **Catchment-Derived Contributions of Microplastics to the Tanzanian Shores of Lake Victoria.**

Samples were collected from selected rivers and lake shores along the Tanzanian portion of Lake Victoria to assess the distribution of microplastics in surface waters and sediments. Surface water samples were collected using a stationary neuston net, while river sediments were obtained using a 10 cm diameter ring sampler. Sediments at river mouths were collected using a grab sampler and homogenised before analysis. The highest mean microplastic concentration in river waters was recorded at Mkuyuni (169.8 particles m^{-3}), while the lowest occurred at Furahisha (9.0 particles m^{-3}). In river sediments, the highest mean concentration was observed at Furahisha (378.3 particles m^{-3}) and the lowest at Mkuyuni (64.1 particles m^{-3}). At river mouths, surface waters showed the highest mean concentration at Mkuyuni (385,061.9 particles km^{-2}) and the lowest at Mara (32,264.4 particles km^{-2}). Sediments from river mouths similarly recorded the highest concentration at Mkuyuni (752.8 MPs kg^{-1}) and the lowest at Nyashishi (27.2 MPs kg^{-1}). Microplastic concentrations along the lake shores were highest near the Mirongo River (2,982,272.2 particles km^{-2}) and lowest near the Nyashishi River (25,761.3 particles km^{-2}). Diverse macroplastics were also recorded, dominated by sulphate bags, plastic bottles, plastic bags, and bottle caps, with additional items including sanitary pads, condoms, straws, toothpaste containers, and packaging materials. These results demonstrate the significant contribution of catchment-based human activities to microplastic pollution and potential ecological risks in Lake Victoria.

Verena Kalter[1], Shanan Brun-Dabbagh[1], Bo Liu[2], Britton Ranson-Olson[2], Ashley Moerke[2] and Uta Passow[1], [1]Memorial University of Newfoundland, [2]Lake Superior State University. **Oil Biodegradation in the Great Lakes - First Insights from an In-Situ Study.**

The Great Lakes, the world's largest group of freshwater lakes, are used extensively for energy generation, drinking water provision, recreation, transport of goods, as well as transport of oil via underwater pipelines. Despite the potential for oil spills into the Lakes, the fate of oil spilled into freshwater is still vastly understudied. Some oil spill response options used in the ocean are not appropriate for freshwater, and natural attenuation of the oil may frequently be the best strategy. Since biodegradation by microbes can be critical for removing oil from the water, we conducted an in-situ experiment to assess the potential of native microbes to biodegrade two types of oil (crude oil and marine diesel), capturing three different seasons and two locations. Preliminary results show a clear indication of biodegradation from the perspective of alkylated polycyclic aromatic hydrocarbon homologs, consistent across both oils. Alkane degradation patterns resembled those previously observed in a laboratory-scale biodegradation experiment, but a more detailed interpretation is outstanding. Microbial community composition, assessed via 16S rRNA sequencing, responded noticeably to the oil, with the genus Aquabacterium exhibiting a remarkable increase in abundance in both oil treatments but not the control. The results of this study have provided insights into the nature and extent of biodegradation in this ecologically and economically crucial freshwater system.

Alexander Karatayev[1], Lyubov Burlakova[1], James Watkins[2], Vadim Karatayev[3], Nikolai Barulin[1] and Lars Rudstam[2], [1]Great Lakes Center, SUNY Buffalo State, [2]Cornell Biological Field Station at

Shackelton Point, Cornell University, [3]Department of Biology, University on Maryland, College Park. **Could invasive dreissenids drive Diporeia to extinction? A synthesis.**

The glacial relict amphipod Diporeia is a keystone species in North American deep freshwater systems, playing a critical role in benthic-pelagic coupling and serving as an essential food resource for many commercially important fishes. However, Diporeia populations have experienced severe declines or local extirpations due to multiple stressors, including climate warming, eutrophication, pollution, and biological invasions. Among these, invasive dreissenid mussels are strongly associated with widespread Diporeia declines, although the magnitude of impact varies by Dreissena species and lake type. Zebra mussels generally exert little influence on Diporeia, whereas quagga mussels have caused sharp reductions—and in some cases complete losses—of Diporeia populations in the four lower Great Lakes, with cascading effects on fish communities. In smaller inland lakes, quagga mussels also negatively affect Diporeia, but declines are less severe. In these systems, Diporeia can shift to consuming terrestrially derived detritus, allowing persistence but leading to markedly reduced lipid content compared to individuals feeding on diatoms. This reduces their nutritional value for fish. Overall, the severity of quagga mussel impacts on Diporeia appears to depend strongly on lake size and the dominant source of primary production, with the greatest effects occurring in large lakes where internal production drives ecosystem dynamics, such as the Laurentian Great Lakes.

Bryan Karney[1], Chris Zuccaro[1] and Fabian Papa[2], [1]University of Toronto, [2]HydraTek and Associates. **A new risk framing of Rainfall-Derived Inflow and Infiltration in Sanitary Sewers.**

Sewer systems often present as "black boxes" that are notable to the public and to nature generally primarily when they malfunction and overflow into stream river networks that drain to - and ultimately affect the quality of - the Laurentian Great Lakes. This talk sheds light on the vulnerability to hydrologic fluxes as Rainfall-Derived Inflow and Infiltration (RDII), which remains a challenging aspect of sewer design, particularly in regions where infrastructure age, local geotechnical conditions, and system configuration conspire. We will present a statistical, data-driven methodology for characterizing RDII magnitudes using extensive monitoring data from 250 sewersheds in the York Region of Ontario, and provide a more robust and risk-aware foundation for planning infrastructure. Results show that the existing deterministic allowance may substantially underestimate RDII as observed, particularly in small and medium sewersheds. A distinct non-linear scaling relationship was observed between sewershed area and RDII magnitude and we propose a power-law RDII design curve calibrated to observed monitoring data. This power-law approach better captures the disproportionately high RDII response of smaller systems Although technically involved, our goal is to unpack the RDII challenge, its prevalence, and overall to explain these matters in a way that is practical and comprehensible for the science community, planners, and governance.

Donna Kashian[1] and Anneke Smit[2], [1]Wayne State University, [2]University of Windsor. **Boundary-Spanning Collaboration for Sustainability in the Great Lakes Region.**

The Great Lakes basin is a complex, shared socio-ecological system where environmental challenges, including climate change, water quality degradation, invasive species, and urbanization, transcend political boundaries and disciplinary domains. Addressing these interconnected issues requires collaborative approaches that intentionally bridge geographic borders, academic disciplines, and sectors, while integrating diverse forms of knowledge and expertise. Here we examine how interdisciplinary and cross-border collaboration enhances sustainability research and practice in the Great Lakes region, while identifying the benefits and challenges of working in teams that bridge

disciplinary, institutional, and cultural silos. This work draws on two complementary models of collaboration: trans-national, community-engaged programming through the Detroit-Windsor United Nations Regional Centre of Expertise on Education for Sustainable Development (UN-RCE), and interdisciplinary research initiatives supported through federal grants focused on Great Lakes environmental challenges. Using a qualitative synthesis of program structures, partnership models, and team-based research experiences, this work evaluates how boundary-spanning frameworks facilitate integration across natural and social sciences, policy, education, and community-based knowledge. These efforts operate across multiple spatial scales, linking local place-based initiatives with basin-wide and cross-border perspectives.

Avneet Kaur and Gail Krantzberg, McMaster University. **Centering Indigenous Perspectives on Climate Migration to the Great Lakes: Insights from Receiving Communities.**

This study examines how Indigenous Knowledge and Traditional Ecological Knowledge (TEK) contribute to understanding climate-induced migration and adaptation in the Great Lakes region. Conducted through the Climate Adaptation and Resilience Strategies (CLARS) project in collaboration with Global Center for Climate Change and Transboundary Waters (GCTW), the research explores how the Great Lakes are emerging as destination for populations migrating due to climate change and how Indigenous communities perceive and experience increased migration pressure near and on their territories, focusing on water governance, land stewardship, and community resilience. Through conversations with members of Six Nations of the Grand River, Menominee Nation, and the Red Lake Nation, this part of project explores Indigenous perspectives on climate migration as it affects housing, employment, water and wastewater infrastructure in the Great Lakes basin. This centers Indigenous communities as decision-makers for migration to their territories. This research addresses critical gaps in climate migration studies by prioritizing Indigenous voices in receiving community research moving towards collaborative approaches that honours Indigenous leadership. The findings will contribute to ongoing efforts to co-produce knowledge and strengthen Indigenous-led approaches to climate change preparedness in the Great Lakes.

Kat Kavanagh, Water Rangers. **Data to Action: When Community Evidence Is Designed to Matter.**

Community-based monitoring should inform watershed planning, yet many programs stop at data collection, leaving unresolved questions about how observations translate into shared understanding, reporting, and response. This presentation explores an emerging, systems-based approach to community monitoring that intentionally links tool development, data infrastructure, and interpretation to support weight-of-evidence assessment within watershed decision-making contexts. Drawing on work with Water Rangers work in the Lake Erie region and in Saskatchewan and concepts from the Catchment Systems Thinking Cooperative (CaSTCo) from the UK, we examine how community-accessible tools are co-developed with volunteers and scientists, tested in real field conditions, and connected to evolving data workflows. The approach is designed to support weight-of-evidence interpretation by combining multiple data sources and knowledge types. The work surfaces a remaining challenge: building clear, trusted mechanisms for communities to report issues and see data meaningfully feed into watershed planning and response. This presentation invites researchers, data managers, and practitioners to consider how integrated system design can better empower communities to generate, interpret, and share data that genuinely informs freshwater management and action.

Robert Kayanda[1], Chrisphine Nyamweya[2], Richard Mangeni[3], Benedicto Kashindye[4] and Anthony Taabu-Munyaho[5], [1]Lake Victoria Fisheries Organization, [2]Kenya Marine and Fisheries Research Institute, [3]National Fisheries Resource Research Institute, [4]Tanzania Fisheries Research Institute, [5]Freelance Consultant in Blue Economy. **Lake Victoria Fish Stocks Under Pressure: Linking Science with Management.**

Lake Victoria supports one of the world's largest inland fisheries with an annual fish catch of 1.5 million tonnes in 2021, underpins food security and livelihoods across the East Africa. Currently, its fish stocks are under escalating pressure from multiple drivers which include increased fishing effort, increased use of illegal gears, habitat degradation and inadequate governance. These drivers have contributed to declining catches and biomass of major commercial species, Nile perch (Lates niloticus), Nile tilapia (Oreochromis niloticus), and cyprinid (Rastrineobola argentea) which has resulted in the closure of fish factories, increased conflicts, loss of employment and income. The present paper synthesizes the current scientific understanding of fish stock dynamics, biological information, catches, effort data and proposes an integrated ecosystem and science-based management framework that aligns assessment methods, compliance enforcement, and co-management objectives. We provide evidence from fishery-independent hydroacoustics surveys, fishery-dependent catch and effort data, and limnological data to characterize stock status, catch-effort, and spatial distribution of these major fish species. We then translate these findings into actionable management options which includes reference points, strengthened monitoring, control, and surveillance to reduce illegalities, enhance community involvement through co-management arrangement and ecosystem-based measures. Rebuilding and sustaining Lake Victoria fisheries requires coordinated investment in routine data collection, and strong community involvement. A linked science management approach can stabilize biomass and yields, improve resilience, and safeguard the fisheries' role in regional economies, nutrition and livelihoods

Brooklynne Keber, Courtney Shuert and Stephen Petersen, Assiniboine Park Conservancy. **A multi-prong approach to surveying an elusive aquatic species-at-risk, the Manitoba Mudpuppy.**

Rare and At-Risk species are often difficult to detect and effectively survey, which has led to an increase in the use of alternative techniques for survey and detection efforts, including environmental DNA (eDNA). Minimally invasive eDNA surveying techniques can increase the likelihood of detection of species compared to traditional capture-based sampling. However, population-specific tissue vouchers and reference sequences are needed to develop and validate robust eDNA assays, which ultimately requires a sufficient understanding of the distribution of the targeted species. The Mudpuppy (Necturus maculosus) is a fully aquatic salamander in Canada, which was split into two designatable units in 2023: the Manitoba population (Threatened), and the Great Lakes/St. Lawrence population (Special Concern). We followed a multi-prong approach to understand the distribution of the elusive Manitoba Mudpuppy. Previously available information for the species suggests the population is largely restricted to southeastern Lake Winnipeg and its southern tributaries. Using social media and online platforms, we uncovered nearly four times more observations of Manitoba Mudpuppy than were previously recorded. Using these data, we identified key locations for eDNA sampling and trapping. From collected tissue vouchers, we sequenced key mitochondrial genes to inform eDNA assay design and validation, and present preliminary eDNA-based occurrence data to date. By improving both our ecological understanding and our detection tools, this project directly supports more effective long-term monitoring and conservation of this at-risk Manitoba population.

Avery Keen[1,2], Amy Pitzel[1], Hassan Nazari[2], Lara Puetz[2], Margaret Docker[2] and Sara Good[1,2], [1]University of Winnipeg, [2]University of Manitoba. **Genetic Markers of Sex in Sea Lamprey to Facilitate Research Aimed at Reproductive Control.**

Sea lamprey is an invasive pest that has severely impacted the Laurentian Great Lakes ecosystem. Current control methods have reduced its abundance by ~90%, but alternative or supplemental strategies—including disruption of reproduction in a species-specific manner—are being explored. Identification of sex-specific genetic markers would facilitate this research. At present, identification of sex in larvae and juveniles requires histological analysis, which is lethal, not easily scalable, and difficult in presumptive male larvae since testicular differentiation does not occur until metamorphosis. In ongoing work, we identified hundreds of genes showing sex-biased expression in the gonads of larvae >90 mm, including presumptive males. Using random forest approaches, we then identified top loci exhibiting sex-biased expression across developmental stages. Iteratively, we then optimized expression of 3-4 male- and female-biased genes using qRT-PCR and assessed the specificity and sensitivity of these loci to identify males vs females using total RNA-sequence information as the gold standard and histology as a secondary benchmark. Although still lethal, these findings provide a scalable, rapid method to identify sex in larval and juvenile sea lamprey and open the door to finding non-lethal approaches to identifying sex. For instance, blood markers—such as genes for protein and steroid hormones associated with the hypothalamic-pituitary-gonadal axis—or qRT-PCR from a cloacal swab could potentially be employed. Early molecular markers would be valuable for research in support of genetic control strategies.

Rachael Keighan[1], Tim Johnson[2] and Kevin McCann[1], [1]University of Guelph, [2]Ontario Ministry of Natural Resources. **Anthropogenic Food Web Hot Spots.**

The role space plays in food web ecology has been underappreciated even though species distributions and interactions depend on the spatial arrangement of environmental conditions within an ecosystem. At the same time, humans are actively and often unintentionally modifying space in ways that alter habitat, productivity and underlying abiotic conditions (e.g., temperature) - attributes that promise to alter how species utilize space. Here, using case examples, I discuss human modification that may act as 'attractors' for mobile species, with the potential to form 'hot spots' of resource density and intensified multi-trophic interactions. Here, I define 'anthropogenic multi-trophic hot spots' as areas where consumer-resource interactions are amplified due to human activities that increase local resource availability (i.e. density and/or accessibility). Using case studies from thermal effluent and cage cultures, I argue that unlike most of their natural counterparts, these anthropogenic 'hot spots' have the potential to subsidize the affected environment perpetually, driving strong top-down pressures with the potential for profound and lasting impacts on community composition, food web stability and critical ecosystem functions (e.g., fisheries production). I end by drawing broadly from the literature to begin to generally characterize the potential for human-generated trophic hotspots.

Susanna Keilig[1], Pascal Wilkins[2], Jason Robinson[2] and Corey Krabbenhoft[1], [1]The State University of New York at Buffalo, [2]New York State Department of Environmental Conservation. **Fine-scale acoustic telemetry uncovers lake trout spawning behaviors hidden under the surface of Lake Erie.**

Lake trout (Salvelinus namaycush) were extirpated from Lake Erie by 1965 due to overfishing, habitat degradation, and invasive species introductions. Despite extensive reintroduction efforts and confirmation of wild reproduction via fry trapping, a self-sustaining population has not been reestablished. Moreover, the locations, timing, and extent to which lake

trout may be spawning in Lake Erie remain unknown. This project seeks to assess three potential spawning sites, chosen due to their proximity to fall nearshore migrations. Fine-scale acoustic telemetry arrays were placed at these sites and hidden Markov models were developed to define movement behaviors, where those behaviors occur, and what abiotic drivers influence them. The models, in conjunction with fry trap surveys, revealed behaviors likely associated with lake trout spawning. Lake trout spawning movements were most likely to occur during low light, low wind speed, and low temperature conditions. Additionally, time spent in each behavior was driven by lake trout sex and total length, with large males displaying the most spawning behavior. We will continue to evaluate these areas via fry trap and habitat surveys to further describe the spatiotemporal patterns of lake trout spawning. Ultimately, this work will clarify spawning behavior of lake trout, the extent at which it is occurring in Lake Erie, and whether this crucial life stage is preventing population reestablishment.

David Keith, Freya Keyser and Tricia Pearo Drew, Fisheries and Oceans Canada. **Productivity changes and trends driving the decline of scallop biomass on Georges Bank, Canada.**

In the 1990s, Canadian fisheries in the Northwest Atlantic shifted focus from primarily targeting groundfish to focusing on invertebrates, such as American Lobster (Homarus americanus), Snow Crab (Chionoecetes opilio), and Sea Scallop (Placopecten magellanicus). This shift was supported by an increase in invertebrate productivity. In the case of the Canadian offshore scallop fishery, landings increased from ≈4,600 $t \cdot yr^{-1}$ in the 1980s to ≈7,000 $t \cdot yr^{-1}$ from 2000-2009. Georges Bank 'a' (GBa) is the largest Sea Scallop stock in Canada, with removals from 2000-2009 averaging ≈5,010 $t \cdot yr^{-1}$. The GBa stock is assessed by deriving estimates of growth, recruitment, natural mortality, and fishing mortality from annual scallop surveys and fishery data. Recent stock assessments for GBa identified rapid changes in stock productivity, resulting in a biomass decline in excess of 75% from 2023-2025. Here, we investigate how each component of productivity (growth, recruitment, and natural mortality) and fishing mortality have changed over the past several decades and explore how recent changes in productivity have contributed to the rapid decline in biomass. While the biomass has fluctuated over time, recruitment has declined since a large year-class in 2014, and in recent years, growth has been highly variable, and natural mortality has increased significantly. While knowledge of these changes supports reactive fishery management decisions each year, moving to a proactive management framework would require reliable predictions for each of these productivity processes in future years.

James Kessler[1], Samuel M. Kelly[2] and Eric J. Anderson[3], [1]NOAA-Great Lakes Environmental Research Lab, [2]University of Minnesota Duluth, [3]Colorado School of Mines. **Surface Currents from Space: Deriving geostrophic flow from high-resolution altimetry.**

The general circulation in the Great Lakes has been a topic of interest for over a century and has motivated the implementation of complex hydrodynamic models as well as routine observations of currents. Surface currents play a key role in distributing kinetic and thermal energy in the Lakes in addition to impacting commercial navigation and search & rescue. However, the surface currents represented by models are largely unvalidated due to the sparse nature of point-based observations. Geostrophic flow-a large component of surface currents, can be derived from accurate sea-surface height measurements which are now possible via the NASA Surface Water and Ocean Topography (SWOT) mission. This work aims to leverage the SWOT data to better understand Great Lakes circulation and provide a more comprehensive point of comparison for hydrodynamic model performance. Preliminary results are presented which compare SWOT-derived currents to both those observed and modeled.

Freya Keyser[1, 2], Suzanne Budge[1], Peter Tyedmers[1] and David Keith[2], [1]Dalhousie University, [2]Fisheries and Oceans Canada. **Seasonal variability in scallop meat yield and composition relative to fishery sustainability metrics.**

While harvesting seafood offers many nutritional and socio-economic benefits, most commercial fisheries in Canada emit greenhouse gases and affect organisms and ecosystems. The climate impacts of individual fisheries are not yet well understood, but for a sedentary species like the sea scallop (Placopecten magellanicus), fished year-round and managed using a total allowable catch, understanding long-term seasonal trends in biomass could reduce impacts by reducing fishing effort. Seasonal patterns in scallop meat yield and nutritional yield will be identified using: (1) year-round measurements of scallop adductor muscle (meat) and shell height collected from 1982-2005; (2) year-round meat weights from the Canadian commercial fishery on Georges Bank; and (3) measurements of meat mass and nutrient density collected from 2024 to 2025. Seasonal patterns, fishery fuel consumption data, and an existing population dynamics model will be used to evaluate the impacts of the timing of fishing on meat and nutrient yields, stock status, habitat degradation, and greenhouse gas emissions. Preliminary results suggest that scallop meat mass declines by approximately 25% annually from June to November, while moisture content increases by 10% during the same period. Proximate composition (protein, lipid, ash, and carbohydrate) and fuel use intensity (litres of fuel burned per kilogram of meat landed) also vary seasonally. Considering nutritional benefits and environmental impacts of fisheries could inform ecosystem-based management approaches, reduce greenhouse gas emissions, and help fisheries adapt to a changing climate.

Milena Esser[1], Raina Hubley[2], Shreya Sehrawat[1], Denina Simmons[2] and **Karen Kidd**[1], [1]McMaster University, [2]Ontario Tech University. **Fathead minnows have male-biased gut microbiome responses to the antimicrobial benzalkonium chloride.**

Quaternary ammonium compounds (QACs) are widely used antimicrobials in household and industrial products, and their release into aquatic environments raises concerns about impacts on microbial communities, including the gut microbiomes of aquatic organisms. To assess these effects, we exposed male and female fathead minnows (Pimephales promelas) to environmentally relevant concentrations (0.5-15 μg/L) of benzalkonium chloride (BAC), a commonly used QAC, for 28 days under flow-through conditions. Gut tissues were dissected post-exposure, DNA extracted, and microbial communities profiled by 16S rRNA gene amplicon sequencing (V3-V4 region). Control fish showed no significant differences in baseline gut microbiomes. In BAC-exposed males, PERMANOVA revealed a significant shift in community composition. Enterococcus (including E. gilvus) significantly declined with BAC exposure, while Peptostreptococcaceae increased. Enterococcus are facultative anaerobes that produce lactic acid and support gut homeostasis, whereas Peptostreptococcaceae are obligate anaerobes that ferment peptides and amino acids to generate short-chain fatty acids (SCFAs). This shift may alter fermentation pathways and SCFA profiles, with potential consequences for gut function. In contrast, female gut microbiomes showed no significant changes, suggesting greater resilience to BAC-induced perturbation, potentially mediated by sex-specific physiological mechanisms. Overall, these findings demonstrate that BAC exposure can induce sex-specific gut microbiome dysbiosis, with males particularly susceptible, which may predispose exposed fish to impaired gut function and negative health outcomes, highlighting the ecological and physiological risks of BAC contamination in aquatic environments.

Katarina Kieffer[1], Angélica Vázquez-Ortega[1], Samira Rifat Prova[2], Shikshya Gautam[1] and Marios Drosos[3], [1]Bowling Green State University, [2]West Virgina University, [3]University of Basilicata.

Comparing Soil Organic Matter in Dredged Material and Farm Soil with Humeomics and PARAFAC.

The Western Lake Erie Basin (WLEB) is dominated by intensive agriculture, negatively affecting soil health, including loss of nutrients and degradation of soil structure. Due to nutrient pollution and sediment loss, the WLEB has faced increased harmful algal blooms and downstream sediment accumulation. To keep shipping channels clear, Toledo Harbor is dredged annually, and the removed dredged material (DM) must be stored. The storage capacity is limited, and finding beneficial uses for DM is a high priority. Previous research on Toledo Harbor DM found agronomically ideal levels of Ca, organic carbon (OC), and cation exchange capacity, as well as increased yield and root development in crops grown in DM as compared to farm soil (FS). Differences in the quality of soil organic matter (SOM) could offer an explanatory mechanism. For this study, Toledo Harbor DM and a Northwest Ohio FS were qualitatively and quantitatively characterized and compared after progressive organic extraction with the humeomics method. All fractions were characterized for relevant nutrients (OC, TN, TP, Ca), and FTIR was used to assess functional groups. EEM-PARAFAC was used to calculate the humification index, fluorescence index, model components, and compare relative intensity of SOM composition between FS and DM fractions. Significant differences were found between DM and FS in terms of where nutrients were concentrated in the SOM structure, as well as in the composition of SOM between the FS and DM.

Rafaela S. Y. Kimura[1], Gabriel M. Silva[1], Bruno E. Soares[2] and Marcos G. Nogueira[1], [1]Universidade Estadual Paulista, [2]University of Regina. **Limnological compartmentalization and interannual trends in Small Hydropower Plants reservoirs, southeast Brazil.**

Large Hydropower Plants (HPPs) are widely known for causing extensive physicochemical alterations in fluvial ecosystems. In contrast, Small Hydropower Plants (SHPs) cascades are considered as a lower-impact alternative, but there is still no consensus on the actual extent of their environmental impacts. We evaluated 12 years (2013-2024) of temperature and dissolved oxygen data from two SHP reservoirs (Palmeiras and Retiro) in the Sapucaí-Mirim River (southeast Brazil). Samplings were carried out every year during four seasonal campaigns across four reservoir compartments (lotic, intermediate, lentic, and downstream). Temperature and dissolved oxygen exhibited spatial, seasonal, and interannual patterns in both reservoirs (GLM; $p < 0{,}001$). Lentic and intermediate compartments presented warmer conditions and lower dissolved oxygen compared to lotic and downstream areas, reflecting reduced flow, limited vertical mixing, and longer water residence times associated with damming. In addition to seasonal variability, gradual interannual changes were observed over the 12-year period, indicating long-term modifications in reservoir dynamics. Finally, vertical analyses revealed persistent temperature stratification and reduced oxygen availability at depth across most seasons and years (Wilcoxon test; $p < 0{,}001$). Our results demonstrate that SHPs induce considerable limnological alterations in the affected river stretches, leading to longitudinal compartmentalization and vertical structuration. These findings reinforce the need for proper impact evaluation, continuous monitoring and long-term ecosystem-based assessments of such systems, despite the relatively small size and short water residence time, when compared to HPPs.

Ella Kinart[1], Nathalie Kuria[1], Steven Murphy[2], David Ruffo[2], Jean-Francois Koprivnjak[1], Kaitlyn Fleming[1] and Mary-Claire Buell[1], [1]Trent University, [2]Michipicoten First Nation. **Evaluating per- and polyfluoroalkyl substances in traditional food sources throughout the Michipicoten First Nation.**

Per- and polyfluoroalkyl substances (PFAS) are synthetic chemicals widely used in industrial and consumer products for their desirable properties, including their stability, inertness, heat resistance, and oil, water, and stain repellence. However, they are increasingly recognized as persistent environmental contaminants with adverse impacts on human and ecological health. Northern Indigenous communities in Canada have been identified as disproportionately at risk, with elevated PFAS levels reported in blood samples, though the contribution of traditional food sources to this exposure remains poorly understood. This research investigated PFAS contamination in various traditional food sources, including fish and game, across several lakes and harvesting sites within the Michipicoten First Nation (MFN) Territory, a region with limited data. Sampling was conducted collaboratively with MFN harvesters, and laboratory analyses were conducted, during which 40 PFAS were extracted and quantified in each sample. Species-specific accumulation of PFAS was assessed, and exposure risks were determined based on community consumption practices, as ascertained through surveys. By establishing baseline data on PFAS in traditional foods, the project addresses critical knowledge gaps in environmental toxicology and supports long-term monitoring and risk assessment. Ultimately, the findings will inform community consumption practices, contribute to understanding PFAS fate in the environment, and advance environmental justice by centring Indigenous food sovereignty in contaminant research.

Mikayla Kindler[1], Jorden McKenna[2], Jason Fischer[2], Justin Chiotti[2], Richard Kraus[3], Song Qian[1], Matthew R. Acre[3], Eric Weimer[4], John Navarro[4] and William D. Hintz[1], [1]University of Toledo, [2]United States Fish and Wildlife Service, [3]United States Geological Survey, [4]Ohio Department of Natural Resources. **Will They Stay or Will They Go? Drivers of River Retention and Movement in Reintroduced Lake Sturgeon.**

Lake sturgeon are considered critically imperiled in Lake Erie and its tributaries due to overexploitation, habitat degradation, and water pollution. In 2018, a multi-agency effort was initiated to reintroduce lake sturgeon into tributaries across Lake Erie, with the Maumee River as the first candidate river. To better understand survival, habitat use, and movement of lake sturgeon stocked in the Maumee River, we implanted a total of 160 age-0 fish with acoustic transmitters to track throughout the first-year post-release. First-year survival results are promising, with 84%-97% monthly apparent survival across four release years. In the first three years, most individuals made early, long-distance, downstream dispersals, entering western Lake Erie and moving along the southern shore. In 2022, a larger proportion of fish stayed and moved within the river than in previous years. River residence appears to depend on discharge and water temperatures surrounding the release date. Exploratory movements by river residents were greatest when discharge was low (<1000 cfs) and water temperatures were warmer (>10°C). Additional variation in movement behaviors could reflect individual heterogeneity (i.e. genetic, tag burden). Understanding how seasonal, biological, and technical factors affect movement and habitat use will help identify critical habitats, guide release strategies, and improve the overall success of reintroduction efforts.

Garett Allen[1], Amara Fortier[1], Evan Cornmiller[2], Meghan McBride[2], Tim Gingera[2] and **Sarah Kingsbury**[2], [1]Acadia University, [2]Fisheries and Oceans Canada. **The end of the line: a case study ground-truthing the import of freshwater non-indigenous species for the aquarium trade in Nova Scotia, Canada.**

The aquarium trade facilitates the large-scale movement of aquatic species, often from regions where they are indigenous or cultured to areas outside their native geographic range. Frequently, these species are poorly identified, with limited taxonomic resolution (e.g., lacking scientific names) and/or have minimal information on potential invasiveness. To assess the potential

risks of species entering Canada, especially at 'end-of-the-line' national supply chain provinces such as Nova Scotia, without proper naming, with potential contaminating species, or perhaps species that are high-risk invaders, nine Nova Scotian aquarium retailers were visited to catalogue species, to morphologically and genetically identify species, and check species for contaminating species (i.e. hitchhikers) or naming inaccuracies. We also compared the list of species identified in Nova Scotia with previously assembled lists aquarium species import or online purchase, and the region's freshwater invasive species watchlist. Overall, most aquarium retailers do not advertise species using scientific names, instead using vague descriptors, such as 'Assorted plants' or 'Nerite snail.' Plants, molluscs, and crustaceans were particularly prone to misidentification or not identified at all. In some species, hitchhiker organisms were observed, particularly among aquatic plants. Hundreds of species found in Nova Scotia were not listed in previous Canadian aquarium import reviews or online purchase records, including some high-risk invasive species. These findings highlight the need for improved retailer education and updating regulatory processes to filter out invasive species from consumer purchase options.

Amy Kireta[1] and **Joan Chadde**[2], [1]University of Minnesota Duluth, [2]jchadde@mtu.edu. **Lake Superior Youth Symposium 1995-2025: History, Impact & Future.**

The Lake Superior Youth Symposium is a binational event for 8th-12th grade students and educators to learn about and inspire stewardship of the Lake Superior and Great Lakes watersheds. Since 1995, this biennial 4-day, 3-night symposium rotates its location amongst Michigan, Wisconsin, Minnesota and Ontario around the Lake Superior watershed, hosted by various education institutions. Interdisciplinary programming focuses on Great Lakes science, art, culture, and building community through workshops, field trips, keynote speakers, student presentations and social events. Participants gain knowledge, friendship and ways to become more involved with protection and stewardship. The number of participants has ranged from 40 to 400. Some participants have attended up to three symposiums. The University of Minnesota Duluth brought together 133 participants in May 2025 with programming that included an indigenous lacrosse game, a ship tour of the working Duluth-Superior ports, and explorations to north shore state parks. Planning has already begun for the 2027 Symposium at Michigan Technological University in Houghton, Michigan. Members of the international planning team will share impact data, history, and best practices. A key feature of the Symposium is the focus of bringing youth from around the watershed to build community and emphasize their shared responsibility for stewarding this global freshwater resource.

Elizabeth Kitching[1], Christine Michel[1], Lisa Matthes[1], Laura Castro de la Guardia[2], Zou Zou Kuzyk[3], Audrey Limoges[4], Jens Ehn[3], Tim Papakyriakou[3] and CJ Mundy[3], [1]Fisheries and Oceans Canada, [2]Scottish Association for Marine Science, [3]University of Manitoba, [4]University of New Brunswick. **Local marine primary production hotspot in the coastal waters of Southampton Island, Nunavut.**

The marine region around Southampton Island, in northwestern Hudson Bay, Nunavut, Canada, is described as a hotspot of marine mammal diversity and abundance. While marine ecosystem services support three local communities, the region remains understudied, particularly with respect to the primary production at the base of the food web. Strong stratification and high freshwater input lead to the perception of oligotrophy in the marine ecosystem of the larger Hudson Bay; however, the presence of recurrent polynyas in the Southampton Island region can enhance primary production via nutrient availability and increased open water. Here we present integrated euphotic zone primary production estimates around Southampton Island during August 2019. High

variability in primary production around Southampton Island resulted from differences in physical characteristics, including ice conditions and the strength of stratification. A local hotspot of high primary production, roughly three times higher than previous averaged estimates in Hudson Bay and Foxe Basin, was identified in the constricted straits and sounds north of the island. This high primary production was supported by tidal- and wind-mixing that disrupted stratification and enhanced nutrient availability to phytoplankton. We will highlight the importance of local primary production hotspots, and how they can support regional Arctic ecosystems. We will also discuss the potential importance of this local hotspot to the wider Hudson Bay Complex (Hudson Bay, Hudson Strait, James Bay, and Foxe Basin).

Meghan R. Klasic[1], **Tom Hollenhorst**[1], Aabir Banerji[1], Terri Jicha[1], Maurer Julie[2], Daniel Sullivan[1], Jules Witts[1] and Chris Yarnes[1], [1]Great Lakes Coastal Sciences Branch, Office of Applied Sciences and Environmental Solutions, U.S. Environmental Protection Agency, [2]Oak Ridge Institute of Science and Education Fellow, Great Lakes Coastal Sciences Branch, Office of Applied Sciences and Environmental Solutions, U.S. Environmental Protection Agency. **Merging Social and Ecological Streams into Robust Interdisciplinary Great Lakes Research.**

The emergence of "social-ecological systems" thinking prompted environmental researchers across disciplines to acknowledge the interplay between social and ecological dimensions in studying environmental systems. Despite the growing body of theoretical and applied literature, research still prioritizes either ecological or social, often relegating the complementary perspective to a secondary mention. For example, the Great Lakes Water Quality Agreement outlines beneficial use impairments (BUIs)—chemical, biological, and physical—as metrics for assessing improvements from remediation efforts, while often portraying humans solely as polluters. Discussion of BUIs assumes societal benefits will follow impairment delisting, without adequately studying complex links between ecological and social components. Despite the promise of social-ecological systems bridging disciplines, researchers rarely follow through, remaining entrenched in their disciplinary silos. To address this gap, we assembled toxicologists, ecologists, geographers, biologists, and governance experts to collaboratively design research equally emphasizing "social" and "ecological" facets of the Great Lakes system. Using harmful algal blooms as a pilot, our team worked to craft a framework for conducting purposeful "social-ecological" research. We emphasize the utility of concept mapping and systems thinking in bridging understanding among expertise, while also offering fresh insights into our methodologies. Key challenges include navigating differences in terminology, scope and methodologies, data management, and limited availability of analytical tools tailored for social-ecological research. The views expressed are those of the authors and do not necessarily reflect views or policies of the U.S. Environmental Protection Agency.

Sandra Klemet-N'Guessan, Andrea Villalon and Kelsey Leonard, University of Waterloo. **« Je n'ai rien compris ! » Leveraging linguistic diversity to enhance science inclusion and accessibility.**

Linguistic diversity is a crucial, yet often overlooked, component of equitable and inclusive open science practices, including in aquatic sciences. We investigated the role of language in project design, data collection, management, and dissemination within environmental research, focusing on two peatland research networks, Can-Peat in Canada and CongoPeat in Cuvette Centrale (Central Congo Basin). This was done using a preliminary questionnaire and semi-structured interviews with researchers, language experts, and staff at Local Contexts, an initiative that provides Notices and Labels to protect and manage Indigenous data. As expected, the use of multiple languages was context-dependent and highest in the Congo Basin where local linguistic diversity was high and

English proficiency among both researchers and their interlocutors low. Specifically, researchers from CongoPeat used French most at the data collection and results dissemination stage and were the only researchers who used an Indigenous language at the data collection stage. Conversely, researchers from Can-Peat used French most at the results dissemination and data management stages, and only rarely used an Indigenous language at the results dissemination stage. Some of the facilitators and barriers to considering, integrating, and adopting linguistic diversity at any given stage of the research process included administrative, guidance, communication, language proficiency, norms, and capacity for engagement in the Indigenous community. Our study outlines lessons learned from the two networks to inform linguistic diversity practices in future environmental research.

Dale Klodnicki and Mark Ruthven, WSP Canada Inc. **From Data to Dialogue: Fisheries Engagement through Collaboration and Clarity in Large-Scale Fisheries Authorizations.**

Canada's Fisheries Act has evolved considerably over the past 15 years through two legislative amendments. During this time regulators, proponents, indigenous communities and other stakeholders have worked together to establish a new norm, and expectations on what is required to appropriately assess, mitigate or offset unavoidable impact to fisheries during project development. One key area of this process is engagement. WSP is developing a preferred approach to engagement during large-scale fisheries projects, ensuring meaningful participation with all parties and integration of traditional knowledge. Drawing on decades of Fisheries Act Authorization experience, this presentation highlights strategies that promote engagement opportunities throughout the development of the Fish Habitat Offset Plan and associated Fisheries Authorization. We emphasize early and frequent communication in advance of decision making, tracking progress and working with proponents to streamline interactions. The presentation will showcase practical examples from large-scale projects, illustrating how technical concepts can be developed and communicated effectively. By combining scientific rigor with culturally informed practices, WSP demonstrates how collaborative engagement can strengthen project outcomes and improve offsetting strategies. Attendees will gain actionable insights into building relationships, improving communication, and developing an approvable Fish Habitat Offset Plan.

Mary Ellen Klukow[1], Eileen Acosta[1], Kenny Anderson[1], Niah Cohen[1], Daiyanera Kelsey[1], Janice Kerns[2], Lauren Kinsman-Costello[1], Corbin Kohart[3], W. Robert Midden[3], Alex Ochs[1] and Olivia Schloegel[1], [1]Kent State University, [2]Ohio Department of Natural Resources, [3]Bowling Green State University. **Monitoring Nutrient Filtration in Restored Great Lakes Wetlands: Pairing Soil and Water Nutrient Indicators.**

Of the ecosystem services provided by Great Lakes wetlands, nutrient retention in eutrophic systems may be one of the most directly impactful to human health as well as one of the most understudied in situ. While we know the primary processes by which wetlands capture nutrients from surface water and store them in biomass or soil, the relationship between common soil indicators (e.g., soil phosphate sorption capacity, total nitrogen, etc.) and nutrient filtration remains unclear. In this presentation, we will discuss how soil nutrient parameters and surface water nutrient parameters relate to each other over time (e.g., seasonally and annually) and along wetland flow paths (i.e., from source water inflow through wetland pools to outflow). We explore soil chemistry and surface water quality results from 2021 to 2025 at over 40 restored wetlands in Ohio to deepen understanding of i.) how wetland soil nutrients change over time, ii.) how surface water nutrient concentrations change from wetland inflow to outflow, and iii.) how these changes relate to each

other. These results have the potential to inform wetland restoration and construction, maintenance, and monitoring.

Alexander Koeberle[1], Tom Stewart[2], Joseph Langan[3], Suresh Sethi[4], James Watkins[1] and Lars Rudstam[1], [1]Cornell University, [2]Independent Researcher, [3]NOAA Great Lakes Environmental Research Laboratory, [4]Brooklyn College. **Quantifying the scope for restoration of Great Lakes fish assemblages with linear inverse modeling.**

Restoring native species is believed to improve food web function. Yet, experimentation to inform restoration is challenging, making modeling a valuable tool to understand restoration outcomes. While Great Lake ecosystems are likely not returning to a pre-modified state, efforts have intensified to restore native coregonine (Coregonus spp.) prey fish assemblages. Coregonine restoration is hypothesized to increase ecosystem resilience and restore an important cold-water energetic pathway from lower-trophic level zooplankton and mysids (Mysis diluviana) to top predators like lake trout (Salvelinus namaycush). Here, we construct contemporary food webs of Keuka Lake and Lake Ontario and apply linear inverse modeling to explore the potential fish community development of future-restored food webs and to quantify uncertainty. Our models constrain lower-trophic compartments to observed levels of production ranges and only prescribe the topology and bioenergetics of fish species-groups, with no constraints on fish production. Using Markov chain Monte Carlo algorithms, we quantify the potential multi-species landscape of mass-balanced future fish assemblages and compare food web function among clusters of viable alternatives, including varying levels of native species production. Lastly, we examine tradeoffs between future levels of restored native and non-native fish species production. Because fish production is limited by lower-trophic level production, our approach is useful for quantifying restoration potential from a whole-ecosystem perspective. This research will advance food web analytics, food web theory, and fisheries management planning throughout the Great Lakes basin.

Jennifer Korosi[1], Randelle Adano[1], Dale Hardy[2], Tim Hollinger[3], Kira Jordun[1], Adam Kowtiash[2], Rachel Pellegrino[1], Robert Stewart[3], Vesta Tajik[1], Joshua Thienpont[1] and Nathan Wilson[3], [1]York University, [2]Biinjitiwaabik Zaaging Anishinaabek, [3]Lakehead University. **Ontario's forgotten Great Lake: Exploring industrial and resource development legacies in Lake Nipigon using paleolimnology.**

Lake Nipigon is the thirteenth largest lake in Canada and thirty-eighth largest lake in the world by area, and a critical headwater system for Lake Superior. Western science data on limnological conditions and changes over time are extremely limited for Lake Nipigon, a surprising knowledge gap for a lake of its size and significance. The last in-depth limnological sampling occurred more than a century ago in 1922, prior to the intensification of industrial and resource development in the basin. This includes the Ogoki Diversion, constructed in 1943 to divert the flow of the Ogoki River from the Hudson Bay watershed into the Great Lakes watershed through Lake Nipigon, to enhance hydroelectric power generation 1000 kilometers downstream in Niagara Falls. Our research responds to this knowledge gap by using paleolimnology to reconstruct ecosystem changes in bays and nearshore areas of Lake Nipigon over the last ~200-300 years. Preliminary results from sediment geochemical fingerprinting indicate that the spatial footprint of erosional impact from the Ogoki Diversion may be far greater than previously thought. Sediment mercury enrichment was elevated in Ombabika Bay compared to other nearshore areas of Lake Nipigon, likely a result of the flooding of forests when the diversion was constructed. Analysis of biological subfossils is ongoing. This study is being conducted through the Biinjitiwaabik Zaaging

Anishinaabek Guardians program and aims to support Indigenous water governance in the Lake Nipigon basin.

Jonah Koscielny, University of Manitoba. **Comparing Bayesian Schaefer Model Performance using Different Indices of Abundance.**

Catch per Unit Effort (CPUE) can be used as an approximation for biomass in stock assessment. However, occasionally there are cases where there is a breakdown in the relationship between CPUE and biomass. One such scenario is where fishers move between fishing sites due to active interference between other fishers. The Multiple Fishing Ground (MFG) index attempts to account for fisher movement by using proportional effort as an index of abundance. We determined the effect of index choice on parameter and biomass estimation. For this study, catch and effort data from the 4X5Y Haddock fishery was provided by DFO. Movement between the two regions: Bay of Fundy and Scotian Shelf, was examined. Indices for both sites were used in JABBA, a Bayesian modelling framework. There was no difference between parameter estimation or biomass estimation when using different indices for either region. It may be that these fishers do not follow the ideal free distribution, which is the theory behind the MFG index. Another possibility is that differences in these indices is not enough to change parameter and biomass estimation. Further study into model performance will focus on simulated fisheries to determine if there are scenarios where model performance changes with different indices. This simulation study will also be used to explore why there was no difference in model performance when using either index.

Julia K. Kozak[1], Helen M. Baulch[2], Sonya M. Havens[3], Lewis A. Molot[4], Sherry L. Shiff[5], Derek K. Gray[1] and Jason J. Venkiteswaran[6], [1]Wilfrid Laurier University, Department of Biology, [2]University of Saskatchewan, School of Environment and Sustainability, [3]International Institute for Sustainable Development-Experimental Lakes Area, [4]York University, Faculty of Environmental Sciences, [5]University of Waterloo, Department of Earth and Environmental Sciences, [6]Wilfrid Laurier University, Department of Geography and Environmental Studies. **Ecological Divergence, Physiological Convergence: Iron-mediated PSII Efficiency Across Boreal Lakes.**

Climate driven eutrophication shifts freshwater algal communities toward cyanobacteria-dominated harmful algal blooms (cHABs). While phosphorus (P) management has been prioritized, cHABs can often be limited by reduced iron (Fe). Sediment-water interface oxidation with nitrate (NO3-) prevents the reduction of Fe(III) to bioavailable Fe(II). Fe(II) is the primary component of phytoplankton photosynthetic performance (PSI/PSII), yet how intracellular Fe (FeInt) limitations affect NO3- availability, biomass, and phytoplankton community speciation on PSII efficiency remains not well understood. Dissolved Fe (DFe), FeInt, chlorophyll-a (Chl-a), and PSII efficiency (Fv/Fm) were measured across five boreal lakes of varying trophic statuses (TP: 2.4-23.9 ug/L) in 2024. L303 underwent Ca(NO3)2 additions to maintain an overall concentration of 2mgN/L. Phytoplanktonic health quantum efficiency was determined through PAM fluorometry. FeInt:Chl-a was the primary predictor of PSII with a physiological threshold of ~200 nmol ug/L. Chl-a was significant predictor of PSII under high NO3- conditions (L303; $p < 0.001$), but not in low NO3- lakes. Ecological differences among lakes (PAR, TP) structured Fe availability, phytoplankton biomass, and baseline Fv/Fm among communities, yet did not affect the physiological response of Fv/Fm to FeInt:Chl-a even under NO3- enriched conditions ($p < 0.05$). L303 NO3- additions altered Fe supply yet still supported high phytoplankton biomass with moderate PSII efficiency, indicating that NO3- influences PSII indirectly by shifting community composition along an Fe limitation continuum rather than altering the physiological dependency of PSII on Fe.

Joseph Krieger, NOAA Great Lakes Environmental Research Laboratory. **Clear and present danger: identifying and addressing aquatic invasive species in the north american great lakes.**

The Great Lakes, a vital freshwater resource, unfortunately hold the distinction of being the most heavily invaded freshwater ecosystem globally, with approximately 188 established non-native species. While many coexist benignly, about 34% are classified as invasive due to their profound negative impacts on native wildlife, plants, the economy, and human health. These aggressive invaders reproduce rapidly, outcompete native species for resources, and often lack natural predators, leading to significant ecological disruption. Key invasive species, such as sea lamprey, and quagga and zebra mussels, have permanently altered the ecosystem. Sea lamprey, for instance, parasitize native fish, leading to population declines. Quagga and zebra mussels dramatically disrupt the food web by consuming vast amounts of phytoplankton and zooplankton, essential food sources for many native fish. The introduction of these species often occurs through ballast water from ocean-going freighters or through shipping canals. Addressing this complex issue is crucial for the future of the region's biodiversity, fisheries, tourism, and recreation. Ongoing efforts include control methods for specific species, such as lampricides for sea lamprey and various management strategies for invasive plants, alongside preventative measures like ballast water exchange regulations. Understanding the characteristics and impacts of these invaders is essential for prioritizing management resources and preventing further spread. This presentation will highlight new and innovative methods for identifying and addressing Great Lakes aquatic invasive species.

Nathan Kroeze, Great Lakes Commission. **A Binational Framework for Resilient Great Lakes Coastal Ecosystems.**

Promoting ecosystem resilience to climate-driven stressors is a core priority of the Great Lakes Commission Action Plan for a Resilient Great Lakes Basin. To advance this goal, a binational advisory group of researchers and resource managers was convened to develop the Science-Based Framework for Building Resilient Coastal Ecosystems in the Great Lakes Basin. The framework synthesizes current understanding of climate-driven changes affecting coastal ecosystems to provide a shared foundation for planning. Rather than providing a prescriptive management philosophy, the framework accommodates existing decision-support approaches, placing them within an iterative adaptive management cycle that considers strategic alternatives. This structure is intended to help practitioners evaluate the viability of protection, restoration, and management strategies under rapidly changing environmental conditions, high uncertainty, and shifting ecological baselines. The framework also addresses the role of communities, stakeholders, and organizational capacity in shaping management outcomes. This presentation will describe the framework's development process, conceptual structure, and practical applications for cross-jurisdictional coastal management. Attendee feedback will inform refinements, potential case studies, and improvements to usability prior to release. Ultimately, the framework supports government and community decision-making in reassessing conservation goals, addressing procedural barriers to implementation, and expanding the portfolio of strategies for fostering resilient coastal ecosystems.

Emily Kroft, IISD. **The Case of Eco-Certification in Manitoba's Commercial Fisheries.**

Manitoba is the second-largest commercial producer of freshwater fish in Canada, producing approximately 13 million kg of freshwater fish per. There has been an increase in interest over the last several years in eco-certification for these commercial freshwater fisheries, due to business as well ecological considerations. This presentation examines both the business case and ecological case for Manitoba freshwater fisheries becoming eco-certified.

Jayson Kucharek[1], Paige Arieno[1], Benicio Benzan[1], Matthew Hoffman[2] and Christy Tyler[1], [1]Thomas H. Gosnell School of Life Sciences, Rochester Institute of Technology, [2]School of Mathematical Sciences, Rochester Institute of Technology. **Interception of Stormwater-Driven Anthropogenic Debris in Monroe County, NY.**

Stormwater has been identified as a key driver of anthropogenic debris transport in urban and suburban environments. We quantified input of debris to the stormwater system using LittaTraps—baskets with 5 mm mesh— installed in nine storm drains in Rochester and Brighton, NY, USA. Using two years of input data, we built a predictive model to identify potential hotspots of debris input. With additional support from the U.S. National Oceanic and Atmospheric Administration's Marine Debris Program, we are partnering with Monroe County to develop a targeted debris interception program. Insights from the model guided the installation of 19 additional LittaTraps in 2025, placed at both high- and low-input sites to further improve model performance. Approximately 30 more sites will be added in 2026, selected specifically from the highest-input areas to maximize debris capture and other factors such as potential impact to sensitive ecosystems, flooding risk, and safety. The ultimate goal is to develop a transferable debris interception framework that can be used in similar urban and suburban environments to minimize anthropogenic debris inputs to waterways.

Aleksandr Kucheryavyy and Natalia V. Polyakova, Institute of Ecology and Evolution, Russian Academy of Sciences. **Migratory Plasticity as an Evolutionary Bet-Hedging Strategy in Lampreys.**

Bet-hedging represents a fundamental evolutionary strategy in lamprey species, particularly within the Lampetra and Lethenteron genera. A single biological species can manifest multiple, ecologically distinct life-history forms within its metapopulation. This strategy enables lampreys to simultaneously exploit rich but unpredictable marine and lacustrine resources through migratory parasitic forms, while maintaining a stable, low-risk reproductive core in headwater stream habitats through resident, non-parasitic forms. The adaptive value of this strategy is rooted in phenotypic plasticity. A single genome can produce alternative, adaptive phenotypes in response to environmental cues, allowing individuals to express either migratory parasitic or resident strategies. Molecular evidence demonstrates a panmictic gene pool, with complete intermingling of haplotypes across both life-history types. The dominant haplotype occurs with nearly identical frequency in migratory and non-migratory forms, confirming this is a case of ecological polymorphism rather than distinct genetic species. This bet-hedging provides resilience, allowing lampreys to survive climatic oscillations, recolonize post-glacial territories, and adapt to anthropogenic pressures like habitat fragmentation. Resident forms can establish populations in new habitats, and their offspring can switch to migratory morphs if conditions improve, enabling exploitation of novel resources. Even where dams obstruct anadromous migration, resident forms persist in isolated upstream habitats. Consequently, this plasticity transforms ecological variability from a taxonomic challenge into a universal key for long-term survival in perpetually changing environments. This work was supported by the Russian Science Foundation (project No. 24-14-00111).

Bijoy Kumar Ghosh, Associate Professor, Directorate of Secondary & Higher Education Ministry of Education, Dhaka, Bangladesh. **Hydraulic Impact of Fish Migration in Sariakandhi Fish Pass of Bangladesh.**

The importance of open water fish in our socio-economic regime has recently drawn the attention of the policy makers of the country. FCD/FCDI projects mainly serve the agricultural interests, but it interfere fish migration. This inevitably affects the open water fisheries sector as

migratory routes. Nursing grounds of many species of fish are hampered and disturbed for these projects also. In order to permit fish migration in rivers, it is necessary to maintain conditions that help migrants reach their spawning grounds. To overcome obstacles, such as hydraulic structures, placed in the path of migrating fish, structures must be designed to assist the fish to pass them. The periodic and directed travel of fish mainly for feeding, breeding and over coming adverse climatic conditions is called migration. The structures will also aid in efficient development of the carp fishes. Spawning migration, mainly in carp fish, in the study area was found to begin at the 2nd week of May and continue up to the 3rd week of July. Catfish migrations began at the last week of March and continue up to the 2nd week of June. The study also found that there were seven major category migratory species in the project area and the fish pass is contributing positively for growth of fishery resources in then study area.

Nathalie Kuria[1], Jean-Francois Koprivnjak[2], Viviane Yargeau[3], Barbara Wall[4] and Mary-Claire Buell[2, 5], [1]Environmental and Life Sciences Graduate Program, Trent University, [2]Trent School of the Environment, Trent University, [3]Department of Chemical Engineering, McGill University, [4]Chanie Wenjack School for Indigenous Studies, Trent University, [5]Department of Forensic Science.
Spatial Distribution and Exposure Assessment of PFAS in Fish from First Nations Territories.

Nearly all Canadians have PFAS in their blood serum, with higher levels in Indigenous and northern populations. Exposure pathways driving these elevated concentrations remain poorly understood, raising concerns about environmental contamination and impacts on critical food systems. Fish are an essential traditional food that supports food security, cultural identity, and economic independence in many First Nations communities on Turtle Island. Despite this, Canada lacks coordinated PFAS monitoring within traditional territories, and Indigenous knowledge systems remain largely excluded from national strategies. Fish Forever is a community-driven investigation of PFAS in fish from culturally significant fishing locations in partnership with several First Nations across Ontario and British Columba. This initiative addresses knowledge gaps by centering Indigenous knowledge and priorities in sampling design, data interpretation and results sharing. Through this collaboration, we developed a community-based sampling framework that reduces barriers to community engagement and ensures reliable sample acquisition. To support this framework, PFAS concentration and distribution were compared across multiple tissue types in Lake Erie walleye to identify a muscle subsection that best represent the PFAS burden of commonly consumed edible portions. Conventional monitoring approaches rely on whole-fillet analysis, which can impose burdens on anglers who depend on their catch for subsistence or income. This presentation will discuss experimental results, report concentrations of 40 targeted PFAS compounds in fish caught within partner territories and evaluate potential human exposure through fish consumption.

Morgan Hocking[1, 2], **Maria Kuruvilla**[2, 3], Joao Braga[1], Emma Atkinson[4], Dan Greenberg[5], Olivia Cornies[3], Leila Krichel[3], Caroline Glass[3], Jay Speier[6], Midori Nicolson[6], Brendan Connors[5], Peter Tschaplinski[7], Alejandro Buren[1, 8, 9], Andrew Bateman[3, 10, 11], Adam Lewis[1], Mark Lewis[2] and Martin Krkosek[3, 11], [1]Ecofish, [2]University of Victoria, [3]Salmon Coast Society, [4]University of Alberta, [5]Fisheries and Oceans Canada, [6]Musgamagw Dzawada'enuxw Fisheries Group, [7]BC Ministry of Water, [8]Consejo Nacional de Investigaciones Científicas y Técnicas, [9]Instituto Antártico Argentino, [10]Pacific Salmon Foundation, [11]University of Toronto. **Cumulative effects of forest harvest on Pacific salmon in coastal British Columbia.**

More than a century of industrial forest harvesting has altered the functioning of watersheds that support wild Pacific salmon, yet the population-level effects of forestry on salmon are controversial and remain largely unknown. We reconstructed annual time series of forest disturbance history for 1,746 watersheds with salmon population monitoring data in coastal British Columbia dating back to 1883, when forestry accelerated in the region, with cumulative disturbance to many watersheds today now exceeding 80%. A strong negative effect of forestry on chum salmon recruitment was observed with median estimated declines ranging from 18.9% to 52.3% by chum conservation unit, and effect sizes that exceed that those of ocean conditions for 20 out of 24 of the chum conservation units. In contrast, forestry effects appear to be negligible for the more resilient pink salmon. Our evidence shows that forestry can cause shifts in watershed functioning that can last for decades, leading to salmon population declines and long timescales for recovery.

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Marie-Pier Labonté[1], Murray MacKay[2], Dominique Paquin[1] and Pierre Pellerin[1], [1]Ouranos, [2]Division of Meteorological Research, Environment and Climate Change Canada. **Improving lake representation in regional climate models using the Canadian Small Lake Model.**

Lakes are a major component of the North American landscape, influencing regional climate through exchanges of heat, moisture, and momentum with the atmosphere. Accurate representation of lake processes, including water temperature and ice cover, is essential for reliable hydroclimate simulations. In the Canadian Regional Climate Model (CRCM), the Freshwater Lake model (FLake) is the standard lake model, a widely used 1D scheme representing bulk heat and energy rather than full vertical temperature structure. To resolve vertical temperature profiles and support applications requiring detailed lake physics, such as freshwater and ecosystem studies, we implemented the physically based Canadian Small Lake Model (CSLM) into CRCM6-GEM5. Unlike FLake, CSLM explicitly resolves the vertical thermal structure, allowing for a more realistic representation of stratification and mixing. Two ERA5-driven simulations (1979-2022) were performed, one using FLake and one using CSLM. CSLM reduces climatological biases in 2-m air temperature across most seasons, particularly over lake-rich regions of the Canadian Shield. During summer, in-situ measurements from small Quebec lakes indicate that excessive stratification simulated by CSLM, producing too-warm surface layers and too-cold deep waters, limits improvements in near-surface air temperatures. Adjusting lake heat input improves vertical temperature profiles for small lakes. These improvements in lake physical processes enhance surface fluxes and hydroclimate simulations across lake-rich regions, and ongoing work will examine whether these improvements extend to larger lakes, including the Great Lakes.

Jessica Lagroix and **Meghan McLeod**, DataStream Initiative. **Streams of Knowledge: Bridging local and continental freshwater stewardship with DataStream.**

Across Canada, monitoring programs led by governments, researchers, Indigenous nations, environmental organizations, and community groups are generating valuable water quality data that reflect local priorities. Connecting information from these different sources in a consistent, reuseable format generates powerful new insights at scales beyond the scope of any single monitoring initiative. DataStream is a standardized, open-access data platform designed to bring together western scientific water quality data. Since its launch in 2016, DataStream has expanded to meet the needs of hundreds of diverse freshwater stewardship initiatives. Map-based search, data visualization tools, science explainers and hands-on support help make the platform and the

information it contains accessible to a broad audience. As the platform's data holdings and community of users has grown over a decade of operation, so have the possible uses of DataStream. By supporting consistent publication standards, DataStream enables decision-makers to easily access hundreds of datasets across sectors and watersheds. Data shared from community-based monitoring programs are a key part of this data ecosystem. This local data amplifies community contributions to freshwater assessments, research, and policy, strengthening connections between local insight and system-level understanding. In this presentation, we will draw on examples of knowledge-sharing successes to highlight how open data infrastructure can amplify community monitoring and support more connected approaches to freshwater stewardship.

Vernon LaLone, Stephanie Baklarz and Nathan Tafelsky, Wave Lumina. **Closing the PFAS Data Gap: A Field-Deployable Screening Platform Validated in Real Groundwater.**

Per- and polyfluoroalkyl substances (PFAS) pose a growing threat to Great Lakes watersheds, with contaminated groundwater representing a critical exposure pathway for communities and ecosystems. Current monitoring depends on laboratory-based LC-MS/MS analysis. Laboratory testing is accurate but slow, expensive, and logistically demanding, with turnaround times of days to weeks that constrain real-time decision-making at investigation and remediation sites. We present a field-deployable surface-enhanced Raman spectroscopy (SERS) platform that delivers quantitative surfactant-class PFAS results in approximately 20 minutes. The workflow couples a novel extraction chemistry with SERS-based detection, yielding calibration linearity of $R^2 \geq 0.98$ and spike recovery nearing EPA Method 1633A acceptance criteria in real groundwater matrices. Comparison against LC-MS/MS reference data from active monitoring sites shows strong correlation across multiple site types, with agreement tightening further under site-specific calibration. Rather than replacing laboratory analysis, this platform is designed to direct it. The technology enables field teams to prioritize samples, characterize contamination profiles, and make same-day decisions while reserving confirmatory resources for where they matter most. Current validation is strongest for groundwater screening, with treatment process monitoring as the next development target. This presentation shares performance evidence, describes early commercial engagement with environmental consultants and site managers, and examines the barriers between field-validated screening technology and scaled deployment in Great Lakes remediation workflows.

Lawrence Lambert, Ion Works Inc. **Autonomous Lake Robotics: Integrating AI, Physics-Based Treatment, and Nutrient Removal.**

Harmful algal blooms (HABs) increasingly threaten Great Lakes water quality, safety, and regional economies. Traditional reactive approaches—chemical dosing, manual sampling, dredging—address symptoms but fail to disrupt the root cause: excess bioavailable phosphorus. Ion Works Inc. has developed Oxybot and Oxybot Pro, autonomous AI-guided robotic platforms that fundamentally shift freshwater management from reactive intervention to proactive ecosystem protection. Oxybot combines hydraulic cavitation, plasma oxidation, and Aluminium electrocoagulation into a unified, mobile treatment system. The platform autonomously patrols designated lake zones, detects emerging algal hotspots via embedded sensors, and deploys targeted multi-stage treatment to neutralize cyanobacteria while extracting up to 99% of bioavailable phosphorus through vivianite sequestration—preventing bloom recurrence. Oxybot Pro provides complementary high-resolution, multiparameter water profiling with advanced sensor arrays and precision winch deployment, delivering spatiotemporal data harmonized with global standards (LakeBeD-US) for machine learning and predictive analytics. Both platforms operate autonomously 24/7 under remote smartphone oversight, eliminating costly infrastructure, chemical residues, and

labor-intensive sampling cycles. In addition the recently developed Stream guard EC system meters controlled amounts of Al++ to control land origin amounts of P Early field deployments demonstrate significant reductions in algal biomass, improved dissolved oxygen profiles, and sustained water clarity. Results confirm that integrating robotics, AI-driven decision-making, and physics-based remediation at scale addresses both the nutrient and climate dimensions of the HAB crisis. This presentation showcases deployment strategies, and the infrastructure enabling commercialization of next-generation HAB technologies.

Joseph Langan[1], Peter Alsip[1], Hazem Abdelhady[2], Charles Bronte[3], Cory Goldsworthy[4], Matthew Kornis[3], Krista Oke[5], Eva Thorstad[6] and Benjamin Turschak[7], [1]NOAA Great Lakes Environmental Research Laboratory, [2]Texas A&M University, [3]US Fish and Wildlife Service, [4]Minnesota Department of Natural Resources, [5]University of Alaska Fairbanks, [6]Norwegian Institute for Nature Research, [7]Michigan Department of Natural Resources. **Pink salmon in the Great Lakes: an unexpected invasion with insights for three oceans.**

Introductions of species outside their native range, such as pink salmon (Oncorhynchus gorbuscha) in the Laurentian Great Lakes, can serve as unplanned experiments that provide new insights into ecological plasticity and adaptation. We synthesize information on the understudied Great Lakes pink salmon invasion, use information from marine systems to help bridge knowledge gaps, and highlight how this case can inform research and management related to expansions and invasions of this species in the Pacific, Arctic, and North Atlantic Oceans. Accidentally introduced to Lake Superior in 1956, pink salmon quickly spread to all five Great Lakes, displaying unexpected life history changes and behaviors. This invasion history demonstrates a remarkable ability of pink salmon to establish from a small founder population, colonize large areas, produce explosive year classes to rapidly increase in abundance, and complete a full life cycle entirely in freshwater. One of the most striking changes is a shift from the rigid two-year life cycle exhibited in the native Pacific range to a variable maturation age ranging from one to four years, likely influenced by prey availability as well as temperature and other environmental factors. We discuss these observations and their potential implications for Great Lakes ecosystems, as well as outline high-priority research themes necessary for understanding pink salmon dynamics in this region with broader relevance for the native and non-native ranges.

Jacob Lasci, Keith Hobson and Bryan Neff, Western University. **Integrating eDNA, visual gut analysis, and stable isotopes to uncover overlapping foraging niches of Lake Huron salmonids.**

The Lake Huron fish community consists of many non-native species, including the introduced piscivorous Pacific salmonids chinook salmon Oncorhynchus tshawtscha, coho salmon Oncorhynchus kisutch, and rainbow trout Oncorhynchus mykiss. The only abundant native piscivorous salmonid is the lake trout Salvelinus namaycush. Since 1980, there has been a steady decline in the biomass of the prey fishes these salmonids consume. The collapse of alewife Alosa pseudoharengus in 2003 has led to growing concern that lake trout will be outcompeted by the non-native salmonids. Paramount to understanding this concern is determining the diet overlap between salmonids and how the overlap has shifted with changes in prey abundance. Here, stable isotope analyses, visual identification of gut contents, and gut content eDNA metabarcoding revealed convergence of foraging niches for all piscivorous salmonids. Given the competitiveness of the Pacific salmonids, this is concerning for the re-establishment of the native lake trout.

Sarah Lavallée and Vivian Nguyen, Carleton University. **Wild food harvesting in urban blue and green spaces: A Lower Great Lakes case study.**

Urban blue and green spaces (UBGS) are increasingly recognized for their importance to human health, well-being, and ecological resilience. As food insecurity worsens in cities across North America, there is a need to explore how urban spaces may offer sources of wild food through fishing and foraging for diverse people. This research examines the role of UBGS in wild food harvesting among a diverse urban population in Cleveland, OH, and the Greater Toronto Area, ON, to understand the barriers and facilitators to accessing wild foods in urban spaces. These case studies used focus groups of urban foragers (n=13), immigrants (n=17), and urban anglers (n=14), paired with intercept surveys of urban shore anglers (n=31). This research sheds light on cultural ecosystem services (e.g. well-being, social cohesion) associated with wild food harvesting in UBGS and explores how to increase access to wild foods in urban spaces. Results highlight the value of both land and water-based urban wild food harvesting in fostering environmental stewardship, and in expressing cultural heritage and identity while demonstrating access disparities to urban lands and waters.

Ethan Lawler and Joanna Mills Flemming, Dalhousie University. **A high-resolution spatial stock assessment model for Arctic Surfclam in Atlantic Canada.**

Arctic Surfclam (Wkta'nukewe's) is a long-lived clam species that is fished primarily on Banquereau Bank in Atlantic Canada. Surfclam are a stationary species that move only small distance throughout their adult life, and are fished with bottom trawls. This fishery has very limited survey data and can be considered a data-poor fishery with almost catch-only data. We present a new stock assessment model that predicts Arctic Surfclam biomass density at a very high spatial resolution (~1 km^2).

