Strengthening Great Lakes Winter Science

Needs and Opportunities to Enhance Winter Science Research and Monitoring

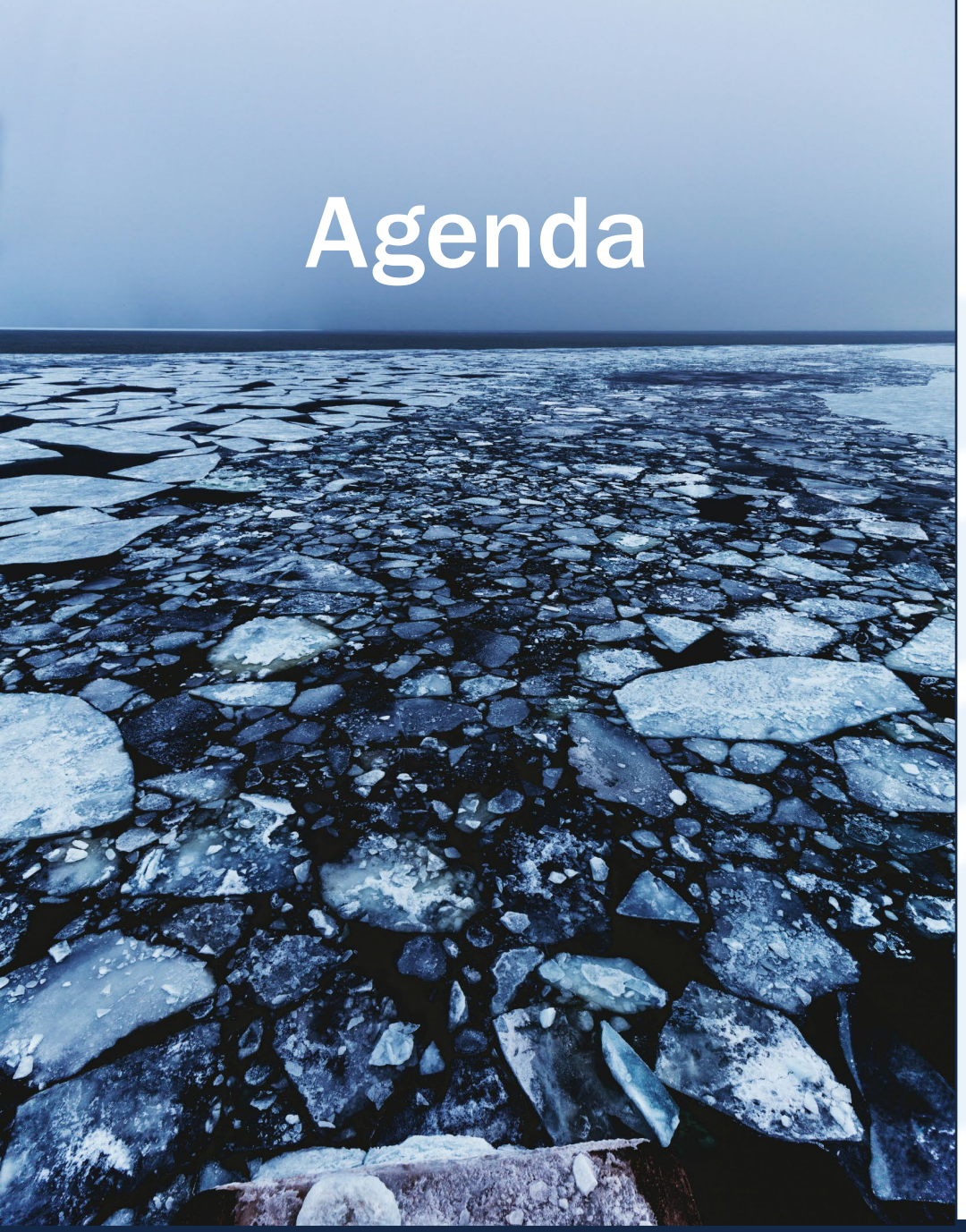
International Joint Commission

Great Lakes Science Advisory Board

Thursday, May 15, 2025
1:00 pm – 2:00 pm ET

More than a century of cooperation protecting shared waters
IJC.org

Agenda



- Opening Remarks
- Presentation of Report
- Q and A

Report available at:

Bit.ly/Winter-sci

Work Group Thank Yous

- Marguerite Xenopoulos, Trent University & work group co-chair
- Michael Twiss, Algoma University & work group co-chair
- Jay Austin, University of Minnesota, Duluth – Large Lakes Observatory
- Warren Currie, Fisheries & Oceans Canada
- Hilary Dugan, University of Wisconsin – Madison
- Drew Gronewold, University of Michigan
- Ian Harding, Red Cliff Band
- Scott Higgins, International Institute for Sustainable Development–Experimental Lakes Area
- Todd Howell, Ontario Ministry of Environment, Conservation & Parks (retired)
- Kathi Jo Jankowski, US Geological Survey
- Bill Mattes, Great Lakes Indian Fish & Wildlife Commission (retired)
- Mike McKay, University of Windsor- Great Lakes Institute for Environmental Research
- Ted Ozersky, University of Minnesota, Duluth – Large Lakes Observatory
- Carl Platz, US Army Corps of Engineers
- Milla Rautio, Université du Québec à-Chicoutimi
- Steve Ruberg, National Oceanic & Atmospheric Administration – Great Lakes Environmental Research Laboratory
- Sapna Sharma, York University
- Mathew Wells, University of Toronto – Scarborough

