

International Joint Commission
Canada and United States



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July 25, 2022

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Environment and Climate Change Canada
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Re.: Great Lakes Science Advisory Board Advice on Parties' 2022-2025 Priorities for Science

Dear Messrs. Korleski and Goffin,

As you are aware, Annex 10 of the *Great Lakes Water Quality Agreement* requires that the Parties establish science priorities on a three-year basis, considering advice developed by the Commission in consultation with the IJC's Great Lakes Science Advisory Board (SAB). The Commission recently reviewed and endorsed the attached SAB advice on the Parties prospective 2023-2025 Priorities for Science.

Based on additional advice from the SAB, the Commission believes that the restoration and health of the Great Lakes would benefit from a longer-term integrated and expanded binational approach to science. On this basis, our Science Advisory Board is currently finalizing a science strategy for a decadal, binational program of Great Lakes research. The project will summarize major existing investments in Great Lakes research and monitoring, identify high-level science gaps and needs, and identify several priority investment categories that—if implemented—would allow the Great Lakes science and management community to address new and emerging challenges. We expect that the Science Strategy will reinforce and complement the Parties' Priorities for Science, and look forward to sharing the Strategy at the appropriate time.

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We trust the attached SAB advice will be helpful to the Parties. Consistent with its current policy, the Commission will make these comments available to the public.

Sincerely,



Robert Sisson
A/Chair
U.S. Section



Pierre Béland
Chair
Canadian Section

cc. Evelyne Coulombe, Global Affairs Canada
John Whiteley, U.S. Department of State

Attachment

**INTERNATIONAL JOINT COMMISSION
SCIENCE ADVISORY BOARD**

ADVICE ON PARTIES' DRAFT PRIORITIES FOR SCIENCE (2023-2025)

July 12, 2022

Introduction

Annex 10 (Science) of the Great Lakes Water Quality Agreement assigns the International Joint Commission (IJC) and its Science Advisory Board (SAB) a role in providing input to the Parties on priority science issues on a three-year basis. The relevant excerpt from Annex 10 of the Agreement is pasted below, with italics added for emphasis:

C. Science Review, Priority-Setting and Coordination

The Parties, in cooperation and consultation with State and Provincial Governments, Tribal Governments, First Nations, Métis, Municipal Governments, watershed management agencies, other local public agencies, and the Public, shall:

1. undertake a review of available scientific information to inform management actions and policy development. Priority issues to be addressed through this review of available scientific information shall be established on a three-year basis by the Parties in consultation with the Great Lakes Executive Committee, *considering advice developed by the Commission in consultation with the Great Lakes Science Advisory Board;*

2. *identify science priorities, taking into account recommendations of the Commission;*

This document summarizes the SAB's advice to the Parties on the attached draft Priorities for Science. The Agreement does not invite IJC input on the Priorities for Action, and therefore comments are limited to Priorities for Science.

General comments that apply to all Agreement Annexes are presented first, followed by advice on each of the Agreement's 10 Annexes.

General

In 2019, the Commission provided input on the Parties (then) draft Priorities for Science (2020-2022), accessible at <https://ijc.org/en/sab/advice-parties-draft-priorities-science-2020-2022>. The SAB finds that several of the recommendations included in the Commission's previous advice are relevant for the 2023-2025 science priorities.

For the draft 2023-2025 Priorities for Science, the SAB finds that there is significant unevenness in the level of detail associated with each Annex's science priorities. The Annex 7 priorities provide a good example of detailed and specific priorities that could serve as a model for the other Annexes. Although less detailed priorities allow for flexibility, greater detail is more appropriate for guiding agency science programs over the three-year duration that the priorities are in effect.

The SAB notes that there is only one Annex – Annex 3 (CMCs) - that mentions communication of results. The SAB believes that dissemination of findings and results should be included for all Annexes.

Annex 1 – Areas of Concern

The draft priorities identify individual AOCs where sediment sampling will be undertaken, and individual beneficial use impairments that will be monitored to confirm impairment status. It would be helpful if readers could access information about the prioritization process e.g., included as a link or footnote.

The Parties are to be commended for their progress towards delisting AOCs. Once an AOC is delisted, regular monitoring should be completed to ensure delisted AOCs continue to meet or exceed the criteria for delisting, and those results should be communicated to the affected community(-ies). Although the SAB recognizes that in some cases ongoing agency-based lake monitoring is occurring in and around delisted AOCs, we believe an explicit commitment to monitoring following AOC delisting should be added to the Priorities for Science.