Ted Lawrence, African Center for Aquatic Research and Education. **Tropical Freshwater Training: The desire. The need. A vision & plan.**

African students typically do not have as many in-field training opportunities as their Northern counterparts, and Northern students often do not have the ability to gain in-depth perspectives on tropical freshwater environmental issues beyond their own geographies. To ensure that the next generation of freshwater experts has the ability and opportunities to receive comprehensive field training so that they may address the issues on large, freshwater systems, the African Center for Aquatic Research and Education (ACARE) is proposing, with the School for Field Studies (SFS) to create a tropical freshwater lake training program on the African Great Lakes. Using existing models, infrastructure, administration, and other resources, the program will be a one-of-a-kind field training program that will provide students interested in freshwater studies to advance in-field training in limnological sciences, fisheries, and socio-economic aspects of tropical large lakes. One of the most critical aspects of this venture is the inclusivity of participants from different continents, backgrounds, perspectives, and resources. This talk describes a plan to implement an in-field program, first on Lake Victoria, and second on Lake Malawi/Niassa/Nyasa. Benefits of such a program include: a growing freshwater expert network of North American and Africa freshwater students to address the issues on our large lakes; exchange information; find financial and research resources; conduct future joint-research; and write joint publications.

Lauren Lawson[1], D. Andrew R. Drake[2] and Dalal Hanna[1], [1]Carleton University, Department of Biology, [2]Fisheries and Oceans Canada, Great Lakes Laboratory for Fisheries and Aquatic Sciences. **Spatially mapping and quantifying watershed threats to aquatic Species at Risk.**

Despite progress being made in understanding the population ecology and habitat requirements of aquatic species at risk (SAR) in Canada, relatively less progress has been made on developing rigorous data-driven approaches for threat assessment. We developed a framework to assess the likelihood of occurrence and severity of impact of watershed threats to aquatic species at risk, and applied the framework in a series of lower Great Lakes Basin SAR case studies. Examined threats include: upstream urban and cropland land use, roads, wastewater treatment plants, dams, and environmental spills. Importantly, we used a distance-weighting approach to account for watershed configuration between critical habitat areas and the location of upstream threats. We compared the effect of hydrologically active versus Euclidean distance-weighting on ultimate threat scores. We also identify similarities and discrepancies between our quantitative threat analysis results and previously published qualitative threat assessments. By leveraging largely open-access data and software, we present a framework that can guide future threat assessment and more fine-scale watershed restoration actions for aquatic species at risk.

Analisa Lazaro-Côté[1], Benjamin Kissinger[2], Sarah Glowa[3], Neil Mochnacz[3] and Ken Jeffries[1], [1]University of Manitoba, [2]fRI Research, [3]Fisheries and Oceans Canada. **Mucus transcriptional profiling to assess the physiological status of wild bull trout.**

Bull trout (Salvelinus confluentus) are a cold-water stenotherm listed under Canada's Species at Risk Act due to population declines and range contraction associated with rising stream temperatures and other stressors. As a legally protected species, rapid and non-invasive tools to assess their physiological status are essential. Epidermal mucus is continuously secreted and can be collected non-lethally in less than one minute, making it ideal for integration into routine fisheries surveys. With laboratory-reared, temperature-acclimated bull trout, we used mucus, gill, liver, and muscle transcriptional profiles to develop tissue-specific random forest classifiers capable of accurately identifying individuals experiencing cellular stress. Mucus transcriptional profiles classified thermally stressed fish with accuracy comparable to profiles from other tissues. Mucus transcriptional profiling was subsequently deployed in wild bull trout populations to identify streams where individuals may be experiencing elevated physiological stress. In collaboration with fRI Research and Fisheries and Oceans Canada, epidermal mucus samples were collected from wild bull trout in two contrasting watersheds; one that is highly impacted by multiple anthropogenic stressors (Kakwa, Alberta) and a minimally disturbed watershed (Nahʔą Dehé, Northwest Territories). The transcript abundance of 28 target genes was measured using custom OpenArray chips developed for salmonid mucus. Our approach holds promise as a non-lethal biomonitoring tool to identify thermally unsuitable habitats and support conservation efforts.

Peter Leavitt, Members of the Regina Limnology Laboratory and Members of the Institute of Environmental Change and Society, University of Regina. **Catchment-scale effects of urban nitrogen diversion on eutrophic lakes.**

Limnologists, governments, and managers are divided on whether management should limit P pollution alone, or whether there are additional benefits to regulating N influx. Here we describe the first eight years of a catchment-scale experiment (52,000 km^2) in which urban pollution with dissolved N (mainly NH_4^+) was reduced >90%, leading to a ~50% decline in flux of total N to lakes after 22 years of monitoring. There was no change in total P influx. Comparison of four headwater reference lakes with three downstream impacted lakes revealed no substantial change in total chlorophyll (Chl) or Secchi depth after 8 years of N diversion. Surface blooms of colonial cyanobacteria in mid-reach and downstream lakes occurred both before and after N reduction due to lake warming and increasing internal loading of NH_4^+. As expected, N_2 fixation increased from

<1% to ~10-15% of phytoplankton demand in the most heavily-impacted lake, but was accompanied by a 75% decline concentrations of microcystin. Fixed N did not alleviate N limitation and remained a minor component of the whole-lake N budget. Instead, mass balances and sediment incubations showed that up to 85% of water column N in impacted lakes is derived from sediments. These findings show that N diversion does not trigger more severe cyanobacterial blooms or toxic conditions, lake recovery will require decades, and that beneficial effects of N diversion may be compromised by future lake warming.

Kenneth Lee[1], Lisa Isaacman[2] and Boumy Sayavong[2], [1]Kenneth Lee Research Inc, [2]Natural Resources Canada. **Advances in Freshwater Oil Spill Research, Preparedness and Response: Canada's Multi-Partner Research Initiative.**

Increased demand for electrification and the development of AI data centres is reshaping North America's energy demand. By 2030 electricity consumption for data processing is projected to exceed that of traditional energy-intensive industries such as aluminum, steel, and chemicals. Rather than displacing conventional fuels, this growth is driving increase demand across the energy mix, including oil and gas alongside renewable sources. This evolving energy landscape underscores the continued importance of advancing oil spill preparedness, response, and recovery research to manage ongoing risks associated with the production, transport, and use of hydrocarbons - particularly in freshwater environments. Concern has increased regarding accidental spills in inland waters, where expending energy infrastructure, transportation corridors and changing climate conditions heighten exposure because of a greater likelihood to occur close to populated areas, often lower dilution and dispersion capacity of the waterbody, the sensitivity of freshwater aquatic species, and the higher likelihood of contamination of shorelines. In these settings, oil spill cleanup strategies such chemical dispersants and in-situ burning may be limited due to inaccessibility or proximity of spill sites to shore, seasonal ice cover, and the potential for greater damage to sensitive ecosystems by the applied countermeasure than the oil itself. This presentation will provide a review of research network activities on freshwater oil spill science under Canada's Multi-Partner Research Initiative to improve our capability and capacity in oil spill preparedness and response.

Robert Lennox[1], Caliyena Brown[1], Sarah Tuziak[2], Marc Trudel[2], Morgan Piczak[3] and Imogen Bellinger[1], [1]Dalhousie University, [2]Fisheries and Oceans Canada, [3]University of British Columbia. **Acoustic tracking reveals migratory patterns, survival, and predation of Endangered Inner Bay of Fundy Atlantic salmon.**

The Inner Bay of Fundy Atlantic salmon is Canada's only Atlantic salmon population listed by the Species at Risk Act as Endangered. Native to rivers of the Minas Basin and the Inner Bay, the species historically migrated to feed in the Bay of Fundy and was not known to make the typical migration to the Labrador Sea that other populations from North America do. Inner Bay of Fundy Atlantic salmon are now maintained by gene bank facilities including Coldbrook Biodiversity Facility to attempt to overcome threats and restore the population. One of the key questions about the population is marine survival and behaviour, and we used acoustic telemetry to track kelts and smolts in the Bay of Fundy. In 2024-2025, tags were deployed on hatchery-reared kelts and wild-captured smolts from the Inner Bay of Fundy to better understand migration routes, hotspots, and survival of this unique salmon population in the Bay of Fundy.

John Lenters[1], Peter Blanken[2], Newell Hedstrom[3], Erin Nicholls[4] and Chris Spence[3], [1]University of Michigan, [2]University of Colorado, [3]Environment and Climate Change Canada, [4]University of

Calgary. **Lake Superior Ice Cover, Evaporation, and Water Temperature: A New Look at an Old Problem.**

It used to be thought that lake ice forms a "cap" that inhibits evaporation, but this interpretation is vastly oversimplified. Research from over a decade ago revealed that extensive Lake Superior ice cover during harsh winters is actually an indicator of large latent and sensible heat flux prior to the onset of ice cover. Only until late winter and into the next summer do evaporation rates become suppressed, primarily due to below-normal water temperatures, and secondarily due to ice. At the time, this was presented as a new paradigm for interpreting Great Lakes ice cover - not as a "cap" on evaporation, but rather as an indicator of high evaporation rates that created the ice in the first place. Even this perspective is nuanced, however, and in this presentation, we analyze two recent years of eddy covariance data from Lake Superior that challenges this "old paradigm." The results show weak evaporative heat loss and below-normal ice cover during the warm El Nino winter of 2023-24, as might be expected. The colder winter of 2024-25, however, had much higher evaporation rates, yet still with below-normal ice coverage. Further analysis reveals a large difference in antecedent autumn water temperatures, which not only affected evaporation rates, but also the time required to form extensive ice cover. We discuss the implications of this "nuanced paradigm" for the Great Lakes in a warming climate.

Wendy Monk[1], **Jennifer Lento**[2], Roxanne MacKinnon[3], Gillian Kerr[4] and R. Allen Curry[5], [1]Environment and Climate Change Canada @ Canadian Rivers Institute, Faculty of Forestry and Environmental Management, University of New Brunswick, [2]Canadian Rivers Institute and Department of Biology, University of New Brunswick, [3]ACAP Saint John, [4]School of Environment and Sustainability, Royal Roads University, [5]Canadian Rivers Institute, Department of Biology, and Faculty of Forestry and Environmental Management, University of New Brunswick. **Quantifying the intangible: Linking flow variability and well-being to water governance in a large regulated river in Atlantic Canada.**

Integrating social-cultural-spiritual dimensions into environmental flows is critical for sustainable river management, yet structured methods often remain elusive. This study tested the efficacy of a Driver-Pressure-State-Impact-Response (DPSIR) framework quantified via Fuzzy Cognitive Mapping (FCM) to bridge ecological processes and Indigenous and local values in the regulated, transboundary Wolastoq (New Brunswick, Canada). We synthesised data from expert workshops, producing 69 flow-ecology hypotheses, with a public survey exploring river connections. The resulting semi-quantitative FCM model visualised a network of 39 socio-ecological nodes with 941 connections. Network analysis identified "flow variability" (environmental stressor) and "peace and tranquility" (social-cultural-spiritual state) as critical bridges between domains. Notably, "peace and tranquility" exhibited the highest indegree centrality, linking to environmental states like water quality and biodiversity. The framework explicitly mapped how management actions (e.g., flow regulation) cascade through physical processes to impact community well-being. Results also highlight a feedback loop where enhanced well-being promotes environmental stewardship. These pathways were synthesised into a seasonal hydrograph highlighting temporal trade-offs between ecological maintenance (e.g., migration cues) and social connections (e.g., recreational access). This study confirms that DPSIR-FCM is a powerful tool for translating complex socio-ecological interactions into transparent, inclusive, and evidence-based water governance.

Adam Lepage, Kate Pappin and John Gunn, Vale Living with Lakes Centre, Laurentian University.
Lake Charr (Salvelinus namaycush) Recovery in Industrially Impacted Sudbury Lakes.

Lake charr (Salvelinus namaycush) are a cold-water species whose sensitivity makes them good indicators of lake health. Their ecological and cultural importance is especially notable in Ontario, which contains roughly a quarter of North America's lake charr lakes, including 39 within the City of Greater Sudbury. Sudbury represents a globally significant example of industrial damage and recovery, with decades of logging, mining, and smelting causing severe acidification, metal contamination, and watershed degradation, eliminating sensitive species and simplifying food webs. Regulatory intervention and technological improvements later reduced SO_2 emissions by over 98%, enabling chemical recovery to begin, and eventually meeting the conditions necessary for biological recovery. This synthesis draws on historical data, management records, and updated water chemistry to (1) summarize the regional trajectory from degradation to recovery; (2) evaluate natural recolonization, stocking, and assisted recovery efforts; and (3) identify implications for adaptive management in multi-stressor landscapes. Experimental management case studies of liming trials, stocking outcomes, genetic refugia, and food-web reassembly highlight both the progress and variability of lake charr recovery, as some lakes now support reproducing populations while others remain biologically impaired. Overall, the Sudbury story demonstrates that source emission reductions, not liming or stocking alone, were the primary catalyst for recovery. Long-term monitoring, protection of genetic diversity, and management that addresses emerging stressors will be essential to sustaining lake charr populations for future generations under continued environmental change.

Ryan Lepak[1], Grace Armstrong[2], Alex Kasperek[3], Alena Krauss[4], Lauren Votava[4], Christopher Yarnes[1], Michael Mahon[1], Mitch Kehne[3] and Jonathon Launspach[5], [1]US Environmental Protection Agency, [2]US Geological Survey, [3]SpecPro Sustainment & Environmental, [4]University of Minnesota - Duluth, [5]General Dynamics Information Technology. **Results of Per and Poly Fluoroalkyl Substances in the lower food web of Lake Erie.**

In the 2024 Lake Erie field season, we executed projects intended to address Per and Poly Fluoroalkyl Substances (PFAS) fate, transport and bioaccumulation into the lower food web. We focused on spatially mapping PFAS in zooplankton, benthos, suspended particulate matter and water to better understand spatial trends and to connect basal food web PFAS bioaccumulation to the higher food web. We then sought to reveal how changes in limnological condition (e.g., changed redox status) may impact the fate and distribution of PFAS. We will provide an update of our results and when applicable, contextualize those results using other streams of data including but not limited to water quality, limnological character, taxonomy and stable isotopes. Early results indicate that summed PFAS concentrations as well as PFAS profiles were dynamic spatially, across redox gradients and across media. Biota PFAS profiles were dominated by >8 carbon chain length PFAS whereas water profiles were dominated by lower chain length PFAS. Lake Erie appears to have the second highest water-PFAS concentrations of the Great Lakes but presumably due to its eutrophic conditions favoring growth dilution, lower invertebrate-PFAS concentrations. We also found porewater PFAS outpaced surface water concentrations 3-5-fold, a finding we aim to explore further.

Ryan Kar-Long Leung, Neil Rooney, Ryan Prosser and Robert Hanner, University of Guelph.
Sediment eDNA Assessment of Benthic Biodiversity Impacts from Freshwater Net-Pen Waste Deposition.

Net-pen aquaculture is poised to expand in Ontario to meet the increasing demand for fish-sourced protein. Solid waste deposition on sediment from net pens is a primary environmental concern for ecosystems in general, and for benthic invertebrate communities specifically. While fish waste deposited in benthic environments represents a potential food source for invertebrates, these communities are also potentially exposed to stressors such as anoxia and waste-associated contaminants. To support sustainable aquaculture expansion, it is therefore essential to understand how fish waste influences benthic communities. This study employed an environmental DNA (eDNA) metabarcoding approach to explore the impacts of fish waste from freshwater net-pen aquaculture on benthic biodiversity. Surface sediment samples were collected along a transect extending outward from a net-pen farm in Ontario. eDNA was extracted and analyzed using four genetic markers—COI, 18S, 16S, and 12S—to characterize invertebrates, general eukaryotes, microbial communities, and fish, respectively. Bioinformatic analyses are ongoing and are predicted to detect shifts in benthic biodiversity along the transect. The findings will demonstrate both the usefulness and limitations of the sediment eDNA approach for characterizing how fish waste alters benthic community composition and diversity, while providing insight into its potential to inform environmental management and support sustainable development of net-pen aquaculture in Ontario.

Charles Levkoe[1] and **Kristen Lowitt**[2], [1]Lakehead University, [2]Queens University. **Advancing Self-Determination and Resurgence through Indigenous Approaches to Fisheries Management on Lake Superior: Reflections on an Indigenous-Settler Partnership.**

For millennia, Indigenous people across the globe have relied on fisheries and coastal environments as a part of their sustenance, well-being, livelihoods, culture, and spirituality. Despite the ongoing exclusions they face from settler colonial management structures, Indigenous communities continue to exercise their rights to fish and practice their traditional systems of governance. This presentation shares insights from a settler-Indigenous research partnership to share the experiences of Batchewana First Nation on Lake Superior to exercise self-determination and jurisdiction over their fisheries. We share reflections from a collaboration among two settler researchers with Batchewana First Nation on a food sovereignty, action-oriented project that aimed to amplify stories from the community's historical and current fishing practices and governance through the co-creation of a feature length documentary film titled, Lake Superior Our Helper: Stories from Batchewanaung Anishinabek Fisheries (https://www.batchewanaungfish.ca). The film focuses on the perspectives of fish harvesters, Elders, Knowledge Keepers, youth, and community leaders to document their struggles and visions for fishing and asserting jurisdictional authority in support of their cultural continuity. We present these insights to improve our own individual and collaborative practice and to share our learnings with other scholars, activists, and community practitioners engaged in similar partnership-based and praxis-oriented research.

Lewen Li[1], Paul Blanchfield[2], Timothy Fernandes[3], Tyler Tunney[2] and Karen Smokorowski[2], [1]Queen's University, [2]Fisheries and Oceans Canada, [3]Centre for Ecosystem Management, University of Guelph. **Refining activity estimates of free-swimming lake trout: insights from high-resolution telemetry data.**

Measuring energy expenditure in wild, free-swimming fish is a major challenge in understanding the bioenergetic basis of their ecology. Traditional telemetry technologies provide estimates of energy costs by inferring fish activity from movement patterns, typically using transmitters that output acoustic values at relatively coarse temporal intervals. However, recent studies show that telemetry data collected at much higher temporal resolution, such as every few

seconds, can reveal fine-scale behavioural responses that are not detected using standard telemetry approaches. Here, we double-tagged individual lake trout (Salvelinus namaycush) with standard acoustic transmitters (300 s ping rate; 69 kHz) and high-resolution transmitters (5 s ping rate; 180 kHz) equipped with pressure-derived depth, temperature, and acceleration sensors. Fish movements were monitored using paired receivers that provided extensive spatial coverage of Turkey Lake. We hypothesized that activity estimates derived from standard acoustic telemetry underestimate fine-scale movement relative to high-resolution telemetry. Specifically, we predicted that activity metrics derived from high resolution transmitters would capture vertical and horizontal movements that are smoothed or missed when data are summarized over longer time intervals. We further hypothesized that higher temporal resolution would reveal greater variability in fish movement and result in higher estimates of activity costs. By comparing standard and high-resolution transmitters deployed on the same individuals, we quantify how sampling resolution influences movement-based estimates of activity relevant to fish bioenergetics.

Romullo GSF Lima[1], Andressa S. Reis[2], Bruno E. Soares[3] and Miriam P. Albrecht[2], [1]Universidade Federal do Ceará, [2]Universidade Federal do Rio de Janeiro, [3]University of Regina. **Richness is the primary component structuring fish biodiversity in Neotropical streams.**

Human activities affect freshwater environments and multiple dimensions of the diversity of ecological assemblages, mostly assessed through indices of taxonomic, functional, and phylogenetic indices. Each one of these dimensions can be further decomposed in three main components quantifying how much variety is there (richness), how equal units are distributed (regularity), and how different units are from one another (divergence). The variety of methods hinder deciding which methods should be applied to track ecological changes in different situations. We applied multivariate techniques to quantify the importance of different biodiversity dimensions and components to describe the fish community-level variation in third order Neotropical streams across an environmental gradient. Richness indices were the most important to describe changes in biodiversity. FRic explained 47% of the biodiversity variation, reflecting the high morphological variability from narrow to wide streams, followed by richness and phylogenetic richness (13% and 12% of explanation, respectively). The regularity component was the second most important, driven by changes as communities shift from being dominated by a single lineage to having a more even distribution among lineages. Divergence indices were less important to describe ecological changes in stream fish assemblages, probably because the replacement of species across communities occur mostly between functionally similar species, thus maintaining different functional groups and divergence. Our results underscore the importance of assessing different dimensions and components of diversity in ecological communities.

Shuqi Lin[1] and Chin Wu[2], [1]Environment and Climate Change Canada, [2]University of Wisconsin-Madison. **Multi-time scale water level fluctuation in Lake Winnipeg.**

Lake water level fluctuation, as an inherent characteristic of the lake system, is critical to hydrologic functioning, ecological productivity, and water quality of the lake, influencing multiple aspects from fish habitat and wetland health to shoreline erosion processes and human use of the lake. The magnitude of the fluctuations depends on the climate variables, morphology, as well as the inputs/outputs from/to the watersheds. Due to the special morphology and shallowness, Lake Winnipeg has been known for its storm surges and large lake level fluctuation amplitudes. In recent years, severe damage along the shoreline of the South Basin due to usually high-water level and storm surges have been reported. Also, there is little study exploring the response of aquatic ecosystems to the water level fluctuations in Lake Winnipeg. This study, making use of long-term

data at 7 water level monitoring sites across Lake Winnipeg, aims to provide a comprehensive study of annual and seasonal lake water level fluctuations over the lake, focusing on long-term and seasonal trends in recent years. A data-driven model was established to assess the relationship among lake water level fluctuation, climate data, and hydrological data.

Shuqi Lin and Jun Zhao, Environment and Climate Change Canada. **Year-round observation and modelling of the thermal structure in Great Slave Lake.**

To fill the knowledge gaps in the northern lakes and assess their responses to the accelerated warming in arctic regions and rapid change in landscape, the year-round observations of water temperature in the Great Slave Lake during 1998-2002 and 2023-2025 were analyzed. With two observed sites in the Main (Western) Basin and two sites in the North Arm, this study aims to reveal the water column mixing and stratification during the open water seasons, and ice cover duration during the winters in the Great Slave Lake. A numerical model tool is applied to understand how weather variables regulate the water movement and heat transfer in the lake.

Begemann Lindsay, Simon Fraser University. **How do we Evaluate the Effectiveness of a Fishery Closure?**

Spatial and temporal fishery closures are increasingly relied upon as precautionary management tools to protect vulnerable fish populations and habitats. While relatively straightforward to implement under existing regulatory frameworks, closures are blunt instruments that generate significant socio-economic and cultural trade-offs. Despite their widespread use, evaluation of closure effectiveness remains limited, creating uncertainty about whether conservation objectives are achieved and under what conditions closures should be adjusted or lifted. This research evaluates the effectiveness of the commercial chum gillnet fishery closure in the Central Coast of British Columbia. Following a 90% decline in returns from 1960 to 2020, the Canadian government implemented longer term closures of commercial salmon fisheries under the Pacific Salmon Strategy Initiative. This research uses a multi-pronged approach combining: (1) empirical bycatch impact analysis using net scar frequency on sockeye salmon and steelhead as an indicator of reduced fishery interactions; (2) abundance assessments for target (chum) and bycatch species (sockeye, Chinook, steelhead); (3) estimation of fishery profits; and (4) bioeconomic modelling of future harvest scenarios to inform collaborative governance decisions for this fishery and others. This research aims to address fundamental questions in fisheries management: How do we assess whether closures work? What ecological, economic, and social indicators should guide reopening decisions? What would it take to move beyond blunt closures toward adaptive, evidence-based strategies in data-limited systems?

Paige Lipczynski[1], Lauren Chapman[2] and Nicholas Mandrak[1], [1]University of Toronto Scarborough, [2]McGill University. **Varying viability: Context dependence of thermal and hypoxia tolerances of a freshwater fish species at-risk.**

Freshwater fish species-at-risk are subject to multiple stressors as anthropogenic pressures continue to heighten, which may further their imperilment. The potential interactive effects of stressors may affect physiological performance and, thus, fitness of individuals. However, the extent to which stressors affect fish may vary based on the environment they are found in and/or intrinsic individual traits. Using a Threatened minnow, Pugnose Shiner (Miniellus anogenus), from the Great Lakes basin as a model species, we examined the potential variation in thermal and hypoxia tolerance within a single population across three thermally different waterbodies in southwestern Ontario from May to October 2025 and among genetically distinct populations from previous

studies. Such data will be beneficial for understanding the degree to which Pugnose Shiner can adapt to changing local conditions, and to fill species-specific knowledge gaps required to aid in successful conservation strategies, such as determining the suitability of different source populations for reintroductions and translocations.

Bo Liu[1], Kevin Kapuscinski[1], Ashley Moerke[1] and Allison Snider[2], [1]Center for Freshwater Research and Education, Lake Superior State University, [2]Great Lakes Oil Spill Center of Expertise, U.S. Coast Guard. **Evaporation and Photooxidation of Marine Diesel and Light Crude Oil in Freshwater Wetland Mesocosms.**

Oil includes saturates, aromatics, resins, and asphaltenes, which have diverse physiochemical properties and respond differently to oil weathering processes. Changes in oil components during weathering alter bulk oil properties (e.g., density, viscosity, and surface/interfacial tension), which consequently affect oil transport and fate in the environment. Freshwater wetlands, characterized by low flow and high biomass, tend to retain spilled oil for extended periods, allowing prolonged exposure to oil evaporation, dissolution, and photo-oxidation processes. However, interactions among weathered oil, water, and substrates (e.g., salinity, organic matter, sediments) in freshwater wetlands remain poorly understood. To examine variations in oil photo-transformation, physiochemical properties, and oil/freshwater interactions, this study simulated oil evaporation and photo-oxidation in freshwater wetland environments using shallow round tanks over 13 days. Weathering processes (dark and light), oil types, and seasonal conditions (summer and winter) were compared. Results showed a significant increase in oil density and viscosity due to the evaporation of low-molecular-weight hydrocarbons. Oil biodegradation may also contribute to the loss. A further increase in density and viscosity was observed in the light treatments and was accompanied by an increase in dissolved organic matter in the water column. These observations indicate substantial photo-transformation of hydrocarbons, which promoted the dissolution of medium-molecular-weight hydrocarbons. Overall, these findings improve predictions of oil transformation and migration in freshwater wetlands.

Songzhi Liu[1], James Kessler[2], Andrea VanderWoude[2] and Ayumi Fujisaki-Manome[1], [1]University of Michigan Cooperative Institute for Great Lakes Research, [2]National Oceanic and Atmospheric Administration Great Lakes Environmental Research Laboratory. **Extending the Great Lakes GLSEA Surface Temperature Record using OISST (1981-Present).**

Adaptive management of the Great Lakes requires robust, long-term hydroclimate datasets for testing water management alternatives and accurately forecasting lake level and thermal regime changes. Lake Surface Temperature (LST) is a fundamental variable, serving as a critical boundary condition for hydrologic and atmospheric models. While the Great Lakes Surface Environmental Analysis (GLSEA), currently derived from Advanced Clear-Sky Processor for Oceans (ACSPO) processing, provides a high-resolution, daily LST product crucial for modern forecasting, its operational record begins in 1995. This leaves a significant gap in the pre-1995 climate record needed for comprehensive trend analysis. This study addresses the need for an extended LST dataset by utilizing the Optimum Interpolation Sea Surface Temperature (OISST) product, which offers a consistent record dating back to 1981. OISST's long-term span provides essential data for characterizing multi-decadal variability and defining a stable climatological baseline. The study's critical technical step involved regridding the coarser-resolution OISST product to match the spatial grid and resolution of the operational ACSPO GLSEA. The impact of this regridding on data quality was assessed through a detailed comparison of the regridded OISST (1981-2024) against the original

OISST product. The results provide adaptive managers with a validated dataset extending the Great Lakes LST record back to 1981.

Yongbo Liu[1], Hui Shao[2], Chelsea Lobson[3] and Joey Pankiw[4], [1]Environment and Climate Change Canada, [2]University of Guelph, [3]Lake Winnipeg Foundation, [4]Seine Rat Roseau Watershed District.
Assessing the effectiveness of BMPs on nutrient load reductions for the Joubert Creek Watershed.

Reducing nutrient loadings from tributary watersheds is a major priority for the Lake Winnipeg Freshwater Ecosystem Initiative (LW FEI). Best Management Practices (BMPs) are widely used to mitigate nutrient losses, yet their performance can vary with climate, soils, topography, land use, and management. This study developed an Integrated Modeling for Watershed Evaluation of BMPs (IMWEBs) model for the 348-km² Joubert Creek watershed in the Red River basin of southern Manitoba to assess BMP effectiveness on nutrient load reduction at field and subwatershed scales. Joubert Creek was chosen because of the availability of monitoring data and information on the state of current management practices. The model was built using available geospatial, climate, hydrology, and water quality datasets and calibrated to historical conditions. Nine existing BMPs and potential future implementation scenarios were evaluated, including fertilizer/manure management, cover cropping, rotational grazing, small dry dams, riparian access management, riparian buffers, improved crossings, cropland conversion to perennials, and wetland conservation. Model simulations quantified nutrient reductions at field and watershed outlets and identified landscape hotspots contributing disproportionately to nutrient export. Results show that BMP performance varies under different landscape and land management conditions. and that combined practices can provide substantial cumulative benefits. The study highlights remaining knowledge gaps and emphasizes the need for improved BMP modeling and assessment model refinement to reduce uncertainty and support nutrient-reduction strategies across the Lake Winnipeg Basin.

Chelsea Lobson, Karl Friesen-Hughes and Fallon Moreau, Lake Winnipeg Foundation.
Completing the data-to-impact cycle: The Lake Winnipeg Community-Based Monitoring Network.

At the centre of Canada, Lake Winnipeg is the world's 10th largest freshwater lake, recognized nationally and internationally for its ecologically and culturally important habitats. Over the past century, peoples around Lake Winnipeg have witnessed a concerning decline in the lake's health. Eutrophication - the over-fertilization of freshwater ecosystems with the nutrient phosphorus - is causing increasingly frequent and severe algal blooms that negatively impact water quality and drinking water, recreation and tourism, subsistence and commercial fisheries, lakeshore economies and ecosystem integrity. In recent years, much emphasis has been placed on the size and multi-jurisdictional nature of the Lake Winnipeg watershed. Too often, unfortunately, the scale of the watershed serves as an excuse for inaction or as an explanation for slow progress in improving the lake's water quality. In reality, efforts to address Lake Winnipeg's algal blooms have simply lacked the relevant and necessary data to ensure their success. Community-based monitoring is now filling this evidence gap. The Lake Winnipeg Community-Based Monitoring Network (LWCBMN) is a collaborative long-term monitoring program designed specifically to identify localized phosphorus hotspots within the larger Lake Winnipeg watershed. This program builds on past research and complements existing agency monitoring programs to create a robust, continuous data set that enables geographic targeting of phosphorus-reduction efforts. With data shared openly through Lake Winnipeg DataStream, LWCBMN provides the evidence base necessary to improve Lake Winnipeg's water quality through efficient and cost-effective action.

Bryan Loucks[1], **Edith (Bardo) Leoso**[2], **Laura Horton**[3], Jason Henry[4], Clint Jacobs[5], Barbara Wall[6], Michael Waasegiizhig Price[7], Myrna Kicknosway[1], JoAnne Cook[8], Karen Diver[9], Bronson Herman[10] and Janessa Esquible[5], [1]Naugon Associates, [2]Bad River Band of the Lake Superior Tribe of Chippewa Indian, [3]Rainy River First Nation, [4]Chippewas of Kettle And Stony Point First Natio, [5]Walpole Island First Nation, [6]Citizen Potawatomi Nation of Shawnee, Oklahoma, [7]Wikwemikong First Nations, [8]Grand Traverse Band of Ottawa & Chippewa Indians, [9]Fond du Lac Band of Lake Superior Chippewa, [10]North American Marine Alliance. **Strengthening our Understanding of Inaaknigewin and Upholding Our Responsibilities to All of our Relations.**

The Inaaknigewin:Giigoonyag, Nibi ge Aki initiative focuses on revitalization and reaffirmation of Indigenous relationships with giigoonyag (fish), nibi (water), and aki (earth) through a culturally grounded gathering that occurred in December of 2025. This gathering brought together Anishinaabeg and allies from across the Great Lakes Basin to discuss our responsibilities to the fish, water, earth, and each other. Our approaches in planning this gathering were grounded in respect, relationality, responsibility and reciprocity. Organizers provided an opportunity for participants to learn more about clan systems and revitalization efforts, Anishinaabe decision-making processes, critical water teachings, youth visions, relations with "invasive species" and much more. Our three days together facilitated collective learning, healing and growth. We strengthened relations and our understanding of Anishinaabe Inaaknigewin. In this presentation, our leaders will discuss key reflections and outcomes of this initiative, with a focus on our responsibilities towards our shared waters, the beings who rely on them and future generations.

Jonathan Low[1], Emmanuel Frimpong[1], David Haak[1], Mark Olokotum[2], Marc Stern[1], Papius Dias Tibihika[3] and Elizabeth Nyboer[1], [1]Virginia Polytechnic Institute and State University, [2]National Fisheries Resources Research Institute, [3]Aquaulture Research and Development Centre, National Fisheries Resources Research Institute. **Cross-institutional collaborations for social and ecological sustainability research in Lake Victoria's cage aquaculture industry.**

Aquaculture is increasingly promoted as a strategy for enhancing global food security, fostering economic development, and supporting fishery sustainability. As the sector grows in Lake Victoria, however, concerns are rising over its potential impacts on biodiversity, wild fish stocks, and socio-economic impacts on local livelihoods and fishing communities. To address multiple research needs, we built cross-institutional and interdisciplinary collaborations to assess the ecological and social sustainability of aquaculture in Lake Victoria, Uganda. To identify potential threats to wild fish stocks, we collected genetic samples from wild and farmed Nile tilapia and are using genotyping by sequencing (GBS) to analyze genome-wide levels of introgression and admixture among populations. In parallel, to understand how aquaculture is perceived by local stakeholders, we conducted household surveys and interviews with fish farm workers, farm owners, community leaders, and local community members who reside near and away from aquaculture sites. These data allow us to evaluate community-identified risks and benefits, explore local perceptions of aquaculture governance mechanisms, and assess implications for environment health and local community wellbeing. Our interdisciplinary approach contributes to the development of equitable and sustainable governance of aquaculture in this dynamic aquaculture-fisheries context.

El Lower, University of Michigan. **The GLANSIS Social Science Data Hub.**

The GLANSIS Social Science Data Hub hosts the results of social science surveys and stakeholder interviews on issues related to aquatic invasive species throughout the Great Lakes region. The Social Science Data Hub includes project results, final reports, and anonymized datasets that are available for download and for secondary and meta-analysis. By hosting this data on

GLANSIS, social scientists working on Great Lakes AIS issues have free access to large clean datasets from a variety of partnerships and projects throughout the region, as well as a place to store the raw data and additional appendices often required as an addendum to published manuscripts in peer-reviewed journals. The GLANSIS team intends the Social Science Data Hub to be a resource that can support researchers interested in interdisciplinary collaboration, continuing our mission of serving as a "one-stop shop" for AIS information in the region.

Kristen Lowitt[1] and Charles Levkoe[2], [1]Queen's University, [2]Lakehead University. **Exploring blue justice in Great Lakes fisheries.**

Fisheries in the Great Lakes watershed are vital to ecosystems, culture, food security, livelihoods, and community well-being. However, they face threats from industrial development, ecosystem alteration, pollution, climate change, and tourism. These challenges, along with growing demand for freshwater resources, are giving rise to increasing interest about the prospects for a new "blue economy" for the Great Lakes watershed. The idea of the blue economy is meant to balance conservation and environmental needs while promoting economic activities. However, the place of fisheries in an emerging blue economy is uncertain. Some have cautioned that the concept may reinforce existing social and environmental challenges and inequities if not carefully implemented. In this context, blue justice is gaining momentum as an organizing framework that centers justice and sustainability for fisheries and coastal communities. It foregrounds the preservation of aquatic ecosystems and respect for fishers' rights within coastal development. This presentation will share emerging findings from our interviews with fisheries actors in the Great Lakes watershed about what blue justice means to them, how they are engaged in decision-making with respect to fisheries and economic development, and opportunities to enhance blue justice for the fisheries sector. We will focus our analysis on fisheries in proximity to mid-sized urban centers around the Great Lakes watershed, including Kingston and Thunder Bay, Ontario.

Sha Luo, Lexi Guzman, Bret Shaw and Nan Li, University of Wisconsin-Madison. **Improving Ice Safety Communication: Efficacy Cues and Narrative Context in Great Lakes Maps.**

Warming winters and declining ice cover have made ice fishing on the Great Lakes increasingly hazardous, yet ice safety communication often relies on outdated heuristics and provides limited guidance for behavioral change. This study examines how efficacy cues and narrative context interact to influence ice anglers' evaluation of safety maps and related risk perception. Participants (N = 249) were recruited through Facebook advertisements targeted to Western Great Lakes states via the Wisconsin Sea Grant page. Using a 2×2 experimental design, participants viewed an ice safety map that varied the presence of efficacy information (actional guidance vs. none) and narrative context (details about accident data beyond counts of death and injuries). Outcomes included map evaluation (usefulness, credibility, accuracy, and likelihood of use), perceived vulnerability of others, and confidence in one's own ability to stay safe on the ice. Ordinary Least Squares analyses showed no significant main effects of efficacy or narrative context alone. Instead, results showed a significant three-way interaction among efficacy, narrative context, and perceived seriousness of risk for map evaluation ($p = .037$), with a similar interaction emerged for perceived vulnerability of others ($p = .027$). These findings suggest that ice safety maps are most effective when actionable guidance is paired with explanatory context, particularly for audiences already concerned about changing ice conditions. However, persistent confidence in personal safety highlights a challenge for translating risk awareness into precautionary behavior.

Frank Lupi, Michigan State University. **Looking Back on the Economic Benefits of Sea Lamprey Control on the St. Marys River.**

This talk revisits a Great Lakes Fishery Commission-funded effort to estimate economic benefits of improved sea lamprey (Petromyzon marinus) suppression on the St. Marys River. That work linked an economic model of recreational fishing in Michigan to fish populations in the Great Lakes to estimate economic benefits that accrue to recreational anglers when fish populations increase. The method discussed here was used to estimate benefits to Michigan anglers of several sea lamprey treatments options for the St. Marys River. When estimated benefits are compared to treatment costs, all treatment options examined were shown to have positive net present value. Thus, the results suggest that sea lamprey suppression efforts on the St. Marys River yield economic benefits that exceed costs, and this held even though only part of the economic benefits were measured. The talk will review this work, revisit the results with the perspective of time, and discuss the key role that Great Lakes Fishery Commission funding played in this and subsequent efforts to assess economic benefits of Great Lake fisheries.

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Zira MacFarlane[1, 2] and Shannon McCauley[1], [1]University of Toronto Mississauga, [2]Center for Urban Environments. **Do neighborhoods shape neighbors? Impacts of Urbanization on Frog Community Structure.**

Globally, amphibian populations are facing severe declines due to a barrage of threats, including climate change, disease, and habitat loss. However, North American amphibians persist throughout a surprising range of habitats, including intensely urbanized landscapes. Within cities, many species of amphibian appear able to breed in almost any type of freshwater habitat available, including heavily disturbed ponds, polluted water, and blue infrastructure. Here, we use community science and open datasets (including the North American Amphibian Monitoring Program, the National Aquatic Resource Surveys, and the National Land Cover Database) to explore the degree to which urbanization shapes amphibian communities. We assess relationships between community structure and urban development, aquatic pollution, and other anthropogenic disturbances across the Eastern United States. In specific, we look for watershed level patterns of homogenization in anuran richness, phylogenetic representation, & functional diversity across urbanization gradients over space and time.

Emma MacNeill, Kathryn Schreiner, Cody Sheik and Euan Reavie, University of Minnesota Duluth. **Paleoenvironmental Reconstruction of Phytoplankton Community Trends in Great Lakes Areas of Concern.**

The Laurentian Great Lakes (LGL) have historically endured water quality threats following Euro-American settlement and industrial growth. In response, initiatives, such as the Great Lakes Water Quality Agreement and the designation of Areas of Concern (AOCs), were established to manage and mitigate issues like excessive nutrient inputs and eutrophication. Despite some remedial success, eutrophication remains an issue across the LGL due to historical and current nutrient loading, and likely warming. Eutrophication in nearshore environments is especially troublesome and can drive the development and persistence of harmful algal blooms (HABs). Although monitoring efforts provide valuable information of current status, knowledge of historical trends of HABs is lacking, so it is difficult to attribute observed changes in HAB dynamics to management or anthropogenic stressors. To help fill this gap, we reconstructed multi-decadal trends in the

phytoplankton communities from sediment cores collected from five AOCs and two delisted AOCs. Sediment-preserved pigments and 16S rDNA sequences were used to quantify temporal changes in cyanobacterial abundance and community structure; additionally, land-use data were integrated to examine changing watershed influence. Preliminary findings indicate that cyanobacterial presence has increased over the past two decades at multiple sites, including both active and delisted AOCs. These data enable assessment and attribution of cyanobacterial community responses to anthropogenic pressures and management interventions. These data will contribute to the development of more effective, data-driven management strategies for the LGL.

Alexia Macri[1], Katie Stammler[2], Catherine Febria[3], Alice Grgicak-Mannion[3] and Alyssa Frazao[4], [1]Author, [2]Co-Author, [3]Supervisor, [4]Technician. **To Buffer, or Not to Buffer: A Multivariate Exploration of Land-Based Stewardship and Freshwater Ecosystem Health Indicators.**

Lake Erie watersheds across southwestern Ontario are historically impacted by intensive agricultural development and land use changes. Such is the case for the River Canard watershed in Essex County, where several tributaries display high variation in their riparian buffer characteristics. Riparian buffers play an important but poorly defined role in protecting freshwater ecosystems. Buffers size - in terms of width, length and integrity - can compromise aquatic resources as well as landowner values and livelihoods. Therefore, understanding qualities of riparian buffers in supporting stream ecosystem health can help advance sustainability of land and water. Despite global calls to action to restore ecosystems, relationships between local stewardship and freshwater restoration remains underexplored. To address this, my research employs multivariate indicators and spatial data together to assess freshwater ecosystem health. With the River Canard watershed as a case study, I will analyze biodiversity data (benthic macroinvertebrates, Unionid freshwater mussels and fish) together with water quality and riparian metrics. The objectives are to: (1) explore freshwater ecosystem health using in-stream indicators including freshwater biodiversity, and (2) explore riparian buffer indicators using GIS, to (3) apply multivariate analyses for characterizing relationships between ecological indicators used for the riparian zone and freshwater. My research advances insight into land stewardship and freshwater ecosystem health with place-based research to better ensure that policy and practice can achieve environmental sustainability goals.

Mohammad Madani[1], Patrick Delaney[1], Dylan Kime[2] and Aurelien Hospital[1], [1]DHI Water and Environment Inc. CANADA, [2]DHI Water and Environment Inc. USA. **Advancing Oil Spill Fate and Transport Modelling in Lake Ontario.**

Oil spills pose a critical threat to Lake Ontario's water quality and ecosystem health, given the region's aging pipeline infrastructure and industrial activities. To assess this challenge we integrated the MIKE 21/3 Oil Spill module into the Lake Ontario Water Quality Forecasting System, utilizing advanced hydrodynamic and oil fate modeling principles. The system is powered by continuously running 3D-hydrodynamic and wave model that forecasts Lake Ontario's complex circulation patterns, wind-driven surface flows, stratification dynamics, and wave conditions. These high-resolution flow fields provide the physical foundation for predicting oil transport under historical, real-time, and forecasted lake conditions. The module applies a hybrid Lagrangian-Eulerian approach: floating oil is tracked as particles, while dissolved hydrocarbons are modeled as concentration fields. This dual representation is coupled with a pseudo-component framework that partitions oil into fractions (volatile, semi-volatile, heavy, wax, and asphalt) each governed by distinct thermodynamic and kinetic properties. The model simulates interacting weathering processes, including evaporation, emulsification, dissolution, biodegradation, and sedimentation. These processes dynamically alter oil composition and behavior, enabling robust predictions of trajectory

and fate. Results include concentration of each fraction and overall oil spread. By coupling detailed hydrodynamics with scientifically rigorous oil fate algorithms, a robust platform for scenario analysis and risk assessment is provided. Beyond technical innovation, this work underscores the importance of science-driven modelling in safeguarding water resources: enabling informed decisions that protect ecosystems, drinking water supplies, and communities.

Lauren Mader and Patricia Ramey-Balci, Department of Biological Sciences, University of Manitoba. **Diet and interactions between co-occurring intertidal invasive crabs in Nova Scotia, Canada.**

Ecosystems increasingly harbour multiple invasive species, which can alter ecosystem function, yet studies examining interactions among marine invasive species remain limited. In northwestern Atlantic intertidal habitats, the Asian shore crab, Hemigrapsus sanguineus (hereafter shore crab) co-occurs with the European green crab, Carcinus maenas. The shore crab's recent introduction to Atlantic Canada (first observed in 2017) provides an opportunity to examine their interactions. This study examined the spatial distribution, abundance, and diet of these crabs at two sites in Nova Scotia in 2022 and 2023. Subsequent experiments examined whether feeding and diet were altered in the presence of a competitor (alone vs. inter- and intra-specific pairings). Both crabs co-occurred in areas <0.25 m^2, and higher densities of green crabs than of shore crabs indicate that the shore crab is in the early stage of invasion. Crabs consumed a variety of similar food resources but showed significant species- and site-specific differences in diet. Green crab stomachs were dominated by animal prey (e.g., barnacles), whereas shore crabs consumed more macroalgae, a pattern that was consistent across treatments. However, green crabs were more likely to consume barnacles compared to macroalgae only when alone or with a conspecific, whereas shore crabs showed no difference in the likelihood of consuming either food item across treatments. These findings are important for understanding how species interactions shape feeding and resource use, with implications for population and community dynamics.

Michelle Monteiro[1], William Dew[1], Trevor Pitcher[2], Olivia Galloway[2], Stuart Ness[1] and **Christine Madliger**[1], [1]Algoma University, [2]University of Windsor. **No effect of lampricide exposure on olfaction and stress physiology in yearling lake sturgeon (Acipenser fulvescens).**

Lampricides are a central component of sea lamprey control in the Laurentian Great Lakes. However, there remains concern regarding the potential sublethal effects on non-target species. Juvenile lake sturgeon (Acipenser fulvescens) are often considered vulnerable to exposure, but the sensitivity of life stages beyond young-of-the-year (YOY) is not well understood. We investigated whether exposure to 3-trifluoromethyl-4-nitrophenol (TFM) or a TFM-1% niclosamide mixture influences stress-axis activity or olfactory responsiveness in yearling lake sturgeon. We exposed fish to lampricide concentrations designed to match typical management practices for either 30 minutes or 12 hours and then provided a six-day depuration period. We used electro-olfactography (EOG) to assess olfactory function and measured stress physiology via blood cortisol and glucose. Across all endpoints, fish exposed to lampricide treatments did not differ from controls. Baseline cortisol levels, the capacity to mount an acute cortisol response to handling, and circulating glucose concentrations were comparable among groups. Likewise, EOG amplitudes showed no treatment-related reductions, and we found no effect of lampricide exposure on combined olfactory responses across odorants. Together, these findings demonstrate that short-term, operationally-relevant lampricide exposures under the tested water chemistry conditions did not impair sensory or endocrine function in yearling lake sturgeon. These findings contrast with reports of higher

sensitivity in YOY sturgeon and suggest that vulnerability to lampricides is likely stage-dependent, with implications for refining risk assessments and conservation management.

Alexander Maguffee, Michigan State University. **Habitat selection of invasive grass carp in the Lower Sandusky River using fine-scale acoustic telemetry relocation data.**

Grass carp (Ctenopharyngodon idella) are an invasive species in the Laurentian Great Lakes that consume large amounts of aquatic vegetation, threatening native fish communities. Understanding grass carp habitat use can improve the efficiency of targeted removal efforts. We used a high-density acoustic telemetry receiver array to generate position estimates of grass carp locations in the Lower Sandusky River and fit resource selection functions using raster-based predictors including substrate type, depth, distance to shore, and distance to large woody debris. To account for spatial autocorrelation and irregular sampling intervals, grass carp movement was modeled as a continuous-time stochastic process, and habitat predictors were weighted using predicted space-use hotspots. Results indicate that grass carp generally selected areas farther from shore and closer to large woody debris, although selection patterns varied among individuals. Ongoing analyses are examining variation in habitat selection across years, diel periods, and spawning seasons to further inform removal strategies.

Stephanie S Maheux and Scott A Pavey, University of New Brunswick. **Detecting Striped Bass, Smallmouth Bass, and Atlantic Salmon in the Miramichi River using environmental DNA.**

Atlantic salmon (Salmo salar) are a species of high economic, ecological and cultural importance across Atlantic Canada (DFO, 2023; Gardner Pinfold, 2011; Pander & Geist, 2010; Samways et al., 2015). However, in recent years the specie's population has been steadily declining, leading to concerns about the future of the species in Canada and around the world (Dadswell et al., 2022). One of the proposed drivers of this population decline, specifically in the Miramichi River, is the increased abundance of striped bass (Morone saxatillis) and smallmouth bass (Micropterus dolomieu) (S. Andrews et al., 2019; Daniels et al., 2018; Falkegård et al., 2023, O'Sullivan et al., 2020). It has been suggested that populations of striped bass and smallmouth bass may be predating upon the smaller and more vulnerable juvenile salmon, decreasing the overall abundance of the already depleted population (Daniels et al., 2018; Falkegård et al., 2023). Environmental DNA (eDNA) is a method of species monitoring that involves obtaining genetic material from the environment rather than from an individual (Deiner et al., 2017; Thomsen & Willerslev, 2015). eDNA can be used to map the distribution of a given species (Deiner et al., 2017; Thomsen & Willerslev, 2015). Over the course of this project, winter eDNA samples were taken across the Miramichi River and combined with data previously collected in spring and fall of 2017, 2018 and 2024 to determine species' distribution.

Nicholas Maleski, Angelica Vazquez Ortega, Peter Gorsevski and Carlos Soto, Bowling Green State University. **Edge Of Field Monitoring of Agricultural Fields Amended with Dredged Sediments.**

The Western Lake Erie Basin (WLEB) has been facing annually recurring harmful algal blooms (HABs) since 2003, primarily driven by an increase of bioavailable phosphorous and nitrogen created from agricultural runoff. On July 1, 2020, Ohio passed legislation to ban open water disposal of dredged sediments (DS) into Lake Erie. Open water disposal could potentially reintroduce high concentrations of nutrients into the water column, which may intensify HABs. These regulations have created a need to identify alternative uses for DS. Prior greenhouse and field studies have suggested that DS is effective as a soil amendment for agricultural fields. However, the

effect the DS as a soil amendment has on the environment, specifically nutrient exports and water quality, has not yet been explored. In the WLEB watershed, edge of field monitoring has been successfully utilized to evaluate the effect of various agricultural best management practices on nutrient export. This research aims to quantify event based and seasonal surface runoff and dissolved nutrient losses from tile drainage using edge of field monitoring to determine P and N load into waterways. Additionally, it evaluates the effects of DS and soil compaction on the health and yield of cash crops (corn and soybean). The findings of this study will provide valuable insight into the effectiveness of DS as a soil amendment and its influence on nutrient exports into waterways.

Nicholas Mandrak, University of Toronto Scarborough. **Elections and Endangered Species.**

Globally, endangered species have always taken a backseat to economic issues. This has been particularly true since the onset of the COVID pandemic. In an effort to offset the fallout of the pandemic and other economic pressures, North American governments have been viewing environmental protections as impediments to economic recovery and progress. Although not part of election platforms, newly elected governments have recently put endangered species in their crosshairs. In the United States, the government is threatening to weaken the Endangered Species Act. Actions to weaken endangered species protections in Ontario have been more concrete. In 2024, the provincial government proposed sweeping changes to the Endangered Species Act (ESA). In 2025, in response to opposition to the proposed changes, the province rescinded the changes and, in Bill 5, proposed to scrap the ESA altogether and replace it with a Species Conservation Act that excluded most aquatic species. Furthermore, the province passed Bill 212 that exempted the Highway 413 project, which will impact over 20 endangered species, from environmental assessment, and the federal government has passed its own major projects bill (Bill C-5) to exempt designated projects from environmental legislation. The plight of the Endangered Redside Dace in the Greater Toronto Area exemplifies the real impact of these changes.

Nicholas Mandrak, University of Toronto Scarborough. **Aquatic Science and Education Across the Borders in the Laurentian Great Lakes: Past, Present, and Future.**

Given shared resources and stressors, and federal, provincial, and state jurisdictions, the science-based management of the Laurentian Great Lakes requires a trans-disciplinary and trans-boundary approach. This was first formally recognized by the Boundary Waters Treaty (1909), followed by the Convention on Great Lakes Fisheries (1954), and the Great Lakes Water-Quality Agreement (1972, 2012). Although these are binational agreements, they do not necessary support collaborative, trans-boundary approaches to science and education. The binational Great Lakes Fishery Commission (1955) does support collaborative binational research, particularly as it relates to the management of fisheries and aquatic ecosystems. As research teams often include both American and Canadian academics, there is a trans-boundary education element by default, if not by design. I have been involved in several binational projects, primarily related to aquatic invasive species, most of which have been primarily funded through single institutions and emphasized science rather than education. Currently, the funding sources that have facilitated binational projects in the past are dwindling. Going into the future, there is an urgent need for mechanisms to fund trans-disciplinary and trans-boundary approaches to aquatic science and, particularly, education, to address existing and emerging issues such as microplastics, contaminants, invasive species, urban ecology, and climate change. A collaborative Great Lakes curriculum could facilitate a renewed interest in trans-disciplinary and trans-boundary approaches to emerging issues through the training of the next generation of Great Lakes managers.

Nathan Manning, National Center for Water Quality Research, Heidelberg University. **Lake Erie Tribs: Updates from the Heidelberg Tributary Loading Program.**

The Heidelberg Tributary Loading Program (HTLP) is one of the longest continuously operating water quality monitoring programs in North America. The National Center for Water Quality Research at Heidelberg University has been operating water quality monitoring stations in the Lake Erie watershed since 1974. The HTLP started with the Maumee and Sandusky Rivers and has expanded over the years to include 23 monitoring sites across Ohio and Southeast Michigan, 16 of which are in the Lake Erie watershed. The long period of record, and high frequency nature of these data sets provide unique insights into how water quality constituents respond to management actions at the seasonal, annual and decadal time scales. This presentation will provide updates for the 2025 water year and 2026 early spring loads and flow-weighted mean concentrations for the Lake Erie tributaries monitored by the NCWQR. We will put recent trends in context with changes to river discharge, and how recent patterns compare to previous decades. Additionally, we will discuss how the Lake Erie tributaries compare to the Ohio River and Grand Lake St. Marys sites.

Julius Manyala[1], Joyce Nyeko[2], Ogello Erick[3], Kishekelwa Tchalondawa[4], Phiri Harris[5], Nkalubo Winnie[1] and Ngochera Maxi[6], [1]Lake Victoria Advisory Group, [2]Lake Albert and Edward Advisory Group, [3]Lake Turkana Advisory Group, [4]Lake Kivu Advisory Group, [5]Lake Tanganyika Advisory Group, [6]Lake Malawi/Nyassa/Niassa Advisory Group. **Toward Resilient African Great Lakes: a Five-Year Strategy for Science-driven Governance and Sustainability.**

The Strategic Plan for the African Great Lakes Advisory Groups (2026-2030) presents a coordinated framework for strengthening science-based governance, regional cooperation, and sustainable management of Africa's seven major lake systems—Victoria, Tanganyika, Malawi/Nyasa/Niassa, Turkana, Albert, Edward, and Kivu—shared across ten riparian countries. Developed under the African Centre for Aquatic Research and Education and guided by the Council of Advisory Groups, the plan responds to escalating ecological, socio-economic, and governance challenges driven by climate change, population growth, pollution, overexploitation, and weak transboundary coordination. Grounded in a participatory and evidence-driven planning process, the strategy aligns with African Union Agenda 2063, the Sustainable Development Goals, and regional priorities of EAC, SADC, and IGAD. It advances a shared vision of resilient lake ecosystems that sustain biodiversity, livelihoods, and equitable development through collaborative research, policy engagement, capacity strengthening, and sustainable financing. The plan is organized around five interlinked strategic goals advancing science and innovation, strengthening institutional and community capacity, enhancing resource mobilization, promoting ecosystem sustainability and climate resilience, and deepening governance and partnerships. These priorities are implemented through targeted programmes, coordinated delivery, and risk management frameworks.

Julius Manyala[1], Alfred Achieng[2] and Akwenda Francis[1], [1]Jaramogi Oginga Odinga University of Science and Technology, [2]University of Toronto. **AI-Artificial Neural Networks (ANN) for Ecological Modelling of Rastrineobola argentea in Lake Victoria.**

Lake Victoria, the world's largest tropical lake, underpins food security, livelihoods, and economic development for 40 million people in East Africa. The ecosystem faces escalating pressures from overfishing, eutrophication, invasive species, climate variability, and rapid socio-economic change. Conventional ecological and fisheries models, largely linear and parameter-intensive, have struggled to adequately capture the complex, nonlinear interactions that characterize Lake Victoria's coupled human-natural system. Application of Artificial Neural Networks (ANNs) as an innovative, data-driven approach for ecological modelling of Rastrineobola argentea catches in

Lake Victoria was attempted for the first time. ANNs are well suited to integrate heterogeneous datasets, including fisheries catch and effort statistics, water quality measurements and climate projections, and to identify patterns and thresholds that are difficult to detect using traditional methods. The production modeling of R. argentea in Lake Victoria obtained the best ANN architecture of 10-9-1 based on environmental data and 12-6-1 based on fish catch statistics with 25 hidden layers and 30 hidden layers respectively. Rainfall accounted for 37% of the multinomial variation, followed by fisheries development (33%) and the lake level (17%). Importance of fisheries development accounted for 71.1% and species interaction with Lates (15.6%), Haplochromis (6.6%) and Bagrus (4.2%). It is demonstrated that AI-based approach can support sustainable fisheries, climate resilience, and blue economy objectives in the Lake Victoria, while contributing to SDGs 13 (Climate Action) and 14 (Life Below Water).

Benjamin Marcy-Quay[1], Daniel Hall[1], Katherine Bemis[2, 3], Katriina Ilves[4] and Margaret Docker[5], [1]U.S. Geological Survey, [2]National Systematics Lab, NOAA Fisheries, [3]National Museum of Natural History, Smithsonian Institution, [4]Canadian Museum of Nature, [5]University of Manitoba. **Treasure in the stacks? Evaluation of sea lamprey museum specimens as a genomic resource.**

The invasion of sea lamprey (Petromyzon marinus) into the Great Lakes, Finger Lakes, and Lake Champlain occurred in the late 1800s to early 1900s and caused ecological and economic devastation to fisheries. Since the development of selective lampricides, sea lamprey populations have reduced by 90% from peak abundances. However, these treatments are not 100% effective at killing all larval lamprey in streams, which provides opportunities for adaptations to arise within surviving individuals. Detecting the signatures of such adaptation is critical to ensuring continued control but requires an understanding of pre-control baselines. Unfortunately, the period from the introduction of sea lamprey into the Great Lakes and other large inland lakes preceded modern understanding of genomics, and thus samples were not preserved with DNA integrity in mind. However, that period was characterized by widespread scientific collecting, with preserved specimens deposited in museum collections throughout (and even beyond) the species' native and introduced ranges. Such specimens have historically been used in morphological, geographical, and ecological studies, but were previously assumed too damaged for genetic analyses. Here we present a pilot study to: 1) evaluate whether recently developed techniques for DNA extraction from historical (in many cases formalin-preserved) tissue can produce informative genomic data and 2) create a unified catalog of sea lamprey specimens currently residing in museums. Results show strong promise for leveraging historical specimens in contemporary genomic studies.

Nevaeh Marshall[1], Madeline Nyblade[1], Erica Wood[1], Dave Arquette[2], Neil Patterson[1], Robin Kimmerer[1], Abigail Guinan[1], Tusha Yakovleva[1], Catherine Landis[1], Colin Beier[1] and Stewart Diemont[1], [1]SUNY ESF, [2]Haudenosaunee Environmental Task Force. **Climate Change Impacts on Plants in Haudenosaunee Homelands Across the Eastern Great Lakes Region.**

Indigenous Nations throughout the Eastern Great Lakes Region are experiencing rapid climate-driven ecological changes that threaten plants essential for food, medicine, and lifeways. Despite global recognition of Traditional Ecological Knowledge (TEK) in biodiversity conservation, Indigenous perspectives remain underrepresented in climate adaptation science and policy. Building on priorities identified at the 2018 Voices from Maple Nation: Indigenous Women's Climate Summit, this project advances an Indigenous-led research agenda in support of cultural plant protection and restoration guided by TEK and mainstream science. To do this, we first identified a preliminary list of plants from available academic and cultural literature, noting the frequency of occurrence. From this list of culturally referenced plants (CRP), we mapped outputs from Natural

Resources Canada (NRC) models predicting plants' future habitat suitability under future climate scenarios. Specifically, we created comparative maps of current and future habitat suitability to identify locations where losses and gains in climate suitability were likely to occur. We also convened Indigenous environmental leaders across Haudenosaunee homelands to identify ecological research needs and co-develop adaptation approaches such as Indigenous-led nurseries, biocultural restoration, refugia, and traditional tending practices. Next steps include reviewing and adjusting our CRP list based on Haudenosaunee TEK and refining our habitat suitability maps with land use/land cover data, in order to develop more practical outputs that can inform Indigenous-led conservation projects.

André L Martel[1], Annie Paquet[2], Sarah Steele[1], Romy Léger-D'Aigle[3], Jill Heinerth[4], Nancy Binnie[5], Mark D'Aguiar[6], Simon Jacques[7], Laélien Bassi[3], Colin Rennie[8], Katriina Ilves[1] and Hans-Frédéric Ellefsen[3], [1]Canadian Museum of Nature, [2]Ministère de l'Environnement, de la Lutte contre les changements climatiques, de la Faune et des Parcs, [3]Minist`ère des Pêches et Océans, [4]Cave Diver, Royal Canadian Geographical Society, [5]SCUBA diver volunteer, retired Senior Conservation Scientist, [6]Department of Fisheries and Oceans, [7]Ministère des Pêches et Océans, [8]Department of Civil Engineering, University of Ottawa. **Hickorynut and other unionid mussels thriving among fluvial dunes of the Ottawa River.**

Knowledge of the benthic ecology of native freshwater mussels (Unionida), including preferential habitats of species at risk (SAR), is key to the conservation of this declining fauna. As part of a multidisciplinary study aimed at investigating the connectivity between the Hickorynut mussel and its putative host fish, the Lake Sturgeon, this research examined and described a preferential habitat identified by preliminary SCUBA diving surveys (2014) as a 'hot spot' for this mussel in Canada. This habitat corresponds to a vast network of fluvial dunes (primarily transverse) of 0.5 to 3+ m height at 2 to 15+m water depth on a sand substrate, located in the lac Coulonge reach of the Ottawa River. During 2019 & 2022 abundance of the endangered Hickorynut and other mussel species composing this unionid community was examined by snorkelers and SCUBA divers who deployed 100-m long transects (n=84) and 1m^2 quadrats (n=1,562). Intensive diving and data collecting led to a detailed description of an important habitat for the Hickorynut. Species present included, by decreasing order of abundance, Eastern Elliptio, Plain Pocketbook, Hickorynut, Eastern Lampmussel, Black Sandshell and Triangle Floater. Hickorynut were most abundant on the slipface and trough areas of the dune (commonly 1-7 ind./m2). Results show that the Hickorynut thrives, as does the Lake Sturgeon, in the deep waters of the dynamic fluvial dunes of the Ottawa River.

Graham Matheson[1], Michael Rennie[1] and Evan McCaul[2], [1]Lakehead University, [2]Ontario Parks.
Trophic Ecology of Lake Sturgeon (Huso fulvescens) in a Historically Diverted Watershed.

River fragmentation can significantly alter freshwater ecosystems, impede fish movement, and threaten fish populations that rely on long river runs for their migration. When fragmentation occurs, previously contiguous fish populations may become isolated, and ecosystem-level processes such as food web structure can be affected. While the impacts of fragmentation on fish migration and reproductive success are relatively well-characterized, less is known about how community-level interactions and food web structure are affected. Whitewater Lake is located upstream of the Ogoki Diversion - which bisected the Ogoki River watershed and acts as a barrier for fish passage between the two segments - and was commercially fished in the 20th century. A whole-lake food web study using stable isotope analysis of carbon and nitrogen was conducted in Whitewater Lake, with Lake Sturgeon (Huso fulvescens) - a species at risk - being the focal species of the research. A non-lethal

sampling protocol for Lake Sturgeon was completed, with additional sampling for other fish species, benthic invertebrates, and zooplankton. Research was conducted in partnership with Ontario Parks and Whitewater Lake First Nation, whose local Indigenous knowledge-keepers worked with researchers to identify sturgeon foraging behaviour, feeding areas, and species interactions. Preliminary results suggest that Lake Sturgeon are still recovering from the anthropogenic impacts of the fishery and the diversion, and that small benthic macroinvertebrates are the major source of energy for Lake Sturgeon in this system.

Jean-Michel O. Matte[1], Guillaume Dauphin[2], Cindy Breau[2], Carole-Anne Gillis[3], Ilias Hani[4], Normand Bergeron[4] and André St-Hilaire[4], [1]Geoprocess Research Associates, [2]Fisheries and Oceans Canada, [3]Gespe'gewa'gi Institute of Natural Understanding, [4]Institut National de la Recherche Scientifique - Centre Eau Terre Environnement. **Fifty years of size-at-age change in juvenile Atlantic salmon and environmental drivers.**

Quantifying the effects of climate change on juvenile salmonid body length across large spatiotemporal scales is challenging due to complex biological processes and methodological constraints. Here, we analysed changes in size-at-age of juvenile Atlantic salmon cohorts over the past 50 years in the Miramichi and Restigouche rivers (Canada) and their relationships with environmental factors. We developed a novel age-structured hierarchical model extending the von Bertalanffy growth framework to incorporate environmental parameters and age-specific cessation of winter growth. Model predictions indicated that end-of-season size increased across all life stages from 1970-2021 in the Restigouche River, but declined marginally in the Miramichi River. This contrast may reflect the warmer thermal regime of the Miramichi, which is less favourable for growth. However, incorporating temperature metrics, density, and discharge into the growth parameter K did not improve model performance. Similarly, end-of-season size was negatively related to fish density but showed no clear relationship with temperature metrics or discharge, despite substantial differences in thermal regimes between rivers. Overall, while observed size trends broadly aligned with expectations under climate warming, explicitly linking these patterns to temperature-dependent growth was challenging at this spatial and temporal scale, likely reflecting the influence of additional ecological processes.

Julie Maurer[1], Wilson Melendez[2], James Pauer[3], Christian Coffman[4], Tom Hollenhorst[5] and Anna Hess[5], [1]Oak Ridge Institute of Science and Education Fellow, Office of Applied Sciences and Environmental Solutions, U.S. Environmental Protection Agency, [2]General Dynamics Information Technology, U.S. Environmental Protection Agency, [3]Office of Research and Development, U.S. Environmental Protection Agency, [4]Department of Biostatistics, University of Minnesota, [5]Office of Applied Science and Envionmental Solutions, U.S. Environmental Protection Agency. **Application of Multiple Models to Understand Nearshore Phosphorus Dynamics in Lake Ontario.**

Despite successful nutrient reduction efforts in the Great Lakes, local eutrophication persists in critical nearshore areas such as the southern nearshore of Lake Ontario. Mechanistic models are aiding the understanding of nutrient transport and retention dynamics in the Great Lakes to inform resource management. In this study, we quantified differences between three models, a simple TP model connected with two different hydrodynamic models (EFDC, FVCOM) and a full ecosystem model, in simulating the transport and fate of total phosphorus (TP) in the southern nearshore of Lake Ontario. Simulations for three loading scenarios ran from April 1st to October 1st of 2018 and model differences were quantified statistically and graphically against data. The simple TP model connected with FVCOM simulated less TP accumulation in the southern nearshore, and faster nearshore-offshore mixing, while the ecosystem model simulated the highest nearshore TP

concentrations and slower mixing under all scenarios. Comparing two hydrodynamic models, connected to a simple TP model, exemplified the effect of hydrodynamic grid resolution and structure and circulation differences on TP fate and transport in Lake Ontario. Comparing the simple TP model and ecosystem model highlighted the effect of lower food web processes and water chemistry on TP accumulation. This presentation demonstrates the benefits of applying a multi-model approach to address nearshore-offshore nutrient dynamics in Lake Ontario. The views expressed in this presentation may not represent the views/policies of the USEPA.

