

Review of the Great Lakes Water Quality Agreement

**Prepared for the International Joint Commission
Water Quality Board – Great Lakes Water Quality
Agreement 50th Anniversary Work Group**



Acknowledgements

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The project team would like to thank the many individuals who agreed to be interviewed or replied to the survey for their time and contributions to this project, including sharing valuable insights and expertise, providing feedback on drafts of the matrix of actions and sharing important resources and data to support the study.

Pollution Probe is solely liable and responsible for the contents of this report. Acknowledgement does not constitute an endorsement of the material.

Executive Summary

In early 2021, the Great Lakes Water Quality Board (WQB) formed the Great Lakes Water Quality Agreement (GLWQA) 50th Anniversary Work Group to assist the International Joint Commission (IJC) with preparations for the 50th anniversary of the 1972 Canada-U.S. Agreement. The Work Group set out to review the GLWQA and its Annexes, assessing the context of how the Agreement is focused and organized, and whether it could or should be structured differently to better facilitate progress towards its objectives and goals. Whether or not the goals of the Agreement are being met is and will continue to be the purview of the Parties to the Agreement, the Canadian and U.S. governments, through State of the Great Lakes Reports (SOGL), the Progress Report of the Parties (PRP) and the IJC's Triennial Assessment of Progress (TAP).

To support its work, the GLWQA 50th Anniversary Work Group commissioned a project team, comprised of Pollution Probe, Sally Cole-Misch (Creative by Design), Dave Dempsey and René Drolet (René Drolet Consulting Services). The project team was charged with performing a comprehensive literature review, analyzing a survey, conducting interviews, and providing analysis in a report overseen by the GLWQA 50th Anniversary Work Group. This report is the result of work undertaken in support of this study. It summarizes key findings, considers the context of how the Agreement is focused and organized, and examines whether there are opportunities for Agreement implementation mechanisms or language to be strengthened to facilitate progress towards its overall goals. The emphasis is on recommendations that can be accomplished within the existing Agreement. The report also looks more closely at strengths, barriers, and opportunities for improvement to address specific Great Lakes water quality issues more effectively.

Methods

The methodology for this study involved a review of existing literature, including past and current versions of the Agreement, an analysis of the results of a survey of 35 subject-matter experts conducted by the GLWQA 50th Anniversary Work Group in the fall of 2020, and other supplementary materials. The literature review was complemented by interviews and an online survey of key partners, stakeholders, and subject-matter experts to gather additional relevant information, and to help fill any gaps.

A total of 38 interviews were conducted with 44 individuals (some interviews were with more than one person) between August and December 2021. An additional set of individuals contributed to the study by providing input through an online survey, which allowed for broader reach and a greater number of participants. The methodological approach for this study was based on an iterative, flexible, and collaborative process, and was inclusive of a broad range of perspectives to ensure that the review of the Agreement was thorough, systematic, and balanced.

The broad scope and amount of data mining required to effectively conduct this study necessitated the development of an analytical framework to help guide the review of the Agreement and its Annexes. This framework served as a means to consider the context for how the Agreement is focused and organized, and whether there are opportunities to strengthen implementation mechanisms that facilitate progress towards its overall goals.

Discussion and Findings

The project team's research yielded a wealth of views among stakeholders, representatives of federal, Tribal, First Nations, Métis, provincial, state, and municipal governments, and past and current members of IJC Great Lakes boards and the IJC Great Lakes Regional Office (GLRO). Key topics ranged from the Agreement's evolution to its current structure and efficacy of meeting current and anticipated challenges to the chemical, biological and physical integrity of the Great Lakes. Consistent themes emerged from the literature review as well.

The Agreement has provided an overarching binational framework and space for two countries, eight states, one province and a wide range of partners and stakeholders to come together, establish a focus on critical Great Lakes issues, express commitments, and communicate, coordinate, and collaborate with each other. The most significant success of the Agreement may be the governments' continued support, demonstrating that Canada and the U.S. continue to acknowledge the importance of working together to protect and enhance the water quality of the Great Lakes, despite ever-changing political and cultural contexts, various administrations, and a long list of competing priorities.

The content of the Agreement was criticized by some interviewees, who said it has lacked an overarching plan or clear direction on how to coordinate approaches and achieve measurable results. Other interviewees and survey respondents felt the Agreement is primarily aspirational and lacking teeth where policy is concerned, citing minimal success at preventing new threats as an example of how it has fallen short of its intended purpose.

Many interviewees and the literature review discussed the inherent tension between the IJC's progress measurement and reporting role and its relationship with the Parties. A frequently expressed concern was the diminishment in importance of the IJC's role in assessing progress as the Parties took on more of that responsibility under the 2012 Agreement.

Of particular concern in many interviews were the public engagement approaches of the Parties and the IJC itself on Agreement matters, and a decline in public participation over time. The elimination of the Lake Superior Binational Forum and other mechanisms for public engagement symbolized to some a change in approach by the Parties and a shift towards an engagement model geared towards top-down communicating, rather than a two-way exchange of ideas and information. It was suggested that a large proportion of the public is unaware of the existence of the Agreement and who is responsible for its implementation. Taking Agreement information-gathering and reporting activities into communities across the Great Lakes watershed was frequently suggested as a means of improvement, as was using the best possible social engagement methods to ensure basin-wide collaboration versus top-down, directed communication methods.



The role of Tribal Governments, First Nations and Métis in the Agreement and related activities was a central theme. It was not until the 2012 Agreement that four Indigenous representatives were added to the WQB, including two from Canada and two from the U.S. In 2019, Dr. Henry Lickers was the first Indigenous citizen in the history of the IJC to be appointed as a commissioner (Canadian). Despite these welcome changes, much work remains to ensure appropriate and successful engagement of Tribal Governments, First Nations and Métis, including the need to acknowledge and incorporate the use of traditional ecological knowledge (TEK)*. Interviewees also felt that to move forward, there is a need to recognize that Indigenous governance systems existed prior to European settlement and the establishment of the IJC.

A number of interviewees and survey respondents noted that the 2012 Agreement lacks the inclusion of a focus on equity, diversity, inclusion and environmental justice, described as encompassing fairness, participation, and relationality.

Many of the Agreement's successes may be as much philosophical as they are practical. One example frequently cited is the use of the ecosystem approach, formally introduced as a means of managing environmental stressors within the Great Lakes Basin in the 1978 amendment to the Agreement. The ecosystem approach emphasizes principles that flow from a scientific understanding of the nature of ecosystems. There was a lack of agreement among subject-matter experts interviewed for this study about how successful this approach has been in realizing practical improvements on-the-ground over time.

Funding and support for Great Lakes activities and programming is identified in the literature and by study participants as a critical challenge affecting the success of Agreement implementation.

The limited role of human health in the Agreement was remarked upon by several interviewees. While human health is referenced in the preamble, interviewees and survey respondents noted that the Agreement would also benefit from the inclusion of a more explicit statement or focus on the social dimensions associated with the Great Lakes ecosystem.

* For the purposes of this report, Indigenous Knowledge (IK) encompasses environment, socio-economic, cultural, and other elements of overall knowledge held by Indigenous peoples and within Indigenous communities. Traditional Ecological Knowledge (TEK) is the term that has come to be recognized as one component of Indigenous Knowledge systems. While inseparable from the broader system as a whole, TEK is recognized as that subset that is specific to ecology. Therefore, while TEK is the terminology that will primarily be used throughout this report, IK may also be used in recognition of that inseparability.



Recommendations

Findings from the literature review, surveys and interviews contributed to the development of a set of 16 recommendations aimed at the Parties, the IJC and the broader Great Lakes community. The first set of recommendations can be implemented without changes to the Agreement, and they focus on strengthening governance, implementation and accountability to meet the existing objectives and fulfill the purpose of the GLWQA.

The second set of recommendations would likely require consideration for amendments to the Agreement to better recognize the multiple, complex and ever-evolving Great Lakes water quality issues of today and the future. Revisions should consider clarifying and strengthening language and the need to incorporate a more proactive, equitable, future-focused vision for the Great Lakes Basin ecosystem with consideration for both the environment and human health.

It is important to note that grouping recommendations according to when they should be implemented is not a reflection of their importance or priority. In addition, it is anticipated that the outcomes from many short-term recommendations will be necessary to inform those that should be implemented over the longer-term.

I. Recommendations to Strengthen the Implementation of the Agreement in the Short-Term

For the Parties:

Recommendation 1: Strengthen the role of Tribal Governments, First Nations and Métis, by broadening the Agreement's governance and implementation mechanisms. This should include:

- Ensuring greater consideration is given to the specific priorities and concerns of Tribal Governments, First Nations and Métis (e.g., access to clean water, destruction of wild rice fields, impacts of blue-green algal blooms on fisheries, human health and wellbeing), including the need for sufficient funding to enable meaningful engagement.
- Building relationships and working with Tribal Governments, First Nations and Métis to explore how traditional ecological knowledge (TEK) and ways of knowing could be better integrated into the implementation of the Agreement (e.g., transferring existing frameworks and best practices from other fields or areas).
- Explore options for acknowledging the GLWQA as a multilateral, rather than binational Agreement, in recognition of the vital role of Tribal Governments, First Nations and Métis.

Recommendation 2: Recognize that meaningful public engagement should be a priority and actualize the stated commitment in the Agreement to cooperate and consult with state and provincial governments, Tribal Governments, First Nations, Métis, municipal governments, watershed management agencies, local public agencies, and the public (i.e., individuals and organizations such as public interest groups, researchers and research institutions, and businesses and other nongovernmental entities), by creating a coordinated, well-resourced and sustained model of engagement and education. The model should maintain long-term, cooperative consultations and engagement in each lake basin, and also in a basin-wide collaboration via virtual and/or in-person participation, discussion and reporting at Great Lakes Executive Committee (GLEC) meetings, and during triennial Great Lakes Public Forum and Summit meetings.

This model should also include:

- Adequate resources to allow Tribal Governments, First Nations, Métis and stakeholders in each lake basin to design and create an ongoing engagement group that meets at least quarterly, and with representatives to serve on a basin-wide engagement group to encourage and ensure ongoing discussions and collaboration.
- Partnering with credible organizations and associations who work directly with Tribal Governments, First Nations, Métis and stakeholders that can support discussions, education, and action by each lake group in a credible manner.
- Allotting adequate time at GLEC meetings and the Great Lakes Public Forum for each lake basin stakeholder group and the basin-wide engagement group to report on findings, comment on the Parties' reports and propose innovative ideas and actions.
- Devoting adequate time to hold a Great Lakes Collaborative at each Great Lakes Public Forum that brings together lake and basin-wide stakeholder groups and all others interested in in-depth discussions, brainstorming and consensus on cooperative actions that can contribute to reaching Agreement goals and objectives.

Recommendation 3: Create opportunities within GLEC meetings, and between meetings on a quarterly basis, for interactive and in-depth discussions among members to identify issues and solutions that will enhance governance, implementation and accountability. Reorient GLEC administration to prioritize interactive, collaborative approaches and discussions for each meeting to ensure that all members and their ideas and work are recognized, respected and contribute to the best solutions for the Great Lakes ecosystem. The GLEC should also consult with Tribal Governments, First Nations and Métis, as well as external organizations and stakeholders regarding solutions to enhance governance, implementation and accountability. The results of these consultations should be reported publicly within one month after each quarterly meeting.

Recommendation 4: In recognition of collaborative science as the underpinning of the Agreement, prioritize the funding of scientific studies and monitoring efforts, and the collection, analysis and reporting of data that will contribute to a more proactive and preventative approach to addressing threats to the Great Lakes.

For the International Joint Commission:

Recommendation 5: Clearly define the scope and depth of the Triennial Assessment of the Parties (TAP) report by prioritizing a shortlist of recommendations aimed at increasing the likelihood for in-depth review and detailed response, acceptance and implementation by the Parties. The IJC should issue the TAP within a consistent and prompt timeframe after the release of the governments' Great Lakes reports, or within six months. The governments should be required to respond to the TAP publicly and promptly as well, or no later than four months of receipt of the TAP report. The IJC should also outline a process for continued dialogue between the IJC and the Parties to address accountability for actions recommended in the TAP report.

Recommendation 6: To fulfill its responsibilities under the Agreement to consult on a regular basis with the public, provide the public with the opportunity to raise concerns, and to increase awareness of the inherent value of the Great Lakes and the benefit of taking individual and collective action to restore and maintain them, the IJC should:

- Continue to travel to at least one location in every lake basin during a triennial cycle to meet with residents, stakeholders, Tribal Governments, First Nations and Métis and underrepresented communities.

- Assist in the creation and coordination of lake and basin-wide stakeholder groups. This includes assigning staff to attend meetings and report on their findings and activities to the IJC's Water Quality Board.
- Seek and ensure adequate funding and staff to carry out these duties.

Recommendation 7: To enhance its role and function as part of its Agreement responsibilities, the IJC should provide organizational support to the Great Lakes Regional Office (GLRO). This should include:

- Extend the director's term to a minimum of six, and maximum of eight years to attract highly qualified candidates who may be unable, for career or other reasons, to commit to a term limited to four years. This will also ensure that the director, GLRO staff and Agreement boards have adequate time to develop a rapport and team approach to goal setting and implementation of Agreement responsibilities.
- Clearly articulate the GLRO's status within the IJC family as a binational office with specific Agreement responsibilities that are separate from those of its Ottawa and Washington, DC offices.
- Provide targeted budget increases to ensure adequate scientific and public affairs staff to assist its boards in assessing Agreement progress and to provide effective communications and public engagement.

For the Great Lakes Community:

Recommendation 8: The Great Lakes region is rich with nongovernment organizations that are committed to restoring and protecting the lakes and have played an essential role in Agreement progress in the past. To recognize and fulfill this essential role, these business/industry, citizen, environmental, scientific, Indigenous, and cultural organizations should:

- Recommit to engaging in lake-wide and Great Lakes Basin-wide actions to ensure Agreement progress, while still undertaking local initiatives that contribute to this progress. This includes participating in the design and ongoing work of the lake stakeholder groups and their basin-wide coordination efforts, and engaging with the Parties and the IJC via a variety of direct and indirect methods to ensure that Agreement goals and Annexes receive the resources, attention and action required for their success.

Recommendation 9: To recognize and communicate the value of the Great Lakes to every resident in the region, the Parties, IJC, and the full range of government and non-government partners and the public should invest in creative online and in-person communications tools such as stakeholder mapping, digital visualizations, video streaming and others to strengthen the exchange of information, education, and engagement for a variety of audiences. These tools should reflect the scientific, musical, artistic, and cultural richness of the Great Lakes binational region.



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II. Recommendations for Potential Future Amendments to the Agreement over the Longer-Term

For the Parties:

Recommendation 1: Strongly consider creating a new governance structure that could lead to a multi-party version of the GLWQA. Through this process, which would be rooted in the principles of Reconciliation, Tribal Governments, First Nations and Métis would be asked if they would like to be signatories to the Agreement, and if so, how the negotiation of a renewed Agreement could be facilitated. They would also be asked what else they would like to see included in an updated Agreement and its implementation mechanisms.

Recommendation 2: Strengthen Agreement implementation in recognition that physical integrity is as important as the chemical and biological integrity of the lakes. This could include incorporating additional language across the Agreement's Annexes specific to addressing aspects of physical integrity.

Recommendation 3: Reinforce a holistic approach to addressing threats to the Great Lakes by further linking and integrating commitments under the Agreement's Annexes. This may include:

- Exploring alternatives to the Annex structure for addressing complex, interrelated issues.
- Determining how overarching, cross-cutting issues (e.g., climate change, watershed approach, TEK) can be better integrated across all Annexes and their implementation.
- Provide opportunities for knowledge-sharing, collaborative discussions, and interrelated programming between subcommittees on specific areas of intersection beyond regularly scheduled meetings, such as those of GLEC.

Recommendation 4: Strengthen existing principles and approaches outlined in the 2012 Agreement and broaden them through a stronger focus on social and environmental equity issues, including drivers of water disparity, inequality, and unaffordability; and recognize the importance of an equitable distribution of resources and access to safe and affordable drinking water.

Recommendation 5: Support improved governance, progress measurement and accountability by:

- Enhancing the governance model by developing an overarching plan for the Great Lakes that outlines a clear and strong management and implementation framework to address challenges related to accountability on implementation, monitoring, reporting and review.
- Providing greater specificity in each Annex on priorities for action, clearly identifying who is responsible for taking the lead and the roles and expectation for other partners, identifying accountability and measurement targets, and outlining realistic timelines for action that align with short-, medium- and long-term goals.
- Providing clear language, detail and guidance on desired outcomes and how progress has or will be achieved and measured so that the public can understand and hold the Parties accountable.
- Ensure alignment of recommendations, targets and goals with SMART principles (i.e., specific, measurable, achievable, relevant, and time-bound) and require that progress is consistently reported on.

Recommendation 6: To improve and strengthen the implementation and accountability of commitments under each Annex:

- Prioritize the provision of financial resources to support programming, including identifying specific needs under each Annex.
- Identify priority geographies where the model employed to address AOCs could be used to further collaboration, coordination, and communication to address Great Lakes issues and implement the principles of the Agreement.

Recommendation 7: Commit sufficient financial resources to ensure that each Party can achieve the objectives identified in Agreement, in the timeframes specified. Long-term, sustainable funding is critical to successfully addressing the targets and objectives of the Agreement.



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Table of Contents

Acknowledgements	3
Executive Summary	4
About this Report	15
Report Outline	16
Objectives and Methodology	17
Analytical Framework for the Review of the Great Lakes Water Quality Agreement	19
 SECTION ONE: Introduction and Background	 24
1.1. Evolving Pressures facing the Great Lakes	24
1.2. Great Lakes Water Quality Agreement	27
 SECTION TWO: Evolution of the Great Lakes Water Quality Agreement	 29
2.1. Key Historical Successes, Challenges and Lessons Learned	29
2.1.1. Overarching Successes, Challenges and Lessons Learned	29
2.1.2. Specific Successes, Challenges and Lessons Learned	39
 SECTION THREE: The 2012 Great Lakes Water Quality Agreement	 45
3.1. Scope, Purpose and Objectives	45
3.1.1. Historical Considerations	45
3.1.2. Scope of the 2012 Great Lakes Water Quality Agreement	47
3.1.3. Purpose, Principles and Approaches	48
3.1.4. General and Specific Objectives	51
3.1.5. Opportunities for Improvement	53
3.2. Structure and Implementation	54
3.2.1. Historical Considerations	54
3.2.2. Articles	56
3.2.3. Annexes	57
3.2.4. Opportunities for Improvement	73
3.3. Governance	74
3.3.1. Role of the Parties	75
3.3.2. Role of the International Joint Commission Great Lakes Regional Office and its Director	76
3.3.3. International Joint Commission Great Lakes Boards	76
3.3.4. Tribal Governments, First Nations, and Métis	77
3.3.5. Independent Assessment of Progress by the International Joint Commission	77
3.3.6. Governance Indicators	78
3.3.7. Opportunities for Improvement	78

3.4. Roles and Engagement of Tribal Governments, First Nations and Métis	78
3.4.1. Historical Considerations	78
3.4.2. Current Provisions and Practices	80
3.4.3. Opportunities for Improvement	82
3.5. Roles and Engagement of Governments, Stakeholders and the Public	84
3.5.1. The International Joint Commission, Citizen Engagement and Biennial Meetings 1978-2012	85
3.5.2. Changes via the 1987 Protocol	86
3.5.3. Agreement Review, 2006-2012	87
3.5.4. The 2012 Great Lakes Water Quality Agreement	88
3.5.5. Engagement and the Agreement, 2012-Today	89
3.5.6. Opportunities for Improvement	91
3.6. Progress and Measurement	92
3.6.1. Historical Considerations	92
3.6.2. Discussion and Findings	93
3.6.3. Opportunities for Improvement	95
 SECTION FOUR: Summary of Findings and Future Considerations	 97
4.1 Summary of Findings	97
4.1.1 What is Working Well?	97
4.1.2 Opportunities for Improvement	99
4.2 Emerging Issues and Considerations	102
4.2.1. Plastic Pollution and Other Marine Debris	102
4.2.2. Pharmaceuticals and Personal Care Products	103
4.2.3. Multiple Stressors	104
4.2.4. Population Growth and Climate Migration	104
4.2.5. Environmental Equity	105
4.3. Matrix of Actions	106
4.3.1. Potential Actions	106
4.3.2. Involvement of Partners and Stakeholders	107
4.3.3. Important Considerations Prior to Exploring the Matrix of Action	107
 SECTION FIVE: Recommendations	 118
Conclusions	123
APPENDIX A: Select Definitions and Abbreviations	124
References	127



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About this Report

Recognizing the need for a framework to coordinate efforts to manage and protect the Great Lakes, Canada and the U.S. signed the Great Lakes Water Quality Agreement (GLWQA) in 1972 to “restore and enhance water quality in the Great Lakes System.”¹ Integral to the Agreement was an understanding that, to be effective, the GLWQA would need to be updated from time to time based on new experiences, evolving science and emerging challenges.

The Agreement provides a framework for identifying binational priorities and implementing actions that improve water quality. Revised in 1978, amended in 1983 and 1987, and updated in 2012, the Agreement has continued to evolve over time to align with advances in science, to address threats requiring urgent attention and to reinforce efforts on existing issues. April 15, 2022, marks the 50th anniversary of the Agreement, presenting an important opportunity to take stock of its history, and explore how it can be strengthened to address current and future challenges facing the lakes.