Annex 2 – Lakewide Action and Management Plans

The SAB believes multiple science-focused efforts in the lakes can benefit by laying out the current conceptual understanding of key drivers, stressors, and responses in the lakes. Suggestions on potential increased use of conceptual frameworks in planning for restoration and protection work in the Great Lakes can be accessed [here](#).

Annex 3 – Chemicals of Mutual Concern

The SAB agrees it is important to prioritize chemicals for management action. In addition to designating CMCs and measuring trends in their concentrations over time, the Priorities for Science should address other chemicals' presence in Great Lakes, information on sources and cycling, and potential human health and ecological effects e.g., chemicals of emerging concern (CECs) that may not yet be designated as CMCs.

Horizon scanning and other approaches for detecting potential threats and opportunities that are currently not well recognized are important for anticipating chemicals or chemical mixtures prior to their effects becoming widespread throughout the lakes. The SAB's 2020 report *Towards a Great Lakes Early Warning System* includes relevant information and can be accessed [here](#). A second phase of the project is underway to develop the analytical approaches associated with the early warning system, and we look forward to sharing the findings of that project in due course. As well, the IJC plans to further explore emerging contaminants in the 2023 Triennial Assessment of Progress report.

The term 'media' is vague and should be replaced with 'sediment, water and tissue'.

Plastic pollution in the Great Lakes is an increasingly important Great Lakes stressor and surveillance and research on this topic should be reflected in the Priorities for Science.

Annex 4 – Nutrients

The SAB finds the narrative in the ‘General to All Lakes’ section to be very general. More specificity is needed, including which existing initiatives should be supported or enhanced, or whether new joint initiatives are needed or planned.

The SAB is supportive of the Parties’ focus on nutrient-related priorities in lakes Erie and Ontario. The drawback to calling out just two of the five lakes is the impression it lends that work on nutrients is unimportant over most of the Great Lakes, particularly because the ‘General to All Lakes’ Priorities for Science are so generic. The ‘General to All Lakes’ Priorities should include an assessment of lake-wide budgets of nitrogen and phosphorus for all the lakes. On a related note, the IJC’s 2020 *Second Triennial Assessment of Progress Report on Great Lakes Water Quality* (accessible [here](#)) included a recommendation to characterize Lake Superior nutrient loads, which is also relevant for the Priorities for Science.

The SAB concurs that the fourth Priority for Science for Lake Erie is very important, and believes that more detailed language should clarify that the efficacy of BMP implementation will be explored considering various types of BMPs, location and scale of implementation, and socioeconomic aspects. Approaches for preventing runoff, as well as controlling or trapping nutrients, should be explored.

For Lake Erie, two additional Priorities for Science are needed:

- “Conduct Western Lake Erie research and monitoring to improve our understanding of phosphorus retention in the lake sediments and the role of harmful algal bloom overwintering cells for prediction of harmful algal blooms.
- Define and formalize the Lake Erie Adaptive Management Framework institutional structure and evaluations cycle.”

The SAB agrees with the third Lake Ontario Priority for Science, which addresses the dichotomy between nearshore nutrient enrichment and offshore nutrient deficiency. The SAB continues to recommend that the Parties improve coordination between water quality and fishery managers and improve the understanding of ecosystem impacts of nutrients in both nearshore and offshore waters of the Great Lakes. More detailed information is included in the SAB’s 2020 report *Understanding Declining Offshore Productivity in the Offshore Regions of the Great Lakes* accessible [here](#).

Annex 5 – Discharges from Vessels

Comments on discharges from vessels were provided in the SAB’s advice on the 2020-2022 Priorities. Those comments are still relevant and are accessible [here](#).

Annex 6 – Aquatic Invasive Species

The second Priority for Science should include reference to horizon scanning and related approaches to help prioritize detecting new organisms that are potential invasive species.

The third Priority for Science should include greater specificity. Are there individual species that will be prioritized?

Annex 7 – Habitat and Species

In light of climate change, the Priorities for Science should promote a prioritization process for identifying habitats that are particularly vulnerable. The prioritization process could be advanced through a pilot project for a vulnerable habitat type or region. Accordingly, the SAB understands that the Lake Superior Binational Partnership is working on updating its ‘Important Habitat Map’ which was first done under the Lake Superior Binational Program. This could serve as a suitable pilot document for prioritization.