Noa Mayer[1], Jacey Van Wert[2], Terra Dressler[3], Kim Birnie-Gauvin[4], Shaorong Li[5], Marika Gale[6], Kristina Miller[5], Erika Eliason[5], Michael Russello[1] and Scott Hinch[1], [1]UBC, [2]NOAA, [3]Stillwater Sciences, [4]Technical University of Denmark, [5]DFO, [6]Freshwater Fisheries Society of British Columbia. **Physiological and genomic evidence of differential thermal performance in Kokanee salmon (Oncorhynchus nerka).**

Pacific salmon (Oncorhynchus spp.) are highly vulnerable to climate-driven freshwater warming due to their narrow optimal temperature ranges, exposure to elevated temperatures during rearing and migration, and limited capacity to extend upper thermal tolerance. We evaluated aerobic scope, critical thermal maximum, genomic stress signatures, and infectious agent prevalence across a 12-24 °C gradient for three Kokanee salmon (O. nerka) populations (Coldstream, Mission, Norbury). We constructed a high-throughput Kokanee Fit-Chip, a suite of biomarker panels activated under specific stress or disease states, to assess how environmental conditions affect physiologically important stock-specific metrics such as thermal stress and immune function. We also examined whether gene expression signatures and infectious agent load aided in explaining both individual variation and population differences in metabolic rates. Populations showed strong differences in thermal tolerance: 100% mortality occurred at 22 °C for Coldstream and 24 °C for Mission, while Norbury fish had higher survival (50% mortality at 24 °C). Coldstream and Mission fish carried higher infectious-agent burdens, had greater probabilities of thermal and hypoxic stress, and exhibited lower maximum metabolic rates and reduced aerobic capacity relative to Norbury. Fish also showed rapid, short-term increases in thermal tolerance following ~20 h acclimation, highlighting rapid plasticity. Overall, this work provides new insight into mechanisms shaping thermal performance, disease vulnerability, and resilience among declining O. nerka populations, informing future conservation and management under climate change.

Cassidy Mazur, **Noelle Wood**, Matthew Klachefsky, Lisa Peters, Morgan Anderson, Dilber Yunus, Serene Parenteau and Sarah Warrack, IISD-Experimental Lakes Area. **Inclusive programming inspiring youth through freshwater science.**

Our goal for this presentation/workshop will be to understand how we engage and intertwine knowledge from our Indigenous Partners, as well as how we have tailored several outdoor educational youth programs supporting marginalised youth, women/girls, as well as culturally and linguistically diverse (CALD) communities. At IISD-ELA we believe in the power of engaging youth directly in with the outdoors, using hands-on, science and placed based learning to inspire an interest and motivate youth to examine the world around them, kickstarting the process of lifelong learning. We will explore three outdoor education programs created: MeDLEY (Monitoring eDNA and learning ecology with youth); ELSE (Experimental Lakes Student Experience); and LEAF (Learning at ELA about Freshwater), their successes, failures. Some of the topics we will discuss are how to use science to interact with the environment, conducting an independent research project and communicating their findings in a scientific poster to their local community. We will discuss recruitment strategies, how we tailor our programs and supports we have in place for marginalized

youth, women/girls, and CALD communities. We integrate career exploration using tests, expert roundtables and mentorships, supporting youth in the outdoor sector as they transition from school to the "real world". Through outdoor education and science exploration, ultimately supporting marginalized youth, women/girls, and CALD communities, we are creating space for everyone creating a more inclusive outdoor sector.

Oliver Jolezya Hasimuna[1, 2], Sahya Maulu[3], **Joyce Mbewe**[1] and Elvis Simpanzye[4], [1]Palabana University ZM, [2]Lecturer/ Researcher/ Ag. HoD - Aquaculture and Fisheries Sciences School of Agricultural Sciences Palabana University, [3]Centre for Innovative Approach Zambia (CIAZ) ZM, [4]Kapasa Makasa University ZM. **Assessment of the essential mineral composition of red claw crayfish (cherax quadricarinatus) as a potential natural mineral source for aquafeeds.**

The study inspected the essential mineral composition of the whole-body of the red claw crayfish, Cherax quadricarinatus a widely and highly considered invasive species globally, to understand the distribution and physiological importance of these elements. Mineral concentrations were analyzed for phosphorus (P), calcium (Ca), copper (Cu), selenium (Se), iron (Fe), and zinc (Zn). The results showed that phosphorus was the most abundant mineral, with a high mean concentration of 2.86 g/kg and minimal variation (CV: 0.404%), highlighting its critical role in exoskeleton development and metabolic processes. Calcium was the next most abundant, with a mean of 0.643 g/kg and consistent levels (CV: 6.47%), indicating its stable physiological function in the organism. Trace minerals, including copper (mean: 0.137 g/kg), selenium (mean: 0.377 g/kg), and zinc (mean: 0.0333 g/kg), were present in lower concentrations but with moderate variability. In contrast, iron exhibited a high degree of variability (CV: 79.6%), suggesting potential fluctuations influenced by environmental or physiological factors.

Kevin McCann, University of Guelph. **Trophic Hotspots, Spatio-Temporal Variability and Resilience.**

Here, we start by arguing that while food web ecology has historically focused on a static framework for understanding the structure and functioning of ecosystems, the threat of a changing climate has pushed us to embrace spatio-temporal variation, and with it the role variation itself plays in ecosystem stability and functioning. Towards this, we generalize existing ideas from ecology to argue that within this non-equilibrium framework, landscapes are inherently replete with spatio-temporally variable **trophic hotspots** -- often driven by physical and/or biological processes -- whereby strong differentials in productivity spatially drive species to aggregate (e,g,, via a birdfeeder effect) fueling powerful, and relatively understudied, trophic interactions. With this definition, we then catalog diverse examples of trophic hotspots before drawing from recent conceptual advances to argue that some key properties of these hotspots (potentially separating natural from anthropogenic hotspots) may be central to maintaining an ecosystem's adaptive capacity and therefore its resilience and overall functioning in a changing world.

Gregory K. McCullough[1], Chelsea Lobson[2] and Karl Friesen-Hughes[2], [1]University of Manitoba (retired), [2]Lake Winnipeg Foundation. **Leveraging Community-Based Monitoring data with land use information to explain phosphorus export from small watersheds.**

Community-based monitoring programs employ local volunteers and partners to respond promptly to snowmelt or rainfall events, making it possible to collect timely, hydrologically-based water samples in multiple small watersheds spread over large regions. The Lake Winnipeg Community-Based Monitoring Network (LWCBMN) measures phosphorus concentrations at over 100 Water Survey of Canada hydrometric stations for WSC sub-watersheds in southern Manitoba,

and provides phosphorus export (kg P/ha/y) for most of these subwatersheds. There are now over 7 continuous years of record for about half of these stations, with annual export ranging from near zero to 4 kg P/ha/y. Here, we leverage the LWCBMN dataset with potential forcing factors, including annual discharge, land type and use, phosphorus application (synthetic and manure fertilizer) and waste water effluent reported by the Canadian Agricultural Census and other agencies, to investigate the causes of variability in phosphorus export from these watersheds.

Matt McDougall, Prairie Scientific Inc. **Incorporating Inuit Qaujimajatuqangit (IQ) into scientific program design and decision making in Nunavut.**

The Kivalliq Inuit Association (KIA) has worked with Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC) and the Nunavut General Monitoring Plan (NGMP) to establish an aquatic cumulative effect monitoring program (CEMP) with the ongoing support of Kivalliq communities, including Rankin Inlet, Baker Lake, Chesterfield Inlet, Whale Cove, Arviat, Coral Harbour and Naujaat. The aim of the CEMP is to address core questions of community concern: Is the water safe to drink? Are the fish safe to eat? The program unites the principles of Inuit Qaujimajatuqangit (IQ) with scientific data collection to create a comprehensive monitoring framework. By working closely with local communities and Inuit governments and through interviews with Elders and community members, Traditional Knowledge is embedded in the project and supported by rigorous environmental sampling and analysis. This collaborative approach ensures that both scientific data and Indigenous perspectives guide decision-making, providing Nunavummiut with meaningful, reliable information about their environment.

Hayley McIlwraith, Chelsea M. Rochman, Susan Debreceni and Hannah De Frond, University of Toronto Trash Team. **Local cleanup as a tool for monitoring, pollution prevention, and pollution removal.**

To reduce plastic pollution, actions are needed at global scales, such as reducing plastic production and improving waste management. However, local-scale action is also needed to identify and prevent local sources of plastic pollution and clean up legacy plastics. We (the University of Toronto Trash Team), with PortsToronto, began trapping trash in the Toronto Harbour in 2019 to inform local solutions in our city. Our program, powered by trash traps and manual skimming, is used as a monitoring tool and centerpiece for outreach and education. As a monitoring and research tool, our cleanup data documents litter in Lake Ontario, tracks trends over time, identifies prominent sources, informs student-led pollution prevention projects, and documents the efficacy of solutions to reduce inputs. As an outreach tool, our trash traps promote awareness and increase waste literacy to shift behaviours towards more sustainable plastic consumption. Through cleanup, we remove hundreds of thousands of plastic pieces from the waterfront annually—preventing negative interactions between wildlife and plastic pollution. Through our work, we have galvanized a community of stakeholders, influenced policies in the Great Lakes, and transformed our program into the Toronto Inner Harbour Floatables Strategy—a collaborative strategy of diverse partners working together to reduce plastic pollution in Lake Ontario. We amplified this work globally by co-founding the International Trash Trap Network to collect global data and motivate local strategies across the world for greater impact.

Rebek Jody-lynn[1], Ahmed Aziz[1], Maria Alejandra Pascagasa Usaquén[2], Kamran Abbasov[1], **Amber McKay**[1] and **Courtney Vaughan**[3], [1]Algoma University, [2]Manitoba University, [3]Lakehead University. **The place of the rapids: Strengthening intercultural relationships and collective care of Nibi (water) at Bawaating.**

Anji Inaashkawun ("waves of change" in Anishinaabemowin) is an initiative based in Sault Ste. Marie, or Baawaating ("the place of the rapids"). We focus on strengthening intercultural relationships for the collective care of Nibi (water) health. This presentation shares the results of Phase 1 (recently published in the Journal of Great Lakes Research), where residents of the region share a strong sense of shared responsibility for water health and the need for enhanced community-based actions. Building on these findings, we share the emerging objectives and outcomes of Phase 2.Guided by an Advisory Circle of local Knowledge Keepers, this project seeks to build bridges between Indigenous, Settler, and Newcomer water advocates and aims to grow a broader culture of caring for the water in the Bawaating/Algoma region. Through relational approaches such as community events, sharing resources, creative storytelling, education, and supporting innovative regenerative economies, our team focuses on community-based approaches and establishing circles of care for the local environment and connecting waterways. Ultimately, our research explores the role of ceremony, art, play, and time on the land as key tools in building reciprocal and respectful relations with all forms of life and healing. We will share our process of connecting and creating relationships to support others seeking similar co-learning experiences and co-developed land and water care.

S. Morgaine McKibben, NASA Goddard Space Flight Center / Science Systems Applications Inc.
NASA's hyperspectral PACE mission: Advancing space-based aquatic applications.

Launched in February 2024, the NASA Plankton, Aerosol, Cloud, ocean Ecosystem (PACE) satellite provides a novel set of daily, hyperspectral and polarimetric Earth observation capabilities that are unmatched by any other satellite platform, public or private. PACE's primary sensor, the Ocean Color Instrument (OCI), is an imaging spectrometer that measures properties of light from the ultraviolet (UV, 340 nm) through visible and near infrared (NIR, 895 nm) portions of the electromagnetic spectrum in 1.25 to 2.5 nm steps at 5 nm resolution, plus 7 shortwave infrared (SWIR) bands. Observations from OCI are moderate spatial resolution (1.2 km), enabling a revisit time of 1-2 days. Specialized to observe the world's oceans, PACE also covers coastal zones and large, inland freshwater systems such as the Great Lakes. PACE's continuous, synoptic imaging spectroscopy enables next-generation water resources monitoring and management tools for water quality, fisheries, harmful algal bloom detection and more. In this presentation we will provide an overview of the PACE mission, its capabilities, and provide examples of PACE data in action in freshwater and coastal zones. Our PACE Applications program supports the translation of PACE's novel observations to actionable, trusted tools through cross-sector partnerships and community support. We will provide an overview of this program and resources to get involved through our Community of Practice, Early Adopters Program, and information-sharing and co-production events that we plan throughout the year.

Dylan McNay[1], Adrian Vasquez[2], Xiangmin Zhang[3] and Jeffrey Ram[1], [1]Wayne State University, [2]Mercer University, [3]ByteGen LLC. **Discovery of beetles in diets of vernal pond water mites using next generation sequencing techniques.**

Vernal ponds are isolated ephemeral water bodies, lacking fish, that play an integral role in Great Lakes watersheds by capturing runoff, reducing floods, and slowing dispersion of nutrients, sediments, and contaminants into nearby tributaries. They support diverse food webs while improving water quality and resilience across the Great Lakes. Palmer Park in Detroit, Michigan, contains multiple vernal ponds. We aimed to evaluate the role of water mites, which are poorly studied predatory microinvertebrates, in Palmer Park vernal pond food webs and to assess their utility in studying vernal pond biodiversity. We compared cytochrome oxidase I (COI) barcode

sequences of vernal pond invertebrates to water mite gut DNA next generation COI sequences. COI barcodes identified three water mite taxa in the ponds as Parathyas sp., Hydryphantes waynensis, and Hydryphantes sp., the latter differing genetically from H. waynensis by 11.6%. Next generation COI barcodes revealed multiple invertebrate COI sequences in water mite diets, including DNA from worms, mosquitoes, midges, crustaceans, flies, and beetles. Beetle taxa identified directly in the ponds or through diet-detected barcodes included Copelatus glyphicus, Acilius sp., and Hygrotus sayi. Diet analysis revealed taxa and novel barcodes not observed through traditional sampling, highlighting the value of water mites for community characterization. These results support the hypothesis that water mites are opportunistic predators, uniquely report beetles in their diets, and emphasize their ecological importance and utility in assessing vernal pond biodiversity.

Darcy McNicholl, Natalie Koopman, Laurissa Christie and Karen Dunmall, Fisheries and Oceans Canada. **A food web for the decade: Temporal variation in trophic structure of coastal fishes during 2014-2024 in a western Canadian Arctic MPA.**

The Arctic is changing at an accelerated rate as increasing temperatures, sea-ice loss, and shifting trophic interactions reshape the marine ecosystem. Ubiquitous environmental change is exacerbated by our limited understanding of natural variability within habitat use of endemic species, particularly among remote coastal habitats. The importance of establishing long-term trends in basal carbon ($\delta^{13}C$) and trophic position ($\delta^{15}N$) among species is essential to interpret if a trophic shift is in response to direct effects of environmental change, range-expanding species, or is the natural variability in niches occupied by endemic species. Here, we examine a decade of trophic data gathered among coastal fishes of the Anguniaqvia Niqiqyuam Marine Protected Area between 2014 and 2024 and use stable isotopes to determine the extent of change among dietary niches, within species and among trophic groups (e.g., anadromous piscivores, marine benthivores, pelagic planktivores). Using these dietary niches, we can examine species resiliency and the extent of coupling as a measure of trophic stability. Focusing on key quantifiable indicators, developed with the leadership of Indigenous partners, is essential to monitoring coastal ecosystem changes in ecologically and culturally important areas across the Canadian Arctic.

Amelia McReynolds[1], Ellen Marsden[1], J Michael Jech[2], Lars Rudstam[3], Mark Henderson[1, 4] and Jason Stockwell[1], [1]University of Vermont, [2]National Oceanic and Atmospheric Administration Northeast Fisheries Science Center, [3]Cornell University, [4]United States Geological Survey. **Vessel avoidance by pelagic forage fishes during acoustic/trawl surveys conducted with a hybrid-electric research vessel.**

Acoustic/trawl surveys of small pelagic fishes in large lakes inform fisheries management but are potentially subject to biases due to vessel avoidance behavior. Alewife (Alosa pseudoharengus) are sound-sensitive and occupy the near-surface blind zone, thus are particularly vulnerable to these biases. Conversely, rainbow smelt (Osmerus mordax) occupy deeper water and are less sensitive to sound. We conducted an in situ experiment to quantify vessel avoidance of these two species in Lake Champlain using a hybrid research vessel operating under either diesel or electric propulsion. We hypothesized that alewife would exhibit the strongest avoidance behavior when the vessel is trawling under diesel propulsion. The experiment was repeated during early and late thermal stratification and under full and new moons to assess the impact of environmental conditions. Two autonomous upward-looking acoustic platforms (Kongsberg WBAT with 70-and 200-kHz transducers) were used to measure fish before, during, and after vessel passage. Our preliminary results suggest that fish density, depth, swimming speed and direction did not significantly change as

the vessel passed. In similar studies in the Laurentian Great Lakes, alewife avoided survey vessels in Lake Ontario, but not in Lake Michigan or Lake Huron. While vessel avoidance may impact survey estimates in some cases, we did not find evidence of a consistent, significant bias in acoustic survey estimates of alewife or rainbow smelt in Lake Champlain.

Nathan Medinski, Tristan Sparks, Scott Cope and Braydi Rice, Shuswap Band. **Bull Trout Movement and Habitat Use in the Columbia River Headwaters Region of Southeastern B.C.**

Movement patterns and seasonal habitat use by Bull Trout in the Columbia River headwaters region is not well understood, leaving a gap in our understanding of important areas to focus conservation and fisheries management efforts. Shuswap Band has embarked on a multi-year radio telemetry project to address this knowledge gap. We radio tagged 20 Bull Trout in the Columbia Headwaters region (Columbia Lake, Dutch Creek and Columbia River) in 2025, allowing us to track fish to spawning and overwintering locations, many of which were unknown prior to implementing this project. Further, we identified a location on the landscape where large mature Bull Trout hold downstream of a movement barrier prior to spawning that is open to fishing harvest, though the majority of the creek that is accessible to migratory fish is subject to catch-and-release regulations. This study also allowed us to identify sources of suspected mortality, including predation by bears and angler harvest. Applying this knowledge, we are engaging with provincial fisheries management colleagues to recommend angling regulation changes that ensure fish are protected in areas where they are highly susceptible to harvest. Future work will include monitoring movement and seasonal habitat use in other lakes, wetlands and streams in the upper Columbia basin, genetic stock identification, and developing thermal suitability models based on Spatial Stream Networks analysis.

Zach Melnick[1], Yvonne Drebert[1], Andrew Muir[2], Erin Dunlop[3] and Ryan Lauzon[4], [1]Inspired Planet Productions, [2]Great Lakes Fishery Commission, [3]Ontario Ministry of Natural Resources, [4]Chippewas of Nawash Unceded First Nation. **When the Boat Is Rocking: ROV Observations of Lake Whitefish Spawning Under Rough Surface Conditions.**

Direct observation of lake whitefish (Coregonus clupeaformis) spawning in the wild is rare due to nocturnal timing and challenging late-season weather conditions. In 2021, we documented the first known in situ visual record of lake whitefish spawning using remotely operated vehicle (ROV) technology. In the two years that followed, repeated ROV deployments documented pre-spawning behaviours but did not capture additional spawning events. During extended ROV-based field work (Nov. 24-Dec. 5, 2025) on Lake Simcoe, ON., we captured multiple lake whitefish spawning events and noted a consistent pattern in lake conditions preceding spawning events. Spawning was observed only during periods of intense wind (16-34 kts) and wave action (>1 m), across a range of water temperatures (7.37-5.00C). During calm conditions, no gamete release was observed, even when aggregations of lake whitefish were present and displaying pre-spawning behaviour. The accessibility of Lake Simcoe allowed repeated observations across a range of weather conditions, which, in addition to a greater lake whitefish abundance, likely contributed to the video capture of more spawning events than our previous efforts. Our observations highlight the importance of ROVs for documenting fish spawning and provide new context for advancing our conceptual model of spawning behavior in this important species. Our work contributes to a growing body of visual evidence that can inform spawning habitat assessment and fisheries management.

W. Robert Midden[1], Mary Ellen Klukow[2], Corbin Kohart[1], Genna Hunt[1] and Lauren Kinsman-Costello[2], [1]Bowling Green State University, [2]Kent State University. **Geostatistical Optimization of Soil Sampling Regimes in Wetlands Using Variograms and Kriging.**

Soil processes contribute to wetlands effects on watershed transport of phosphorus and nitrogen. Soil in wetlands is spatially heterogeneous. Thus, an important question for evaluating the function of soil in wetlands is where and how many samples must be collected to generate an estimate of soil chemical composition with the desired level of confidence. Fifty-five soil samples were collected on a uniform grid of approximately 1/3 hectare area (i.e., 40m X 80m) in four wetland pools of different soil types, hydroperiods, and locations in northwest Ohio. Samples were analyzed for indices of phosphorus and nitrogen content. Empirical variograms that illustrate parameter spatial co-variance were produced for each dataset. Ordinary kriging was used to generate a map of 10,000 points of predicted parameter values. Subsets of the kriged values were selected from the kriging results by randomly choosing one point from each cell in grids of different cell numbers ranging from 2 to 100 laid on the full kriging map. 100 subsets of samples were selected for each grid size. Summary statistics were calculated for each selected subset and compared to the those of the kriging predictions and the actual high-density soil samples. Differences in means and medians were used to determine the optimum distribution and minimum sample numbers needed to achieve the desired level of confidence in soil parameter estimates. This guides design of cost-effective wetland soil sampling regimes.

Brock Mihell[1], Dak de Kerckhove[2], Chris Parrish[3], Mery Martinez Garcia[1] and Tom Johnston[2], [1]Laurentian University, [2]Ontario Ministry of Natural Resources, [3]Memorial University. **Gamete quality and reproductive performance in relation to adult traits in Lake Trout.**

Sustainable fisheries management requires adequate protection of the spawning stock. For iteroparous species, understanding which age and size classes of the spawning stock contribute most to recruitment is essential for establishing selective harvest guidelines. However, the relationships between gamete and offspring quality and the age, size and condition of adult fish remain poorly understood for many species. We examined gamete quality and spawning success in relation to adult traits for Lake trout (Salvelinus namaycush), a slow-growing, iteroparous piscivore, from two lightly-exploited northern populations with diverse adult age distribution. Reproductive traits analyzed included testes size, spermatocrit, and sperm velocity for males, and ova size, ova lipid content and composition, and embryonic survival for females. Embryonic survival was determined by incubating egg batches of individual females under controlled conditions. Adult traits for both sexes included age, body size, growth rate and indices of body condition. Preliminary results indicate that ova size tends to increase with female age and that embryonic survival is more variable among younger females than older females. Analyses for both sexes are ongoing. Our results will advance our understanding of reproductive strategies in long-lived, iteroparous fishes and have implications for conservation and management of lake trout populations, particularly in the context of harvesting rules and broodstock management for fish culture programs.

Edward Millar, Aaron Fisk and Katelynn Johnson, University of Windsor. **Linking Community Science, Real-Time Observation, and Algae Monitoring in Lake Erie.**

Seasonal harmful algal blooms (HABs) are a persistent problem in Lake Erie, and one of the water quality issues that resonate most deeply with local residents. Despite advances in cyanobacteria monitoring, forecasting, and public communication, knowledge gaps remain in how outreach strategies are experienced, interpreted, and engaged with by community members. HABs are a pressing concern for residents, but the observing systems used to detect them are typically deployed

offshore and out of public view, creating barriers for direct public engagement. The Real-Time Aquatic Ecosystem Observation Network (RAEON), based out of the University of Windsor, implements sensor buoys in Lake Erie to support hypoxia forecasting and to develop an early warning system that alerts local water utilities to potential bloom conditions near drinking water intakes. Data are publicly available through the Great Lakes Observing System (GLOS)'s Seagull, a user-friendly open access data platform visualizing live lake conditions. Observations made by community scientists contribute to RAEON's initiative, but the links between baseline water quality parameters and algae can appear abstract to volunteers. This presentation describes efforts to bridge this gap by integrating community science with public education materials and art-based engagement strategies. Together, these approaches aim to make offshore observing systems and bloom processes more tangible, visible, and accessible to the public, strengthening connections between community science, real-time data, and lake management.

Madeleine Milne[1], Chelsea Rochman[2], Scott Higgins[3], Matthew Hoffman[4], Diane Orihel[5], Jennifer Provencher[6], Michael Rennie[7] and Michael Paterson[1, 3], [1]University of Manitoba, [2]University of Toronto, [3]International Institute for Sustainable Development - Experimental Lakes Area, [4]Rochester Institute of Technology, [5]Queens University, [6]Environment and Climate Change Canada, [7]Lakehead University. **Effects of microplastics on the freshwater plankton food web in a whole-lake manipulation experiment.**

Microplastics have demonstrated effects on organisms in laboratory settings, but their impacts at population, community, and ecosystem levels are largely unknown. Using a whole-lake manipulation experiment conducted at the International Institute for Sustainable Development - Experimental Lakes Area (IISD-ELA) in Ontario, Canada, we examined the effects of microplastics on a freshwater planktonic food web, including phytoplankton and zooplankton, and a dominant invertebrate predator of zooplankton, Chaoborus spp. The experiment was designed as a before-after-control-impact study with seven years of data collected from an unmanipulated, reference lake, and a manipulated, impact lake. During each year of the manipulation period, 330 billion microplastics were added to the impact lake. Phytoplankton in the impacted lake during the manipulation had a statistically significant reduction in biomass and changes in species composition compared to the reference lake and baseline period. The biomass of zooplankton did not change from the pre- to post-addition periods in the experimental lake but increased in the reference lake, suggesting possible effects. A significant shift in the size distribution of the Chaoborus spp. population was observed in the manipulation period, resulting in a decrease in the lengths of Chaoborids and in population biomass following the addition of microplastics to the impact lake. Together, these effects suggest that planktonic organisms are vulnerable to impacts from microplastics in the environment, causing changes that could potentially impact the rest of the food web.

Nicole Mischuk, Government. **The Lake Winnipeg Freshwater Ecosystem Initiative.**

Through the Lake Winnipeg Freshwater Ecosystem Initiative (LW FEI), the Canada Water Agency is working to improve the health of Lake Winnipeg and its basin through investments that advance science, support partner-led action, and accelerate nutrient reduction—particularly phosphorus. This presentation will outline our science-to-action approach, highlighting how local science and information is driving efforts to explore more targeted nutrient reduction strategies, including partner-led on-the-ground action, innovation, and knowledge mobilization, and describing how partnerships with governments, Indigenous peoples, academics, industry, and non-governmental organizations are being leveraged to maximize impact. The presentation will also

discuss efforts to advance aquatic ecosystem health reporting for Lake Winnipeg and the Lake Winnipeg Basin that is informed by diverse perspectives and supports the needs of various stakeholders and decision-makers.

Neil Mochnacz[1], Matthew Guzzo[1], Margaret Docker[2] and Daniel Isaak[3], [1]Fisheries and Oceans Canada, [2]University of Manitoba, [3]United States Forest Service. **Integrating adaptive capacity alters outcomes when modelling effects of warming on a cold-water fish.**

Local species distributions are often geographically restricted to a subset of environmental conditions across a species' full range, complicating forecasting climate warming effects. Bayesian species distribution models (SDM) can leverage geographically restricted datasets with broader knowledge of habitat relationships across the species' range, to forecast climate vulnerability. Principles of niche tracking and niche expansion were explored using an innovative Bayesian SDM approach to refine a climate vulnerability assessment for a cold-water fish. A spatially dense fish occurrence and stream temperature dataset was used to model how climatic and geomorphic factors influence the current and future distribution of bull trout near its northern range extent. To assess niche tracking, wherein modelled relationships were based on observed occurrence patterns, we fitted the SDM with uninformative priors. For niche expansion, which assumes the population can adjust to occupy a warmer niche, we added an informative prior for summer stream water temperature occupancy. Models projected effects of warming on habitat suitability using Representative Concentration Pathways 4.5 and 8.5 emissions scenarios for 2061-2080. Distribution was patchy and limited to intermediate thermal and slope conditions in streams with high groundwater contributions. Under niche tracking, suitable habitat is projected to decline by 36-46%, while under niche expansion, suitable habitat could increase by 25-28%. The large dichotomy between projections illustrates the importance of considering local features and adaptive capacity in climate vulnerability assessments of northern fishes.

Ashley Moerke[1], Cecilia Heuvel[1], Michael Twiss[2], Robert McKay[3], Bo Liu[1], Jon Doubek[1], Britt Ranson-Olson[1], Chris Weisener[3], Christine Madliger[2], Bill Dew[2], Allison Snyder[4] and Kevin Kapuscinski[1], [1]Lake Superior State University, [2]Algoma University, [3]University of Windsor, [4]US Coast Guard Great Lakes Oil Spill Center of Expertise. **Seasonal multi-trophic level effects of light crude oil in simulated coastal wetlands.**

Great Lakes coastal wetlands face ongoing oil spill risk, but seasonal ecological responses to oil in these important freshwater ecosystems is poorly understood. We investigated the seasonal, multi-trophic level effects of light crude oil on food webs in coastal wetlands of the Laurentian Great Lakes using a 24-tank outdoor mesocosm facility adjacent to the St Marys River. Two 30-day experiments were conducted in 2025, one in summer (June-July), and another in fall (October), to evaluate seasonal differences in ecosystem responses to crude oil contamination. Each tank received sediment, unfiltered river water, aquatic emergent plants, aquatic invertebrates, and five bluntnose minnows (Pimephales notatus). One of four treatments was applied to each tank in both experiments to replicate a surface spill of light crude oil (none, 0.02 g/L, 0.1 g/L, and 1% of a high-energy water-accommodated fraction [oil:water ratio of 1:120]). Over a 30-day exposure, we assessed treatment- and season-specific differences in (1) water quality, (2) phytoplankton and epiphyton biomass, (3) composition of phytoplankton, zooplankton, and benthic microbial communities, and (4) diets, condition, and mortality in aquatic invertebrates and fish. Collectively, our results will inform future experiments, advance understanding of ecological effects of oil spills, inform risk assessment models, and enhance spill preparedness, response, and damage assessment in the Great Lakes region.

Audrey Moffett, Marianne Bachand, Émile Chouinard, Gabriel Poirier, Rémi Gosselin, Patrice Fortin, Olivier Champoux and Jean Morin, Environment and Climate Change Canada, National Hydrological Service, Hydrodynamics and Ecohydraulics Services, Quebec City. **How Modeling Aquatic Ecosystems Helps Address Water Level Management in Rainy-Namakan System.**

Located west of Lake Superior along the Canada-U.S. border and flowing into Lake of the Woods, the Namakan Chain of Lakes (reservoir), Rainy Lake, Rainy River, and their surrounding shorelines form a large hydrological system directly affected by water-level control structures (dams), one above Kettle Falls and another at International Falls. Water management has shaped the Rainy-Namakan system for more than a century and has evolved to meet multiple interests, including ongoing effort to better represent environmental, socio-economic, and First Nation and Metis considerations. Modeling tools developed since 2016 by a hydrodynamic and ecohydraulic technical team of the National Hydrological Service have created a strong foundation to address how water levels impact aquatic ecosystems in a spatiotemporally explicit manner (Morin et al., 2016). This work became crucial in evaluating the effect of different water management plans (Rule Curves) on the system, defining some 20 ecosystem performance indicators (PIs). Among these, a subset of improved habitat suitability PIs will be examined in greater details, namely Wild Rice, Walleye, and Lake Whitefish. Refining both ecological and underlying physical models, for instance by integrating new field observations from active approach and external collaborations, enable more accurate predictions, therefore guiding future water management decisions that are better aligned with the interests of the local communities.

Roshni Mohan, Ratheesh Kumar C S, Sudha A and Sreejisha U, Cochin University of Science and Technology. **From Fractions to Fluxes: Sedimentary Nutrient Dynamics in Transitional Aquatic Ecosystems.**

Unveiling the spatial and seasonal pattern of nutrient content in aquatic environment is important in assessing the contamination status and the potential eutrophication risk. This study investigates the spatiotemporal variability in concentration and distribution of various fractions of sedimentary phosphorus (P) and nitrogen (N) in Ashtamudi Lake, a Ramsar designated tropical wetland. The results reveal a strong influence of biogeochemical processes on nutrient distribution, with spatial patterns indicating significant inputs from anthropogenic sources, including domestic sewage, agricultural runoff, and industrial effluents. Sediment texture analysis showed a consistent dominance of fine particles (silt and clay) across seasons, favouring nutrient retention. Reducing environment prevailed in the wetland was due to active mineralisation of sedimentary organic matter (OM), substantiated by declined redox potential (Eh) values. The relatively lower average C/P ratio during monsoon and N/P ratio indicated increased P inputs from allochthonous sources. Estimated bioavailable phosphorus (BAP), accounting for ~34-60% of total P, indicates a high potential for sediment-to-water P release under favourable conditions. The statistical analysis (Pearson Correlation, PCA, HCA) endorses that OM enrichment, redox, and sediment grain size jointly control the nutrient variability in the depositional environment. Risk assessment indices highlight pronounced seasonal shifts in nutrient cycling, classifying the wetland as moderately to severely contaminated. The study underscores the importance of fraction-specific nutrient assessment for effective management and protection of Ramsar wetlands under increasing anthropogenic pressure.

Wes Moir[1], Tim Jardine[1], Robert Bailey[2] and Chrystal Mantyka-Pringle[1, 3], [1]University of Saskatchewan, [2]Ontario Tech University, [3]Wildlife Conservation Society Canada. **Looking Back to Move Forward: Tracking Temporal Change in Benthic Macroinvertebrate Communities Under Cumulative Stressors.**

Northern river ecosystems are increasingly affected by overlapping disturbances associated with wildfires and placer mining, yet infrequent sampling in the Yukon makes it challenging to track how these stressors shape freshwater communities through time. Benthic macroinvertebrates (BMI) are widely used as indicators of ecological health because they are sensitive to environmental change. However, they have not been used to detect cumulative disturbance over time in the Yukon, limiting their role in supporting management decisions. In this study, we use a network of stream monitoring sites across central Yukon and the Traditional Territory of the First Nation of Na-Cho Nyäk Dun to track changes in BMI communities from the same sites over a 15-year period. By resampling historical sites, we evaluate shifts in BMI community composition and structure in relation to a cumulative disturbance gradient across the landscape. We also compare temporal change at disturbed and minimally disturbed reference sites to test whether observed shifts exceed natural variability within the region. This will provide a direct assessment of whether community change reflects disturbance or background temporal variation. Results will indicate whether benthic macroinvertebrates are sensitive to cumulative effects in data-limited northern ecosystems. More broadly, this study will support regional land-use planning in central Yukon by improving the tools used to assess cumulative impacts on freshwater ecosystems.

Lewis Molot[1], Jason Venkiteswaran[2], Sherry Schiff[3], Julia Kozak[2], Scott Higgins[4], Sonya Havens[4], Megan Blackwell[5], Helen Baulch[5] and Jeremy Leathers[2], [1]York University, [2]Wifred Laurier University, [3]University of Waterloo, [4]IISD-ELA, [5]University of Saskatchewan. **Impact of Nitrate Additions on Sediment Redox and Cyanobacteria Blooms in Two Lakes at ELA.**

A whole-lake experiment was designed to test the hypotheses that low sediment redox results in cyanobacteria bloom formation and internal ferrous iron (Fe(II)) loading from anaerobic sediments is the immediate trigger. Conversely, high sediment redox prevents bloom formation. Two small oligotrophic lakes, one polymictic (L303) and one deep enough to thermally stratify (L304) were dosed weekly with phosphate (P) in 2019-2025 excluding pandemic years. High doses of nitrate (an oxidizing agent) were added weekly to L303 in 2024 and 2025 and to L304 in 2025. Equivalent amounts of N as urea are planned. Dialysis incubations with ferrozine at the sediment-water interface captured Fe(II) in non-nitrate years but not when nitrate was applied with a few exceptions, inferring effective oxidation of the SWI. Cyanobacteria were not dominant in 2017 (pre-treatment year) but dominated in the first year with P enrichment with more variable responses in subsequent years. In 2023 (non-nitrate year), L303 was unexpectedly dominated by a chlorophyte while cyanobacteria dominated during most of 2024, a nitrate year with unusually low mixing. Cyanobacteria did not dominate the lakes in 2025 (nitrate year). The lakes exhibited some variability - adding only P without N promoted blooms in 5 of 7 lake-years while adding P + nitrate prevented blooms in 2 of 3 lake-years. Hence, oxidation can prevent blooms, possibly through restricting Fe(II) release but other conditions such as turbulence can modify responses.

Brigitte Mongane[1, 2] and Stella Matutina[2], [1]African Women Scientist, [2]Pharmaceutical and Nutrition Scientist. **Comparative Assessment of Preservation Methods for Limnothrissa miodon from Lake Kivu: Microbiological Safety, Nutritional Retention and Biochemical Stability.**

Lake Kivu is one of the African Great Lakes, located on the border between the Democratic Republic of the Congo and Rwanda. Limnotrissa miodon represents an important source of proteins, essential lipids, and micronutrients for the populations living around Lake Kivu. However, its preservation faces numerous challenges related to microbial proliferation, loss of nutritional value, and rapid biochemical degradation due to its high content of polyunsaturated fatty acids and proteins. This study aims to evaluate the effectiveness of different locally used

preservation methods by assessing their impacts on microbiological safety, nutrient retention, and biochemical stability. The preservation methods evaluated include smoking, refrigeration, freezing, salting-drying, and vinegar preservation. For each method, microbiological analyses (fecal coliforms, Staphylococcus aureus, Salmonella, Escherichia coli, sulfite-reducing anaerobes, total aerobic mesophilic flora, yeasts, and molds), nutritional analyses (proteins, lipids, and minerals), and biochemical analyses (moisture content, pH, and total volatile nitrogen) were conducted. The results show significant variations among the preservation methods: some techniques effectively reduce microbial contamination but negatively affect nutritional value, while others better preserve nutrients but present risks of oxidative degradation. This study highlights the need to adopt preservation techniques that are adapted to local conditions while being scientifically optimized, in order to ensure improved food safety and sustainable nutritional quality. It also represents an important contribution to the valorization of local fishery resources and to the reduction of post-harvest losses

Hugo Morin-Brassard[1,2], Emmanuelle Chrétien[3] and Olivier Morissette[1], [1]Université du Québec à Chicoutimi, [2]Groupe de recherche interuniversitaire en limnologie (GRIL), [3]Université du Québec à Rimouski. **Hotspot! Is heat accumulation in urban structure a burden to fish communities?**

Urbanisation in watersheds can alters conditions and integrity of aquatic ecosystems. Riparian and adjacent land use can create environmental modifications, such as Urban Heat Islands (UHIs), resulting in fast increases of water temperature of nearby streams. In our study, we explore the impacts of UHIs on fish community and fish eco-physiological performances. Since temperature is a key driver in aquatic communities, we hypothesise that UHIs significantly impacts fish communities composition. To verify that, we monitored 14 streams, tributaries of St. Lawrence River, in southern Québec, on sites both inside and outside a UHI. We monitored stream temperature, fish communities, riverbank quality and water characteristics to determine if UHIs are a driver of fish communities. To evaluate individual performance, four key species have been targeted. On specimens of those species, isotopic ratios of carbon ($\delta^{13}C$) and oxygen ($\delta^{18}O$) of the otoliths are analysed to assess thermal niche and metabolism. Temperature monitoring showed faster increases in water temperature on UHI sites, up to 3.7 °C in 30 minutes, while paired control sites showed a maximum variation of 1.8 °C / 30 min. This project aims to clarify links between sudden temperature increases and subsequent fish responses, on a community and individual level.

Olivier Morissette[1], Martin Breton[1], Lucas de Fries[1], Pascal Sirois[1], Véronique Nadeau[2], Isabeau Pratte[3] and Julien April[4], [1]Université du Québec à Chicoutimi, [2]Direction générale de la faune aquatique - région nord du Québec, Ministère de l'Environnement, de la Lutte contre les changements climatiques, de la Faune et des Parcs, [3]Administration régionale Kativik, [4]Direction principale de l'expertise sur la faune aquatique, Ministère de l'Environnement, de la Lutte contre les changements climatiques, de la Faune et des Parcs. **Evolutionary dead-end or overlooked strategies of the Hudson Bay Atlantic salmon - the migratory behaviour of the Nastapoka River salmons.**

The occurrences of Atlantic salmon in the rivers draining to the Hudson Bay and the coast of the bay itself are sporadic but persistent. The only drainage confirmed to sustain salmon is the Nastapoka River, a unique northern population composed of fish captured above and below a 35 m waterfall 1 km to the coast. We used otolith chemistry to elucidate the migration patterns and natal origins of salmon captured in this isolated system. We identified two migratory groups; one exhibited short movement to brackish or marine environments, and the second group exhibited strictly freshwater residence above the waterfall. Body condition and putative origins of captured salmon suggest that some specimens may complete their life cycle as anadromous salmon, a

phenomenon never formally identified. Our result then highlights the potential coexistence of partial migration strategies within this population driven by environmental constraints and resource optimization, suggesting hypotheses on the life history of this population concordant with historical reports and local knowledge. We suggest this study should be the first step toward an increased conservation interest, driven by scientific research directed toward Hudson Bay fish populations, a task pioneered by Louis and its team.

Holly Mosco[1], Kristen Cyr[1], Isabelle Tormasi[1], Frankiesha Wright[2], Margaree Salmon Association[3], Patricia Voyer[1], Analisa Lazaro-Côté[4], Kenneth Jeffries[4], Daniel Heath[1] and Christina Semeniuk[1], [1]University of Windsor, [2]Grieg Seafood, [3]Margaree Salmon Association, [4]University of Manitoba.
Epidermal Mucus Swabbing: Field Validating a Non-Invasive Method for Measuring Transcriptional Stress in Juvenile Salmonids.

Lethal sampling techniques have traditionally been used in conservation to assess transcriptional stress responses. However, growing pressure to reduce harm to wildlife, as well as values expressed by rightsholders and stakeholders, have increased the demand for non-lethal sampling methods. Non-lethal sampling allows repeat sampling of individuals, providing opportunities to monitor changes over time, particularly impactful for species at risk. In fish, gill biopsies are a widely used and minimally harmful method for quantifying cellular stress responses. Although gill biopsies do not generally affect survival, communities are increasingly seeking even less invasive techniques, such as epidermal mucus swabs. Previous studies have demonstrated that mucus can be used to quantify transcriptomic gene expression changes with environmental stressors. However, the application of this approach in field studies remains relatively underutilized. Our study compares gill biopsies and epidermal mucus swabs for mRNA profiling to examine stress in juvenile Atlantic Salmon in the Southwest Margaree River, Cape Breton. To assess relative gene expression, we used OpenArray technology to conduct high-throughput qPCRs specifically designed for salmonid gill and mucus. Our results evaluate whether epidermal mucus collected under field conditions yields mRNA of sufficient quality and quantity to assess transcriptional stress responses, and importantly, if gene expression patterns in mucus reflect those measured in gill tissue. Our findings help guide the use of mucus sampling as a minimally invasive tool for monitoring stress in wild salmon populations.

Happiness A Moshi[1], Daniel A. Shilla[2], Ismael A. Kimirei[3], Catherine O'Reilly[4], Bernhard Wehrli[5], Benedikt Ehrenfels[5] and Steven A. Loiselle[6], [1]1. Aga Khan University, Arusha Climate and Environmental Research Centre, Arusha, Tanzania 2. Department of Aquatic Sciences and Fisheries Technology, University of Dar es Salaam, Dar es Salaam, Tanzania, [2]Department of Aquatic sciences and Fisheries technology-University of Dar es Salaam, [3]Tanzania Fisheries Research Institute, Dar es Salaam Headquarters, P.O. Box 9750, Dar es Salaam, Tanzania, [4]Department of Geography, Geology and the Environment, Illinois State University, Normal, IL, USA, [5]Department Surface Waters - Research and Management, Eawag, Swiss Federal Institute of Aquatic Science and Technology, Kastanienbaum, Switzerland, [6]Dipartimento Biotecnologie, Chimica e Farmacia, University of Siena, INSTM, Via Aldo Moro 2, Siena, Italy. **Role of Citizen Science in Monitoring Nutrients Pollution in Lake Tanganyika Coastal Waters.**

Several studies in Lake Tanganyika have effectively employed traditional methods to explore changes in water quality in open waters; however, coastal monitoring has been restricted and sporadic, relying on costly sample and analytical methods that require skilled technical staff. This study aims to validate citizen science water quality collected data (nitrate and phosphate) with those collected and measured by professional scientists in the laboratory. A second objective of the study

was to use citizen scientist data to identify the patterns of seasonal and spatial variations in conditions of nutrient pollution and forecast potential changes based on expected changes in population and climate (to 2050). The results showed that the concentrations of nitrate and phosphate measured by citizen scientists nearly matched those established by professional scientists, with overall accuracy of 91% and 74%, respectively. In both laboratory and citizen scientist-based studies, all measured water quality variables were significantly higher during the wet season compared to the dry season. Climate factors were discovered to have a major impact on the likelihood of exceeding water quality restrictions in the next decades (2050), which could deteriorate lake conditions. Expanding citizen science to more communities on the context of environmental monitoring would raise environmental awareness, inform management and mitigation activities, and aid long-term decision-making.

Lucas Moura[1, 2], Alex Bevington[2, 3], Ian Spendlow[4, 5], Nikolaus Gantner[5, 6] and Eduardo Martins[2, 7], [1]PhD Student, [2]University of Northern British Columbia, Prince George, BC, Canada, [3]Lecturer, [4]Fisheries Biologist, [5]Resource Stewardship Division, Omineca Region (7A), Ministry of Water, Land and Resource Stewardship, British Columbia, Canada, [6]Senior Fisheries Biologist, [7]Associate Professor. **Long-term lake surface temperature trends in the Omineca Region, northern interior British Columbia.**

Lake surface water temperature (LSWT) integrates key physical processes that regulate freshwater ecosystem dynamics, including surface energy budgets and stratification, thereby shaping the growth, abundance, and body size of aquatic species. As LSWT responds to atmospheric forcing and varies with lake-specific attributes, understanding spatiotemporal thermal patterns is essential for predicting the impacts of warming on the trajectories of wild and stocked fish populations. In this context, we analyzed regional warming trends across small lakes (<10 km²) in the Omineca Region of northern interior British Columbia. Our objectives were to: (1) validate satellite-derived summer LSWT against in situ records for long-term monitoring suitability, and (2) quantify spatiotemporal LSWT trends as a foundation for evaluating temperature-driven variation in fish abundance and body size. We matched in situ records (~0.2 m depth) from focal lakes and provincial programs to thermal satellite imagery and used Bayesian spatiotemporal models, incorporating lake morphometry and geographic gradients, to LSWT time series from 687 lakes (1990-2023). Preliminary results showed a strong agreement between satellite and in situ measurements (R = 0.85), with a mean satellite offset of 1.2 °C warmer. Modelled trends indicate consistent regional warming signal, with mean summer LSWT increasing approximately 0.78 °C per decade. These regionally averaged estimates integrate spatial variability among lakes. These findings provide a thermal baseline for subsequent analysis, linking lake-specific LSWT shifts to fish population dynamics and informing regional fisheries management approaches.

Andrew Muir, **Jess Ives** and **Janessa Esquible**, Great Lakes Fishery Commission. **Shared Visions: Building Bridges, Strengthening Relations and Implementing Change.**

This presentation shares staff reflections on the relational approaches that the Great Lakes Fishery Commission (Commission) has taken during the past five years with First Nations and Tribes across the Great Lakes Basin to work toward a shared vision of healthy waters, fish, and communities. These relational approaches center on respect, reciprocity, and responsibility. We share and reflect on our collective efforts to document and highlight Indigenous research priorities and to identify shared visions and goals with Indigenous communities across the basin. This journey entails overcoming key challenges and issues associated with multiple knowledge systems and knowledges and highlights critical opportunities for strengthening and broadening the Commission's

programs and using more collaborative and relational approaches in all aspects of its work. We discuss the evolution of the Commission's research programs and advisory board processes to better assess and understand research needs across the Laurentian Great Lakes basin and to identify key institutional changes required to build stronger science and greater capacity to better care for our Great Lakes. We identify several examples of these cross-cultural and collaborative research initiatives and partnerships across the basin. We welcome input from participants on our approaches and efforts to better serve Indigenous communities, our shared waters, and fisheries in the work supported by the Commission.

Brant Muir[1], Robert Stewart[1], Michael Rennie[1] and Randall Kolka[2], [1]Lakehead University, [2]USDA Forest Service. **Bioretention Treatment & Spatial Prioritization for Fish Habitat Protection in Northern Lake Superior Tributaries.**

Bioretention systems (BSs) reduce stormwater quantity and quality impairments to receiving waters. However, fish habitat requirements are often overlooked. This research incorporates water quality guidelines with BS performance metrics to assess fish habitat protection in urban Lake Superior tributaries. During rainfall events, BSs reduced peak and total discharge by over 85% and suspended solids concentrations by 50 to 65%. Winter snowpack along roadways had up to 46 times higher suspended solids concentrations than reference conditions, underscoring the threats from traffic-derived pollutants in spring. During melt events, BSs reduced peak discharge by 75 to 90%, total discharge by 75 to 80%, turbidity by 5 to 60%, suspended solids concentrations by 85 to 90%, and dissolved organic carbon concentrations by 20 to 40%. BSs did not reduce chloride or nutrient concentrations, highlighting the need to reduce road salt and fertilizer applications to complement BS installations. To determine whether the BSs effectively protect fish habitats, we assessed whether inflow and outflow quality data met established water quality guidelines. We also developed and tested an assessment framework that integrates stormwater quality data and fish habitat scores to prioritize locations where BS retrofits would yield the greatest protection for fish habitat. Collectively, this research demonstrates how bridging stormwater engineering, aquatic ecology, and watershed planning can strengthen the resilience of northern, trout-sensitive Lake Superior tributaries and support more connected, habitat-focused approaches to urban stormwater management.

Andrew Mulligan[1, 2], Rochelle Sturtevant[2, 3], Ashley Elgin[4], El Lower[1, 2] and Elizabeth Striano[1, 2], [1]University of Michigan, [2]Michigan Sea Grant, [3]Michigan State University, [4]NOAA Great Lakes Environmental Research Laboratory Lake Michigan Field Station. **Updated ecological impact history of dreissenid mussels in the Great Lakes.**

Scientific literature detailing the invasion history, ecology, and impacts about the Zebra Mussel Dreissena polymorpha and the Quagga Mussel Dreissena rostriformis bugensis have been widely published in North America since their introduction to the Great Lakes Basins in the late 1980s. The continued study of this biological invasion yields a vast and diverse product catalog, ranging from physical specimen collections to classroom case study workshops. These products are consumed by an equally vast and diverse stakeholder demographic, ranging from conservation managers to schoolchildren. Subsequently, there is strong demand for an effective promotion of equitable ecoliteracy for all stakeholders in the Great Lakes Region. Michigan Sea Grant has been charged to complete a Science Transfer Project synthesizing relevant information to produce communication products that seek to inform stakeholders about the enigmatic ecological and socioeconomic impacts of Dreissenids in the Great Lakes. This project specifically aims to increase audience understanding of how potential altered stable states affect fish production and fishing

levels. Funding for this project has been allocated by the Great Lakes Fisheries Commission. Work will commence in January of 2026. The first goal is to review the latest literature detailing potential Dreissenid impacts on fisheries and update existing Great Lakes Aquatic Non-Indigenous Species Information System webpages with relevant information. This poster will facilitate space for feedback on these updates and next steps.

Espérance Musombwa Kubota[1, 2], Kisekelwa Tchalonawa[1, 2], Luis M.da Costa[3, 4], Djiman Lederoun[5], Philippe A. Lalèyè6[5], Jonathan Brecko[6, 7] and Emmanuel J. W. M. N. Vreven[3], [1]2Centre for Research in Biodiversity, Ecology and Evolution (CRBEC), Bukavu, DRC, [2]1Biology and Chemistry Department, Research Unit in Teaching and Applied Hydrobiology (UERHA), Institut Supérieur Pédagogique de Bukavu, Democratic Republic of the Congo (DRC), [3]Ichthyology, Vertebrates Section, Royal Museum for Central Africa (RMCA), Tervuren,, [4]MUHNAC, Museu Nacional de História Natural e da Ciência (MUHNAC), Universidade de Lisboa, Portugal., [5]Laboratory of Hydrobiology and Aquaculture, Faculty of Agricultural Sciences, University of Abomey-Calavi, Cotonou, Benin, [6]Natural Heritage Collections, Collection Management, Royal Museum for Central Africa (RMCA), Tervuren, Belgium, [7]Scientific Heritage Service, Royal Belgian Institute of Natural Sciences (RBINS), Brussels, Belgium. **New skygazer catfish from Lowa Basin reveals Anoplopterus kivuensis species complex.**

This study used an integrative approach combining morphological and genetic (mtDNA: COI and cytb) data to examine 90 specimens from the Lowa Basin, including some from within and near the Kahuzi-Biega National Park (KBNP). The high-altitude specimens correspond to Anoplopterus kivuensis, while the low-altitude ones represent a new species to science, here described as Anoplopterus kahuzibiegaensis sp. nov. The two species exhibit notable differences in caudal fin shape, fork length, inner mandibular barbel length, anterior-posterior nare distance, colouration, and genetic divergence (COI K2P: 1.6-2.8%; cytb: 2.3-3.3%). The ML tree showed that An. kahuzibiegaensis sp. nov. is a member of what is here referred to as the An. kivuensis species complex, which comprises four sub-clades: A. kivuensis (high altitude); An. kahuzibiegaensis sp. nov. (low altitude); and two tentative new species referred to as An. sp. 'NCA' (low altitude, outside KBNP) and An. sp. 'muhunguzi' (in-between altitude, Tanganyika Basin). Additionally, sexual dimorphism in genital papilla shape was observed during the dry season between high and low altitude species. An IUCN Red List assessment is provided for the new species. Finally, the need for improved conservation of the ichthyofauna of the Lowa Basin and low-altitude rivers of the KBNP is emphasized.

Daniel Mutton[1], M. Altaf Arain[1], Dan Princz[2] and Bruce Davison[2], [1]School of Earth, Environment & Society, McMaster University, [2]National Centre for Hydrology, Environment and Climate Change Canada. **Simulating Insect Driven Disturbance Effects on Forest Carbon and Water Dynamics Using the MESH-CLASSIC Model.**

The MESH-CLASSIC is a coupled hydrologic and biogeochemical model comprising the Mod´elisation Environmentale Communautaire Surface and Hydrology system (MESH) and the Canadian Land Surface Scheme Including Biogeochemical Cycles (CLASSIC) models. MESH-CLASSIC provides capabilities to investigate the impact of hydrologic processes on biogeochemistry, specifically carbon cycle at the site and catchment scales. In this study we incorporated an insect infestation module in the MESH-CLASSIC model to represent the three most common infestation types in North America including spongy moth defoliation (BD), spruce budworm defoliation (NLD) and pine beetle tree killer (NLK). The model was then validated on three eddy covariance flux tower forest sites across North America that experienced their respective

infestations to evaluate model performance in simulating carbon exchanges and to investigate how the infestation impacted hydrology (streamflow) at these sites. When run with the infestation, carbon fluxes closely matched observations, vastly improving the simulations at flux tower sites, including the long-term recovery of forest health after the NLK infestation. Results also showed the clear relationships between defoliation and evapotranspiration and lateral flow. Insect infestation is a growing concern across the world under changing climate. By developing the next generation of coupled hydrologic and ecosystem model, this work will help to investigate the full dynamics of infestation impacts on forest carbon and water cycles and their feedbacks.

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Nathan Nadeau and M. Altaf Arain, School of Earth, Environment & Society, McMaster University. **Assessing the Flood Vulnerability in the City of Hamilton, Ontario Under Different Scenarios of Climate Change.**

Climate change and the increasing frequency and intensity of extreme weather events have heightened the risk of severe flooding across Southern Ontario and the Great Lakes region. These risks are projected to grow further in the coming decades as rising temperatures intensify the hydrologic cycle, leading to greater economic and environmental impacts. As a result, the ability to identify areas that are vulnerable under a range of future climate scenarios has become essential for effective long-term planning. This study develops a research framework to assess flood vulnerability in the City of Hamilton, Ontario, using the Flood Vulnerability Index (FVI) and climate projections from the Coupled Model Intercomparison Project Phase 6 (CMIP6) data across multiple future climate scenarios. Study findings indicate that the most vulnerable locations are those situated near major water bodies, rivers, and streams—particularly areas around Spencer Creek and the Lake Ontario shoreline in Downtown Hamilton. These regions are expected to face increasingly severe flood events over time. Without substantial intervention from planners and decision-makers, these high-risk areas may become increasingly susceptible to overwhelming flood impacts. The insights from this research aim to guide future investments in resilient infrastructure and support policies that mitigate the growing threat of flooding and associated damages.

Frank Nansereko, Mbanawe Ndyahwerwa, Nicholas Muzahura, Elias Muhumuza, Colleb Nuwahereza, Rebecca Dushimimana, Stephen Sekiranda and Samuel Bassa, National Fisheries Resources Research Institute (NaFIRRI). **Post COVID-19 impacts of the Upper Victoria Nile Fisheries.**

The Upper Victoria Nile is a habitat for diverse fish species of conservation importance, among which are the Cichlids Haplochromis simotis and Oreochromis variabilis, and the Cyprinid Labeo victorianus that contribute significantly to local livelihoods and food security. The COVID pandemic of 2019-2021 disrupted livelihood strategies, market dynamics, and fisheries governance, which were anticipated to have altered fishing regimes with a potential implication on fishing effort and catches. This study assessed the post-COVID how fishing effort influenced catch trends of fish species of conservation concern in the Upper Victoria Nile. Fish catch data were collected pre and post covid from Upstream, Reservoir, and downstream of the Bujagali Hydro power project, using effort and monitoring catch survey, quantifying fishing effort, gear types, and fishing frequency. Catch biomass was analysed alongside effort indicators to assess spatial and temporal patterns, while species compositions were examined. During the pandemic, there was an official ban on movements which could have affected the fisheries; however, there was no observable difference in the catch

despite likely dipartites in the market, fishing continues in the riparian communities' fishery. These findings underscore the need for management measures that prioritize regulating fishing effort and gear use to sustain fish biomass while conserving species diversity in the Upper Victoria Nile.

Margret Bintu Nanyanzi, Ministry of Agriculture, Animal Industry and Fisheries. **Upstream and Downstream Controls in Lake Victoria Fisheries to Improve Market Access Strengthening.**

Lake Victoria is Uganda's most important inland fishery and a vital source of food, employment, and economic security for millions of people. However, despite its high productivity, there remain numerous challenges specifically with enforcement and regulation. Weak enforcement systems and limited surveillance capacity exacerbated by Illegal, unreported, and unregulated (IUU) fishing, all enhance the upstream challenges. Further, poor infrastructure and weak handling practices create significant barriers to market access in the downstream. Very few landing sites have reliable electricity, cold rooms, clean water, or sanitary facilities. Nevertheless, regional initiatives are also empowering more than 5,000 women in the small-fish value chain across East Africa to adopt improved processing technologies, reduce post-harvest losses, and increase incomes. This study aims to strengthen upstream and downstream control mechanisms in the Lake Victoria fish value chain to improve market access, product quality, and incomes for fish-dependent communities. We shall specifically asses fish factory compliance and fisheries inspector capacity across Lake Victoria; map landing sites practices, hygiene and cold-chain gaps; pilot targeted intervention including training, infrastructure, digital traceability; and ultimately develop policy and operational recommendations for scaling effective regulatory controls on Lake Victoria.

Hassan Nazari[1], Lara Puetz[1], Margaret Docker[1] and Sara Good[1,2], [1]University of Manitoba, [2]University of Winnipeg. **A Multi-Tissue Genomic Perspective on Metamorphosis in Sea Lamprey: Insights into Stage-Specific Genomic Regulation.**

Given its complex life history, the sea lamprey serves as a valuable model for studying the molecular and morphological reprogramming that occurs during metamorphosis from a filter-feeding larva to a parasitic juvenile. Furthermore, better understanding of metamorphosis in this invasive pest could contribute to alternative or supplemental control strategies in the Great Lakes. Although many of the core genes regulating metamorphosis in sea lamprey have been identified, comprehensive genome-wide analyses of the molecular changes occurring across tissues are lacking. We characterized transcriptomic profiles at two major developmental stages (pre-metamorphic larvae versus metamorphosed individuals) across four tissues (brain, gonad, liver, and intestine). Analysis of global transcriptomic profiles revealed highly coordinated molecular changes across the liver, intestine, and brain in particular. KEGG enrichment pathway analysis highlighted extensive restructuring of metabolic processes, including lipid, carbohydrate, and amino acid pathways, as well as pathways associated with immune responses, apoptosis, and cellular signaling. Tissue-specific analyses emphasized the liver as a central node for lipid and hormone metabolism, the intestine for immune and digestive remodeling, the brain for neurodevelopmental and endocrine integration, and the gonad for energy metabolism and structural reorganization. Further examination of five major signaling pathways (thyroid hormone, PI3K-Akt, MAPK, insulin, and apoptosis) demonstrated pronounced tissue-specific regulation, with contrasting patterns between neural and hepatic/digestive organs. Overall, the results indicate that coordinated molecular reprogramming, including apoptosis, occurs prior to the onset of visible metamorphosis.

Bryan Neff, University of Western Ontario. **Bluegill sunfish: three decades of genetic insights into mating, parental care, and hybridization.**

Louis Bernatchez was a formative influence on my scientific career, serving as a mentor during my graduate studies, when we first met in Guelph at my first conference, and then continuing as a valued colleague throughout my time as faculty member. In his honour, I present a retrospective of my lab's research on bluegill sunfish, a model system that has yielded fundamental insights into mating systems. Our early work pioneered microsatellite-based paternity analysis in wild fish populations, developing novel primers and analytical frameworks at a time when such molecular tools were technically demanding. These methods revealed remarkable patterns of cuckoldry and multiple mating, driven by alternative reproductive tactics. The methods also revealed that parental males dynamically adjust their parental care in response to perceived paternity. We subsequently explored the genetic architecture underlying the tactics, including brain transcriptional profiles associated with male reproductive phenotypes and the hormonal mechanisms mediating paternal behaviour. Our hybridization studies revealed that reproductive tactics drive asymmetric gene flow between sunfish species, with bluegill sneaker males facilitating interspecific mating. Throughout this journey, the collaborative spirit and rigorous approach to evolutionary questions that Louis exemplified has shaped how my lab investigates the interplay between genetics, behaviour, and fitness. This body of work stands as testament to the power of integrating molecular tools with field-based ecological research. An approach Louis championed throughout his distinguished career.

Alex Neumann[1], Tao Xu[1], Maria Dittrich[1], Yasasi Fernando[1], John Gibson[1], Ramin Farnood[1], David Depew[2] and George Arhonditsis[1], [1]University of Toronto, [2]Environment and Climate Change Canada. **Modeling Internal Phosphorus Loading and Iron-P Binding in Hamilton Harbour: A Predictive Environmental Engineering Tool.**

Eutrophication in freshwater ecosystems often persists even after external phosphorus (P) reductions, driven by internal P loading from sediments. This study presents a sediment diagenesis process-based model applied to Hamilton Harbour, Lake Ontario, to investigate the impact of declining external P and iron (Fe) inputs over three decades. The model simulates P-Fe interactions, revealing that despite reductions in external nutrient loading, internal P loading has increased since the 2010s due to the diminished capacity of Fe to bind P and the release of legacy Fe-bound P. The model predicts a transition from slow to faster sediment diagenesis, where elevated internal P release continues to affect hypolimnetic P concentrations and phytoplankton biomass at moderate levels. This work demonstrates the model's potential as an environmental engineering tool for predicting the dynamics of P binding with iron, offering insights into sediment nutrient cycling and water quality management. By predicting P-Fe interactions, the model serves as a robust tool for guiding remediation strategies in eutrophic systems, enabling better-informed decision-making for sustainable water management and ecosystem restoration. Its broader applicability in predicting sedimentary nutrient dynamics makes it valuable for engineering applications in water quality improvement.

Elizabeth Arango Ruda[1], Donna Small[1], Randy Kirby[1], George Arhonditsis[2] and **Alexey Neumann**[2], [1]LTVCA, [2]University of Toronto. **Spatial and Temporal Dynamics of Phosphorus in Agricultural Subwatersheds Draining to Lake Erie.**

Excess phosphorus loading is a concern for water quality in the Thames River watershed. In consequence, the Lower Thames Valley Conservation Authority (LTVCA) monitors water quality at several tributaries to aid phosphorus reduction efforts. Preliminary analyses revealed considerable spatial and interannual variability in mean total phosphorus (TP) concentrations from 2016 to 2024.

These concentrations ranged from 0.03 mg L^{-1} at Cruickshank Creek to 0.42 mg L^{-1} at McGregor Creek, and even up to 0.52 mg L^{-1} at Big Creek. TP concentrations generally peaked in May, likely due to fertilizer application and snowmelt, and again in September during the harvest period. Annual TP loads calculated at seven sites with available flow data ranged from 675.5 ± 255.8 kg yr^{-1} at Jeannettes Creek Upstream to 49,461.8 ± 14,588.3 kg yr^{-1} at McGregor Creek. The Thames River at Thamesville exhibited an interannual mean TP load of 431,353.0 ± 211,190.4 kg yr^{-1}. McGregor Creek and Big Creek had the highest areal TP loads, averaging 3.04 and 2.02 kg ha^{-1} yr^{-1}, respectively, and have been prioritized for best management practice (BMP) implementation. Correlation analyses demonstrated strong associations between TP concentrations and various land use factors. These findings highlight the importance of targeting high-risk subwatersheds to effectively reduce nutrient loading to Lake Erie and support LTVCA's watershed management objectives.

Seth Jarrett[1], Stephen Jacquemin[2], Haley Hoehn[2], Morgan Jutte[2], Nick Ray[3] and **Silvia Newell**[1], [1]University of Michigan, [2]Wright State University Lake Campus, [3]University of Delaware. **Nutrient removal and greenhouse gas tradeoffs in a restored wetland in a highly agricultural midwestern watershed.**

Grand Lake St. Marys Watershed in northwestern Ohio is the second most toxic drinking water source in the U.S. due to persistent harmful algal blooms, leading to a state of Ohio distressed watershed designation in 2011. A suite of best management and conservation practices have been implemented across the watershed, including wetland restoration. This study investigated nutrient processing by one restored, >40-acre wetland along the Burntwood Creek tributary, including denitrification, greenhouse gas production, and phosphorus burial. Water discharge was measured continuously and inflow and outflow concentrations weekly. Nutrient and gas fluxes were measured via intact sediment core incubations every other month. Within the first two years of construction, this site was able to process ~5 percent of the 2023 annual stream volume, and ~8.8 percent of the 2024 annual stream volume. Over the two-year period, TP and TN nutrient loads were reduced by 129 kg and 6,030 kg, respectively, by capturing 171 million gallons of flow. When inflow nitrate concentrations were high, denitrification rates above 1 mmol/m^2/hr were observed, but rates were very low in summer during low flow (and sulfide production was observed). While the wetland was a sink for CO_2, CH_4, and N_2O in spring, it was a strong source in winter.