While the responsibility for implementation of the Agreement rests with the Canadian and U.S. governments, the International Joint Commission (IJC) — an independent, binational organization created by the two governments under the Boundary Waters Treaty (BWT) of 1909 — plays a key role in evaluating efforts to restore and maintain the Great Lakes ecosystem, engaging the public on their perspectives of Great Lakes health and completing its own research on issues facing the lakes. The IJC assesses progress towards achieving the Agreement’s stated goals and objectives, and the effectiveness of government programs to meet them. Its Great Lakes Water Quality Board (WQB) is the principal advisor to the Commission to assist in exercising the powers and responsibilities assigned to it under the Agreement, and researching, evaluating and assessing a variety of water quality issues for the purpose of providing further insight.

In support of the 50th anniversary of the GLWQA, the WQB convened a Work Group (i.e., the GLWQA 50th Anniversary Work Group) to review the Agreement and its Annexes and commissioned the project team, comprised of Pollution Probe, Sally Cole-Misch (Creative by Design), Dave Dempsey and René Drolet (René Drolet Consulting Services), to assess the context for how the Agreement is focused and organized, and whether there are opportunities for facilitating further progress towards its objectives and goals.

This report is the result of work undertaken in support of this project. The report also looks more closely at the Agreement’s strengths and weaknesses and identifies opportunities for improvement in an effort to more effectively address specific Great Lakes water quality issues. A set of key recommendations is presented for consideration by the WQB 50th Anniversary Work Group based on the outcomes of this work.

Report Outline

This report is divided into five sections that describe the broad context for the review of the GLWQA, explore both historical and current versions of the Agreement to identify successes, challenges and opportunities for improvement, and outline a set of key recommendations.

Section One provides a general introduction to the Great Lakes and the GLWQA in an effort to contribute to a better understanding of the report findings.

Section Two provides an overview of key historical successes, challenges and lessons learned associated with previous versions of the GLWQA and highlights their relevance for the current Agreement.

Section Three of the report explores the current Agreement and its Annexes, including its purpose, principles and approaches, objectives and structure, the roles of Tribal Governments, First Nations and Métis, and various partners and stakeholders, and identifies highlights or challenges.

Section Four summarizes the findings of the report, describes what has been working well under the current Agreement and where there is room for improvement. This section also identifies emerging issues and threats to the Great Lakes and introduces a Matrix of Action.

Section Five outlines the key recommendations emerging from this work, organized according to short- and long-term priorities.

Appendix A includes Select Definitions and Abbreviations



Objectives and Methodology

The overall goal of this project was to review the current GLWQA and to provide information to assist the IJC with preparation for its 50th anniversary in 2022. More specifically, the objectives were to:

- Review historical information related to the Agreement, including the identification of past challenges and successes.
- Review and assess the current version of the GLWQA and its Annexes, with a focus on the effectiveness of its purpose and objectives.
- Identify areas within the Agreement that should be highlighted, as well as an assessment of any potential challenges and opportunities for improvement.
- Develop a set of key recommendations for the GLWQA 50th Anniversary Work Group for the purpose of providing to the IJC for consideration.

The methodology pursued for this project involved a comprehensive literature review of existing material, including past and current versions of the GLWQA, the results of a survey of 35 subject-matter experts by the GLWQA 50th Anniversary Work Group in the fall of 2020, biennial reports and related materials, Triennial Assessment of Progress (TAP) reports, binational strategies and agreements, Progress Reports of the Parties (PRP), State of the Great Lakes (SOG) reports, Lakewide Action and Management Plans (LAMs) and annual reports, Areas of Concern (AOC) assessments, a range of materials prepared by the IJC and its advisory boards and committees, reports prepared by partners and stakeholders, books, and journal and newspaper articles.

Interviews with the full spectrum of partners, stakeholders and subject-matter experts were conducted with the aim of filling any information or data gaps in the existing literature. A standardized interview format was developed to ensure consistency and credibility around the findings, while also leaving room to explore areas of interest for each interviewee. A total of 38 interviews were conducted with 44 individuals (some interviews were of more than one person) between August and December 2021.

An additional set of individuals contributed to the study by providing input through an online survey, which allowed for broader reach and a greater number of participants. The priority for the survey was to focus on addressing any gaps in representation from the interviews, as well as engaging representatives with specific or targeted expertise (e.g., industry groups, lake-specific organizations, etc.).

Table 1 shows the geographic and temporal representation of interviewees and survey respondents and Table 2 provides a breakdown of the total number of interviews and surveys completed according to partner, stakeholder or group. Where an interviewee or survey respondent provided multiple perspectives, they have been accounted for in each respective category. As a result, the total number of interviewees and survey participants does not equal the sum of the totals for all categories. Figure 1 shows the general location of interviewees and survey respondents across the Great Lakes region.

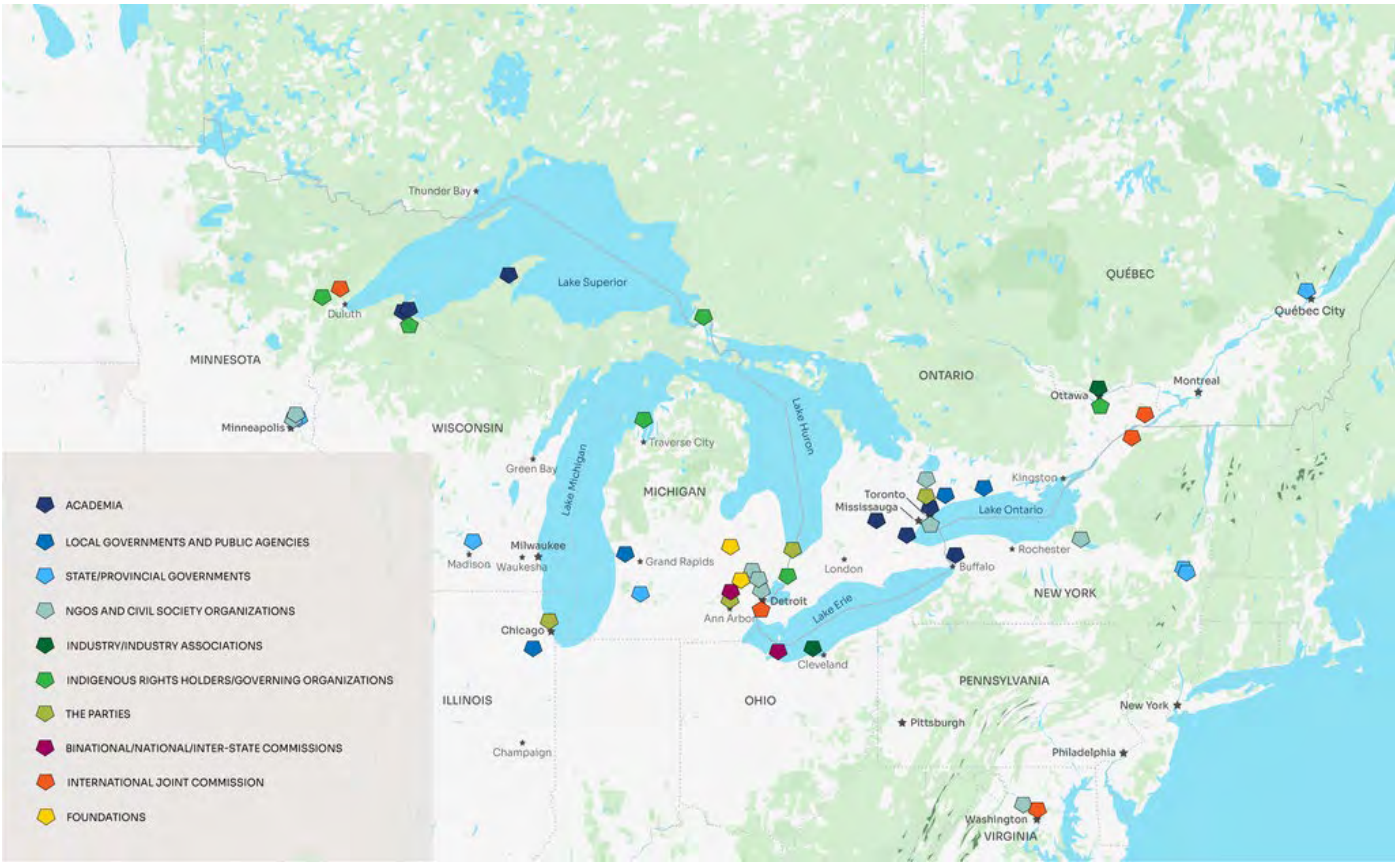
Table 1: Interviewees and Survey Respondent by Geographic and Temporal Representation

Geographic and Temporal Representation	Number of Interviews	Number of Surveys	Total
Canada	14	4	18
U.S.	24	9	33
Historical and/or long-term engagement with the GLWQA	3	2	5
Current and/or more recent familiarity with the GLWQA	14	4	18
Both historical & current engagement with the GLWQA	21	7	28

Table 2: Interviewees and Survey Respondent by Partner, Stakeholder or Group

Key Partners & Stakeholders	Interviews	Surveys	Total
IJC and substructures (e.g., advisory boards, committees, etc.)	14	4	18
Parties (i.e., Canadian and U.S. governments)	4	0	4
State/provincial governments	3	4	7
Local governments, public agencies, and watershed management agencies	3	3	6
Binational/national/inter-state commissions (e.g., Great Lakes Commission, Great Lakes Fisheries Commission)	4	1	5
Tribal Governments, First Nations and Métis	8	0	8
Nongovernmental organization /Civil society organizations	6	1	7
Academia	8	2	10
Industry/Industry associations	3	2	5
Foundations	2	0	2
TOTAL	55	17	72

Figure 1: Location of Interviewees and Survey Respondents



Analytical Framework for the Review of the Great Lakes Water Quality Agreement

The broad scope and data mining required to effectively conduct this study necessitated the development of an analytical framework to help guide the review of the GLWQA and its Annexes, and any supplementary materials. Six overarching questions and nine key themes were selected to help assess the previous and current versions of the Agreement and to organize and identify strengths, successes, challenges, gaps and opportunities for improvement. More specifically, the framework focused on the following overarching questions:

1. **What were the most important successes and challenges from previous versions of the Agreement and how can they offer lessons learned or best practices that are relevant to the GLWQA today?**
2. **What are the key highlights/successes and challenges/issues with the 2012 Agreement and its implementation?**
3. **What factors or conditions (e.g., political, environmental or social) provide context for how each version of the Agreement is focused and organized?**
4. **What short- and long-term opportunities exist for improvement and how should they be prioritized to strengthen the Agreement and its implementation, to better address the challenges facing the Great Lakes, and to improve the overall integrity of the ecosystem?**
5. **How can the Agreement stay nimble in a rapidly changing climatic, political and social environment?**
6. **To what extent has the Agreement contributed directly to the improvement of the chemical, physical and biological integrity of the Great Lakes over the last 50 years?**

Table 3 introduces nine key themes identified to help address these questions, along with a set of guiding questions developed to help ensure consistency in application. Themes were selected based on an understanding of similar approaches found in the literature.



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Table 3: Interviewees and Survey Respondent by Geographic and Temporal Representation

Key Themes	Example of Guiding Questions
1. Governance by the Parties As signatory Parties for the Agreement, federal governments in Canada and the U.S have primary responsibility for the implementation of the GLWQA. Clear internal roles and responsibilities, collaborative relationships, effective communication, and coordination of actions within and between the Parties and their delegate agencies/ministries under the GLWQA (e.g., U.S. Environmental Protection Agency (EPA) and Environment and Climate Change Canada (ECCC)) are important for ensuring binational leadership, and necessary for setting priorities, implementing programs and achieving progress on the GLWQA's purpose and objectives.	- How have the roles, responsibilities, and relationships of the Parties and their delegate agencies/ministries evolved under various versions of the Agreement? What have been the associated impacts? - How well do the Parties communicate, coordinate, and cooperate on the implementation of the GLWQA, both internally and with each other? - What are the key successes and challenges with the GLWQA as they relate to governance? What opportunities exist to strengthen governance mechanisms?
2. Roles and Responsibilities of the IJC The IJC and its advisory boards and substructures have several key roles and responsibilities related to the GLWQA. Clear understanding of these roles and responsibilities internally, effective communication and coordination, and diverse representation, including as part of its advisory boards and substructures, are necessary for ensuring that the IJC successfully supports the Parties in advancing the GLWQA agenda and implementation efforts. Constructive and collaborative working relationships and interactions between the IJC and the Parties (and delegate agencies/ministries) are also important for effective implementation of the Agreement.	- How have the internal roles, responsibilities, and relationships of the IJC and its advisory boards and substructures evolved under various versions of the Agreement? What have been the associated impacts? - How have the working relationships and interactions between the IJC and the Parties (and delegate agencies/ministries) evolved over time? - How well do the Parties and the IJC communicate, coordinate, and cooperate under the GLWQA and with its implementation? - What are the key successes and challenges with the GLWQA as they relate to the roles and responsibilities of the IJC? What opportunities exist to strengthen the role of IJC?
3. Agreement Structure and Implementation A clear and comprehensive purpose, scope, objectives, and structure under the GLWQA are critical to ensuring that the multiple, complex, and ever-evolving challenges facing the Great Lakes are effectively addressed. The structure of the Agreement and its implementation mechanisms establish an overarching framework that helps ensure that priorities are set, necessary programs are developed and implemented, appropriate resources are committed and directed to key sectors and groups, and performance is measured and assessed. The Agreement outlines commitments and requirements, and provides guidance for all partners and stakeholders, ensuring consistency in terms of goals and approaches. It is also important that the Agreement provides a flexible framework that enables the incorporation of emerging issues that may not have previously been on the environmental science or policy radar, in a timely and effective manner.	- How have the Agreement structure and implementation provisions, including purpose, scope, issue-specific Annexes and implementation measures, evolved under different versions of the GLWQA? - Does the current Agreement provide sufficient clarity of language and detail regarding purpose, scope, principles and approaches, roles and responsibilities, implementation programs and approaches, and desired outcomes? - To what extent do the current Annexes support and effectively address specific issues by providing clear structure, purpose, scope, commitments, binational and domestic implementation mechanisms, timelines or targets? - What are the key successes and challenges with the GLWQA as they relate to the Agreement's structure and implementation? What opportunities exist to strengthen the GLWQA structure and its implementation? - Does the Agreement provide a flexible framework for addressing new and emerging water quality issues and threats in a timely and effective manner? Does it provide for flexibility to pivot when necessary?

Key Themes	Example of Guiding Questions
4. Coordination of Partners A range of partners and stakeholders have a role to play in leading or supporting the implementation of the GLWQA. Meaningful, effective, and genuine engagement, coordination, cooperation, and communication with government partners, including Tribal Governments, First Nations, Métis or organizations representing them, and non-government partners is required to ensure that their diverse experience, expertise, resources, perspectives and traditional knowledge inform planning and the prioritizing of solutions, as well as their ability to lead or support the delivery of on-the-ground programs and initiatives.	- How well have the Parties (and delegate agencies/ ministries) and the IJC (and its advisory boards and substructures) communicated, coordinated, and cooperated with partners under different versions of the GLWQA? What have been the associated impacts? - Do existing formal coordination structures, mechanisms and models provide opportunities to influence decision-making and advance collaborative solutions through in-depth discussions, input, meaningful comments or critiques, and participation in on-the-ground actions? - What are the key successes and challenges with the GLWQA as they relate to the coordination of partners and stakeholders? What opportunities exist to strengthen their roles and engagement?
5. Engagement and Knowledge-Sharing Broader engagement of key partners and stakeholders, communities and the public, and opportunities to collect input and information, share knowledge and raise awareness of the GLWQA, can further strengthen decision-making and the implementation of the Agreement. Effective engagement and knowledge-sharing captures a broader range of perspectives, values, wisdom, and historical and traditional knowledge, to inform planning and the prioritizing of solutions, and contributes to greater general support for the Agreement and its implementation.	- How have engagement opportunities and knowledge-sharing processes for key partners and stakeholders, communities and the public evolved under various versions of the Agreement? What have been the associated impacts? - Do existing mechanisms and processes (e.g., public forums, consultations, information gathering and knowledge-sharing activities and tools) provide targeted engagement and information for different audiences? - Are there opportunities for new and/or different audiences to actively participate, provide continuing input and influence outcomes through interactive and ongoing engagement? - What are the key successes and challenges with the GLWQA as they relate to broader engagement and knowledge-sharing with various partners and stakeholders, communities and the public? What opportunities exist to strengthen their roles and engagement?
6. Tribal Governments, First Nations and Métis Tribal Governments, First Nations and Métis and their governing bodies require additional consideration in recognition of their important roles and engagement, unique concerns and priorities, and valuable Traditional Ecological Knowledge (TEK).	- How have the roles and engagement of Tribal Governments, First Nations and Métis, and their governing bodies evolved under various versions of the Agreement? What have been the associated impacts? - Are the roles of Tribal Governments, First Nations and Métis appropriately defined under the current Agreement? - Do current activities and programs engage and support Indigenous communities in the Great Lakes Basin, including through the incorporation of Traditional Knowledge? - What are the key successes and challenges with the GLWQA as they relate to the roles and engagement of Tribal Governments, First Nations and Métis and their governing bodies? What opportunities exist to strengthen their roles and engagement?

Key Themes	Example of Guiding Questions
7. Funding and Resource Allocation Long-term and consistent funding and other types of support (e.g., capacity-building and human resources, the production of guidelines and frameworks, etc.) are critical to ensuring successful implementation, engagement of partners and stakeholders, and general support for the Agreement and its objectives.	- How have the allocation of funding and other resources to support the achievement of the Agreement's objectives evolved under various versions of the Agreement? What have been the associated impacts? - Is adequate, long-term, prioritized funding and other types of support available to support the implementation of the GLWQA? - What are the key successes and challenges with the GLWQA as they relate to funding and resource allocation? What opportunities exist to strengthen funding and resource allocation?
8. Science and Data Collection Decision-making is strengthened when it is based on sound science and data, which has been collected, analyzed and made publicly accessible so that it can be understood by governments, partners and stakeholders and/or the public.	- How have research, monitoring, and data collection and sharing been used to support decision-making under various versions of the Agreement? What have been the associated impacts? - Do existing initiatives and programs enable the collection and sharing of necessary data and knowledge to support decision-making? - What are the key successes and challenges with the GLWQA as they relate to science and data collection? What opportunities exist to strengthen science and data collection?
9. Progress Measurement and Accountability Measuring performance using a comprehensive suite of indicators is necessary for understanding overall progress in addressing issues and threats to the Great Lakes. Regular monitoring and tracking of performance are necessary for ensuring accountability for the implementation of the Agreement and for determining whether its objectives are being met. Regular and publicly available reporting on progress and timely public access to information are important to enable partners and stakeholders and the public to evaluate the effectiveness of work undertaken to achieve the objectives of the Agreement. Knowledge-sharing is also important to ensure alignment on priorities and best practices to effectively coordinate across jurisdictions.	- How have performance measurement indicators, reporting requirements, and their implementation evolved under various versions of the Agreement? What have been the associated impacts? - Does the Agreement provide a clear framework and accountability mechanisms for tracking and regularly reporting on progress? - Are data collection and performance measurement based on a comprehensive suite of indicators? - Is reporting on progress in achieving specific goals and objectives regular, timely and comprehensive? - Are data on progress and achievements made regularly and publicly available in user-friendly formats? Is data shared directly with relevant organizations and jurisdictions? - What are the key successes and challenges of the GLWQA as they relate to progress measurement and accountability? What opportunities exist to strengthen progress measurement and accountability?



SECTION ONE: Introduction and Background

The five Great Lakes – Lake Superior, Lake Michigan, Lake Huron, Lake Erie, and Lake Ontario — form the largest group of freshwater lakes on Earth, making up about one-fifth of the world’s surface fresh water.^{2,3} Spanning a total surface area of over 244,106 km², the lakes border two countries, and within those two countries, eight American states (Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania, and Wisconsin) and one Canadian province (Ontario). A second province, Québec, is affected by Great Lakes water quality and its representatives frequently participate in Great Lakes forums. With the exception of Lake Michigan, which lies entirely within the U.S., the border between Canada and the U.S. runs through the middle of the lakes, making Great Lakes issues a key focus of binational relations. The region is home to hundreds of rural and urban municipalities and numerous Tribal Governments, First Nations and Métis communities — providing drinking water for more than 40 million people — and it is growing rapidly.

The Great Lakes region is a major economic powerhouse, with an annual GDP of approximately \$6 trillion USD.⁴ The lakes provide water for power generation, commercial fisheries, subsistence fishing, agriculture, manufacturing, pulp and paper production, and food processing, while also supporting a variety of recreational activities, such as sport fishing, boating and hunting. They are a vital shipping route for overseas markets, with major ports located on their shores. The lakes support over 1.5 million jobs and if the region as a whole stood alone, it would represent the third-largest economic unit in the world, after the U.S. and China.⁵

The natural beauty and abundance of the Great Lakes landscape have been a profound source of spiritual and artistic inspiration for the people living around them, including Indigenous peoples, who have inhabited the region for millennia. Tribes, First Nations and Métis have a special relationship with the Great Lakes and consider them sacred, living in harmony with them and demonstrating a sense of responsibility for the protection of their waters.⁶

Variations in lake depth, climate and geology in the Great Lakes region help sustain rich diversity, including more than 350 species of fish and over 3,500 plant and animal species, some of which are found nowhere else on Earth.⁷ The lakes, rivers and streams that flow into the Great Lakes, often fed by abundant groundwater, also support immensely diverse ecosystems, further enriching biodiversity in the region.