The Great Lakes connecting waters offer unique habitats and restoration opportunities and could be reflected in the Priorities for Science. Additional information is included in the SAB’s 2021 report titled *Monitoring Infrastructure and Activities in Great Lakes Connecting Waters* accessible [here](#).

Annex 8 – Groundwater

The first Priority for Science should be revised to clarify “...impacting Great Lakes basin *surface* waters.”

The SAB recently released its report titled *Development of a Great Lakes Groundwater and Surface Water Conceptual Framework* (accessible [here](#)) which we expect will be helpful to the Annex 8 Subcommittee. The SAB appreciates the participation of the Parties’ agency staff on the project work group and associated workshop.

Annex 9 – Climate Change Impacts

As noted in the SAB’s 2020 report *An Evaluation of Stressor Interactions in the Great Lakes* (accessible [here](#)), climate change is the most pervasive stressor that merits further consideration in terms of its interaction with other stressors, including those described in the SAB report (i.e., toxic chemicals, invasive species, habitat loss, nutrients and pathogens).

The Priority for Science is very constrained and should be broadened. Key priorities for science that should be advanced include addressing how changing precipitation will impact nutrient loads, and understanding the effect of moderating (disappearing) winter. The SAB observes that both priorities are a focus in almost all other assessments of Great Lakes science needs. Advancing winter science is particularly relevant to Annex 9 since winter is the season most affected by changing climate.

The SAB agrees that Annex 9 should support and inform the Lakewide Action and Management Plans (Annex 2). The relevance of the Priorities for Science to other Annexes should also be clarified, including but not limited to chemicals of mutual concern, nutrients, aquatic invasive species, and habitats and species.

Annex 10 – Science

The Science Advisory Board is currently finalizing a science strategy for a decadal, binational program of Great Lakes research. The project will summarize major existing investments in Great Lakes research and monitoring, identify high-level science gaps and needs, and identify several priority investment categories that—if implemented—would allow the Great Lakes science and management community to address new and emerging challenges. We expect that the Science Strategy will reinforce and

complement the Parties' Priorities for Science, and look forward to sharing the Strategy at the appropriate time.

The SAB encourages the Parties to consider whether there are any areas relevant to the Great Lakes where increased binational coordination is needed, beyond CSMI.

Also, the SAB believes the Parties should acknowledge the importance of increasing human dimensions research (e.g., cultural, social and economic values) that are relevant to objectives of the GLWQA.

The importance and appropriateness of interweaving Traditional Ecological Knowledge (TEK) with western science should be reflected in the Priorities for Science. The SAB commends the Annex 10 Task Team (U.S. caucus) on its TEK guidance document, and encourages all Annex Subcommittees to include TEK in their decision-making, where appropriate. The SAB has a project underway to develop a framework toward bridging TEK and western science and looks forward to sharing insights from that project at the appropriate time.

Attachment: Parties’ Draft Priorities for Science (2023-2025)

ANNEX	PRIORITIES FOR SCIENCE
Annex 1 – Areas of Concern	<p>Conduct sediment sampling.</p> <ul style="list-style-type: none"> • In the U.S., conduct sediment sampling activities necessary for the implementation of sediment remediation projects in Areas of Concern (AOCs), including sampling in the Detroit River, Grand Calumet River and Niagara River AOCs. • In Canada, conduct sediment sampling activities necessary for the implementation of sediment remediation projects in AOCs including Thunder Bay, St. Marys River, St. Clair River, Niagara River, and St. Lawrence River AOCs. <p>Conduct monitoring to confirm beneficial use impairment (BUI) criteria have been met.</p> <ul style="list-style-type: none"> • In the U.S., conduct monitoring activities to confirm that BUI removal criteria have been met in the following AOCs: Waukegan Harbor for the <i>Restrictions on Fish Consumption</i> BUI; River Raisin for the <i>Bird or Animal Deformities or Reproduction Problems</i> BUI; and Muskegon Lake for the <i>Degradation of Benthos</i> BUI. • In Canada, conduct monitoring activities to confirm that BUI delisting criteria have been met, including monitoring in the following AOCs: Jackfish Bay and Niagara River for the Loss of Fish and Wildlife Habitat BUI; Thunder Bay and St. Marys River for the Degradation of Fish and Wildlife Populations BUI; Bay of Quinte and St. Lawrence River for the Eutrophication and Undesirable Algae BUI.
Annex 2 – Lakewide Management	<p>Establish Coordinated Science and Monitoring (CSMI) Priorities:</p> <ul style="list-style-type: none"> • In 2023, establish science and monitoring priorities for the 2025 Lake Michigan CSMI field year • In 2024, establish science and monitoring priorities for the 2026 Lake Superior CSMI field year. • In 2025, establish science and monitoring priorities for the 2027 Lake Huron CSMI field year.
Annex 3 – Chemicals of Mutual Concern	<p>Conduct monitoring and surveillance in Great Lakes environmental media to track trends of CMCs and other priority chemicals, enhance these efforts through the CSMI initiative, and communicate results.</p> <p>Coordinate research, monitoring and surveillance activities to address information gaps and needs for existing CMCs.</p>