Teika Newton and **Meghan Mills**, Lake of the Woods Water Sustainability Foundation. **The Rainy-Lake of the Woods International Multi-Agency Arrangement: Facilitating Cooperative Action for Water Quality Restoration.**

The International Multi-Agency Arrangement enables Canadian, American and Indigenous water resources agencies in the Lake of the Woods and Rainy River watershed to work collaboratively across the border to enhance and restore water quality and address the most pressing challenges facing aquatic ecosystems in this watershed. The IMA structure fosters interagency and international relationship-building among its nearly 30 participating partners, facilitating cooperation, collaboration and leveraging capacities and expertise. Agency partners participate and take action in line with their respective missions. The IMA includes a working group of agency managers and a technical advisory committee of field personnel and resource management experts who contribute to subcommittees focused on planning and action to address key priorities related to water quality, nutrients, contaminants, aquatic invasive species (AIS), and collaborative water quality monitoring. A novel model for Canada - U.S. transboundary water resources management, the IMA is convened by

the Lake of the Woods Water Sustainability Foundation, a Canadian registered charity dedicated to watershed sustainability planning and action. Recent IMA successes in watershed-wide interagency water quality monitoring, AIS prevention, and water quality restoration will be highlighted.

My Nguyen, Tri Nguyen-Quang, Kateryna Hushchyna, Kayla McLellan and Devleena Sahoo, Biofluids and Biosystems Modeling Lab (BBML), Faculty of Agriculture, Dalhousie University.
Spatial-temporal proliferation of Harmful Algal Blooms (HAB): A hydrodynamic modelling case-study of Torment Lake (TL), Nova Scotia.

Harmful algal blooms (HABs) have become an increasing environmental and public health concern in freshwater systems across Nova Scotia and other regions of Canada. This study investigates the spatial-temporal dynamics of HABs in Torment Lake (TL), Nova Scotia, using an integrated hydrodynamic modeling framework. The three-dimensional AEM3D model was applied to simulate lake circulation, thermal stratification, and phytoplankton dynamics by incorporating bathymetry, meteorological forcing, and water-quality processes. Model outputs were validated against field observations, including chlorophyll-a (Chl-a) concentrations and cyanobacterial biomass collected during 2017 and 2025 monitoring campaigns. Results show strong agreement between simulated and observed Chl-a ($R^2 = 0.97$, RMSE = 15.24 $\mu g\ L^{-1}$), indicating high model reliability. Meteorological forcing, particularly solar radiation, was identified as the primary driver of summer thermal stratification, creating stable surface conditions favorable for cyanobacterial growth. Despite the shallow depth of TL (~8 m), stratification develops under low wind mixing and elevated surface heating, supporting bloom persistence. Seasonal simulations indicate that cyanobacterial biomass increases from early summer, peaks in mid-summer, and declines toward autumn as solar radiation decreases. Spatial patterns show that bloom intensity is concentrated in the northern region of the lake, influenced by hydrodynamic transport processes. Overall, the modeling framework effectively captures HAB dynamics and provides a robust tool for predicting bloom risks and supporting water-quality management under future climate change scenarios.

Vivian Nguyen[1], Andrew Howarth[1], Jennifer Holzer[1], Flavio Affinito[2], Lara Cornejo[3], Jacqueline Hamilton[2], Samantha Howard[3], Kiirsti Owen[4], Christine Beaudoin[5], Albana Berberi[1], Valerie Berseth[6], Allison Drake[1], Acacia Frempong-Manso[1], Jessika Guay[1], Jenna Hutchen[1], Hanna Kobluk[7], Raul Seles Reyes[6], Gadfly Stratton[8], Duncan Warltier[2], Emily Wells[3], Steven Cooke[1], Laura Tozer[6], Nicole Klenk[6] and Andrew Kadykalo[2], [1]Carleton University, [2]McGill University, [3]Dalhousie University, [4]University of New Brunswick, [5]Universite de l'ontairo francais, [6]University of Toronto, [7]Simon Fraser University, [8]Unaffiliated. **A talk for those curious about working at the social and ecological interface.**

Aquatic scientists are increasingly encouraged to "work across disciplines," yet far fewer are shown what interdisciplinary research actually looks like in practice. While the demand for integrating social and ecological sciences to address complex aquatic and environmental challenges is growing, the capacity to train and support researchers who can work effectively at the social-ecological interface continues to lag. This talk draws on first-hand experiences of researchers integrating social and ecological sciences to explore what interdisciplinary research looks like in practice. It highlights common motivations for pursuing social-ecological work, the challenges and trade-offs encountered along the way, and the intellectual and practical rewards of crossing disciplinary boundaries. The presentation also reflects on different archetype of social-ecological researchers illustrating many pathways to engage at this interface. The talk concludes with practical insights for trainees, mentors, and institutions interested in building and strengthening capacity for interdisciplinary social-ecological research.

Martha Nielsen, Laura Schachter, Bridget Kaemming and Wonsook Ha, U.S. Geological Survey, Upper Midwest Water Science Center. **Water bottling in the US Great Lakes: overview and case studies of Michigan hydrologic impacts.**

Water bottling is a substantial component of the bottled beverage industry in the Great Lakes region of the United States but is sometimes socially controversial. As part of a wider national study, the U.S. Geological Survey (USGS) is studying the hydrologic impacts of water bottling in the Great Lakes region. In Michigan and Wisconsin, applications for water bottling permits have been challenged by the public for economic, cultural, and hydrologic reasons. According to a national USGS bottled beverages facilities dataset, breweries are the dominant type of bottled beverage facility in Michigan and Wisconsin, followed by water bottling, and most facilities of both types use water from municipal supply. Where bottlers directly develop "natural" sources like springs or small local aquifers, controversy often follows. This research seeks to understand the impacts of spring-fed groundwater withdrawals for bottled water in two areas of Michigan and by quantifying the impacts on groundwater levels and streamflow. A two-dimensional, steady-state GFLOW model was used to quantify hydrologic impacts in each of these areas. The analysis shows that in both areas the impacts are very localized. Withdrawals create a small amount of drawdown and reduce streamflow in the immediate vicinity of the pumping. When put in the context of other withdrawals in the model areas, such as public supply and irrigation, pumping for water bottling is relatively small, making up approximately 5% of the total withdrawals.

Shayenna Nolan[1, 2], Juliana Lesage-Corbiere[1, 3], Hanna Sewell[1, 4] and Susan Chiblow[5, 6], [1]Batchewana First Nation, [2]Integrative Biology, University of Windsor, [3]Batchewana Natural Resources Department, [4]Wiiminodoodaadizo Consulting, [5]Garden River First Nation, [6]School of Environmental Sciences, University of Guelph. **Creating an Anishinaabek biocultural stream assessment with Batchewana First Nation.**

Indigenous knowledge and science are largely absent from environmental assessments and freshwater monitoring programs in Canada, despite the federal recognition of Indigenous science as "a distinct, time-tested, and methodological knowledge system that can enhance and complement Western science" (ECCC, 2025). Community-based monitoring (CBM) programs are often advanced by academic, governmental, and institutional actors as a means of addressing Indigenous exclusion from monitoring and assessment. However, these programs frequently reproduce the exclusion they seek to mitigate when Indigenous knowledge is extracted through participation but rarely allowed to shape priorities, indicators, or governance decisions. While Indigenous science does not exist to complement Western science, Indigenous peoples around the world are creating their own biocultural frameworks that center Indigenous knowledge while selectively employing Western scientific tools. Informed by Indigenous-led frameworks globally, this project focuses on the creation of a Batchewana-led biocultural stream assessment protocol for freshwater stewardship and decision-making by the nation. A gathering will be held in Spring 2026 to facilitate discussion on freshwater health, monitoring and assessment, river governance, and restoration. Using an Anishinaabek qualitative research methodology, participant contributions will inform the development of a biocultural protocol to be used alongside scientific tools such as eDNA metabarcoding. Together, these approaches offer insight into freshwater monitoring through multiple ways of knowing.

Michaela Novak, Grand Council Treaty #3. **Territory-Wide Monitoring of Aquatic Invasive Species in Treaty #3: A Collaborative Approach to Stewardship.**

The Grand Council Treaty #3 Territorial Planning Unit (TPU), representing 28 Anishinaabe First Nations, leads aquatic invasive species monitoring initiatives across the Treaty #3 territory—a vast and ecologically diverse region spanning 140,000 km² of Ontario, Manitoba, and the Canada-USA border. Grounded in Anishinaabe cultural laws and relationships with the land, water and spirits, work is guided by principles of respect, reciprocity, and responsibility to future generations.As Treaty #3 is a largely unmonitored and data-deficient region, the TPU's efforts help fill critical knowledge gaps, providing foundational data and leadership for collaborative management. Since 2023, the TPU found novel detections of Zebra Mussels (Dreissena polymorpha) and Phragmites australis populations. These discoveries, including new detections along major transportation corridors and binational water bodies, emphasize the urgency of coordinated responses. Working alongside Treaty #3 communities, provincial and federal governments, and regional partners, the TPU is building a shared understanding of invasive species risks and responses. Together, we engage in mapping, monitoring, and management of multiple invasive species—including Zebra Mussels, invasive Phragmites, Purple Loosestrife, and Flowering Rush. Data is shared across platforms and organizations to empower all partners, support informed decision-making, and prevent duplication of efforts. While respecting Treaty #3 communities' data sovereignty, the TPU ensures accessibility through self-published reports and public platforms such as iNaturalist, EDDMapS, and DataStream. These collaborative efforts are helping build a coordinated, territory-wide response to aquatic invasive species.

Mariana Novello[1], Ana Clara Sampaio Franco[2], Joice Silva de Souza[3], Carolina Mendes Muniz[4], Luciano Neves dos Santos[5] and Bruno Eleres Soares[1], [1]University of Regina, Institute of Environmental Change & Society, Regina, Canada, [2]Estación Biológica de Doñana, Consejo Superior de Investigaciones Científicas, Sevilla, Spain, [3]University of Campinas,Institute of Biology, São Paulo, Brazil, [4]GRECO, Institute of Aquatic Ecology, University of Girona, Catalonia, Spain, [5]Universidade Federal do Estado do Rio de Janeiro, Rio de Janeiro, Brazil. **Darwin's Naturalization Conundrum: Unraveling Amazonian Top Predator Invasion Success Through Phylogeny and Functional Traits.**

The integrity of freshwater ecosystems has been intensely threatened by anthropogenic activities, with non-native species introductions as a key driver of biodiversity loss and ecological disruption, highlighting the need to understand the factors that determine invasion success. Darwin's naturalization conundrum (DNC) links invasion outcomes through two opposing mechanisms: preadaptation (closely related species benefit from shared traits), and naturalization (evolutionary distance reduces competition) hypothesis. We assess DNC to uncover the processes that shape invasion success, focusing on Cichla ocellaris, a top predator amazonian fish widely introduced across South America. To test this, we updated Franco et al. (2021) database of C. ocellaris occurrence and fish assemblage in native and non-native systems. We gathered functional traits from FishBase and FishMORPH, and constructed a phylogeny using Fish Tree of Life. Phylogenetic and functional distances were estimated, summarized with four indices, and analyzed using linear mixed-effects models. Our results reveal that invasion success is driven by a decoupling between phylogenetic and functional dimensions, offering support for both sides of DNC. Invaded assemblages exhibited lower phylogenetic distances between Cichla and native species, suggesting that shared evolutionary history may facilitate passage through environmental filters. In contrast, functional distances were higher in the same communities, indicating reduced niche overlap and competitive pressure. Overall, our findings fill gaps in South American invasion records and

mechanistic studies, providing guidance for predicting and managing biological invasions in biodiversity-rich, data-limited ecosystems.

Madeline Nyblade[1], Daniel Larkin[2], Darren Vogt[3], Rob Croll[4], G.-H. Crystal Ng[2], William (Joe) Graveen[5], Kristen Hanson[5], Hannah Panci[4], Brandon Byrne[4] and Bazile Minogiizhigaabo Panek[2, 6], [1]SUNY ESF, [2]University of Minnesota, [3]1854 Treaty Authority, [4]GLIFWC, [5]Lac du Flambeau Band of Lake Superior Chippewa Indians, [6]Good Sky Guidance. **Climate Change and Declining Manoomin Abundance and Harvests in the Upper Great Lakes.**

Wild Rice (Ojibwemowin: Manoomin; Dakodiapi: Psiŋ; Latin: Zizania palustris) is central to Indigenous lifeways, linking people, water, and land through cultural, nutritional, economic, and spiritual significance. We analyzed 1985-2020 Manoomin stem density and harvest data across the Upper Great Lakes to assess regional trends and climate impacts. Our approach followed Traditional Ecological Knowledge (TEK) and implemented mainstream environmental science methods through a tribal-university partnership. Tribal priorities and TEK guided research questions, hypotheses, and interpretation. Long-term monitoring by the 1854 Treaty Authority and Great Lakes Indian Fish and Wildlife Commission provided 20-34 years of density data from 49 waterbodies and 27 years of harvest surveys. Results from our statistical analysis show higher fall stem density in years with (1) lower early-summer water levels and (2) longer lake-ice duration. Projected trends—warmer winters and increased early-summer precipitation—are associated with reduced Manoomin abundance. In total, off-reservation harvest availability has declined by ~5-7% annually. These declines threaten Indigenous food sovereignty and treaty-protected harvesting rights.

Elizabeth Nyboer[1], Lovin Kobusingye[2], Emma Rice[1], Jonathan Low[1] and Valence Byaruhanga[1], [1]Virginia Tech University, [2]AWFISHNET. **Strengthening resilience in Lake Victoria's fisheries through gender-responsive approaches.**

Freshwater fishing communities are highly vulnerable to a range of interacting environmental, social, and institutional shocks. In Lake Victoria, East Africa, inland fisheries are shaped by complex social, ecological, and governance dynamics that influence access to fish, foods, and factors that strengthen household adaptive capacity. Women play a central role in fisheries through post-harvest processing, trade, and household provisioning, yet they remain marginalized in decision-making and face limited access to key resources that support adaptive capacity. Despite more than half a million women depending on Lake Victoria's fisheries for their livelihoods, the lack of sex-disaggregated research has constrained the development of equitable and effective responses to both environmental change and sudden governance shifts. This talk will explore barriers and opportunities for adaptation among women in Lake Victoria's fisheries. We link livelihood impacts of systemic change, adaptive responses, and perceptions of governance legitimacy to understand how governance across multiple scales can support or erode adaptive capacity of fishing households. We identify pathways for gender-responsive approaches that support agency, organizational autonomy, and locally grounded strategies for navigating ongoing and future shocks in inland fisheries.

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Julia Obuya[1], Christopher Ward[2], George Bullerjahn[1], Dennis Otieno[3], Winnie Owoko[4] and Zadock Omach[5], [1]Bowling Green State University, [2]University of Massachusetts Dartmouth, [3]University of Windsor, [4]Kings College London, [5]Stony Brook University. **Linking Cage Aquaculture Intensification to Phytoplankton Dynamics in Winam Gulf, Lake Victoria.**

Cage aquaculture has emerged as a key protein source, supplementing capture fisheries under increasing demand. In Kenya, Winam Gulf has particularly experienced intensification of floating cages due to its sheltered bays and ease of access from the shoreline. However, installations of these cages can act as localized disturbance structures that enhance habitat heterogeneity and influence microbial processes in the nearshore environments. This study presents baseline findings from a desktop review of cage aquaculture operations in Winam Gulf. The desktop data synthesizes existing records from government agencies and published sources to provide information on total cage numbers, cage types, construction materials, dimensions, spatial distribution, stocking densities, fish feed types, and production cycles across major cage farming areas in the Gulf. In addition, water samples for phytoplankton analysis were collected from cage aquaculture farms at Dunga and Ogal beaches in Kisumu County, which have recently experienced fish-kill events. The goal is to examine how cage aquaculture operational characteristics shape phytoplankton diversity in cages and control sites. We hypothesize that these characteristics will influence phytoplankton community structure and microbial interactions that regulate biogeochemical cycling of nutrients, particularly through increased organic matter inputs and microbial respiration beneath cages. This study is expected to provide a foundation for subsequent molecular investigations aimed at identifying mechanisms connecting aquaculture practices, microbial diversity patterns, and fish health outcomes in Winam Gulf, Kenya.

Alexandra Ochs[1], Mary Ellen Klukow[1], Niah Cohen[1], W. Robert Midden[2] and Lauren Kinsman-Costello[1], [1]Kent State University, [2]Bowling Green State University. **Fact or Fiction: Unraveling SPSC's Relationship to Nutrient Flux.**

In Ohio, wetlands are being constructed to prevent excess nutrients from entering Lake Erie. Soil Phosphate Sorption Capacity (SPSC) is a common calculation for assessing a soil's phosphate binding capabilities, based on iron and aluminum concentrations and bioavailable P. We wanted to determine if SPSC indicates actual sediment-surface water nutrient exchange. We sampled three constructed wetlands from the Maumee watershed in the Western Lake Erie Basin with contrasting modes of hydrological connectivity. We conducted intact core incubation with ambient conditions to assess SPSC's relationship to sediment-surface nutrient exchange. We also spiked cores with dissolved reactive phosphorus (DRP) to simulate maximal loading conditions to see how changes in surface water phosphate may influence sediment phosphate sorption and the accuracy of the SPSC calculation. We incubated the cores with site water for 72 hours with samples collected at hours 0, 24, 48, and 72. We sampled the inflow and outflow of the cores at each time point and measured DRP, nitrate + nitrite, and ammonium to calculate net nutrient flux in each core. Combining yearly data from the H2Ohio Wetland Monitoring Program, site soil samples, and our intact core experiments, we gain insight into the nutrient processing capabilities of a wetland and use this to inform future management decisions.

Inês de Castro Oliveira[1], Antoine Fages[2], Nicolas Boileau[2], Martyn Lucas[3], Sissel Jentoft[4], Leif Asbjørn Vøllestad[4], Ole K. Tørresen[4], Benedicte Garmann-Aarhus[5], Kjetill Sigurd Jakobsen[4],

Bernardo Ruivo Quintella[6], Walter Salzburger[2], Pedro Raposo Almeida[7] and Catarina Sofia Mateus[7], [1]Marine and Environmental Sciences Centre, University of Évora, [2]Zoological Institute, Department of Environmental Sciences, University of Basel, [3]Department of Biosciences, University of Durham, [4]Centre for Ecological and Evolutionary Synthesis, University of Oslo, [5]Natural History Museum, University of Oslo, [6]Department of Biology, Faculty of Sciences of the University of Lisbon/Marine and Environmental Sciences Centre, Portugal, [7]Department of Biology, School of Science and Technology, University of Évora, Évora, Portugal/Marine and Environmental Sciences Centre.
Gene expression divergence in the European lamprey Lampetra fluviatilis and L. planeri species pair.

Lampreys are ancestral cyclostomes that have evolved through different life history strategies that are reflected in their phenotype (i.e., migratory vs. resident). Throughout their distribution, lampreys appear as paired species, constituting good models for studying ecological adaptations through their differentiated life cycles. The European lamprey species pair consists of the parasitic and migratory river lamprey (Lampetra fluviatilis) and the nonparasitic and freshwater-resident brook lamprey (L. planeri). These species are morphologically very similar in their larval stage whereas the adults adopt alternative life histories. The morphological differences, apparent mainly after metamorphosis, led to the search for genetic differences between species. Genetic differences between species appear to be more substantial in populations in southern Europe than recent differences found through whole-genome assemblies of river lamprey and brook lamprey in northern Europe. We used RNA sequencing to assess differences in gene expression between species from adults in a northern European population (England). We sequenced the transcriptomes from five key organs (brain, gills, heart, kidneys, liver) across the two species and both sexes. We detected strong gene expression differences across tissues, consistent with their biological functions, as well as marked cross-species divergence in gills and kidneys and sex-biased gene expression in the liver. Finally, our analyses revealed some of the genes and biological functions associated with interspecific divergence, possibly related to their respective ecological specializations.

Rodrigo M. Oliveira[1], Romullo G. S. F. Lima[2], Carla F. Rezende[2] and Bruno E. Soares[1], [1]University of Regina, [2]Universidade Federal do Ceará. **River intermittency promotes food partitioning among freshwater fishes in the Brazilian semiarid.**

Rainfall seasonality alters the waterscape, modifying the aquatic habitat area that fishes can forage and the availability of food resources. Such changes can affect how species compete for food resources. This study investigates the effects of seasonal variation on the food partitioning among three tetra fishes (Characidae) in an intermittent river (Cruxati) located in the semi-arid northeast of Brazil. Selected species were Serrapinnus heterodon (SH), Phenacogaster calverti (PC), and Serrapinnus piaba (SP), all exhibiting generalist, opportunistic feeding habits that mirror local resource availability. Samplings were conducted in the dry season when there is no waterflow and pools are formed, and in the rainy season, when high pluviometry maintains continuous river flow. Diet composition was assessed through stomach content analysis; and niche breadth is quantified using Levin's index and the niche overlap compared visually using the volumetric proportions of the food items. Fishes were more generalist in the dry season and fed on different resources: PC consumed mostly organic matter (72.80%), SH consumed mostly phytoplankton (17.08) and animal fragments (48.71%), and SP consumed mostly vegetal (15.95%) and animal fragments (74.01%). In contrast, during the rainy season, all species consumed mostly zooplankton (V% = 94.13%). Overall, we show how varying waterflow affects food webs by reducing habitat area during the dry season, pushing fishes to shift their dietary habits to different alternative resources, potentially minimizing competition.

Mark Olokotum[1], Catherine Quiblier[2], Jean-François Humbert[3], William Okello[4], Ronald Semyalo[5], Benjamin Marie[2], Clare Bertrand[3], Cécile Bernard[2] and Marc Troussellier[6], [1]National Fisheries Resources Research Institute (NaFIRRI), P. O. Box 534, Jinja, Uganda, [2]UMR 7245 MCAM CNRS-MNHN, Muséum National d'Histoire Naturelle, Paris, France, [3]INRAE-Institute of Ecology and Environmental Sciences of Paris, Sorbonne University, Paris, France, [4]Directorate of Graduate Studies, Research and Innovations, Soroti University, Soroti P.O. Box 211, Uganda, [5]Department of Zoology, Entomology and Fisheries Sciences, Makerere University, P. O. Box 7062, Kampala, Uganda, [6]UMR 9190, MARBEC, CNRS-Université de Montpellier - IRD - IFREMER, Place Eugène Bataillon, 34095 Montpellier Cedex 5, France. **Planktonic communities exhibit differential responses to nutrient and fish additions from micro and mesocosm experiments.**

Eutrophication often favours cyanobacteria and smaller-bodies zooplankton communities, but these changes vary depending with the eutrophic environment. This study utilized data from microcosm and mesocosm experiments using water from Napoleon Gulf (NG) and Murchison Bay (MB). Over seven days, we examined the response of planktonic communities (biomass/density, diversity, and richness) to the addition of nutrients and fish. The results demonstrate that adding N+P significantly enhanced phytoplankton biomass and increased cyanobacteria growth. Trace elements had no effect on plankton biomass in MB but did in NG. The composition, diversity, and biovolume/density of the phytoplankton and zooplankton communities were found to have changed. Particularly, the zooplankton community composition and density of rotifers Lecane sp. and Brachionus sp. were significantly affected by addition of fish. Similarly, fish addition reduced the composition of green algae but not cyanobacteria. The dominance of cyanobacteria resulted into higher microcystin (MC) production, and its consumption transferred MCs into the intestines of fish with up 27.5 μg/g FW of MC-LR. MC accumulation up to 0.48 μg/g and 0.3 μg/g of MC-LR FW in the liver and muscle of fish from MB was observed respectively. Because of low abundance of toxigenic cyanobacteria, there was no accumulation of MC in fish muscle in NG mesocosms. Nonetheless, the prevalence of cyanobacteria linked to elevated MC will further increase the possible health risks from consuming entire fish from Lake Victoria.

Amanda L. Olsen[1, 2], Connor W. Faulkner[1], Sonny J. Ittinuar[3], Michael W. Johnson[4], Bonnie M. Hamilton[5], Matthew J.H. Gilbert[6], Jean-Sébastien Moore[7] and Les N. Harris[1], [1]DFO, [2]University of Manitoba, [3]Rankin Inlet Local Resource User, [4]North/South Consultants Inc, [5]University of Ottawa, [6]University of Alaska Fairbanks, [7]Université Laval. **From Lakes to the Sea: Diet and Freshwater Foraging of Anadromous Arctic char (Salvelinus alpinus) During Early Marine Transition.**

Across their range, limited information exists on the foraging ecology of anadromous Arctic char (Salvelinus alpinus, Iqalukpik) during their downstream migration from freshwater overwintering habitats to marine foraging areas. Here, we examine the stomach contents of Arctic char captured during their downstream migration or upon estuary entry after overwintering to document and quantify the relative importance of freshwater- and marine-associated prey types in two river systems within Nunavut: the Lauchlan River near Cambridge Bay (2018, 2019) and the Diana River near Rankin Inlet (2021, 2022). Across all years and locations, freshwater-associated prey types were identified in Arctic char stomach contents (23-55%). Temporal and spatial dietary variability influencing observed prey species was likely influenced by the distance travelled from overwintering lakes to estuaries, annual sea ice variability, and the duration of time spent foraging in the marine environment prior to capture. Our findings suggest that after ceasing feeding upon return to freshwater in fall, anadromous Arctic char can resume foraging prior to reaching the ocean the subsequent spring. These results highlight the importance of freshwater prey types in supplementing

depleted energy reserves prior to marine entry, and further demonstrate plasticity in their foraging ecology.

Eniola Olu-Ayorinde[1], Romullo G. S. F. Lima[2], Renata Bartolette[3], Marcelo F. G. Brito[3] and Bruno E. Soares[1], [1]University of Regina, [2]Universidade Federal do Ceará, [3]Universidade Federal do Sergipe.
Rainfall and terrestrial biomass shape the diet of Red-tailed Flag Tetra along a Neotropical river.

Dietary shifts in fishes mirror changes in the environment. Two important environmental drivers in the diet of riverine fishes are the amount of allochthonous resources available surrounding the aquatic system and rainfall, which carries allochthonous biomass into the river. In this study, we analyzed the gut contents of 556 individuals of Hemigrammus marginatus, a generalist and abundant schooling species in the Brazilian semiarid region, to track how environmental factors (rainfall and woody biomass density as a proxy of terrestrial biomass) influence dietary shifts in seven locations along a longitudinal gradient in the São Francisco river. Univariate and multivariate analyses were conducted to disentangle the relative importance of rainfall and woody biomass density in the diet composition and trophic plasticity of H. marginatus. Rainfall was the main driver of the species' diet composition ($R^2 = 0.22$; $p < 0.05$), with increasing rainfall leading to higher consumption of allochthonous prey items and total allochthonous biomass ($R^2 = 0.3$; $p < 0.05$). In addition, increasing rainfall and terrestrial biomass were correlated with an increasing number of consumed prey, while increasing terrestrial biomass was associated with dietary generalism ($R^2 = 0.12$; $p < 0.05$). Therefore, we highlight the importance of the rainfall dynamics to the trophic ecology of fishes inhabiting freshwater ecosystems in the Brazilian semiarid region. This underscores the complex dynamics underlying Neotropical freshwater food webs.

Khalid Omar[1, 2] and Sara Pearson[1, 2], [1]Michigan Geological Survey, [2]Western Michigan University.
Data Gap Analysis and Water Resources Assessment to Support Sustainable Water Management in Michigan.

Michigan has long been a major industrial center in the U.S. and recently is experiencing localized population growth and agriculture, increasing demand for water resources and exacerbating preexisting water challenges such as groundwater depletion, aging infrastructure, water contamination, and industrial demands. Despite these conditions, the statewide demand and distribution have not been evaluated against available water resources. This highlights the urgent need for a comprehensive data gap analysis and water resource assessment. The Michigan Geological Survey, in collaboration with and funded by the Michigan Department of Environment, Great Lakes, and Energy (EGLE), initiated two key water studies. The first study focuses on existing water-related data gap analysis across Michigan to identify areas requiring additional monitoring and investigation. The goal is to characterize the spatial-temporal distribution of Michigan's water resources. The second is a comprehensive regional water study in western Michigan covering several counties. The study evaluates current water availability relative to demand and projects future availability under various stress scenarios using key variables (e.g. land-use, population, and environmental factors). The results will be presented via interactive tools to support water resource planning and inform decision makers. These initiatives establish a foundation for understanding water resource availability and demand across the state. The findings will support more coherent and sustainable water management practices, guide water quality preservation, and ensure water resource availability in Michigan.

Lorine Auma Omondi[1], Cavan Harpur[2] and Mary-Claire Buell[1], [1]Trent University, Peterborough, Ontario Canada, [2]Parks Canada, Ontario, Canada. **Assessment of per and polyfluoroalkyl substances (PFAS) in the Great Lakes using dreissenid mussels.**

Dreissena polymorpha (zebra mussel) invaded Great Lakes in 1980s followed by Dreissena bugensis (quagga mussel) in early 1990s and are used to monitor contaminants in Great Lakes. The aim of this study is to implement a parallel program to the USA Mussel watch program for the first time in Canadian waters and contextualize the findings in relation to the USA mussel watch sites and other biomonitoring studies. This study was conducted at two sampling regions in the Canadian part of Lake Huron. We investigated PFAS of mutual concern listed in the Great Lakes Water Quality Agreement due to their toxic effects and persistence in the environment. Preliminary findings from this study showed that dreissenid mussels had higher Perfluorooctanoic Acid (PFOA) (0.25 - 0.53 ng/g ww) at Lake Huron sites (Canada) than those reported in USA Great Lakes sites. However, dreissenid mussels in Lake Huron had lower Perfluorooctane Sulfonate (PFOS) (0.23 - 0.35 ng/g ww) as compared to previous studies within Great Lakes that used dreissenid mussels and the zebra mussels. Fingerprint plots were used to evaluate sources of PFAS detected in the mussel samples. Together, these results demonstrate the value of dreissenid mussels as sensitive biomonitors for PFAS, offering a robust tool for tracking contamination sources and strengthening transboundary contaminant surveillance in the Great Lakes.

Melvin Kerubo Ondiba[1], Bouabid Badaoui[2], Rachid Elfermi[3], Ichrak Hayah[3], Kenneth Irvine[4], Leandro Antonio De La Cruz Alvarez[4], Heleen Maetens[5], John Simaika[6], Viola Clausnitzer[7], Jos Snoeks[5], Nathan Vranken[8], Tamara Schenekar[9] and Maarten Van Steenberge[10], [1]Laboratory of Biodiversity, Ecology and Genome, Faculty of Sciences, Mohammed V University (UM5), [2]Laboratory of Biodiversity, Ecology and Genome, Faculty of Sciences, Mohammed V University (UM5) and African Sustainable Agriculture Research Institute (ASARI), Mohammed VI Polytechnic University (UM6P), [3]African Genome Center (AGC), Mohammed VI Polytechnic University (UM6P), [4]Department of Water Science and Engineering, UNESCO-IHE Institute for Water Education, [5]Section Vertebrates, Biology Department, Royal Museum for Central Africa and Laboratory of Fish Diversity and Conservation, Department of Biology, University of Leuven, [6]International Water Management Institute (IWMI), [7]Senckenberg Research Institute, [8]Section Vertebrates, Biology Department, Royal Museum for Central Africa, Laboratory of Fish Diversity and Conservation, Department of Biology, University of Leuven, Operational Directorate Taxonomy and Phylogeny, Royal Belgian Institute of Natural Sciences and Research Group Zoology: Biodiversity and Toxicology, Centre for Environmental Sciences, Hasselt University, [9]Institute of Biology, University of Graz, [10]Operational Directorate Taxonomy and Phylogeny, Royal Belgian Institute of Natural Sciences and Research Group Zoology: Biodiversity and Toxicology, Centre for Environmental Sciences, Hasselt University. **Biodiversity Assessment of Rivers, Lakes, and Wetlands Flowing into Lake Victoria using eDNA Metabarcoding Approach.**

Environmental DNA (eDNA) metabarcoding is a highly promising, non-invasive method for assessing aquatic community structures. This approach enables large geographical areas to be sampled with minimal effort and is non-invasive, an important feature when monitoring species. In this study, we applied eDNA metabarcoding to 36 water samples collected from rivers, lakes, and wetlands (22 sites) flowing into Lake Victoria (9 sites in the Akagera National Park in Rwanda and 13 sites in the Mara Wetland in Tanzania), using two metabarcoding primer pairs:12SV5 (targeting vertebrates) and MiMammal (targeting mammals). We also barcoded over 200 fish specimens collected at the same locations using experimental gill nets for comparison. Our objectives were to evaluate the performance of the eDNA metabarcoding approach in detecting vertebrate species and

to determine the presence of rare or historically reported cichlid species in Lake Victoria. eDNA metabarcoding survey yielded a total of 19,196,347 paired-end DNA sequences using the two libraries. We detected diverse organisms, including fish (18), mammals (16), birds (two), and amphibians (two). Both the 12SV5 and MiMammal primer sets successfully detected fish species, with 12SV5 exhibiting higher sensitivity across overall fish diversity. This study showed that eDNA metabarcoding can be a powerful tool for monitoring, management, and conservation efforts. By including appropriate genetic markers and updated reference databases, eDNA metabarcoding method can be extended to monitor the whole aquatic and non-aquatic vertebrate communities in the region.

Jessica Orlofske, Laura Schulz and John Skalbeck, University of Wisconsin - Parkside. **Connecting students to Great Lakes water issues through participation in regulatory monitoring.**

Interbasin transfer of Great Lakes water to other watersheds is governed by the Great Lakes Compact and an important issue for regulators and the public on both sides of the US-Canadian border. In 2013, the city of Waukesha in southeastern Wisconsin, USA, applied for a Great Lakes water diversion which was approved in 2016. In compliance with permit requirements, water sourced from the Great Lakes must be returned to the basin. The Root River, which flows through Milwaukee and Racine counties before discharging into Lake Michigan at the city of Racine was identified as a portion of the return flow convenance. Since 2017, students, academic staff, and faculty at the University of Wisconsin - Parkside have conducted hydrological and biological monitoring along the Root River to support the regulatory process. Engaging students in this effort not only provides training in field and laboratory techniques in a real-world setting, but also introduces students to international freshwater policy and regulation. Here, we will describe the learning opportunities offered to students through this long-term study and highlight biological and geomorphic data collected from the Root River during the pre-diversion baseline monitoring from 2017 to 2023, including surveys of habitat conditions as well as macroinvertebrates and fish communities. We will demonstrate how involving students in professional experience enhances learning outcomes, student retention, and can be effectively linked to freshwater curriculum.

Dennis Otieno[1], Ken Drouillard[1], Michael McKay[1], Monah Farhani[1], Julia Obuya[2], Kefa Otiso[2] and George Bullerjahn[2], [1]Great Lakes Institute for Environmental Research, University of Windsor, Windsor, Ontario, Canada, [2]Biological Sciences, Bowling Green State University, Bowling Green, OH, USA. **Sediment trace element, mercury and organic pollutants from Winam Gulf, Lake Victoria, Kenya.**

Winam Gulf incorporates much of Kenya's jurisdiction of Lake Victoria. As one of the largest enclosed embayments of Lake Victoria subject to large population pressures, this shallow system is subject to considerable point and non-point source pollution. The study collected sediment samples at 20 locations distributed throughout Winam gulf. Trace element, mercury and organic contaminants (PAHs, PCBs, OC-Pesticides and PBDEs) were analyzed to examine spatial patterns of sediment contamination, assess relative risks and determine inter-pollutant associations. Chemical ordinations were performed by non-metric multi-dimensional scaling (NMDS) with additional associations to water quality parameters performed by canonical correspondence analysis (CCA). In addition, Gettis-Ord local statistics were completed to identify prospective sediment 'hot' and 'cold' spots within the Gulf. While pollutant concentrations in sediments were generally less than sediment quality guidelines, inter-chemical associations suggestive of common sources and/or environmental focusing were apparent in the data and examined in the context of proximity to rivers and urban areas.

Kefa Otiso[1] and **Dorine Were**[2], [1]Bowling Green State University, [2]Maseno University, Kenya.
Distribution of Microcystin concentrations in Winam Gulf, Lake Victoria, Kenya.

Winam Gulf, a semi-enclosed bay in northeastern Lake Victoria, Kenya, is increasingly affected by eutrophication resulting from urban, agricultural, and industrial nutrient inputs. This enrichment promotes harmful algal blooms (HABs), particularly Microcystis spp., which produce microcystin;a cyanotoxin that poses ecological and public health risks. Despite growing concern, information on the spatial distribution of microcystin in the gulf remains limited. This study evaluated the spatial variability of microcystin concentrations across 20 stations using the Enzyme-Linked Immunosorbent Assay (ELISA), alongside in situ measurements of dissolved oxygen (DO), temperature, and pH. Water samples were collected from surface and sub-surface depths (1-4 m) at sites commonly used for fishing and drinking water abstraction. Mean DO was 5.06 ± 3.37 mg/L, with lower values observed in deeper waters and semi-closed bays. Temperature ranged from 22.8°C to 29.2°C (mean 26.2 ± 1.84°C), while pH ranged from 7.4 to 8.7 (mean 7.96 ± 0.42). One-way ANOVA indicated no significant spatial differences in DO and pH, but temperature varied significantly among stations ($p < 0.001$). Microcystin concentrations ranged from 0.01 to 1.34 μg/L (mean 0.149 ± 0.324 μg/L). Although mean concentrations were below the WHO drinking water guideline (1.0 μg/L), they exceeded the ecological threshold (0.1 μg/L), highlighting the need for continued toxin monitoring and nutrient management in Winam Gulf.

Kefa M. Otiso, Bowling Green State University. **The role of Kenyan cities in the creation and management of Lake Victoria's cHABs: Benefits and Challenges of International Interdisciplinary Research.**

Cities are central to the creation and management of harmful algal blooms (cHABs) because their activities (pollution, waste, infrastructure) load water bodies with nutrients (N, P) and create ideal stagnant habitats, while city actions like improved green infrastructure, better sanitation, sustainable water management, and green space integration are crucial for mitigating these blooms, making them both major contributors and key solution providers. In this paper, we examine the role of Kenyan cities in the creation and management of Lake Victoria's cHABs. In the process, we reflect on the benefits and challenges of our multi-year international interdisciplinary research on cHABs in Kenya's Lake Victoria waters. Such research, while hard to manage, offers superior insights that can play a critical role in managing cHABs.

Matteo Ottaviani, NASA Goddard Institute for Space Studies. **Polarimetric detection of oil spills from the spaceborne NASA PACE mission.**

The Fresnel laws of specular reflection directly connect remote sensing observations of light polarization within the sunglint region to the refractive index of the surface of a water body. This parameter is then instrumental to identify areas affected by oil or floating substances altering the refractive index of pure water. The method was devised based on observations available from the NASA Goddard Institute for Space Studies' Research Scanning Polarimeter, which offers superior performance in terms of observational wavelengths, angular sampling, and polarimetric accuracy. We present the extension of the same retrieval approach to the Hyper Angular Rainbow Polarimeter (HARP-2) sensor onboard the NASA Plankton, Aerosol, Cloud, ocean Ecosystem (PACE) spaceborne mission.

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Mike Shriberg, Kristen Bashen, Keyan Li, Jenny Miller, Adriana Nieto, **Nathan Parr** and Riley Pohlman, University of Michigan. **Planning for More Equitable Flooding Infrastructure in Lake Michigan Communities.**

Coastal Great Lakes communities are experiencing significant damage from compound flooding: a severe type of flooding that occurs when a region experiences an extreme rainfall event during high lake levels, causing slow drainage of rivers and sewers. Prior research demonstrates that resilience infrastructure does not benefit all groups of people equally, leaving marginalized communities more vulnerable to flooding impacts. The cities of Benton Harbor, Michigan and Milwaukee, Wisconsin, are among these coastal communities that are home to largely minority or low-income populations living with diminished capacities for resilience as a result of historic economic losses, redlining, and disinvestment. Our work ultimately provides collaborative, actionable, and fundable recommendations for flooding impact mitigation that emphasize the value of community input in decision-making and promote socioeconomic equity. These recommendations were developed using responses from our stakeholder interviews, a socioeconomic vulnerability analysis (building off the CEJST and SoVI), community member engagement in Benton Harbor, and the results from larger, ongoing technical projects for both cities. This work also accounts for the current variation in progress toward equitable flooding infrastructure implementation in both cities, and predictions for future natural hazard realities as a result of climate change. We envision these flooding mitigation efforts as one part of a new line of communication between stakeholders and community members to work toward trust, equity, and co-creation throughout the Great Lakes.

Lonnie Parry[1, 2], Olaf Jensen[1], Zach Feiner[1, 2], Laura Schmidt[2], Titus Seilheimer[3], Cheryl Masterson[2], Iyob Tsehaye[2] and Amy Schultz[1], [1]University of Wisconsin-Madison, [2]Wisconsin Department of Natural Resources, [3]Wisconsin Sea Grant. **Looking Beyond the Catch: Demographic, Behavioral, and Motivational Variation in Urban and Rural Recreational Fisheries.**

Recreational fisheries are increasingly understood as coupled social-ecological systems, yet how angler participation varies across access types and landscape contexts remains poorly resolved. We used creel survey data from Great Lakes, inland urban, and rural fisheries in Wisconsin to evaluate differences in angler demographics, spatial behavior, fishing effort, target-species specialization, and motivations across fishing modes (boat vs. shore) and locations. Demographic composition differed significantly among angler groups, with shore anglers in urban fisheries representing more racially and socioeconomically diverse participants than boat anglers. Travel distance and trip duration varied among groups; rural boat anglers traveled the farthest distances, while boat anglers across all locations fished longer per trip than shore anglers. In contrast, effort-weighted niche breadth showed only modest differences, indicating broadly similar patterns of species targeting. Motivation scores also varied significantly, with the strongest differences observed in harvest orientation, where shore anglers reported higher values than boat anglers. Across analyses, fishing mode emerged as a primary driver of participation patterns, while geographic context structured spatial access and extent. These findings highlight the importance of incorporating both access mode and landscape context into creel survey design and fisheries management to better capture diverse angler behaviors and support equitable, context-specific decision-making.

Michael Paterson[1], Paul Blanchfield[2], Sonya Havens[1], Scott Higgins[1], Graham Mushet[3] and Michael Rennie[4], [1]IISD-Experimental Lakes Area, [2]Fisheries & Oceans Canada, [3]Queen's University, [4]Lakehead University. **A long-term whole-lake diversion experiment to examine the effects of changes in hydrologic inflows.**

We used a long-term whole-lake experiment at the IISD Experimental Lakes Area to better understand the potential effects of future changes in water inputs caused by climate change and water diversions. At the start of the study in 2008, L626 was a small fourth-order lake that received water inputs from a 372ha watershed. After the collection of 2-3 years of pre-diversion baseline data, inflows from the upstream catchment were diverted away from L626 and water inputs decreased to approximately 5% of pre-diversion levels. Using 15 years of post-diversion data and Before-After-Control-Impact comparisons (BACI) with a nearby unmanipulated reference lake (Lake 373), a statistically significant 10% reduction in dissolved organic carbon (DOC) was observed. The decreases in DOC were associated with increases in water transparency, deeper thermocline depths, and small increases in deep-water oxygen concentrations. No significant differences in nutrient concentrations, phytoplankton, or zooplankton biomass were observed. Preliminary assessments suggest that abundances of lake trout, white sucker, yellow perch, and minnows decreased following the diversion. Some of these reductions may be attributable to the inability of fish to move between L626 and upstream Lake 627 following the closure of the inflow dike.

Gregary Ford, Megan Coad, **Heather Patterson** and Kyle Chuckry, Swim Drink Fish Canada. **Defining the 'Nuisance' Condition of Algae Using The Visual Assessment Survey Tool (VAST).**

The Visual Assessment Survey Tool (VAST) at Swim Drink Fish blends community science and crowdsourced surveillance in monitoring shorelines. In 2025, we engaged in a pilot study to use VAST to define the 'nuisance' condition of algal washup in Western Lake Ontario and Eastern Lake Erie. Preliminary results show: (1) algal quantity is not necessarily indicative of recreational water quality failures; (2) in areas where E.coli is a threat to recreators, increased abundance of wet, rotting algae can be indicative of poorer recreational water quality; (3) moderate amounts or algae or greater in the nearshore dissuade recreational use in nearly half (46.7%) of surveyed beachgoers; (4) dried algae on the beach has a low influence on whether people will recreate there or not; 5) the threshold at which recreators will not engage with water due to excess algae is variable. Further investigations will occur in 2026 using this protocol, as well as integrating data from Remotely Piloted Aerial Systems (RPAS) surveillance, as well as testing nutrient levels at stormwater outlets. By correlating user-reported perceptions of beach usability with quantitative algae assessments, we can establish a clear benchmark for "nuisance" levels and isolate the impact of algae on beach recreation over time and space. This knowledge will inform management strategies to mitigate the negative impacts of these blooms on public health, ecosystem health, and beach recreation.

Kristen Patterson[1], Tanya Roerick[2] and Loren Miller[3], [1]Minnesota Department of Natural Resources, [2]Leech Lake Band of Ojibwe Division of Resource Management, [3]Minnesota Department of Natural Resources, Univeristy of Minnesota. **Anglers Know More About Muskies Than I Do: Pairing Passion and Science to Understand Populations.**

Muskellunge are a low density, elusive species that traditionally require intensive spring sampling efforts to obtain population metrics. Leech Lake, a 41,700 ha (103,000 acre) lake in north central Minnesota, is a prominent Muskellunge fishery in the state and has been a source population for a statewide propagation program. Changes in angler satisfaction, perceived increases in catch and

release mortality, and growing concerns around the impacts of emerging technologies and angler ethics have spurred public interest about current management and understanding of the population. Leech Lake has vast littoral habitat making standard sampling methods unrealistic. By partnering with tribal and local resources managers we have engaged the angling community in a multi-year effort to conduct the first population estimate on Leech Lake Muskellunge. In balancing accurate fish identification and angler comfort/animosity we are utilizing genotypes to mark opposed to traditional marking methods (tagging, fin clipping, etc.) for a mark-recapture population estimate. This project is a first step in gaining knowledge about the status of this important Muskellunge population, provides a benchmark for population monitoring into the future, and tests the effectiveness of utilizing angler engagement to collect samples on large waters in Minnesota and beyond. We have completed the mark phase and will share results, challenges, and successes encountered with this project design and execution.

Lydia Paulic[1], Russ Miller[2], Kristen Rosier[3], Steve Ruberg[3], Todd Leadley[1], Katelynn Johnson[1] and Aaron Fisk[1], [1]University of Windsor, [2]University of Michigan-CIGLR, [3]NOAA-GLERL. **Novel applications of Slocum gliders and communication buoys: advancing freshwater ecosystem monitoring.**

Emerging observation technologies are transforming how we monitor and understand complex freshwater ecosystems like the Laurentian Great Lakes. Technologies like the Slocum glider, an autonomous underwater vehicle, and real-time communication buoys, have proven invaluable in aquatic observation by collecting fine-scale data, enabling real-time ecosystem analysis, improving forecasts through modeling, and complementing vessel-based sampling. The benefit of multiple science sensors operating on a single glider or buoy enables observation of the physical, biological, and chemical properties of the water column in tandem with horizontal and vertical distribution patterns of fishes and smaller organisms. Recent deployments in Lakes Ontario and Michigan demonstrated the glider's ability to track fish survival and quantify aquatic organisms across sizes and trophic levels over extended periods, while buoy networks in western Lake Erie support drinking water protection and harmful algal bloom monitoring. The glider and buoys' capability for direct data uploads provides immediate insights supporting timely and informed decision-making on fish tracking and directly links to environmental data collected on the same mission. These capabilities provide critical inputs for improving and validating ecological and physical models of freshwater ecosystems, in turn informing adaptive management strategies and monitoring long-term changes in ecosystem structure and function.

Georgia Peck, Living Lakes Canada. **From Shoreline Data to Decision-Making: A Community-Led Approach to Lake Stewardship.**

Living Lakes Canada's (LLC) science-driven community-based programs aim to elevate water stewardship and empower people across the country to protect their freshwater sources. LLC has been coordinating the Foreshore Integrated Management Planning (FIMP) program since 2017. Operating across diverse lake systems in Canada, FIMP supports communities, Indigenous Nations, local governments, and researchers to collaboratively assess and manage shoreline pressures that directly affect aquatic health, habitat integrity, and water quality. At the core of FIMP is a standardized, repeatable monitoring framework that generates locally and scientifically robust data on foreshore condition, land use, and cumulative impacts. This data is used by communities to guide planning decisions, inform policy development, prioritize restoration, and track changes over time. A defining strength of the program is its Local Indigenous Knowledge and Values Framework, which was co-developed to align Indigenous knowledge systems with Western scientific approaches.

This framework supports Indigenous leadership and participation by embedding local knowledge, values, and priorities into monitoring design, interpretation, and decision-making, while maintaining consistency and data integrity. In doing so, FIMP advances reconciliation in practice and strengthens the relevance and legitimacy of community-generated data. This presentation will demonstrate how FIMP functions as a Community-Based Monitoring model, from engagement and training, to data collection and sharing, to tangible policy and stewardship outcomes, offering transferable insights for freshwater practitioners, researchers, and decision-makers working across Canada and beyond.

Kyle Peco[1], Jiali Wang[1], Pengfei Xue[2], TC Chakraborty[3], John Lenters[4], Peter Blanken[5], Christopher Spence[6], Zhao Yang[3], Yun Qian[3] and Rob Hetland[3], [1]Argonne National Laboratory, [2]Michigan Technical University, [3]Pacific Northwest National Laboratory, [4]University of Michigan, [5]University of Colorado, [6]Environment and Climate Change Canada. **Regional and Global Reanalysis Datasets for Energy Fluxes and Snowstorm over the Great Lakes Region.**

Energy exchanges between the Great Lakes and the atmosphere play a critical role in regulating regional weather, climate, and hydrology, including lake temperatures, ice cover, and lake-effect snow. Accurate representation of radiative and turbulent surface fluxes is therefore essential for numerical weather prediction (NWP) in this region. However, in situ observations over the lakes remain sparse, necessitating reliance on gridded satellite and reanalysis datasets. In this study, we evaluate the performance of two satellite products (CERES-EBAF and CLARA-A3) and two global reanalyses (ERA5 and MERRA-2) in representing surface radiative and turbulent fluxes over the Great Lakes, validating against observations provided by NOAA's NBDC and GLEN, as well as FLUXNET. To assess the meteorological implications of these fluxes, we examine how ERA5 and the HRRR model simulate lake-effect snowfall, evaluating against NOAA's Storm Events Database. Results indicate that satellite datasets provide the most robust characterization of surface radiative fluxes across the lakes and surrounding regions, while ERA5 shows the strongest overall performance for turbulent heat fluxes. Despite this, ERA5 underrepresents the intensity of lake-effect snowfall events. With its higher spatial resolution, HRRR more reasonably captures lake-effect snowfall events, accurately pinpointing spatial coverage and snowfall totals. Together, these analyses provide a complementary evaluation of satellite and reanalysis datasets over the Great Lakes, bridging the gap of data availability over the region for climate applications and future projections.

Omowunmi Aworinde[1], **Judith Perlinger**[1], Noel Urban[1], Dylan Friisvall[2], Gene Mensch[2], Dione Price[2], Evelyn Ravindran[2], Emily Shaw[2], Diana Aga[3], Joshua Wallace[3], Mindula Wijayahena[3], Celina Monzon[1] and Pengfei Xue[1], [1]Michigan Technological University, [2]Keweenaw Bay Indian Community Natural Resources Department, [3]University of Buffalo. **PFAS Compound Profiles in Smelt as "Fingerprints" of Sources to the Keweenaw Region of the Lake Superior Fishery.**

PFAS contaminants impair ecological, cultural, and educational health for Indigenous communities. Due to their persistence and mobility, per- and polyfluoroalkyl substances (PFAS) bioaccumulate in food webs following emission into the environment. The objective of this project was to characterize the mixture of PFAS present in the smelt fishery of the Keweenaw Bay Indian Community, and to understand factors that may explain the PFAS concentrations in the smelt. In this presentation, we use statistical techniques to examine factors that may influence concentrations of individual PFAS compound profiles or "fingerprints". Chemical factors include PFAS compound molecular structure; biological factors include individual fish size and sex, and differing fish populations; physical factors include proximity of PFAS sources to the lakes, and lake water retention time. Detectable concentrations of 13 PFAS compounds were found in 27 composites of smelt collected at the mouths of seven Lake Superior tributaries. In contrast to commonly reported

PFAS profiles in fish, PFOS (1.5 - 10 ng/g ww) was not the dominant compound at all sampling locations. However, PFOS concentrations exceeded Michigan's health screening value for 2 meals/month at some sites. PFDoA and PFTrDA concentrations were significantly higher in larger smelt, indicating size-related bioaccumulation. Female smelt contained higher total PFAS concentrations than males. PFAS fingerprints vary among the sites and suggest that there are localized sources such as industrial discharge, sewage discharge, aqueous film-forming foams at certain sites.

Kurstyn Perrin, Alberta Lake Management Society. **Shared Waters, Shared Responsibility: Community-Based Monitoring in Alberta.**

In 2018, the Alberta Lake Management Society (ALMS) launched LakeKeepers, a community-based lake monitoring program that equips and trains volunteers to collect water-quality data year-round. Through accessible training, consistent protocols, and flexible delivery, participants monitor lakes of personal and community importance across the province, generating long-term datasets that inform research, stewardship, and decision-making. LakeKeepers, particularly its winter monitoring component, has experienced immense growth, demonstrating the ability of CBM to fill monitoring gaps in Alberta. Volunteer-generated data now represents one of the most extensive sources of winter lake information in the province, exceeding historical government-led efforts. As participation expanded, the program adapted to community needs by refining training, sampling logistics, and reporting formats to better support lake stewards. In 2022, LakeKeepers became the foundation for the Indigenous Community-Based Monitoring (ICBM) program, which supports community-led water-quality monitoring on culturally significant waterbodies in Alberta's oil sands region. Developed in response to community concerns about cumulative impacts from oil sands development, the program equips and trains Indigenous communities to collect water-quality samples, including industrial contaminants, using standardized lake and river protocols and incorporating Indigenous Knowledge indicators. The program continues to grow in participation and waterbodies monitored, while building technical capacity through training, field visits, and accessible, community-focused reporting. While data sovereignty agreements limit public sharing, the data supports communities in addressing their priorities and building long-term capacity for future monitoring programs.

Mary Ann Perron[1], **Abraham Francis**[2, 3], Stephany Hildebrand[1] and Leigh McGaughey[1], [1]St Lawrence River Institute, [2]Aronia Collective, [3]Clarkson University. **A Call to Action for the Conservation of Kiawerón:ko (the American Eel).**

The plight of Kiawerón:ko **(**the American Eel, Anguilla rostrata) in Kaniatarowenneneh (the St. Lawrence River) has been well known for over half a century. However, actions to date have been unsuccessful in bringing this species back from endangerment. Given recent decisions not to protect the species under federal legislation in Canada that run counter to Indigenous knowledge and scientific evidence, reconnecting local communities with their relative the eel has never been timelier. We are experiencing a shift in the waters, where the previously perceived "impossible" barriers are no longer acceptable when it comes to species conservation. A crucial aspect in creating change is having a well-informed community. In the case of the eel, real-world change along Kaniatarowenneneh is occurring through a community-driven ecosystem health report, the Great River Rapport. This project brings together art, science, community and Indigenous perspectives to engage people in conversations related to the health of the river. The case of the eel is symbolistic of broader struggles in the region rooted in past and ongoing neglect of Indigenous voices which has

led to unacknowledged trauma for the community and the perpetuation of environmental harm. We present a call to action to industry, government, and community to protect Kiawerón:ko.

Reid Pestana[1], Elizabeth Nyboer[1], Janessa Esquible[2], Alexander Duncan[3], Susan Chiblow[4], Deborah McGregor[5] and Isabella Badon[1], [1]Virginia Tech, [2]Great Lakes Fishery Commission, [3]University of British Columbia, [4]University of Guelph, [5]University of Calgary. **Building stronger partnerships: Improving Indigenous-Agency collaboration for Sea Lamprey management in the Great Lakes.**

Sea lamprey (Petromyzon marinus) are a species of parasitic fish whose introduction to the Great Lakes of North America disrupted the region's fisheries. The Great Lakes Fishery Commission (GLFC) was formed by the governments of Canada and the U.S. to manage the species. Despite management successes, tensions exist between Indigenous Peoples (U.S. Tribes and Canadian First Nations) relating to exclusions from decision-making and sea lamprey treatment on Indigenous territories. The purpose of this study is to identify perceived successes, challenges, and barriers in communication between management agencies and Indigenous communities, and offer recommendations on how to improve Indigenous-Agency relationships. This was done through a workshop held at the Sea Lamprey Annual Workshop (SLAWS) with data collected via electronic surveys, in-person worksheets, and focus group discussions. Respondents represented every region surrounding the Great Lakes, and were mostly technicians and control agents from the USFWS. Among the emerging themes, commonly reported successes included outreach programs, interactions related to the sea lamprey treatment programs, and scientific collaborations. Common barriers included temporal and structural barriers in communication, knowledge and trust gaps, and limited opportunity to work directly with Indigenous communities. Recommended actions for agencies include creating more opportunities for agents to engage with Indigenous communities, offering training and workshops to bridge knowledge gaps, and allocating time for dedicated community engagement. Efforts should also be made to recognize Indigenous communities as management partners and collaborators.

Bradley Peter, Alberta Lake Management Society. **Tracking Cyanobacterial Blooms in Alberta Lakes with Remote Sensing.**

Harmful algal blooms, primarily associated with cyanobacteria, are a special issue of concern in lakes in Alberta, Canada. Long-term community-based monitoring of these lakes has been successful in describing chlorophyll-a composite averages and long-term trends, but it fails to describe the unique spatial and temporal distribution of these blooms. Satellite-based monitoring of Alberta lakes, informed by models developed from in-situ sampling, can enable an understanding of bloom dynamics within lakes and across ice-free seasons at a spatial and temporal resolution not possible with individual sampling. Eleven organizations, including the Alberta Lake Management Society, have partnered under an Alberta Innovates-funded study to develop a satellite-based monitoring system and public web application for six lakes. An optimal algorithm was developed to relate chlorophyll-a samples to a red-edge index derived from paired Sentinel-2 spectral reflectances. The resulting algorithm is applied to all cloud and ice-free Sentinel-2 imagery over the six lakes from the year 2017 to the present. A bloom threshold of 30 μg/L chl-a was chosen, considering the naturally productive conditions characteristic of Alberta lakes. The pixels in bloom then feed into calculations quantifying the intensity, extent, severity, and duration of blooms in a lake in a given year. Initial results have revealed dynamic patterns in chlorophyll-a concentrations. Arising from this work is an open source web application enabling near-real time visualization of harmful algal blooms on Alberta's lakes.

Lisa Peters[1], Alexandra Giuliano[2], Krista Robertson[1], Morgan Anderson[1], Madeline Stanley[1] and Vince Palace[1], [1]IISD-Experimental Lakes Area, [2]University of Manitoba. **Monitoring changes in biodiversity following cattail management and reintroduction of wild rice using environmental DNA.**

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 collaborative study with the Makate Waagamichiwanang Gakinaa'amaatiwin (MWG) Youth and Family Wellness Camp focuses on monitoring aquatic community changes in response to the removal of cattails and reintroduction of wild rice, and blends Indigenous knowledge with environmental DNA (eDNA) tools. 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.

Sidney J. R. Pettit and Elizabeth C. Minor, University of Minnesota-Duluth. **A Photochemical Study of the St. Louis River plume in Lake Superior.**

Recently, the Lake Superior region has been experiencing more extreme storm events, which are increasing nearshore inputs of chromophoric organic matter and suspended sediment, both directly from runoff and as riverine inputs. A study of surface waters from the St. Louis River plume and the open lake has been conducted to investigate photochemically induced changes in dissolved and particulate material in plumes. The concentrations of soluble reactive phosphorous (SRP), total phosphorus, ammonia, nitrate plus nitrite, and total and dissolved organic carbon (TOC and DOC, respectively) have been measured from initial samples and over the course of irradiation experiments. Photochemical studies of naturally suspended particles are complicated due to the presence of organisms. The photoreactivity of sterile-filtered water was compared with that of samples containing particles that had been freeze-dried and then resuspended. Upon irradiation, particulate-containing plume samples show an increase in DOC concentration, suggesting photodissolution of organic particles, while samples lacking particles show a loss of DOC, most likely via oxidation to dissolved inorganic carbon. SRP is released from plume water regardless of the presence of particulates. Ammonia is released from plume particulates and dissolved constituents in offshore lake water. Thus, photochemical effects on plume water significantly alter dissolved constituent concentrations. The photochemical release of nutrients may contribute to the cyanobacterial blooms that have recently been occurring in plume-impacted waters of Lake Superior a few weeks after storm events.

Laura Phalen and Brandi Mogge, Fisheries and Oceans Canada. **The Basics and Common Challenges of the Fisheries Act Regulatory Review Process.**

This presentation will aim to summarize the Fisheries Act regulatory review process, and provide a perspective on common challenges from a Regulatory Review Biologist employed by Fisheries and Ocean Canada (DFO) in the Ontario and Prairies Region. Detailed information about fish habitat and fish distribution relative to project impacts is required to satisfy federal regulatory requirements. Depending on the scale of the project, the effort required to acquire the necessary information can range from a single site visit and a desktop exercise, to a multi-year habitat characterization field program. Likewise, the effort and detail required to predict residual effects to fish and their habitat, and to accurately account for benefits gained through offsetting, vary widely. This makes it difficult to generate one-size-fits-all information requirements, and creates uncertainty for project Proponents. Information exists in DFO-produced academic documents that speak to principles, and the degree to which they are followed is dependent on the experience of the biologists working on both sides of the regulatory process.

Rewa Phansalkar, New York State Water Resources Institute, Cornell University. **From the Ground Up: Local Barriers and Opportunities for Shoreline Adaptation along Lake Ontario in New York State.**

In the wake of the disastrous impacts of climate induced flooding along the Lake Ontario shoreline in 2017 and 2019, major New York State initiatives such as the Resiliency and Economic Development Initiative (REDI) and the Coastal Lakeshore Economy and Resiliency Initiative (CLEAR) have made a concerted push toward resilience through nature-based and land use policy oriented adaptation actions. Despite this momentum, as communities continue to face worsening flood and erosion risks, shoreline hardening remains the most common response among local actors, underscoring the persistent disconnect between state level priorities and local adaptation practice. This presentation summarizes findings from the Local Perspectives on Barriers to Adaptation Along Lake Onatrio project, which used detailed interviews with adaptation professionals, county and regional planners, and Soil and Water Conservation District staff across all eight New York counties along the Lake Ontario shoreline to identify barriers to adopting non-structural or "soft" solutions for coastal adaptation. Using a barrier analysis framework developed by Moser and Ekstrom (2009), the study systematically outlines challenges across the understanding, planning, and managing phases of the adaptation process. Results highlight mismatched priorities, informational gaps, and fragmented legal structures, and suggest practical opportunities through technical assistance, collaboration, and governance reforms to advance more adaptive, locally grounded shoreline management.

Luc Philippot[1], **H. Rakel Holm**[2], Becky Platt Filopoulos[1], Dr. Caleb T. Hasler[2], Brookelynn Waite[1] and Dr. Joni Storie[2], [1]Manitoba Métis Federation, [2]University of Winnipeg. **Red River Métis-Led Oil Spill Risk Assessment of Culturally and Ecologically Important Aquatic Areas.**

The Manitoba Métis Federation (MMF), in partnership with the University of Winnipeg, is leading a Red River Métis-led study to assess potential oil spill impacts on aquatic and shoreline environments of cultural and ecological significance to the Red River Métis. Through community mapping sessions across the MMF's seven Regions, Citizens shared Traditional Knowledge to identify sensitive areas, key species, and important use sites that may be at heightened risk. This project addresses a critical gap: the MMF currently lacks a Homeland-wide understanding of how oil spills could affect priority ecosystems and culturally important waterways. By combining Red River Métis Traditional Knowledge with western scientific methods—including GIS mapping, habitat

sensitivity analysis, and research on biological effects of oil exposure—the study develops a more accurate and community-grounded picture of oil spill vulnerability. Findings will guide the MMF in prioritizing high-risk areas, identifying species of concern, and strengthening mitigation and response planning within its Emergency Response Plans. Beyond technical outcomes, the project demonstrates how meaningful partnerships can braid knowledge systems to support environmental decision-making that honours Red River Métis stewardship, values, and lived experience. This presentation will highlight our collaborative research approach, insights gained through community-led mapping, and lessons learned in advancing Indigenous leadership in environmental risk assessment and oil spill preparedness.

Andrea Kirkwood[1], **Morgan Piczak**[2], Jerome Marty[3], Gadfly Stratton[4], Cosette Arseneault-Deraps[5], Christine Madliger[6] and Ali Shakoor[7], [1]Ontario Tech University, [2]Unviersity of British Columbia, [3]International Association for Great Lakes Research, [4]NA, [5]Carleton University, [6]Algoma University, [7]University of Michigan. **Making aquatic sciences more Diverse, Equitable, Inclusive, and Accessible: Perspectives on how individuals can take action in their professional practice.**

Achieving Diversity, Equity, Inclusion, and Accessibility (DEIA) in the aquatic sciences has been a chronic challenge, and while recent progress has been made, shifting political and institutional landscapes increasingly jeopardize these crucial efforts. To highlight strategies on how to continue to support DEIA initiatives, the Society of Canadian Aquatic Sciences and the International Association for Great Lakes Research co-hosted a webinar with diverse panelists entitled Making Aquatic Science Spaces More Equitable, Diverse, Inclusive & Accessible: A Panel Discussion. Building on the webinar, we synthesize eight actions individuals in aquatic sciences can take to uphold DEIA values and dismantle barriers: (1) make safety front of mind; (2) embrace complexity and intersectionality; (3) be proactively compassionate and inclusive; (4) identify and remove barriers; (5) engage non-scientific audiences in outreach and public dialogue; (6) be ready to make mistakes and learn from them; (7) be prepared to challenge misinformation; and (8) keep dialogue open about DEIA realities. We have also included narratives which highlight lived experiences of the panelists and how these actions have been implemented in the real world. In the face of growing political and institutional challenges, advancing DEIA in aquatic sciences will increasingly rely on grassroots action, sustained by individual commitment to building a more inclusive and just community.

Morgan Piczak, University of British Columbia. **Integrating Movement Ecology of Atlantic Mackerel with Fisheries Management.**

Atlantic mackerel (Scomber scombrus) populations in Canadian waters have undergone severe declines, yet limited knowledge of their predation dynamics and movement ecology continues to constrain effective management. In particular, little is known about movements undertaken after spawning, including dispersal to foraging and overwintering sites. Here, we used acoustic telemetry (over 200 receivers) within the Bay of Fundy (BoF; between Nova Scotia and New Brunswick) and Passamaquoddy Bay (PB; along the northern shore of the BoF) to document predation events and characterize post-spawning movements of Atlantic mackerel. Of the 70 tagged individuals, 68 were detected, and six were confirmed to have been consumed by endothermic predators (i.e., pinnipeds) based on distinct increases in internal tag temperature above 30°C, with no evidence of predation by mesothermic predators (i.e., sharks and tuna). All endothermic predation events occurred in the island-studded outer bay habitat of PB, primarily during late summer. Using generalized additive models, we found that mackerel were more resident than expected, exhibiting consistent habitat use within the inner bay of PB throughout the summer months, although some individuals made forays

into the greater BoF. Network analyses revealed key movement corridors between Deer and Campobello Islands and Deer Island and St. Andrews. These findings provide the first detailed insight into post-spawning movement, residency, and predation of Atlantic mackerel in Canadian waters, offering a foundation for improved understanding of mortality processes and habitat use.