1.1. Evolving Pressures facing the Great Lakes

The natural riches of the Great Lakes environment have shaped the development of the communities within it, and that development has in turn, had an impact on the environment of the lakes. Beginning in the 17th century, the arrival of European settlers substantially altered the ecosystem integrity of the Great Lakes. The opening of the Erie Canal in 1825 and the Welland Canal in 1829 created a navigable waterway between Lake Ontario and Lake Erie and from Lake Erie to the Hudson River, opening the region to new arrivals, and farms, commercial enterprises and factories expanded in the area. Runoff and dumping from these activities polluted the water and depleted vast populations of fish, animals and birds.⁸ Recognizing that something needed to be done to address shared pollution and water quality issues along the 5,500-mile (8,900-kilometer) U.S.-Canadian border, the governments of Canada and the U. S. signed the BWT in 1909.

Throughout the early 20th century, the intensification of human settlement put increasing strain on the Great Lakes. During the 1940s, industrial expansion led to increases in mining as well as steel, rubber and chemical production around the lakes. New chemicals were used extensively in manufacturing. In 1959, the completion of the St. Lawrence Seaway opened the entire St. Lawrence–Great Lakes waterway to large vessels. This newly continuous shipping route resulted in a dramatic increase in trade and prosperity for the Great Lakes region but also introduced invasive, non-native species found in ships’ ballast water.

A series of events from the 1940s through the 1960s brought greater attention to the dire environmental situation in the Great Lakes Basin. The Cuyahoga River in Ohio repeatedly caught fire due to its oily surface, and industrial wastes in Michigan's Rouge River turned the water orange.⁹ Lake Erie was said to be “dying” as a result of too much phosphorus from detergents and untreated sewage, causing the proliferation of algae, foamy water and fish mortalities.

During the 1960s and '70s, toxic chemicals were found in fish and wildlife in high concentrations, sparking concern about the implications for the Great Lakes ecosystem and the health of those living in the region.¹⁰ In response, a number of substances, including mercury, PCBs (polychlorinated biphenyls) and DDT (dichlorodiphenyltrichloroethane), were either banned or controlled. Thanks to these efforts, fish and bird populations began to rebound and the overall environmental state of the lakes improved. While many of the most visible problems of the past may have been addressed, some have re-emerged in recent years and the lakes continue to face major issues today.

The 2019 binational report on the SOGL issued by the Canadian and U.S. governments highlights a familiar list of issues: a proliferation of invasive species, the deterioration of shoreline habitats and resulting impacts on food webs across the basin, and nutrient loading and associated harmful algal blooms.¹¹ A number of threats endanger the lakes, including contaminants such as pharmaceuticals, personal care products and microplastics, and climate change, arguably one of the greatest environmental challenges of our time.

The GLWQA commits the Parties (i.e., the U.S. and Canada) to report on the overall condition of the Great Lakes. The SOGL reports summarize the overall condition of the lakes based on the analysis of available data by over 200 government and non-government Great Lakes scientists and other experts.¹² The assessments are an important means of understanding current and emerging challenges to Great Lakes water quality and ecosystem health and they provide a critical means of evaluating the effectiveness of the environmental programs and policies in place to address them.

The most recent SOGL report found the condition of the lakes to be “Fair and Unchanging”¹³ based on the status of the following set of nine overarching indicators of ecosystem health (supported by 45 sub-indicators), linked to the nine objectives of the GLWQA:

- | | |
|------------------------|---|
| 1. drinking water | 6. nutrients and algae |
| 2. beaches | 7. invasive species |
| 3. fish consumption | 8. groundwater |
| 4. toxic chemicals | 9. watershed impacts and climate trends ¹⁴ |
| 5. habitat and species | |

Figure 2 shows the status and trend for each of these indicators across the lakes. While drinking water and beaches are noted to be in good condition, fish consumption, toxic chemicals, habitat and species, nutrients and algae, groundwater, and watershed impacts were assessed as fair. The status of invasive species is considered poor and deteriorating based on their contributions to continued impacts on biological communities, degraded water quality and altered nutrient cycling.¹⁵ However, when looking more closely at each of the lakes, important regional disparities become apparent. Nutrient conditions in Lake Erie remain poor, while flame-retardants like PFAS (per- and polyfluoroalkyl substances) are being found in greater amounts in Lake Ontario and Lake Erie. Climate change is also impacting water quality with an increase in the number of storm events contributing to more runoff and associated contamination.

There has also been increasing recognition in recent years of the importance of the interaction of multiple environmental stressors — factors whose presence adversely affects individuals, populations or ecosystems — and their cumulative impacts on the Great Lakes ecosystem.¹⁶ The SOGL reports illustrate the interrelationships that occur in the ecosystem and between sub-indicators (e.g., sub-indicator “condition of beaches” is impacted by several other sub-indicators, including water levels, precipitation, harmful algal blooms, and zebra and quagga mussels).

A 2020 report from the IJC’s Science Advisory Board (SAB) – Science Priority Committee found consensus in ecological literature for impacts resulting from multiple stressor interactions and outlines seven priority stressors representative of the breadth of those facing the lakes, including invasive species, toxic chemicals, nutrients, climate change, habitat loss, fish harvest and pathogens. While many of the interactions of multiple environmental stressors remain poorly understood, examples of significant impacts on the lakes include the rapid disappearance of *Diporeia* (a widespread benthic amphipod), the proliferation of zebra and quagga mussels, wetland loss, declines in native fish populations and nuisance algal blooms in Lake Erie.¹⁷

Figure 2: Assessment of Nine Great Lakes Indicators of Ecosystem Health according to Status and Trend (2019)*

Great Lakes Indicator	Status and Trend
Drinking Water	Status: Good; Trend: Unchanging
Beaches	Status: Good; Trend: Unchanging
Fish Consumption	Status: Fair; Trend: Unchanging
Toxic Chemicals	Status: Fair; Trend: Unchanging to Improving
Habitat and Species	Status: Fair; Trend: Unchanging
Nutrients and Algae	Status: Fair; Trend: Unchanging
Invasive Species	Status: Poor; Trend: Deteriorating
Groundwater	Status: Fair; Trend: Unchanging
Watershed Impacts and Climate Trends	Watershed Impacts: Status: Fair; Trend: Unchanging
	Climate Trends: No Overall Assessment
STATUS  Good  Fair  Poor  Undetermined	

Protecting the Great Lakes environment and preventing future issues is vital to the economic, social and ecological wealth not just of the region, but of the continent as a whole. The IJC’s second TAP report in 2020 noted that the Great Lakes, as always, are in transition. While important progress continues to be made on a variety of fronts, considerable work remains to be done. A complex network of institutions and organizations has developed over the years to collaborate on issues of importance to the region and there is a rich tradition of cooperation in addressing water quality issues among the two countries, states and provinces, municipalities, Tribal Governments, First Nations and Métis, industry, citizen groups, academia, environmental and community organizations, and others who share in the responsibility of protecting the lakes.

* Status is defined as Poor, Fair or Good. Trend is defined as Unchanging, Deteriorating or Improving and is assessed over a 10-year period.

1.2. Great Lakes Water Quality Agreement

There are a number of important initiatives and policy and regulatory frameworks of overarching importance to the Great Lakes, as well as those that address more specific issues. Building on what was established under the BWT and recognizing the need for a framework to coordinate efforts to manage and protect the Great Lakes, Canada and the U.S. signed the GLWQA in 1972.¹⁸ The Agreement provides a high-level framework “for identifying binational priorities and implementing actions that improve water quality.”¹⁹ Environment and Climate Change Canada (ECCC) coordinates activities and programs in accordance with the GLWQA in Canada, and the U.S. Environmental Protection Agency (EPA) is responsible for those in the U.S. In collaboration with its three advisory bodies, the WQB, the SAB and the Health Professionals Advisory Board (HPAB), the IJC provides advice to the Parties, identifies emerging issues, is responsible for public outreach and education and assesses the extent to which progress with government programming and other measures has been made in achieving the GLWQA’s objectives.²⁰

A broad range of partners and stakeholders have also supported the implementation of the GLWQA in various ways over time. These include other federal departments and agencies, state and provincial governments, Tribal Governments, First Nations, Métis, municipal governments, watershed management agencies, local public agencies, industry, non-governmental organizations and the public. The GLWQA had been credited with providing a space for partners and stakeholders through its recognition that they are essential to achieving the objectives of the Agreement.

The general water quality objectives of the 1972 Agreement called for the lakes to become “free from substances...in concentrations that are toxic or harmful to human, animal or aquatic life.”²¹ This version sought primarily to facilitate a coordinated approach to tackling the issue of phosphorus pollution from municipal and industrial sources.

A revised GLWQA, signed in 1978, adopted an ecosystem approach for the management of the lakes, considering the interaction of air, land, water and all living things, including people. The 1978 GLWQA also called for a broad range of pollution reduction programs, including a philosophy of zero discharge and the virtual elimination of persistent toxic substances (i.e., reducing the quantity or concentration of a substance in a release to below the lowest level that can be accurately measured using sensitive but routine sampling and analytical methods).

In 1983, the Agreement was supplemented to address phosphorus loading, in response to algal blooms in Lake Erie. The supplement included new scientific information on the “relation of land use to phosphorus introduction” and encouraged further monitoring from the Parties.²² Additional changes were made in a 1987 amendment:

- Annexes were added to address non-point sources of airborne toxic substances and contaminants in groundwater and sediment.
- Forty-three of the most seriously polluted areas in the Great Lakes Basin were identified as AOCs and procedures for cleanup through the development and implementation of site-specific Remedial Action Plans (RAPs) were formulated.
- The amended Agreement required the development of LaMPs to identify critical pollutants and present strategies to restore open lake waters.²³

The 1987 amendments to the GLWQA also called for improved bilateral consultation on Great Lakes issues, with meetings to review progress and coordinate strategies. In 2009, the two governments announced their intention to update the GLWQA again, recognizing that the provisions of the existing Agreement did not effectively address challenges such as invasive species, urbanization, habitat degradation and climate change. In 2012, a revised Agreement was signed that incorporates these issues, along with the roles of key institutions, issues of accountability, protection and restoration of nearshore areas and methods of ensuring shared responsibility for the Great Lakes.



Photo Courtesy of Sally Cole-Misch

SECTION TWO: Evolution of the Great Lakes Water Quality Agreement

The 50th anniversary of the signing of the GLWQA provides a unique opportunity to draw on historic progress and the many lessons learned from decades of incredible efforts to restore and protect the Great Lakes. An important step in moving forward is to first look back to assess progress made and to apply learning.

It became increasingly clear in the course of this project that separating past challenges associated with the GLWQA from its successes would not be a simple task. There have been unquestionable improvements in the overall quality of the Great Lakes ecosystem, habitat and biodiversity since the introduction of the Agreement, yet there is still considerable work to be done to address many of the issues that have faced the lakes for decades. Some have described progress as “inadequate”.²⁴ New threats with potentially significant risks for the health of the Basin continue to emerge, and issues once thought to have been addressed have resurfaced years later.

Understanding the evolution and interconnectedness of successes, challenges and relationships across the various iterations of the GLWQA is vital, as they not only tell a compelling story about the history of the basin and the Great Lakes community that has grown around it, but they also play an important part in identifying opportunities to further strengthen the Agreement.

2.1. Key Historical Successes, Challenges and Lessons Learned

Each successive version of the GLWQA has looked to address the most pressing environmental challenges facing the lakes at a specific point in time. This section explores overarching challenges and successes associated with the implementation of the Agreement, complemented by a discussion of the specific environmental and water quality issues that have served as the focal point for each iteration. This lays the foundation for an exploration of key lessons learned emerging from these challenges and successes.

It should be noted that the challenges, successes and lessons learned outlined herein are not an exhaustive list. Instead, they represent those that were identified through the literature or that were mentioned by interviewees or survey respondents as necessary context for the review of the current GLWQA.

2.1.1. Overarching Successes, Challenges and Lessons Learned

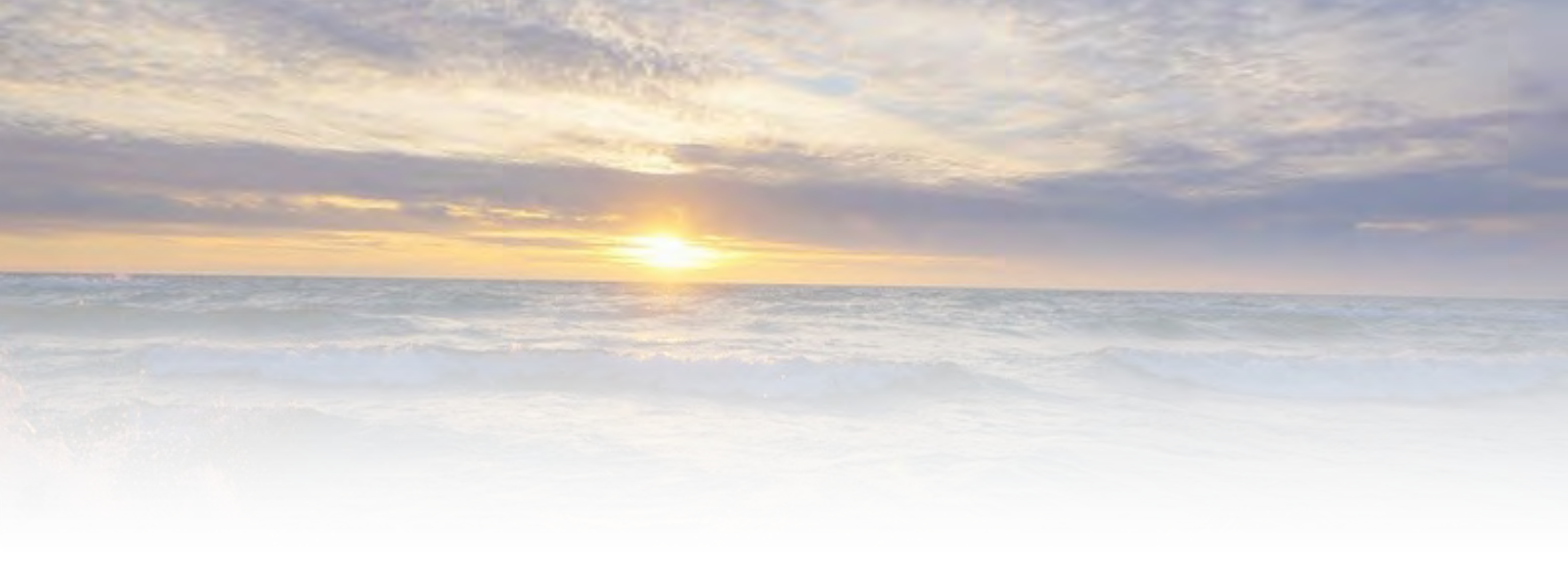
A Framework for Binational Collaboration and Coordination

Successes:

- The Agreement has provided an overarching binational framework and space for two countries, eight states, one province and a wide range of partners and stakeholders to come together, establish a focus on critical Great Lakes issues, express commitments, and communicate, coordinate, and collaborate with each other.
- The Parties see value in working cooperatively to fulfill their commitments under the Agreement.

Challenges:

- A consistent challenge faced by the GLWQA since its inception has been ensuring that it is robust in scope and capable of addressing multiple interests in Canada and the U.S., while also remaining nimble in its approach to new and emerging issues.
- The Agreement has lacked a clear, overarching plan to coordinate approaches and achieve measurable results.
- The lack of a clear and strong management and implementation framework has been identified as hindering implementation for some binational activities.



Lessons Learned:

- There is a need to recognize the use of domestic governance frameworks and tools to address commitments under the Agreement while at the same time increasing accountability.
- Agreeing on the science is necessary to determine challenges and specific actions to address them.

As previously noted, Canada and the U.S. recognized the need for a binational approach to managing their shared waters, which comprise over 40% of their common border, in the early 20th century.²⁵ Decades of environmental impacts from industrial development, agricultural run-off, and population increases had contributed to considerable impacts on water quality, demanding a revolutionary approach to addressing them, and one in which communication, coordination and collaborative governance were prioritized.^{26,27,28}

The signing of the BWT in 1909 and the establishment of the IJC marked a turning point at which both countries recognized that their shared waterbodies required coordinated management. Over time, this binational approach has evolved under the GLWQA into a framework capable of facilitating coordination and knowledge-sharing, as well as transparency and communication between the Parties, the IJC and the wide range of government and non-government partners and stakeholders that make up the Great Lakes community.

The GLWQA is recognized globally as significant in that two sovereign countries have agreed to restore and maintain their shared water resources.²⁹ Underlying the original GLWQA in 1972 was a commitment to working towards common goals regardless of national interests, and an understanding that both countries were equal under the Agreement, despite any differences in population, politics or economy.^{30,31} This commitment has continued and the binational approach to the governance of the Great Lakes has been described as “essential to achieving the goals of the GLWQA.”³² Yet, there is a lack of consensus among subject-matter experts, including those interviewed as part of this project, about how successful this approach has truly been.^{33,34}

Many interviewees and survey respondents point to Canada and the U.S. continuing to acknowledge the importance of working together to protect and enhance the water quality of the Great Lakes, despite ever-changing political and cultural contexts, various administrations, and a long list of competing priorities, as perhaps the most significant success of the Agreement. Indeed, the experience under the 1972 GLWQA demonstrated that despite complex jurisdictional issues, binational joint management by Canada and the U.S. could protect the lakes better than either country could alone.³⁵ However, other interviewees questioned how well the Parties, who have primary responsibility for ensuring that the GLWQA is implemented, have fulfilled this requirement.³⁶ Interviewees acknowledged that while there have always been strategies and frameworks outlined in the Agreement to address

specific environmental issues, it has lacked an overarching plan or clear direction on how to coordinate these approaches and achieve measurable results. Other interviewees criticized the Agreement for being primarily aspirational and lacking teeth where policy is concerned, citing a poor record of preventing new threats as an example of where it has fallen short of its intended purpose.

A review of the GLWQA conducted by the Parties in 2006 and 2007 with input from the public, pointed to the Agreement lacking “a clear and strong management and implementation framework, which has hindered implementation for some binational activities”.³² Participants in this project mentioned historic challenges related to the Parties’ ability to prioritize the health of the lakes while also balancing federal, state and provincial interests. It was also noted that there have been limited structures in place to protect the efficiencies of the Agreement when there is a change of administration on either side of the border, leading in some cases to meetings being convened without Commission members in attendance as they had not yet been appointed. One interviewee felt that this lack of efficiency contributed to slowing progress and could present challenges for consistently addressing environmental issues in future.

Emerging from these challenges and successes are lessons related to effective governance and the importance of binational cooperation in managing a shared resource. It was suggested by interviewees that there is a need to increase understanding of how respective governments use the tools at their disposal to achieve action in line with the science. The U.S. and Canada have different governance frameworks and tools at their disposal and the GLWQA allows them the room to determine which are most appropriate. However, one interviewee highlighted that this freedom can only be effective where there is accountability, and this is one area where several interviewees feel the Agreement needs to be strengthened.

As was noted by one interviewee, the underpinning of the Agreement is cooperative science and the understanding that there is a need to agree to what the challenges are so that you can take appropriate action to address them. The Great Lakes Basin is a successful example of where two Parties continue to work together to identify these challenges and to find ways to improve water quality based on current science and research.

Roles and Responsibilities of the International Joint Commission

Successes:

- Oversight and reporting by the IJC have brought attention to serious water quality issues affecting the lakes.
- The Agreement established important advisory bodies including the WQB, SAB and the GLRO to advise and support the activities of the IJC.
- The IJC has played a key role in bringing together partners and stakeholders to collaboratively achieve GLWQA objectives.

Challenges:

- There has been a decline in the effectiveness of IJC oversight over time, with its mandate limited in part by the Parties not having followed many of the reporting requirements outlined in the GLWQA.
- Emphasis on greater input and participation at the local level has complicated the role of the IJC.

Lessons Learned:

- There is a need for strong accountability mechanisms in the Agreement to support the implementation of binational activities.

The IJC serves as an independent advisor to the Parties, working to prevent and resolve disputes related to boundary water management. The IJC is comprised of three commissioners from each country (i.e., Canada and the U.S.). With the establishment of the BWT, the IJC was tasked with overseeing disputes and managing water resources in a fair and neutral manner and presiding over competing claims for allocation and use. In the years following its inception, the IJC was drawn further and further into Great Lakes issues, repeatedly asked to give advice on topics ranging from water and air pollution, to land use, water levels and diversions.

As early as 1912, the IJC began to support Canada and the U.S. by undertaking important studies and reports on water quality in the Great Lakes. In the late 1960s, the IJC released a report on the lower lakes that pointed to severe nutrient pollution causing injury to both health and property.³⁸ This report was foundational for the signing of the GLWQA in 1972, which gave responsibility to the IJC to oversee and assist with the implementation of the Agreement, including investigating and reporting on the status of the upper lakes and on land use activities related to contamination of the lakes. More specifically, the 1972 GLWQA assigned the IJC the following roles and responsibilities:

- Collating, analyzing and disseminating data and information on water quality in the Great Lakes and the operation and effectiveness of programs.
- Providing advice and recommendations, including those related to water quality objectives, legislation, standards and regulatory requirements and programs.
- Assistance in liaising and coordinating binational activities.
- Assistance in the coordination of Great Lakes water quality research and the dissemination of information concerning this research.
- Assessing and reporting annually on the Parties' progress towards achieving the objectives of the GLWQA.³⁹

In addition, the 1972 Agreement directed the IJC to establish a WQB and a Research Advisory Board (RAB). The role of the WQB was to assist the IJC in the exercise of the powers and responsibilities assigned to it under the Agreement. Among the responsibilities for the RAB were requirements to review research activities to determine their adequacy and reliability, to identify additional research to be undertaken and to provide advice and recommendations of a scientific nature to the IJC.⁴⁰ Finally, the Agreement permitted the IJC to establish the GLRO, made up of Canadian and U.S. staff. The staff at the GLRO provide administrative and technical support to the RAB (and later the SAB) and the WQB, along with services for programs.⁴¹

It is noted in the literature that while the 1972 GLWQA reinforced the IJC's role by recognizing it as the primary intergovernmental agent, coordinator and overseer for all Great Lakes pollution programs, its function remained limited to monitoring, surveillance and coordination of pollution programs.⁴² Articles 3 and 4 of the Agreement outlined formal reporting requirements for the IJC, with the implication that it would be involved in performance assessment related to commitments under the Agreement. The literature notes that this set up a "tension between the authority to report on performance, which was lodged with the IJC under the 1972 Agreement and the authority to actually implement the commitments, which resided with the Canadian and American governments as the signatory parties to the GLWQA."⁴³ This tension was noted by interviewees to have continued over time.