Workshop Participants

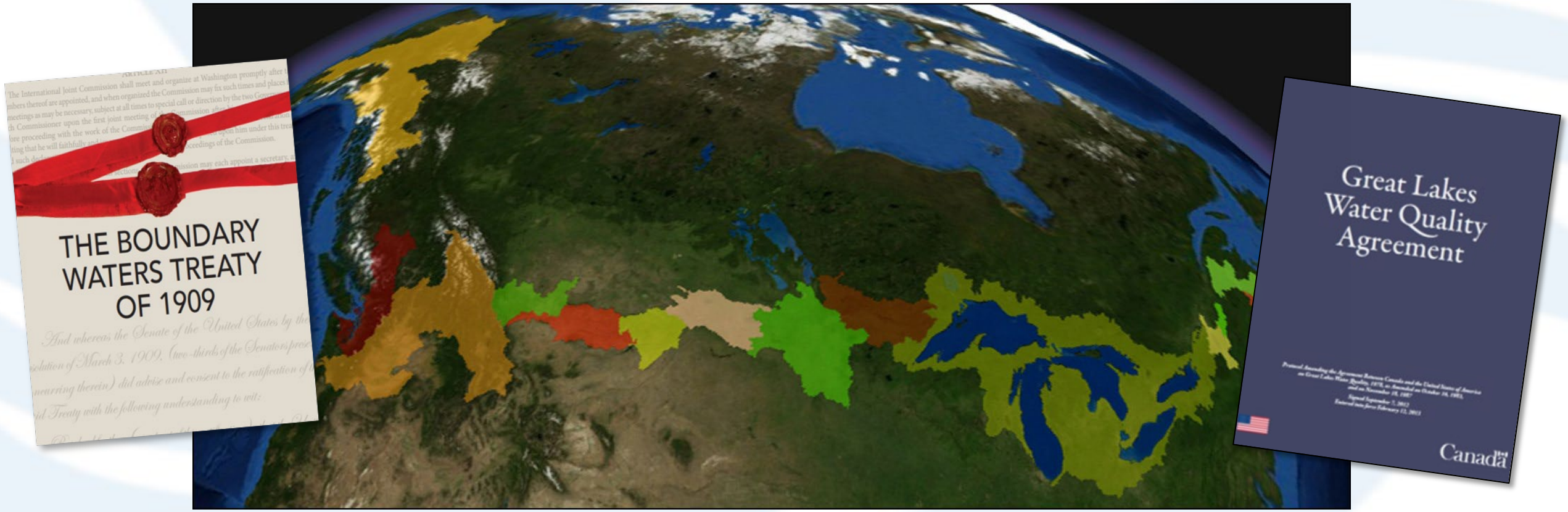
Contractor Team

- John Bratton, LimnoTech
- Michelle Platz, LimnoTech
- Samir Qadir, Potomac-Hudson Engineering

Opening Remarks

Heather Stirratt
Director, Great Lakes Regional Office
International Joint Commission

The International Joint Commission



"The purpose of this Agreement is to restore and maintain the **chemical, physical and biological integrity** of the Waters of the Great Lakes."

IJC Great Lakes Science Advisory Board (SAB)

- Advises IJC and its Great Lakes Water Quality Board on research and science:
  - *Research Coordination Committee (RCC)*
  - *Science Priority Committee (SPC)*

Members of the Great Lakes Science Advisory Board from their April 2025 meeting in Niagara Falls, ON