Mariana Pinho and Christopher Somers, University of Regina. **Living on the warm side: anthropogenic thermal effluent alters crayfish population structure.**

Heated water effluent from coal-fueled power plants creates artificial thermal regimes that can alter population structure and trophic interactions in aquatic ecosystems. In southern Saskatchewan, thermal effluent produced since the 1950s has warmed an important reservoir inhabited by the Northern Crayfish (Faxonius virilis), a key benthic omnivore and essential prey for fish and turtles. We sampled crayfish (n = 1,240) from May to August 2025 in heated (Boundary Dam, n = 899) and non-heated (Rafferty, n = 341) reservoirs to assess how contrasting thermal environments influence crayfish size and population structure. Preliminary analyses show spatial and temporal variation in body size, relative abundance, and the timing of reproduction across the study area. Anthropogenic warming was associated with sexual size dimorphism, with males reaching larger total lengths (mean = 7.1 ± 1.7 cm) on average 9% longer than females (mean = 6.5 ± 1.5 cm). Body mass, after accounting for length, also varied across months, indicating seasonal shifts in condition. These patterns suggest that long-term thermal effluent supports a larger and potentially more productive crayfish population in Boundary Dam, increasing the ecological prominence of this species. Ongoing stable isotope analyses will augment our perspective on how thermal alteration affects the crayfish niche and pathways of energy flow within these ecosystems

Trevor Pitcher[1], Maiza Saqib[1], Britney Firth[2] and Dane Roberts[1], [1]University of Windsor, [2]University of Alberta. **Captive breeding and the effect of tank colour on the body colour, somatic growth, survival and behaviour of Chinook salmon.**

Captive breeding often results in the production of animals that exhibit maladaptive phenotypes that result in lower fitness (compared to their wild counterparts) in the context of conservation reintroductions. These maladaptive phenotypes are likely due, in part, to the environmental mismatch (compared to the wild) that occurs during their early ontogeny in captivity. One such potentially environmental mismatch, that may reduce the fitness of captive bred animals for conservation, is the colour of the housing where the animals are reared. We investigated the effects of tank colour (in the context of crypsis) on body colour, somatic growth, and survival in Chinook salmon, which are endangered throughout much of their range. Six different tank colours (many commonly used in rearing facilities) were used, including grey, red, black, white, blue and green. Body colouration was significantly impacted by the colour of the rearing tanks but growth and survival were not significantly impacted early on. We also examined the plasticity of the body colouration by experimentally altering the substrate of the rearing tanks halfway through the experiment. The results of this study will be discussed in light of conservation captive breeding efforts for fishes around the globe.

Amy Pitzel[1], Vivian Gauthier[1], Avery Keen Keen[1], Margaret Docker[2] and Sara Good[1,2], [1]University of Winnipeg, [2]University of Manitoba. **Characterization of canonical vertebrate sex determination and differentiation genes in sea lamprey.**

Sea lamprey (Petromyzon marinus) offer a model for investigating how core pathways underlying sex determination (SD) and sex differentiation (SDD), including those in the hypothalamus-pituitary-gonadal (HPG) axis, emerged in early vertebrate evolution. Unlike most

vertebrates, lampreys undergo programmed genome rearrangement (PGR) early in development, eliminating germline-specific regions (GSRs) that contain hundreds of germline-specific genes (GSGs). Previous studies suggest that several vital genes associated with SD/SDD are located within the GSR; expression of these genes can serve as germ-cell specific markers that track the divergent pathways of male and female gonadal development. Here, we characterized the expression of canonical vertebrate SD/SDD genes, including HPG axis genes and candidate sex-specific GSGs across larval and juvenile stages of lamprey gonad development. Quantitative PCR was used to measure transcript abundance and validate differential expression patterns between sexes, while histological analyses with H&E staining was performed to track gonadal changes during putative stages of SD and SDD. We compared differential transcript abundance of core genes with histological distinctions observed between male and female gonads at comparable developmental stages. These results highlight parallels and differences between vertebrate and lamprey-specific genomic regulation of SD and SDD and offer potential applications for managing invasive sea lamprey populations.

Janina Plach, Merrin Macrae and Helen Jarvie, University of Waterloo. **Mobility and fate of phosphorus in agricultural streams impacted by rural point sources.**

Phosphorus (P) loading is a persistent driver of eutrophication in mixed land-use watersheds of the Great Lakes region. While much attention has focused on diffuse field P losses, less is known about the role of rural point sources and if/how they interact with in-stream processes. This field-based study investigated P dynamics in water and sediments of rural agricultural streams impacted by bunker-manure- and barnyard-runoff under seasonally variable hydrologic conditions in Ontario, Canada. Suspended sediments consistently exhibited higher P concentrations than bed sediments, and both sediment compartments acted as net sources of soluble P to the streamwater. Sediment P concentrations and sorption capacity were governed by organic-matter and reactive metal oxides, while calcium-associated P represented a comparatively stable pool. Sediment P partitioning patterns reflected these controls, with organic matter-associated and redox-sensitive P pools showing high spatial and temporal variability. Seasonal shifts in hydrology and point source runoff strongly influenced the distribution of reactive substrates and associated P pools, leading to dynamic P behavior across space and time. Overall, the results demonstrate that interactions among hydrologic-regime, sediment composition, and localized rural point source inputs exert strong control on P retention and mobility in agricultural streams. These findings emphasize the need to account for both hydrology and sediment biogeochemistry when assessing P risk and managing agricultural streams affected by rural point sources that function as both acute and chronic sources of P downstream.

Erica Plivelic[1], Tyler Tunney[2] and Kevin McCann[1], [1]University of Guelph, [2]Department of Fisheries and Oceans. **Structured Perturbations in Aquatic Ecosystems: Evaluating Encounter Risk of Freshwater Fish Communities.**

Information on the risk associated with perturbations from human activities is critical for avoiding and mitigating harm to organisms under rapid anthropogenic change. Yet, little is known about how the structure of perturbations - such as the size, duration, and timing - interacts with organism behaviour to shape encounter risk. Encounter risk is defined here as the proportion of individuals overlapping with a perturbation spatially and temporally. Here, I apply simulated perturbations of varying structure to a multi-species acoustic telemetry dataset of fish positions, and I quantify the mean and variance of encounter risk. Intuitively, preliminary results show that mean encounter risk of the fish community increases with perturbation size and duration. Interestingly,

mean and variance of encounter risk differ between species and across time, which appears to be driven by species-specific seasonal behaviour. These findings highlight that, in addition to perturbation size and duration, decisions makers may mitigate risk of harm to organisms like fish by regulating the timing of human activities. Furthermore, decisions about timing may require considering a trade-off between minimizing the mean encounter risk versus avoiding months with an "all-or-nothing" encounter risk profile, where the average risk associated with a perturbation may be lower but there is a greater possibility of a perturbation affecting an intolerably high proportion of individuals.

Jocelyn Plouffe and Eric Collins, University of Manitoba. **Using Real-Time DNA Sequencing for Aquatic Microbial Monitoring of Remote Environments.**

Exploring microbial genomics in remote freshwater systems has become increasingly feasible using real-time sequencing platforms such as Oxford Nanopore Technology (ONT). In this study, environmental DNA (eDNA) samples collected from remote lakes in Manitoba were sequenced using ONT to characterize the microbial and broader aquatic community composition. A streamlined workflow, from field sampling and filtration through DNA extraction, sequencing, and taxonomic assignment, enables generation of community profiles within one day of sample collection. This turnaround provides rapid ecological insight into aquatic systems otherwise difficult and costly to monitor, and can help to inform communities, government, and policy makers on water quality. Additional applications include rapid surveillance and early detection of invasive species in remote regions, such as zebra mussels (Dreissena polymorpha), offering an additional layer of biological monitoring. These freshwater methods build on sequencing studies at the Churchill Marine Observatory and aboard the CCGS Amundsen in the Queen Elizabeth Islands, collectively demonstrating that high-quality genomic data can be generated and interpreted directly in the field across remote regions such as Arctic and subarctic environments. The portability and relative affordability of this approach highlights the potential for Community-Based Monitoring programs that integrate local knowledge of waterways, seasonal patterns, and species distributions. Together, these capabilities position ONT as a powerful tool for adaptive, locally informed monitoring of aquatic ecosystems in remote Northern regions.

James Polidori, Great Lakes Commission. **Groundwater Management and Water Use Trends in the Great Lakes Basin.**

Since 1987, the Great Lakes Commission (GLC) has facilitated the Great Lakes Regional Water Use Database, a collaborative effort to promote sustainable water management and guide the future development of the region's water resources. The database provides uniform, consistent water use data on Great Lakes water withdrawals, diversions and consumptive uses by jurisdiction, watershed, use sector, and source (i.e., Great Lakes surface water, tributary surface water, and groundwater). In its 2024 policy resolution titled "Understanding Impacts to Great Lakes Agriculture and Water Use Under Changing Climate Conditions," the GLC aims to build a coordinated scientific, technical, and economic understanding of the current state of groundwater management in the Great Lakes basin. GLC staff have engaged with partners and agencies to better understand how groundwater is managed under the Great Lakes-St. Lawrence River Water Resources Compact and Agreement and state or provincial law or policy to assure sustainable, equitable and balanced use of the basin's groundwater resources. This presentation will cover groundwater withdrawal and consumptive use trends throughout the Great Lakes-St. Lawrence River basin from 2014-2024 and discuss policy implications of increasing high-consumptive water

uses that impact groundwater resources, including data centers, Artificial Intelligence (AI), Quantum, and Semiconductor infrastructure development.

David Porter, Maria Arquero de Alarcón, Melissa Duhaime, Kristin Hass and Vanessa Louis, University of Michigan. **The Detroit River Story Lab: Re-Storying Local Waterways through Place-Based Experiential Learning.**

The successful cultivation of environmental awareness requires cultural as well as scientific expertise. This paper presents a case study of an interdisciplinary university initiative devoted to fostering stewardship of natural resources in a river city by supporting community-centered narrative infrastructure projects along the river's shores. Over the past five years, students and faculty at the University of Michigan's Detroit River Story Lab have helped to catalyze transformative place-based education projects, such as the Detroit River Skiff & Schooner Program, that demonstrate the critical role played by narrative epistemologies in the long-term success of river restoration efforts. Topics to be covered include principles of community engagement and strategies for integrating the natural and human sciences in place-based education programs.

Philippe Poulin, Peter May, Paulusie Papak and Katherine Snowball, Nunavik Research Centre. **Using long-term in situ and remote sensing data to monitor freshwater habitats in Nunavik.**

In Arctic and sub-Arctic regions, climate change is rapidly altering freshwater systems through changes in hydrology, temperature, and permafrost dynamics. In Nunavik, Inuit communities have reported declining water levels in small rivers for decades, with shallow reaches limiting Arctic char access to spawning and overwintering habitats. Despite these observations, long-term discharge and water level records remain largely limited to major rivers, leaving small, community-valued rivers poorly documented. Monitoring of these systems has only recently begun. To address this gap, long-term datasets are being developed by the Nunavik Research Centre, using Sentinel-2 and Landsat imagery to reconstruct historical river water extent as a proxy for water level variability. Preliminary analyses based on spectral water indices and threshold-based classification show promising potential to track interannual variability during key migration periods. Water temperature is also a key parameter to monitor. While satellite-derived water surface temperature is effective for estimating surface conditions, in situ measurements remain necessary to assess lake stratification. Near Kuujjuaq, five years of logger deployments in Stewart Lake (14 m deep) revealed no summer stratification, with temperatures reaching 18 °C near the bottom in 2023. The absence of deep cold-water refuges suggests potentially stressful conditions for fish during warm events. Combined with Inuit Traditional Knowledge and biological observations, long-term satellite and in situ datasets provide a foundation for monitoring climate-driven changes in freshwater ecosystems in northern environments.

Jennifer R. Powell[1], Madeline Morrison[1], Owen Taylor[2], Rosalind Chang[3] and Nicholas E. Mandrak[1], [1]University of Toronto Scarborough, [2]Southcott Pines Parks Association, [3]Ausable Bayfield Conservation Authority. **A community-science approach to Eurasian Water-milfoil (Myriophyllum spicatum) control in critical fish habitat.**

The Old Ausable Channel (OAC) in southwestern Ontario is home to several remnant populations of at-risk fishes that have disappeared or heavily declined elsewhere in the region. Most of the channel runs through a provincial park, while the northern part is in a residential area, making the channel an important part of community life for residents and visitors as well as aquatic life. In recent years, a substantial Eurasian Water-milfoil infestation has taken over the northern part of the channel, rendering it unusable for recreation in the summer, severely degrading fish habitat, and

threatening downstream habitat. Through mutual concern over the future of the channel, a partnership evolved between endangered fish researchers, community organizations, government agencies, a provincial park, and local residents to evaluate the effectiveness of burlap benthic mats as a milfoil-control technique given the unique conditions of the OAC. Two mats and one control area were set up at four locations of heavy milfoil infestation. At each location, one mat was left bare while the other was seeded with native plants to try to jumpstart regeneration. Mats and controls were evaluated three times over the course of the summer and fall for vegetation growth, light penetration, and water quality. The presentation will discuss the collaborative development and implementation of the study and share preliminary findings and lessons from the project.

Randal Power and **Joel MacDonald**, Parks Canada. **Mapping Walleye Habitat: Collaborative Study at Bobcaygeon Dam to Understand Reproductive Success.**

Locks and dams along the Trent-Severn Waterway are managed by Parks Canada, which also oversees water levels in connected rivers and lakes. In 2024, Parks Canada partnered with Kawartha Conservation, the City of Kawartha Lakes, and Curve Lake First Nation to study fish habitat at the Bobcaygeon dam—an important Walleye (Sander vitreus) spawning site. The goal was to assess habitat conditions and understand water management impacts. Several techniques were used. Substrate near the dam was mapped by drone during winter low-water conditions and verified with ground transects. Nighttime flashlight surveys were then conducted at multiple stations to estimate Walleye spawning timing. These observations were paired with water depth and velocity data collected using a Sontek M9 Acoustic Doppler Current Profiler (ADCP) mounted on a remotely controlled ARCBoat. The boat surveyed bathymetry, depth, and velocity in April during spawning and again in May for larval Walleye conditions. By correlating substrate, depth, and velocity with fish observations, researchers identified key habitat characteristics for sustaining Walleye populations. This comprehensive approach produced a detailed aquatic habitat map downstream of the dam, highlighting factors that may limit spawning, hatching, and nursery success. The study enhances community understanding of dam impacts and supports collaborative efforts between Parks Canada, conservation groups, First Nations, and the public to address potential issues.

Jade Prange[1], Bryan Loucks[2] and Janessa Esquible[3], [1]University of Michigan, [2]Naugon Associates, [3]Great Lakes Fishery Commission. **Revitalizing Anishinaabe Inaaknigewin Relationships: Fish, Water, and Clan Governance.**

The Great Lakes Fishery Commission (GLFC) and Naugon Associates collaborated with Indigenous Peoples to support a regional event reconnecting Anishinaabe Tribes and First Nations with cultural teachings on fish, water, and clan governance. This initiative recruited Indigenous knowledge holders for planning and program development, centering traditional knowledge and community priorities. Participants engaged in discussions, ceremonies, and presentations designed to strengthen cultural identity, stewardship practices, and intergenerational knowledge sharing. This model highlights the importance of relationship building, reciprocity, and restorative justice, offering insights into how collaborative, community-driven approaches can enhance trust and resilience. By documenting planning strategies, program logic, and participant experiences, this model may provide a framework other organizations can adapt to honor Indigenous leadership, amplify cultural knowledge, and create equitable partnerships. Ultimately highlighting a promising path forward for sustaining healthy ecosystems, fisheries, and vibrant community networks across the Great Lakes region.

Lara Puetz[1], Patricia Montalvo-Rodriguez[1], Kallie Strong[1], John Hume[2], Trisha Searcy[3], Nicholas Johnson[3], Margaret Docker[1] and Sara Good[1, 4], [1]University of Manitoba, [2]Michigan State University, [3]U.S. Geological Survey, [4]University of Winnipeg. **Captivity reduces diversity and alters community composition of larval sea lamprey gut microbiota.**

Gut microbiota play a pivotal role in fish metabolism, behavior, immune system regulation, and physiology; as such there is interest in trying to control fish health by modulating the gut microbiome, especially in sustainable aquaculture practices. Sea lamprey, an invasive pest in the Laurentian Great Lakes, is still abundant enough to cause significant damage, but successful control measures are making procurement of some life stages challenging. Thus, the need for reliable sources of animals for research into novel control tactics has driven recent captive-breeding efforts. However, how closely captive individuals resemble their wild counterparts remains a concern. Here, we compared the microbiota from the intestines of artificially propagated, wild-caught lab-reared, and newly wild-caught sea lamprey larvae and from paired environmental samples. Captivity and season dramatically shifted the gut microbiota community composition of larvae, and the environment is likely a primary source of microbial acquisition. Artificially propagated larvae had significantly lower bacterial diversity than wild sea lamprey, likely reflecting the reduced bacterial diversity of the rearing environment. Understanding how the dynamic responses of sea lamprey gut microbiota correlate with indicators of performance in captivity will be critical for current efforts to culture sea lamprey in captive breeding environments. More broadly, by characterizing how the gut microbiota and host phenotypes co-vary during early stages of captivity, we provide further insight into our mechanistic understanding of how wild animals adapt to new environments.

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Michael Raess, Alamos Gold Inc. **Parallel Processes in Practice: Integrating Design Evolution, Engagement, and Fisheries Act Approvals.**

Alamos Gold Inc.'s Lynn Lake Gold Project provides a practical case study of Fisheries Act Authorization (FAA) application development in which project design, environmental understanding, Indigenous Nation engagement, and regulatory approvals progressed in parallel. This presentation examines the balance between providing meaningful time, funding, and technical capacity for Indigenous Nations and the risk of open-ended processes that can stall projects capable of delivering economic and employment benefits. Broader challenges discussed include approval dependencies (e.g., Notice of Alteration/Notice of Change [NOA/NOC] requirements preceding FAA decisions), misaligned federal and provincial consultation processes, the absence of dependable timelines, and the compounding effects of delay, where evolving project designs necessitate FAA amendments, renewed engagement, and, in some cases, new legislative or species considerations that increase overall Harmful Alteration, Disruption, or Destruction of Fish Habitat (HADD).

Sohail Rai de Haan, York University. **The Limnology of Lake Nipigon as case study in the History of Science and Colonialism.**

Lake Nipigon has been transformed by commercial interest over the last century. Ontario claimed sovereignty of the lake in 1884 and opened it up to commercial fishing in 1917. From 1921-1924 a group of biologists from the University of Toronto led by Wilbert A. Clemens conducted qualitative and quantitative studies of fish, micro organisms, fauna, and the lake's features to create a natural history of Lake Nipigon. The scientists produced sixteen journals published as the "Limnology of Lake Nipigon, 1921-1924." Underlying the scientific study was an economic focus

on which fish could provide the most value to the provinces fisheries, and how to best maximise the growth of said fishes. This signifies a shift to export focused fishing in contrast to centuries of local Indigenous resource use. Using the limonology of Lake Nipigon as a case study, this paper examines the intersection of natural science and nature as a tool of Canadian colonialism. The construction and discovery of scientific knowledge is purported as a positive development of modernity but, as this paper will show, has been historically used to further the colonial frontier. Knowledge about where and when to fish in Lake Nipigon helped extract maximum profits and contributed to the century of colonial transformation.

Amanda Rajala[1], Brett van Poorten[1], Fiona Johnston[1], Alf Leake[2] and James Crossman[2], [1]Simon Fraser University, [2]BC Hydro, Fish and Aquatic Sciences. **Understanding the Limitations of Fish Performance Measures to Inform Water Use Decisions.**

In dammed river systems water resource management must balance social, economic, and ecological needs. Across BC, the Water Use Planning process develops dam operations determining the quantity, magnitude, and timing of water to be released from the dam (i.e., discharge). A key component is understanding how dam operations impact fish and fish habitat. To better understand potential impacts of altered discharge, performance measures designed to quantify fish habitat are used to evaluate the relative performance of proposed operation alternatives. However, their sensitivity to changes in dam operations may depend on several factors. Upstream factors such as reservoir storage capacity, and dam infrastructure constraints, alongside downstream factors such as river morphology and tributaries, can influence how a given discharge impacts the habitat. In addition, optimal habitat conditions differ between species and life stages. Across four systems in Lower Mainland, BC this study evaluates factors that may limit the ability of two fish habitat performance measures to inform water use decisions. A simulation model is used to generate alternative operations that are evaluated by the response of the performance measures. By comparing results across systems, factors that may restrict dam operators' ability to achieve desired outcomes can be identified. This research helps identify the level of information the measures provide for assessing proposed operations and can be utilized in water management to quickly identify what is achievable given system-specific constraints.

Meena Raju[1], David Cannon[1], Peter Alsip[2], Mark Rowe[2], He Wang[3], Jia Wang[2], Theresa Cordero[4], Robert W. Hallberg[4], Charles A Stock[4] and Joseph A Langan[2], [1]CIGLR, University of Michigan, [2]NOAA Great Lakes Environmental Research Laboratory, [3]University Corporation for Atmospheric Research, [4]NOAA/Geophysical Fluid Dynamics Laboratory. **Linking hydrodynamics and biogeochemistry in Lake Michigan-Huron Using MOM6-SIS2-COBALT3.**

Understanding the coupled physical-biogeochemical processes that regulate primary productivity in large lake systems is essential for improving ecosystem projections under a changing climate. Building on the development and validation of a hydrodynamic-ice model for Lakes Michigan-Huron using the Modular Ocean Model version 6 coupled with the Sea Ice Simulator version 2 (MOM6-SIS2), this study represents the next step toward an integrated Great Lakes Earth System Model by coupling MOM6-SIS2 with the biogeochemical model COBALT v3. The coupled framework explicitly resolves lake thermal stratification, seasonal circulation, ice dynamics, and nutrient-plankton interactions, enabling mechanistic investigation of physical controls on biogeochemical variability. The MOM6-SIS2-COBALT3 system will simulate key biogeochemical tracers, including dissolved inorganic nutrients, phytoplankton biomass, and primary production, while accounting for physical drivers such as vertical mixing, lateral transport, ice cover, and stratification strength. Model performance will be evaluated against satellite-derived chlorophyll-a

and available in situ observations of nutrients, phytoplankton biomass, and biogeochemical rate indicators relevant to primary productivity. The coupled modeling system will improve understanding of physical-biological interactions, enhance predictive capability for ecosystem responses, and support future integration of the Great Lakes into NOAA's regional and global Earth System Models.

Riley Ralph[1] and Christopher Ward[1, 2], [1]Bowling Green State University, [2]University of Massachusetts-Dartmouth. **Urbanization gradients shape environmental conditions and microbial communities in Lake Erie tributaries.**

Urbanization alters hydrology, nutrient routing, and microbial processes, yet how watershed development translates into shifts in stream microbiomes remains poorly resolved. To address this, we sampled two tributaries draining to western Lake Erie: Swan Creek, a small urban-suburban stream within the Toledo metropolitan area, and the Maumee River, a much larger mixed agricultural-urban system spanning eastern Indiana and northwest Ohio—offering contrasting scales of watershed influence. From June-October 2023 and 2024, we conducted monthly sampling, measuring physicochemical conditions, dissolved nutrients, fluorometric algal class concentrations, and 16S rRNA gene amplicons at sites spanning an urbanization gradient. Preliminary correlation analyses indicate distinct system behaviors. In Swan Creek, higher upstream watershed imperviousness (derived from StreamCat's 2019 Mean Imperviousness dataset) was weakly to moderately positively associated with phytoplankton fluorescent signatures (green algae, cyanobacteria, diatoms) and select dissolved nutrient concentrations. By contrast, the Maumee River exhibited moderate negative relationships between imperviousness and dissolved oxygen, pH, and green algal fluorescent signatures. These contrasting responses suggest differences in buffering capacity, connectivity, and residence time that mediate how urbanization influences each system. Ongoing 16S sequencing analyses will evaluate whether these environmental gradients correspond to shifts in bacterial community composition and functional guilds linked to nutrient cycling or cyanobacterial bloom formation, potentially identifying microbial indicators of watershed-scale land use.

Caelin Randall-Scott, Lukas Golterman and Gerjan Piet, Wageningen University and Research, Wageningen Marine Research, Den Helder, Netherlands. **A practical approach towards developing pressure dispersal methods in SCAIRM: A case study of underwater noise.**

Marine soundscapes are increasingly dominated by anthropogenic noise, yet environmental impact assessment frameworks are oversimplifying noise dispersal, leading to underestimation of exposure risk. This study develops methodologies for modeling underwater noise within the Spatial Cumulative Assessment of Impact Risk for Management (SCAIRM) framework, using the Dutch Wadden Sea UNESCO World Heritage site as a case study. We mapped continuous low-frequency noise from six vessel types using EMODnet data and a cylindrical spreading propagation model. Our findings revealed that shipping noise disperses extensively across the Wadden Sea, with received levels exceeding ambient noise (>100 dB re 1µPa) throughout most of the study area. We implemented a categorical threshold-based method using temporary and permanent threshold shift values, and a continuous sigmoid scaling function that better reflects gradual biological responses to increasing noise levels. Both methods demonstrated more accurate representations of impact risk compared to the current approach used in the SCAIRM framework. By addressing a key gap in how cumulative impact assessments (CIAs) incorporate pressure dispersal, this study enhances the realism and reliability of spatial impact models. The implications of this research extend beyond the Wadden Sea, offering valuable tools for marine managers and policymakers worldwide. Our

methodology enables more targeted mitigation strategies, better-informed marine spatial planning, and stronger ecosystem-based management approaches, to support international efforts of reducing anthropogenic noise and its impacts on marine ecosystems.

Ryan Ransom[1, 2, 3], [1]Akwesasne, [2]SUNY Potsdam, [3]Massena Central School District. **Two-eyed seeing: Combining Indigenous Knowledge and Western Knowledge.**

Two eyed seeing (TSE) is a concept developed by Mi'kmaw elders Albert and Murdena Marshall. TSE is a way of thinking that combines Indigenous knowledge with mainstream, or Western knowledge. One eye focuses on the strengths found in Indigenous knowledge while the other eye focuses on strengths found in Western knowledge. This way of seeing avoids one viewpoint becoming dominant over others and creates a stronger and more holistic understanding of the world around us. I will provide some background on two-eyed seeing and discuss my own efforts to develop lessons that embody the principles of this concept and how they can benefit Indigenous and non-indigenous students. Examples include traditional practices like maple tapping, basketry, and lacrosse stick making. With these examples, students receive culturally relevant lessons along with STEM lessons that are tied into these practices. This creates a connection that allows Indigenous students to relate to western designed curriculums, a challenge found among many Indigenous students who often feel unseen.

Mikael Ranta, Shawn Leroux and Craig Purchase, Memorial University of Newfoundland Department of Biology. **Linking Periphyton to Salmon - Bottom-up Processes in the Boreal.**

The Atlantic salmon (Salmo salar) is an anadromous species with a broad distribution from Eastern North America to Western Europe, with ecological, economic, and cultural significance. Despite the expansive range, wild Atlantic salmon stocks across the North Atlantic have experienced gradual decline. Recruitment of individuals to the adult population remains a management area of focus, with a specialized concentration given towards identifying factors affecting salmon at the juvenile freshwater life stage. Specifically, research is needed to identify potential bottlenecks limiting freshwater productivity. We aim to address this research gap with a case study in the Exploits River, Newfoundland- a watershed that receives one of the largest anadromous Atlantic salmon returns in North America. We sampled biotic, chemical, and physical components of 45 streams in and around this watershed in order to characterize juvenile salmon food resources. We tested the hypotheses that invertebrate biomass would be most influenced by periphyton abundance, and that periphyton biomass would be most influenced by chemical and physical stream attributes. Preliminary results reveal that invertebrate biomass was best predicted by a combination of abiotic and biotic variables. Conversely, periphyton biomass exhibited a positive relationship with EPT mass (Ephemeroptera, Plecoptera, and Trichoptera summed weight) and stream wetted width. These findings will help further our understanding of drivers impacting salmon production in this watershed, with potential applications for Atlantic salmon management, conservation, and restoration efforts in other systems.

Euan Reavie, Elizabeth Alexson and Leah Schleppenbach, University of Minnesota, Natural Resources Research Institute. **The picoplankton fraction of primary producers in the Great Lakes is (probably) higher than you think.**

Phytoplankton support diverse food webs in the Laurentian Great Lakes, but to date both the spatial distribution of photosynthetic picoplankton and their overall importance relative to the total phytoplankton community has been unclear. Photosynthetic picoplankton are plankton entities between 0.2 and 2 μm and are assumed to represent an important part of the cyanobacterial community; therefore, they likely play a significant role in nutrient cycling. As part of the

Cooperative Science and Monitoring Initiative and the Great Lakes Biology Monitoring Program (USEPA) we sampled phytoplankton in spring and summer in each lake, obtaining nearshore and offshore samples, as well as summer deep chlorophyll layer (DCL) samples. Using size-fractionated chlorophyll a analysis, we determined that the picoplankton proportions of the total primary producer plankton ranged from ~30% (Lake Erie) to ~62% (Lake Huron). Further, minimal difference between chlorophyll measurements based on 0.2- and 0.7-µm filters indicated that the USEPA's long-running chlorophyll a standard method using 0.7-µm filters was effectively capturing the whole primary producer community. Though analyses for all lakes are not yet complete, early results indicate that in some lakes picoplankton fractions are higher in summer DCLs versus integrated epilimnetic samples, whereas nearshore and offshore fractions are similar. Picoplankton fractions are not known historically, but ongoing monitoring should be used to track changes in picoplankton abundance, given their likely importance to food webs.

Abigail Reed[1], Silvia Newell[1], Euan Reavie[2], Justin Chaffin[3] and Jenan Kharbush[1], [1]University of Michigan, [2]University of Minnesota Duluth, [3]The Ohio State University. **Diatoms and Changing Nutrient Dynamics in Western Lake Erie.**

Warming winter temperatures are affecting Western Lake Erie by causing decreases in ice cover, thickness, and duration, which in turn are affecting phytoplankton communities, including species dominance and growth. Diatoms are particularly susceptible to the effects of warming because they dominate within the lake during colder seasons (winter, spring, and early summer). Changes in winter are shifting under-ice diatom communities and under-ice nutrient cycling processes. We measured rates of nitrogen cycling within diatom-dominated winter and spring communities and summer cyanobacterial-dominated communities in the Western Basin. High rates of nitrate uptake coincided with diatom-dominated communities and were an order of magnitude greater than uptake of ammonium and urea by those same communities. We compare these rates to long-term trends in nutrient concentrations, including reactive silicate, and diatom abundance across Lake Erie. As winters continue to change, diatom blooms may change with them, potentially having negative impacts on higher trophic levels and Lake Erie fisheries.

Julia Reese[1], Annabell Hüsken[1, 2, 3], Jose Luis Rodriguez-Gil[4, 5], Karen Kidd[6] and Bernd Sures[1, 2, 3], [1]Aquatic Ecology, University of Duisburg-Essen, [2]Research Center One Health Ruhr, Research Alliance Ruhr, [3]Centre for Water and Environmental Research, [4]International Institute of Sustainable Development-Experimental Lakes Area, [5]University of Manitoba, [6]McMaster University. **Assessing Digenean trematode diversity in stressor-affected lakes at the IISD - ELA.**

A comprehensive understanding of ecosystem dynamics is essential for interpreting the impacts and interactions of environmental and anthropogenic stressors. While stressor responses of target species and free-living organisms are commonly assessed, parasite communities are often neglected, although parasites are both directly impacted by stressors as well as being stressors themselves, thereby affecting host responses to environmental changes. Quaternary ammonium compounds (QAC) are widely used antimicrobial agents that increasingly enter freshwater systems, yet their potential influence on parasite-host communities remains poorly understood. The objective of this study was to evaluate the occurrence of digenean trematodes in aquatic snails in a QAC-exposed lake and a reference lake at the International Institute for Sustainable Development - Experimental Lakes Area (IISD - ELA). From June to September 2025, 194 freshwater snails were collected and screened for trematode infections. Cercariae from infected snails were morphologically examined and subsequently subjected to molecular identification. Across both lakes, 108 snails from the families Planorbidae and Physidae were infected with digenean trematodes, corresponding to a

prevalence of 55.7%. Molecular analyses identified five digenean trematode families: Diplostomidae (Posthodiplostomum sp.), Plagiorichiidae (Alloglossidium sp.), Psilostomatidae (Ribeiroia ondatrae), Schistosomatidae (Trichobilharzia sp.), and Zoogonidae. Consequently, this study provides a preliminary characterization of digenean trematode communities at the IISD - ELA, establishing a critical foundation for future analyses of host-parasite interactions within the context of whole ecosystem research.

Howard Reeves[1], Michael Fienen[1], Aaron Pruitt[2], Lena Pappas[3] and Megan Cameron[3], [1]US Geological Survey, Upper Midwest Water Science Center, [2]Wisconsin Department of Natural Resources, [3]Michigan Department of Environment, Great Lakes, and Energy. **PyCap-dss: An open-source decision support tool for high-capacity well evaluation.**

The Great Lakes-St. Lawrence River Basin Compact aims to have states implement programs "… to protect, conserve, restore, improve, and effectively manage the waters and water-dependent natural resources of the basin". To support programs in Wisconsin and Michigan, the potential individual and cumulative effects of high-capacity groundwater withdrawals on streamflows, lake levels, and attendant water-dependent natural resources are being evaluated. These states have adopted use of analytical solutions that approximate streamflow depletion by high-capacity wells as part of management programs because of lower data requirements and computational demands. To increase the capabilities and transparency of software used to compute various analytical solutions, we developed an open-source, python-based, module (pycap-dss). As an open-source project, the module includes continuous integration testing against problems from the defining literature and allows for updates submitted by the user community. This collaboration is a valuable example of federal government science working with multiple states. We recognized similar needs in varied but similar regulatory and hydrologic settings, brokered coordination among them, and provided a flexible tool. PyCap-dss can be customized for specific needs and used by all parties.

Umer Abdur Rehman and Myrle Ballard, University of Calgary. **Assessment of Biodiversity Decline in Lake St. Martin Based on Remote Sensing Analysis.**

Biodiversity loss, characterized by declines in species, genetic, and ecosystem diversity, undermines ecosystem resilience and human well-being. Traditional field-based monitoring methods provide detailed local insights but are limited by cost, spatial coverage, and temporal resolution. This study employs multi-temporal remote sensing data from Landsat 5, Landsat 7, and Sentinel-2 (1990, 2000, 2010, 2020) to detect and analyze vegetation loss around Lake Saint Martin, Manitoba, Canada, as a proxy for biodiversity decline. Using a Support Vector Machine classifier, four land cover classes were mapped, with classification accuracy validated via confusion matrices (Kappa = 0.81) and Normalized Difference Vegetation Index (NDVI) trends. Results indicate progressive vegetation degradation over 30 years, with the most severe loss expanding from the southeast-northwest region in 1990 to nearly the entire study area by 2020. NDVI analysis corroborates these trends, revealing sharp declines, partial recovery, and ongoing stress in vegetation health. The spatial extent of vegetation loss increased substantially, while grassland and stable land areas decreased. This research highlights remote sensing's critical role in monitoring biodiversity changes and underscores the urgent need for conservation strategies to address ongoing ecosystem degradation.

Logan Reid[1], Kevin Anderson[1], Megan Bailey[2] and Tyler D. Eddy[1], [1]Fisheries and Marine Institute of Memorial University, [2]Dalhousie University. **DFO Structure and Function in Fisheries Management Decision Making.**

To sustainably manage our oceans and fisheries, under threats of environmental change and overexploitation, regulatory bodies like Fisheries and Oceans Canada (DFO) manage fisheries through a variety of means including, but not limited to, limited entry, fishing seasons, and quota monitoring. The Fisheries Act outlines several factors that may be considered in DFO decision-making around fisheries management, but it does not specify how these factors should be weighted in practice. Scientific stock assessments provide inputs to science advice used in fisheries management decisions, but necessarily DFO considers other scientific evidence and socioeconomic factors. There is a clear gap in understanding how fishery decisions are made at a regional and national level. This research investigates the decision-making processes at DFO, and how decisions may or may not align with scientific recommendations. The study addresses three questions: Do DFO's management decisions align with scientific advice? What external factors, such as socioeconomic considerations, likely cause deviations from scientific recommendations? Do the factors that influence decision-making vary by region and through time? To explore these questions, we analyze DFO's stock assessment data from historic to current Canadian Science Advisory Secretariat (CSAS) reports and posted fisheries management decisions from DFO to identify patterns in management decisions. Additionally, we interview current and former decision-makers to understand their perspectives. Preliminary results on the analyses will be presented, providing an understanding of the factors influencing fisheries management decisions.

Stewart Reid[1] and Damon H., Goodman[2], [1]Western Fishes, [2]California Trout. **Exploring temperatures occupied by native lampreys in California: current environment and implications for the future.**

California is home to a diverse lamprey fauna (Entosphenus spp. and Occidentis spp.) that historically occupied streams throughout the state and into Baja California (México). Recent range fluctuations by anadromous Pacific Lamprey, Entosphenus tridentatus, in its southern range have caused concern with regard to climate change and warming stream habitats. We associate modeled mean August water temperatures (NorWest Summer Stream Temperature Model; AugTw) of stream reaches currently occupied by lampreys in California for periods 2002-2011, 2040, 2080 and +3° C scenarios. The nine lampreys in California occupy a considerable range in temperatures, reflecting broad elevational and latitudinal ranges, with 2002-2011 AugTw of 7.9-25.9° C. Under a projected +3° C increase only eight streams state-wide are projected to have reaches exceeding AugTw of 28.0° C, accounting for 2.6% of currently occupied habitat. Actual 2021 August water temperatures surveyed at selected sites with high modeled 2002-2011 temperatures and currently occupied by Pacific Lamprey ranged from 18.5-32.6° C. Projected temperature increases suggest that future conditions may be within the range currently encountered and tolerated by Pacific Lamprey. Empirical observations of ammocoetes in warmer stream reaches suggest that lampreys are successfully rearing in streams reaching temperatures close to upper lethal limits suggested by laboratory studies. Rising stream temperatures are not likely to restrict distribution of western lampreys in the foreseeable future, and therefore conservation strategies should focus on other issues.

Larisa Renaud[1, 2], Lauren Damphousse[1, 2], Alice Grgicak-Mannion[1] and Catherine Febria[1, 2], [1]University of Windsor, [2]Healthy Headwaters Lab. **Exploring Biodiversity Patterns of Freshwater Mussels and Benthic Macroinvertebrates within an Experimental Mitigation Translocation.**

Freshwater mussels are the ecosystem engineers in the Great Lakes tributaries, shaping habitat structure, linking benthic and pelagic processes through their filter-feeding activities, and

stabilizing sediments for other aquatic communities. Despite the many ecosystem services they provide, freshwater mussels are among the most endangered taxa in the region, being designated as species at risk (SAR). As biodiversity declines, mitigation translocations have become commonly used to reduce infrastructure-related impacts on SAR mussels; however, post-translocation responses of mussel assemblages and broader benthic macroinvertebrate communities remain unclear. In the summer of 2023, an experimental mitigation translocation was conducted in the Sydenham River, Ontario, a regional hotspot for SAR mussel species. Follow-up surveys conducted in 2024 and 2025 evaluate early responses of mussel species and benthic macroinvertebrate communities at both the excavation and relocation sites. Mussel surveys were performed using quadrat-based sampling, while benthic macroinvertebrates were sampled before and after the translocation to assess whether macroinvertebrate communities respond to changes in mussel presence. Analyses of biodiversity patterns in benthic macroinvertebrate communities and mussel assemblages are ongoing and will continue to examine the changes in community composition and the relationship between taxa across spatial and temporal scales. This study will improve the understanding of biodiversity patterns critical to protecting species at risk and will help inform future mitigation translocation strategies performed within the Great Lakes region.

Cecile Renfro[1], Hannah Nicklay[1], Kait Reinl[2] and Kirsten Rhude[1], [1]Lake Superior National Estuarine Research Reserve, [2]Rensselaer Polytechnic Institute. **Hydrologic change shapes plant community and improves ecosystem health in a Lake Superior coastal wetland.**

Understanding how environmental change shapes coastal wetland plant communities is critical as human-induced environmental change is expected to degrade these valuable and productive systems. In the Laurentian Great Lakes, water level change can alter plant community structure, yet the ecological consequences of these changes are unclear. We conducted annual plant surveys in a Lake Superior coastal wetland from 2014-2024 to assess how a transition from prolonged low water (2004-2012) to sustained high water (2014-2023) influenced plant community composition. We integrated temporal turnover with applied indicators of ecosystem health (e.g., introduced species abundance, habitat conservatism), to quantify the magnitude and timing of compositional change and the effect of this change on ecosystem health. We found significant turnover after two years of high water (2016), during which the plant community transitioned from emergent-dominant (e.g., Carex spp., Typha spp.) to hemi-marsh (mix of emergent and submerged). Indicators of ecosystem health revealed this compositional change resulted in a decline in introduced species, an increase in community-level conservatism, and an increase in species richness over the sampling period. Our study highlights that even high-magnitude water level regime shifts that restructure wetland plant communities can still support the health of coastal wetland systems.

Michael Rennie[1, 2, 3], Bianca Possamai[4], Daniel Bollag[4], Lydia Paulic[3, 5], Sam Kelly[6, 7], Tom Hrabik[6] and Jason Stockwell[4], [1]Lakehead University, [2]IISD Experimental Lakes Area, [3]RAEON, [4]University of Vermont, [5]University of Winsdor, [6]University of Minnesota Duluth, [7]Large Lakes Observatory. **What makes lakemounts an ecological hotspot? Testing hypotheses of energy pathways at Superior Shoal.**

Lakemounts in the Great Lakes (like seamounts in the ocean) appear to be 'trophic hotspots'; that is, regions of exceptionally high productivity and biodiversity relative to their surrounding waters. However, relatively little is known about what physical and ecological processes are responsible for supporting these patterns. Several proposed hypotheses involve interactions of shoals with lake currents, including delivery of nutrients via upwelling, deposition of energy via eddy retention and stranding of vertically migrating organisms via advective currents. To test these (and

other) hypotheses, an international expedition to Superior Shoal was conducted in September of 2025. We sampled water for nutrient and chlorophyll-a analyses, zooplankton, fish, and acoustic profiles to estimate fish biomass in distinct shoal locations (South, North, and Halfway ridges) and compared them to adjacent offshore areas. Preliminary analyses indicate strong vertical mixing and elevated epilimnetic chlorophyll-a concentrations at the South and eastern Halfway ridge locations compared to the North Ridge, supporting the nutrient delivery via upwelling hyothesis. Mysis densities were greater over ridges at two sites compared to offshore regions, and densities of lake trout on shoal surfaces were higher at dawn (when vertically migrating organisms attempt to descend) than at dusk (when vertically migrating organisms are unlikely to be over shoals) - both observations support the organismal stranding hypotheses. Future work will examine trophic biomass and energetic pathways using acoustics and stable isotopes.

Mir Amir Mohammad Reshadi[1], Fereidoun Rezanezhad[1,2], Sarah Kaykhosravi[3], Thu Hang Nguyen[1], Stephanie Slowinski[1,2], Ali Reza Shahvaran[1], Lewis Alcott[4], Buuan Lam[5], Monica Puopolo[5] and Philippe Van Cappellen[1,2], [1]Ecohydrology Research Group, Department of Earth and Environmental Sciences, University of Waterloo, [2]Water Institute, University of Waterloo, [3]Department of Environmental Sustainability, [4]School of Earth Sciences, University of Bristol, [5]Sanitary and Stormwater Utilities Division. **Microplastic Yield and Retention in Urban Stormwater Catchments and Ponds.**

Urban stormwater runoff is a major pathway for microplastic (MP) transport to aquatic environments, with stormwater ponds functioning as interception systems that reduce downstream MP loads. This study integrates sampling results, Laser Direct Infrared spectroscopy, sediment accumulation measurements, and hydrological modeling to quantify MP loads and yields from five urban stormwater catchments, and MP retention across their receiving stormwater ponds in Kitchener, Ontario, Canada. Inflow MP concentrations to stormwater ponds ranged from 4.9×10^{6} to 4×10^{7} particles m^{-3} and from 5.8×10^{-2} to 0.9 g m^{-3}, yielding annual catchment loads of 9.7×10^{11}-3.5×10^{12} particles yr^{-1} and 1.1×10^{4}-8.4×10^{4} g yr^{-1}. Impervious-area-normalized SWC yields reached 3.6×10^{10}-2.1×10^{11} particles ha^{-1} yr^{-1}. MP fragments dominated the morphological assemblage, with particles <100 μm accounting for the majority of particle counts but a comparatively minor fraction of total mass, while MPs >500 μm exhibited the opposite pattern. Stormwater ponds retained 42-93% of MPs on a particle basis and 40-92% on a mass basis, with pronounced size- and polymer-dependent variability. Despite high retention efficiencies, outflow loads remained substantial, with one stormwater pond exporting MP loads nearly an order of magnitude greater than others. MP yields were positively associated with catchment imperviousness, residential population density, and rubber particle abundance, indicating road traffic as a contributing source. Overall, stormwater ponds substantially attenuate but do not eliminate MP loads, underscoring the need for standardized monitoring frameworks and targeted mitigation strategies.

Margaret Rettig[1], Julia A. Obuya[1], Katelyn M. Brown[1,2], George S. Bullerjahn[1] and Christopher S. Ward[1,3], [1]Bowling Green State University, [2]Great Lakes Institute for Environmental Research, University of Windsor, [3]University of Massachusetts Dartmouth. **Cyanobacterial associations underlie spatial variation in fungal community composition in Lake Victoria's Winam Gulf.**

Studies characterizing aquatic fungal diversity and ecology are limited, especially in the African Great Lakes. From studies of aquatic fungi in other ecosystems, we anticipate that diverse fungal communities with highly variable ecologies are present and play important roles in ecosystem dynamics and cyanobacterial blooms. To advance understanding of the role of cyanobacterial-fungal interactions in cyanobacterial bloom formation, we examined the spatial variation in the aquatic

fungal community in the Winam Gulf (Lake Victoria) using rRNA metabarcoding for samples collected on a 2022 cruise. In our study, we found that highly diverse fungal communities exist in the Winam Gulf and are primarily comprised of non-Dikarya fungi, particularly members of Chytridiomycota. Taxonomic classification using the DADA2 assignTaxonomy function and the PR2 reference database resulted in a large number of unclassified fungal taxa, even at the phylum level. Further analysis was able to uncover unique fungal assemblages associated with dominant cyanobacteria, indicating that different dominant cyanobacteria may host unique fungal communities. Our results reveal a distinct and diverse fungal community and provide insight into the relationships between aquatic fungi and cyanobacteria, informing future work regarding the ecological function of aquatic fungi and their role in biogeochemical cycling. Through this study, we hope to increase the knowledge of tropical freshwater fungal diversity and highlight the need to characterize the potential role that fungi play in cyanobacterial bloom dynamics.

Emma Rice[1], Elizabeth Nyboer[1], Leandro Castello[1] and Vivian Nguyen[2], [1]Virginia Tech, [2]Carleton.
Urban fish food systems: Insights from Detroit MI.

Recreational fisheries are primarily managed as a leisure activity, however there is growing evidence that food may be a primary motivator for some anglers' participation in recreational fisheries. Using a values-based food systems framework, this paper analyzes the diverse values associated with production, provisioning, and consumption of recreationally caught fish from the Detroit River and Lake Erie in Michigan, United States for different marginalized, ethnic, and racialized groups. Focusing on shore-based anglers, this study uses intercept survey data to quantitively assess the drivers of fish consumption and focus group data to qualitatively analyze the diverse benefits derived from the Lake Erie fish food system. We find that species preferences, consumption rates, and values vary between ethnic groups, with management implications for angler motivation and satisfaction and community level environmental justice implications.

Emma Rice[1], Eranga Galapaththi[1], Marc Stern[1], Lovin Kobusingye[2] and Elizabeth Nyboer[1], [1]Virginia Tech, [2]Uganda National Women's Fish Organization. **Organizational governance: Women's fisheries organizations on Lake Victoria.**

Community-based organizations can be important tools for fishing households to build resilience to various shocks or stressors (e.g. climate change, policy shifts). Social organization (e.g. governance) has been recognized to shape adaptive capacity at various scales; however, little research has been conducted to understand how organizational governance may mediate adaptive capacity for members and their households. In this study, we use the case of women's fisheries organizations (WFOs) in Uganda to answer the questions: (1) How does organizational membership mediate adaptive capacity for small-scale fishing households in Uganda and does it differ between genders? And (2) Which dimensions of organizational governance are most important in determining WFOs ability to support their members during a shock? We examine various dimensions of organizational structure and governance to understand key factors influencing livelihood resilience. We draw on semi-structured and key informant interviews with members and leaders of WFOs to understand why some organizations and households are more able to adapt to social and ecological shocks than others.

E. Agnes Richards and Felix Ouellet, Environment and Climate Changa Canada. **Spatial Delineation of Nutrient Hotspots in the Red-Assiniboine River Basin and the Ecological Consequences.**

We applied a Bayesian SPARROW (SPAtially-Referenced Regression On Watershed attributes) and defined nutrient hotspots and their associated sources. These sources included, agricultural, urban, forests, wetlands, and stream channels. For each source, nutrient hotspots were identified and mapped for both Canada and US. In Canada, the main contributor to phosphorus loading was manure. We examined the ecological implications of the amount of manure produced by different livestock, by application type, and by processing plants. The ecological consequence of excessive phosphorus is that Lake Winnipeg continues to have harmful algal blooms. We examine potential phosphorus reduction strategies.

Jacques Rinchard[1], Matthew Futia[1], Conner Berger[1], Roger Gordon[2], Reinna Blair[2], Meredith Bartron[2], Steve Davis[2] and John Sweka[2], [1]State University of New York - Brockport, [2]US Fish and Wildlife Service. **Lipid and Fatty Acid Signatures of Cisco Eggs from Wild and Domesticated Broodstock.**

Cisco Coregonus artedi was once a key forage species in the Great Lakes, but populations have declined due to overfishing, habitat degradation, and invasive species, prompting restoration and stocking efforts. The objective of this study was to compare neutral and phospholipid contents and the fatty acid composition of eggs from wild and hatchery cisco to identify dietary components that support optimal larval development. Eggs were collected from Drummond Island, Lake Huron, and the Jordan River National Fish Hatchery, in Michigan. Total lipids were extracted from eggs and separated into neutral and phospholipid fractions. Fatty acids were then transmethylated and analyzed using gas chromatography/mass spectrometry. Univariate and multivariate statistics were used to assess significant differences in lipid content and fatty acid signatures between the wild and domesticated eggs. Results showed no significant differences in total, neutral, and phospholipid content between the two sources. However, fatty acid signatures in both lipid fractions differed significantly between wild and hatchery eggs. Future work will examine embryo survival in relation to egg fatty acid composition, with particular focus on how these patterns reflect adult diet.

Dunia Roba, University of Windsor. **Dissolved organic matter as an ecological tracer of human impacts on watersheds of southwestern Ontario, Canada.**

In the field of restoration ecology, identifying the root causes of ecosystem degradation can greatly inform rehabilitation efforts. This is crucial for highly impacted regions such as southwestern Ontario, which has historically been affected by both agricultural and urban development. While commonly utilized ecosystem indicators such as benthic macroinvertebrate diversity or nutrient concentrations can outline the current well-being of streams, they may not specify the sources of said degradation, limiting their ability to evaluate restoration work. An alternate approach uses dissolved organic matter (DOM), or the complex mixture of carbon compounds in water, soil, and sediment. The optical characteristics of these molecules can be used to identify various autochthonous (aquatic) or allochthonous (terrestrial) contributions through fluorescence Emission-Excitation Matrices (EEMs), Parallel Factor Analysis (PARAFAC), and the OpenFluo library-providing knowledge as to how human activities impact streams. This research investigates the extent to which DOM carbon components vary spatially with land use, temporally, and across stream order in southwestern Ontario. Optical analyses were conducted on a regional dataset of more than 700 samples collected from 2020-2025. The data will be processed through a PARAFAC model and interpreted through comparisons to previous EEMs literature. Results will thereby characterize main DOM components and controls for Lake Erie watersheds. Ultimately, this study will provide a regional DOM baseline for research regarding ecosystem restoration and support future long-term DOM analyses in the Great Lakes watersheds.

Steven A. Robinson[1], Ben Chittle[2], Colin Rennie[3], Steven J. Cooke[1] and Jesse C. Vermaire[1], [1]Carleton University, [2]Independent, [3]University of Ottawa. **Evaluating No Wake Zones as a Boat Wake Mitigation Strategy in a Multi-Use Recreational Waterway.**

Boating is increasingly recognized as a stressor to freshwater ecosystems, and vessel-generated wakes are a growing concern for waterway managers due to their acute and cumulative effects on shorelines and nearshore environments. Our study was conducted in the Long Reach, a heavily used section of the Rideau Canal near Ottawa (ON). In response to public concerns about shoreline erosion, property damage, safety, and user conflict associated with boat wakes, Parks Canada installed no wake zones in the Long Reach in 2012; however, these zones lack enforceable regulations, and their effectiveness has not been evaluated. We present the first assessment of no wake zones as a management tool for modifying boating behaviour and mitigating high-energy wake events and cumulative wake energy in a recreational waterway. Between June 29 and October 2, 2025, surface waves were logged by pressure sensors at four sites in no wake zones and six unrestricted sites. Wakes were identified in the pressure time series using spectral wavelet analysis. For each site, wake frequency, duration, and energy were quantified, along with the ratio of wake energy to wind wave energy. Time-lapse imagery enabled precise attribution of wake events to individual boat passes and identification of the vessel types and operating modes contributing most to wake energy. Our results provide empirical evidence to support adaptive management of no wake zones and mitigation of boating impacts in recreational waterways.

Jessica Robson, Catherine Febria and Kenneth Drouillard, University of Windsor. **Sediment Mercury and Dissolved Organic Matter Responses to Capping in St. Clair River.**

The St. Clair River, a Great Lakes connecting channel, was designated as an Area of Concern reflecting intense industrial activity responsible for discharging contaminants such as mercury and organochlorines. Sediment remediation efforts in three priority zones on upstream Canadian portions of the system were completed in spring 2025. Sediment capping covered approximately 3 acres of the highest mercury containing sediments with a target of achieving surface weighted sediment Hg concentrations in the priority areas at 3 μg/g dry weight. This study is two years into a three-year monitoring process evaluating the pre- and post-capping responses of microbial and macroinvertebrate communities in partially remediated Zone 3 of the system. We describe total Hg in the substrate, dissolved organic matter (DOM) and benthic communities pre- and post-capping indexed against a high quality wetland in the Detroit River sampled in the same time frame. Sediments could not be collected from capped areas of Zone 3, but pre-capped Hg and DOM in capped zones and both pre- and post-capping Hg and DOM in non-capped portions of zone 3 are described.

Chelsea Rochman[1], Matthew Hoffman[2], Diane Orihel[3], Michael Rennie[4], Michael Paterson[5], Jennifer Provencher[6], Rebecca Rooney[7], Francis Nuamah[1], Desiree Langenfeld[5], Rachel Cable[8], Garth Covernton[1], Mira Ghosh[1], Stephanie Graves[3], Eden Hataley[1], Ludovic Hermabessiere[9], Emily Johnson[10], Jihyun Kim[3], Celia Konowe[11], Yael Lewis[3], Brenda Li Ludena[1], Rachel McNamee[7], Madeleine Milne[12], Katie Massue-Monat[1], Emilie Montreuil Strub[7], Keenan Munno[1], Ashlyn Nance[1], Natasha Neves[6], Meredith Omer[1], Drew Thompson[7], Cody Veneruzzo[4], Hannah Vonberg[11], Jessie Wilson[6], Susanne Brander[13], Melissa Duhaime[8], Paul Helm[14], Scott Higgins[5], Timothy Hoellein[10], Kenneth Jeffries[12], Barbara Katzenback[7], Mark Mallory[15], Bailey McMeans[1], Matthew Robertson[3], Dimple Roy[5], Christy Tyler[2] and Tony Walker[11], [1]university of Toronto, [2]Rochester Institute of Technology, [3]Queens University, [4]Lakehead University, [5]IISD-ELA, [6]Environment and Climate Change Canada, [7]University of Waterloo, [8]University of Michigan, [9]National Research Council,

[10]Loyola University Chicago, [11]Dalhousie University, [12]University of Manitoba, [13]Oregon State University, [14]Ontario Ministry of Environment and Parks, [15]Acadia University. **Microplastics rapidly sink and beach in a whole-lake experiment.**

Addressing the global problem of microplastic pollution requires a better understanding of their transport and fate in aquatic ecosystems. Here, we share an initial mass balance of microplastics within the first 13 days of our whole-lake experiment. Over three years, we simulated microplastic additions via stormwater inputs to Lake 378 at the International Institute for Sustainable Development's Experimental Lakes Area. Every two-weeks during the ice-free season we added a polydisperse mixture of fragments (~15 - 1400 μm in size) of three polymers that vary in density and chemistry (polyethylene, PE; polystyrene, PS; polyethylene terephthalate, PET). Throughout the experiment, we sampled several environmental compartments to measure fate and transport at an unprecedented scale. Within the first thirteen days (after the first addition, and before the second), we demonstrated that microplastic fragments rapidly redistribute - exiting the water column and settling on the bottom and on the shorelines. At the 13-day sampling point, 4% of the plastic was in the water column, 23% on the shorelines, and 53% on deep bottom sediments. Our mass balance across these compartments accounted for 77% of the PE, 48% PS, and >100% PET. "Missing" plastic was likely in the littoral zone. Our observations suggest if we prevent further inputs to aquatic ecosystems, microplastics will quickly disappear from the water column. Thus, understanding rates of deposition and burial are critical to forecast the legacy of microplastic pollution.

Tazi Rodrigues[1], Lee Hrenchuk[2], Trevor Middel[3], Mark Ridgway[3] and Paul Blanchfield[1, 2, 4], [1]Queen's University, [2]IISD-Experimental Lakes Area, [3]Ontario Ministry of Natural Resources, [4]Fisheries and Oceans Canada. **In hot pursuit: A cold-water predator connects trophic hotspots across thermal barriers.**

Habitat coupling by mobile predators structures and stabilizes ecosystems by linking food webs across semi-discrete habitat patches. However, habitat accessibility can be seasonally restricted by environmental conditions, reducing predator-driven energy flow. The cold-water predator lake trout (Salvelinus namaycush) exist in a gradient of food web types, from lakes with large-bodied cold-water prey (e.g., cisco; Coregonus artedi) to lakes where only littoral warm-water fishes are present. During summer in many boreal lakes, nearshore habitat becomes thermally stressful for lake trout while nearshore productivity increases. This may lead to brief pulses of spatial overlap between lake trout and trophic hotspots as they pursue nearshore prey in ecosystems lacking alternative prey fish, in contrast to lakes where cold-water prey fish overlap with their optimal habitat. We connected thermal accessibility to lake trout space use with acoustic telemetry, considering high acceleration indicative of foraging behaviour over two summers. We found a higher concentration of foraging events at steep (i.e., more accessible), nearshore habitat in a lake without offshore prey fish compared to a lake with offshore cool-water prey fish. Diet analyses revealed comparable proportions of fish in both systems (~20% biomass). The connection between prey distribution and foraging core areas underscores the importance of behavioural flexibility to take advantage of spatially variable trophic hotspots. These results will be extended in this talk to include lakes with coregonid prey in Algonquin Provincial Park, Ontario.

Madison Roeber, Milwaukee School of Engineering. **Nearshore Temperature Monitoring for Lake-Source Cooling Optimization at Discovery World.**

Discovery World, a 120,000-ft² museum along the Milwaukee, Wisconsin lakefront, uses an open-loop lake-source cooling system that withdraws and returns approximately two million gallons of water per day from Lake Michigan; the as-built nearshore intake can reach ~79°F, exceeding the

75°F design maximum for the facility heat exchangers and contributing to reduced efficiency, higher utility costs, and operational issues such as zebra-mussel fouling. This case study evaluates where colder, cleaner, and more stable source water can be accessed, and which intake-relocation strategy provides the best life-cycle value. Two vertical monitoring lines of temperature loggers were deployed adjacent to Discovery World from September 28 to October 5, 2025: one near the current intake and one approximately 400 ft lakeward at the pier (intended design location), each recording hourly temperatures at three depths. To contextualize the short-term field measurements, historical nearshore profiles were compiled from an EPA buoy (~1,230 ft offshore; 2010-2024; to ~20 ft depth) and a University of Wisconsin-Milwaukee Freshwater Sciences buoy (~475 ft from the intake; to ~5 ft depth) to characterize both intake and discharge environments. Planned analyses will quantify stratification and pier/breakwater influences, compare observed water temperatures to building BAS data (with optional redeployment to confirm logger performance), translate temperature differences into impacts on heat-exchanger/heat-pump performance and operating cost, and compare relocation alternatives across capital cost, constructability, and environmental/permitting considerations. Student Presentation Awards: candidate.

Joan Rose[1], Tom Edge[2] and Raj Bejankiwar[3], [1]Michigan State University, [2]McMaster University, [3]International Joint Commission. **Advancing Molecular Technologies and Microbial Water Quality Assessment in the Great Lakes Basin.**

In 1913, an International Joint Commission (IJC) study by 17 labs in Canada and the U.S. used the most advanced microbiology methods of the time to identify sewage hotspots and the human health risks of untreated sewage releases into the Great Lakes. There have also been tremendous advances in molecular technologies to better assess microbial water quality, provide early warnings of health risks, and better understand the implications of changes to microbial communities (microbiomes). In 2022, the Health Professionals Advisory Board (HPAB) convened 4 workshops with scientists and water policy experts to explore how an another large-scale study could advance and modernize microbial water quality assessment of health risks. Since 2023, the HPAB has been developing a plan for a laboratory round robin study for assessing the use of molecular tools for microbial source tracking, metagenomics and assessment of HABs. This effort is also aimed at establishing a community of practice on molecular technologies for use of these tools across the Great Lakes basin. Applications of quantitative and digital PCR were best documented for fecal pollution source identification by microbial source tracking, though lab capacity and active research using PCR and DNA/RNA sequencing were also identified for HABs assessment and metagenomics analyses. The IJC is seeking to coordinate and facilitate a network of laboratories to further develop, validate, and harmonize applications of molecular technologies across the Great Lakes basin.

Jordan Rosenfeld[1], Samantha Ramirez[2], Anas Usoof[3], Matthew Bayly[4] and Alexandra Tekatch[5], [1]University of British Columbia, [2]Fisheries and Oceans Canada, [3]University of Winnipeg, [4]M.J. Bayly Analytics, [5]ESSA Technologies Ltd. **Generic stressor-response functions for modelling hypoxia impacts on fish: pragmatic approaches to assessing cumulative effects.**

Managing the cumulative effects of multiple stressors dispersed across landscapes is one of the most challenging issues in ecology. This is especially true for the conservation and recovery of species at risk, where prioritizing stressor reduction is a key focus of recovery planning. Spatially explicit cumulative effects models require 3 basic elements: i) identification of the spatial units being modelled (e.g. watersheds, stream reaches, or habitat patches, etc.), necessitating decisions about appropriate scale; ii) some measure of stressor levels in the different spatial units (e.g., temperature,

dissolved oxygen, flow); and iii) stressor-response functions that describe the relationship between the stressor and the biological response of interest (e.g., target population size, community structure, or fish production.). Stressor-response functions are the key predictive link between environment and population response, but are lacking for many species-at-risk which are often data-deficient. We illustrate development of a cumulative effects model for endangered Nooksack dace and Salish sucker, data-deficient species endemic to the lower Fraser Valley of British Columbia. We focus on populating the elements of the cumulative effects framework described above, specifically 1) developing generic stressor response functions for the sublethal effects of hypoxia on fish growth, and the lethal effects of hypoxia on fish survival, using meta-analysis of published studies; and 2) development of stressor-estimation functions to predict dissolved oxygen levels in unsampled stream reaches to populate a stressor magnitude database.

Alex Ross[1, 2] and Rob Mackereth[1, 2], [1]Ontario Ministry of Natural Resources, [2]Lakehead University.
Watershed-scale influences on Brook Trout distribution and habitat suitability in boreal headwater streams.

Brook Trout, a cold-water species of conservation concern, face mounting threats from climate warming and land-use activities. Projected hotter and drier summers will likely raise stream temperatures and lower water volumes, reducing suitable habitat. These changes may also disrupt lower trophic levels, compounding impacts on food webs. We examined how access to cold-water refugia influences the distribution of Brook Trout and benthic macroinvertebrate communities throughout headwater stream watersheds in Northwestern Ontario. Specifically, we tested whether local landscape features and remotely-sensed areas of water accumulations (i.e., groundwater) can identify refugia and evaluated their relative importance for fish distribution and food web dynamics. In two nested watersheds, Brook Trout occupied all streams with high refuge availability (8 of 8), but only 4 of 7 streams with low refuge, emphasizing the important role of cold-water habitats. Preliminary results indicate that Brook Trout size structure shows no relationship with watershed size in low refuge streams but is inversely related to watershed size in high refuge streams, an unexpected result. Ongoing analyses of eDNA-based Brook Trout relative abundance estimates, benthic macroinvertebrate communities and local environmental conditions (e.g., discharge, water chemistry, watershed characteristics) will clarify the relative importance of these parameters for Brook Trout ecology within groundwater dominated streams. These results will provide a baseline for identifying critical habitat areas for Brook Trout which may be threatened by climate or land-use changes and focus conservation efforts.

Moana Rothe-Neves[1], Ana Raquel Izidoro[2], Isis Rezende[2], Thiago Kloss[2], Frederico Salles[2], Bruno Soares[1] and Carlos Sperber[2], [1]Univerty of Regina, [2]Universidade Federal de Viçosa. **The chronic impact of mining does not affect the survival of Trichoptera (Trichoptera - Insecta) in a tropical river.**

Mining is a significant economic activity worldwide, but it leads to severe environmental degradation. In 2015, the rupture of the Mariana dam caused the largest socio-environmental disaster in Brazilian history, affecting the Gualaxo do Norte River. Such environmental impacts have long-lasting effects by altering environmental conditions, such as substrate type and resource availability, that may affect the survival and population dynamics of sensitive species. In this study, we evaluated the chronic effects of the changed conditions on the survival of Hydropsychidae larvae (Insecta: Trichoptera). We collected 90 larvae from an unaffected environment and placed them in PVC devices installed at three unaffected and three affected sites for 50 days. At each site, we installed five PVC devices containing three larvae each. After exposure, survival was similarly low in

both conditions: 14% (N = 6) of larvae survived at affected sites and 13% (N = 5) at unaffected sites. No significant difference in the surviving larvae was detected between treatments (t = −0.65, df = 2.88, p = 0.56), suggesting that mortality was driven by similar environmental factors in both regions. Additionally, the long exposure period may have increased natural mortality or enabled emergence in both locations. Therefore, our results do not provide evidence that exposure to mining tailings affected Hydropsychidae larval survival. Future studies incorporating additional biomarkers or shorter exposure periods may help confirm sublethal or short-term effects not captured in this experiment.

Mark Rowe[1], Richard Stumpf[2], Yizhen Li[3], Tongyao Pu[4], Qianqian Liu[5], Craig Stow[1], Song Qian[6] and Casey Godwin[4], [1]NOAA Great Lakes Environmental Research Laboratory, [2]NOAA National Centers for Coastal Ocean Science, [3]CSS Inc. Under Contract to NOAA, National Centers for Coastal Ocean Science, [4]Cooperative Institute for Great Lakes Research, [5]University of North Carolina at Wilmington, [6]The University of Toledo. **Development and Transition to Operations of a Lake Erie Harmful Algal Bloom Toxin Risk Forecast.**

Toxic harmful algal blooms (HABs) have been a recurring summer feature in western Lake Erie since the 2000s. Dominated by the cyanobacterium Microcystis aeruginosa, the HAB often contains toxic compounds known as microcystins. In an effort to mitigate the impacts of HABs and associated toxins on coastal community public drinking water systems and recreational/commercial users of Lake Erie, NOAA produces a suite of information products, and continues to research, develop, and transition new products to operations. In 2020, NOAA transitioned an improved Lake Erie HAB Forecast to operations. The forecast is initiated from satellite imagery, and predicts transport of the bloom, accounting for effects of buoyancy and vertical mixing on transport and surface concentrations of cyanobacterial chlorophyll-a. Building on the HAB forecast, and ten years of observations of microcystins and chlorophyll-a from NOAA and other organizations, we developed a statistical model relating the probability of exceeding the recreational advisory level of microcystins (6 or 8 ug/L) to chlorophyll-a concentration, which is updated weekly using the most recent observations. We assessed two versions of the statistical model, using cross-validation over a ten-year hindcast period. We found that averaged predictions from the two versions performed better than either one alone. NOAA plans to operate a demonstration version of the toxin risk forecast in 2026, and obtain stakeholder feedback, with a public version of the operational forecast planned to initiate in June, 2027.