The 1978 GLWQA established a SAB to provide advice on research and scientific matters for both the IJC and the WQB. However, it has been suggested that the 1978 Agreement failed to provide the IJC with additional responsibilities or to broaden its scope of authority by reaffirming its advisory role. The 1978 GLWQA also included a requirement for the IJC to report to the Parties about progress in fulfilling water quality objectives on a biennial basis, rather than annually, as set out in the previous Agreement. The literature notes that this was likely the result of challenges related to successfully collecting appropriate data on an annual basis.⁴⁴

Over the years, there was pressure for the IJC's role to shift to one of an "environmental watchdog" and an "advocate for an ecological perspective on both sides of the border."⁴⁵ Under the 1987 Agreement, the IJC was given a more permanent role as watchdog with a clear focus on performance and continued biennial reporting related to the effectiveness of programs and other measures.⁴⁶ One interviewee noted that the watchdog role created tensions with the Parties as the IJC often voiced criticisms where there was failure to follow through on commitments. It was suggested that these tensions may have even contributed to a reduction in funding for the IJC from the Parties, and to a diminished mandate in the 1980s that aligned with the responsibility for public SOGL reporting transferring to the Parties.

The literature and interviewees suggested that there has been a decline in the effectiveness of the IJC's oversight over time. A 2006 report from the IJC itself stated that its ability to carry out its mandate had been limited in part due to the Parties not having followed many of the reporting requirements outlined in the GLWQA. It also suggested that the Parties had failed to provide all of the information necessary for the IJC to evaluate progress.⁴⁷ One interviewee referenced repeated messaging in biennial reports about the Parties not being in compliance with their commitments, particularly related to toxic substances. It was suggested that this contributed directly to slow progress on addressing dioxin and mercury in the lakes as the IJC had no power to hold the Parties accountable. Other interviewees noted that when the IJC has been the most outspoken or proactive, it has been ignored or marginalized by the Parties.

The relationship between the IJC and the Parties and the lack of mechanisms for accountability are common themes in the literature and were frequently discussed by interviewees as part of this project. The marginalized role of the IJC over time was also mentioned as an important challenge to be addressed to strengthen the Agreement in future. It has been noted that while the IJC may have faced challenges navigating its role over time, it should continue to be recognized for the important part it has played in bringing together partners and stakeholders to collaboratively support the achievement of GLWQA objectives.⁴⁸ In turn, the emphasis on greater input and participation at the local level has served to make the IJC's job more complicated.

Building a Great Lakes Community and Effective Engagement of the Public

Successes:

- The establishment of the GLWQA brought greater public and stakeholder attention to Great Lakes issues and helped to create and build a community with a commitment to the health of the lakes.
- Binational forums, particularly the Lake Superior Binational Forum, were a creative way of engaging communities, and very successful at providing space to discuss the issues core to the GLWQA, while allowing citizens to provide feedback directly to the Parties.
- Important scientific research and data collection has emerged from an original commitment to research and monitoring.

Challenges:

- The elimination of funding for binational forums and a lack of opportunities for meaningful participation contributed to a decline in public engagement over time.
- There can be challenges in reaching consensus due to the strong, diverse and complex nature of the Great Lakes community.

Lessons Learned:

- There is a need to create and support meaningful opportunities to engage the Great Lakes community and the broader public to meet the purpose of the GLWQA.

The GLWQA has been credited with creating an opportunity for meaningful engagement for a wide range of partners and stakeholders. Several study participants highlighted the fact that over time, the Agreement has provided an important framework and space for those on both sides of the border to come together and express commitments, announce new policy issues, collect data and information, and learn from leading experts about new scientific discoveries or challenges.

The Agreement asks partners and stakeholders to focus on shared priorities beyond those of their respective countries, states, provinces, or municipalities. A number of interviewees mentioned that the Agreement is directly responsible for creating and building a community of those with a common interest, shared language and concepts, and commitment to the health of Great Lakes. Despite any potential shortcomings, the GLWQA has given citizens a greater role in shaping policy to address transboundary pollution through opportunities for public participation in the decision-making process. As one interviewee shared, the Great Lakes community transcends political boundaries, and this social aspect of the Agreement is a notable historical success.

Throughout its various iterations, the Agreement has also drawn awareness to the concerns of the Great Lakes scientific community on a broad range of issues, including those associated with nutrients, persistent toxic substances, and aquatic invasive species (AIS). Much of the scientific research that has been conducted in the Great Lakes Basin has emerged from a commitment in the original 1972 GLWQA to research and monitoring.⁴⁹ As a result, there has been important work undertaken to develop long-term datasets and the framework to support new and emerging research. However, one interviewee noted that political priorities often determine which research is funded, creating challenges for the Great Lakes scientific community. It was suggested that there is a pressing need for decision-makers to ensure they are seeking out scientific research that is objective, credible and free from political influence.⁵⁰

The energy and civic action of the 1970s, along with the growth of the environmental movement, was a common theme in many of the interviews conducted as part of this project. It was suggested that this level of public engagement may have had to do with the feeling that the Great Lakes were in crisis at the time. One interviewee noted that from the 1970s through to the early 1990s, there was significant public engagement at IJC meetings, with thousands in attendance. However, another felt that at the time of the 1978 and 1987 amendments to the GLWQA, the public was “generally absent from both the negotiating and implementation processes.”

Support for inclusion increased in the early 1990s, when binational forums were established “to further consultation and participation among government, industry and environmental stakeholders on the restoration and protection” of each lake.⁵¹ A number of study participants mentioned that these binational forums, and more specifically, the Lake Superior Binational Forum, were a creative and meaningful way of engaging a wide range of partners, stakeholders and communities in effective discourse. Binational forums were noted to be successful at providing

space to discuss the issues that were core to the GLWQA and for ensuring citizens could provide feedback directly to the Parties, something that is seen as critical for encouraging accountability.

Some interviewees noted that when funding for binational forums was eliminated in recent years, it directly contributed to a waning in public engagement that continues to this day. It was suggested that the end of these binational forums was indicative of a broader lack of support by the Parties for the public input process and citizen-led efforts, and a shift towards an engagement model geared towards top-down, communicating out, rather than a two-way exchange of ideas and information. However, other interviewees felt that the binational forums, while successful at engaging a core group of dedicated groups and individuals, failed to reach the rest of the community and the broader public or to gather meaningful feedback. One interviewee noted that whether the forums were effective had a lot to do with finding the right people and ensuring there was a well-funded and sustained effort to engage.

It was noted that in the lead up to the 2012 GLWQA much attention was directed to the need to enable more active engagement of the Great Lakes community in both the development of a renewed Agreement and in the programs to support its implementation. It was suggested by one interviewee that the nature of the strong, diverse and complex Great Lakes community makes it extremely challenging to reach consensus on priorities or a path forward. They felt that the evolution of the Agreement has been an important lesson that there are some cases where the broader community may need to tackle an issue on its own, without expectation that its priorities will always align with those of the Parties, the IJC or other partners and stakeholders.

Engagement of Tribal Governments, First Nations and Métis

Successes:

- Increased engagement of Tribal Governments, First Nations and Métis over time has led to more opportunities to highlight their concerns.
- The IJC continues to promote diversity in the composition of its boards.

Challenges:

- The economic marginalization of Indigenous communities in the Great Lakes Basin and lack of consideration for Indigenous legal structures and governance frameworks has limited engagement with the Agreement.
- Indigenous communities in the Great Lakes Basin continue to face significant and disproportionate environmental issues (e.g., poor water quality resulting in long-standing drinking water advisories).

Lessons Learned:

- It is important to continue to build trust with Tribal Governments, First Nations and Métis and Indigenous communities to ensure their important perspectives and concerns are addressed and that their knowledge and ways of knowing are acknowledged.

The literature points to the BWT of 1909 being developed “through a Western legal framework, exclusive of Indigenous law” and explicitly as a “binational agreement between two sovereign nations, rather than a multinational agreement between multiple nations.”⁵² Water resource development has often occurred at the expense of Indigenous communities who, even prior to the BWT, were not consulted or considered in activities that could potentially harm the lakes, such as diversions and dredging. In fact, “for the first ninety years after BWT was signed, the IJC was specifically instructed not to engage with the Tribes and First Nations.”⁵³

The Tribal Governments, First Nations and Métis, who have lived in the Great Lakes region for millennia, are deeply connected to the health of the ecosystem, and yet their legal structures and governance frameworks have not been taken into consideration over time.⁵⁴ This lack of engagement going back to the establishment of the BWT set the stage for decades of Tribal Governments, First Nations and Métis having to fight for acknowledgement of treaty rights and Indigenous governance, which continues in the present day. While lines of communication were noted to be more open at the time of the 1972 GLWQA, Indigenous communities living in the Great Lakes Basin were not considered as rights holders and their concerns were not sufficiently addressed under the Agreement.⁵⁵

In the 1980s, Indigenous peoples in the Great Lakes Basin began to attend IJC biennial meetings, which by the end of the decade received considerable media coverage and provided opportunities to highlight their concerns.⁵⁶ In 1997, the IJC delivered a landmark report to the Parties calling for a more “inclusive vision of board governance” that specifically mentioned Indigenous communities. As a result, there was a marked change to the composition of IJC bodies, including a number of individuals being appointed to the Science Advisory Board.

One interviewee noted that Indigenous communities in the Great Lakes Basin have been marginalized economically for many decades as the result of treaties and their interpretation, which has made it more difficult to address a variety of environmental issues. At the same time, Indigenous communities in the Great Lakes Basin have disproportionately faced unthinkable challenges, including a lack of access to clean drinking water and drinking advisories that have lasted years, and in some cases, decades. There are important lessons to be learned from the history of engagement of Tribal Governments, First Nations and Métis in the Great Lakes region that can be applied to discussions about strengthening the Agreement moving forward.

Applying an Ecosystem Approach

Successes:

- The GLWQA brings together scientists from various fields and disciplines to drive focused and coordinated research and a shift from a siloed approach to addressing specific issues to a holistic approach.
- Introduction of an ecosystem approach provided a broader, more holistic view of the Great Lakes and how each of the components of air, land, water and living organisms are interconnected.

Challenges:

- It takes time to understand and gather effective research from a holistic perspective, which in some cases, can slow implementation.
- It can be a challenge to effectively implement a complex ecosystem approach, particularly without consensus on its definition.

Lessons Learned:

- It is a significant challenge to determine how to effectively implement and build infrastructure and institutions to support the use of an ecosystem approach.
- Strengthening emphasis on an ecosystem approach will ensure improved outcomes over traditional approaches to addressing Great Lakes water quality issues.



The literature points to several examples of where the successes of the GLWQA are as much philosophical, as they are practical. One example cited is the use of the ecosystem approach, formally introduced as a means of managing environmental stressors within the Great Lakes Basin in the 1978 amendment to the GLWQA. While there is no one definition of an ecosystem approach, it is often broadly described as being in opposition to traditional approaches to resource management that focus on a single media. Instead, the ecosystem approach emphasizes principles that flow from a scientific understanding of the nature of ecosystems.⁵⁷

Addressing one issue at a time had some success early in the history of the GLWQA, but in the 1970s scientists began to question this approach for solving more complex environmental problems. Scientists involved with the IJC's Research Advisory Board agreed that the focus of the 1972 Agreement and its "water quality objectives approach" was too narrow to resolve the problems facing the Great Lakes, including growing evidence of contamination from toxic persistent substances and their long residence times. In 1977, the Research Advisory Board recommended a shift to "an ecosystem approach to problem identification, research and management" in the Great Lakes.⁵⁸

The ecosystem approach is described in the 1978 GLWQA as "the examination of the (Great Lakes) basin as an Ecosystem, simultaneously relating events within the Ecosystem to those in surrounding areas in a biospheric perspective".⁵⁹ It recognizes that there is an interconnectedness within the various elements and components of the ecosystem and a delicate balance that exists between them.⁶⁰ The 1987 GLWQA highlights the fact that restoration and enhancement of the lakes could not be achieved by addressing individual threats in isolation, and further described an ecosystem approach as "taking management actions that integrate the interacting components of air, land, water, and living organisms, including humans".⁶¹

There was a lack of agreement among those interviewed for this study about how successful this approach has been in realizing practical improvements on-the-ground over time. Some felt that the integration of the ecosystem approach was an important success from the 1978 revisions to the Agreement as it provided a broader, more holistic view of the Great Lakes ecosystem. Both the literature and interviewees noted that the integration of the ecosystem approach in the RAP program, requiring that they operate on a principle that embodies a "systemic and comprehensive ecosystem approach", has been a key component of the success of Annex 2 of the Agreement.⁶²

The ecosystem approach under the GLWQA is also credited with bringing together scientists from various fields and disciplines to drive focused and coordinated research. It has been noted that it can contribute to multi-stakeholder decision-making that considers a broader range of impacts on water quality.⁶³ Interviewees were not in agreement about whether the need to ensure that science and priorities under the Agreement take this holistic approach slowed progress on addressing specific issues. Some felt that this was indeed the case, with coordination on various scientific approaches and the interconnection between different elements and stressors being a lengthy undertaking, with results not available for decades when studying extremely complex ecosystems. For example, one interviewee mentioned that it has historically been challenging to limit the discharge of specific contaminants because there is a need to understand how they interact with all aspects of the ecosystem before setting limits.

It was also noted by interviewees and survey respondents that some of the decline in effectiveness of Great Lakes governance over time and through various iterations of the GLWQA has been related to a lack of clarity about how to apply the ecosystem approach.⁶⁴ One interviewee clarified that this familiar argument of not being able to agree on a definition should not be an excuse for inaction as there is consensus around the basic elements, such as the interrelationships between air, water, land and all living things, including humans. An important lesson learned emerging from the history of the GLWQA's use of an ecosystem approach is that it is a significant challenge to determine how to effectively implement and to build the infrastructure and institutions necessary to support its use. However, there was broad agreement among interviewees and survey respondents that employing an ecosystem approach will ensure improved outcomes over traditional approaches in future.

Funding and Financial Support

Successes:

- The establishment of the GLRI has been a motivator, contributing to an increase in remediation and restoration efforts in the U.S.

Challenges:

- There has been a lack of significant and sustained funding for Great Lakes programming and implementation by the Parties over time.
- Funding focused on priority areas can contribute to a false picture of the extent of the issues faced across the Great Lakes Basin.

Lessons Learned:

- Funding activities often align with public and civic advocacy efforts.
- Partners and stakeholders can't effectively take the lead on implementation and programming efforts without financial support.

Funding and support for Great Lakes activities and programming is identified in the literature and by interviewees as a critical challenge affecting the success of the implementation of the GLWQA. Over time, there has been inconsistent political will to fund commitments under the Agreement.⁶⁵ The Nixon administration in the U.S. did not provide support under the 1972 Agreement and in 1978, continued to refuse to “fund needed infrastructure around the basin,” with little improvement during the subsequent Carter administration.⁶⁶ It was not until the Great Lakes Legacy Act in 2002 and the establishment of the Great Lakes Restoration Initiative (GLRI) in 2010 that a major, dedicated funding source was established for remediation and restoration efforts in the U.S.

The GLRI contained an initial investment of \$500 million USD over a five-year period, creating a sustained and well-funded program to support Great Lakes efforts. Funding authorities provide tools for local communities through cost-sharing agreements that encourage collaboration through a public-private-non-profit partnership model. Priority under these programs was given to the remediation of contaminated sediments and the restoration of AOCs with the removal of Beneficial Use Impairments (BUIs). The delisting of AOCs is reported to have greatly accelerated since the GLRI was established.⁶⁷ Several interviewees pointed to the GLRI as a motivator and commended its contributions to significant improvements to the Great Lakes Basin ecosystem.

In Canada, a number of funding mechanisms have supported efforts in the Great Lakes over time. Two key historical support mechanisms for the region were the Great Lakes Cleanup Fund, established in the late 1980s, and its replacement, the Great Lakes Sustainability Fund, in 2002. This program was then replaced by the Great Lakes Protection Initiative in 2017. Funding for Great Lakes efforts is also administered under the *Canada-Ontario Agreement Respecting the Great Lakes Water Quality and Ecosystem Health* (COA), signed in 1971 in response to growing public concern about pollution in and around the Great Lakes.⁶⁸ The COA is the primary mechanism through which federal departments and provincial ministries work together to meet some of Canada's key obligations under the GLWQA. The COA management committee also works in cooperation with the U.S. and binational agencies on Great Lakes initiatives.

Interviewees and study respondents mentioned that a number of the financial commitments made over time have aligned with public will and advocacy from the Great Lakes community. Several study participants noted that regardless of the language outlined in the GLWQA, it is not possible to effectively implement the Agreement without sustained financial resources. Interviewees also highlighted the significant difference between the amount of funding that has been committed by the U.S. over the last decade versus Canada and the impact this has had on addressing issues on respective sides of the border.

2.1.2. Specific Successes, Challenges and Lessons Learned

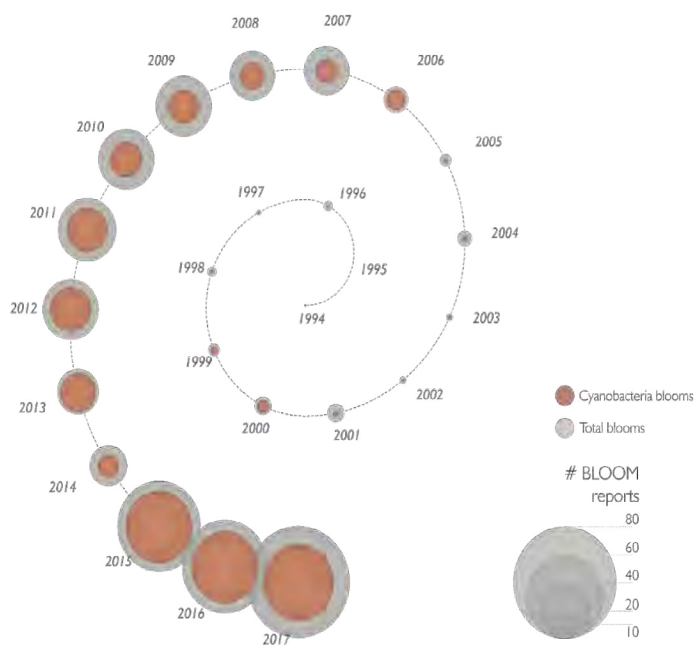
Nutrient Loading and Eutrophication

When looking at more specific environmental issues in the Great Lakes, perhaps the most critical lessons can be learned from the history of addressing nutrient loading within the Basin. While challenges associated with municipal and industrial nutrient sources were initially successful, the continued threat of algal blooms across the Great Lakes points to shortcomings in the approach to addressing the issue under the Agreement.

By the mid-20th century, phosphorus entering the Great Lakes primarily from agricultural and urban runoff, industrial discharges, untreated sewage, detergents and atmospheric deposits had helped to create the ideal conditions for the proliferation of algae. This was particularly true of the lower lakes and in the 1970s, Lake Erie was said to be “dying” due to significant algal blooms.⁶⁹ In 1966, the IJC published the Lower Lakes Reference Study, which attributed the degradation of Lake Erie to excess phosphorus.⁷⁰ Central to the 1972 GLWQA were commitments to limit phosphorus discharges into the lakes. The Agreement required the Parties to set basin-wide water quality benchmarks and review the design and operation of the region's water treatment infrastructure. Within a short timeframe, the wastewater treatment systems in many Great Lakes municipalities were upgraded to enhance phosphorus removal, which in turn, led to marked improvements for water quality.⁷¹

Maximum phosphorus loading targets were introduced under the 1978 Agreement in an effort to limit eutrophication. These were further specified for each lake in the 1983 supplement.^{72,73} These changes, implemented in combination with regulations on industrial loading, contributed to a significant decrease in phosphorus concentrations and phytoplankton biomass in the lakes between 1970 and 2000, and the phosphorus reduction measures were regarded as an international environmental success.⁷⁴ This achievement established the GLWQA as an instrument capable of instigating scientific discovery, informing policy, and contributing to environmental protection.