The Great Lakes in Winter

Physical

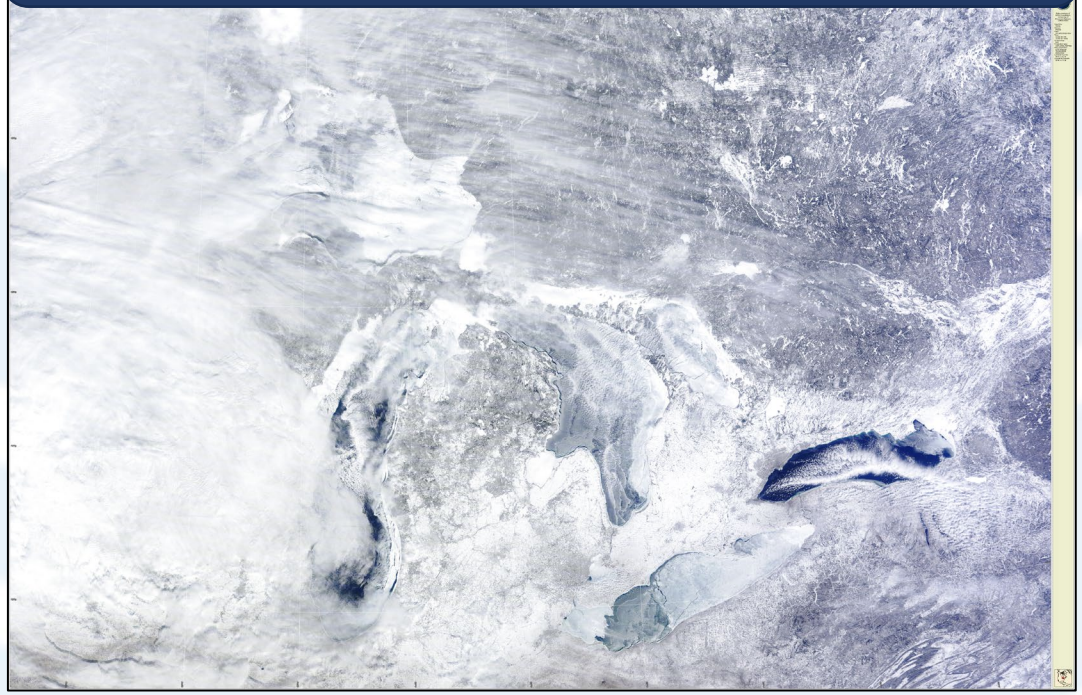
Biology

Biogeochemistry

Socioeconomic & Cultural Values

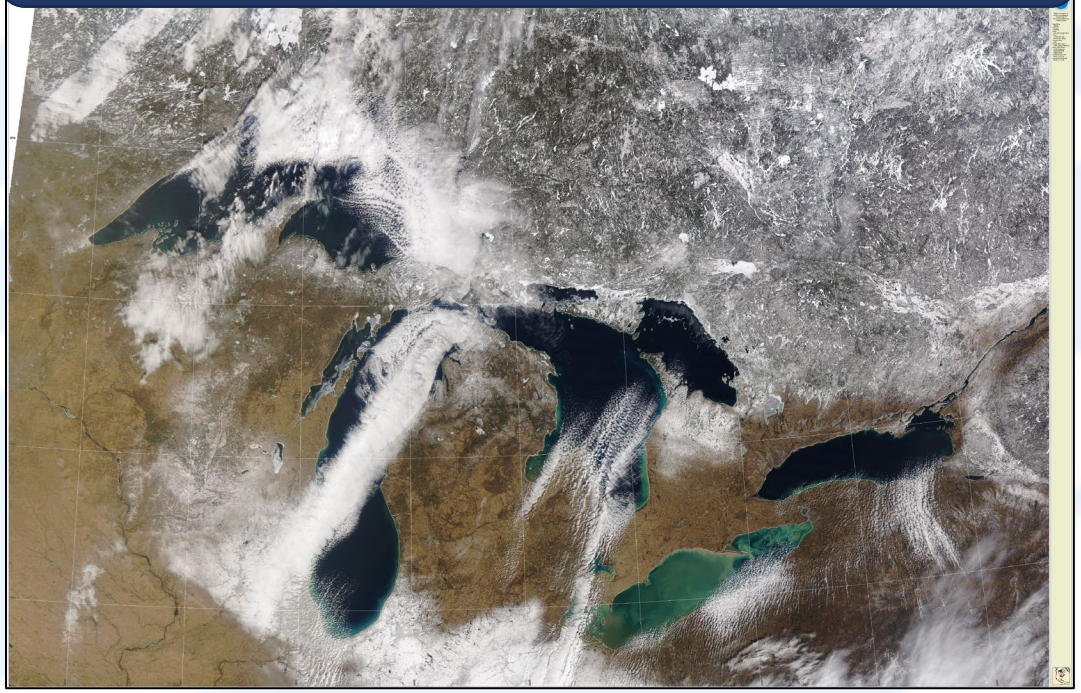
Extremes in Great Lakes Ice Cover

February 28, 2014



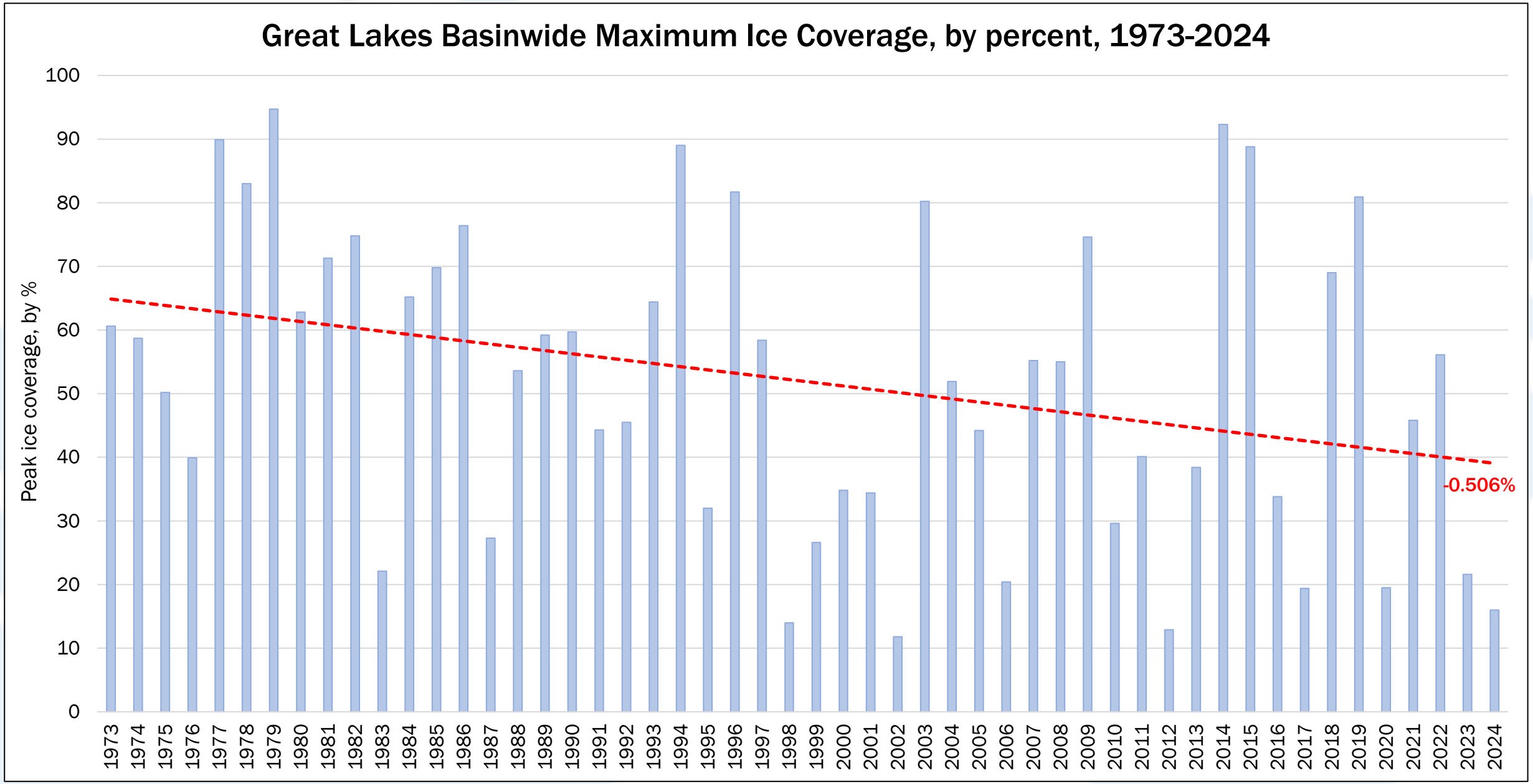
Maximum ice cover: 92.3%, March 2014

February 24, 2024



Maximum ice cover: 16%, January 2024

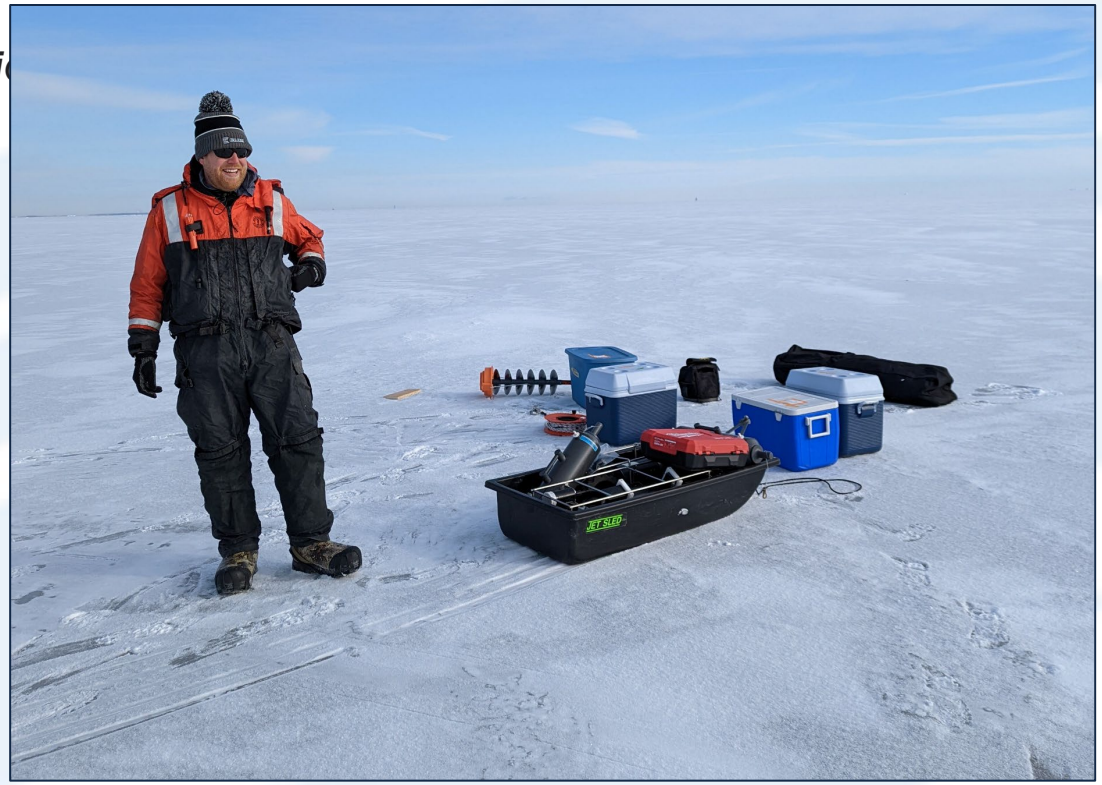
Credit: National Oceanic and Atmospheric Administration



Historical peak ice coverage on the Great Lakes basin, 1973-2024. Data from NOAA GLERL. Credit: IJC

Warm vs. Cold Weather Data Collection

NOAA GLERL engineers deploying a remotely operated vehicle to install flow meters in Lake Huron, July 2019 Credit: David J Ruck, Great Lakes Outreach Media



Collecting samples on Lake Erie, winter 2022. Photo credit: Paul Glyshaw, NOAA GLERL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Great Lakes Winter Science:
Summary Report

A report submitted to the
International Joint Commission
Great Lakes Science Advisory Board

March 2025

Report available at:

Bit.ly/Winter-sci

Presenters

Marguerite Xenopoulos
Professor, Canada Research Chair in Global Change of Freshwater Ecosystems, Trent University
IJC Great Lakes Science Advisory Board Member

Michael Twiss
Professor, Algoma University
IJC Great Lakes Science Advisory Board Member

Project Objectives

Understand the state of Great Lakes winter science knowledge and the infrastructure that supports research and monitoring