Dimple Roy, International Institute for Sustainable Development. **Management of freshwater lakes: Stories from the trenches of translating evidence to decisions.**

Evidence-based management is essential for sustaining freshwater lakes, yet scientists and practitioners often struggle with how scientific knowledge is practically used in management and policy decisions. In real-world lake management, evidence is applied within complex, non-linear decision-making environments shaped by time constraints, competing priorities, and diverse stakeholder needs. As interdisciplinary teams increasingly aim to deliver actionable and impactful lake science, greater attention is needed on the practical mechanics of translating evidence into management action. This presentation shares applied case examples from the International Institute for Sustainable Development (IISD) that demonstrate how scientific evidence has been integrated into lake management and policy processes. We highlight practical approaches for aligning research outputs with management needs, supporting decision-making under uncertainty, and maintaining ongoing engagement between scientists, managers, and policymakers. Preliminary lessons focus on what has worked, what has not, and why, offering transferable insights for lake scientists and

practitioners seeking to strengthen the real-world impact of their work. By grounding these lessons in applied freshwater management contexts, this presentation aims to support more effective use of science in lake governance and management decisions.

Dan Rucinski, Todd Redder and Derek Schlea, LimnoTech. **HABs and Hypoxia Responses to Nutrient and Meteorological Variations Using the Lake Erie Ecosystem Model (LEEM).**

Eutrophication has significantly altered ecosystem services across Lake Erie. The western basin is characterized by recurrent harmful algal blooms, the central basin by seasonal hypoxic "dead zones," and the eastern basin by excessive Cladophora growth. Collectively, these eutrophication-driven impacts threaten drinking water quality, recreational use, tourism, and the sustainability of the lake's fisheries. LimnoTech has previously developed a 3-dimensional advanced ecosystem model (Lake Erie Ecosystem Model; LEEM) to simulate eutrophication responses to changing nutrient loads across several years. Here, we apply the LEEM to develop response curves describing the level of HABs and hypoxia as a function of nutrient loading and hydro-meteorological forcings. Multiple years of tributary and meteorological inputs are combined with nutrient load reductions to develop the response curves.

Lars Rudstam[1], James Watkins[1], Kayden Nasworthy[1], Sarah Lawhun[1], Thomas Evans[2], Anne Scofield[3], Lyubov Burlakova[4] and Alexander Karatayev[4], [1]Cornell University, [2]SUNY Brockport, [3]EPA Great Lakes National Program Office, [4]Buffalo State University. **Benthic-pelagic coupling through mysid migrations depends on bottom depth and water clarity in the Great Lakes.**

Mysid diel migration moves up to 30% of the zooplankton biomass from benthic habitat to the metalimnion each night and these animals contribute to redistribution of both nutrients and energy from the benthic to the pelagic habitat. However, some mysids do stay on the bottom even during the night, and some stay pelagic during the day, both effects limiting the degree of benthic-pelagic coupling. We combine information from hydroacoustics, net tows, and benthic grabs to get an estimate of the proportion of mysids staying on the bottom during the night and evaluate how that proportion change with bottom depth and light levels. Acoustic analysis show that a large portion of the mysid population will remain in the water column in areas deep enough that light levels in the water column do not exceed avoidance levels, but some still move to the bottom. The number staying on the bottom during the night has declined in some lakes, but this decline is not larger than the decline in pelagic mysids indicating limited change over time of the proportion staying on the bottom at night. The effect of this partial vertical migration on benthic-pelagic coupling depends on knowing the proportion staying on the bottom as well as on mysid feeding activity during the day, which is poorly known.

Elizabeth Runge, William Dougherty and Shaili Pfeiffer, Wisconsin Department of Natural Resources. **Thermoelectric Power Generation and Water Use Implications for Wisconsin and the Great Lakes Basin.**

Thermoelectric power generation represents a critical intersection of energy production and water resource management in the Great Lakes-St. Lawrence River Basin. In Wisconsin, thermoelectric facilities accounted for approximately 73% of total water withdrawals in 2024, underscoring the sector's importance in basin-wide water availability considerations. From 2020 to 2024, Wisconsin generated an average of 85% of its electricity demand in-state, of which thermoelectric sources were roughly 88%. The 2024 Wisconsin Water Withdrawal Report examined how different thermoelectric technologies and cooling systems compare between water withdrawal and consumptive use. Using 2024 data, water-use intensity (gallons per megawatt-hour) was

examined across representative facilities employing once-through and recirculated cooling systems, including fossil fuel and nuclear generation. Once-through cooling systems withdraw substantially larger volumes of water but return most of it to the source, while recirculated systems withdraw less water overall but exhibit higher consumptive losses due to evaporation. Notably, facilities with higher consumptive-use percentages may still demonstrate lower consumptive water loss per unit of electricity generated, highlighting the importance of standardized intensity metrics for policy-relevant comparisons. Collectively, Wisconsin's ten largest thermoelectric facilities generated 80% of statewide electricity in 2024, withdrawing an estimated 715 billion gallons of water -- with 9.7 million gallons lost to consumptive use. This examination provides critical context for evaluating future water availability as climate change, new water-intensive industries, and expanded energy demand place increasing pressure on water resources.

Amber Ruthenbeck[1,2] and Elizabeth Minor[1,2], [1]Large Lakes Observatory, Duluth, MN, [2]University of Minnesota - Duluth. **Lake Superior's Microplastic Budget: Balancing the Books.**

This study constrains microplastic inputs and outputs in Lake Superior using a mass-balance approach. Sources of microplastics to the lake include atmospheric deposition and river inflow, and exports from the lake include sedimentation and outflow via the St. Marys River. Initially, a combination of literature data and data acquired in our laboratory indicated greater input than export, yielding a net value of 2E14 microplastics per year (mp/yr), but this estimate lacked atmospheric deposition and sediment burial measurements for Lake Superior itself and instead relied on information from other regional lakes. We are now measuring these inputs and outputs in Lake Superior to determine the lake's microplastic budget in a more qualitative manner. Using the size, shape, and polymer density of identified particles, we are also converting this information into mass inputs and exports of microplastics. Thus far, we have found that atmospheric deposition contributes 3.05E14 mp/yr, or ~2.96E11 grams of microplastics to Lake Superior per year. Sediment cores have been collected and are being processed to determine sedimentation rates. This presentation will highlight current input and output flux estimates and estimate the residence time of plastic in Lake Superior.

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Belinda Saint Louis[1], Saeed Memari[2], Eric Anderson[2] and Andrew Gronewold[1], [1]University of Michigan Ann Arbor, [2]Colorado School of Mines. **Modeling Nutrient and HAB Connectivity to Support Management in the Maumee-Lake Erie System.**

Freshwater ecosystems across the United States are increasingly threatened by hypoxia and harmful algal blooms (HABs) driven by nutrient pollution, climate change, and other anthropogenic stressors. The Great Lakes, particularly western Lake Erie, are especially vulnerable due to nutrient-rich inflows from major tributaries such as the Maumee River. Although NOAA's Great Lakes Operational Forecast System (GLOFS) skillfully simulates lake-scale dynamics, it does not fully resolve hydrodynamic and nutrient transport processes within large rivers or river-lake transition zones. To address this gap, we developed a coupled hydrodynamic modeling framework that integrates USGS gauge observations with the Semi-implicit Cross-scale Hydroscience Integrated System Model (SCHISM). SCHISM provides high-resolution, three-dimensional fields of velocity, water surface elevation, diffusivity, and wind forcing, which are used to drive a Lagrangian Particle Tracking (LPT) model. Vertical mixing is represented using a buoyancy-aware random walk scheme, with particle density dynamically influenced by temperature, salinity, irradiance, and nutrient

availability informed by satellite observations. This framework explicitly couples physical transport with algal processes, including growth, respiration, mortality, and diel vertical migration. Through scenario experiments that vary hydrodynamic and biogeochemical drivers such as discharge and nutrient loading, we investigate how river-lake exchange regulates nutrient distributions and Microcystis bloom connectivity between the Maumee River and Lake Erie. These results aim to improve HAB predictability and inform more effective nutrient management and mitigation strategies in the Great Lakes.

Thomas Saleh[1] and Joey Simoes[2], [1]IISD Experimental Lakes Area, [2]International Institute for Sustainable Development. **Prairie Watershed Analytics - Joint statistical-physical modeling of phosphorus hotspots at a local scale.**

One common approach to targeting phosphorus (P) reduction efforts is the spatial modeling of P exports from different land uses. However, standard models can be difficult to adapt accurately to the Prairies, due to variations in climate, topography, and local agricultural practices and agroecology. This study seeks to determine whether the contribution of different P sources can be empirically modeled and validated across Southern Manitoba using local, publicly available data. A simplified hydrological modeling method is automatically applied to several watersheds across the province to estimate flow from ungauged sub-catchments. Data on land-use, livestock, and municipal wastewater (where available) are paired with the sub-catchments to generate discharge-weighted P export factors. The loads calculated from P concentrations at sampling sites are then used to derive P export coefficients via a generalized linear model (GLM). These export coefficients are compared for consistency across different watersheds, different input datasets (where available), and the modeled P loads are compared with observed loads and with results from previous modeling efforts. Depending on their accuracy, these results will enable the modeling of different P sources at the sub-catchment scale. This research has been developed in close consultation of watershed districts, governments, and ENGOs, to ensure that the data produced aligns with existing phosphorus reduction efforts and practices.

Roberto Carlos Sanchez Ambrosio[1], Christy Morrissey[2], Iain Phillips[2], Chloe Rawlings[3], Sonia Cabezas[2] and Tim Jardine[1], [1]School of Environment and Sustainability, University of Saskatchewan, [2]Department of Biology, University of Saskatchewan, [3]Toxicology, University of Saskatchewan. **Understanding the impacts of agricultural land use on aquatic insect populations in the Prairie Pothole Region.**

Aquatic insect populations in prairie wetlands are threatened by intensive agricultural land-use. Pesticide runoff from cropland alters water chemistry and affects aquatic communities, yet the extent of these impacts remains unclear. This study assesses how agricultural land use influences aquatic insect biomass, and polyunsaturated fatty acid (PUFA) production in wetlands of the Prairie Pothole Region. We sampled 36 wetlands classified as grassland (n=18) or agricultural (n=18) by deploying emergence traps throughout the breeding season. Adult aquatic insects were collected every 5-8 days, identified to order level, and their biomass estimated through dry weight measurements. PUFA content was analyzed in selected samples with sufficient biomass (>20 mg). Biomass and PUFA data were $\log_{10}$-transformed prior to statistical analyses. Results showed similar biomass in grassland wetlands (14.643 mg/m^2/day) and agricultural wetlands (14.551 mg/m^2/day). Similarly, PUFA production was 0.7 mg/m^2/year in agricultural wetlands and 0.7 in grassland wetlands. Finally, statistical analyses indicated no significant effect of land use on biomass or PUFA levels. This lack of significant differences suggests that wetlands classified as grasslands may still be

influenced by surrounding agricultural activities, potentially through pesticide drift or hydrological connectivity.

Thiago Santos[1], José Fogaça[1], Camila Bento[1], Bruno Soares[2] and Welber Smith[1], [1]Universidade Paulista, [2]University of Regina. **Ecological characteristics of the ichthyofauna in the Jacuí River basin, Rio Grande do Sul, Brazil.**

In this study, we characterized the ecological traits of the ichthyofauna of the Jacuí River basin, a Neotropical basin located in the Mixed Ombrophilous Atlantic Forest biome in the state of Rio Grande do Sul, southern Brazil. The basin has experienced increasing agricultural and forestry expansion, in addition to being affected by extreme precipitation events that impact aquatic fauna. A total of 33 species were captured, of which 32 were native and one non-native, distributed among 13 families and five orders. Cluster analysis identified ten ecological groups based on habitat use, trophic guilds, and behavior. Three groups comprised generalist species with greater ecological plasticity, such as omnivorous feeding habits and low habitat specificity, whereas the remaining groups exhibited higher ecological specialization, including detritivorous diets (group 4), algivorous diets (group 5), and piscivorous diets (groups 6 and 7), as well as migratory behavior (group 4), venom presence (group 6), or environmental specialization, such as preference for clear waters (group 10). Overall, 17 species were classified as generalists and 16 as specialists. This ecological characterization of the ichthyofauna organizes essential information to understand the mechanisms by which anthropogenic and natural impacts alter biodiversity and the ecosystem processes associated with these species.

Sreeja Sarasamma, Kian Buckowski, Yu-Wen Chung Davidson, Tyler Buchinger, Kristen Lounsbury and Weiming Li, Department of Fisheries and Wildlife, Michigan State University, East Lansing, MI, USA. **Tracing Early Primordial Germ Cell Lineage and Developmental Pathways in the Sea Lamprey.**

Primordial germ cells (PGCs) are the stem cell lineage that transmits genetic information across generations and are central to studies of germline development, reproduction, and evolution. However, the lack of molecular tools in basal vertebrates, such as lampreys and hagfish, has constrained comparative analyses of vertebrate germline evolution. Here, we report the first germline-specific reporter in the sea lamprey (Petromyzon marinus), Tg(piwil1: egfp-UTRnanos1), which drives Green Fluorescent Protein (GFP) expression in early PGCs. Promoter activity was validated by robust GFP expression in PGCs of zebrafish embryos co-injected with Tol2 transposase mRNA. Injection into sea lamprey embryos produced early-onset, persistent GFP-positive cells that localized to the gonads, demonstrating stable transgene expression in a jawless vertebrate. These results indicate conserved regulatory features of vertebrate germline development and establish a foundational tool for functional studies in cyclostomes. Using the Tg(piwil1: egfp-UTRnanos1) construct, performed lifelong in vivo imaging of zebrafish germline cells. We found that embryos with higher PGC numbers showed a pronounced female bias during sex differentiation, supporting the hypothesis that PGC abundance actively influences sex determination in teleosts. Collectively, this work presents the first functional germline reporter in a basal vertebrate, enabling new investigations into germline evolution, genome dynamics, and reproductive development across vertebrates. Importantly, the capacity for germline engineering in sea lamprey also provides a potential framework for developing genetic biocontrol strategies to manage invasive lamprey populations in the Great Lakes.

Sherry Schiff[1], Jason Venkiteswaran[2], Lewis Molot[3], Richard Elgood[1], Scott Higgins[4], Helen Baulch[5], Sonya Havens[4], Megan Blackwell[5], Julia Kozak[2] and Jeremy Leathers[2], [1]University of Waterloo, [2]Wilfrid Laurier University, [3]York University, [4]IISD-ELA, [5]University of Saskatchewan.
Where Did All the Nitrate Go? Two Whole Lake Nutrient Addition Experiments at the IISD-ELA, Canada.

To study the impact of changing sediment redox conditions on cyanobacterial bloom formation in eutrophic lakes, both nitrate and phosphorus were added weekly to 2 lakes of contrasting thermal stratification; a polymictic shallow lake (2 years) and a dimictic lake with an anoxic hypolimnion (1 year). To prevent the release of reduced iron to the overlying water column, nitrate concentrations were maintained above 2 mg/l, requiring weekly additions to compensate for nitrate loss. Nitrate can be removed by denitrification or by biological uptake but with differing isotopic fractionation effects, affecting both the $^{18}O/^{16}O$ and $^{15}N/^{14}N$ ratios. Nitrate can also be added back to the water column by microbial decomposition of the bloom, fuelling further uptake but this regenerated nitrate is characterized by low $^{18}O/^{16}O$. Stable isotopic values of nitrate in the fertilizer additions and throughout the water column were followed from ice-off to fall overturn. The $^{15}N/^{14}N$ and $^{18}O/^{16}O$ increased overall in the residual nitrate in the epilimnetic water column. The $^{15}N/^{14}N$ also increased in both the particulate organic matter (POM) and the dissolved organic matter (DOM) yielding information on the formation of autochthonous DOM and POM. Stable isotope mass budget calculations can be used to examine isotopic fractionation in the aquatic N cycle in addition to the importance and timing of N uptake and return in these experimentally eutrophic lakes.

Leah Schleppenbach, Elizabeth Alexson, Euan Reavie and Holly Wellard Kelly, University of Minnesota, Natural Resources Research Institute. **Taxonomy and occurrence of protozoa in the Laurentian Great Lakes.**

Diverse phytoplankton communities exist across the Laurentian Great Lakes; however, the significance of protozoa in the lower food web remains poorly understood. Over the last three years we analyzed protozoans to better track their distribution and abundance in the Great Lakes. Concurrent with phytoplankton assessment, samples were collected during annual spring and summer surveys from 72 long-term monitoring sites as part of the USEPA Great Lakes Biology Monitoring Program; integrated surface water (INT) samples were collected in both seasons, and deep chlorophyll layer (DCL) samples were collected when present in the summer. We built a taxonomic library consisting of 68 protozoa categories, including species of Ciliophora, choanoflagellates, and Sarcodina. Average protozoa biovolumes ranged from 21,000 μm^3/mL (Lake Superior) to 51,000 μm^3/mL (Lake Erie) and were usually greatest during summer months. Though choanoflagellates were abundant based on cell density, ciliates were the most abundant protozoa by biovolume, due to their larger average size. Our results indicate that protozoa contribute a significant portion of biovolume to the lower food web community, and continued monitoring will aid in clarifying their role in a changing Great Lakes ecosystem.

Olivia Schloegel[1], Mary Ellen Klukow[1], Raissa Mendoca[1], Kenneth Anderson[1], Eileen Acosta Porras[1], Siena Larrick[1], W. Robert Midden[2], Stephen J. Jacquemin[3], Janice Kerns[4] and Lauren Kinsman-Costello[1], [1]Kent State University, [2]Bowling Green State University, [3]Wright State University, [4]Ohio Department of Natural Resources, Office of Coastal Management, Old Woman Creek National Estuarine Research Reserve. **Quantifying and communicating uncertainty in wetland nutrient retention: Lessons learned from dialogue among researchers and practitioners.**

Wetlands are increasingly restored, enhanced, or created across Great Lakes watersheds to reduce nitrogen and phosphorus delivery to rivers and lakes. Whether data encompass the most policy-relevant metrics (e.g. nutrient load reductions) or the underlying biological mechanisms, the ways in which scientists estimate and communicate uncertainty around these measurements can affect the pace at which data transforms to results and results turn into information. This presentation will highlight quantitative results and anecdotal observations from four years of work among the H2Ohio Wetland Monitoring Program's community of researchers and practitioners. Different stakeholders need to know in varying levels of detail if wetlands are retaining nutrients and how water patterns, plant communities, land features, or weather conditions promote retention. Terms like "error" and "variability" may be used differently across stakeholder groups, which complicates shared understanding of wetland function and value. Case studies featuring water and soil data collected from recently restored wetlands will A) exemplify small impactful shifts toward common definitions for different types of uncertainty and B) explore options toward a template approach for addressing uncertainty in wetland nutrient and hydrologic functions. Such actions can help build clarity, trust, and continuity across groups and time, which may ultimately strengthen adaptive design and management of wetlands for water quality.

Amber Schmidt, Charles Roswell, Scot Peterson, Hillary Glandon and Sergiusz Czesny, University of Illinois. **A comparative approach to quantifying the ecological impacts of nearshore reefs in southern Lake Michigan.**

The general lack of quantitative data on the effectiveness of shoreline protection structures at enhancing Great Lakes coastal habitat limits the ability of managers to implement them effectively across the region. With ongoing pressure to enhance coastal resiliency across the Great Lakes, there is an urgent need to (a) collect data addressing biological impacts of different types of engineered nearshore reefs, and (b) translate/communicate findings to the diverse stakeholder groups throughout the heavily populated Great Lakes coastal zone, from angler groups to the civil engineering community. Here we present findings from a project focused on evaluating the effectiveness of nature-based submerged shoreline-protection structures from two different nearshore constructed reef complexes in southwestern Lake Michigan. The abundance and diversity of the aquatic community (invertebrates, benthic and pelagic fishes) were studied at both reef locations, with nearby control sites offering broader spatial and temporal contexts for ecological system dynamics. This comparative dataset will help to quantify the ecological impacts of nature-based methods of shoreline protection, enhancing their utility throughout the Great Lakes region.

Katharina Schmidt and Jennifer Kimball, University of Minnesota. **Restoring Trust in Wild Rice Research Through Robust and Reciprocal Communication Networks.**

Wild rice (Zizania palustris) holds deep cultural and ecological significance across the Great Lakes region. Yet, the majority of its 75-year history of research and cultivation has unfolded separately from the communities most connected to it. The University of Minnesota's wild rice breeding lab is conducting a multilevel assessment into how the program's historical and current practices shape relationships, trust, and communication with Tribal Nations, growers, and other stakeholders. Through extensive review of scientific and historical literature, open lab events, incorporation of oral histories, and development of a land stewardship centered research framework, this project documented where communication has broken down and identifies recurring themes in persisting miscommunications and conflicts. Results show the need for transparent decision-making, clear articulation of research goals, and attention to place-based responsibilities that extend beyond scientific objectives. Community members express a strong desire for reciprocal knowledge

exchange, opportunities to shape research priorities, and acknowledgement of the social, cultural, and ecological dimensions that are often overlooked in plant breeding programs. By synthesizing these insights, this work establishes a practical framework for transparent and intersectional agricultural research that centers long-term and reciprocal knowledge networks. The relevance of this work extends beyond wild rice: it offers a model for how university research programs can build and maintain robust communication networks, build and restore trust, and align their activities with the needs and values of the communities they serve.

Anne Scofield[1], Julie Lietz[2], Joseph Connolly[3], Stephanie Figary[3], Meaghan Lightfoot[4], Christopher Marshall[3], Lars Rudstam[3] and James Watkins[3], [1]Environmental Protection Agency, [2]General Dynamics Information Technology, [3]Cornell University, [4]Oak Ridge Institute for Science and Education. **Community structure and distribution of zooplankton across the Great Lakes.**

Zooplankton are commonly used as indicators for the state of aquatic ecosystems. The EPA Great Lakes National Program Office has monitored zooplankton in all five Great Lakes for more than two decades using consistent methods, including both deep net tows (0-100 m or 2 meters off the bottom, 153 μm mesh) and shallow net tows (0-20 m, 63 μm mesh). All samples are analyzed for crustacean zooplankton, allowing for comparison of communities across depth strata. Using data from 2001 to 2023, we investigated long-term trends and variation in the vertical distributions of summer zooplankton. Shallow and deep net tow biomass significantly declined over in lakes Ontario, Michigan, and Huron. However, in eastern Lake Erie and in Lake Superior, significant declines were observed only in shallow tow biomass. There were no significant trends in western or central Lake Erie zooplankton biomass. Significant diel vertical migration patterns occurred in all lakes, with greater biomass observed in shallow net tows at night, although the magnitude of migrating zooplankton biomass varied across lakes and among taxa. Cladocerans, especially Daphnia, were the strongest migrators. The taxonomic composition of cladoceran communities varied among lakes, which contributed to differences in the depth distributions of zooplankton within the water column. Continued monitoring of zooplankton biomass, composition, and distributions will improve our understanding of long-term change in both bottom-up and top-down processes in the Great Lakes.

David Scott, University of British Columbia. **Physiology and infectious agents in subyearling migrating Chinook salmon in the Fraser River estuary, B.C.**

This study examined the physiological status of early migrating ocean type Chinook salmon captured in the Lower Fraser River and estuary. While previous studies of fish health have typically been limited to inferring physiological status from behavioural response, mortality, and through the measurement of stress hormone response, we take a more in depth look at fish condition by applying biomarkers to detect presence of pathogens, salinity stress and even signals of mortality. Juvenile Chinook salmon were captured in the Fraser River estuary across three (2019 - 2021) outmigration seasons. We found that in late March and early April juvenile Chinook appeared to be mostly in a pre-smolt status, with no fish categorized as smolt's prior to mid April. This trend appeared to be more related to the day of year then it was to fork length, although there was a small but significant association between increased fork length and smoltification score. We found that osmoregulation was the main stressor impacting juvenile Chinook, with little hypoxic stress and limited thermal stress when water temperatures were highest. These results help us to understand juvenile Chinook migration patterns and the need to conserve certain types of habitat areas in the estuary.

Tyson Scott[1, 2], Lucassie Arragutainaq[3, 4], Paloma C. Carvalho[1], Connor Faulkner[1], Steve Ferguson[1], Les Harris[1], Joel Heath[4], Kelsey F. Johnson[1], Megan Wardekker[1], Jason R. Treberg[2] and David Yurkowski[1], [1]Department of Fisheries and Oceans Canada, Winnipeg, MB, [2]The University of Manitoba, Winnipeg, MB, [3]Hunters and Trappers Association, Sanikiluaq, NU, [4]Arctic Eider Society, Sanikiluaq, NU. **Assessing stress response to nutrient availability in subsistent species.**

A warming Arctic ecosystem coupled with phenological changes of sea ice impact the feeding habits of ice-dependent species. Ringed seals (Pusa hispida), anadromous Arctic char (Salvelinus alpinus) and Iceland scallops (Chlamys islandica) all showcase physiological adaptations to seasonal availability of resources and are key subsistence species used by community members of Sanikiluaq, Nunavut. Fasting is behavioral strategy utilized by these species when: ringed seals molt, Arctic char overwinter in freshwater lakes, Iceland scallop resources decline due to seasonal variation. Lipids are replenished over the summer during pulsed resource events. However, it is unknown how seasonal variation in their foraging strategies and fasting influences their metabolic pathways as well as their eco-physiological responses to nutritional stress. Our goal is to quantify the metabolite profile and level of metabolic stress of ringed seal, Arctic char and Iceland scallops during their annual fasting and foraging periods to compare how these species recover from seasonal reduction in nutrient availability. Ecological metabolomics will identify key lipids, triglycerides, amino acids and other important metabolites related to protein degradation and synthesis within muscle tissue of each species. We will use stable isotope analysis ($\delta^{13}C$ and $\delta^{15}N$) to infer diet and to examine relationships with metabolites. The results of this study could indicate a coupling of metabolomics and stable isotope ecology as an early warning indicator of environmental and/or anthropogenic stress in Arctic species.

Frank Seglenieks[1] and Lauren Fry[2], [1]Environment and Climate Change Canada, [2]National Oceanic and Atmospheric Administration. **GLAM hydroclimate team planning for the review of the Lake Superior regulation Plan 2012.**

The International Lake Superior Board of Control is responsible for managing the control works on the St. Marys River in accordance with International Joint Commission (IJC) Orders of Approval. The Board operates under the direction of the IJC and follows Regulation Plan 2012 as the set of rules to determine the total amount of flow to be released from Lake Superior through the St. Marys River and into Lake Michigan-Huron. Regulation Plan 2012 was designed to provide a balance of socio-economic and environmental benefits on both Lake Superior and Lake Michigan-Huron, while respecting the physical constraints and operational limitations of the system. The IJC requires an assessment of the effectiveness of regulation Plan 2012 at a minimum of every 15 years. The assessment should include how the system is changing and an assessment of the extent to which the results predicted by the research and models used to develop Plan 2012 occurred as expected. The presentation will describe the objectives and deliverables that the Hydroclimate group of the Great Lakes Adaptive Management Committee as part of this assessment. These deliverables will include coordination of past water supplies and an analysis of whether future water supplies are expected to be different from those used to create Plan 2012.

Titus Seilheimer, Wisconsin Sea Grant. **Managers, fishermen, and scientists in the same cooperative research boat.**

Science-based management decisions require research, but what if management agencies do not have the funding to conduct that research themselves? In that case, cooperative projects between managers, industry, and scientists can be a useful tool. I led a cooperative study to quantify harvest and bycatch in an experimental bottom trawl fishery. The change in fishing gear was in

response to changes in lake conditions that led to an increase level of fouling of set gear (e.g., trap nets) in the main basin of Lake Michigan. The use of bottom trawling allowed for the harvest of Lake Whitefish Coregonus clupeaformis quota with low bycatch while reducing the temporal overlap with sport fishing and allowing for winter harvest when demand was higher. The lessons learned from this project can be followed by other researchers interested in working on applied research topics. Ongoing communication with natural resource managers, the commercial fishing industry, and local sport fishing groups were a key to minimizing conflict. Successful communication and outreach from this project helped partners and other lake users to navigate the complex world of fisheries management. Science communication for applied research should not be an afterthought, rather it succeeds through planning and careful execution.

Christina Semeniuk, **Kristen Cyr**, **Holly Mosco** and **Isabelle Tormasi**, University of Windsor. **Collaborative Science for Co-occurring Stressors: Stories from the Margaree River, Cape Breton, Nova Scotia.**

Cold-adapted fishes are increasingly exposed to cumulative stressors arising from warming water temperatures and the expansion of warm-adapted invasive species. For salmonids such as Atlantic salmon, warming rivers impose physiological heat stress, while invasive species may predate on juveniles or outcompete them for resources. However, as climate-driven habitat change enables invasive species to expand into historically cold systems, salmonids now face these stressors simultaneously. Despite this growing overlap, little is known about how combined thermal and biotic stressors shape salmon habitats at the ecosystem scale. Addressing this knowledge gap is challenging without drawing on diverse knowledge systems. Study design, site selection, data needs, and the usefulness of outcomes can vary widely across watersheds, making local context essential. Partnering with local rightsholders and stakeholders helps identify the most pressing questions, determine where research should take place, and ensure that results are relevant and actionable for management. In this presentation, the Margaree Aquatic Research Team from the University of Windsor will draw from their personal experiences in collaboration with the rightsholders and stakeholders of the Margaree River, Cape Breton, Nova Scotia, sharing how such relationships have shaped and benefitted each stage of their research, from defining initial questions, adapting study design, to ensuring effective uptake of results from the local level to management. Together, these stories illustrate how co-developed research has more effectively addressed concerns about cumulative stressors in freshwater ecosystems.

Alyssa Warrior and **Shannon Seneca**, University at Buffalo. **Federal Policy, Indigenous Water Guardianship, and Source Water Protection.**

The West Valley Demonstration Project (WVDP) is a nuclear waste site located within the Cattaraugus Creek system, whose waters flow through Seneca Nation Cattaraugus Territory and ultimately into Lake Erie. Although a site-wide Environmental Impact Statement (EIS) and subsequent clean-up efforts were completed over the last couple of decades, unresolved risks persist, including erosion, groundwater movement, and off-site migration of radioactive contaminants. With a Supplemental Environmental Impact Statement (SEIS) anticipated next year, decisions will directly affect the livelihood of the Seneca Nation and the source waters serving millions of downstream drinking water users in western New York. Drawing on Indigenous scholarship and technical expertise, this presentation examines how federal policy governs decision making at legacy nuclear sites situated within Indigenous homelands, with particular attention to Seneca water guardianship as a framework that recognizes the enduring, interconnected nature of waterways. Without speaking on behalf of the Seneca Nation, the analysis evaluates federal trust and treaty obligations as policy

mechanisms intended to prevent harm and protect waters over the long term, positioning West Valley as a critical test of whether federal environmental decision making can adequately safeguard source waters in the face of uncertainty.

Lienne Sethna[1] and Michelle Anderson[2], [1]Science Museum of Minnesota - St. Croix Watershed Research Station, [2]Red Lake Department of Natural Resources. **Historical abundance and extent of wild rice: environmental drivers leading to its decline in Northern Minnesota.**

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 stressors including fluctuating 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. 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. A key aspect of our study is the use of wild rice DNA to quantify historical abundance. Our use of this technique will help demonstrate its effectiveness in future, tribally-led studies. The main goal of our study is to quantify the historical abundance of wild rice and its relationship with lake level post-damming 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.

Sophia Shaban, Tanzania Fisheries Research Institute. **Legacy in the Water: Haplochromine Diversity and the Future of Lake Victoria's Conservation.**

Lake Victoria, the world's largest tropical lake (68,000Km^2), represents one of the most extraordinary chapters in vertebrate evolution. Following a catastrophic desiccation approximately 15,000 years ago, the lake's refilling triggered a rapid radiation of endemic haplochromine cichlids. From the ancestral lineages, over 500 species evolved within a short geological window, each uniquely adapted to specific trophic niches. These species constituted about 80% of the lake's fish biomass, forming a complex trophic web that regulated nutrient cycles and prevented algal blooms. However, the introduction of the Nile perch (Lates niloticus) in the 1960s fundamentally disrupted this balance. By 1980s, an estimated 200 haplochromine species vanished in the greatest vertebrate extinction of modern times, leading to severe eutrophication and oxygen depletion. Today, while some resilient species show signs of resurgence, the haplochromine flock remains at critical risk from habitat degradation, overfishing, and genetic bottlenecks. Emerging human-related stressors, such as cage fish farming, pose new risks through nutrient blooming and biosecurity concerns, though they may incidentally protect breeding grounds by restricting fishing nearby. To ensure the future of this unique ecosystem, a shift from purely commercial fishery management to holistic ecosystem conservation is imperative. This way forward requires, Elevating the status of haplochromines from trash or bait fish to recognized evolutionary treasures through public education, protecting refugia habitats that provide sanctuary from predation and human-induced degradation.

Ali Shakoor and Donna Kashian, Wayne State University. **Using Hydroacoustics to Analyze Microcystis and Fish Distribution During Harmful Algal Blooms in Lake Erie.**

In Western Lake Erie (WLE), Harmful Algal Blooms (HABs) are occurring with increased frequency and duration. Microcystis aeruginosa, the primary HAB- forming cyanobacterium, increases turbidity, disrupts food webs, and produces toxins that can harm humans and animals. While most research focuses on toxin production and bloom formation, less is known about HABs impacts on WLE's food web and fisheries. This study aimed to determine subsurface Microcystis concentrations and fish community distribution inside and outside of HABs events in WLE using multi-frequency hydroacoustics. Partnering with NOAA-GLERL, data was collected using a Biosonics hydroacoustics system, utilizing 70, 120, 200, and 420 kHz transducers towed along a transect covering HABs and non-HABs areas. Data was collected over two days, during daytime and nighttime cruises, during August of 2022. Fixed station water quality data consisting of Chl-a, Microcystis concentrations, microcystin concentrations, temperature and dissolved oxygen were also collected. Preliminary data indicates Microcystis is distributed throughout the water column, likely from wind-mixing in shallow WLE. Fish in HABs zones appeared constrained between surface blooms and possible toxic bottom conditions. These spatial shifts in fish distributions during HABs events may affect fish abundance indices used in surveys. Improved understanding of these dynamics can help fisheries managers refine regulations and ensure sustainable resources use.

Ahana Shamamba Gisèle[1], Jacques Riziki Walumona[1, 2] and Masilya Mulungula Pascal[1, 2, 3], [1]Unité d'Enseignement et de Recherche en Hydrobiologie Appliquée (UERHA)-ISP/Bukavu, Bukavu, Sud-Kivu, Democratic Republic of the Congo, [2]Centre of Research in Biodiversity, Ecology, Evolution and Conservation (CRBEC), Bukavu, Republic Democratic of the Congo (DRC), [3]Département de Biologie, Centre de Recherche en Sciences Naturelles (CRSN) Lwiro, Lwiro, Sud-Kivu, Democratic Republic of the Congo. **Impact of chemical treatment of Bralima-Bukavu wastewater on the Lake Kivu coastal zooplankton, South Kivu, DRC.**

Conducted in vitro, this study assessed the effects of chemically treated brewery wastewater from Bralima-Bukavu on the Lake kivu coastal zooplankton (Copepods, Cladocerans, and Rotifers). Bioassays comparing untreated effluents, treated effluents, mixtures of treated and household effluents, and lake water as a control were conducted over seven days. Zooplankton mortality was monitored every 48 hours, while physicochemical parameters, nutrients, and chlorophyll-a were measured before and after exposure following APHA procedures. Findings revealed that although treatment improved some aspects of water quality, key parameters, including turbidity, pH, dissolved oxygen, nitrite, phosphate, and ammonium, remained above recommended limits for brewery effluents and or aquatic life, resulting mostly on lower removal efficiencies. These inadequate conditions contributed to high zooplankton mortality. Household effluents further increased pollutant loads and toxicity on zooplankton. After exposure, some parameters confirmed the filtration and purification roles of zooplankton. Statistical analyses indicated significant effects of sampling days ($p<0.001$) and treatment types ($p<0.001$) on copepod densities, while Cladocerans and Rotifers, were influenced by sampling day only ($p<0.001$), with both groups dying before the second sampling. This study highlights the sensitivity of zooplankton as bioindicators of wastewater impacts and emphasizes the need to integrate biological assessments with physicochemical monitoring into effluent monitoring. It recommends the improvement of both the treatment plant purification efficiency to reduce the impact on aquatic organisms and the test conditions to reduce control mortality during experiments.

Salim Shamsu-Deen Mohammed, Kevin McCluney, Angélica Vázquez-Ortega, Christopher Ward, Carlos Soto López, Riley Ralph, Lakshan Beligala and Katarina Kieffer, Bowling Green State University. **Biological Cycling of Phosphate in Agricultural Soils Amended with Dredged Materials.**

Phosphorus cycling in soil is crucial for crop productivity and sustainable agriculture, particularly in the face of growing environmental challenges and nutrient depletion. Dredged material (DM) from the Western Lake Erie Basin (Toledo Harbor, Ohio) is a potential soil amendment for replenishing lost topsoil, but its effects on biological phosphate cycling remain unclear. We conducted a greenhouse experiment with soybeans to evaluate how DM application influences soil nutrient dynamics, plant growth, and microbial P-cycling activity. Soil, plant, and microbial parameters, including the expression of the key P-mineralizing enzyme gene phoD, were measured at various soybean growth stages. Although DM-amended soil did not substantially increase soil total P, it elevated bioavailable P (70-90 mg kg^{-1}), calcium (14,403-17,598 mg kg^{-1}), cation exchange capacity (29.68-31.07 meq $100g^{-1}$), and soybean root and shoot growth relative to unamended conventional farm soil. However, this growth resulted in lower concentrations of some nutrients in plant tissues, possibly due to a nutrient dilution effect. RT-qPCR analyses suggested that phoD expression increased over time in DM-amended soils. The timing of these increases, along with delayed rises in bioavailable P, suggests that DM stimulates microbial P-mineralization indirectly by promoting plant growth and associated rhizosphere activity rather than through a direct chemical effect. Overall, our findings suggest that incorporating DM into farm soil can improve soil health and crop performance by boosting nutrient cycling processes and stimulating plant growth.

Asilatu Shechonge[1], George Turner[2], Benjamin Ngatunga[1], Rashid Tamatamah[3], Stephanie Bradbeer[4], Jack Harrington[4], Antonia Ford[5] and Martin Genner[4], [1]Tanzania Fisheries research Institute (TAFIRI), [2]School of Biological Sciences, Bangor University, [3]Department of Aquatic Sciences and fisheries, University of Dar es Salaam, [4]School of Biological Science, University of Bristol, [5]Department of Life Sciences, Whitelands College, University of Roehampton. **Genetic and morphological homogenization of tilapia following introductions threatening cichlid biodiversity.**

Among the many negative impacts of invasive species, hybridization with indigenous species has increasingly become recog- nized as a major issue. However, relatively few studies have characterized the phenotypic outcomes of hybridization following biological invasions. Here we investigate the genetic and morphological consequences of stocking invasive tilapia species in two water bodies in central Tanzania. We sampled individuals from the Mindu Reservoir on the Ruvu river system, and at Kidatu on the Great Ruaha-Rufiji river system. We screened individuals at 16 microsatellite loci, and quantified morphology using geometric morphometrics and linear measurements. In both the Mindu and Kidatu systems, we identified evidence of hybridization between indigenous Wami tilapia (Oreochromis urolepis) and the introduced Nile tilapia (Oreochromis niloticus) or blue-spotted tilapia (Oreochromis leucostictus). At both sites, purebred individuals could largely be separated using geometric morphometric variables, with hybrids occupying a broad morphospace among the parental species. Our data demonstrate that the gene pools and phenotypic identity of the indigenous O. urolepis have been severely impacted by the stocking of the invasive species. Given the lack of evidence for clear commercial benefits from stocking invasive tilapia species in waters already populated by indigenous congenerics, we suggest further spread of introduced species should be undertaken with considerable caution.

Samantha Sherry[1, 2, 3], [1]ECB, [2]Shedd Aquarium, [3]Carleton University. **Fishing for Food or Fun? Understanding Chicago Urban Angling.**

When picturing fishing for consumption, commercial fisheries typically come to mind, but in actuality, there are significantly more recreational fishing licenses than commercial ones. The population count of recreational fishers who harvest their catch and even rely on it for food security is still significantly understudied, especially in the Great Lakes region. Our pilot study seeks to identify behavioral motivation as well as sociodemographic information on this understudied population. This includes shoreline anglers in urban areas who fish for complex reasons, economic necessity, cultural practice, recreation, and food provisioning. Our study uses a framework called **provisioning fisheries** that recognizes the overlapping boundaries between commercial, subsistence, and recreational fishing practices. Specifically, we investigate how this concept applies to urban fishing communities along the Chicago shoreline, including Lake Michigan, its surrounding rivers, and lagoon systems. By conducting inclusive surveys and key informant interviews, this study found important pilot data such as anglers' specific motivations to fish. We discovered that a majority of our 24 respondents fished to be outdoors as a form of stress relief. On top of this we discovered the target species for Chicago urban anglers were Bass, Perch (which were in season), and Sunfish. The majority of participants surveyed stated they did not eat their catch, and were not reliant on it as a food source rendering them incompatible with the title of provisioning fishers.

Mitchell B. Shorgan[1], Graham D. Raby[2], Amber L. Fedus[2], Bradley E. Howell[2], Laura S. E. Haniford[2], Leah C. Howitt[2], Natalie V. Klinard[3], Jordan K. Matley[4], Jacob W. Brownscombe[5], Steven J. Cooke[6] and Aaron T. Fisk[7], [1]Kilgour and Associates Ltd., [2]Trent University, [3]Dalhousie University, [4]Flinders University, [5]Fisheries and Oceans Canada, [6]Carleton University, [7]University of Windsor. **Effects of surgical implantation of electronic tags in fishes: a review and meta-analysis.**

Electronic tags have been used to track fishes for decades and continue to gain popularity. Tags are often implanted in the coelom of fishes, with a substantial body of experimental evidence now assessing the effects of those tags. We revisit a review of tagging effects (Cooke et al. 2011) to provide the most comprehensive synthesis and meta-analysis of intracoelomic tagging effects in fishes to date. We reviewed 295 studies, yielding 226 laboratory trials reporting survival and 215 reporting tag retention. Mean survival in tagged fishes was 88.26% and tag retention was 87.05%. Both metrics were negatively related to tag:body mass ratios (i.e., tag burden), remaining above 90% on average with tag burdens below ~ 3%. Substantial heterogeneity existed among studies, with a modest portion of the variability in survival and tag retention explained by family, tag burden, or trial duration. Across the tagging effects literature, 42% of papers documented negative effects of tagging on growth, and 34% found reduced critical swimming speeds relative to controls. Progress has been made in addressing some knowledge gaps, but biases in the tagging effects literature remain and only a small fraction of species used in electronic tagging studies are represented. Tag burdens of ~ 3% appear to balance tag size and unwanted tagging effects. More research is needed to better understand sublethal tagging effects and improve the inferences made from electronic tagging studies.

Narayan Shrestha, Zelalem Tesemma, Fuad Yassin and Frank Seglenieks, Environment and Climate Change Canada. **Data-Driven Estimation of Evaporation over the Great Lakes Using Long Short-Term Memory Networks.**

Accurate estimates of Net Basin Supply (NBS) are crucial for understanding and forecasting water level changes in the Laurentian Great Lakes, which directly influence hydroclimate

assessments and binational water-management decisions. Of all the NBS components, evaporation remains the most uncertain because observations over the lakes are sparse and developing physically based models that capture the complex lake-atmosphere processes takes considerable time and effort. Machine-learning approaches, such as the Long Short-Term Memory (LSTM) network, offer a promising alternative by learning the non-linear and time-dependent patterns such as seasonal cycles and lagged responses from the data. We used daily air temperature, relative humidity, wind speed, and long- and shortwave radiation from the Canadian Surface Reanalysis (CaSR v2.1) to estimate monthly evaporation over Lakes Superior, Michigan-Huron, St. Clair, Erie, and Ontario. Due to the lack of direct observations, monthly evaporation estimates from the Great Lakes Seasonal Hydrological Forecasting System (GLSHFS) were used to train lake-specific LSTM models, which were validated and tested to assess model robustness. Results indicate strong agreement between LSTM-based estimates and GLSHFS evaporation, with consistently high predictive skills. The median KGE values during the training period (1980-1999) and testing period (2010-2018) were 0.95 and 0.81, respectively. These findings demonstrate that data-driven LSTM-based machine-learning models provide a reliable and computationally efficient alternative for estimating evaporation from the Great Lakes.

Mike Shriberg, University of Michigan. **The Line 5 Pipeline Controversy: Shifting Perceptions and Outcomes.**

The Line 5 oil pipeline controversy has evolved from a single advocate's question into an issue of international strategic importance driving a key part of a debate on the future of the fossil fuel industry, water policy, states' rights, and Indigenous sovereignty. It's evolved well beyond a Great Lakes issue yet is rooted in Great Lakes policy and management, which may ultimately determine the outcome. This presentation will stem from a study - the first academic analysis of this ongoing controversy about the Enbridge Energy Pipeline in Michigan and Wisconsin - that traced and analyzed the Line 5 story through interviews, literature review and participant observation. Core research questions include: What and who defines "winning" on a complex, shifting issue? How do changing public perceptions drive campaign strategy for advocacy organizations and their opponents? The presentation will begin with an overview of the complex history of the Line 5 controversy, including the most recent developments. The presentation will then outline how perceptions, strategies and frameworks have shifted over the course of the 15 years of the Line 5 debates. The presentation concludes with lessons learned for messaging, framing and strategic development of advocacy campaigns on water issues in the Great Lakes and beyond.

Mike Shriberg and **Olivia Laforce**, university of Michigan. **The Story of GLRI: Lessons Learned for Great Lakes Stewardship and Beyond.**

The project from which this presentation stems was created to document and archive the history of the Great Lakes Restoration Initiative (GLRI) through written and verbal accounts. The goal is to understand how it came to be, and why GLRI continues to be successful and durable. More specifically, we assess how the lessons from the formation and continuation of GLRI can be applied to other regional watershed restoration efforts as well as to the future of the Great Lakes. Additionally, we explore how insights from this project can inform the future development of the GLRI to address more complex challenges in the Great Lakes region, such as access to clean and affordable drinking water, climate change adaptation, and environmental justice. The completion of this project, which provides archival information for future projects through public documentation at the University of Michigan Bentley Historical Library of the over 80 interviews and thousands of pages of historical documents, marks the first phase of a larger initiative to analyze the history of

GLRI and document the importance of this program. The key findings highlight the importance of collaboration, clear messaging, and perceived (and actual) unity in goals and outcomes.

Shannon Turner, John Day, Maryn Cunningham, Sakshi Venkateswaran, Kenneth Ho, Jia Jhen Ho and **Mike Shriberg**, University of Michigan, School for Environment and Sustainability. **Societal Impacts of Great Lakes Ice Decline - A Preliminary Qualitative Study.**

This research is the first assessment of the socioeconomic impacts of lake ice decline in the Great Lakes region. Declining lake ice cover has been recorded since the 1970s, and this project addresses a knowledge gap concerning how this impacts United States coastal communities. The University of Michigan team - a group of Masters' students and an advisor in partnership with the Cooperative Institute for Great Lakes Research (CIGLR) and Great Lakes Observing Systems (GLOS) - conducted 41 interviews and implemented a basin-wide ice activity survey. We examined the impacts of ice decline on key sectors, including recreation, tourism, shipping and community as well as on culture. Interviewees identified 14 winter ice-dependent activities. Eight sectors of concern were synthesized based on interview data, with the three most frequently mentioned issues being loss of regional culture or sense of place, reduced winter recreational activities, and negative impacts on ice fishing. Several themes emerged, including regional differences between the upper and lower Great Lakes, involuntary adaptations, and unpredictable conditions posing a threat to ice safety and community event planning. Due to the broad and preliminary nature of this research, we also provide recommendations for future research directions. Quantitative economic data collection is suggested to determine the indirect economic impacts of reduced ice-based recreation and tourism, as well as conducting a sector-specific or localized approach to ice decline evaluation.

Mahder Shumi[1, 2], Abebe Getahun[1], Thomas Hien[3] and José Luis Toca-Herrera[2], [1]Departent of Zoological Sciences,Addis Ababa University, [2]Institute of Biophysices, University of Natural Resources and Life Sciences, [3]Institute of Hydrobiology and Aquatic Ecology , University of Natural Resources and Life Sciences. **Cytotoxic Effects of Polluted Rivers in Addis Ababa on Rainbow Trout Cell Line; Eco-toxicological implication.**

Aquatic ecosystems receive diverse chemical inputs whose combined toxic effects are difficult to predict using chemical analysis alone, highlighting the need for effect-based bioassays to assess water quality. In vitro bioassays such as using fish cell lines provide a sensitive and ethical approach for screening toxic effect and evaluate potential toxicity risks in the aquatic environments. Such assessments are crucial for impacted urban rivers. Multi-pathway cytotoxicity of surface water from the Little and Greater Akaki Rivers, Ethiopia was evaluated using CellTiter-Blue (CTB), 5-carboxyfluorescein diacetate acetoxymethyl ester **(CFDA-AM)** and Neutral Red (NR) assays. RTgill-W1 cells cultured in L-15 medium were exposed to solid-phase-extracted (OASIS-SPE) rivers water samples. Cell viability varied markedly between seasons with hormetic response at higher dilution. The dry-season samples showed lower mean % viability of (**0 -17.97** ± 7.989), (**0-41.35** ± 8.13) and (**4.84 - 100**± 31.66) than wet-season samples (**0 - 100** ± 32.71), (**0.23-79.83** ± 23.41) and (3**.34-100**±28.38) for CTB, CFDA-AM and NR assays, respectively. The CTB assay consistently indicated a significant reduction in metabolic activity while moderate effects in the membrane integrity (CFDA-AM) and minimal effect in lysosomal uptake (NR) observed. Highest toxicity index value (76-94) was recorded in the sampling sites located in the middle section of the city. Spatial and seasonal heterogeneity in eco toxicological stress was observed with elevated biological hazard and potential risk to aquatic organisms particularly during the dry season.

Robert Silber, Patricia Corcoran and Kelly Evans, Western University. **Comparison of pellets and other visible plastic debris on 55 beaches across the Laurentian Great Lakes in 2018 and 2024.**

Plastic products are produced and used on a global scale, but once mishandled, enter the environment as plastic debris items, which persist longer than many of their natural or semi-synthetic counterparts. To investigate long-term variations in plastic pollution, we sampled the same 10 m^2 quadrats on 55 beaches in 2018 and 2024. Visible plastic debris items declined from 8,575 in 2018 (15.6 items m^{-2}) to 1,469 items in 2024 (2.7 items m^{-2}), representing an 83% decrease. Fragments were the dominant category in both years, comprising 42% of items in 2018 (5.77 fragments m^{-2}) and 48% in 2024 (1.34 fragments m^{-2}). Lake Ontario beach quadrats contained the greatest concentrations of visible plastic debris items in both years. Plastic pellet concentrations also declined substantially, from 12,442 pellets in 2018 (22.6 pellets m^{-2}) to 3,112 pellets in 2024 (5.7 pellets m^{-2}), corresponding to a 75% decrease. Pellet distribution was heterogeneous, with a small number of beaches accounting for a large proportion of pellets. Pellet concentrations were highest at Baxter Beach, Bronte Beach, and Rossport Beach in 2018, whereas in 2024, Baxter Beach, Rossport Beach, and Colonel Samuel Smith Park accounted for 81% of pellets. Reductions in both visible plastic debris and plastic pellets may reflect a combination of increased public awareness, shoreline clean-up efforts, the decreased plastic production during the COVID-19 pandemic, improved waste management practices, and variability in annual weather patterns.

Subodha Silva[1], Asanka Jayasinghe[1], Ashoka Deepananda[1] and Clive Jones[2], [1]Faculty of Fisheries and Marine Sciences & Technology, University of Ruhuna, Sri Lanka, [2]Centre for Sustainable Tropical Fisheries and Aquaculture, College of Science and Engineering, James Cook University, Australia. **Comprehensive ecological study of the giant freshwater prawn (Macrobrachium rosenbergii) in Sri Lankan reservoirs.**

Understanding the feeding ecology of Macrobrachium rosenbergii (giant freshwater prawn, GFP) is crucial for effective management of reservoir ecosystems. This study integrates stomach content analysis and stable isotope analysis (SIA) to investigate the trophic structure of GFP across six Sri Lankan reservoirs. Out of 74 individuals examined, 58% had empty stomachs. Kruskal-Wallis tests showed no significant differences in stomach fullness among reservoirs. Eight dietary components were identified, with fish remains (28.27%) and plant matter (19.65%) being most dominant. The Index of Relative Importance (IRI%) further confirmed fish remains (29.9%) as the primary food item, followed by plant matter (17.4%). To validate long-term dietary patterns, SIA was conducted on 43 GFP samples and associated prey items. Carbon ($\delta^{13}C$) and nitrogen ($\delta^{15}N$) values were analyzed using MixSIAR models in two representative reservoirs (Ku5 and P4). Isospace plots confirmed adequate source separation. Posterior estimates revealed that GFP diets were dominated by small indigenous fish (~60% in Ku5; ~52% in P4), followed by submerged plants, detritus, and mollusks. Both uninformative and informative priors produced consistent results, indicating data robustness. This dual-method approach highlights the omnivorous and opportunistic feeding behavior of GFP and emphasizes the role of GFP as a secondary consumer. These findings provide a valuable baseline for future food web studies and reservoir-based aquaculture planning in tropical freshwater ecosystems.

Elder Priscilla Simard[1, 2], [1]Treaty #3, [2]Women's Council of Treaty #3. **Grand Council Treaty 3: Nibi Portal- Sharing Anishinaabe Nibi Inendamowin, water knowledge.**

Grand Council Treaty #3 is the traditional government of the Anishinaabe Nation in Treaty #3. Manito Aki Inaakonigewin (MAI) is the sacred resource law of the nation. This is a customary law that has governed our people since time immemorial and is based on our responsibility to ensure that the land, the people, and the future are protected. The Nibi Declaration ensures that the Treaty #3 Anishinaabe Nibi Inaakonigewin (water law principles) are recorded and formally recognized in governance processes. The Nibi Declaration states Water is Spirit, Life, Sacred, Respected and we must honour our teachings. The Nibi Portal (https://nibi.gct3.ca/connect) will be shared as a resource guiding water education from Anishinaabe perspective and to help build relationships. Within the portal is the Nibi Curriculum guiding an in-depth understanding of the Spirit of Nibi and providing a foundation for the future learning for growth and active participation for the good of all.

Paul Simonin[1, 2], Christy Juteau[1, 3], James Casey[1, 4] and Harley Chappell[1, 5], [1]Shared Waters Alliance, [2]A Rocha Canada, [3]KWL, [4]WWF-Canada, [5]Semiahmoo First Nation. **Shared Waters Alliance: lessons and opportunities in transboundary water quality and shellfish restoration.**

For thousands of years, the intertidal marshes, mudflats, and open water marine habitat of Steloqwen (Boundary Bay, USA/Canada) supported diverse Indigenous shellfish fisheries. First Nations and later European settlers all relied on shellfish from this bay, which produced most of British Columbia's oysters in the early part of the 1900's. But, due to poor water quality, shellfish harvesting in the Canadian parts of the bay has been illegal since the 1970s. The Shared Waters Alliance is an international working group focused on restoring the water quality of the Canadian-US-First Nation shared waters of Steloqwen. Since the formation of Shared Waters, shellfish farming has been able to re-start in selected US waters of Drayton Harbor, Washington, but remains closed in Canadian waters. Within recent years, Shared Waters has been reinvigorated under the guidance of Semiahmoo First Nation, whose traditional territory stretches across current national/provincial/state/First Nation boundaries. The Shared Waters Alliance has recently coordinated several studies to identify the magnitude and sources of bacterial contamination to Steloqwen and envision pathways toward restoration and reconciliation in and around this bay. Urban areas are major contamination sources. Possible pathways forward attempt to weave together modern provincial and federal policy tools with Indigenous shellfish traditions and rights. We will share both the current water quality and shellfish contamination research from the Steloqwen transboundary watershed alongside lessons learned in our attempt to conduct a transboundary alliance.

Kiley Sims[1], Ian Fleming[1] and Sarah Lehnert[2], [1]Memorial University of Newfoundland, [2]Fisheries and Oceans Canada. **Hybridization between invasive brown trout and Atlantic salmon across rivers in Newfoundland.**

Introduced brown trout (Salmo trutta) are a widespread invasive species in Newfoundland (NL), Canada, and can hybridize with native Atlantic salmon (Salmo salar). However, hybrids are an evolutionary dead end and do not persist beyond F_1. Our study tests whether the frequency of hybridization between these species across rivers in NL has declined due to selection for reproductive isolation in the past 3.5 decades since their first documentation in the region by Verpoor (1988) and McGowan and Davidson (1992). They found hybridization rates of 1.7% and 4.7%, respectively. We captured and sampled juvenile salmon and trout across 21 rivers on the Avalon Peninsula in NL using backpack electrofishing, 17 of which had co-occurrence of salmon and trout (n= 1,891 individuals). Species identity was confirmed using genetic analyses. Sixty-six

individuals were identified as hybrids, representing approximately 3.5% of the sampled fish. Hybrids were detected in 12 of the 17 sampled rivers, representing 71% of rivers where brown trout and Atlantic salmon co-occurred. Among rivers with hybrids present, hybrid frequency ranged from 1% to 13.9%. These results provide an updated, region-wide assessment of hybridization between brown trout and Atlantic salmon in NL and indicate little evidence of a decline in rates 3.5 decades later. Given ongoing declines in Atlantic salmon populations in the region, documenting the extent of hybridization is important for understanding potential genetic interactions that may affect population persistence.

Erin Smith, **Emilie DeRochie** and Leigh McGaughey, River Institute. **Inspiring local action for regional impact: Community Based Science in the Upper St. Lawrence River.**

Community-based science (CBS) monitoring programs are continuing to expand in freshwater ecosystems, with growing support from government agencies, researchers and community members. To support this continued growth, it is essential to share lessons learned from implementing such programs. Here we share lessons learned from a regional CBS water monitoring program conducted by the Great River Rapport, a community-engaged ecosystem health report for the Upper St. Lawrence River. We expanded a CBS water monitoring program by training new volunteers, providing interactive workshops to meet community member priorities. Additionally, we used this data to evaluate an ecological indicator (water temperature) to better understand the health of the river. We share lessons learned from the community scientist engagement, training and program management, as well as highlighting the scientific insights and policy implications from the data collected through the program. Through sharing this work we hope to provide key insights to aid other organizations in growing their CBS programs and applying the information gained from them.

Rosie Smith[1], Eric Hitkolok[2], Amanda Dumond[2], Simon DePasquale[3], Hannah Thibault[1], Spencer Weinstein[1], Paul Craig[1], Tracey Loewen[4] and Heidi Swanson[3], [1]University of Waterloo, [2]Kugluktuk Hunters and Trappers Organization, [3]Wilfrid Laurier University, [4]Fisheries and Oceans Canada. **Environmental influences of migration timing of sympatric anadromous Arctic Char and Dolly Varden near Kugluktuk, Nunavut.**

Arctic Char (Salvelinus alpinus) and Dolly Varden (Salvelinus malma) exhibit remarkable plasticity in life history and morphology, and are critically important to Indigenous communities in Arctic Canada. Inuit fishers from Kugluktuk, Nunavut, rely on anadromous life history types of Arctic Char and Dolly Varden. Anadromous life history types of the two species rarely occur in sympatry, but both overwinter in the Coppermine River system. The Coppermine River is experiencing rapid and substantial changes in break-up and freeze-up of river ice, with implications for migration timing and associated fitness and survival. We used acoustic telemetry to investigate and compare migration timing and responses to environmental conditions between species (Arctic Char and Dolly Varden) and between Dolly Varden that overwintered in different locations within the Coppermine River. We observed plasticity in timing of return migration to fresh water among years, largely driven by sea surface temperature. Response to environmental conditions differed between species and between overwintering locations, which resulted in substantial differences in conditions experienced among individuals returning to fresh water and has implications for ongoing and future stressors. Our findings further scientific knowledge on the drivers of migration timing of the two species, and inform predictions of species' responses to environmental change. Continued monitoring will be essential to determine if responses are adaptive and to inform community management of the local fishery for these ecologically and culturally important species.

Stephanie Smith[1], Ted Lawrence[1], James Last Keyombe Atalitsa[2] and **Sharon Gubamwoyo**[1], [1]African Center for Aquatic Research and Education, [2]Kenya Marine and Fisheries Institute. **From Fragmentation to Connection: Exploring the African Lakes Digital Hub.**

Access to data, publications, and collaboration spaces for African lakes particularly the African Great Lakes remains fragmented, limiting knowledge exchange and coordinated lake management. The African Center for Aquatic Research and Education (ACARE) is piloting the **African Lakes Hub**, an emerging digital platform designed to curate and connect research, reports, and practitioner knowledge across institutions and regions. This presentation introduces the Hub as a newly developed work in progress and uses it as a catalyst for dialogue with Great Lakes researchers and practitioners. Attendees will be invited to share lessons learned from similar platforms, identify priority features and governance needs, and explore how digital hubs can realistically support collaboration, equity, and decision-making in lake science. The discussion will inform the next phase of development as ACARE prepares for broader user testing and growth.

Karen Smokorowski[1] and Darcy Pickard[2], [1]Fisheries and Oceans Canada, [2]Pickard Environmental Consulting Inc. **Monitoring habitat offsets, banks and restorations: a science-based standardized monitoring and evaluation framework.**

Each year in Canada, hundreds of habitat improvement projects are conducted either to satisfy Fisheries and Oceans Canada (DFO) regulatory requirements when a development harmfully impacts fish and fish habitat (i.e., habitat offsets and banks), or to address past or cumulative harms to fish and fish habitat (i.e., habitat restorations). Monitoring these habitat improvement actions historically occurred on a project-by-project basis, making it difficult to compare and learn across projects. Fisheries and Oceans Canada has developed new step-by-step guidance to support restoration practitioners in the development and implementation of project specific monitoring and evaluation plans within a standardized framework. Key items were addressed that provide advancement in standardization, including: identifying common habitat improvement actions and key attributes, guiding the intensity and type of monitoring, providing a short list of core indicators, guiding the timing and duration of monitoring, decision points for where and when spatial and/or temporal controls are most valuable, and a transparent process for evaluating success. Future meta-analyses can use data from required monitoring to evaluate the success/effectiveness of the habitat offsets, banks, and restoration projects across Canada, which could advance scientific knowledge and improve outcomes for habitat projects and reporting on DFO's Fish and Fish Habitat program results.

Cecilia Sobral[1, 2], Michael Paterson[1, 2], Patrique Bulloch[2] and Michael Rennie[2, 3], [1]University of Manitoba, [2]International Institute for Sustainable Development Experimental Lakes Area, [3]Lakehead University. **This Lake Isn't Big Enough for the Two of Us: Apparent Exclusivity Between Mysis diluviana and Chaoborus spp. Revealed Through Assisted Re-establishment at the IISD Experimental Lakes Area.**

The cold-water stenothermic crustacean Mysis diluviana and the larval stages of the phantom midge Chaoborus spp. are important invertebrate predators inhabiting the pelagic zone of many lakes. Both predators are significant sources of food for fish and can have a substantial impact on the structure of zooplankton communities. From 1976 to 1983, Lake 223 at the IISD Experimental Lakes Area (IISD-ELA) was acidified, resulting in the extirpation of Mysis diluviana in 1979. Chaoborus then became the dominant invertebrate predator. Between 2018 and 2021, we reintroduced Mysis to L223 through stocking. Initially, densities of Mysis remained low, but began to increase after 2021. By 2024, densities had returned to pre-acidification levels. With the Mysis

reintroduction, Chaoborus densities decreased and are now near our detection limits. Moreover, among-lake data revealed that Chaoborus and Mysis rarely coexist in small lakes at the IISD-ELA; Mysis dominate in deep lakes, which have cold hypolimnia, whereas Chaoborus dominanate in shallower lakes. We hypothesize that Chaoborus cannot coexist with Mysis in deeper lakes because (1) Mysis competes with Chaoborus spp. for resources, and (2) Mysis may feed on early larval instars of Chaoborus.

Christopher Somers, University of Regina, Biology. **Coming soon to a waterbody near you: invasive Prussian carp are on the move!.**

The Prussian carp (Carassius gibelio) is an invasive fish species that is moving eastward from its initial colonization site in Alberta, Canada. In the neighbouring province of Saskatchewan, these fish have recently spread to a large area in the South Saskatchewan River watershed. Field studies between 2019-2022 showed that Prussian carp populations in Saskatchewan were already productive and age-stratified, and had mixed ploidies containing diploid, triploid, and tetraploid individuals. Emergence of Prussian carp juveniles at our study sites began in early July and continued through August, indicating an extended period of reproduction annually. Our findings suggest that invasive Prussian carp are well established in Saskatchewan and are using provincial waterbodies as a conduit to colonize more areas. Of particular concern is the potential for Prussian carp to escape Lake Diefenbaker via the Qu'Appelle Dam outlet, thereby accessing waterbodies connected to a vast area of Canada and the USA. Additional research on how Prussian carp affect native aquatic ecosystems is sorely needed, as is intensified surveillance for this species.

Boglárka Somogyi, Huan Li and Lajos Vörös, HUN-REN Balaton Limnological Research Institute. **Disruption of benthic-pelagic coupling drives algal blooms in a large shallow lake.**

Shallow large lakes are especially susceptible to climate-driven shifts in trophic structure and nutrient cycling that can trigger rapid eutrophication. These processes are typically associated with altered stratification patterns and the onset of sediment surface anaerobia, promoting increased phosphorus release from the sediment. Here, we identify wind-driven changes in water column mixing, potentially linked to global shifts in meteorological conditions, as an additional mechanism capable of destabilizing shallow lake ecosystems by decreasing benthic algal habitat. During the summer of 2024, an unexpected algal bloom developed in the eastern basin of Lake Balaton (Hungary; surface area: 596 km^2, avg. depth: 3.5 m), with a weaker recurrence in 2025. Both events coincided with markedly increased turbidity and light attenuation compared to the 2002-2023 period, strongly constraining benthic algal growth. Benthic algal biomass during these summers was substantially lower than values recorded during summer campaigns between 2005 and 2022. Oxygen microelectrode measurements further demonstrated that benthic primary production in deeper areas was insufficient to compensate for sediment oxygen demand. We propose that the resulting loss of benthic algal oxygen production promoted sediment surface reduction and enhanced phosphorus release from the sediment, thereby increasing nutrient availability for phytoplankton. These results demonstrate the stabilizing influence of benthic algae in shallow lake ecosystems and stress the importance of underwater light regimes in controlling benthic-pelagic coupling. Financial support: MTA FFT NP2022-II-3/2022.