ANNEX	PRIORITIES FOR SCIENCE
Annex 4 – Nutrients	<p><u>(General to all Lakes)</u> Implement and enhance coordinated binational research and monitoring.</p> <p><u>Lake Erie:</u></p> <ul style="list-style-type: none"> • Improve tracking and reporting on annual phosphorus loads to Lake Erie and the extent of harmful algal blooms. • Improve hypoxia assessment methods • Explore the feasibility of a toxicity prediction model for harmful algal blooms. • Conduct edge-of-field and in-stream research and monitoring to improve our understanding of phosphorus retention on the landscape and techniques for controlling and trapping phosphorus. <p><u>Lake Ontario</u></p> <ul style="list-style-type: none"> • By 2025, enhance tributary water quality monitoring and streamflow data to produce more accurate estimates of phosphorus loads to and from Lake Ontario. • Establish a coordinated and standardized binational approach and plan for monitoring and calculating phosphorus loads into the future. • Develop a modelling approach to represent the Lake Ontario aquatic ecosystem that includes Cladophora dynamics in the nearshore and food web dynamics in the offshore, as well as the nearshore-offshore linkages.
Annex 5 – Discharges from Vessels	<p>Use best available science to examine effectiveness of greywater discharge requirements in preparation for MARPOL Annex IV guidelines and U.S. and Canadian domestic regulations.</p> <p>Undertake scientific and, when appropriate, economic analysis, on the introduction of Aquatic Invasive Species (AIS) via biofouling, including testing of in-water cleaning technologies.</p> <p>Establish a scientific working group on AIS and formalize regular, ongoing meetings, to share plans and coordinate activities, explore compatible methods, and share results on ballast water and biofouling.</p> <p>Undertake and collaborate on research and development regarding challenges to the use of ballast water management systems on the Great Lakes.</p> <p>Examine risk to the Great Lakes from wash water discharges related to exhaust gas recirculation and exhaust gas cleaning systems discharges (aka scrubbers).</p>
Annex 6 – Aquatic Invasive Species	<p>Research and operationalize technology that prevents the spread of AIS while allowing the movement of other ecosystem components through canals and waterways.</p> <p>Develop and evaluate early AIS detection technologies and methods.</p> <p>Research and develop technologies and methods for control and eradication of AIS.</p>

ANNEX	PRIORITIES FOR SCIENCE
Annex 7 – Habitat and Species	Assess coastal environments, with a binational focus on coastal wetlands through the Great Lakes Coastal Wetland Monitoring Program (U.S.) and the Canadian Coastal Baseline Habitat Survey (Canada), to support protection and restoration efforts and other actions that increase resiliency of coastal habitat and species.
Annex 8 – Groundwater	<p>Conduct research to identify point and non-point sources of pollution from groundwater impacting Great Lakes basin waters and ecosystem health.</p> <p>Conduct research into new and relevant methods for assessing impacts on aquatic ecosystems from contaminated groundwater inputs to Great Lakes basin surface waters.</p> <p>Conduct research examining groundwater influence on water quality and temperature on nearshore environment and coastal wetlands.</p> <p>Compile background geochemistry for aquifers in the Great Lakes basin and conduct work to delineate groundwater discharge pathways to provide information needed in estimation of potential contaminant degradation and transport.</p>
Annex 9 – Climate Change Impacts	In collaboration with Annex 2, enhance Lakewide Action and Management Plans by augmenting these reports with the inclusion of most recent assessment of climate change for the lake such as current climate trends, and best available information of projected future change and impacts.
Annex 10 - Science	Implement the binational CSMI Initiative to coordinate planning, delivery and reporting of science in relation to the specific priorities identified through the Lakewide Management process. (Lake Ontario 2023, Lake Erie 2024, Lake Michigan 2025).