Identify and propose solutions to address existing knowledge gaps and research infrastructure and resource needs

Literature Review

- Summarized 150+ peer-reviewed articles, published in the last 3-4 years.
- Identified 42 publicly available databases of winter science data.

Literature review included in contractor report.

Bit.ly/Winter-sci

Impacts to Great Lakes Water Quality

Physical

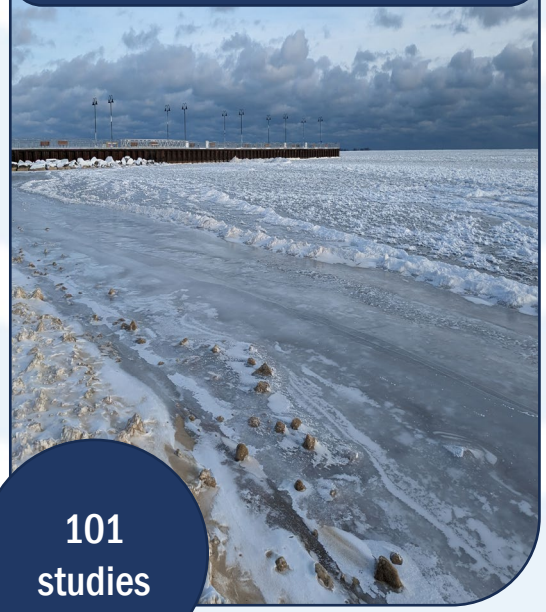
Biology

Biogeochemistry

Socioeconomic & Cultural Values

Impacts to Great Lakes Water Quality

Physical



101 studies

Impacts we expect ...	More knowledge is needed on ...
Ecological • More coastal erosion • More soil erosion • More lake effect snow • More winter storms and flooding **Human Health** • More winter drownings **Socioeconomic/Cultural** • Less over-ice transportation	• Ice • Coastal processes • Temperature • Hydrological cycles • Light exposure

Impacts to Great Lakes Water Quality

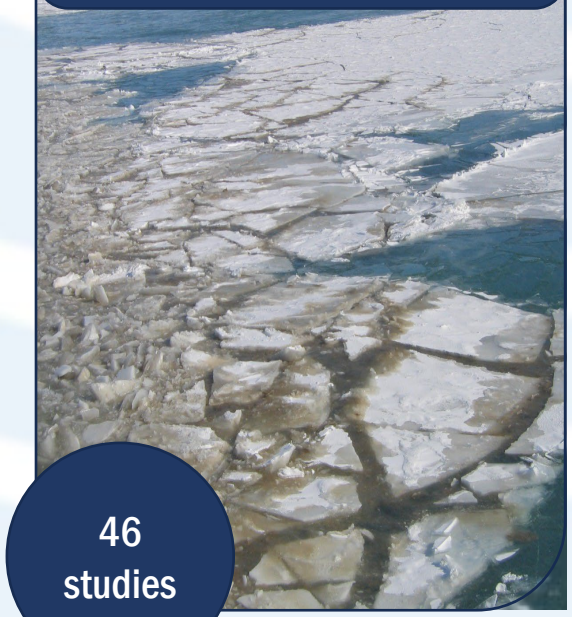
Biology

53 studies

Impacts we expect …	More knowledge is needed on …
Ecological • Changes in fish distribution & abundance, particularly native fishes • Higher likelihood for aquatic invasive species	• Fish • Phytoplankton • Zooplankton • Food webs

Impacts to Great Lakes Water Quality

Biogeochemistry



46 studies

Impacts we expect ...	More knowledge is needed on ...
Ecological • More eutrophication **Human Health** • Higher likelihood for drinking water issues	• Greenhouse gases • Nutrients • Oxygen • Salt