Christopher Spence[1], Newell Hedstrom[1], Peter Blanken[2], John Lenters[3] and Erin Nicholls[4], [1]Environment and Climate Change Canada, [2]University of Colorado, [3]University of Michigan, [4]University of Calgary. **Ship-borne eddy covariance systems identify turbulent flux boundaries on the Laurentian Great Lakes.**

Sound observations are essential for understanding lake-atmosphere energy exchanges, which govern lake water levels and energy budgets and are critical for weather forecasting, water quality assessment and navigation. While advances have been made with observation programs on large lakes, such as North America's Laurentian Great Lakes, current fixed-location platforms measure relatively little of the spatial variability in turbulent fluxes across these large systems. Here, we apply ship-borne eddy covariance derived turbulent flux measurements that reveal the presence of evaporation zones separated by turbulent flux boundaries that first form near shore and expand outward. Boundaries continue to migrate with time, with atmospheric conditions and the lake thermal state, but will collapse as the lake warms through summer. These results have implications for how evaporation should be estimated, which would be improved with distributed approaches. Coupled lake-atmosphere representation in predictive platforms are likely necessary to capture these spatial dynamics which would improve water level prediction, lake thermal and ecosystem characterization, and weather forecasting. Lastly, the date of turbulent flux boundary collapse could be used as a new metric of lake function and state that augments existing metrics such as date of stratification.

Habiba Ferchichi[1], **André St-Hilaire**[1] and Stephen Dery[2], [1]Institut National de Recherche Scientifique, [2]University of Northern British Columbia. **Modelling Lake temperature using air2water and physical models.**

Lake temperature is a key physical, water-quality, and ecological variable that influences not only lake ecosystems but also downstream riverine systems. Consequently, lake temperature is an important input for several river hydrological thermal models (e.g., CEQUEAU). Despite its importance, lake temperature monitoring remains limited across many Canadian lakes. In this study, we investigated lake temperature modelling for three Canadian lakes using MODIS-derived lake surface water temperature (LSWT), validated against Landsat-derived LSWT and in situ measurements. Lake Surface water temperature was simulated using air2water model, based on a statistical relationship between LSWT and air temperature. In addition, we evaluated the performance of five one-dimensional hydrodynamic lake models (e.g., MyLake, FLake, Simstrat) to simulate water temperature at different depths in two lakes. Results demonstrated excellent performance of air2water model for surface temperature simulation, with Nash-Sutcliffe efficiency values exceeding 0.8 and root mean square errors ranging from 1.65 °C to 1.67 °C across the lakes. Among the hydrodynamic models, Simstrat and MyLake performed best for epilimnion temperature simulation, while Simstrat showed the best overall performance for simulating lake temperature across all depths. Future lake temperatures will be generated and evaluated under multiple climate change scenarios.

Shawn Palichuk[1], Andrew Mickle[2], Chris Van Esbroeck[3], Jessica Van Zwol[4] and **Katie Stammler**[1], [1]Essex Region Conservation Authority, [2]Lower Thames Valley Conservation Authority, [3]Upper Thames River Conservation Authority, [4]St. Clair Region Conservation Authority. **Building Incentive Programs That Match Local Needs Results in Greater Uptake.**

Conservation Authorities (CA) in Ontario are watershed-based organizations that are well placed to implement localized agricultural and rural landowner incentive programs to reduce phosphorus that leads to harmful algal blooms in Lake St. Clair and Lake Erie. In 2024, several CAs in southwestern Ontario (Essex, Lower Thames, Upper Thames, St. Clair, Long Point and the Grand River CAs) received funding through the Canada Water Agency's Great Lakes Freshwater Ecosystem Initiative to reduce phosphorus that leads to harmful algal blooms in Lake St. Clair and Lake Erie. In 2024, the collective of CAs delivered $2.3 million dollars to over 300 farmers for

implementing beneficial management practices like cover crops, reduced tillage, improved fertilizer placement, crop nutrient plans and erosion control structures. While each CA has their own programs and deliverables, we have created a strong relationship with one another so that we can each achieve success in our watersheds. In this presentation, we will highlight how we have created incentive programs that meet the unique needs of our agricultural communities, while also providing a consistent approach where possible. We will also highlight the various tools we have implemented for education and outreach that have led to our ability to engage with more members of the community than we have in the past. These tools include hyper-local efforts, opportunities for peer to peer learning, and collaboration on larger events.

Katie Stammler[1], Amy Weinz[1], Shawn Palichuk[1] and Joseph Salerno[2], [1]Essex Region Conservation Authority, [2]Environment and Climate Change Canada. **Water Quality Comparisons and Targeted Phosphorus Reduction in Watersheds with Diverse Agricultural Activities in Southwestern Ontario.**

The Essex Region Conservation Authority is a watershed-based organization in the extreme southwest of Ontario stretching from Windsor to Leamington. The area has more than 20 hydrologically distinct watersheds draining either to Lake St. Clair, the Detroit River or Lake Erie. The primary soil type is Brookston clay with vast areas used for row crop agriculture (corn, soy beans and wheat), and a sandy area in the southeast that has a rapidly expanding greenhouse sector. We will provide a statistical view of long-term data (15-20 years) from watersheds across this agricultural gradient, including estimates of nutrient loads from four small watersheds considered to be part of the 'Leamington Tributaries' that are identified in the Great Lakes Water Quality Agreement as priority watersheds for phosphorus reduction. We will also discuss how data are utilized to target the implementation of appropriate agricultural beneficial management practices through an incentive program designed specifically to address the local community's unique needs and challenges. In 2024, this resulted in farmers in the Essex Region receiving $425,000 to implement actions such as cover crops, erosion control structures, crop nutrient plans and reduced tillage. Using published coefficients, these actions are estimated to have reduced phosphorus by 4,370 lbs. Results from the 2025 program will also be presented.

Jessica Stevens and Patricia Chow-Fraser, McMaster University. **Change in relative abundance of sunfish species to three different water-level scenarios in 12 coastal marshes of eastern and northern Georgian Bay.**

Georgian Bay coastal marshes (GBCM) provide critical habitat for many Great Lakes fish species. While typically relatively undisturbed, these marshes have recently experienced an atypical pattern of mean annual water-level (MAWL) fluctuations. MAWL remained below the century (1918-1998) mean for 16 years (1999 to 2013; Period 1), followed by 10 years with MAWL above the century mean (2014 to 2023; Period 2), and have recently returned to below average WLs (2024 to 2025; Period 3). Here, we document how the fish communities in 12 GBCM have changed over the three water-level scenarios. Species richness decreased between Period 1 and 2, however, there has been an increase in Period 3, suggesting a certain degree of ecosystem resilience. Changes were also observed in the relative abundance of Centrarchidae fishes. One of the most notable changes was the increase of bluegills (Lepomis macrochiru). Bluegills increased greatly in Periods 2 relative to Period 1, eclipsing its congener, pumpkinseed (Lepomis gibbosus) which were the dominant fish during Period 1. With water-levels remaining below the century mean in Period 3, the proportion of bluegills is beginning to decrease in most sites. This trend can be explained by the ecology and life-

history traits of sympatric Lepomis species living in varying water-level conditions in these coastal marshes.

Erin Stewart[1], Christian Bihun[1], Mark Ridgway[2], Chris Wilson[2] and Graham Raby[1], [1]Trent University, [2]Ontario Ministry of Natural Resources. **Variation in metabolic plasticity and resilience to thermal change in diverse populations of brook trout.**

The effects of climate change are expected to vary across aquatic habitats and geographic areas, so understanding how coldwater fish respond to warming below the species level will be essential for effective conservation and management. Brook trout, thermal generalists among salmonids, exhibit substantial phenotypic plasticity, giving rise to diverse ecotypes and life histories across their wide range, yet this diversity has not been captured in previous work on thermal performance. We investigated how brook trout from 14 populations with distinct ancestries, rearing environments, and life histories responded to thermal stress to elucidate the drivers of intraspecific variation in thermal performance and identify traits that mediate vulnerability and resilience. To do so, we quantified the metabolic plasticity of over 250 brook trout ranging from 46-448 mm (fork length) by briefly acclimating fish to an optimal or sublethal temperature. Standard and maximum metabolic rates were assessed both at their acclimated temperature and, without further acclimation, at the alternate temperature to evaluate aerobic scope under optimal and thermally challenging conditions. By integrating respirometry-based estimates of whole-organism performance across diverse populations, the differences detected in our study highlight the importance of examining thermal tolerance below the species level, as phenotypic plasticity, ontogeny, and heritable traits interact to shape resilience and the potential for adaptation in the face of environmental change.

Robert Stewart[1], **Dale Hardy**[2], Tim Hollinger[1], Jennifer Korosi[3], Adam Kowtiash[2], Abe Kowtiash[2], Joshua Thienpont[3], Nathan Wilson[1] and Patricia Burke Wood[3], [1]Lakehead University, [2]Biinjitiwaabik Zaaging Anishinaabek, [3]York University. **A Long-term Cumulative Effects Assessment and Indigenous Guardian Network by the Anishinaabek of Lake Nipigon.**

Biinjitiwaabik Zaaging Anishnaabek (BZA) have long observed changes in the Lake Nipigon Basin using local knowledge and natural laws shared through verbal and lived histories. However, the rapid pace of ecosystem changes from colonial development, and marginalization from lake governance, has left communities exposed to an many stressors in the aquatic environment. Despite a traditional role as the protectors of the Great Lakes (the headwaters of Lake Superior), the communities of Lake Nipigon do not have a recognized role in Great Lakes Management. From drinking water to fisheries, the stressors mount, and community leaders want to correlate local observations with common scientific, geographic and historical information to elevate their voice about ecosystem change and their rights to govern in their traditional territory. We outline a decade of community-based assessments, funding strategies and co-management partnerships that have developed research and Guardianship roles among Lake Nipigon Anishinaabek communities, academic parthers and tribal organizations. Community-based assessments include country food studies, fish population and contaminant assessments, water quality and paleolimnological assessments and the development of a historical record and real-time spatial accounting of the cumulative effects of development on traditional lands. The session hope to capture common interests in collecting lakewide data to address a number of external pressures for development, protection and consultation; the potential for Co-Management by First Nations, and; the ways First Nations can exert their Rights within Lake Management.

Wendylee Stott[1], Andrea Bernard[2], Sarah Beech[3], Paul Blanchfield[1], Bruce Tufts[4] and Chris Wilson[3], [1]Fisheries & Oceans Canada, [2]Nova Southeastern University, [3]Ontario Ministry of Natural Resources, [4]Queen's University. **Genomic Structure and Diversity of Lake Whitefish (Coregonus clupeaformis) from Lake Ontario.**

The Lake Whitefish fishery in Lake Ontario is supported by spawning populations in the Bay of Quinte, along the south shore of Prince Edward County, and Chaumont Bay which are managed separately. Meristic and morphological data suggested that Lake Whitefish from the Bay of Quinte and the lake represented different populations, but an analysis in the early 2000s that used eight microsatellite DNA loci concluded that the lake and bay populations did not represent distinct units for management. Genomic markers may provide increased resolution as they allow hundreds to thousands of markers to be assessed. We reanalyzed Lake Whitefish from Lake Ontario collected in the early 2000s and samples collected in 2023 with a panel of over 400 single nucleotide polymorphisms (SNPs) that was developed for Lake Whitefish in the Great Lakes. We found that Bay of Quinte and Chaumont Bay samples from both time periods grouped together and are genetically distinct from samples from the south shore of Prince Edward County. These results are compared to recent acoustic telemetry data to show how different approaches can be used to better understand factors that produce differences in the observed population structure and how they can be applied to fisheries management.

Gadfly Stratton, Unaffiliated. **A seat in the audience or a seat at the table?: Experiences of marginalized genders in the sciences.**

Marginalized groups often face greater barriers to participation in the sciences. Folks of marginalized genders, for example, often face greater scrutiny, less resources, and additional safety concerns in the field. To alleviate these sorts of additional and unequal burdens, scientific organizations including SCAS and IAGLR have made committments to support DEIA principles so that our science can be more robust and also more reflective of the communities we serve. This past year has demonstrated how imperative it is that we respect and uphold those committments. We have seen withdrawal of support for DEIA and even outright hostility toward those principles; women have lost funding and their jobs due to being labelled "DEI hires"; and trans+ people have been denied access to the use of facilities as basic and fundamental as washrooms. This talk will draw upon data from prior workshops and engagement with folks working in the sciences, focusing on the experiences of women and trans+ people. This talk will briefly outline some of the barriers faced by gender minorities in the sciences, as well as providing guidance for moving forward together, and hopefully providing some food for thought for the session's panel discussion to follow.

Kevin Strychar, Annis Water Resources Institute - Grand Valley State University. **Image Flow Cytometry Rapidly Assesses Viable vs Non-viable Escherichia coli along Coastal Beaches of Lake Michigan.**

Over the years monitoring of Escherichia coli (E. coli) in recreational water has traditionally been performed using Colilert/Coliert-18 - an EPA approved product from IDEXX that simplifies Method 1603 and produces results as “most probable number” in 18-24 hrs. - and was/is considered the “gold standard”. In 2015 a novel method was developed using qPCR. The advantage of this method over other methods is the relative rapidity (results can be obtained in 3-5 hrs.). A key disadvantage of qPCR, culture-based, and other methods is the inability to identify viable (live) and non-viable (dormant, dead) cells. This disadvantage has the potential to create false positive and/or negative results. Here, we use image flow cytometry (IFCM) that fluorescently tags

DNA to characterize viable vs. non-viable E. coli. IFCM data show comparable cell detection limits to qPCR, but also allowed differentiation between viable (live) vs. non-viable (dormant/dying/dead) cells. Together, IFCM and qPCR offer a better and more rapid set of methods for the decision-making process potentially preventing beach closures and providing actionable information to stakeholders compared to standard culture methods.

Brett Studden[1], Cassandra Owen[2], Sarah Lamontagne[2], Owen Sweazey[1] and Bailey McMeans[2], [1]University of Toronto, [2]University of Toronto Mississauga. **Integrating angler observations: the influence of weather and storms on the movement of freshwater fishes.**

Across many regions, the intensity, frequency, and duration of extreme weather events are increasing, with potentially significant consequences for freshwater ecosystems. While the impacts of shifting weather conditions and storms, including their influence on abiotic conditions such as mixing regimes, thermal structure, light, and nutrients, are supported by a growing body of research, far less is known about how large, mobile organisms may respond. We draw on an information-rich source of ecological insight, angler observations, to develop a set of predictions about how weather conditions influence fish behaviour. The angling community frequently documents perceived links between weather conditions and fish behaviour, yet these perspectives are rarely incorporated into ecological research. We systematically reviewed angler-generated online content, identifying over 37 predictions regarding behavioural responses to weather, which we unify into a predictive framework. For instance, many anglers assert that low or dropping atmospheric pressure increases fish activity, while others emphasize the importance of wind and rain as agents of behavioural change. We evaluate these predictions using continuous, high-resolution acoustic telemetry data from two freshwater fish species (lake trout and smallmouth bass) in Smoke Lake, Algonquin Provincial Park (ON, Canada). We then consider storm events, assessing their potential to generate abrupt behavioural shifts. Our work highlights the importance of integrating local ecological knowledge with long-term tracking to illuminate novel insights into fish behaviour in a rapidly changing world.

Dawsyn Sturch[1], Peter R. Leavitt[2] and Cale A.C. Gushulak[1], [1]Department of Biological Sciences, University of Manitoba, [2]Department of Biology, University of Regina. **Climate change drives decadal eutrophication in Waterhen Lake (Manitoba, Canada), an eco-certified fishery.**

Waterhen Lake (Manitoba) is a regionally large, shallow, largely undeveloped lake located in the Boreal Plains Ecozone of central Manitoba, an area highly sensitive to climate change. Waterhen Lake was certified by the Marine Stewardship Council in 2014 as a sustainable commercial fishery (walleye and northern pike) and is also used for subsistence fishing by local Indigenous communities. Despite this eco-certification, no long-term water monitoring has ever been undertaken at Waterhen Lake and there is little information on the lake's past or present ecosystem health. Here we examined paleolimnological markers of overall production and phytoplankton community composition (organic matter, carbonate content, algal pigments, diatoms) from a ^{210}Pb-dated sediment core collected from Waterhen Lake to infer historical changes in water quality and overall ecosystem health. Lake production (as pigment concentration) was relatively low during the early 1900s but increased substantially after ~1970-1980 concomitant with increases with mean annual (and winter) temperatures in the region. Analysis of pigment-inferred community composition revealed that bloom-forming colonial taxa increased while potentially N_2-fixing Nostocales taxa declined, possibly due to increases in N fertilization upstream of Waterhen Lake. These results indicate that the quality and health of Waterhen Lake and its fisheries are being impacted by regional stressors, and local communities and managers should be prepared to adapt to these changing conditions.

Rochelle Sturtevant[1] and Andrew Mulligan[2], [1]Michigan Sea Grant, Michigan State University, [2]Michigan Sea Grant, University of Michigan. **Representing change in historic databases.**

Changes to science-based information pose a challenge for databases that rely on historical information. This presentation examines a few recent examples of how our database - The Great Lakes Aquatic Nonindigenous Species Information System - has dealt with information shifts. Taxonomic shifts are one such category of scientific changes - subspecies elevated to species level and vice versa (e.g., Phragmites australis australis and Phragmites australis americana), species complexes rarely identified to species level (e.g., Salix cinerea/atrocinerea), and reclassification based on genomic evidence (Cipangopaludina japonica to Heterogen japonica) - which can create difficulties in assigning historic reports to modern species names. New sediment core records have resulted in reclassification of species (e.g., Cyclotella atomus) previously considered nonindigenous as native to portions of the Great Lakes. Yet other species have hybridized (Phalaris arundinacea). Distribution maps based on historic presence data are often interpreted as representing current species distributions; however, the system has not focused on collection of absence data that could reflect local extirpations. Expert reviewers have suggested delisting several species that have not been reported for >25 years (e.g., Sphacelaria lacustris). Dreissena polymorpha have been displaced by Dreissena rostriformis bugensis) from the deeper waters of the Great Lakes. Management actions have also successfully eradicated some local populations (e.g., Myriophyllum aquaticum). Development of rigorous criteria, new mapping techniques, and transparent interpretation is necessary to keep the information relevant without compromising historical accuracy.

Sarika Suarez Sharma, Catherine Febria and Karim Malik, University of Windsor. **Managing Phragmites from Above: A Remote Sensing and Deep Learning Approach for Ecological Monitoring in the Great Lakes Basin.**

The spread of invasive species and resulting loss of aquatic biodiversity and ecosystems require spatial-based restoration strategies. The Phragmites australis expansion (Phragmites) in southwestern Ontario is such an example. Despite a suite of management techniques, Phragmites continues to be a pervasive threat to native ecosystems, among which are tallgrass prairies and wetlands. Long-term monitoring is required to support evidence-based Phragmites management over time and to identify priority areas. Current monitoring efforts, however, are laborious and unsustainable. Phragmites mapping and monitoring must be advanced in efficiency to evaluate management success and to implement strategic planning within and between management groups. To this end, Remotely Piloted Aircraft (RPA) imagery and Machine Learning (ML) methods may offer an innovative solution to prevent, detect, and control invasive species spread. Commercial RPAs are non-destructive in their ability to generate detailed images, and ML models can automate post-processing to locate site-specific vegetation. In this research, we process RPA images, Light Detection and Ranging (LiDAR) data, and visible band vegetation indices to train and compare U-Net models that delineate Phragmites in vulnerable habitats. Our results demonstrate that models solely trained on raw RGB imagery are the most effective in classifying Phragmites stands in Wetland habitats (F1 score = 0.99). By working directly with restoration practitioners, this work seeks to establish an economical and scalable protocol to advance spatially informed Phragmites management decisions in the Great Lakes basin.

Michael Sullivan, Alberta government. **Cumulative effects modelling of Alberta's blue-ribbon trout fishery, and why models fail.**

Alberta's Bow River sport fishery is declining, Numerous stressors have been blamed, individually or collectively, including major flood events, whirling disease, water flows, habitat loss,

and high angling pressure. To better understand, and act on this complexity of cumulative effects, Alberta Environment and Parks is using a modelling process called 'Joe" modelling. By quantifying the impact of each stressor in terms of severity, we can optimizes the most effective mitigation actions. With input from public meetings, data from field studies and extensive literature reviews, we initially identified over 20 different stressor-response curves. The three stressors of importance (at this stage) for the Bow River fishery appear to be overfishing (50%), irrigation canal entrainment (30%), and flow alterations (20%). Implementing management actions to resolve these problems has highlighted two critical limitations of any cumulative effects problem; 1) The Blame Game - each affected group argues "fix the other issue before you restrict me!" and 2) The Uncertainty Cloud - big restrictions on a single factor have a much smaller and often undetectable effect on the whole problem. There are huge social and monetary costs to fishery and water use restrictions, and it is very difficult to get collaborative agreement to push management levers because of these two critical limitations. These are human dimensions issues, and more or better science is not going to solve the problem.

Sierra Sullivan[1], John Hagen[2], Brendan Anderson[3], Jordan Rosenfeld[1, 3] and Sue Pollard[4], [1]University of British Columbia, [2]John Hagen and Associates, [3]Ministry of Water, Land and Resource Stewardship, British Columbia Provincial Government,, [4]Freshwater Fisheries Society of BC. **Using cumulative effects modelling to quantify risks to Coastal Cutthroat Trout.**

Status assessments for aquatic species typically involve describing and exploring the risks or threats that an organism faces. These descriptions are often qualitative, listing threats that should be addressed at varying levels of priority. Risk assessments, however, must consider the combined and interactive effects of natural scenarios and human activities on fish habitat and populations, which requires quantifying threats. The CEMPRA cumulative effects framework (Cumulative Effects Model for Prioritizing Management Actions) enables the quantification and management of threats at a landscape scale. For a province-wide status assessment of Coastal Cutthroat Trout—a native salmonid in British Columbia—we applied the CEMPRA framework to estimate the degree of threat to species persistence within conservation units. Our model integrates ten stressors identified via expert elicitation as major threats to the species, weighting each with stressor-response functions and local stressor magnitude data. The model reveals highly variable risk scores across the province. These results can help guide biological monitoring, the collection of higher-accuracy threat data, the refinement of stressor-response curves, and the implementation of effective recovery actions. Due to its ease of use and flexibility, applying CEMPRA in this risk assessment is intended as the first step in an iterative process of data refinement, threat reassessment, re-evaluation of management goals, and model validation. We conclude by emphasizing the value that quantitative cumulative effects models can bring to species status assessments.

Sal Suri, Harvard University. **Colonial Locks and the Ecology of Infrastructure: The Sea Lamprey's movement through the St. Lawrence Seaway.**

The 19th- and 20th-century construction of inland waterways by the settler-states of the U.S. and Canada made possible the circulation of capital to and from ports in the Great Lakes Region (GLR), industrializing and intensifying the colonial occupation of interior coastal spaces. In their terraformation, these canals also provided thoroughfares for the movement of non-human species, facilitating the expedited disruption of existing ecologies and multispecies relations, and creating crisis for inland fisheries. In this article, I think with the 1950's journey of the sea lamprey into the Great Lakes via the St. Lawrence Seaway to refract the social dynamics that have shaped this aquascape's shifting ecological realities. Drawing on archival documents from organizations

including the Great Lakes St. Lawrence Seaway Development Corporation, the Michigan Sea Grant Program, the Michigan Fish and Wildlife Service, and the St. Lawrence Seaway Authority (Canada), I trace the movements of the sea lamprey to highlight how the human and multispecies realities of the Great Lakes were fundamentally altered and continuously disrupted by the Seaway in service of colonial-capitalist circulations. Ultimately, I place nonhuman migrations within the broader system of colonial-capitalist logics and infrastructures that facilitated their movements, to argue against projections of "nonhuman invasion" and to unsettle the assumed necessity of expanded and extended shipping infrastructures.

Jaanus Suurväli[1], Phil Grayson[1, 2], Jessie Ogden[1], Meghan Mahoney[1, 3], Eleana Karachaliou[1], Margaret Docker[1] and Colin Garroway[1], [1]University of Manitoba, [2]Beam Therapeutics, [3]Colorado State University. **Native or invasive? Reconstructing the history of sea lamprey colonization of the Great Lakes basin using whole genome sequences.**

It is well established that sea lamprey—a significant pest in the Laurentian Great Lakes—gained access to Lake Erie (and subsequently the upper Great Lakes) from Lake Ontario when the Welland Canal allowed them to bypass Niagara Falls. However, its origins in Lake Ontario and other large lakes of eastern North America remain unclear. According to one common theory, they invaded from the Atlantic Ocean via canals within the last 200 years, quickly establishing themselves in Lake Ontario, Champlain, and the Finger Lakes (Oneida, Seneca, and Cayuga). An alternative hypothesis, backed by studies using mitochondrial DNA sequence and microsatellite data, suggests they have been native to at least some of these lakes since post-glacial retreat approximately 10,000 years ago. We used whole genome data from 317 North American sea lamprey to examine the demographic history and genetic structure of their contemporary freshwater populations. We show that there are three freshwater populations (Erie + upper Great Lakes, Finger Lakes, Lake Champlain), all distinct from sea lamprey from Atlantic drainages, suggesting long separation from the Atlantic population. However, all populations downstream of Niagara Falls show traces of recent introgression, especially Lake Ontario which showed significant admixture between the Erie + upper Great Lakes and Finger Lakes populations. Taken together, contemporary sea lamprey in freshwater lakes appear to be the mixed descendants of native and non-native populations.

Christine Swanson and Scott Steinschneider, Cornell University. **Operational Constraints Suppress Forecast Value in State-Aware Policies for Highly Regulated Water Systems.**

Hydrologic forecasts have long supported reservoir operations, with recent advances in subseasonal-to-seasonal forecast skill increasing interest in forecast-informed policies. However, most studies demonstrating forecast value examine systems with relatively few objectives and substantial operational flexibility, leaving open questions about whether forecasts can improve performance in highly regulated, many-objective settings. We address this gap using the Lake Ontario-St. Lawrence River (LOSLR) system, a large, many-objective transboundary system that operates under multi-tier, nonlinear, seasonally varying flow constraints. We first identify a neural network policy architecture through an offline search to ensure operations can flexibly use different types of state and forecast information. Afterwards, we design state-aware policies using three experiments: (1) basic inputs (lake level, seasonality), (2) basic inputs plus a perfect net total supply forecast, and (3) the same forecast-augmented inputs evaluated under relaxed constraints. Policies are optimized across hundreds of stochastic centuries and re-evaluated on held-out water supply scenarios. Under actual LOSLR constraints, policies using perfect forecasts do not improve performance relative to basic-input policies, indicating that the feasible decision space is too narrow to translate forecast information into better outcomes. With relaxed constraints, forecast value

emerges, showing that the forecast is informative but rendered unusable by operational constraints. These findings demonstrate that forecast value is an emergent property shaped by objectives, constraints, and policy design, emphasizing the importance of operational flexibility in leveraging forecast information for multi-objective water systems.

Owen Sweazey, Bailey McMeans and Brett Studden, University of Toronto Mississauga.
Temporal, spatial, and individual variation in thermal habitat use in warm- vs cold- water freshwater fishes.

Temperature is a critical habitat feature that regulates the biological activity and performance of organisms. However, our understanding of how freshwater fishes use thermal habitats in response to natural variations in time and space, both among species and individuals, is still limited. This hinders our ability to accurately predict the effects of climate change. Here, we quantified the thermal habitat use of two culturally and ecologically important lacustrine fish species, the cold-water lake trout (Salvelinus namaycush) and the invasive, warm-water smallmouth bass (Micropterus dolomieu) through time (hourly across 3 consecutive years), space (3 connected lakes), and individuals (n = 36 and 30, respectively) using fine-scale acoustic telemetry in Algonquin Provincial Park, Ontario. Smallmouth bass are considered eurytherms and lake trout stenotherms due to the wider and narrower range of seasonal temperatures these species experience in temperate lakes. However, our fine-scale data uncovered that thermal habitat use was consistently less variable in smallmouth bass than in lake trout at hourly and interannual time scales, across lakes and among individuals. On any given day, lake trout used a larger range of thermal habitats and occupied colder temperatures in our study lake with higher prey density. Our study provides important information for conservation and management by shedding new light on how variation in time and space influence the temporal niche (i.e., time spent near optimal temperatures) of different fish species.

Emiliana Swick[1], Graham Raby[1], Erin Stewart[1], Amber Fedus[1], Kurtis Smith[2] and Jacob Brownscombe[2], [1]Trent University, [2]Fisheries and Oceans Canada. **Sensor tags reveal thermal preferences of walleye and smallmouth bass in the wild.**

Fish may select different thermal habitat to maximize aerobic performance, food intake, or conservation of energy. Furthermore, different fish species use different thermal habitats and will therefore respond to climate warming differently. Our existing understanding of thermal habitat selection in fish has been used in many fisheries management applications but comes mainly from lab-based studies, which lack empirical data from the field and limit applications to wild populations. Using acoustic telemetry, we investigated thermal habitat selection by walleye (Sander vitreus) and smallmouth bass (Micropterus dolomieu), two species with ample data on aerobic performance (aerobic scope) and bioenergetics, a lens through which we can interpret thermal behaviours. These two species are often found in the same ecosystems but have different thermal regimes and will therefore respond to climate change differently. We quantified the thermal habitat occupancy by both species in relation to available habitat to generate an index of thermal selection. Our results reveal differences between these species in their thermal preferences that help us to understand thermal optima in realistic conditions. There were also interesting species differences in their seasonal patterns of thermal habitat selection, which will be important for updating bioenergetics models and informing evidence-based decision-making in fisheries management for both species.

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Allyza Tabirara and Dr. Nora Casson, University of Winnipeg. **Characterizing Sediment Phosphorus in the FortWhyte Alive Lakes.**

Urban lakes are vulnerable to eutrophication because they receive continuous nutrient inputs from surrounding watersheds and often experience restricted hydrologic exchange. This is a particular problem at FortWhyte Alive, an environmental education centre where long-term monitoring has documented substantial differences in phosphorus concentrations among five lakes. These lakes are endorheic and were formed from clay quarry pits, creating closed basins where nutrients accumulate. Despite sharing a common watershed, the processes driving their differing phosphorus levels remain poorly understood. One potential explanation is that sediment phosphorus reservoirs differ among lakes, influencing the mobility of phosphorus and its availability in the water column. To investigate this, we conducted a preliminary survey of sediment phosphorus during the summer of 2025. Three sediment samples were collected from each lake using an Ekman grab to capture spatial variability and were analyzed for water-extractable and Olsen phosphorus. We compared concentrations of these sediment fractions with existing surface water phosphorus data from FortWhyte Alive's long-term monitoring program. Water-extractable phosphorus was consistently low across all lake sediments, but there was substantial variation in Olsen phosphorus among lakes. In general, lakes with higher sediment Olsen phosphorus exhibited higher water column phosphorus concentrations, this relationship was influenced by the presence of aerators in some lakes. These results suggest that sediment-associated phosphorus contributes to spatial differences in nutrient conditions at FortWhyte Alive and plays an important role in lake-specific phosphorus dynamics.

Samantha Tank[1], Nichole Angell[1], Autumn McGowan[1], Taaja Tucker-Silva[1], Lindsay Chadderton[2], Tim Johnson[3] and Bo Bunnell[4], [1]Great Lakes Commission, [2]The Nature Conservancy, [3]Ontario Ministry of Natural Resources, [4]U.S. Geological Survey. **Coordination of two multinational initiatives to control invasive dreissenid mussels in North America's Great Lakes.**

Invasive dreissenid (zebra and quagga) mussels have reshaped Great Lakes ecosystems since their introduction in the late 1980s, driving ecological change that spans nearshore reefs and offshore waters. Addressing these impacts requires coordinated action that bridges disciplinary, cultural, and institutional boundaries. This presentation highlights how two complementary, multinational initiatives—the Invasive Mussel Collaborative (IMC) and the Great Lakes Spawning Whitefish and Invasive Mussels (SWIM) project—are advancing invasive mussel control through integrated research and management across the Great Lakes region. The IMC is developing a research roadmap to guide strategic investment in invasive mussel control, with an emphasis on achievable site-scale suppression and the long-term goal of regional control. Informing this effort, the SWIM project is conducting a five-year experiment in Lakes Michigan and Huron to evaluate how invasive mussels affect lake whitefish larval survival. Together, these initiatives link fundamental research, applied management, and restoration objectives. These efforts rely on diverse partnerships that include U.S. and Canadian federal agencies, state and provincial governments, Tribal and First Nation partners, academic researchers, and non-governmental organizations. We will reflect on the benefits and challenges of sustaining these collaborations, including coordinating across governance structures, integrating Indigenous knowledge with Western science, and aligning timelines and objectives.

Mark Hernandez[1] and **Jonathan Teaford**[2], [1]University of Colorado, Boulder, [2]Green Steel Environmental. **Activating Steel Slag into a Circular Economy Paradigm for Phosphorus Removal from Wastewater.**

Municipal, agricultural and industrial wastewater plants employ a number of processes to reduce phosphorus levels in their effluent, including utilizing substantial volumes of expensive hazardous chemicals. Emerging research suggests that an abundant by-product of steel making (referred to as slag), may be used to efficiently recover phosphorus and sulfur from wastewater. Specifically, slags can be engineered to reliably remove phosphorus and sulfur with higher efficiency and lower costs than conventional chemical approaches. Slags remain stockpiled near steel plants around the world. An estimated 45,000 tons of steel slag is produced in Manitoba each year. This material is mainly composed of calcium, silica, and iron oxides, which, when activated, acts as a specific and potent chemical sorbent, selectively removing phosphorus, from wastewater. Great Lakes-area slag inventories are remarkably abundant making it attractive for nutrient removal given the sustainability hallmarks of upcycling. Here we present activating slag in a novel upcycling application, reusing this ubiquitous industrial by-product. To this end, the University of Colorado has conducted pilot studies at the City of Boulder's wastewater facility showing a classic dose-response behavior with respect to phosphate and sulfide sequestration when granulated steel slag was added to pilot digesters. Subsequent research is optimizing particle sizes for activating steel slag residuals to realize complimentary operational benefits: reductions in struvite and vivianite formation potential, improving dewatering behavior, as well as siloxane removal.

Alexandra Tekatch[1], Matthew Bayly[2] and Jordan Rosenfeld[3], [1]ESSA Technologies Ltd., [2]M.J. Bayly Analytics Ltd., [3]The University of British Columbia. **Development and Application of a Cumulative Effects Model for Prioritizing Recovery Actions (CEMPRA).**

The Cumulative Effects Model for Prioritizing Recovery Actions (CEMPRA) is an integrative modelling framework. The CEMPRA toolbox uses a series of standardized stressor-response functions to link environmental attributes to the system capacity of a target species/system. This framework design is as generalizable, simple, and versatile as possible so that users can apply the model to various geographic regions, contexts, systems, and species. As the name suggests, CEMPRA helps prioritize recovery actions for data-limited species and species-at-risk, with the flexibility to accommodate both data-rich and data-poor study systems. We will explore the suite of modelling components offered within the CEMPRA toolbox and discuss past and current applications of CEMPRA for scenario modelling and decision-making in southern British Columbia. We will outline the full range of abilities and limitations of CEMPRA, as well as future directions for its application as a flexible adaptive management and cumulative effects assessment tool.

Kristin TePas[1], **Meaghan Lightfoot**[2], Annie Scofield[3] and Meaghan Gass[4], [1]University of Illinois/Illinois-Indiana Sea Grant, [2]Oak Ridge Institute for Science and Education, [3]U.S. Environmental Protection Agency Great Lakes National Program Office, [4]Michigan State University Extension/Michigan Sea Grant. **Bridging Science and Education: Engaging Youth with Real-World Great Lakes Data.**

Connecting youth with the Great Lakes is essential for cultivating future stewards of our shared waters. Yet, bridging the gap between cutting-edge science and classroom learning remains a challenge for educators and scientists alike. How can complex data become approachable for teachers, and how can educators transform that data into engaging, place-based lessons for students? This presentation highlights an innovative Sea Grant program, Teaching Great Lakes Literacy

(TGLL), that addresses these questions by integrating real-world Great Lakes science into classrooms in ways that inspire curiosity and action. Through TGLL's collaborative program, scientists and educators developed a hands-on lesson plan using the Environmental Protection Agency's Great Lakes Biology Monitoring Program data and scientific processes. In this project, students investigate changes to Lake Michigan's productivity, linking concepts such as water clarity and quality to aquatic worms living on the bottom of the lake. This initiative demystifies science and empowers youth to see themselves as environmental stewards and future scientists. This presentation highlights strategies for making Great Lakes science relevant and exciting for learners. Attendees will leave with practical insights into how scientist-educator collaborations can transform data into dynamic learning experiences. By engaging youth today, we ensure a future where healthy waters are sustained through informed stewardship.

Joshua Thienpont[1], Vesta Tajik[1], Kristen Coleman[2] and Jennifer Korosi[1], [1]York University, [2]Bruce Power. **A paleolimnological assessment of nearshore environments in Lake Huron near the Bruce Power Generating Station.**

The Laurentian Great Lakes have been impacted by a broad range of environmental stressors, including the introduction of invasive species, climate warming, and watershed development of varying intensities. Lake Huron, the second largest of the Great Lakes, is the location of the Bruce Power Generating Station, on the eastern lake shore. Bruce Power has been operating since the mid-1970s and is one of the largest power generating facilities in the world. The power plant releases thermal effluent into Lake Huron, as lake water is drawn into the facility to be used for cooling, and then released to the lake at as much as ten degrees above ambient lake temperatures. We will present the results of a paleolimnological assessment of recent (last ~200 years) environmental changes in sediment cores taken from shallow, nearshore areas of Lake Huron at a range of distances up to ~75 km from Bruce Power, to investigate potential impacts of thermal effluent. Sedimentary diatoms and stable isotopes are being analyzed, as this indicator group can provide insights into several gradients of environmental change, including those that might be related to changing water temperatures or associated habitat shifts. Ultimately, this work will contribute to a better understanding of how multiple environmental stressors may be impacting the shallow nearshore areas of Lake Huron.

Elizabeth Austin-Minor, Amber Ruthenbeck and **Ariyah Thomas**, University of Minnesota Duluth. **Microplastic Depth Patterns in Lake Superior: Linking Polymer Characteristics to Vertical Distribution.**

Increases in plastic production have led to increases in waste, and global mismanagement of waste has heightened concerns about plastic pollution. Microplastics sampling has historically been limited to the water surface in lakes and oceans, with results often extrapolated to the entire water column. However, recent studies employing in situ pumping show that microplastic particles exist at varying levels throughout the water column. To improve understanding of vertical distributions of microplastics, this study conducted depth-resolved sampling of suspended particles in Lake Superior and compared this with sinking particles from the lake's hypolimnion. Microplastic concentration and composition were determined to see if general trends in plastics density, size, or morphology may be related to particle depth. Suspended particles were sampled using in situ pumps deployed at discrete depths, while sinking particles were collected with sediment traps positioned at 100 m depth. Preliminary data indicate little difference in size across depths in the suspended particles and between sinking and suspended microplastics. Major plastic polymer distributions were also similar across all samples. Sinking particles did include a more diverse collection of denser polymers, such

as polyurethane and polycarbonate, while polyethylene-terephthalate and polystyrene were present in both sinking and suspended samples. These findings suggest microplastic size and type alone do not control vertical transport; rather, other processes such as aggregation, fecal pellet incorporation, or formation of biofilms likely play pivotal roles in vertical distribution.

Kendra Thompson-Kumar, Catherine Vanner, Christina A.D. Semeniuk, Catherine M. Febria and Amy Fitzgerald, University of Windsor. **Casting an Inclusive Net: Feminist Pedagogy at the center of FishCAST, a NSERC-CREATE Program.**

As the landscape of science education shifts from strictly Western science to embracing other teaching and classroom styles, principles of feminist pedagogy have great potential to shape the future of higher education. While there is extensive research to support the use of feminist pedagogy principles in the social sciences classroom, there is far less research on how to incorporate those principles into the natural science classroom. By adding to the limited research in this area, this research project intends to encourage further use of feminist pedagogy theories in natural science education. The NSERC-CREATE FishCAST Program, a graduate-level training program, being studied in this research project incorporates feminist pedagogical theories through its attention to social justice principles and creation of an inclusive environment for early-career researchers to collaborate and grow together. A program evaluation case study is being conducted through a combination of document analysis and participant interviews of the FishCAST program. While this program is focused on graduate students, the results and recommendations will be beneficial for professionals in all levels of the education field. This research aims to understand what components of the FishCAST Program have 1) been influenced by feminist pedagogy, intentionally or not, 2) what impacts these components have had on student success, and 3) what recommendations are there for employing feminist pedagogy principles in natural science classrooms.

Andy Todd, Great Lakes Fishery Commission. **Applied Human Dimensions: Fisheries Management Perspectives on Challenges and Opportunities.**

The application of human factors within fisheries management presents several challenges related to the interplay between fisheries governance, management goals, knowledge creation and action. Human dimensions fit within the entire fisheries management spectrum from broad binational to provincial policy, to lake wide and local management planning and implementation including allocation, regulation, stocking and monitoring. Understanding how and where human factors fit within the management framework will help policy makers, managers and researchers align human dimension information needs and tools. This talk will explore some of the challenges and successes of applied human dimension based on fifteen years of experience in binational Lake Ontario fisheries management.

Joey Tonin, Manitoba Government. **Things are connected in ways you wouldn't expect - the biogeography of AIS in Manitoba.**

Biological invasions are among the most important ecological disturbances threatening global biodiversity. Managing invasive species threats and impacts is challenging given the wide range of pathways and vectors of spread, species of concern, vulnerable ecosystems, affected resource users, and impacts. However, despite the challenge, many jurisdictions understand that they must respond and underwrite complex programs to address current and emerging impacts. A primary challenge for resource managers is how to most effectively allocate limited resources to prevent aquatic invasive species (AIS) invasion and/or minimize invasion impacts. This talk will

outline how AIS monitoring and response in Manitoba are prioritized within an interconnected landscape and the challenges these connections can pose.

Isabelle Tormasi[1], Kristen Cyr[1], Holly Mosco[1], Frankiesha Wright[2], Sinead Addis[3], Margaree Salmon Association[4] and Christina Semeniuk[1], [1]University of Windsor, [2]Grieg Seafood, [3]Dalhousie University, [4]Margaree Salmon Association. **Investigating the behavioural phenotypes of invasive smallmouth bass (Micropterus dolomieu) in the Margaree River, Nova Scotia.**

Behaviours such as boldness and exploration play a key role in facilitating how organisms interact with their environments and can therefore be used to explain the dispersal ability and invasion success of non-native species. Smallmouth bass (Micropterus dolomieu) were introduced into Nova Scotia through legal introductions to bolster the fishing industry in the 1940s; however, their riverine usage and drivers of movement in the province remain poorly understood. Behavioural traits in smallmouth bass such as risk-taking when faced with a hazardous situation and willingness to explore novel habitats have been previously observed in experimental lab settings; however, recent studies investigating behaviour in a natural setting are lacking, and in particular, whether behavioural phenotypes reflect the invasion potential of smallmouth bass. Our study investigates the behavioural types of smallmouth bass in the southwest Margaree River, Cape Breton. Using in-stream behavioural trials, we assessed boldness and exploratory traits of 30 telemetry-tagged fish ranging in size from 17cm to 51.5cm in the summer of 2025. Fish were angled; each placed in an arena, and underwent a series of assays measuring time-to-acclimate, shelter use, and predator responsiveness. Our results provide new insights into how fish behaviours such as risk-taking and neophilia, are associated with bass in newly invaded habitats. Our findings provide a better characterization of the behavioural types of smallmouth bass and can be used to help create integrated management strategies.

Travis Durhack[1], Mélanie Aminot[2], **Jason Treberg**[3] and Eva Enders[4], [1]Fisheries and Oceans Canada, Winnipeg, MB, [2]New Brunswick Centre for Precision Medicine, Moncton, NB & Département de chimie et biochimie, Université de Moncton, Moncton, NB, [3]Department of Biological Sciences, University of Manitoba, [4]Centre Eau Terre Environnement, Institut national de la recherche scientifique. **Temperature acclimation effects on whole animal and red muscle mitochondrial oxygen flux in brook trout.**

Whole animal respirometry is a valuable tool for indirectly measuring metabolic rate in fishes but is logistically challenging for use in field conditions. Oxygen consumption in animals predominantly occurs at the level of mitochondrial respiration, raising the hypothesis that isolated mitochondrial preparations could act as an alternate tool for proxy estimates of metabolic capacity or activity. Mitochondrial oxygen fluxes can be assessed using high resolution respirometry without the long acclimation period needed for whole animal estimates, particularly to accurately assess the standard metabolic rate (SMR). The SMR is an estimate of the minimal metabolic requirements in ectotherms and is a foundational part of many fish bioenergetics models. In active fishes the red muscle is enriched with mitochondria to power aerobic swimming, making it a promising tissue to relate mitochondrial traits to whole animal metabolic capacities. Here we report on the effect of temperature acclimation on both whole animal and red muscle mitochondrial oxygen fluxes in brook trout (Salvelinus fontinalis) using intermittent respirometry and high-resolution respirometry with permeabilized muscle respectively. We find that mitochondrial respiratory capacities do not predict whole animal maximum oxygen fluxes or aerobic scope; however, mitochondrial respiratory capacities did follow the same pattern across acclimation temperatures as the SMR. Our findings support further interrogation of the potential for isolated mitochondrial preparations to act as

candidate proxy measurements of how whole animal metabolic rates respond to environmental change.

Anett Trebitz[1, 2], Aabir Banerji[1], James Gerads[1], Brent Gilbertson[3], Tom Hollenhorst[1], Terri JIcha[1], Ryan Lepak[3], Ryan Roekle[4], Chris Yarnes[1], Katie Alexson[4], Meagan Bell[1], Kasey Benesh[4], Grace Casciano[5], Emma Christensen[5], Morgann Gordon[4], Meghan Klasic[1], Courtney Larson[1], Caitlin McConaghy[5], Mackenzie Nash[5], Spencer Phillipsen[4], Ethan Rentschler[4] and Anna Hess[1], [1]U.S. Environmental Protection Agency, Office of Applied Science and Environmental Solutions, [2]ORISE, [3]U.S. Environmental Protection Agency, Office of Chemical Safety and Pollution Prevention, [4]SpecPro Sustainment and Environment, [5]Oak Ridge Institute for Science and Education. **Lake Erie water quality and lower food web assessments in the 2024 CSMI.**

As part of the 2024 Lake Erie Cooperative Science and Monitoring Initiative field year, staff of EPA-Duluth led water quality sampling, collaborated to generate lower food web data, collected specimens for examination of contaminant bioaccumulation, examined primary producer responses and Hazardous Algal Bloom (HAB) precursors, and provided a fully staffed research vessel for the summer cruise. Simulation modeling work was also undertaken, with nutrient and algal field data providing ground truthing. This EPA-Duluth work addresses Lake Erie Partnership science and monitoring priorities for chemical contaminants and for nutrient pollution (distribution, responses, HABs potential). Research vessel coverage was coordinated with EPA's Great Lakes National Program Office, and food web and contaminant work was coordinated with the US Geological Survey. Sampling extended across three seasons, with the design spanning ~30 offshore stations distributed across all three lake sub-basins and another ~30 nearshore/western-basin stations where more intensive sampling took place. Laboratory analyses are nearing completion for water quality (nutrients, chlorophyll a, anions/cations, CTD profiles), biological endpoints (phytoplankton and microbial composition/pigments/toxins, zooplankton composition, food web stable isotopes), and contaminant body burdens. At the IAGLR conference we expect to report initial findings related to vertical structure, spatial heterogeneity, lake-wide productivity, and energetic and contaminant trophic transfer. The views expressed in this abstract are those of the author(s) and do not necessarily represent the views or policies of the U.S. EPA.

Khang Trinh, Aaron Boyd, Kenneth Jeffries and Patricia Ramey-Balci, Department of Biological Sciences, University of Manitoba. **Baseline Assessment of Nearshore Soft-sediment Macrofaunal Communities in Qikiqtarjuaq, Nunavut.**

The Arctic is experiencing rapid change from climate warming, with increased solar radiation accelerating sea ice melt, ocean freshening, elevating ocean temperatures, and expanding infrastructure development (e.g., ports, roads, and pipelines). These changes highlight the need for baseline data and long-term monitoring in Arctic ecosystems. Benthic macrofauna (e.g., polychaetes, bivalves, and crustaceans) are key components of coastal marine ecosystems that provide essential functions in nutrient cycling and food web dynamics, fundamental to predicting effects of environmental change. Since macrofauna respond quickly to changes in their environment, shifts in community structure (species distribution, composition, and abundance) are commonly used to monitor habitat quality and disturbances. Consequently, they can provide early insight into subsequent ecosystem changes, making them valuable for environmental assessments. This study characterizes soft-sediment macrofaunal communities in shallow (<10 m) nearshore habitats at Qikiqtarjuaq, Nunavut. Sediment samples containing macrofauna were collected in September 2025 at 16 sites distributed around Broughton Island (n = 39) using a Petite Ponar grab sampler. Preliminary results examining spatial patterns of community composition and abundance in relation

to sedimentary habitat characteristics will be presented. This study provides the first comprehensive assessment of nearshore soft-sediment macrofaunal communities in this understudied region, establishing a foundation for future environmental monitoring.

Jonathan Truscott[1], Sarah Beech[2], José Bonilla-Gomez[3], Chris Davis[2], Kristopher Dey[4], Erin Dunlop[2], Aaron Fisk[5], Scott Hansen[6], Ian Harding[7], Timothy Johnson[2], Ryan Lauzon[8], Ellen Marsden[9], Gary Michaud[4], Erik Olsen[10], Freya Rowland[11], Joseph Schmitt[11], Jason Smith[12], Christina VanDoornik[13], David Walters[11] and Jacques Rinchard[1], [1]SUNY Brockport, [2]Ontario Ministry of Natural Resources and Forestry, [3]US Fish and Wildlife Service, [4]Little Traverse Bay Bands of Odawa Indians, [5]University of Windsor, [6]Wisconsin Department of Natural Resources, [7]Red Cliff Band of Lake Superior Chippewa, [8]Chippewas of Nawash Unceded First Nation, [9]University of Vermont, [10]Grand Traverse Band of Ottawa and Chippewa Indians, [11]US Geological Survey, [12]Bay Mills Indian Community, [13]Little River Band of Ottawa Indians. **Assessing the influence of thiamine deficiency as a potential threat to lake whitefish recovery.**

Lake whitefish is an ecologically and economically important species in the Great Lakes that has held immense cultural value among the Anishinaabek for millennia. Over the last two decades, their populations have declined throughout the lower four Great Lakes, a trend widely attributed to benthic regime shifts caused by invasive dreissenid mussels. Resulting changes in prey availability have forced lake whitefish diets to shift toward lower quality resources, including dreissenid mussels, prompting renewed interest in how nutritional constraints shape their early-life survival. Thiamine deficiency, linked to maternal diets, has been identified as a major physiological stressor affecting the recruitment of several Great Lakes salmonids, yet its potential role in lake whitefish has not yet been fully investigated. In this study, we examined spatial patterns in egg thiamine concentrations and maternal fatty acid signatures (FAS) of lake whitefish from multiple sites across the Great Lakes over two consecutive spawning seasons. We further assessed how these nutritional metrics related to prey compositions through FAS analysis of prey species. Preliminary analyses suggest that egg thiamine concentrations did not differ significantly among locations, despite significant spatial differences in maternal FAS. Ongoing analysis of prey FAS will help establish dietary profiles across locations. These findings will contribute to our understanding of thiamine deficiency in the Great Lakes and underscore the need to address how changing prey assemblages affect maternal provisioning and recruitment in lake whitefish.

François Turcotte, Jenni McDermid, Daniel Ricard and Douglas Swain, Fisheries and Oceans. **Defining a biomass limit reference point under decreasing stock productivity: NAFO 4T Atlantic cod.**

Many commonly used fisheries reference points assume stable population processes, yet time-varying productivity is increasingly observed among fish stocks. Atlantic cod (Gadus morhua) in the southern Gulf of St. Lawrence (sGSL) collapsed in the 1990s and has not recovered, with non-stationarity in recruitment, growth, maturity, and natural mortality preventing equilibrium conditions. In Canada, the biomass limit reference point (LRP) defines the threshold below which a stock is considered to experience serious harm to its productivity and requires rebuilding. We used life-history data, stock-recruit models, a statistical catch at age model and a surplus production model to evaluate candidate LRPs while accounting for non-stationarity in sGSL cod productivity. Two indicators of serious harm were identified: a persistent low production-low biomass state and a breakpoint in production suggesting the stock crossed an Allee threshold in 1992. Three candidate LRPs were supported and produced similar stock status, whereas other commonly used static or dynamic methods generated values below the threshold of serious harm. These findings highlight

the importance of testing multiple approaches when estimating LRPs for stocks experiencing shifting productivity.

Michael R. Twiss[1], Kennedi Johnson[2], Kate Brown[3], Bo Liu[2], Cecelia Heuvel[2], Kevin Kapuscinski[2], R. Michael L. McKay[3] and Ashley Moerke[2], [1]Algoma University, [2]Lake Superior State University, [3]Great Lakes Institute for Environmental Research, University of Windso. **Impacts of marine diesel and light crude oil on Great Lakes phytoplankton community composition and population dynamics.**

As the autotrophic base of the aquatic food web, understanding phytoplankton sensitivity to oil spills is needed to support evidence-based decisions on response measures. We conducted three experiments with either marine diesel (November, 2024) or light crude oil (June, 2025; October, 2025) each with 6 replicates of four treatments (low and high concentrations, a water associated fraction, and a control) established in 1,400-L of unfiltered St. Marys River water with river sediment covering the base along with emergent macrophytes (Scirpus). In conjunction with daily observations of water quality, phytoplankton community composition was assessed 3-5 times over the course of the experiment using a pigment-specific fluorometer (bbe FluoroProbe). Cool weather experiments (October, November) revealed observable changes in community composition and net growth rates. Additional experiments using light crude oil showed that it did not alter fluorometric responses of phytoplankton over the short term (based on supporting the use of fluorometry as an assay endpoint); dilution assays of phytoplankton growth and loss rates by microzooplankton supported the measurements of population dynamics. eDNA was also used to assess the autotrophic community. Marine diesel appeared more toxic than light crude oil; low diesel treatments showed no impact on net community growth but caused selection for greater proportions of Cyanobacteria. It follows that phytoplankton community composition and not only total phytoplankton biomass (using chlorophyll-a as a proxy) should be used to assess toxic impact.

Christy Tyler[1], Mira Ghosh[1], Natalie Hernandez[1], Maria Kazour[1], Alonso Ponce[1], Sophie Routenberg[1], Sydney VanWinkle[1], Steven Day[1], Nathan Eddingsaas[1], Andre Hudson[1], Matthew Hoffman[1] and Korfmacher Katrina[2], [1]Rochester Institute of Technology, [2]University of Rochester. **Plastic Pollution in Lake Ontario: Input, Fate, and Risk to Ecosystems and People.**

In the Great Lakes region of the US, plastic pollution rivals the oceans and is growing. At the same time, environmental heterogeneity is increasing with expanding temperature extremes, shifting water chemistry, and more intense precipitation. The interaction of these two drivers on ecosystem and human health is largely unknown. The Lake Ontario Center for Microplastics and Human Health, a Center for Oceans and Human Health, brings together environmental and human health scientists to address this gap in knowledge with the overarching hypothesis that spatial and temporal environmental heterogeneity in the watershed and the lake will influence the input, transformation, fate, and impact of plastic pollution, with increasingly negative implications for ecosystem and human health. To this end, we are addressing three aims: (1) measure long-term spatial and temporal variation in stormwater-derived debris input and accumulation in the watershed and nearshore region of the lake; (2) characterize the chemical, physical, and biological transformation and impact of post-consumer plastic in the environment under abiotic conditions associated with temporal and spatial heterogeneity; and (3) develop models to predict input, transport, and fate of debris in Lake Ontario to assess risk for exposure at critical human interfaces. Results to date indicate that environmental heterogeneity drives input, fate and impact of plastic pollution, with polymer-specific effects that lead to increasing accumulation of plastic in the lake and harm to beneficial uses.

Alana Tyner[1], Aisha Chiandet[2] and Andrea Kirkwood[1], [1]Ontario Tech University, [2]Water First. **Phytoplankton dynamics before, during, and after the listing of a Great Lakes Area of Concern.**

Severn Sound is an embayment system composed of several smaller bays located in southeastern Lake Huron, Ontario. Starting in the early 1970s, Severn Sound and its embayments have been monitored for phytoplankton and water quality. In 1987, Severn Sound was designated as a Great Lakes Area of Concern (AOC) due to multiple beneficial use impairments identified under the Canada-U.S. Great Lakes Water Quality Agreement, including eutrophication and excessive algae. In 2003, Severn Sound was delisted as an AOC primarily due to improvements related to nutrient pollution mitigation. The present study investigated long-term (1973-2016) phytoplankton and cyanobacterial community trends in each of the 4 Severn Sound embayments. Generalized Additive Mixed Models showed decreases in total phytoplankton biovolume and differences in the environmental drivers of seven major phytoplankton divisions. Using Generalized Additive Models, we found a significant difference in environmental drivers of the three major genera. Location, nitrogen species, total phosphorus, water temperature, and water clarity played a differential explanatory role in driving Aphanizomenon, Dolichospermum, and Microcystis, the three major cyanobacterial genera in Severn Sound. Our study highlights important changes and associated explanatory variables of phytoplankton biovolume and community composition in a former AOC. These findings can help inform management decisions surrounding the effects of nutrient mitigation, including the type of nutrients, in the Severn Sound region, other AOCs, and other regions experiencing eutrophication.

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Diane Umutoni and **Stephanie Smith**, African Center for Aquatic Research and Education. **Bridging Gender Gaps for Improved African Great Lakes Health.**

Women remain underrepresented in the management and governance of the African Great Lakes (AGLs), resulting in policies and leadership structures that often overlook their perspectives. To address this gap, the African Center for Aquatic Research and Education (ACARE) developed the African Women in Science (AWIS) hybrid program to strengthen the scientific, leadership, and communication skills of women working across the AGL region. AWIS combines online training in leadership, scientific writing, public speaking, and critical thinking with in-person exchanges that enhance data management skills, expand professional networks, and foster peer-to-peer mentorship. Through collaborative projects, participants build confidence, problem-solving, and team management skills, leading to increased professional responsibilities, promotions, and salary growth. Despite these successes, demand for the program continues to exceed capacity, highlighting the ongoing need to expand women's participation and leadership in African Great Lakes science and management.

Noel Urban[1], Hayden Henderson[1], An Nguyen[1], Trista Vick-Majors[1], Pengfei Xue[1], Reagan Errera[2], Elizabeth Minor[3], Chenfu Huang[1], Chuyan Zhao[1] and Anna Proulx[1], [1]Michigan Technological University, [2]NOAA GLERL, [3]University Minnesota - Duluth. **Will CO2 induce Great Lakes Acidification?**

Will rising atmospheric CO_2 cause acidification of the Great Lakes? Answering this question is a goal of a three-year, multi-institute project funded by NOAA's Ocean Acidification Program. This project will focus on the two extremes: lakes Erie and Superior. Here we will talk briefly about project strategy, illustrate contrasts between the two lakes, and highlight new data streams that are advancing our understanding of carbon cycling and pH regulation. Instrumented moorings were deployed in central locations in lakes Erie and Superior to record surface water conditions with high temporal resolution. Four to five ship cruises per year provide vertical and horizontal spatial coverage in both lakes, seasonal testing of moored sensor drift, and measurement of additional biological and chemical parameters. Geology creates an offset in pH and concentrations of carbonate species between the lakes. Geology, hydrology and human activities interact to create larger seasonal cycles and short-term variability in carbon fluxes in L. Erie. Both lakes pass through equilibrium with atmospheric CO_2 only twice per year; Erie is further from equilibrium most of the year. Biology plays a larger role in controlling pH and maintaining L. Erie out of equilibrium with atmospheric CO_2 than for L. Superior. Future work will include a second year of measurements, validating coupled hydrodynamic-biogeochemical models for each lake, and performing model experiments to clarify the importance of individual processes.

Anas Usoof[1], Rolf Vinebrooke[2], Craig Emmerton[3], Mina Nasr[3], Faye Wyatt[3], Cristina Buendia[3], Jordan Rosenfeld[4], D. Andrew R. Drake[5], Todd Morris[5] and Nicholas Mandrak[6], [1]The University of Winnipeg, [2]University of Alberta, [3]Government of Alberta, [4]BC Ministry of Water, Land and Resource Stewardship, [5]Fisheries and Oceans Canada, [6]University of Toronto Scarborough. **Beyond Stressor Maps: Integrating Biological Endpoints into Freshwater Management Prioritization.**

The importance of accounting for cumulative effects in spatial prioritization for freshwater management has been increasingly recognized, and incorporating biological endpoints is central to making these assessments ecologically meaningful. We present three case studies that demonstrate alternative ways to integrate biological data into cumulative-effects-based spatial prioritization. In the first, aimed at identifying priority watersheds for proactive and reactive freshwater biodiversity conservation in southwestern Ontario, we overlaid a cumulative index of watershed-scale human pressures with spatial data on fish and mussel biodiversity. The second case study ranked subwatersheds within the North Saskatchewan River Basin, Alberta, for management planning. We developed geospatial models of watershed integrity by combining human-pressure data using additive, multiplicative, and dominance-based cumulative-effects model formulations, and evaluated them against field-derived biological indicators, including bacteria, periphyton, benthic invertebrates, and fishes. The third case study prioritized stream reaches for conservation of two at-risk fish species, Salish Sucker and Nooksack Dace, in the lower Fraser Valley, British Columbia. We developed stressor-response functions that quantify how changes in key stressors (temperature, dissolved oxygen, flow, and habitat availability) affect species responses, based on published empirical evidence and expert opinion, and used them to calculate cumulative-effects scores for each reach under current and projected conditions. Across case studies, we compare the advantages and limitations of these approaches in relation to spatial scale, data needs, and objectives for freshwater management planning.

Anas Usoof[1], Belén Franco-Cisterna[2], P.V.S.L. Gunawardana[3], Most Shirina Begum[3], Joana Mariz[4], Carla Olmo[5], Montserrat Rivera-Herrera[6], Björn Wissel[7], Meryem Beklioğlu[8], Mihir Kulkarni[9], Altin Ghojoghi[10], Beryl Ochieng[11], Olivera Stamenković[12], Amanda de Cássia da Cunha[13], Kelvin Muli[14], Jessica Edinborough[1] and Lilen Yema[15], [1]The University of Winnipeg, [2]Instituto Milenio de

Oceanografía, [3]Trent University, [4]Technical University of Munich, [5]University of Valencia, [6]Universidad Nacional Autónoma de México, [7]Université Claude Bernard Lyon 1, [8]Middle East Technical University, [9]Indian Institute for Human Settlements, [10]Leibniz-Institute of Freshwater Ecology and Inland Fisheries, [11]Chinese Academy of Sciences, [12]HUN-REN Centre for Ecological Research, [13]The National University of Luján, [14]Pan African Network for Climate Action, [15]Universidad de Buenos Aires. **Inclusive Limnology: Community Experiences, Barriers, and Opportunities.**

Equity, Diversity, and Inclusion (EDI) are increasingly recognized as essential to the quality and impact of science, yet evidence on how EDI is experienced within the limnology community remains limited. Scientific societies can play a critical role in fostering broad participation, inclusive leadership, and the meaningful inclusion of diverse perspectives. In this context, the International Society of Limnology (SIL) EDI Task Force and the Developing Economies Committee designed and implemented an anonymous global survey to explore the experiences and perceptions of EDI among limnologists within and beyond the SIL. The questionnaire covered demographics, barriers to conference participation and publishing, perceptions of leadership, awards and funding, and awareness of existing SIL programs and initiatives, in the context of developing economies and beyond. Here we present emerging patterns from the survey, focusing on how structural, financial, linguistic, and cultural factors may influence participation, recognition, and career progression across regions and career stages. We highlight broad trends, recurring concerns, and examples of promising practices to guide future actions. Additionally, we also discuss how these insights intersect with SIL's recent efforts to advance EDI, including mentorship opportunities, evolving congress guidelines, and reflections on award and leadership processes, and outline potential directions for society-level change. This work illustrates how professional organizations can use community-informed evidence to identify gaps, monitor progress, and co-develop more equitable structures for global limnology.

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Natalie Vachon[1, 2], Lucassie Arragutainaq[3], Joel Heath[3, 4], Paloma Carvalho[1], Steven Ferguson[1], Kimberly Howland[1], Kelsey Johnson[1], Tatiana Meta[1], CJ Mundy[2], Sarah Rauf[1], Abby De Los Rios[1], Bruno Rosenberg[1], Tyson Scott[1, 2], Kallie Strong[1], Cortney Watt[1], Colin Garroway[2] and David Yurkowski[1, 2], [1]Fisheries and Oceans, [2]University of Manitoba, [3]Sanikiluaq Hunters and Trappers Organization, [4]Arctic Eider Society. **Trophic interactions, food web properties, and community composition around the Belcher Islands, Nunavut.**

Arctic marine food webs are undergoing rapid change as climate warming and anthropogenic stressors alter sea ice dynamics, hydrology, and primary production. The Belcher Islands (Qikiqtait region) in southeastern Hudson Bay, an area of conservation interest and an important harvesting area for the community of Sanikiluaq, is unique with strong hydrological mixing, nutrient availability, and productivity. This region is rapidly changing, yet knowledge of spatial patterns in community composition and trophic dynamics across taxa are scarce. Here, we integrate biotracers, DNA metabarcoding, community metrics, and network analysis to characterize the marine food web from invertebrates to marine mammals and identify north-south regional differences. North of the islands was colder and more saline, and the benthos had greater fish species richness and was dominated by shrimp and tunicates. In the warmer and more river-influenced south, brittle stars and Arctic cod were dominant. Northern benthopelagic fish, molluscs, sessile invertebrates and decapods relied on more ice-derived carbon, while in the southern region, sessile invertebrates, echinoderms and decapods had higher trophic positions. Species central to energy flow were benthic in the north but

included both benthic and pelagic taxa in the south. Across the study area, bearded seals relied most on ice-derived carbon (73.4%), while beluga whales had the highest trophic positions (4.28). These results advance our understanding of environmental drivers impacting Arctic coastal food webs and identify vulnerabilities under climate-driven change.

Rene Valdez[1], Lou Cornicelli[1] and Taylor Lange[2], [1]Southwick Associates, [2]University of Maine.
Economic Impact of the Great Lakes Fisheries.

To effectively demonstrate the economic contributions of Great Lakes recreational and commercial fisheries to stakeholders and the general public, the Great Lakes Fishery Commission authorized a study to measure the economic value of the Great Lakes fisheries. The methods used followed a similar 2020 effort with the intention of developing long-term economic trendlines. This project consists of three efforts - (1) a survey of Great Lakes recreational anglers to estimate number of anglers and expenditures per angler, followed by a valuation of economics contribution (impact on regional jobs and sales), (2) estimate economics contributions from commercial fishing, and (3) a survey of the general public to estimate the Great Lakes fishery's non-use values. This presentation focuses on the results of the recreational angler survey. Surveys were distributed from May-June 2024 to licensed anglers in the eight states that border the Great Lakes. Anglers were asked to report their fishing effort, travel, equipment, and other related expenditures, and fishing practices on the Great Lakes in 2024. In 2024, there were an estimated 1.6 million US anglers who fished the Great Lakes, and they spent $4.5 billion on fishing-related expenditures. We will present results of overall participation and expenditures for Great Lakes anglers and broadly compare 2024 results with the 2020 results. We will provide an overview of the challenges of a large-scale survey effort and make recommendations for agencies and organizations to improve state and region-wide angler estimates.