However, this was not to be the end of the phosphorus story. Despite these measures and early successes related to urban point sources, several issues have not yet been fully addressed or began to reoccur years later.⁷⁵ For example, microcystis blooms became a more regular occurrence in Lake Erie, cladophora began to reach nuisance levels on a more regular basis in the lower lakes and hypoxia has continued to degrade fish habitat. These impacts have occurred despite no obvious increases in nutrient loading in the lakes.⁷⁶ While studies have pointed to these issues potentially resulting from an increase in the proportion of bioavailable nutrients or changes in the nutrient cycle as a result of invasive species, it highlights the importance of re-examining how nutrients in the lakes are addressed on an ongoing basis.⁷⁷



Persistent Toxic Substances

The Great Lakes played a critical part in North America's industrial development. When whole populations of cormorants, herons and gulls living on the lakes began to disappear in the 1960s and 70s, scientists realized that the threat of toxic chemical pollution had become a reality. Persistent toxic substances were discovered in wildlife during routine monitoring. Some bird populations disappeared, others had difficulty hatching their eggs and still others could not reproduce at all. Bird species were particularly affected by dioxin, which caused thinning eggshells and birth defects, such as extra limbs and crossed beaks in chicks. Fish showed signs of contamination as well, including tumours and reproductive effects.⁷⁸

Water pollution controls enforced by Canada and the U.S. in the 1970s reduced the dumping of suspended solids and oxygen-depleting materials. PCBs and DDT were banned, so that their levels in the environment decreased. Persistent toxic substances were the focus of the 1978 GLWQA, following a WQB report in 1977 identifying discharges as the most significant contributor to degraded water quality.⁷⁹ The Agreement called for the virtual elimination of "any or all persistent toxic substances" by adopting a zero discharge philosophy. Many interviewees and survey respondents identified the inclusion of these approaches in the GLWQA, and binational cooperation towards implementing them, as a key success.

Targeted actions to control many of the sources of these pollutants resulted in a significant improvement in water quality in the lakes, and by the late 1970s, decreases in the levels of persistent toxic substances allowed many species to regain their vitality. Yet despite these measures, studies performed in the Great Lakes in the mid-1980s

* Figure adapted from Winter, J. G. et al. (2011). Algal Blooms in Ontario, Canada: Increases in reports since 1994. *Lake and Reservoir Management*, 27(2).

still showed the presence of persistent toxic substances. Study participants noted that initial bans on DDT and PCBs were very successful at reducing releases into the lakes but that it proved to be much more difficult to deal with cleaning up sediments. Many persistent toxic substances had bound themselves to particles in the water and moved to the sediment; so, while initial concentrations in the water and fish were reduced, these substances were eventually released back into the water.

Many types of Great Lakes fish have been identified as unsafe for consumption for women of reproductive age and young children over the years.⁸⁰ Consumption restrictions remain for some Great Lakes fish today, primarily as a result of elevated levels of PCBs and mercury.⁸¹ As a result, the unrestricted consumption of Great Lakes fish for the general population is not yet possible, which has a significant impact on many communities that rely on fish for food, cultural, economic or spiritual purposes.

Over the years, a number of other contaminants have been identified in the Great Lakes, their risks assessed, and in many cases, actions taken. These include PFAS, phthalates, nonylphenols, and polybrominated diphenyl ethers (PBDEs) and other flame retardants. Many of these chemicals are from non-point sources: they have been found in surface water, groundwater, drinking water, aquatic species, sewage biosolids, soil and sediments in the Great Lakes Basin. Evidence continues to mount on the range of human health effects that these contaminants contribute to, from temporary and relatively mild, to chronic and serious. They vary from substance to substance and even from one person to another, depending on factors such as genetic susceptibility and stage of development at time of exposure.

A number of study participants discussed the Zero Discharge Demonstration Program (ZDDP) in Lake Superior as a best practice model for addressing contaminants. The program outlined nine bioaccumulative contaminants of concern (i.e., mercury, PCBs, dioxin, hexachlorobenzene, octachlorostyrene and four pesticides including DDT and chlordane) and has made tremendous progress in addressing them. The ZDDP is credited with reducing the release of mercury and dioxin into the Lake Superior Basin by 80% and 85% by 2010 from baselines determined in 1990.⁸²

In the 1987 amendment to the GLWQA, the Parties agreed to develop RAPs to restore 42 AOCs in the Great Lakes (a 43rd was added in 1991) that were suffering from severe environmental degradation. An AOC is a “geographic area that fails to meet the General or Specific Objectives of the Agreement”.⁸³ AOCs are designated by assessing the state of local environmental conditions against 14 different BUIs based on human activities (e.g., eating fish, drinking water, swimming) and ecological impacts (e.g., bird and animal deformities, loss of wildlife habitats, etc.). However, despite the importance of their introduction, only three Canadian AOCs (Collingwood Harbour, Severn Sound and Wheatley Harbour) and one U.S. AOC (Oswego River) had been delisted prior to the 2012 amendment to the GLWQA.



Photo Courtesy of Sally Cole-Misch

Areas of Concern, Remedial Action Plans and Lakewide Management Plans

The 1987 amendment to the GLWQA also required greater levels of accountability with the development of LaMPs for each of the five Great Lakes. LaMPs identify actions that are necessary to help restore and maintain each lake and to coordinate the work of the numerous stakeholders involved in the implementation of these actions. Some of the activities under the various LaMPs have included remediation efforts for AOCs; the development of biodiversity strategies and AIS prevention plans; monitoring of harmful pollutants and habitat loss; and efforts to reduce waste and prevent nutrient loading. The Parties were mandated to develop LaMPs in consultation with state and provincial governments, to “reduce loadings of Critical Pollutants”⁸⁴ and effective in addressing localized challenges.

Support for addressing issues in AOCs has been described in the literature as a watershed moment as it represented a tangible commitment to rebuilding infrastructure that is critical to ensuring thriving communities and to providing a rich quality of life.⁸⁵ There were a variety of perspectives among those interviewed for this study related to the successes and challenges associated with AOCs. While many were critical of the lack of progress in most over time, they acknowledged that the inclusion of Annex 2 in the Agreement was an undeniable success. Others mentioned that it is unrealistic to expect that all AOCs would have been restored or remediated in the period since the Agreement has been in place given the extent of the issues in many locations and the fact that it can take time for the ecosystem to show any measurable response to management actions.⁸⁶ One interviewee felt that the AOC model provides an effective way to eliminate siloed responses to the challenges facing the Great Lakes through its focus on collaborative, science-based solution development.

One interviewee pointed to the geographic scale of the AOCs as an important consideration when determining how to effectively address environmental issues. AOCs can be considered microcosms of the impact of humans on the Great Lakes. It was noted that there is considerable focus under the GLWQA on planning, assessing and reporting on a lake-wide or basin-wide scale. While this is important, it was suggested that in many cases it may be too broad where collaboration, coordination and communication are concerned. History has shown that addressing some diffuse and complex environmental challenges may be most effective on a smaller scale (either geographically or thematically). As such, there are lessons to be learned related to where an AOC model could be applied.

The literature points to a range of lessons learned from those AOCs that have been successfully delisted including to “ensure meaningful public participation; engage local leaders; establish a compelling vision; establish measurable targets; practice adaptive management; build partnerships; pursue collaborative financing; build a record of success; quantify benefits; and focus on life after delisting.”⁸⁷ The accountability for action built into the RAP program has also been identified as a successful intervention method that could be looked to for inspiration in other areas under the Agreement. Accountability is established by clearly defining problems and supporting the sharing of information, agreement on remedial and preventative action, and the identification of who is responsible. This builds a strong foundation for holding partners and stakeholders accountable for their responsibilities.

Physical Integrity

The purpose of the 1978 GLWQA is to “restore and maintain the chemical, physical, and biological integrity of the waters of the Great Lakes Basin Ecosystem.” The literature notes that this was important because it pointed to the idea that the Agreement would focus less on the end-of-the-pipe treatment of contaminants in the Great Lakes and more on the integrity of the ecosystem.⁸⁸ However, due to the fact that most of the visible harm and pollution facing the lakes at the time was related to contaminants, initial focus under the Agreement was on the chemical and biological integrity of the lakes.

The phrase “physical integrity” points to a need to make room for rivers, headwater forests, aquifers, small flows, wetlands and the lakes themselves that support and are supported by natural flowing rivers. However, the long history of navigational dredging in the Great Lakes has meant that the effects of rearranging channels may have gone unquestioned in the past.⁸⁹

There has been increasing recognition over the years that physical integrity is critical for management, conservation, flood control and navigation.⁹⁰ It has been noted that “Urban development degrades wetlands by hardening shoreline, filling wetland, adding a broad diversity of chemical pollutants, increasing runoff, adding sediments, and increased nutrient loading.”⁹¹ Physical alterations in waterways can also contribute to drought or flash flooding, both of which can significantly impact water quality and the Great Lakes Basin ecosystem. Interviewees questioned the extent to which the GLWQA had successfully considered physical integrity over time and noted that there was a need to determine how best to more routinely take this aspect of the Agreement’s purpose into account moving forward.

Climate Change

The potential implications of climate change for the Great Lakes region were recognized as early as the mid-1980s, and scientific evidence developed since then has only intensified concerns about its effects. Compounding the challenge of climate change are other stresses already facing the lakes, including those related to land use, the presence of toxic substances, elevated levels of phosphorus, aging infrastructure and invasive species. Many of these stresses are predicted to become more severe as a result of climate change.

The Great Lakes Basin had been showing signs of many of the impacts consistent with a changing climate for many years in the lead up to the renegotiated GLWQA in 2012, including an increasing number of extreme weather events such as rainstorms, floods, blizzards and droughts. Scientists were predicting warmer winters, more extreme heat waves in summer, increased lake evaporation and warmer water temperatures throughout the region. However, it was not until the 2012 amendment that a new annex was added which outlined more comprehensive measures to address climate change. Several study participants noted that addressing diffuse issues like climate change, which have a significant impact on almost every other threat facing the Great Lakes, is one of the most important challenges requiring greater consideration under the GLWQA moving forward.



Photo Credit: Skyler Ewing

SECTION THREE: The 2012 Great Lakes Water Quality Agreement

Despite the ambitious goals set out under the 1987 GLWQA, efforts to meet them slowed in the years to follow. It was also apparent through a review of various measurement activities (e.g., BUIs in AOCs) that more recent progress under the Agreement at the time had been minimal. A review of the GLWQA was triggered following the release of the IJC's 12th Biennial Report in 2004. The review took place between 2006 and 2007. Review Working Groups were convened and binationally co-chaired to provide their input to the comprehensive review of the operation and effectiveness of the 1987 Agreement. The review process found that while there had been many successes, the GLWQA was outdated and unable to address current threats to the Great Lakes at that time.⁹² A call for a new “action-oriented” Agreement with “clear accountability provisions, a binational steering committee, more public involvement, and requisite resources” emerged.⁹³ In response to consensus, the Parties announced in 2009 that they would begin negotiations to amend the Agreement.

The GLWQA was amended for a fourth time in 2012. While re-affirming existing commitments, the new Agreement provided an updated approach for dealing with more modern issues that may not have previously been a policy priority. The 2012 Agreement introduced new annexes related to threats such as AIS, loss of habitat, and climate change. It also emphasizes the importance of public engagement in making progress against its purpose and objectives. The literature and input from interviewees and survey respondents point to the renegotiated 2012 Agreement being reflective of the idea that existing laws, policies and institutions were sufficient at the time and that the focus moving forward should be on improving the performance of both binational and domestic implementation efforts to attain better results than those that had been achieved up to that point.⁹⁴

This section explores successes and challenges associated with the 2012 GLWQA and highlights opportunities where the Agreement could be strengthened to facilitate progress towards its goals. It is organized according to the following broad themes identified in the literature and most prevalent in responses from the interviews and surveys conducted as part of this project:

- Purpose, Objectives and Scope (3.1)
- Structure and Implementation (3.2)
- Governance (3.3)
- Roles and Engagement of Tribal Governments, First Nations and Métis (3.4)
- Roles and Engagement of Governments, Stakeholders and the Public (3.5)
- Progress Measurement and Reporting (3.6)

3.1. Scope, Purpose and Objectives

This subsection takes a closer look at the purpose, objectives, and scope of the 2012 GLWQA, with an eye towards clarity of language, and determining their adequacy in addressing the complex and ever-evolving water quality challenges facing the Great Lakes.

3.1.1. Historical Considerations

1972 Great Lakes Water Quality Agreement

The 1972 GLWQA was shorter in length than subsequent versions of the Agreement, consisting of 13 articles and eight Annexes aimed primarily at cleaning up visible pollution.⁹⁵ For the most part, the language of the Agreement was broad and aspirational, but it also included specific benchmarks or concentration limits for various inputs to the “Great Lakes System”, which represented the minimum desired levels to ensure water quality. It established general and specific water quality objectives for the first time. General objectives included keeping the Great Lakes

free from toxic substances and nutrients that contribute to eutrophication, floating materials, nuisance conditions and sludge deposits. The specific objectives included standards for dissolved oxygen, total dissolved solids, pH, iron, coliform, phosphorus and radioactivity.⁹⁶

The Agreement outlined specific means of addressing Great Lakes pollution, including establishing programs for the control of municipal and industrial source pollution, measures for the control of eutrophication, plans for the control of pollution from agricultural, forestry and land use activities and programs for the control of pollution from shipping, dredging, offshore and onshore activities.

1978 Revisions to the Great Lakes Water Quality Agreement

The 1978 GLWQA contained important new provisions that reflected the changing complexities of Great Lakes pollution and promised more rigorous control. A new purpose statement introduced the concept of an ecosystem approach and the virtual elimination of the discharge of toxic substances. A zero discharge approach was also implemented through stricter water quality objectives.⁹⁷ Of significance were new or revised articles which addressed pollution from various land use activities (e.g., agriculture, forestry, etc.) and the effect of air pollution on water quality.

The Agreement followed the structure of the 1972 GLWQA in its inclusion of general and specific water quality objectives. While the general objectives remained relatively unchanged, they provided that the lakes be free from thermal pollution, floating materials and nutrients which create growths of aquatic life that interfere with beneficial uses.⁹⁸ The specific objectives differed significantly from those of the 1972 GLWQA, outlining stricter water quality goals. For example, the amendment required the Parties and the IJC to develop and maintain an inventory of pollution abatement requirements, along with completing compliance schedules and status reports. The Parties were also required to consult on the establishment of the specific objectives and on pollutant loading rates for each lake.⁹⁹ These changes pointed to a broadening of the goals of the Agreement related to the types of pollution to be addressed, the approach to their management and the expectations of the Parties with respect to water quality in the Great Lakes.¹⁰⁰

1987 Amendment to the Great Lakes Water Quality Agreement

The 1987 Protocol maintained the framework of previous versions of the Agreement, such as the inclusion of water quality objectives, programs and reporting. However, provisions related to management were strengthened and there were significant changes to the Agreement, including the following:

- The principle of ecosystem integrity was strengthened through the introduction of the development and adoption of ecosystem objectives.
- The scope of the Agreement was broadened, and new annexes were added to address non-point source contamination, pollution from airborne toxic substances, contaminated sediments, groundwater and subsurface sources.
- The list of specific objectives expanded considerably beyond those outlined in previous versions of the Agreement.
- Restoration of impaired water uses in 42 designated AOCs (a 43rd was introduced in 1991)¹⁰¹ was introduced, along with a requirement to develop and implement RAPs.
- Introduction of a requirement to develop and implement LaMPs to address lake-wide contamination.¹⁰²

Table 4 provides a high-level overview of the changes to the definitions, purpose and objectives of the Agreement for 1972, 1978, 1983 and 1987.

Table 4: Great Lakes Water Quality Agreement Purpose and Objectives*

Article	1972	1978	1987
1	Definitions	Definitions	Definitions
2	General Water Quality Objectives	Purpose	Purpose
3	Specific Water Quality Objectives	General Objectives	General Objectives
4	Standards and Other Regulatory Requirements	Specific Objectives	Specific Objectives

3.1.2. Scope of the 2012 Great Lakes Water Quality Agreement

The 2012 GLWQA is organized by a series of articles defining principles and outlining general and specific objectives, along with approaches that describe the structure and process for its implementation. Revisions to the Agreement established a “comprehensive shared vision and common objectives and commitments to science, governance and action” aimed at restoring and protecting Great Lakes water quality and ecosystem health.¹⁰³ It includes modernized provisions related to excessive algal growth, pollutants and pollution from ships and scientific research. It also incorporated new commitments to addressing degradation of the nearshore, and threats from AIS, climate change and the loss of habitat and species. In addition, the 2012 GLWQA strengthened provisions for governance, accountability and engagement of government and non-government partners and the public.¹⁰⁴

A theme explored in the literature but also discussed by interviewees in the course of this study, is the question of geographic boundaries considered under the GLWQA. Despite the fact that the waters of the Great Lakes flow out through the St. Lawrence River Basin, watersheds located in Québec that flow into the lakes are not included within the Agreement.¹⁰⁵ There was a lack of consensus on whether this issue should be addressed under the GLWQA. A number of interviewees and survey respondents felt that expanding opportunities for greater collaboration with governments and other partners in Québec would serve to more effectively protect the entire Great Lakes and St. Lawrence Basin. However, one survey respondent noted that the St. Lawrence in Québec does not share a border with the U.S. and for this reason, discussion of inclusion of the province under the Agreement should not be reopened.¹⁰⁶

Interviewees and survey respondents also felt strongly that the increased recognition of Tribal Governments, First Nations and Métis, throughout the current Agreement, including under the principles and approaches and objectives, goes a long way towards further acknowledging their important perspectives, valuable insights and right to be included in conversations and decision-making related to the Great Lakes ecosystem. However, there was broad agreement that much more needs to be done.

Another important change to the scope of the 2012 GLWQA was recognition of nearshore areas as part of an integrated approach to management of the Great Lakes. The definition for the “Waters of the Great Lakes” in the current Agreement makes specific reference to the inclusion of the nearshore, in addition to open waters.

An interviewee acknowledged that one of the biggest challenges for the scope of the GLWQA is determining how to find a balance between setting a large regional framework and not being overly prescriptive, and the need to provide enough direction on how to implement the Agreement through programs and policies. They noted that determining how to translate regional issues into programs and policies at a federal, state, or provincial level is critical for striking this balance.

* Adapted from Jetoo, S., & Krantzberg, G. (2014). A SWOT analysis of the Great Lakes Water Quality Protocol 2012: The good, the bad and the opportunity. *Electronic Green Journal*, 1(37).

3.1.3. Purpose, Principles and Approaches

Purpose

Purpose of the 2012 Great Lakes Water Quality Agreement

1. The purpose of this Agreement is to restore and maintain the chemical, physical, and biological integrity of the Waters of the Great Lakes. To achieve this purpose, the Parties agree to maximize their efforts to:
 - (a) cooperate and collaborate;
 - (b) develop programs, practices and technology necessary for a better understanding of the Great Lakes Basin Ecosystem; and
 - (c) eliminate or reduce, to the maximum extent practicable, environmental threats to the Waters of the Great Lakes.
2. The Parties, recognizing the inherent natural value of the Great Lakes Basin Ecosystem, are guided by a shared vision of a healthy and prosperous Great Lakes region in which the Waters of the Great Lakes, through sound management, use and enjoyment, will benefit present and future generations of Canadians and Americans.
3. The Parties recognize that it is necessary to take action to resolve existing environmental problems, as well as to anticipate and prevent environmental problems, by implementing measures that are sufficiently protective to achieve the purpose of this Agreement.

A review of the literature and feedback from interviewees suggests that overall, the purpose of the Agreement remains relevant and sufficiently broad to allow the Parties to focus on the protection and restoration of the Great Lakes, while flexible enough to address new and emerging threats.¹⁰⁷ For the most part, interviewees were in agreement that the language used is clear and that it does an adequate job of communicating the purpose. Responses to the GLWQA 50th Anniversary Work Group survey indicated that 59% of participants felt there was no change needed to the Agreement's purpose, while those who did support change pointed to a need to clarify or strengthen language, increase accountability, include specific issues and even consider a complete rewrite. Interviewees for this project pointed to other key concepts and terms that are either notably absent, or which are not clearly and explicitly articulated in the purpose.

Several interviewees pointed to the Agreement's purpose lacking a proactive, forward-looking, long-term perspective and despite the inclusion of language around anticipating and preventing environmental problems, felt that it is framed in a way that speaks primarily to addressing pollution hot spots, historical issues, restoration and maintenance of the status quo. While there has been some success in addressing certain issues from a reactive standpoint, the purpose fails to articulate a vision for the Great Lakes of the future. It was suggested by one interviewee that including language specific to proactive action in the purpose statement would contribute to further strengthening efforts to not only address issues already facing the lakes, but to also make use of foresight, forecasting and the identification of potential threats before they emerge.¹⁰⁸

While human health is referenced in the preamble, interviewees and survey respondents noted that the purpose would also benefit from the inclusion of a more explicit statement or focus on the social dimensions associated with the Great Lakes ecosystem. As one interviewee noted, “I want to emphasize the need for better understanding how the health of the Great Lakes is tied to the lives and the livelihoods of the people that live and visit here.”

There was a lack of consensus among interviewees and survey respondents about whether the Agreement has been successful in meeting its intended purpose to “maintain the chemical, physical, and biological integrity of the Waters of the Great Lakes.” One interviewee highlighted that the commitment to the physical integrity of the lakes, in particular, has been overlooked and even damaged in the pursuit of other goals like restoring chemical and biological integrity. Since the most visible harm has historically occurred in the lakes themselves, where contaminants in the system collect, the focus has been on removing or containing them. They argued that instead, “physical integrity may be the most important factor in the health and resilience of a stream” because chemical and biological integrity are dependent on it. It was suggested that this is one area where greater emphasis needs to be built into the Agreement.¹⁰⁹

Principles and Approaches

The 2012 GLWQA includes a list of principles and approaches, many of which build on concepts and lessons learned from previous versions of the Agreement, including virtual elimination and zero discharge.¹¹⁰ There was general agreement among interviewees and survey respondents that the inclusion of these principles and approaches under Article 2 has served to strengthen the Agreement’s overall implementation. However, a consistent comment was that there is a need for further clarity and agreement on the definitions for some of the principles and approaches.