Impacts to Great Lakes Water Quality

Socioeconomic & Cultural Values

28 studies

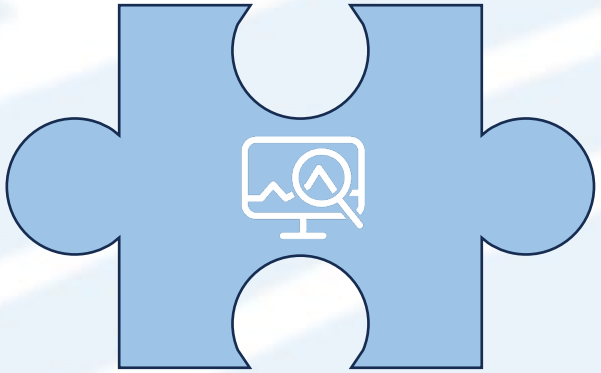
Impacts we expect ...	More knowledge is needed on ...
Socioeconomic/Cultural • Longer shipping season • Lower ice breaking costs • Higher insurance costs • Climate migration • Fewer recreational opportunities • Loss of cultural identity	• Ecosystem services • Shipping • Human Wellbeing

Science Gaps and Needs

Monitoring and Surveillance

- Ability to collect winter data is limited by current resources and assets

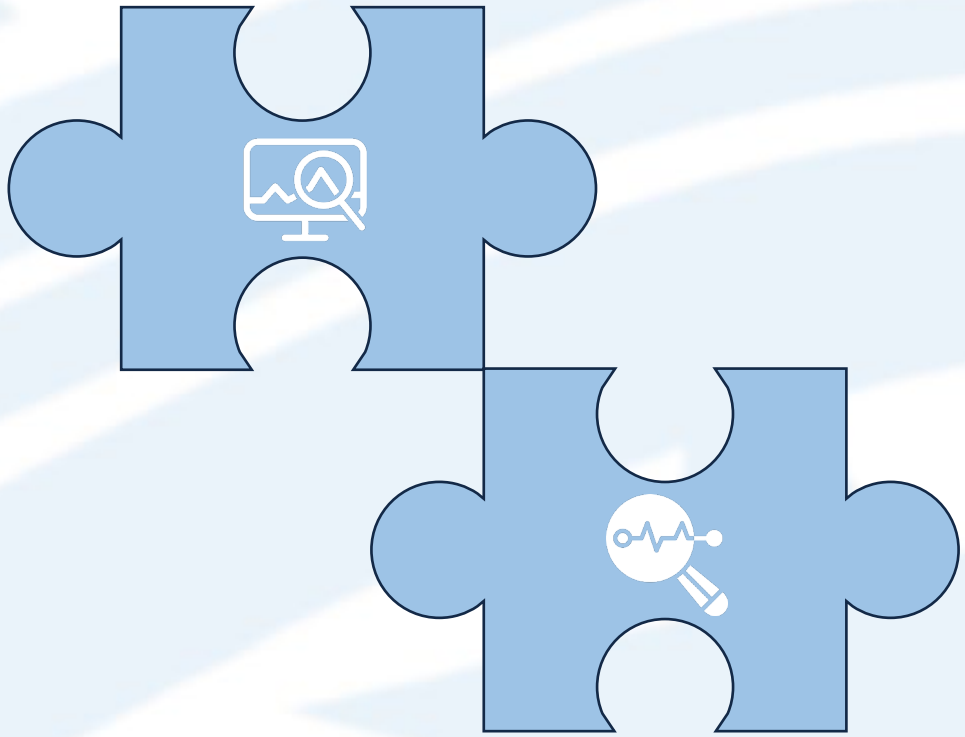
- Emerging technologies could enable data collection year-round



Science Gaps and Needs

Modeling and Forecasting

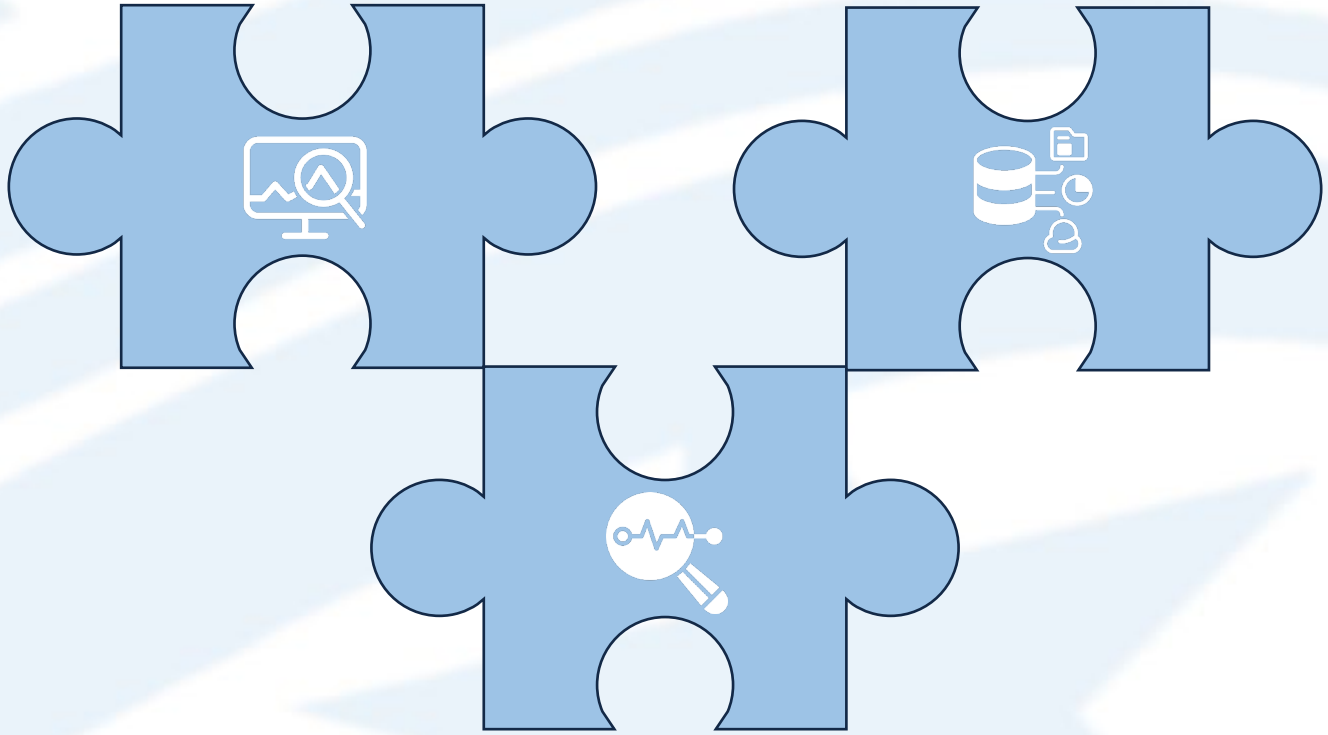
- Need for updated modeling methods and designs for the purpose of addressing winter science problems