Reza Valipour[1], David Depew[1] and Chris Dallimore[2], [1]Environment and Climate Chnage Canada, [2]Hydronumerics. **Modelling dreissenid mussel nutrient recycling and Cladophora dynamics in Lake Erie nearshore waters.**

We developed an updated Cladophora growth and dreissenid mussel nutrient-recycling framework within AEM3D and coupled it to a three-dimensional hydrodynamic and water-quality model to simulate nearshore Cladophora dynamics. The framework was applied to Lake Erie where Cladophora habitats overlap with dreissenid mussel-covered substrates. The model was calibrated and validated using extensive observational datasets, including water temperature, velocity profiles, total and soluble phosphorus concentrations, Cladophora biomass, and tissue phosphorus content. Model results successfully reproduced key nearshore physical and biogeochemical processes, including nutrient dynamics and nearshore-offshore exchanges driven by coastal upwelling events. Comparisons with previous modelling and recent parameterizations by Kuczynski et al. (2022) demonstrated the framework's ability to simulate Cladophora phosphorus uptake and to represent the role of mussel-driven nutrient recycling in sustaining favorable nearshore phosphorus conditions. For the first time, the model explicitly quantified phosphorus contributions from lake-wide mussel recycling using a bi-national Lake Erie mussel distribution map, in conjunction with phosphorus inputs from coastal upwelling and riverine sources. Finally, the framework was used to assess the effects of external phosphorus-loading reduction scenarios on nearshore phosphorus availability and Cladophora growth, both with and without the presence of dreissenid mussels.

Colton Van Der Minne[1], Saul Milne[2] and Andrea Reid[1], [1]University of British Columbia, [2]Ha'oom Fisheries Society. **The Great Feastbowl: How ƛaʔuukʷiʔatḥ Leadership, Lifeways, and Ethics Shape Restoration of the haʔukmin Watershed.**

The haʔukmin (Kennedy) watershed, located on the west coast of Vancouver Island, B.C., Canada, is deeply connected to ƛaʔuukʷiʔatḥ (Tla-o-qui-aht) First Nation. Meaning "the Great Feastbowl", haʔukmin was a vital source of food, ceremony, health, and home for ƛaʔuukʷiʔatḥ. However, Western logging and fishing practices have decimated the watershed and its inhabitants, damaging the Nation's relationship to haʔukmin and our ability to fish there. This talk focuses on past and present restoration efforts in the watershed, with particular focus on ƛaʔuukʷiʔatḥ leadership in this work. It explores how ƛaʔuukʷiʔatḥ lifeways and epistemologies shape these efforts, and how the Nation's pluralistic stance embraces both ƛaʔuukʷiʔatḥ and western knowledges to best inform and enact these efforts. Finally, the talk will highlight the future that ƛaʔuukʷiʔatḥ is building in the watershed and how our ethics give guidance in navigating our relationships to haʔukmin and the fish that live there going forward.

Michelle Lewin and **Gavin Vance**, The Federation of Ontario Cottagers' Associations. **Empowering and Engaging Community Stewards: Input and Feedback from Over 200 Volunteer Community Scientists.**

The Lake Partner Program (LPP) is a community science-based water quality monitoring program that has been run in collaboration between the Ministry of Environment, Conservation, and Parks (MECP) and the Federation of Ontario Cottagers' Association (FOCA) since 2002. Annually the program provides water quality monitoring kits to over 600 individual community scientists who collectively sample over 500 lakes across Ontario. The LPP has two goals: one is to maintain and grow a public long-term database of water quality data across Ontario's freshwater lakes, and the other is to foster interest and promote stewardship of water quality and freshwater lakes across Ontario. The latter of these goals is difficult to measure due to the subjective nature of defining someone's interest, yet this goal is crucial to the LPP and other community science-based programs. To understand if the LPP has fostered interest in lake stewardship and water quality we decided to ask the volunteers themselves via a survey. This survey asked over 200 volunteers about how they have engaged in stewardship activities at the lake, how they have engaged their community, as well as other questions about their experience and engagement with the program and lake stewardship. This presentation will look at the results from this survey and reflect on the successes and failures the program has had in engaging volunteers in the program and lake stewardship activities.

Frank Vattheuer, University of Manitoba. **Nonlinear Investigations of NAFO 4X5Y Haddock Trawl Catch-Effort Dynamics.**

Fisheries analyses commonly rely on models that impose fixed functional relationships or average effects over time when interpreting catch and effort data. As a result, dynamic feedbacks driven by fish behavior, fisher behavior, and environmental variability may be obscured. Here, I apply Empirical Dynamic Modeling (EDM), a data-driven non-parametric modeling framework, to investigate the dynamics and causal structure of haddock trawl fisheries on the Scotian Shelf and in the Bay of Fundy. EDM reconstructs system behavior directly from time series data without assuming fixed equations, allowing relationships among variables to vary with the system's state. Preliminary analyses of weekly and monthly catch and effort time series indicate that nonlinear dynamics are more readily detected at finer temporal scales. At the weekly scale, strong nonlinear

behavior is evident in both catch and effort on the Scotian Shelf but is weaker or absent in the Bay of Fundy. These differences may reflect regional variation in fishing efficiency, fisher behavior, and environmental coupling. Causality results indicate bidirectional feedbacks between catch and effort, with lagged effects suggesting delayed responses rather than simple synchrony. Together, these results show that catch-effort relationships may vary with time scale, region, and recent system history, highlighting the importance of accounting for state-dependent, nonlinear dynamics in fisheries analyses. Incorporating nonlinear approaches such as EDM may improve interpretation of catch-effort relationships and support more robust fisheries management under changing environmental conditions.

Marta Venier[1], Chunjie Xia[1], Traci Greenberg[2], Staci Capozzi[1] and Daryl McGoldrick[2], [1]Indiana University, [2]environment climate change canada. **PFAS in the Atmosphere: Sources, Fate, and Transport.**

Per- and polyfluoroalkyl substances (PFAS) are increasingly recognized as global contaminants with both ionic and neutral compounds present in the atmosphere. As part of the Integrated Atmospheric Deposition Network (IADN), precipitation (n = 207) and air (n = 60) samples were collected from five sites across the Great Lakes basin between 2021 and 2023 and analyzed for 41 PFAS. Median ∑41PFAS concentrations in precipitation ranged from 2.4 to 4.5 ng L-1, while air concentrations ranged from 146 pg m-3 at Sleeping Bear Dunes to 410 pg m-3 in Cleveland, emphasizing the influence of both regional and local sources. Mass budget analysis of PFBA, PFBS, PFOA, and PFOS revealed that atmospheric deposition is a dominant pathway of PFAS inputs to the upper Great Lakes, particularly Lake Superior, where deposition accounted for more than 90% of inputs for PFBA. Net transfer estimates indicated that Lakes Superior, Michigan, and Huron are generally accumulating PFAS, whereas Lakes Erie and Ontario are approaching steady state or acting as net exporters. These results highlight the important role of atmospheric deposition in PFAS cycling within the Great Lakes and underscore the importance of continued monitoring.

Clare Venney, University of Alberta. **Epigenomics as a tool for salmonid conservation.**

Many salmonids are in decline worldwide, with declines exacerbated by human activity, nonnative species, and climate change. Population declines are being fought through conservation and supplementation efforts, including the use of captive rearing for stocking and supplementation. This often involves spawning adult fish in a hatchery and rearing their offspring in captivity for a few months. Despite the short duration of captivity, it can lead to altered phenotypes and considerable reductions in fitness and reproductive success in the wild without substantial genetic changes between captive and wild fish. Epigenomic mechanisms, such as DNA methylation, can affect phenotype through heritable changes in gene regulation without a change in DNA sequence. DNA methylation is affected by captive rearing and may serve as the molecular mechanism driving phenotypic changes associated with captive rearing. Here I will provide a perspective on the utility of epigenomics in captive rearing, highlighting the ongoing and future work on at-risk trout species that has become the focus of my new research group. The field of epigenomics offers fresh perspectives on the underlying mechanism and potential heritability of trait variation introduced via captive rearing. It also offers new research avenues and tools for salmonid conservation, including the development of nonlethal epigenomic biomarkers. This research will provide new insights into how salmonids respond to captivity through epigenomic mechanisms, and how epigenomic toolkits can inform on species resilience and recovery.

Paul Venturelli[1], Josh Hrabowski[1], Sandy Clark-Kolaks[2] and Drew Holloway[3], [1]Ball State University, [2]Indiana Department of Natural Resources, [3]Muncie Bureau of Water Quality.
Minimum sample sizes and conversion factors for turning cheap app data into expensive creel metrics.

Creel surveys provide important information, but are expensive to conduct. This limits creel survey location and frequency. Recent studies have shown that app data can produce similar metrics as creel surveys, potentially paving the way for app-based monitoring when and where creels are not being conducted. However, most of these studies involve a single fishery at a specific time, which limits our ability to apply results in novel contexts or form general conclusions. In this study, we identified hundreds of creel surveys from across the United States that coincided with a minimum number of catch records that were logged within a popular fishing app. We then compared metrics from the creel surveys to app-based proxies from the same time frame. Our results identify metrics that can be reliably derived from app data (e.g., species-specific catch), and the minimum sample size at which the app data are likely to provide a reasonable approximation for a given metric (e.g., 1 catch or user/km^2/month). When we applied these metrics to app data in the United States, it revealed thousands of additional lakes and years that have been "creeled." This work contributes to efforts to use apps and other sources of digital data to address knowledge gaps by supplementing current monitoring efforts in both space and time.

Rolf Vinebrooke, Bradley Garnett-Boyer, Jenna Cook and Renz Layugan, Centre for Interdisciplinary Science, University of Alberta. **Are multiple stressors weakening or strengthening stress-tolerance in aquatic communities?**

How species stress responses are correlated may provide insights into the cumulative impacts of multiple stressors on their communities. Negatively correlated species responses highlight the potential for one stressor to weaken the tolerance of a community against the other stressor. In contrast, species responses that show positive correlation point to one stressor inducing greater community tolerance. Yet, seldom investigated is correlation of species responses to stressor combinations. We hypothesized that positively correlated species stress responses are most common given meta-analytical evidence of the prevalence of less-than-additive cumulative impacts of multiple stressors on aquatic communities. The hypothesis was tested by correlating species responses and changes in aggregate community properties in global change experiments involving two or more stressor treatments. Our results suggest that positive correlation of highly diverse species responses enables communities to respond antagonistically against paired stressors.

Natalija Vojno, Our Shared Futures, Our Living Waters, Shared Path Consultation Initiative.
Watershed Circles: Co-creating knowledge through traditional teachings and dialogue.

This presentation shares a place-based, relationship-centered practice for co-creating freshwater knowledge through public dialogue circles held within the Humber River Watershed in Treaty 13 territory. At its core, the approach applies the non-hierarchical nature of the circle as a space for integrating local stories, embodied experiences, Indigenous teachings, and science about local waterbodies.Co-delivered with urban Indigenous partners, the circles were opened through ceremony and traditional teachings. In this way Indigenous and non-Indigenous peoples from diverse communities learn from each other and conservation experts about the state of their watershed. By meeting adjacent to the river and reflecting on their relationship with it, participants were invited to become part of "the system seeing itself" through challenges like climate change into a desired future. The circle format enabled Indigenous and non-Indigenous participants—alongside conservation experts—to engage across diverse knowledge traditions without hierarchy, cultivating

humility and shared responsibility. The facilitation encouraged participants to identify common values and initiatives for protecting and restoring their local watershed. The design was intended to enable more informed and sustainable decisions while also building a shared sense of community and a watershed identity. This approach moves beyond generic environmental awareness toward a place-based model of civic engagement and collaborative governance. It offers insights for scientists, communicators, and practitioners seeking to integrate multiple ways of knowing and strengthen data uptake through relationships for inclusive freshwater decision-making.

Kate Vonderbank and Gail Davoren, University of Manitoba. **Trophic ecology of sympatric jellyfish species in the coastal summer food web in Newfoundland, Canada.**

Marine food webs are characterized by many species present at the bottom (phytoplankton and zooplankton) and top (e.g., seabirds, large fish, whales) of the food web but few in the middle. Middle species typically include forage fish, which are essential for linking components of marine food webs, but may also include gelatinous zooplankton, or jellyfish. Human-induced changes, such as climate change and overfishing, are causing a higher occurrence of jellyfish blooms (high abundances) globally. The trophic ecology of jellyfish species is not well known and, thus, multiple species are often lumped into one functional group, ignoring potential trophic variation. We aimed to investigate the trophic ecology of three sympatric jellyfish species (Cyanea capillata, Aurelia aurita, Bolinopsis infundibulum) in coastal Newfoundland, Canada during the summer using stable isotope ratios of carbon ($\delta^{13}C$) and nitrogen ($\delta^{15}N$). Analyses will determine whether all species consume similar prey types (isotopic niche overlap) or consume a similar variety of prey types (isotopic niche breadth) and whether these metrics vary with jellyfish size. Overall, determining the trophic position of each jellyfish species in this coastal summer food web will also allow estimates of species-specific trophic roles in the food web to help understand the implications of jellyfish abundance increases on the long-term sustainability of fisheries yields and productivity of this Canadian marine ecosystem under a changing ocean climate.

Patricia Voyer[1], Daniel Heath[1], Olivier Morissette[2], Tim Johnson[3], Matthew Yates[1] and Jonathon LeBlanc[1], [1]University of Windsor, [2]Université du Québec à Chicoutimi, [3]Ontario Ministry of Natural Resources and Forestry. **Gene transcription profile variation among yellow perch (Perca flavescens) across thermal gradients at local and regional spatial scales.**

Climate change is projected to raise average ocean temperatures by approximately 1-4°C by the end of the century. Despite extensive research on marine environments, comparatively less attention has been given to freshwater systems, including Ontario's inland lakes, which remain highly vulnerable to increasing temperatures. As the first step in initiating a gene expression response to environmental stressors, gene transcription variation can provide insight into how fish are coping with rising water temperatures in their natural environments. Here, we characterized variation in gene transcription profiles among wild yellow perch (Perca flavescens) populations across temperature gradients (18-26°C) at a local scale (Bay of Quinte) and at a larger regional scale encompassing 14 lakes spanning southern to northern Ontario. Using the GEN-FISH Perciformes Stress Transcriptional Profiling (STP) qPCR chip, we quantified relative transcription of 25 genes associated with hypoxia and metabolism, detoxification, thermal and general stress response, and immune function. Results suggest that fish sampled along both spatial scales exhibited coordinated patterns of gene transcription indicative of adaptive responses, with implications for the roles of phenotypic plasticity and flexibility in response to climate change. While climate change is affecting freshwater ecosystem health and function, the thermal impact in our study systems is not yet

substantial. Our results contribute to ongoing efforts to quantify how yellow perch respond to continued warming as climate change progresses.

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Zayd Walid and William Shuster, Wayne State University. **Urban Groundwater Monitoring Under Contrasting Sewer Pipe Condition and Proximity to the Detroit River.**

Despite its importance in the hydrologic cycle, urban groundwater is understudied due to a combination of complexity in monitoring infrastructure, poor coverage of urbanized areas with monitoring wells, and an overall lack of data records of any substantial length. We monitored groundwater levels in two sewersheds of the Detroit combined sewer system that contrast in at least two ways: 1) One site is closer to the Detroit River (Newport - Jefferson Chalmers), and the other is farther away (Elgin-City Airport); then 2) The former pipe system is lined, and the latter site is not and subject to leaks. Within each sewershed, we placed monitoring wells adjacent to the sewer pipe, and then several meters away in a parcel location. After three years of monitoring, our results indicate that groundwater level data from both sewersheds are independent of Detroit River stage; well levels adjacent to the sealed pipe are more dynamic than those for the leaky pipe; and parcel wells reflect seasonal patterns in losses (e.g., the senescent season groundwater levels are shallower than during the growing season). As for sensitivity of groundwater dynamics with proximity to the river, we have single, unnested wells at each location, our weekly and sometimes less-frequent measurement intervals are likely missing sub-diurnal dynamics, and subsurface engineering in the coastal eastside of Detroit may isolate the near inland groundwater from the fluctuating stage of the Detroit River.

Wojciech Walkusz, **Samantha Fulton**, Krista Kenyon and Sheila Atchison, Fisheries and Oceans, Canada. **Ecosystem Approach to Fisheries Management in the Canadian Arctic shrimp fisheries.**

Fisheries and Oceans Canada (DFO) aims at implementing the Ecosystem Approach to Fisheries Management (EAFM) in all fisheries managed by the DFO. Some of these fisheries are located in the Arctic, which presents the opportunities to improve on the currently used approaches and, at the same time, has challenges due its remote location and lack of appropriate information. One of the examples of this scenario is in the Pandalid shrimp fishery in the Hudson/Davis Strait complex. There, a commercially important shrimp stock is harvested annually; however, limited environmental data available (very short time series) makes their incorporation into a shrimp stock assessment model very challenging. This presentation will provide an overview of the history of the stock, approaches to gather appropriate habitat information, and challenges associated with implementing the EAFM in the Arctic.

Alex Walmsley[1], Paul Blanchfield[2], Cindy Chu[2], Anna-Maija Laflamme[2], William Richmond[2] and Cam Stevens[3], [1]Queen's University, [2]Fisheries and Oceans Canada, [3]ERM. **Habitat, dietary, and isotopic niches of fishes in a dewatered subarctic lake.**

Intensifying mineral development and climatic change are driving an increased need to understand ecosystem function in subarctic lakes. These systems are understudied relative to southern lakes, yet fish-habitat associations and trophic relationships are frequently inferred from lower-latitude data. These inferences can introduce uncertainty when assessing and compensating for impacts of projects requiring Fisheries Act authorizations. Fish-outs associated with northern

lake dewatering projects provide rare opportunities to intensively study how fishes relate to one another and their ecosystems. Llama Lake, Nunavut, is a small headwater lake representative of other lakes previously dewatered for mining. The system supported six fish species that were all targeted during a 2023 total removal effort prior to drainage in 2025. Complete demographic, spatial, and morphological data for captured fish were combined with bathymetric surveys and high-resolution aerial imagery to build habitat association models across life stages. Stable isotope signatures from a sample of fishes and dominant invertebrates supported multi-dimensional analysis of niche partitioning and energy flow, while stomach content analysis provided additional insight into prey choice and feeding strategy. Preliminary results indicate a strong reliance on nearshore and benthic resources across trophic levels even during the period of maximum thermal stratification. By combining multiple methodologies in a single system, our project improves understanding of ecosystem function in subarctic lakes, providing local data to inform habitat compensation projects for similar systems in the region.

Julianna Wanke[1], Madeline Stanley[2], Lauren Timlick[2] and Vince Palace[1, 2], [1]University of Manitoba, [2]IISD-Experimental Lakes Area. **Effects of Water and Competition Stress on the Growth of Two Varieties of Wild Rice (Manoomin).**

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.

Charlotte Ward, Timothy Fernandes and Kevin McCann, University of Guelph. **Seasonal Hotspots of Vulnerability in Freshwater Ecosystems.**

Food webs are dynamic systems in which species continually adjust their behaviour and spatial distribution in response to environmental variation through time. In seasonally variable freshwater ecosystems, fish track changes in resource availability and habitat suitability, often leading to predictable periods of spatial aggregation as individuals and populations concentrate in habitats that reduce physiological stress or enhance foraging opportunities. These seasonal aggregations create trophic hotspots whose location and intensity vary across the annual cycle. While aggregation reflects an important component of species' ability to behaviourally adapt to changing conditions, it may also increase vulnerability to disturbance by concentrating populations and interactions into limited areas of the landscape. Here, we draw on examples across freshwater ecosystems and species to demonstrate how aggregation varies through time and space, and how such variation corresponds to changing environmental constraints. By illustrating the dynamic nature of trophic hotspots, we

highlight periods when fish and the food webs they support may be disproportionately exposed to anthropogenic pressures, including fishing, habitat alteration, and climate-driven stressors. We argue that understanding how aggregation varies across seasons is critical for identifying when and where vulnerability is greatest, and for developing management strategies that account for the dynamic nature of lake ecosystems.

Jamie Ward, Jonathan Waddell, Timothy J. Calappi, Jonathan Dephillips and Matthew McClerren, United States Army Corps of Engineers - Detroit District. **Using seasonal buoy observations to characterize warm-season Lake St. Clair over-lake evaporation.**

Although Lake St. Clair is part of the Laurentian Great Lake system, it is not technically a Great Lake. However, Lake St. Clair's water supply impacts flows between the upper and lower lakes. In the 2010s, the downstream discharge gage on the Detroit River measured less flow than the upstream St. Clair River. This unusual flow anomaly was represented in the monthly average. Coupled with a lack of corresponding water level response, this discrepancy highlights a critical gap in our understanding of the Lake St. Clair water balance. Reducing uncertainty in its water balance components, particularly over-lake evaporation, is essential for accurate basin-wide water management. Over-lake evaporation is arguably the most uncertain of all Lake St. Clair water supply components because near-shore observation stations are sparse. To better constrain Lake St. Clair's over-lake evaporation, two buoys were deployed at deep and shallow water locations in U.S. waters during the 2022-2024 warm seasons. After validating meteorological, thermal, and energy flux buoy observations, we calculated daily and monthly over-lake evaporation at each buoy location. Overall, we found that lake surface temperatures, air temperatures, and wind speeds agreed well with validation data. However, precipitation was likely overestimated because of wave action-caused interference with onboard precipitation sensors. In addition to buoy performance, we will also present preliminary over-lake evaporation estimates derived using the buoy data and numerous evaporation calculation techniques.

Sarah Warrack and Nora Casson, University of Winnipeg. **Forecasting Interannual Phosphorus Variability and Algal Bloom Potential in five Urban Lakes, FortWhyte Alive, Winnipeg, Manitoba.**

Urban lakes are permanent or semi-permanent water bodies within urban environments that provide stormwater retention, flood control, and recreational or aesthetic functions. They experience anthropogenic pressures, including urban pollution, nutrient loading, managed hydrology, dense waterfowl populations, and extensive impervious land cover. These pressures differ from those affecting natural lakes, which are influenced by land-use change, climate variability, agricultural runoff, and typically maintain higher ecological integrity. Management strategies developed for natural lakes may be ineffective in these highly altered systems. FortWhyte Alive, located on the outskirts of Winnipeg, contains five lakes that are remnants of exhausted clay quarries. These lakes have no natural outflow and have experienced decades of nutrient accumulation from watershed runoff and seasonal fecal inputs from thousands of staging waterfowl. Consequently, the lakes exhibit recurrent algal blooms, oxygen depletion, and fish kills, requiring year-round aeration. Despite aeration reducing phosphorus concentrations, substantial interannual variability in surface water phosphorus persists. This study uses long-term monitoring data to quantify interannual variability in surface phosphorus concentrations (0.0347-1.56 mg/L) and identify its primary environmental drivers. We integrate surface phosphorus, chlorophyll-a, and local climate data to assess seasonal and interannual nutrient dynamics using generalized linear models. By identifying key drivers of phosphorus variability, this work aims to support adaptive lake management at FortWhyte

Alive and inform nutrient management in small, closed-basin, urban-impacted lakes experiencing chronic eutrophication under a changing climate.

Doug Watkinson, Robert Barrett, Travis Durhack and Lee Gutowsky, Fisheries and Oceans Canada. **The Milk River: Fish community response to extreme flow changes in a Great Plains ecosystem.**

The Milk River is a Great Plains stream and a direct tributary to the Missouri River, making it part of the only drainage in Canada to flow into the Gulf of Mexico. This unique geography supports a distinctive fish fauna to Canadian waters. Since the early 20th century, the river has undergone substantial flow changes and species introductions due to the flow diversion from the South Saskatchewan River watershed into the Missouri River watershed for irrigation in Montana, USA. This modified flow regime has persisted for over 100 years, altering the available habitat and shaping the current fish community. In 2020 and 2024, catastrophic infrastructure failures halted diversion, resulting in zero flow for most of the 2020, 2024, and 2025 growing seasons. As part of their standardized sampling protocols to assess four Species at Risk, Fisheries and Oceans Canada sampled fish populations in the Milk River during periods of normal water diversion and complete flow loss. Sampling has detected sharp declines in fish abundance, contraction of species ranges, shifts in population size structure, and strong associations between seasonal flow availability and recruitment. Continued monitoring is underway to determine the fish community response to increased flows. This work highlights the critical value of consistent, long-term standardized field sampling for detecting before-and-after ecological responses to human-driven hydrological disruptions.

Meredith Watson, Lake Huron Coastal Centre. **Community science, education, and action to fight plastic pollution in Lake Huron.**

Lake Huron's natural beauty draws countless vacationers each year, significantly boosting local coastal economies. However, the influx of visitors during peak seasons leads to increased plastic debris on our beaches and in the lake itself. At the Lake Huron Coastal Centre (LHCC), we aim to connect shoreline communities and facilitate coastal conservation, education, and research projects. In 2025, we mobilized the community to clean up Lake Huron beaches, educating local organizations and community members on plastic pollution. During beach clean-ups, volunteers recorded items removed, collecting community science data on types of litter found on Lake Huron beaches. 630 volunteers showed up across 12 beach clean-up events that ranged from Sarnia to the Bruce Peninsula, removing 1,200 lbs of garbage from the shoreline. Small items (cigarette butts, plastic fragments) were the most common, with over 7,000 items removed. Thousands of nurdles were identified and removed in Kincardine, ON with hundreds observed in Grand Bend, ON. Interestingly, we observed lower numbers of single-use plastics in comparison to past years, potentially due to federal regulations on single-use plastics. This community science and engagement initiative provides valuable information to inform research and plastic pollution prevention initiatives on Lake Huron. Findings by the LHCC suggest that increased plastic pollution prevention measures and large-scale policy change are required in addition to community action and education.

Joel Weber, Founder & CEO. **Lakewater Nutrient Capture; Our journey from an idea to a building a business.**

At Lakewater Nutrient Capture, we are building a service that provides communities the ability to quickly implement and directly remove excess phosphorus from their lakes and rivers. We provide an effective alternative to replace traditional treatments, using nano iron-oxyhydroxide as an

interim or long-term solution. We are filtering the water much like you do at home with a simple furnace air filter but on a larger scale. At the heart of the concept is to keep things simple, elegant in design that produces direct and tangible results. Building a business and being an entrepreneur is difficult and challenging despite all the fanfare requiring dedication and grit. Join me as I share more about the journey of building Lakewater Nutrient Capture from a simple concept to securing our first customers. I will discuss how I came up with the concept and identified the gap in the market. Joining our local business incubator, North Forge, to validate the business model and the importance of getting plugged into the entrepreneurial community. I will share about our success and challenges that forced us to pivot our strategy. Building our minimal viable product and securing a customer fit with our early adopter customers. I hope that by sharing our journey, I can inspire other entrepreneurs to tackle the daunting challenges we face with our waterways.

Thiranya Weerakoon and Catherine Febria, University of Windsor. **Assessing stream habitats that support Unionid Species at Risk: Insights for Land-based stewardship.**

Habitat stewardship plays a pivotal role in protecting Canada's threatened freshwater aquatic species. However, the effectiveness of these actions in safeguarding these habitats is not well understood. North American freshwater mussels (Bivalvia, Unionidae) are among the most at-risk benthic macroinvertebrates, and their sessile, filter-feeding nature makes them reliable indicators of ecosystem health. The Sydenham River watershed, comprising the North and East branches, supports Canada's highest diversity of freshwater mussels, including multiple species at risk (SAR). This study evaluated how stream habitat characteristics shape unionid assemblages and how these findings inform existing and future stewardship measures. Stream habitat characteristics were quantified across ten sites— substrate composition, riparian vegetation, and water quality parameters were measured. We found that coarse sand was the dominant substrate type in this watershed, with higher proportions observed in the North branch compared to the East branch. Riparian vegetation composition varied among sites, with no single vegetation type dominating either branch. Unionid SAR were strongly associated with gravel substrate and graminoid-dominated riparian vegetation, whereas non-SAR species occupied a broader range of in-stream substrate and vegetation conditions. Land-based stewardship prioritizes restoring in-stream conditions, particularly gravel substrate, while considering riparian vegetation and water quality parameters, can more effectively support unionid species at risk in this watershed.

Yashodha Charuni Weerasekara and Nora J. Casson, university of winnipeg. **Influence of dissolved organic matter on snowmelt phosphorus loss from agricultural soils, Red River Basin.**

Eutrophication of aquatic ecosystems has become a significant water quality concern across the Canadian Prairies, particularly in Lake Winnipeg. Over-enrichment of surface water with phosphorus (P) mobilized through spring snowmelt runoff from agricultural soils in the Red River Basin is a major driver of Lake Winnipeg eutrophication. Soil dissolved organic matter (DOM) directly influences soil P availability through competition for mineral sorption sites and modification of soil physicochemical properties. The dynamics of DOM are influenced by source quality, land use and management practices, and environmental factors. This research explores how variability in DOM quality in soil, with respect to land use, cropping systems, manure application practices, topography, soil type, texture, pH, and organic matter content influences P mobilization from agricultural fields during snowmelt in the Red River Basin, south of Winnipeg. Absorbance and fluorescence indices of DOM and dissolved reactive phosphorus (DRP) will be analysed in soils collected from 117 agricultural fields across this region. Landscape and soil properties of each site

will be documented through landowner interviews and provincial databases. Statistical analyses will characterize relationships between landscape variables, DRP concentrations, and DOM quality indices. The research outcomes will help us understand interactions between soil organic matter properties and the risk of P loss during snowmelt. Furthermore, it will help to identify high-risk areas within the Red River Basin where management interventions could most effectively reduce P export during snowmelt.

John Wells[1], Ernst Uzhansky[2] and Naokazu Taniguchi[3], [1]Ritsumeikan University, [2]Naval Postgraduate School, Montery CA, [3]Hiroshima University. **An Acoustic Tomography Experiment in a Stratified Lake at Super-kilometer Ranges.**

We present results of an acoustic tomography experiment conducted in a stratified lake, the first such experiment reported for super-kilometer ranges. In late November 2018, five near-bottom transducers were deployed at bottom depths ranging from 9 to 68 meters in the North Basin of Lake Biwa, Japan, with horizontal separations between the transducer pairs ranging from 6.6 to 15.2 kilometers. Over a period of 13 days, the transducers performed quasi-simultaneous reciprocal transmissions every ten minutes, using 11-bit maximum length quasi-random sequences modulating a 5 kHz carrier frequency. Observed arrival time evolution, and ray tracing simulations, support the identification of two distinct patterns in the recorded signals: an early group predominantly traversing the warm epilimnion, and a later group propagating through the colder hypolimnion. Analysis of travel time nonreciprocity focused on the two stations, separated by 6.6 km, that communicated reciprocally for the entire 13 days. After a wind-induced excitation, the early and late arrival groups yielded an anticorrelation in their respective travel time nonreciprocities. Considering the same transect, we report the first application of the Matched Nonreciprocity Method to quantify current-induced nonreciprocity in transmission. Previously tested only with synthetic data, this method yielded plausible estimates of depth-averaged current between the two transducers.

Brittany Welsh[1], Erin Bennett[1], Andrew Paterson[2], Huaxia Yao[2], Ken Drouillard[3] and Julian Aherne[1], [1]Trent University, [2]Ministry of the Environment, Conservation and Parks, Dorset Environmental Science Centre, [3]University of Windsor. **Microplastic pools and fluxes in a rural headwater lake catchment.**

As microplastics permeate ecosystems worldwide, scientific efforts have increasingly focused on characterizing the microplastic cycle by identifying its sources, sinks, and environmental fate. Yet, field-based assessments quantifying microplastics at the catchment scale remain scarce. We investigated the distribution of microplastics (mp) in a rural headwater lake in Huntsville, Canada, over 15 months, measuring pools (soil, sediment, snow, ice, lake water) and fluxes (inflows, outflow, sedimentation, atmospheric deposition). Lake water was sampled monthly in ice-free seasons and under ice in winter, alongside snow, ice, and sediment cores in the lake. Atmospheric deposition was monitored bi-weekly, and stream inflows and outflow were sampled with flow-weighted frequency. Stratification and seasonal turnover shaped microplastic dynamics: concentrations peaked in the hypolimnion water during summer (20.8 ± 8.0 mp/L) and in snow and ice prior to spring melt (22.7 ± 20.2 mp/L), and were lowest in the lake water after spring melt (5.21-6.37 mp/L). Median particle deposition was highest in autumn (12.54 ± 2.09 mp/m²/d) and lowest in summer (6.40 ± 0.30 mp/m²/d), suggesting meteorological control despite non-significant seasonal differences. By quantifying microplastic pools and fluxes across ecosystem compartments, this study provides a foundation for mass-balance and residence-time estimates essential for plastic-waste management.

Our results indicate that forested lake catchments act as major sinks for microplastics, underscoring the need for catchment-scale budgets to understand their environmental fate.

Phillipe Wernette[1], Peter Esselman[2] and Anthony Geglio[3], [1]Michigan State University, RS&GIS, [2]U.S. Geological Survey, Great Lakes Science Center, [3]Michigan Technological University, Great Lakes Research Center. **Modernizing Great Lakes Nearshore Mapping with Machine Learning.**

Great Lakes benthic substrate maps consist of data of varying age and quality and updating these maps for large areas is challenging because of technological constraints and/or human resource limitations. With very large data volumes from sonar, autonomously and remotely operated vessels, and long-range autonomous collection platforms, efforts to accurately map geologic and biogenic substrates over very large areas are increasingly limited by our capacity of manually sort and interpret these growing data. A random forest model was developed to map geologic substrate in the Great Lakes at very high spatial resolution, specifically the nearshore zones of Lake Michigan, using a new 2m topobathy DEM. Thousands of lakebed images from autonomous underwater vehicles (AUVs) were classified by geologic substrate and used with the 2m nearshore DEM as training data for predicting geologic substrate across the entire Lake Michigan bathymetric DEM. Results indicate that the nearshore geologic substrate map is consistent lake-wide and is most accurate for fine, sandbar, and very coarse substrates. The model is consistent with expected results in areas beyond the training data, suggesting it is a scalable solution to updating geologic maps of the Great Lakes lakebed in an era of rapidly expanding data volume and environmental change.

Kevin J. White, University of Toronto. **Orality and Storytelling: An Experiential Class.**

During COVID, I began experimenting with a way to help students in an Introduction to Indigenous Studies course understand Orality and Storytelling as an experience. I have long struggled with the preferential treatment of textuality versus the West's understanding of Indigenous orality and storytelling. In this discussion, I will share my experiences constructing the experiential class, the anecdotal experiences and lessons learned from the students, and a way to explore how we articulate the stability of our methodologies and pragmatic practices of communally-held memories and stories. Even more, I hope this leads to new discussions within our communities of how we remember things, how we understand orality, and engage with the echoes of our ancestors who first composed these narratives as a way of transmitting our epistemologies or Knowledge Systems, our ontologies or our ways of being especially across generations, and our axiology or our communal held generationally held value systems. Woven together, our lessons lie not only in speaking, understanding, and engaging with the Indigenous languages, but necessarily, in how we experience and understand the ways of thinking and memory across generations and millennia, not merely centuries.

Michael Wilkie[1], Daniel J Hall[2], Nicholas Johnson[2] and John Hume[3], [1]Department of Biology and Laurier Institute for Water Science, Wilfrid Laurier University, [2]US Geological Survey, Great Lakes Science Center, Hammond Bay Biological Station, [3]Department of Fisheries and Wildlife, Michigan State University. **A Unique Approach to Compare Burrowing Performance Between Laboratory-Reared and Wild Larval Sea Lamprey.**

The Sea Lamprey Aquaculture Program (SLAP) aims to develop methods to rear sea lamprey (Petromyzon marinus) from embryos to adults in captivity. An important question, however, is whether the physiology and behavior of lab-reared sea lamprey is representative of their wild counterparts. The survival of larval lampreys depends on their ability to burrow into the soft,

silty sediments of streams for shelter and protection from predators. The present study compared the burrowing performance of lab-reared larval sea lamprey (LAB) to recently captured wild animals. Burrowing performance was measured using a custom "burrowing performance chamber" (BPC), designed to allow observations of key burrowing performance metrics and rapid collection of muscle samples to assess the metabolic costs of burrowing. Using the BPC, we determined that total burrowing time by wild larvae was approximately 40% faster (~11s) compared to LAB larvae, which had more frequent rest-stops during burrowing. Burrowing was also more energetically costly in LAB larvae, which experienced greater relative increase in muscle lactate (aka. lactic acid). In both groups, muscle ATP supply during burrowing was sustained by phosphocreatine, which dropped significantly in both groups, but took twice as long to restore after burrowing in LAB larvae. We conclude that the inferior burrowing performance of LAB larval sea lamprey is related to the relatively stable environment in which they live compared to the more unpredictable conditions experienced by wild larvae.

Kyle Wilson[1, 2], Alejandro Frid[1, 2, 3] and Sean Anderson[1, 4], [1]Simon Fraser University, [2]Central Coast Indigenous Resource Alliance, [3]University of Victoria, [4]Fisheries and Oceans Canada. **Groundfish with diverse life histories increase in size and abundance with proximity to spatial protections.**

Spatial protections that exclude fisheries have long been used to manage and conserve marine species. Detecting the benefits of protected areas for fish within them and for adjacent fisheries (via spillover effects) is key to informing fisheries management yet also difficult. We leveraged an extensive dataset collected over 18 years by an alliance of four Indigenous Nations in Pacific Canada. Our analyses of those data quantified the benefits of spatial fishery closures, known as Rockfish Conservation Areas (RCAs), on 28 species of groundfish occupying a wide range of distances from RCAs (inside RCAs to ≈150 km away). Overall, we found that proximity to RCAs were associated with increased body sizes and abundances of groundfish species with positive effects documented in 89% and 35% of species-RCA combinations, respectively. On average, body sizes and relative abundance increased by 1.1% and 11.0%, respectively, per 5 km-increase in RCA proximity. Variation around these average responses depended on the species' life history characteristics, RCA location, and historical impacts from commercial fishing. Additionally, the benefits of spatial protection increased with time since RCA implementation.

Nathan Wilson[1], Robert Stewart[1], Carrie E. Givens[2] and Jeanette M. Cruz[2], [1]Lakehead University, [2]United States Geological Survey. **Canary in a coal mine: increasing cyanobacteria in the headwaters of Lake Superior.**

Cyanobacteria blooms have been increasing globally. In Ontario increasing occurrences have been documented since 1994. Records of confirmed cyanobacteria bloom reports (CCBRs) in the low nutrient lakes of Lake Nipigon and Pigeon River ecoregions of Northern Ontario begin in 2019. The rising regional occurrence of cyanobacteria blooms contradicts the general assumption for lakes in the Thunder Bay region. By examining available long term monitoring data for the region and use of eDNA techniques we address the concern that cyanobacteria are increasing in quantity in these valuable Lake Superior headwater lakes.

Khyla Wiltshire-Mateer[1], Madison McCaig[2], Erik Emilson[2] and Karen Kidd[1], [1]McMaster University, [2]Natural Resources Canada, Great Lakes Forestry Centre. **Assessing effects of defoliation by spruce budworm on the gut microbiome of stream macroinvertebrates.**

Eastern spruce budworm (SBW) is an insect pest that feeds on spruce and fir trees and alters forest ecosystems through tree needle loss, reduced tree growth, tree mortality, and frass production. To investigate how these forest changes influence aquatic ecosystems, we sampled 7 streams along a gradient of SBW-mediated watershed defoliation in the Gaspésie Peninsula, Québec. Previous work demonstrated that defoliation increases terrestrial carbon inputs to streams, alters biofilm microbial communities, and shifts reliance of benthic macroinvertebrates towards terrestrial carbon sources. Here, we explored whether the SBW outbreak also affects the gut microbiome of benthic macroinvertebrates. In 2024, we collected four insect taxa (Baetidae, Chloroperlidae, Epeorus, Rhyacophila), representing three functional feeding groups, per watershed, along with samples of biofilm, leaf litter, and soil. We assessed macroinvertebrate microbiomes and potential food sources using 16S rRNA amplicon sequencing. No relationship was found between SBW defoliation and macroinvertebrate or environmental microbial alpha diversity, however, biofilm Shannon and Simpson diversity significantly increased with defoliation. Bray-Curtis ordinations and PERMANOVA revealed no significant differences in beta diversity across the defoliation gradient in all samples. Differential abundance analysis indicated that microbial genera within each sample type were consistent across sites for biofilm and macroinvertebrates, while leaf litter and soil were highly variable across sites. Overall, these finding indicate that macroinvertebrate microbiomes remain remarkably stable across SBW-induced forest disturbance, underscoring their resilience despite pronounced changes in the watershed.

Nicole Wood, IAGLR. **Bots, Bias, & Bull: Fighting Misinformation with AI-Powered Science Communication.**

Over the past several years, science has faced significant challenges in communicating scientific information due to widespread misinformation that is overshadowing factual, evidence-based information from qualified professionals. Misinformation has led individuals to make decisions based on false information, resulting in negative outcomes for themselves and those around them. Scientific organizations need to develop pathways using the data-driven tools of science communication to guide preventative measures and countermeasures to help empower individuals and communities to protect themselves from the negative impacts of misinformation. As funding from science organizations is rolled back, limiting resources to provide robust science communication campaigns to protect the people they serve, organizations may be able to greatly benefit from the capacity building AI can provide. This talk will help walk science communication professionals through various AI tools, their applications, and the ethics and best practices of using AI in science communication.

Patricia Wood and Ben Waswa, York University. **Lake Nipigon as Communication, Transportation & Political Infrastructure under Extractivist Colonialism.**

This paper is part of a larger project in partnership with the Biinjitiwaabik Zaaging Aniishnaabek First Nation that seeks to contextualize water quality issues on Lake Nipigon. Through infrastructure that re-engineered the watershed, such as the Ogoki Diversion project, Lake Nipigon has been harnessed physically and discursively for extractivist-colonial "nation-building" projects, particularly in relation to management of the Great Lakes. The impact on the water levels, water quality, and animal and plant life of the lake had further impacts on the Indigenous peoples living in the region. Here we present the preliminary findings of a study of the overtaking of river systems (like the Nipigon River) as modes of communication prior to the severing of direct connection through damming. The arrival of steam power (ship and train) preceded hydroelectric damming and shaped both the state's and the popular imagining of Lake Nipigon as "a national

resource." Drawing on a wide variety of archival sources as well as oral history, we document the impacts, both economic and social, on Indigenous lives.

Kathleen Woodhouse[1] and Trevor Pitcher[1,2], [1]Great Lakes Institute for Environmental Research, University of Windsor, [2]Department of Integrative Biology, University of Windsor. **Determining the effects of post-activation sperm aging on offspring fitness of the Chinook salmon.**

Captive rearing has a long history of producing low fitness offspring (compared to their wild counterparts). In fish, this can be detrimental to wild populations that are reliant on stocking from hatcheries. The aim of this study is to determine if certain factors influence offspring quality so that hatchery practices can be enhanced to better improve survival in the wild. We sought to examine whether post-activation aging of the sperm influences offspring quality in the externally fertilizing Chinook Salmon (Oncorhynchus tshawystcha). During fertilization, sperm is "activated" through a change in environment (i.e. exposure to river water), signaling the expenditure of its limited energy for fertilization. Ovarian fluid is a natural fluid released with the female's eggs that is seldom used in hatchery practices despite being a natural part of fertilization in the wild. We will be analyzing fertilization success and quality of offspring fertilized with sperm subjected to a post-activation time delay of 0, 30, and 60 seconds, both with and without the presence of ovarian fluid. Furthermore, we will be using sperm from both large dominant Hooknose males and precocious small Jack males (alternative reproductive tactics). We will be analyzing fertilization and hatching success in addition to offspring fitness related metrics, including mass, length, and condition. Current outcomes are unknown, but we will be discussing initial patterns and data.

Chin Wu and Joshua Anderson, University of Wisconsin-Madison. **Complex Wave Climate in the Apostle Islands, Lake Superior by Water Information for a Safe Coast (WISC) Watch Network.**

Complex wave climate around the Apostle Islands, Lake Superior, can be formed by rapidly moving storms with wave diffraction, refraction, focusing, and reflection to create unexpected dangerous rogue waves on one side of islands and wave sheltering to yield calm wave conditions on the other side of islands. To provide boaters and park managers with dynamic water information, a real-time wave buoy system, named the Water Information for a Safe Coast (WISC)-Watch network, was developed and implemented since 2021 by a joint effort among many collaborators and partners, including local communities, regional and federal agencies, and researchers. With the valuable dataset, occurrences of extreme waves around the archipelago are characterized. Furthermore, rogue wave characteristics like occurrence conditions, wave profiles, and spectral bandwidths are examined. In this talk, we will show unsteadiness and spatial variations of the complex wave climate around the Apostle Islands, Lake Superior.

Feixiang Wu[1], Mee-Mann Chang[1], Philippe Janvier[2] and Chi Zhang[1], [1]Institute of Vertebrate Paleontology and Paleoanthropology, Chinese Academy of Sciences, Beijing 100044, China, [2]Museum National d'Histoire Naturelle, UMR 7207, CP38, 8, rue Buffon 75231, Paris Cedex 05, France. **Bridging the Gap: the 'modernization' of the morphology and ecology of Jurassic and Cretaceous lampreys.**

Lampreys represent one of the longest-lived vertebrate groups. Modern lampreys are intriguing for their feeding behavior via the toothed suctorial disc and life cycle comprising the ammocoete, metamorphic, and adult stages. They left a meager fossil record and the evolutionary history remains elusive. Lampreys were supposedly conservative in their morphology and feeding ecology throughout their history, however, based on numerous superbly preserved lampreys from

the Jurassic and Cretaceous fossil Lagerstätten, Yanliao Biota and Jehol Biota of North China, recent studies suggest that lampreys might have underwent radical changes in the body size, feeding system and life history strategy during the Jurassic period, which bridged the gap between the Paleozoic ones and their recent relatives and paved the way for the origin for modern lampreys. These stem lampreys recalibrated the petromyzontiform timetree and show that the evolutionary increase of lampreys' body size accompanied the establishment of the modern-type three-phased life cycle, which was likely triggered by the concurrent evolutionary thinning of the body cover (scales) of their most significant piscine hosts in the Early Jurassic. Additionally, the reorganized interrelationships of modern lamprey lineages suggest: (1) modern lampreys were ancestrally flesh eaters rather than blood feeders; (2) they probably originated in the Southern Hemisphere during the Late Cretaceous, which surely challenged the conventional wisdom of their origination in the Northern Hemisphere where currently hosts more than 80% diversity of living lampreys.

Y

Isabelle Yakmission[1], Jessie Ogden[1], Lauren Teller[1], Brennan Richards[2], Erin Wieler[2] and Margaret Docker[1], [1]University of Manitoba, [2]Manitoba Métis Federation. **The use of eDNA techniques in conservation of Mapleleaf Mussel (Quadrula quadrula) in Manitoba.**

The Mapleleaf Mussel (Quadrula quadrula) inhabits freshwater benthic habitats and, in Manitoba, is part of the Saskatchewan - Nelson Rivers population, which was assessed as Threatened by COSEWIC in 2016. Habitat quality is declining due to urban, agricultural, and industrial pollution, as well as the arrival and establishment of invasive Zebra Mussels in 2013, which disrupt the species' ability to feed. The species was assessed as Endangered in 2006; however, increased sampling efforts prior to the 2016 assessment revealed previously unknown locations, and some additional new records since 2016 suggest it may be more widely distributed than previously understood. Through funding from DFO's Species at Risk Program and the Aboriginal Fund for Species at Risk, we used a published probe-based environmental DNA (eDNA) assay targeting a 99-bp fragment of the COI gene (developed and tested in the Ontario portion of species' range by Currier et al. 2018, Aquat Conserv Mar Freshw Ecosyst 28: 545-558) to map Mapleleaf Mussel distribution in southern Manitoba. Fifty-six sites were sampled in 2025, including positive control sites where the species is known to occur, as well as potential range extension sites (e.g., Qu'Appelle, Souris, Berens, and Pigeon rivers). We found positive detections at some of the range extension sites, flagging these locations for follow-up capture-based sampling. This distributional information will help inform COSEWIC decisions when the species is next scheduled for reassessment.

Zhe Yang[1], Scott Grant[1], Trevor Avery[2] and Rioghnach Steiner[3], [1]Centre for Sustainable Aquatic Resources, Fisheries and Marine Institute, Memorial University of Newfoundland, St. John's, NL, Canada, [2]Departments of Biology and Mathematics & Statistics, Acadia University, Wolfville, NS, Canada, [3]Qikiqtaaluk Corporation, Paradise, NL, Canada. **Biological metrics for new emerging Iceland scallop fishery in the sub-Arctic.**

Iceland scallop (Chlamys islandica) in the Sanikiluaq region of Nunavut is an important natural source of protein and recently there has been interest in small scale commercial development. In a rapidly changing Arctic environment, it is important to provide baseline information on life history traits that could be affected by both harvesting and climate change. This study provides novel biological references points on size at 50% maturity (SH_{50}) and growth parameters of Iceland scallop in the Sanikiluaq region. Size at 50% maturity was examined using

histological techniques to determine developmental stages and by applying logistic regression to estimate SH_{50}. Growth parameters were derived using von Bertalanffy growth models (VBGM) fitted to shell height and age data collected from growth marks on the hinge plate. Results indicated SH_{50} was 42.4 mm for females and 29.1 mm for males. The VBGM revealed regionally specific growth patterns between two study areas separated by approximately 34 km: SA1 and SA2. The scallop growth coefficient in SA1 (K = 0.208) was lower than SA2 (K = 0.219). Further, time required to reach a shell height of 60 mm and 70 mm was 8.4 and 13.8 years in SA1 and 5.9 and 8.3 years in SA2. The shell height-round weight relationship revealed that scallop from the two study areas exhibited negative allometric growth, indicating weight increased slower than shell height.

Zhe Yang[1], Scott Grant[1] and Kevin Hedges[2], [1]Centre for Sustainable Aquatic Resources, Fisheries and Marine Institute, Memorial University of Newfoundland, St. John's, NL, Canada., [2]Arctic Fisheries and Marine Mammal Science Division, Arctic Region, Fisheries and Oceans Canada, Government of Canada. **Trophic interactions in Sanikiluaq scallop beds using video and stable isotope analysis.**

Understanding predator-prey interactions is an essential component of ecosystem-based fisheries management in data-limited sub-Arctic. To better understand natural sources of mortality, this study provides trophic relationships between Iceland scallop (Chlamys islandica) and predatory asteroids in the Sanikiluaq region of Nunavut. Underwater towed video surveys and stable isotope analysis (SIA) were used to characterize predator-prey interactions. The target predator species were polar star (Leptasterias polaris), common sun star (Crossaster papposus), purple sun star (Solaster endeca), and toad crabs (Hya coarctatus). Tissues used in SIA included adductor muscle, tube feet, and claw adductor muscle from scallops, asteroids, and toad crabs, respectively. Video analysis indicated the polar star was the most frequently observed asteroids on scallop beds. Moreover, polar stars and toad crabs were observed preying on scallops. Stable isotope analysis indicated the common sun star had the highest Δ15N and was considered the top predator among the species examined. The higher Δ15N and broader Δ13C values of the polar star and common sun stars were indicative of shared similar carbon sources and consumption of a wide range of prey species. These results indicate that asteroids and toad crabs feed opportunistically on scallops. This baseline information can inform ecosystem-based management by identifying key predators, evaluating natural mortality related to predation, and providing isotopic baselines for future reference.

Xuexing Yao[1], Dennis Otieno[1], Qiudi Geng[1], R. Michael McKay[1] and Opeyemi U. Lawal[1, 2], [1]1. Great Lakes Institute for Environmental Research, University of Windsor, Ontario, Canada, [2]2. School of the Environment, University of Windsor, Ontario, Canada N9P 3P4. **Seasonal water-quality in a Great Lakes Connecting Channel from a One Health perspective.**

The Huron-Erie corridor receives the cumulative effluent of >20 wastewater treatment plants in Canada and the US. The connecting waters of this corridor can transport wastewater-associated pathogens and antimicrobial-resistance (AMR) genes thus impacting the beneficial uses of these waters, including recreation, potable water and ecosystem health. These signals are episodic and require hydrologic and biogeochemical context at appropriate temporal resolution. We conducted weekly (February-December 2025) monitoring of composite water samples across nearshore and offshore Detroit River sites, pairing molecular assays (RT-qPCR) with concurrent water-quality measurements. Results showed that spring conditions were event-driven, with turbidity spiking to ~100 NTU with concurrent increases in phosphorus, inorganic nitrogen, and dissolved organic carbon. Major ions (Cl^-, Na^+, Ca^{2+}) and alkalinity (115-120 mg L^{-1} as $CaCO_3$) increased, consistent with enhanced mixing, particle transport, and road-salt inputs. Summer conditions were

comparatively stable with reduced variability. Pepper mild mottle virus (PMMoV) was consistently detected and served as a fecal-signal baseline. Norovirus GI was rare, while GII appeared intermittently. Carbapenemase genes showed similar patterns: blaKPC was frequently detected, whereas blaNDM occurred sporadically during high-turbidity/high-alkalinity periods and near the method's detection limit. Of note, variability concentrated in spring, when hydrologic mixing and particle transport amplified wastewater/AMR signal changes. Our results indicate that surveillance should prioritize spring high-flow windows and use ions, alkalinity, and turbidity as operational flags for when wastewater/AMR markers are most likely to be detectable.

Christopher Yarnes[1], Michael Mahon[2], Mitch Kehne[3] and Ryan Lepak[2], [1]US Environmental Protection Agency, Office of Applied Science and Environmental Solutions, Great Lakes Coastal Sciences Branch, Ecosystem Services Division, [2]US Environmental Protection Agency, Office of Chemical Safety and Pollution Prevention, Risk Assessment Support Division, Translational Ecology Branch, [3]SpecPro Sustainment and Environmental. **Advanced molecular stable isotope analysis improves contaminant monitoring of Great Lakes lower food webs.**

The biological community of the Laurentian Great Lakes experiences a complex set of stressors, from physical (e.g., altered thermal-oxygen profiles and flash erosion events), biological (e.g. invasive species and harmful algal blooms) and chemical (e.g., legacy and emerging contaminants) perturbations. Here, we demonstrate the utility of multi-element, compound-specific, stable isotope measurements ("CSIA") of biological macromolecules in quantifying the impacts of these stressors on the lower food web of the Great Lakes. We demonstrate the potential of these new and emerging tools, as well as present limitations, through two data collections. First, we present carbon and nitrogen analysis of individual amino acids from collections of benthic and pelagic invertebrates across all five Great Lakes. Second, we share pilot carbon and hydrogen measurements of individual fatty acids within the lower food web of Lake Michigan. We outline practical guidelines for the implementation of CSIA analytical tools in monitoring the ecology of the lower food web of the Great Lakes. Finally, we discuss how the incorporation of these stable isotope measurements within monitoring programs can improve our understanding of the impacts of environmental stressors on the distribution and flux of contaminants through the lower food webs of the Great Lakes. The views expressed in this presentation are those of the authors and do not necessarily represent the views or policies of the US Environmental Protection Agency.

Adam G Yates, University of Waterloo. **The cotton strip assay: an opportunity to enhance community-led monitoring of freshwater ecosystems.**

Communities, non-governmental organizations, and individuals are essential to freshwater monitoring as their connections with local ecosystems brings unique knowledge of past and current conditions. In addition, community-led monitoring can greatly extend monitoring capacity beyond what government-led monitoring can achieve. However, tools employed by monitoring agencies are often incompatible with community-led monitoring activities due to the high cost and specialized expertise required to implement those approaches. A potential solution to this problem is the cotton strip assay (CSA). The CSA uses strips of artist's canvas to measure the rate that micro-organisms are processing organic matter; a process strongly linked to ecological conditions. This presentation will introduce the CSA and discuss its suitability as a biomonitoring tool through the lens of applicability to community-led monitoring of freshwater ecosystems. In addition, past and ongoing research led by the UWaterloo StrEAMS Lab demonstrating the strengths and weaknesses of the CSA as a biomonitoring tool will be summarized. Lastly, the presentation will discuss opportunities

and threats for widespread implementation of the CSA as a biomonitoring tool for community-led monitoring.

Matthew Yates[1], Alex van Nynatten[2], Paige Breault[1], Rajanpaul Sandhu[1], Ahmad Rashid[1], Kyle Banwell[1], Shelby Mackie[1], Margaret Docker[3], Daniel Heath[1] and Nicholas Mandrak[4], [1]University of Windsor, [2]University of Victoria, [3]University of Manitoba, [4]University of Toronto. **National fish eDNA survey reveals weak ecological homogenization, novel haplotypes, and phylogeography of widespread species.**

Environmental DNA (eDNA) has transformed species detection but remains largely limited to presence-absence inference. Here, we use a national-scale eDNA dataset to demonstrate the broader ecological and evolutionary information contained in environmental samples. As part of the Genome Canada-funded GEN-FISH "500-waterbody survey," we metabarcoded nearly 3,000 eDNA samples from 504 freshwater systems spanning all major Canadian ecoregions using three long-amplicon fish primers. We detected 173 potential unique species and observed a weak decrease in beta diversity across ecoregions driven by invasive species, with the strongest effects in Pacific regions, although native species losses could not be assessed using this dataset. Beyond community composition, eDNA revealed extensive intraspecific genetic diversity: 102 species/species complexes exhibited haplotype variation, with the 12S M-mito mitochondrial marker recovering the highest diversity (67 species). After conservative error filtering, we detected 791 unique haplotypes across three markers, of which 69.2% of matched existing GenBank records, with the remainder representing undocumented variants. The extended amplicon lengths of the GEN-FISH primers (210-300 bp) further enabled phylogeographic inference. Among species exhibiting haplotype diversity that were detected in ≥ 5 waterbodies, 67% (55/82) showed significant spatial structuring in haplotype composition for at least one marker. Ongoing analyses will test whether haplotype distributions reflect glacial refugium origins. Together, these results demonstrate that eDNA can simultaneously characterize ecological communities, uncover novel genetic diversity, and resolve broad phylogenetic structure at continental scales.

Rachel Kelly[1], **Alisa Young**[2] and Laura Jones[3], [1]GLISA, [2]GLERL, [3]CWA. **Highlights and Recommendations from the 2025 Great Lakes Modeling Workshop.**

The 2025 Great Lakes Climate Modeling Workshop was convened, as an initiative to support the Climate Change Impacts Annex of the Great Lakes Water Quality Agreement (GLWQA). The Workshop brought together a diverse cross-section of climate scientists, model developers, and policy experts from across Canada and the United States for a three-day virtual exchange. The workshop centered on advancing modeling approaches and understanding climate-driven changes in the Great Lakes system. Structured around three thematic sessions that included Lake Modeling, Climate Projections and Analysis, and Future Directions, the sessions highlighted emerging capabilities such as high-resolution, downscaled projections, novel 3D lake modeling frameworks, and the growing application of AI methods in hydrological and ecosystem modeling. Interactive breakout discussions played a pivotal role in shaping collective priorities, underscoring the need for stronger binational data integration, improved accessibility of shared modeling products, and intentional co-design with end-users. Participants emphasized the value of continued coordination within the Great Lakes modeling network, expressing strong support for ongoing collaboration through specialized working groups and future workshops. Building on record participation and broad engagement, the 2025 workshop reinforced the region's commitment to integrating advanced modeling tools for climate resilience and policy-relevant insights. A summary of the workshop, outcomes and recommendations will be presented.

Z

Sarah Zack and Hannah Leonard, Illinois-Indiana Sea Grant. **Reducing plastic pollution in the HOMES: Reaching communities through outreach and assessment.**

It is widely understood that marine debris has many negative impacts on the complex habitats found in the Great Lakes region and beyond. Preventing marine debris is no simple feat, particularly given the wide variety of plastic pollution and the myriad sources that contribute plastic to the environment. Illinois-Indiana Sea Grant (IISG) is currently involved in multiple efforts to tackle the plastic pollution problem in the Great Lakes at the micro and macro scales through source reduction, but only with consistent messaging to educated and involved communities can we expect this problem to be properly addressed. On the macro scale, this presentation will discuss collaborative efforts to prevent new plastic pollution with a joint NOAA-Sea Grant outreach campaign called Bring It From HOMES. In collaboration with Northwestern University, IISG has collected data from IL and IN Lake Michigan coastal communities about their behaviors, knowledge, and needs regarding the microfiber pollution generated by laundry machines, and will share how that information can better inform ongoing engineering efforts. Plastic pollution inputs to the Great Lakes can be reduced by using a tested and well-crafted outreach campaign and a better understanding of the role that Lake Michigan communities play in its generation and reduction.

Nathan Zeinstra[1], William Oliver[1], Brooklynne Keber[2, 3], Robert Hanner[1] and Margaret Docker[2], [1]University of Guelph, [2]University of Manitoba, [3]Assiniboine Park Conservancy. **Using environmental DNA to survey Ichthyomyzon lampreys in Ontario.**

Northern brook (Ichthyomyzon fossor), silver (I. unicuspis), and chestnut (I. castaneus) lampreys are of conservation concern in the Laurentian Great Lakes, and northern brook and silver lampreys are listed as Special Concern on the Canadian Species at Risk Act. Information on their distribution is most commonly obtained as by-catch from sea lamprey (Petromyzon marinus) monitoring, which often overlooks headwater streams and areas outside of the Great Lakes. Using three well-validated eDNA assays (targeting the genus Ichthyomyzon; the paired northern brook/silver lampreys; and chestnut lamprey), we surveyed at 164 locations across 58 Ontario waterways including above and below barriers, in lampricide-treated and untreated sections, and in streams with either historical, recent, or unknown distribution. Our survey detected Ichthyomyzon lampreys in 33 locations across 18 waterways, confirming historical distributions in 13 streams and proposing novel detections in five. Our modeling suggests that the eDNA method had a detection probability of 86.1%, which could be increased with more replication. Sampling above barriers increased detection probability, implying that northern brook lamprey persist in the protected headwaters where sea lamprey control efforts are not applied. Our survey included 2/5 of the waterways where a few chestnut lamprey had been historically reported in Ontario (the Mad and Chippewa rivers), but we did not detect this species. Our results highlight the utility of eDNA to provide actionable species presence information which could aid in native lamprey conservation.

Brittany N. Zepernick[1, 2], Anna G. Boegehold[3], E. Anders Kiledal[4], Emily E. Chase[1, 5], Robbie M. Martin[1], Casey M. Godwin[3], Trisha L. Spanbauer[6], Gregory L. Dick[3, 4], Reagan M. Errera[7] and Steven W. Wilhelm[1], [1]Department of Microbiology, University of Tennessee, Knoxville, TN, USA, [2]Department of Biology & Marine Biology, University of North Carolina Wilmington, Wilmington,

NC, USA, [3]Cooperative Institute for Great Lakes Research, University of Michigan, Ann Arbor, MI, USA, [4]Department of Earth and Environmental Sciences, University of Michigan, Ann Arbor, MI, USA, [5]Department of Biology, University of Winnipeg, Winnipeg, MB, CA, [6]Department of Earth & Environmental Sciences, University of Kentucky, Lexington, KY, USA, [7]Great Lakes Environmental Research Laboratory, National Oceanic and Atmospheric Administration, Ann Arbor, Michigan, USA. **Diel dynamics of Microcystis ecophysiology in Lake Erie.**

Lake Erie, like many large, shallow bodies of water, is prone to recurring cyanobacterial blooms. Monitoring efforts at monthly, weekly and / or daily scales have improved our ability to identify bloom drivers and predict bloom events. Yet, an important dimension remains largely unexplored: diel (day-night) variation. Although diel changes may appear subtle, marine studies suggest diel partitioning of microbial physiology exerts substantial effects at the community level. In fresh waters, earlier work in Lake Erie indicated diel shifts in cyanobacterial gene expression, though the resolution and broader implications were constrained by the lack of both data and statistical tests for diel periodicity. To address this gap, we conducted the Diel Assessment of Life in Lake Erie (DALLE) cruise at a fixed station in the western basin. Samples were collected over a two-day period in July 2023 at 2, 8, 14, 17, and 21 hours to capture key stages along the diel cycle. Our metatranscriptomic analyses indicated Microcystis dominated the transcriptionally active community, comprising up to 47% of total activity. Subsequently, RAIN (Rhythmicity Analysis Incorporating Nonparametric methods) analyses indicated ~8% of cyanobacterial genes exhibited significant diel periodicity. Along with analyses of the entire microbial community, we report these findings to enhance our understanding of cHAB dynamics across within-day gradients and strengthen our capacity to anticipate the drivers and ecology of future blooms.

Caity Zimmermann, Athabasca Watershed Council. **Community-based Monitoring in the Athabasca Watershed: Lessons from Practice.**

The Athabasca River watershed covers one quarter of Alberta's land base, yet supports fewer than 200,000 residents, resulting in a sparsely populated but highly active landscape shaped by resource development, community services, recreation, and cultural land use. While provincial policies exist to manage cumulative effects, relatively few stations beyond the Athabasca mainstem and oil sands region exist, limiting monitoring of the thousands of kilometres of upstream tributaries that support local communities and downstream ecosystems. In response, community-based monitoring (CBM) initiatives have emerged across the watershed to address locally relevant concerns and fill critical data gaps. This presentation highlights an initiative led by the Athabasca Watershed Council (AWC) that demonstrates how CBM can benefit communities and inform policy and action. By connecting communities to standardized tools, training, and data-sharing pathways, the AWC helps ensure data are credible, comparable, and useful at both local and regional scales. A key example is the Pembina River Water Quality Monitoring Program, a CBM that serves as public oversight grounded in local values and knowledge, supporting on-the-ground stewardship and broader decision-making. This area previously relied on a single, regularly monitored water-quality station. Through community-led identification of concerns and priority areas, the program expanded monitoring to 15 additional sites, generating actionable insights for municipalities, regulators, and industry and demonstrating how CBM can come full circle, transforming community concerns into data that inform science, policy, and on-the-ground action.

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Observing System. **Green Bay hypoxia monitoring using a LoRaWAN wireless sensor network.**

A LoRaWAN-based environmental sensing network is being used in lower Green Bay, Lake Michigan, to provide low-cost, real-time monitoring of key water-quality parameters in a region frequently affected by hypoxia and harmful algal blooms. In partnership with Cellcom, a regional communications provider, multiple buoy platforms equipped with low-power sensor packages—including temperature strings, dissolved oxygen sensors, and optical chlorophyll-a and phycocyanin fluorescence sensors—have been deployed over multiple field seasons in this region. These systems transmit compact LoRaWAN data packets to gateway receivers, after which measurements are processed through cloud-based mediation and decoding tools and made publicly accessible via GLOS's Seagull platform. Ongoing development efforts aim to broaden the LoRaWAN receiver array and expand monitoring into additional regions of Green Bay, supporting improved characterization and modeling of dissolved oxygen dynamics, algal activity, and other ecologically significant processes. In addition to studying dissolved oxygen dynamics in lower Green Bay with real-time sensors, this project also incorporates AUV transects to study water quality conditions between buoys, as well as an effort to inform commercial fishing activities by locating dissolved oxygen sensing buoys near deployed nets.

Jake Zunker[1], Kathryn Schreiner[1], Andrew Wood[1], Britta Larson[2], Chan Lan Chun[2], Keagan Bailey[1], Elizabeth Minor[1], Eva Hendrickson[3] and Christopher Filstrup[2], [1]Large Lakes Observatory, University of Minnesota Duluth, [2]Natural Resources Research Institute, University of Minnesota, [3]University of Vermont, Burlington. **Pollen mineralization fuels biogeochemical cycling and microbial community succession in Lake Superior.**

Pollen is ubiquitous in the environment and seasonally introduces variable quantities of terrigenous organic matter (OM) to inland lakes. Though regarded as recalcitrant, significant fractions of nutrients rapidly leach from pollen grains following water column deposition. Here, we examined the effects of pollen mineralization on organic carbon and nutrient availability to evaluate its potential as an unquantified perennial nutrient source and driver of microbial community succession in waters of Lake Superior. Pollen standards were added to lake water and incubated in the dark at 4°C for up to 60 days. Water samples were analyzed for dissolved and particulate fractions of carbon (C), nitrogen (N), and phosphorus (P), alongside ultraviolet-visible spectroscopy. Microbial community succession during pollen mineralization was assessed through metagenomic sequencing and biomass quantification at select times. Results show immediate significant increases in dissolved C, N, and P for up to 3 days, correlated with the introduction of pollen-associated microbes. There was a subsequent increase in prokaryotic biomass and a decrease in dissolved nutrients, with resulting shifts in microbial community composition and structure. These results suggest pollen contains a labile fraction of OM that is a substantial source of bioavailable C, N, and P that can fuel microbial succession and seasonal dynamics in large lakes.