Concepts not found in previous versions of the Agreement have also been incorporated, including adaptive management, sustainability and the precautionary principle, which have been identified as important tools for addressing competing environmental and ecosystem priorities. These concepts have been tied to an expansion of the scope of responsibilities that the Parties have committed to, and the role of the IJC in monitoring action.¹¹¹ One interviewee noted that the focus on adaptive management is of particular importance, as it allows the Agreement to evolve in line with new science, technology and discovery. It also provides room to adapt to new threats and issues as they arise. Another interviewee suggested that there is a lack of agreement on use of the precautionary approach among all partners and stakeholders.

Principles and Approaches

- Accountability
- Adaptive management
- Adequate treatment
- Anti-degradation
- Coordination
- Ecosystem approach
- Innovation
- “Polluter pays”
- Precaution
- Prevention
- Public engagement
- Science-based management
- Sustainability
- Tributary management
- Virtual elimination
- Zero discharge

The following summarizes key successes and challenges outlined in the literature and discussed by interviewees and survey respondents related to the principles and approaches of the 2012 GLWQA.

Accountability: The Agreement has been described as representing one of the only mechanisms in the Great Lakes where there is real, substantive, scientifically credible, funded research underway that is being used to determine whether the Parties are achieving progress under the Agreement.¹¹² A number of interviewees mentioned that the fact that the document is drafted and signed by the Parties is important, as it adds an extra level of accountability beyond a document produced by a third party.

A recurring discussion during the interviews was that under the 2012 Agreement, the Parties are responsible for their own reporting on progress, which raises questions around accountability. Interviewees and survey respondents were divided on whether this was cause for concern. Progress reporting, including reports (e.g., PRP and SOGL reports) and public forums, is central to the implementation of the 2012 Agreement. While a number of study participants mentioned language around transparency as an improvement, it was also suggested that more could be done, particularly related to processes and public engagement.

One interviewee felt that it was important to note that the idea of accountability between nations is an interesting concept because the most that can be done is to shine a light on progress (or a lack of). They noted that the GLWQA supports this, and that it can highlight areas where improvements are needed while also allowing the Parties to use the diplomatic tools available to them to address accountability.

Coordination: The literature and interviewees articulated that despite the inclusion of a coordination principle in the Agreement, there is still a need for more genuine collaboration and relationship-building, particularly with Tribal Governments, First Nations and Métis, and the incorporation of Indigenous perspectives as part of planning and best management practices. Many noted that there is also a need to build trust and work more closely with Indigenous communities in the Great Lakes Basin to appropriately integrate their unique perspectives, including TEK, into programming and activities.

Public engagement: The 2012 GLWQA includes a renewed focus on public engagement. The literature and input from interviewees and survey respondents point to this as being welcome, however, some noted that there has been a rollback on this commitment in the years since the Agreement was signed. One interviewee felt that in addition to providing opportunities for the public to contribute to the achievement of objectives under the Agreement, there is a critical need to be clearer and more consistent about how the science is being communicated. It was suggested that there should be a responsibility to communicate without rhetoric or at the whim of special interests.

A number of interviewees also questioned how the Parties would know whether they have been successful with engaging the public under the Agreement. It was suggested that for the most part, the public is unaware of the existence of the GLWQA or who is responsible for its implementation. Other study participants felt that while public engagement may be a principle guiding the 2012 Agreement, the approach employed by the Parties is outdated and fails to take into account recent advances in understanding about meaningful engagement. For example, there are no guidelines for using new technologies, media or approaches to address a broad range of audiences.

Zero discharge and virtual elimination: The literature and participants in this study pointed to the fact that while some progress has been made towards addressing toxic persistent chemicals in the Great Lakes, there have not been the reductions in use, release or concentrations found in the environment that were anticipated when zero discharge and virtual elimination principles were introduced. This has been attributed to a range of challenges, including the principles being applied to a relatively limited number of substances, uneven or inadequate implementation of the principles, a focus on industrial and municipal sources and application of the principles to

one substance at a time, rather than to an entire class of similar substances.¹¹³ It has also been noted that these approaches lack a focus on addressing the disproportionate impacts of toxic persistent chemicals in Indigenous communities, communities of colour, and low-income communities.¹¹⁴

One interviewee mentioned that the principle of virtual elimination should be broadened to recognize a need to reduce the use of toxic chemicals as part of processes and not just at end-of-pipe. They felt this would have a greater impact on the amount of the substances released into the lakes. It was also mentioned that the use of the word “as appropriate” in the definition for zero discharge leaves a lot of room for subjective application of the concept.

3.1.4. General and Specific Objectives

The 2012 GLWQA commits the governments of Canada and the U.S. to achieving nine basin-wide **General Objectives**. To help achieve these objectives, the Agreement also commits the Parties, in consultation with state and provincial governments, Tribal Governments, First Nations, Métis, municipal governments, watershed management agencies, other local public agencies, downstream jurisdictions, and the public, to identify and attain **Specific Objectives**. These are further categorized according to Lake Ecosystem Objectives to be established for each lake, and Substance Objectives that provide numeric targets to further direct actions to manage substances to reduce threats to human health and the environment.

GREAT LAKES WATER QUALITY AGREEMENT GENERAL OBJECTIVES		
		
Be a source of safe, high-quality drinking water	Allow for swimming and other recreational use, unrestricted by environmental quality concerns	Allow for human consumption of fish and wildlife unrestricted by concerns due to harmful pollutants
		
Be free from pollutants in quantities or concentrations that could be harmful to human health, wildlife, or aquatic organisms through direct or indirect exposure through the food chain	Support healthy and productive wetlands and other habitats to sustain resilient populations of native species	Be free from nutrients that directly or indirectly enter the water as a result of human activity, in amounts that promote the growth of algae and cyanobacteria that interfere with aquatic ecosystem health, or human use of the ecosystem
		
Be free from the introduction and spread of aquatic invasive species and free from the introduction and spread of terrestrial invasive species that adversely impact the quality of the Waters of the Great Lakes	Be free from the harmful impact of contaminated groundwater	Be free from other substances, materials or conditions that may negatively impact the chemical, physical or biological integrity of the Waters of the Great Lakes

Source: Second Triennial Assessment of Progress on Great Lakes Water Quality Report (2020)

A number of interviewees and survey respondents noted that the objectives under the 2012 GLWQA are broad, comprehensive and relevant, particularly when compared to previous versions of the Agreement. Responses from the GLWQA 50th Anniversary Work Group survey indicated that 31% of participants felt that no change was needed to the Agreement's objectives, while 45% thought that there was a need to improve governance, implementation and accountability. Suggestions for specific objectives included combining Lake Huron and Lake Michigan under the GLWQA, addressing water quantity, restoring and maintaining biodiversity, groundwater protection and equality and diversity.

Interviewees noted that as currently written, the Agreement's objectives are too general and with few exceptions, they lack mention of the type of deliverables, concrete targets, and defined timelines that are necessary for prompt action, leading to confusion around necessary outcomes and creating challenges for accountability. However, one interviewee cautioned against an approach overly focused on specific deliverables and timelines, stating that there is the potential to oversimplify complex issues and promote a focus on meeting numerical targets that may be convenient for reporting purposes while losing sight of overall goals.

There was broad consensus among those interviewed or providing survey responses that additions to the objectives related to the introduction and spread of invasive species, harmful impacts on groundwater, and support for healthy wetlands and other habitats were all critical to ensuring the 2012 Agreement is capable of addressing issues that have become increasingly prevalent. However, it was suggested by one interviewee that the general objectives lack a focus on biodiversity and that there is a need for either a stand-alone objective related to restoring and maintaining rich biodiversity, or language that integrates this focus across other relevant objectives. Another noted that recognition of cumulative impacts or the effects associated with multiple stressors are not explicitly addressed in the objectives (including the Substances Objectives), which is a critical gap given that these impacts are not well understood, creating challenges for mitigation.

It was also mentioned by an interviewee that as written, General Objective viii, which states that the Great Lakes "be free from the harmful impact of contaminated groundwater", is too narrowly focused on preventing contaminated groundwater from causing harm to the receiving waters (i.e., the lakes). It was suggested that a broader focus on also preventing groundwater from becoming contaminated would be more appropriate. This would not only serve to ensure the quality of base flow, but it would also protect those who use groundwater as a source of drinking water. Strengthening the focus on water quantity was also discussed, with interviewees noting that low water levels can have significant impacts on water quality. It was suggested that incorporating a general objective related to water quantity, such as maintaining or enhancing surface flows and groundwater levels would be appropriate.

While the specific objectives outline a commitment to collaboration and consultation with Tribal Governments, First Nations and Métis, in their identification and work to attain them, it was noted that overall, the objectives in the 2012 GLWQA lack consideration for their role and priorities, and that language related to relevant treaties, rights, titles and jurisdiction should be further incorporated.

A number of interviewees and survey respondents also noted that the 2012 GLWQA lacks inclusion of a focus on equity, diversity and environmental justice, described as encompassing fairness, equity, participation, and relationality. Interviewees noted that these principles are critical for recognizing and further addressing the disproportionately negative environmental impacts experienced by a wide range of underserved and underrepresented communities, including those related to water affordability and water quality. Including an environmental justice objective would allow for the meaningful and intersectional engagement of all peoples regardless of race, ethnicity, gender, and education level, with respect to the implementation of the Agreement.¹¹⁵ It was suggested that a commitment to equity and environment justice could effectively be integrated into the principles and approaches to ensure that they guide the Parties in achieving the purpose of the Agreement, and could also be further articulated as a Specific Objective to proactively develop, support and encourage inclusion by a diversity of communities.¹¹⁶



Photo Credit: Roman Boed

3.1.5. Opportunities for Improvement

The 2012 GLWQA includes modernized provisions related to excessive algal growth, pollutants, pollution from ships and scientific research, along with new commitments to addressing degradation of the nearshore, threats from AIS, climate change and the loss of habitat and species. It also strengthened provisions for governance, accountability and engagement of government and non-government partners and the public. The majority of interviewees and survey respondents felt that overall, the purpose of the Agreement remains relevant and broad, enabling a focus on protecting and restoring the lakes, while ensuring flexibility to address new and emerging threats. General and Specific objectives under the 2012 GLWQA were also noted to be comprehensive and relevant. These insights align with the results of the GLWQA 50th Anniversary Work Group survey, where 59% of participants felt that no changes were needed to the purpose of the Agreement, while 31% indicated that no change was needed to the General or Specific Objectives.

The key successes and challenges associated with the scope, purpose, principles and approaches of the 2012 GLWQA highlight a number of opportunities to further strengthen the Agreement. Several interviewees pointed to the purpose lacking a forward-looking, long-term perspective and identified a need to strengthen language to support proactive action. The limited role of human health in the Agreement and the need for a more explicit focus on the social dimensions associated with the Great Lakes ecosystem were also highlighted by interviewees and survey respondents. It was suggested that the physical integrity of the lakes has been largely overlooked in the implementation of the Agreement, in pursuit of other goals like restoring chemical and biological integrity. Opportunities to strengthen the focus on physical integrity, such as incorporating additional language or ensuring that a fluvial geomorphologist sits on the WQB were noted as ways to strengthen this focus.

With regards to the Agreement's objectives, suggestions were made to improve governance and accountability, including those related to addressing water quantity, the ecosystem approach, restoring and maintaining biodiversity, groundwater protection and equity, diversity and environmental justice. Interviewees and survey respondents also felt strongly about the need to increase recognition of Tribal Governments, First Nations and Métis throughout the Agreement, and particularly under the principles and approaches and objectives. These and other suggestions for future action are reflected in this report's Matrix of Action (Section 4.3).

3.2. Structure and Implementation

The 2012 GLWQA commits Canada and the U.S. to action on 10 priority issues, structured as a series of Annexes. Several of these, including Annex 6 (AIS), Annex 7 (Habitat and Species) and Annex 9 (Climate Change Impacts), focus on issues previously unaddressed by the Agreement, while others have been updated or revised based on new information, approaches and understanding to support continued work on existing threats to human health and the environment (e.g., harmful algae, toxic chemicals, and discharges from vessels contributing to the spread of invasive species).

It is beyond the scope of this report to review progress that has occurred to meet commitments under the 2012 GLWQA beyond that which relates to the structure of the Agreement. For further detail on progress, see the most recent [PRP](#) and the [IAP](#).

3.2.1. Historical Considerations

1972 Great Lakes Water Quality Agreement

The 1972 GLWQA included eight Annexes and incorporated water quality objectives and joint contingency planning into this structure. Three key actions are identified in the literature as being successful as they relate to implementation efforts: the upgrading of sewage treatment plans, eliminating phosphorus from household detergents and efforts to control point source industrial pollutants.¹¹⁷

1978 Revisions to the Great Lakes Water Quality Agreement

The revised 1978 GLWQA established a list of persistent toxic substances for priority action and introduced additional provisions to address pollution from various land-use activities. The Agreement included a total of 17 Annexes, with notable additions including RAPs and a LaMPs Annex (Annex 2) and a Supplement on Phosphorus Load Reduction (Annex 3). Other new annexes included those related to non-point contaminant sources (Annex 13), contaminated sediment (Annex 14), airborne toxic substances (Annex 15), contaminated groundwater (Annex 16) and associated research and development (Annex 17). Further accountability provisions were also introduced, such as the need for Parties to review specific objectives and requirements, and for the IJC to make appropriate recommendations.¹¹⁸

1987 Amendment to the Great Lakes Water Quality Agreement

By 1987, the GLWQA was amended again through protocol. The investigative role of the IJC was reinforced through biennial reporting responsibilities on the effectiveness of programs and other measures, and advice and recommendation.¹¹⁹ No additional Annexes were added to the Agreement, though terms of reference for joint institutions and the GLRO were incorporated under the Research and Development Annex (Annex 17).

Table 5 shows changes to the Agreement's Annexes for 1972, 1978 and 1987.



Table 5: Agreement Annexes for 1972, 1978 and 1987*

Annex	1972	1978w	1987
1	Specific Water Quality Objectives	Specific Objectives Specific objectives supplement to Annex 1	Specific Objectives Specific objectives supplement to Annex 1
2	Control of Phosphorous	Remedial Action Plans and Lakewide Management Plans	Remedial Action Plans and Lakewide Management Plans
3	Vessel Design, Construction and Operation	Control of Phosphorous Phosphorous Load Reduction Supplement	Control of Phosphorous Phosphorous Load Reduction Supplement
4	Vessel Wastes	Discharges of Oil and Hazardous Polluting Substances from Vessels	Discharges of Oil and Hazardous Polluting Substances from Vessels
5	Study of Pollution from Shipping Sources	Discharges of Vessel Wastes	Discharges of Vessel Wastes
6	Identification and Disposal of Polluted Dredging Soil	Review of Pollution from Shipping Sources	Review of Pollution from Shipping Sources
7	Disposal from Onshore and Offshore Facilities	Dredging	Dredging
8	Joint Contingency Plan	Discharges from Onshore and Offshore Facilities	Discharges from Onshore and Offshore Facilities
9		Joint Contingency Plan	Joint Contingency Plan
10		Hazardous Polluting Substances Appendix 1 - Hazardous Polluting Substances Appendix 2 – Potential Hazardous Polluting Substance	Hazardous Polluting Substances Appendix 1 - Hazardous Polluting Substances Appendix 2 – Potential Hazardous Polluting Substance
11		Surveillance and Monitoring	Surveillance and Monitoring
12		Persistent Toxic Substances	Persistent Toxic Substances
13		Pollution from Non-Point Sources	Pollution from Non-Point Sources
14		Contaminated Substances	Contaminated Substances
15		Airborne Toxic Substances	Airborne Toxic Substances
16		Pollution from Contaminated Groundwater	Pollution from Contaminated Groundwater
17		Research and Development	Research and Development

* Adapted from Jetoo, S., & Krantzberg, G. (2014). A SWOT analysis of the Great Lakes Water Quality Protocol 2012: The good, the bad and the opportunity. *Electronic Green Journal*, 1(37).

3.2.2. Articles

While the Agreement includes a number of articles in support of its implementation, the following summarizes those mentioned by interviewees and survey respondents as being relevant to the objectives of this report.

Article 4: This Article describes programs, activities and other measures to be developed by the Parties, in cooperation and consultation with state and provincial governments, Tribal Governments, First Nations, Métis, municipal governments, watershed management agencies and the public, to fulfill the purpose of the Agreement and achieve its objectives. These include:

- (a) pollution abatement, control, and prevention programs for a variety of sources
- (b) measures to prevent, control and eradicate AIS
- (c) conservation programs to restore and protect habitat, and recover and protect species
- (d) enforcement actions to ensure the effectiveness of programs (a), (b) and (c)
- (e) necessary research and monitoring programs to support the commitments made in the Agreement¹²⁰

Article 4 commits the Parties to the appropriation of funds in support of the implementation of the Agreement, including those required by the IJC to carry out its responsibilities. The Parties are also required to enact legislation that may be necessary to support implementation, to seek the cooperation of the full range of government and non-government partners in pertinent matters and to engage the public and downstream jurisdictions, as appropriate.¹²¹

Article 5: This article addresses consultation, management and review, and recognizes the importance of securing public input and advice related to the GLWQA and its programs and activities. It establishes the following in support of the implementation of the Agreement:

- **Great Lakes Executive Committee (GLEC):** Chaired by ECCC and the U.S. EPA, the GLEC is responsible for overseeing implementation of the Agreement. Its membership consists of senior representatives from the governments of Canada and U.S., state and provincial governments, Tribal Governments, First Nations and Métis, municipal governments, watershed management agencies, and other local public agencies.
- **Great Lakes Public Forum:** A Great Lakes Public Forum is to be convened by the Parties and the IJC every three years to provide an opportunity to discuss and receive public input on the state of the Great Lakes, binational priorities for science and action and progress achieved.
- **Great Lakes Summit:** Convened every three years in conjunction with the Great Lakes Public Forum, the Great Lakes Summit promotes coordination among the Parties, the IJC and other governmental organizations, and to increase their effectiveness in managing Great Lakes resources.

Section 2(c) of the Agreement requires the Parties to establish binational priorities for science and action for each Annex subcommittee, in consultation with the GLEC, to ensure effective implementation of the Agreement. Article 5 also outlines review and reporting requirements for the Parties, including preparing the binational PRP to document actions related to the Agreement prior to each Great Lakes Public Forum, reviewing the Assessment of Progress Reports prepared by the IJC and consulting with each other on the recommendations and necessary actions, and reviewing the operation and effectiveness of the Agreement following every third TAP Report.

Several interviewees commented on Article 5, noting that the structure of the Great Lakes Public Forum and Great Lakes Summit are primarily built around a presentation of reports that have been completed without real conversation or engagement. It was suggested that altering the timing of the forum and summit so that they occurred a year after the release of the SOGL report would allow for improved discussions based on adequate time given for review and to digest its contents.

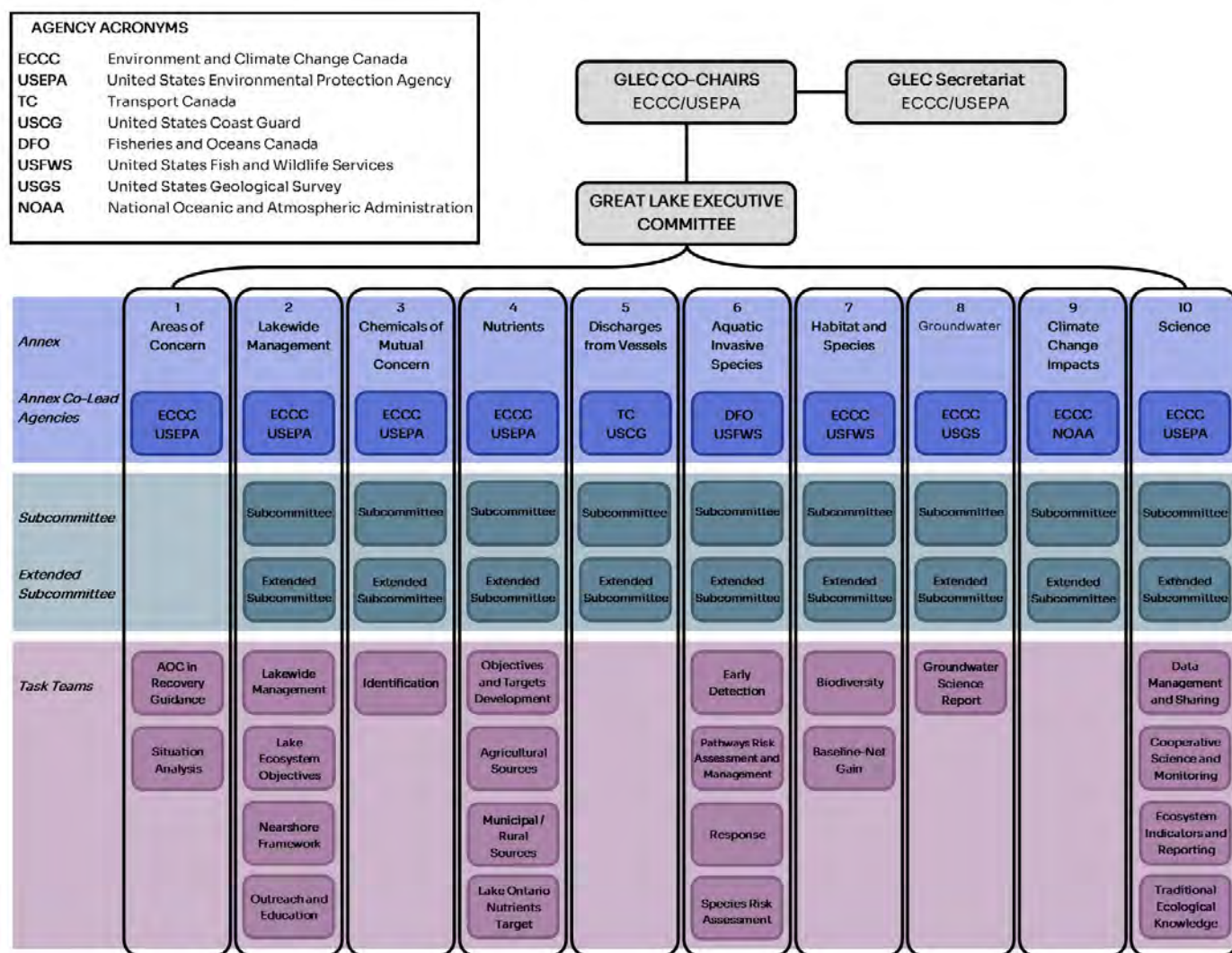
3.2.3. Annexes

The 2012 GLWQA includes the following 10 issue-specific annexes to coordinate collaborative action on priority issues:

- **Annex 1:** Areas of Concern
- **Annex 2:** Lakewide Management
- **Annex 3:** Chemicals of Mutual Concern
- **Annex 4:** Nutrients
- **Annex 5:** Discharges from Vessels
- **Annex 6:** Aquatic Invasive Species
- **Annex 7:** Habitat and Species
- **Annex 8:** Groundwater
- **Annex 9:** Climate Change Impacts
- **Annex 10:** Science¹²²

Each Annex has an Annex Subcommittee that assists with the implementation of programs and other measures. Subcommittees are co-led by representatives from the Parties and include members from a broad range of government departments and agencies. For some Annexes, Extended Subcommittees comprised of nongovernment partners and subject-matter experts also support implementation efforts. Task Teams may be established where specific tasks are required.