Science Gaps and Needs

Data Management and Access

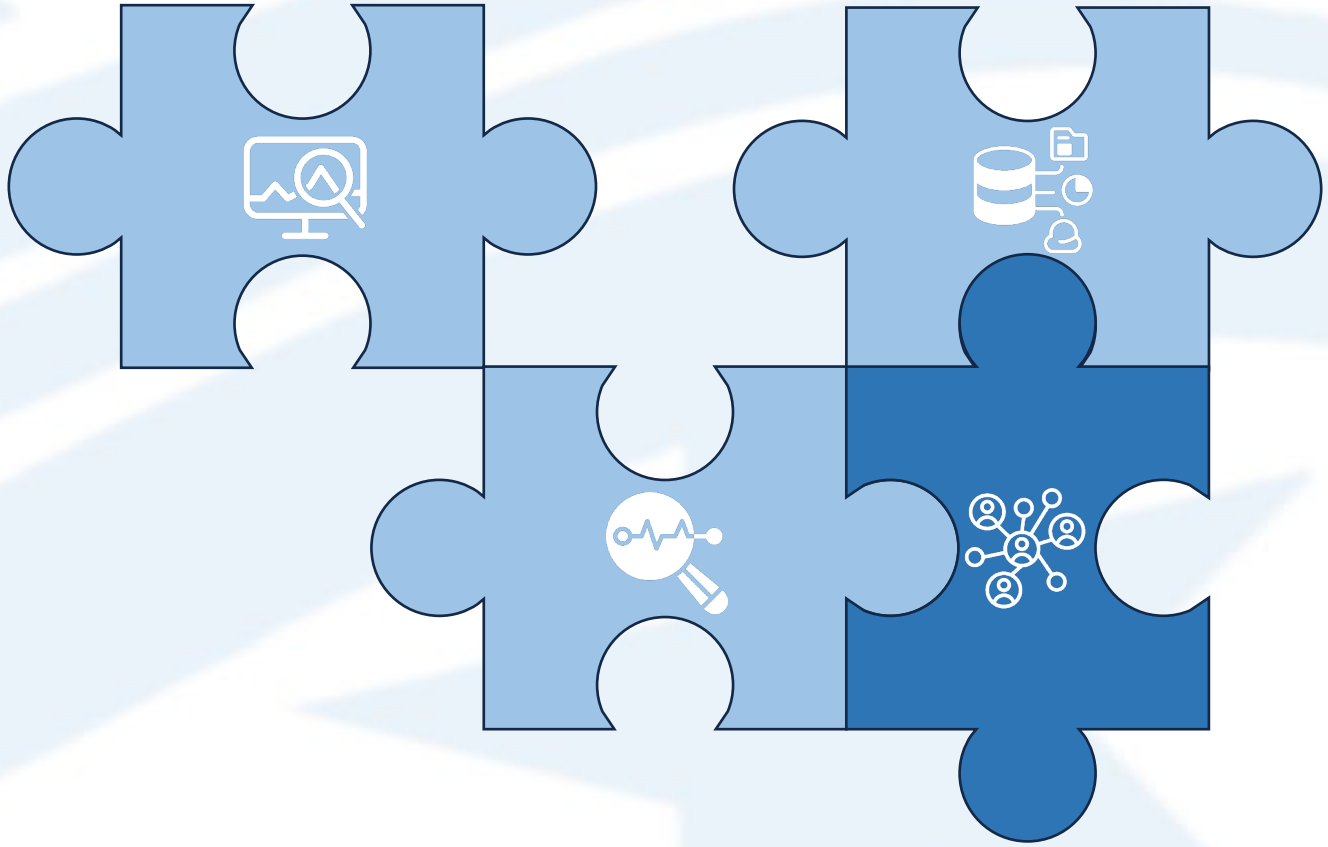
- Limited management and access to data prevents efficiencies
- A centralized, cross-disciplinary database, with support for data integration and sharing, would help advance winter science



Opportunities to Strengthen Research

Collaboration and Cooperation

- Formalized coordination across winter science would help to unify the field
- Collaboration and incorporation of diverse bodies of knowledge needed to understand impacts of changing winters