Figure 3: Structure of each Annex under the 2012 Great Lakes Water Quality Agreement



Source: Adapted from 2016 Progress Report of the Parties

For the most part, interviewees and survey respondents agreed that the use of Annexes to structure implementation and to address priority issues in the Great Lakes Basin is appropriate and necessary as it allows for focused work without being overwhelmed. There was also consensus that necessary progress was made in updating and strengthening existing Annexes with the 2012 GLWQA to align with important Great Lakes issues that had emerged or become increasingly critical (e.g., climate change, habitat and species, AIS, etc.).¹²³ As one interviewee noted, “you have an Agreement now that covers every issue under the sun within the Great Lakes” and it “does address, in some way, all of the key threats.”

The expanded list of issues covered was noted in the literature and by interviewees to contribute to the Annexes being overly broad and light on details.¹²⁴ It was suggested that while in some respects it is advantageous to ensure Annexes are open, this approach must be coupled with an onus to ensure progress on implementation. It was suggested that the lack of significant progress made under some Annexes points to there being room for improvement.¹²⁵ Further leadership, cooperative efforts, and innovative approaches were identified as necessary to address this issue, along with sustained financial resources dedicated to supporting specific Annex programming.¹²⁶

Overall Considerations

Ensuring a Holistic Approach to Addressing Great Lakes Issues

Interviewees and survey respondents had differing perspectives on whether the Annex structure is an effective means of comprehensively addressing threats to the Great Lakes Basin in a holistic manner, or whether it serves to reinforce a siloed approach to progress on individual issues. While interviewees felt that some compartmentalization of priority issues will likely always be necessary in the Agreement to consider the unique aspects and attributes of the complex Great Lakes ecosystem, it was suggested that there is a need for greater recognition of the interconnectedness of Annexes and to incorporate cross-cutting issues, such as a watershed approach or climate change into each. It was noted that to do this effectively may require exploring a rewrite of the 2012 Agreement and a restructuring of Annexes based on overarching issues. For example, as one interviewee suggested, “this massive climate driven paradigm shift really seems to be crying out for a complete top to bottom rewrite, where climate change is actually the narrative thread throughout the entire document, as opposed to being a silo within the overall sort of anachronistic document.” However, others noted that what the Agreement requires is a stronger mechanism to allow for changes without Annexes needing to be re-written.

Lack of Specificity and Concrete Targets

The review of the literature and input from interviewees and survey respondents suggests that there is an overall lack of specificity across the Annexes with regards to priorities for action, roles, responsibility for taking the lead, expectations of partners and timelines for action.^{127,128} Previous versions of the GLWQA included specific objectives that could be independently demonstrated (e.g., maximum concentrations for contaminants) and that provided a solid framework for guiding further domestic regulatory and legislative efforts.^{129,130} In contrast, clear targets and goals are lacking for most Annexes in the 2012 Agreement, with responsibility for determining them left to the Parties.³⁷ This makes measuring progress more challenging, while also creating “room for discrepancy and disconnect to arise between the two federal jurisdictions, where a lack of coordination and communication may serve as a barrier to progress.”¹³¹ Furthermore, specific targets and timelines play an important role in ensuring greater accountability, as it is easier to put pressure on those responsible for progress when deadlines and targets are missed.¹³²

Annex Subcommittees and Extended Subcommittees

More than one interviewee noted that opportunities for meaningful, effective, and genuine engagement and collaboration varies considerably across Annex subcommittees and extended subcommittees. It was also suggested that there is room to improve the format for knowledge- and information-sharing at subcommittee meetings, which was described as the Parties reporting out to members, rather than a discussion allowing for input. A requirement for the two-way flow of information between the Parties and partners and stakeholders for all Annex subcommittees was identified, in line with the principles and objectives outlined in the Agreement. The frequency of meetings for some Annex subcommittees and extended subcommittees was also identified by interviewees and survey respondents as a serious shortcoming.

Early Detection and Prevention

A theme emerging from many of the interviews conducted for this project was the need for Annexes to be more proactive in preventing new and emerging threats to the Great Lakes. The approach to early detection related to AIS was cited as a model that could be explored for other Annexes. As one interviewee noted, “A number of policies and management practices could be pursued to better prepare for issues that have yet to emerge, including those related to contaminants or to prepare for new technologies that have yet to be introduced but which could impact the ecosystem.” This would contribute to all Annexes taking a more forward-looking approach.

Financial Support for Implementation

The lack of sufficient funds devoted to implementation was identified as a factor contributing to limited progress under a number of the Agreement’s Annexes. It was noted that in order to successfully advance the implementation efforts of the GLWQA, the Parties must look for opportunities to collaborate to obtain and appropriate funding that can be used for projects that may extend across a number of jurisdictions. One interviewee suggested that to ensure sustained financial support for Annex activities, each one should include a requirement for implementation plans that outline committed budgets.



Photo Courtesy of Sally Cole-Misch

Issue-Specific Annexes

In addition to broad, overarching opportunities to strengthen implementation, a number of more specific successes and challenges were identified for each of the Agreement's Annexes. It should be noted that some Annexes received more attention during interviews or were noted more often in the literature. A more thorough treatment of specific Annexes herein is not a measure of their overall importance.

Annex 1: Areas of Concern (AOCs)

The purpose of this Annex is to contribute to the achievement of the General and Specific Objectives of this Agreement by restoring beneficial uses that have become impaired due to local conditions at Areas of Concern (AOCs), through the development and implementation of Remedial Action Plans (RAPs) for each AOC designated pursuant to this Agreement.

Annex 1 reaffirms a commitment on the part of the Parties to restore water quality and ecosystem health in AOCs across the Great Lakes. As previously noted, an AOC is defined as “a geographic area designated by the Parties where significant impairment of beneficial uses has occurred as a result of human activities at the local level.”¹³³ The designation of an AOC is based on an evaluation against fourteen specific problems, referred to as BUIs, known to be the result of reduced chemical, physical, and/or biological integrity of the Great Lakes.¹³⁴ An AOC is deemed to be in recovery when all remedial actions have been completed and monitoring plans are in place to track and assess whether the recovery of BUIs is progressing.¹³⁵ When all BUI removal criteria at an AOC have been met, it is delisted.

Each AOC requires a RAP — a clean-up plan that identifies which of the 14 BUIs are present and why, along with identifying the criteria used to determine restoration, the remedial measures that have or will be taken, and the monitoring and evaluation program used to track the progress.¹³⁶ A team of partners and stakeholders are responsible for planning, developing and implementing remediation and monitoring actions to restore beneficial uses in their respective AOCs.¹³⁷

The Annex 1 Subcommittee is co-led by ECCC and the U.S. EPA. While the implementation of actions to restore AOCs are primarily carried out domestically, Canada and the U.S. share information related to approaches and lessons learned on an ongoing basis to increase the efficiency and effectiveness of remediation efforts.¹³⁸ In Canada, efforts to restore AOCs are coordinated by ECCC and the Ontario Ministry of the Environment, Conservation and Parks (MECP), in collaboration with other federal and provincial ministries, municipalities,

First Nations, Métis, conservation authorities and local community groups. The U.S. EPA works with other federal agencies, state and local governments, Tribal Governments, communities and nongovernmental organizations.

Beneficial Use Impairments (BUIs)

1. Restrictions on fish and wildlife consumption
2. Tainting of fish and wildlife flavor
3. Degradation of fish and wildlife populations
4. Fish tumors or other deformities.
5. Bird or animal deformities or reproduction problems
6. Degradation of benthos
7. Restrictions on dredging activities
8. Eutrophication or undesirable algae
9. Restrictions on drinking water consumption, or taste and odor problems
10. Beach closings
11. Degradation of aesthetics
12. Added costs to agriculture or industry
13. Degradation of phytoplankton and zooplankton populations
14. Loss of fish and wildlife habitat



Successes, Challenges and Lessons Learned

There was a lack of agreement among interviewees and survey respondents around whether Annex 1 has been successful in terms of implementation. Some felt the Annex enabled the Parties to address specific Great Lakes water quality issues by providing sufficient detail and clarity with respect to criteria for designating or delisting AOCs, along with identifying specific desired outcomes and reporting requirements.¹³⁹ As one interviewee noted, “historically, the designation of the Areas of Concern was a brilliant, important, and successful thing that happened because it provided a focus and structure under which action could then be taken by the Parties to address serious problems.” The Annex is also noted as being one of the most successful under the Agreement because it brings together various partners and stakeholders for constructive dialogue that translates into meaningful action with widespread support.¹⁴⁰ Subject-matter experts that participated in the WQB 50th Anniversary Work Group survey in 2020 noted that Annex 1 enabled the Parties to address Great Lakes water quality in a particularly effective manner, with 53% pointing to work done to address AOCs and RAPs as particular successes of the GLWQA.

However, Annex 1 was criticized by some interviewees and survey respondents as being ineffective when considering that efforts to restore AOCs have been underway for over 25 years and the majority remain, while others that were previously delisted are experiencing new pollution or contamination issues. This has been attributed to gaps in implementation tied to historic underfunding.¹⁴¹ One interviewee suggested that sufficient funding has been lacking, in many cases, since the introduction of the Annex. Another noted that since the GLRI has prioritized funding for AOCs on the U.S. side of the border, progress has increased by an order of magnitude. Finally, another interviewee cautioned that many of the efforts to address historical environmental challenges take time and that there should not be an expectation for improvements in AOCs to happen quickly.

Annex 2: Lakewide Management

The purpose of this Annex is to contribute to the achievement of the General and Specific Objectives of this Agreement by assessing the status of each Great Lake, and by addressing environmental stressors that adversely affect the Waters of the Great Lakes which are best addressed on a lakewide scale through an ecosystem approach.

The Lakewide Management Annex (Annex 2) commits the Parties, in cooperation and consultation with various partners and the public, to undertake seven lakewide management actions. The Annex highlights an understanding of the need to pursue an approach to restoring and managing water quality that is specifically tailored to each of the Great Lakes, given their unique characteristics and the complexity of the challenges facing them.

Under Annex 2 of the 2012 GLWQA, the U.S. and Canada are required to establish Lakewide Action and Management Plans (LAMPs) — binational, five-year, ecosystem-based strategies that identify and prioritize restoration and

protection activities¹⁴² required to meet the general objectives for each of the lakes and their connecting river systems. LAMPs have been described as blueprints for action as they identify and prioritize desired restoration and protection activities and integrate information and management needs related to the priority issues outlined in the Agreement's other Annexes.

The implementation of commitments under Annex 2 are co-led by ECCC and the U.S. EPA, with support from a Lake Partnership for each lake, comprised of environmental protection and natural resources managers and led by Canada and the U.S., together with provincial, state and Tribal Governments, First Nations, Métis, municipalities, and watershed management agencies. Lake Partnership members work collaboratively to understand lake conditions and stressors, report on existing scientific information, assess the state of the lake, set lakewide priorities and lake ecosystem objectives, and coordinate action for protection and restoration.¹⁴³

Lakewide Management Actions

1. Establish binational lake ecosystem objectives for each lake as a benchmark against which to assess status and trends in water quality and lake ecosystem health
2. Assemble, assess and report on existing science
3. Identify priorities for science and action
4. Conduct necessary surveys, studies and outreach
5. Identify need for further action
6. Develop and implement binational strategies
7. Develop an integrated nearshore framework

Successes, Challenges and Lessons Learned

The development of LAMPs was identified as a key success of the 2012 GLWQA based on opportunities provided for participation from a diverse range of stakeholders who meet on a regular basis. As one interviewee said:

"I want to champion the LAMPs because there has been so much good participation, especially on the U.S. side with Tribes and states and others. We meet regularly and there's real commitment from individuals who participate in those efforts. The LAMPs have been elevated even more within the two Parties, as vehicles for implementing some of the objectives of the GLWQA, and for domestic regulation."

Annex 2 was also noted to successfully contribute to the commitment under the Science Annex (Annex 10) to implement a cooperative science and monitoring initiative for each of the lakes, focused on science priorities identified through the Lakewide Management process.

The literature and input from interviewees and survey respondents point to Annex 2 being overly broad and vague, leading to challenges with timely implementation. Interviewees noted that while the process for how to produce the LAMPs is clearly defined within the Agreement, clarity is lacking on specific objectives to be met and the involvement of the public. In the 2020 TAP report, reduced public engagement was identified by the IJC as contributing to the diminished efficacy and community connection to LAMP projects and programs.¹⁴⁴ One interviewee also noted that the development of the LAMPs is way behind schedule, suggesting that there has been an overcommitment in terms of how often they can be produced.

An increased emphasis on the nearshore in Annex 2 was new for the 2012 Agreement and requires the Parties to collaboratively develop an integrated framework that would assess the state of the nearshore waters. This addition was praised by many interviewees, who mentioned that the GLWQA is meant to take an ecosystem approach and to define the relationship between watersheds and the lakes. As one interviewee said, it is "not just about integration of the watershed, and the relationship with the lake proper, it's also that integration between the shoreline and the nearshore area, and that's a great thing that has come out of the last Great Lakes Water Quality Agreement, is that focus on the nearshore." Other interviewees felt that the explicit inclusion of rivers as part of the LAMPs (e.g., the Lake Ontario LAMP includes the St. Lawrence River and the Niagara River), is also important as it recognizes that the connecting waters can't be ignored when addressing water quality.

Annex 3: Chemicals of Mutual Concern

The purpose of this Annex is to contribute to the achievement of the General and Specific Objectives of this Agreement by protecting human health and the environment through cooperative and coordinated measures to reduce the anthropogenic release of chemicals of mutual concern into the Waters of the Great Lakes.

The 2012 GLWQA introduced a new process for addressing pollutants in the Great Lakes, committing the Parties to identifying and reducing the release of chemicals of mutual concern (CMCs) that originate from anthropogenic sources. The Parties are required to determine those pollutants that are potentially harmful to human health or the environment by:

- Establishing and implementing a process by which the GLEC may recommend CMCs to the Parties, based on available information and support
- Considering the recommendations of the GLEC and jointly designating CMCs

The Agreement commits the Parties to target CMCs by undertaking a range of actions in cooperation and consultation with the full range of government and nongovernment partners and the public. Among these are preparing binational strategies for CMCs, coordinating the development and application of domestic water quality standards, objectives, criteria, and guidelines, eliminating the use and release of CMCs, and monitoring and evaluating the effectiveness of pollution prevention and control measures.

When the 2012 GLWQA was signed, no substances were given a CMC designation. By 2016, the Parties had agreed to an initial set of eight, many of which were substances that had been an issue in the Great Lakes for many years.¹⁴⁵ A [Binational Screening Criteria for Nominated Chemicals of Mutual Concern](#) was finalized by the Parties in 2021 following public consultations and an extended revision period.¹⁴⁶ Substances for consideration as a candidate CMC can be nominated by organizations or individuals and based on the findings of an evaluation and accompanying binational summary report, a decision is made by GLEC Co-Chairs as to whether the substance should be designated. If there is insufficient information to decide, additional research, monitoring, or assessment is required.¹⁴⁷

Chemicals of Mutual Concern

- Hexabromocyclododecane (HBCD)
- Long-Chain Perfluorinated carboxylic acids (LC-PFCAs)
- Mercury
- Perfluorooctanoic acid (PFOA)
- Perfluorooctane sulfonate (PFOS)
- Polybrominated Diphenyl Ethers (PBDEs)
- Polychlorinated Biphenyls (PCBs)
- Short-Chain Chlorinated Paraffins (SCCPs)

Annex 3 is implemented by an extended subcommittee led by ECCC and the U.S. EPA, and with participants from provincial and state governments, Tribal Governments, industry and nongovernmental organizations.

Successes, Challenges and Lessons Learned

Interviewees and survey respondents had a range of opinions about the strengths and weaknesses of the Chemicals of Mutual Concern Annex. According to one interviewee, the approach to addressing pollutants under Annex 3 is an improvement over how they were dealt with the 1987 Agreement, which involved a long list of contaminants that needed to be addressed and which was described as “outdated almost as soon as it was created”. However, others criticized the lack of specific timelines and targets and confusion about the nomination process, stating that the approach under the 1987 Agreement better enabled progress.¹⁴⁸

The speed of progress under Annex 3 was a common theme in discussion with interviewees and in the literature, with many stating that it has been slow, with draft binational strategies for risk management of the first two CMCs (i.e., PCBs and HBCD) not released until February 2017.^{149,150} In the second TAP report, the IJC noted that it heard during public engagement activities that “progress on chemicals of mutual concern (CMC) is inadequate.”¹⁵¹ The report also pointed to the Parties having nominated only two substances within the triennial cycle (lead and polycyclic aromatic hydrocarbons), while two publicly nominated substances (radionuclides and sulfates) remained under consideration.¹⁵² To date, none of these have been designated or rejected by the Parties.¹⁵³

A lack of clarity on the process for nominating a CMC was noted to have contributed to the speed of progress, resulting in confusion around what is required. According to interviewees, another factor contributing to the duration of the CMC process is that chemicals are individually designated, which can be time consuming. It was suggested that identifying and designating entire classes of chemicals that exhibit similar impacts on the environment or human health would not only speed up implementation but would also help to ensure that they are not substituted for another similar compound that may be even more harmful. While the Annex was commended for “promoting the use of safer chemical substances”, one respondent from the WQB 50th Anniversary Work Group survey felt it was weakened by the use of the word “promoting”. It was suggested that moving beyond promotion to making this a requirement would strengthen the Agreement.¹⁵⁴

A participant of this study pointed out that a significant number of substances are currently missed under the Annex because they are not chemicals but are chemically synthesized. For example, microplastics are a significant issue in the Great Lakes but plastic is comprised of thousands of chemicals. It was suggested that the name of the Annex should be changed to “substances of mutual concern”, to account for those substances that do not fit the definition of a chemical.



Annex 4: Nutrients

The purpose of this Annex is to contribute to the achievement of the General and Specific Objectives of this Agreement by coordinating binational actions to manage phosphorus concentrations and loadings, and other nutrients if warranted, in the Waters of the Great Lakes.

The Nutrients Annex (Annex 4) guides efforts to manage phosphorus and other nutrients to minimize hypoxic zones, manage levels of blue-green algae to prevent the formation of harmful toxins, and to ensure that algae species in nearshore waters are consistent with those found in healthy aquatic ecosystems. To meet these goals, the U.S. and Canada have established binational phosphorus concentrations, loading targets and allocations, while also continuing to assess and implement programs and measures designed to reduce phosphorus loadings from point and nonpoint sources. Much of the effort under this Annex is directed towards achieving reductions of phosphorus loading to Lake Erie, which has experienced significant environmental and socio-economic impacts associated with harmful and nuisance algal blooms.¹⁵⁵

Implementation of Annex 4 is supported by the Nutrients Annex Subcommittee, which is co-led by the U.S. EPA and ECCC. Other subcommittee members include provincial, state and Tribal Governments and conservation authorities.

Successes, Challenges and Lessons Learned

Interviewees and survey respondents were generally in agreement that efforts to set specific nutrient targets for Lake Erie under Annex 4 have been successful and that they highlight effective binational coordination on an important Great Lakes issue. It was suggested that Annex 4 is appropriately structured and effective because it is quantitative in nature and tied to clear targets. One interviewee noted, “A success in the 2012 Agreement was the acknowledgement of dissolved phosphorus versus total, and the push to get nutrient targets established. That was very pivotal.” However, it was mentioned that a focus on other nutrients beyond phosphorus should be prioritized. Participants of the WQB 50th Anniversary Work Group survey identified Annex 4 as one of the Annexes most effective at enabling the Parties to address Great Lakes water quality. It was suggested that implementation under this Annex is a best practice with lessons to learn for how other Annexes could be improved with the establishment of clear criteria.¹⁵⁶

Lack of coordination at the state and provincial level was identified as an impediment to progress under Annex 4. It was noted that while states and provinces should have the autonomy to make decisions related to nutrients, more coordination is needed among them to identify solutions and a path forward. One participant of this study felt that while the Agreement includes an effective high-level framework supported by concrete binational targets, there is a limit to what can be achieved through binational planning alone. States and provinces were noted to be slow to finalize plans, and some plans have been criticized for being “unimpressive.” A need was identified for increased state and provincial action plans under Annex 4 that are more detailed, specific, and which incorporate more tracking and identify the need for technical staff and monitoring needs.