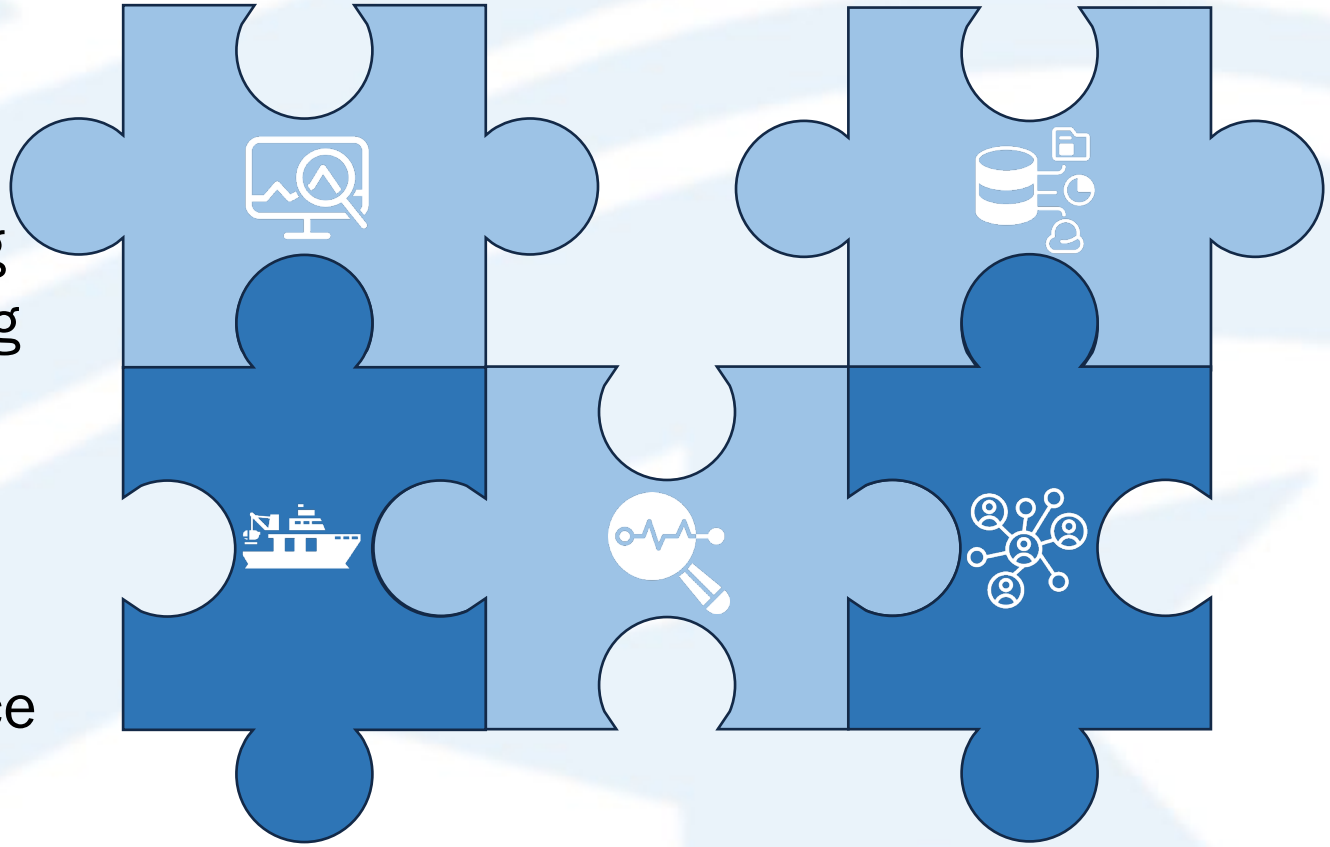


Opportunities to Strengthen Research

Capacity and Funding

- Need to increase access to assets and resources, including funding, equipment and training opportunities

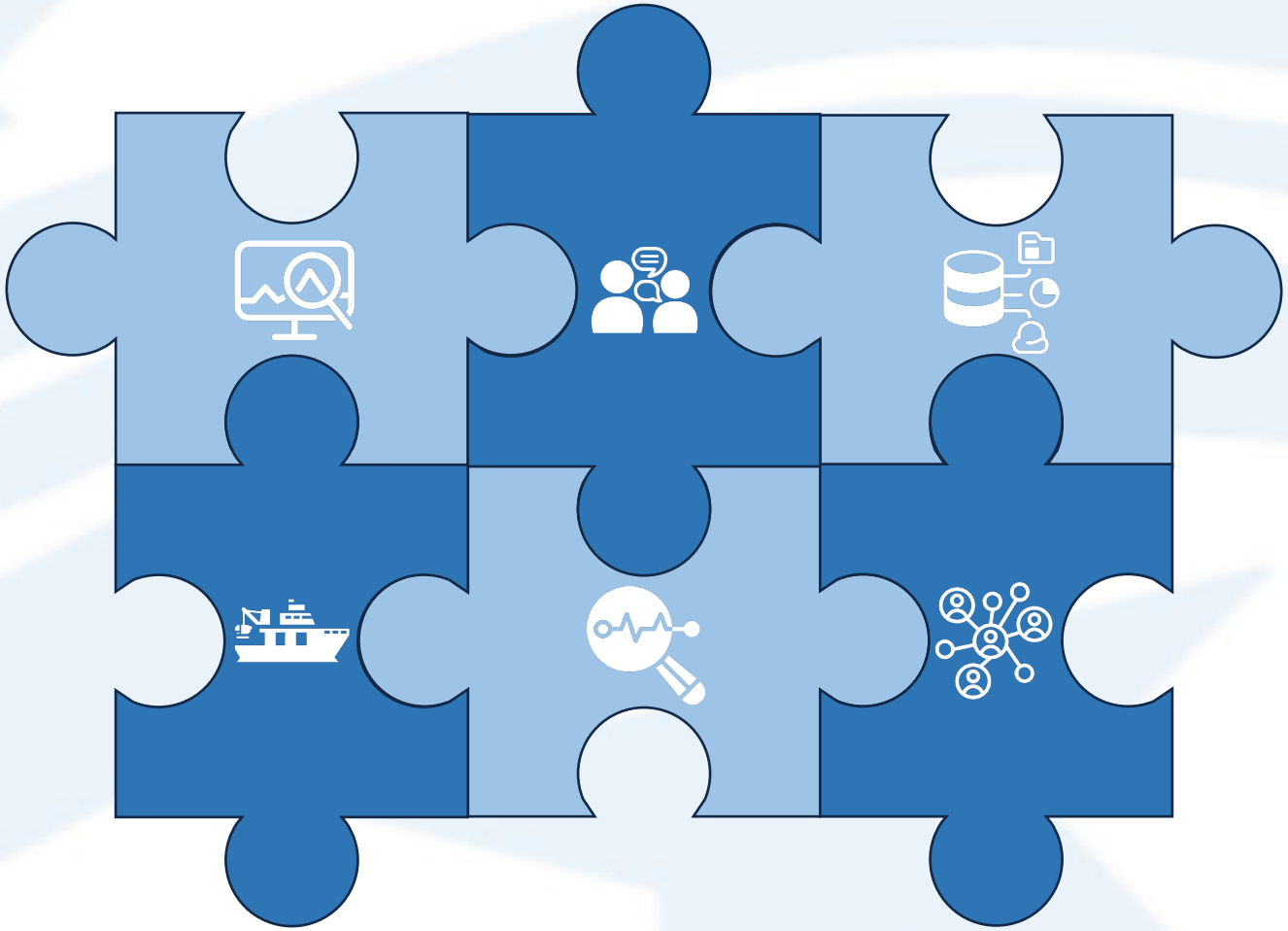
- Ensure an adequate number researchers have lake access and are trained in winter science methods and safety protocols



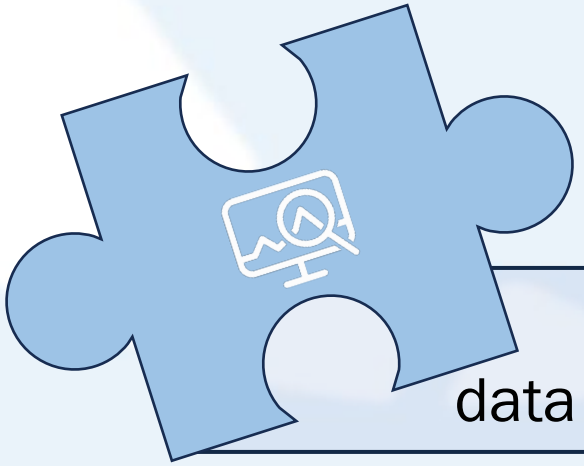
Opportunities to Strengthen Research

Communication and Outreach

- Winter science field would benefit from a unified strategy to raise the profile of winter science, focused on highlighting the impacts on human wellbeing if winter science questions are left unanswered



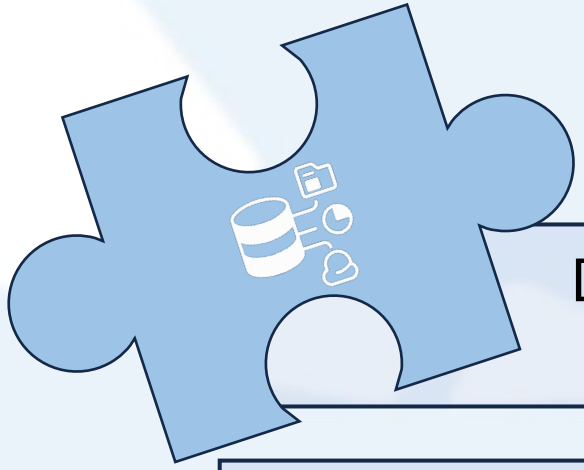
Recommendations – Monitoring & Surveillance



Create approaches to incorporate wintertime
data collection into existing binational monitoring activities

Support the nascent Great Lakes Winter Network
or a similar coordination entity

Recommendations – Data and Modeling

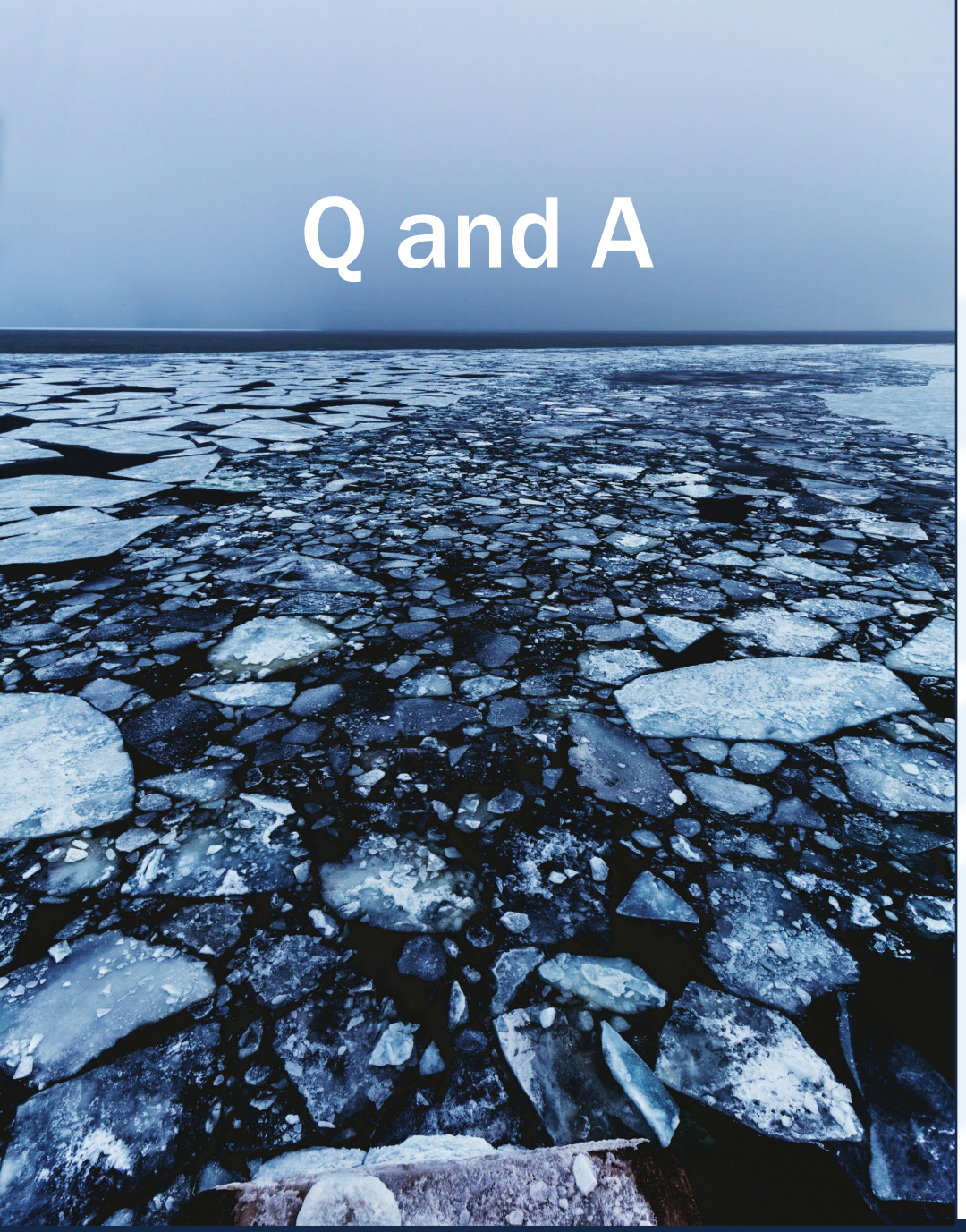


Determine the winter data gaps that limit decision making and that can be addressed by monitoring

Develop a coordinated binational plan to improve modeling and forecasting of ice properties for short and long-term time horizons

Establish an architecture for a master, open-access, winter science database

Q and A



Please use the Q and A function in Zoom.

Report available at:

Bit.ly/Winter-sci

Thank You

For other questions, please email:

matthew.child@ijc.org

Report available at:

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