One interviewee pointed to a key limitation of Annex 4 being its heavy focus on controlling phosphorus loads from sources that flow into the lakes from rivers and their tributaries. They noted that recent studies have shown that cyanobacteria growth, a common cause of harmful algal blooms in the lakes, is also related to the availability of nitrogen, particularly that stored in sediments. They suggested that broadening the focus of the Annex to incorporate greater consideration for other nutrients, including nitrogen, would be an important step in more effectively managing algal blooms.

Interviewees and survey respondents noted that while measurable and sustained progress in reducing nutrients from urban and other point sources has been achieved, nutrient pollution from agricultural production remains a growing problem. Another key challenge identified has been ensuring that domestic action plans are connected to science-based adaptive management frameworks. It was noted that the IJC's Great Lakes – St. Lawrence Adaptive Management (GLAM) Committee could be looked to as inspiration for a similar committee specific to activities under Annex 4.

Annex 5: Discharges from Vessels

The purpose of this Annex is to contribute to the achievement of the General and Specific Objectives of this Agreement by preventing and controlling vessel discharges that are harmful to the quality of the Waters of the Great Lakes, through the adoption and implementation of regulations, programs, and other measures that facilitate coordinated and cooperative implementation and enforcement, where appropriate.

Annex 5 commits the Parties to prevent discharges from vessels from adversely impacting the Great Lakes. The 2012 Agreement outlines commitments to protect the lakes from a broader range of discharges than previous versions, including oil and hazardous polluting substances, ballast water, garbage, wastewater and sewage, biofouling and antifouling systems. The Discharges from Vessels Annex guides the Parties as they work to protect water quality, ensure safety, consider the standards and guidance of the International Maritime Organization, and implement vessel discharge-related domestic laws and regulations. It also accounts for the best available science, and prohibits and penalizes (as appropriate) vessel discharges that harm the Great Lakes.

Implementation of Annex 5 is co-led by Transport Canada and the U.S. Coast Guard, with support from Fisheries and Oceans Canada, the Canadian Coast Guard and the U.S. EPA. Global Affairs Canada and the U.S. Department of State are involved in discussions related to ballast water. The Annex 5 Subcommittee is comprised of additional representatives from federal, state and provincial governments and other organizations, including the Lake Carriers Association, the Chamber of Marine Commerce and the Shipping Federation of Canada.¹⁵⁷

Successes, Challenges and Lessons Learned

Progress has been made on a number of issues related to discharges from vessels as a result of a combination of initiatives monitored by the Annex 5 Subcommittee, including robust domestic pollution prevention, compliance, and preparedness in both Canada and the U.S.¹⁵⁸ A 2019 report from the Great Lakes Seaway Ballast Water Working Group notes that research conducted by Fisheries and Oceans Canada found that the “risk of a ballast water mediated introduction of AIS into the Great Lakes has been mitigated to extremely low levels”.¹⁵⁹ The literature points to ballast water management requirements in the Great Lakes and the St. Lawrence Seaway system as being the most stringent in the world.¹⁶⁰ Several interviewees felt that the structure of Annex 5 works well and that any challenges with implementation are related to actors not following its direction. Participants of the WQB 50th Anniversary Work Group survey also identified Annex 5 as being effective at enabling the Parties to address Great Lakes water quality.

An interviewee stated that one of the challenges that the shipping industry is facing in the Great Lakes is a lack of consistent approaches to ballast water management. It was noted that while Canada has adopted ballast water management regulations that align with the International Maritime Organization's International Convention for the Control and Management of Ships' Ballast Water and Sediments, the U.S. has developed its own regulations with additional requirements.¹⁶¹ A lack of coordination among state governments on ballast water management regulations was also noted to contribute to a patchwork of requirements resulting in high costs for the shipping



industry, with potential broader economic implications. It was suggested that the development of a comprehensive, well-coordinated binational approach to the management of ballast water under Annex 5 would help to address this challenge, with the GLWQA playing a role by ensuring a strong scientific foundation for determining acceptable limits and standards.

One interviewee noted that greater engagement and coordination of the shipping industry is necessary to promote trust and the collaborative relationships necessary to advance solutions that take into consideration the economic realities of the sector.

Annex 6: Aquatic Invasive Species (AIS)

The purpose of this Annex is to contribute to the achievement of the General and Specific Objectives of this Agreement. Through this Annex the Parties shall establish a binational strategy to prevent the introduction of Aquatic Invasive Species (AIS), to control or reduce the spread of existing AIS, and to eradicate, where feasible, existing AIS within the Great Lakes Basin Ecosystem.

Non-native AIS affect the Great Lakes ecosystem by outcompeting native species for food, habitat and other resources, with devastating impacts on the economy and the environment. Annex 6 looks to address the threat posed by AIS while supporting the function, health, and sustainability of native aquatic ecosystems. Priorities identified under this annex include preventing the introduction of new AIS and controlling, reducing, and where possible, eradicating existing AIS within the ecosystem. The annex also outlines a need for the implementation of ballast water discharge programs (aligned with Annex 5) and an assessment of ecosystem impacts of established and high-risk AIS to support rapid response and control programs.¹⁶²

The Annex 6 Subcommittee is co-led by the U.S. Fish and Wildlife Service (USFWS) and Fisheries and Oceans Canada, while the extended subcommittee includes a broad range of representatives from federal, state, provincial and Tribal Governments, and a range of commissions and non-governmental organizations.

Successes, Challenges and Lessons Learned

Interviewees and survey respondents stated that the addition of Annex 6 to the 2012 GLWQA should be considered a major success as it effectively provides a framework to help reduce the rate at which new AIS are entering the Great Lakes. One interviewee commended work underway to move beyond assessing and reporting on the issue, to operationalizing plans and coming up with concrete, on-the-ground activities to support the goals and objectives set out by the Annex 6 Rapid Response Task Team. These include efforts aimed at increasing capabilities and enhancing the coordination of multiple jurisdictions and agencies in response to new invasive species.

Some interviewees commended the focus on minimizing the probability of future introductions of AIS rather than waiting to control populations that have already established themselves in the lakes. However, one interviewee mentioned that the Annex only works well because programs were already in place to address AIS. They felt that this aligned with a broader challenge related to the 2012 GLWQA, in that progress on implementation is often tied to established programs. In addition, it was noted that the inclusion of language in Annex 6 related to early detection and rapid response (EDRR) is a weakness because by the time a new AIS has been detected in the lakes, it is already too late. The focus on prevention or the “action of stopping invasive species from being introduced or spreading into a new ecosystem”¹⁶³ was recognized by many interviewees and survey respondents as the most cost-effective and successful strategy for addressing potentially invasive species and one that should be more explicit in the Agreement.¹⁶⁴

One interviewee noted that the majority of focus under Annex 6 has been on addressing Asian carp, given the severity of anticipated impacts should they become established in the Great Lakes Basin ecosystem. While Asian Carp are an important priority species, targeted resources are also needed to address other invasive species. The ability to purchase and trade organisms on the Internet has contributed to the ease of movement of many AIS around the world, including those that may not be well known.¹⁶⁵ As such, it is becoming increasingly important to develop a prevention-focused approach to guide protective actions, such as the prohibition on imports into the U.S. and Canada or public engagement on lesser-known AIS.

The second TAP report noted that the IJC observed that AIS efforts in the Basin could be more effective if consideration was given to addressing the challenges that stem from responsibility being shared across multiple agencies and the resulting lack of accountability.¹⁶⁶ The Great Lakes Fishery Commission received praise from interviewees for its work in coordinating communications and funding efforts related to AIS, particularly with regards to fisheries management. In 2019, the Commission developed and implemented the Basin-wide Invasive Fishes Communication protocol, critical to advancing information-sharing related to findings on invasive fish in the Great Lakes Basin.¹⁶⁷ In alignment with Annex 6, the Commission is also working on activities to prevent the establishment of Asian Carp in the Great Lakes and conducting research into alternative controls.

Annex 7: Habitat and Species

The purpose of this Annex is to contribute to the achievement of the General and Specific Objectives of this Agreement by conserving, protecting, maintaining, restoring and enhancing the resilience of native species and their habitat, as well as by supporting essential ecosystem services.

The Great Lakes support a rich and diverse array of fish, wildlife and plant species. The Habitat and Species Annex (Annex 7) focuses on the protection of these native species and their habitat, particularly from pressures like the loss or degradation of habitat, the fragmentation of natural systems and threats from AIS.¹⁶⁸ Annex 7 helps to guide collaborative efforts to restore, protect and conserve the diversity of habitats and species that make up the Great Lakes aquatic ecosystems, while also ensuring sustainable social, ecological, and economic benefits.



Annex 7 is supported by the Habitat and Species Subcommittee, jointly led by ECCC and the U.S. Fish and Wildlife Service and made up of a range of federal, state, provincial and tribal government representatives. An extended subcommittee includes members from nongovernmental organizations and experts outside of GLEC leadership.¹⁶⁹

Successes, Challenges and Lessons Learned

Interviewees suggested that the 2012 GLWQA incorporated greater focus on the importance of wetlands, considered buffers for protecting water quality. Under Annex 7, coastal habitats have been better protected, with the rate of coastal habitat loss having also slowed. However, it was also noted that there is a lack of information about progress under Annex 7 and the resulting impacts on the Great Lakes Basin ecosystem. One interviewee stated, “I have absolutely no idea what’s happening with Annex 7. Is there a habitat restoration target? Are the wetlands being restored? Are certain species returning or not returning?”

Interviewees and survey respondents discussed the integration of priorities for the protection of habitat and species through efforts underway in Annex 1 (Areas of Concern) and Annex 2 (Lakewide Management). It was noted that the development of RAPs and LAMPs have been critical for meeting commitments under Annex 7 because they contribute directly to a wide range of restorative efforts. In addition, the RAP program has been attributed with helping to restore habitat and wetlands by dredging contaminated sediment, including in the Maumee River AOC.¹⁷⁰

The Agreement commits the Parties to “conduct a baseline survey of the existing habitat against which to establish a Great Lakes Basin Ecosystem target of net habitat gain and measure future progress”. However, one interviewee felt that there is not currently a clear, agreed-upon definition of net habitat gain and that the language in the Agreement is reflective of the state of science at the time of the revisions when there was “a lack of understanding of what habitat gain in the Great Lakes looked like”. They added that it is vital in the context of a baseline survey, to take into consideration not only the amount of habitat, but also the quality and functionality. It was suggested that the definition for net habitat gain should include a watershed approach to habitat function, consistent with the principles of the Agreement.

Annex 8: Groundwater

The purpose of this Annex is to contribute to the achievement of the General and Specific Objectives of this Agreement by coordinating groundwater science and management actions.

Groundwater makes up a significant proportion of the water entering the Great Lakes by way of discharges along the coast or from rivers and streams. As such, it has the potential to contribute contaminants and nutrients to the waters of the lakes. The Groundwater Annex (Annex 8) coordinates groundwater science and management actions to protect water quality from the potential negative impacts of changes to groundwater entering the lakes.¹⁷¹ It focuses on increasing understanding around how groundwater influences water quality and ecosystem health and identifies priority areas for future action.



Photo Courtesy of Sally Cole-Misch

Implementation of the Groundwater Annex is led by ECCC and the U.S. Geological Survey (USGS), in collaboration with the Annex 7 subcommittee and extended subcommittee comprised of federal, state, provincial, and local agencies, such as conservation authorities.

Successes, Challenges and Lessons Learned

The Groundwater Annex (Annex 8) was a new addition to the 2012 GLWQA. Several initiatives were mentioned by interviewees and survey respondents as successfully contributing to efforts under Annex 8 by filling information and data gaps related to the state of groundwater within the Great Lakes Basin. Interviewees also commended recent progress made on updating the 2019 SOGL groundwater quality sub-indicator report to be published in 2022 and filling previously identified spatial data gaps in groundwater quality. One interviewee noted that the “Groundwater Annex has established some ground for modeling and established a good overview of groundwater issues in the Basin.” However, others felt that progress under Annex 8 is lagging and that projects are often slow to establish themselves. A respondent to the WQB 50th Anniversary Work Group survey noted that they didn’t feel the science exists to address the objectives in the way they are stated in the Annex and that despite the considerable funds spent by conservation authorities and municipalities to characterize groundwater, it still falls short of what the Annex envisions.

A number of interviewees and survey respondents expressed concerns around the scope of existing groundwater science. For example, some noted that not everyone considers groundwater to be a source of drinking water, and that there is a lack of understanding about the link between deforestation and groundwater pollution. One interviewee felt that this lack of agreement on the scope of science under Annex 8 contributes to a lack of meaningful discussion, and ultimately even less communication about the importance of groundwater issues. A need to invest in additional mapping and monitoring of groundwater across the basin, particularly with the emergence of contaminants that are known to be transported in groundwater (e.g., PFAS), was also identified. The summary of public opinion from the first TAP report pointed to a need to develop additional sub-indicators for groundwater degradation and to further link the impact of depleted groundwater tables on the health of wetlands, watersheds and lake levels.¹⁷² It was also suggested that TEK should be better incorporated into research and science related to groundwater.

Annex 9: Climate Change Impacts

The purpose of this Annex is to contribute to the achievement of the General and Specific Objectives of this Agreement by coordinating efforts to identify, quantify, understand, and predict the climate change impacts on the quality of the Waters of the Great Lakes, and sharing information that Great Lakes resource managers need to proactively address these impacts.

Recognizing the impact of climate change on water quality in the Great Lakes, a new annex was added to the 2012 GLWQA. Annex 9 coordinates efforts to “identify, quantify, understand, and predict the climate change impacts on the quality of the waters of the Great Lakes,” and to share information needed to proactively address these impacts.¹⁷³ This includes developing and improving regional-scale climate models, enhancing the monitoring of relevant climate and Great Lakes variables, developing and improving analytical tools, and coordinating binational climate change activities.

Annex 9 is implemented with support from the Climate Change Impacts Annex Extended Subcommittee, which is co-led by ECCC and the National Oceanic and Atmospheric Administration (NOAA), with participants including other federal departments, state, provincial and local governments, Tribal Governments, First Nations and Métis, nongovernmental organizations, research and academic experts, and other organizations with climate change expertise.¹⁷⁴

Successes, Challenges and Lessons Learned

The second TAP report indicated that climate change was the top mentioned public concern for the Great Lakes, up from 15th position in the previous report from 2017.¹⁷⁵ Interviewees and survey respondents were generally in agreement that the 2012 GLWQA strengthened efforts to address climate change and the Annex's adaptive management approach was noted to be appropriate and necessary for addressing climate-related risks. However, perspectives varied on how effectively the Annex enabled implementation. A respondent to the WQB 50th Anniversary Work Group survey noted that "Annex 9 is insufficient to address climate change impacts. Research coordination is essential, but inadequate." They pointed to recommendations outlined in the WQB's Emerging Issues Work Group's "Climate Change and Adaptation in the Lakes" report as still being relevant today. These include:

- The development of a Binational Approach to Climate Change Adaptation and Resilience in the Great Lakes to coordinate and advance strategies that support climate change adaptation and increase ecological resilience in the Great Lakes ecosystem region, with a particular emphasis on safeguarding Great Lakes water quality.
- Investments in research, information-sharing and knowledge management to carry out a vulnerability assessment as a first step in developing a regional approach, to engage stakeholders and Tribal Governments, First Nations and Métis, and to identify priorities for responsive actions in the Great Lakes region.
- The establishment of a "network of networks" on Great Lakes regional climate adaptation and resilience to build on and amplify the work of scientific, regulatory and regional structures and activities.¹⁷⁶

The Annex subcommittee was commended for consistent and concerted efforts to disseminate data and information, in line with the Annex's priorities for science and action. For example, the Great Lakes Climate Quarterly Impacts and Outlook newsletter — a brief summary of weather and water level conditions and their impacts on the Great Lakes — has been published since 2020. The Annual Climate Trends and Impacts Summary for the Great Lakes Basin has been issued since 2018 and provides an overview of climate trends, a summary of major climatic events and relevant climate research and activities.

A common point of discussion during the interviews was related to the need to take climate mitigation more seriously as part of Annex 9. One interviewee suggested that the "emphasis on climate change resilience is important, but mitigation should be the focus" and that in the past, there was a strategic decision not to mention mitigation. Another interviewee suggested that it would be helpful if the Parties would allow the IJC to build capacity and develop a climate mitigation and adaptation plan for the Great Lakes. It was also suggested that the Annex should be renamed "Climate Change Mitigation and Adaptation".

A number of interviewees felt that climate change should not be limited by the Annex framework. Instead, it should be the overall thread or an underpinning of the entire Agreement, as it transcends ecosystems, economies and societies. The second TAP report noted that a recent IJC SAB report found climate change to be the "most pervasive stressor that merits further consideration in terms of its interaction with toxic chemicals, invasive species, habitat loss, nutrients and pathogens."¹⁷⁷ It was noted that the Annex as currently written allows for some study of climate impacts but does not address climate change as a cross-cutting challenge.

Annex 10: Science

The purpose of this Annex is to contribute to the achievement of the General and Specific Objectives of this Agreement by enhancing the coordination, integration, synthesis, and assessment of science activities. Science, including monitoring, surveillance, observation, research, and modeling, may be supplemented by other bodies of knowledge, such as traditional ecological knowledge.

Sound, collaborative science underpins the GLWQA and provides a foundation for a shared understanding of the chemical, physical and biological integrity of the lakes. It also contributes to effective decision-making. The Science Annex (Annex 10) seeks to enhance the effectiveness and efficiency of Great Lakes science activities through coordination, integration, synthesis, and assessment of science activities. Priority activities under Annex 10 include establishing and maintaining comprehensive, science-based ecosystem indicators to assess the state of the Great Lakes, to anticipate emerging threats, and to measure progress in relation to the achievement of the objectives of the Agreement.¹⁷⁸

Implementation of commitments under Annex 10 are co-led by the U.S. EPA and ECCC. The Annex 10 Subcommittee also includes members from other federal departments and agencies from Canada and the U.S., along with provincial and state governments, Tribal Governments, municipalities, conservation authorities and academia.

Successes, Challenges and Lessons Learned

Annex 10 is a revised version of a previous Annex related to prioritizing research and development. Respondents of the WQB 50th Anniversary Work Group survey identified Annex 10 as effectively enabling the Parties to address Great Lakes water quality and interviewees noted that it has been successful in summarizing and communicating the science. It has been commended for successful implementation of the Coordinated Science and Monitoring Initiative (CSMI) — an intensive, five-year effort to collect data and undertake targeted studies on priority issues. CSMI is noted to have contributed to current management, protection, and restoration efforts and has improved coordination among federal science agencies.¹⁷⁹ A number of interviewees professed to be fans of the initiative and highlighted the critical importance of “having that intensive effort on a five-year rotating basis to take a deep dive into collecting data and doing very targeted studies about our priority issues.”

One interviewee stressed the importance of ecosystem objectives under Annex 10, noting that there are no endpoints identified for the state of the lakes indicators. They suggested that without endpoints to show what the desired state is, it is impossible to understand what the objectives should be or how far we are from them.

A number of interviewees noted that Tribal Governments, First Nations and Métis, are not well represented in the overall process of implementing the Annex, with minimal participation on the Annex subcommittee. The 2020 TAP report noted that TEK was a topic frequently raised through the IJC’s engagement activities. The report acknowledged that comments from many Tribal Governments, First Nations and Métis, and other individuals encouraged the Parties and the IJC to meaningfully incorporate TEK into Agreement implementation and include members from Indigenous communities in the Great Lakes Basin in research, education and decision-making.¹⁸⁰

3.2.4. Opportunities for Improvement

There was broad agreement that the use of annexes to structure the Agreement and its implementation and to address priority issues for the Great Lakes Basin is appropriate and necessary. It was noted that important progress was made with the 2012 GLWQA towards incorporating consideration for a wide range of important Great Lakes issues not addressed under previous versions of the Agreement. However, some interviewees suggested that there is still room for improvement, particularly on annexes where significant progress on implementation has not yet occurred. A number of key themes related to successes and challenges with the Agreement's structure were highlighted, including the need to ensure a holistic approach across the Annexes and to better incorporate cross-cutting issues, a lack of concrete targets and the need for greater financial support for implementation efforts. Additional specific opportunities for improvement were also explored for each Annex. Many of these are reflected in this report's Matrix of Action (Section 4.3).

The majority of interviewees and survey respondents felt that the existing Agreement structure and its Annexes cover a wide range of issues facing the Great Lakes and provide sufficient flexibility to address new ones as they arise. However, perspectives on the effectiveness of implementation varied significantly by Annex. A total of 48% of respondents of the GLWQA 50th Anniversary Work Group survey felt that no changes were required to the Annexes, highlighting Annex 1 (AOCs), Annex 5 (Discharges from Vessels), Annex 7 (AIS) and Annex 10 (Science) as working well. Annexes that were noted to need improvement included Annex 3 (CMCs), Annex 8 (Groundwater) and Annex 9 (Climate Change).

Opportunities to improve the structure of the Agreement include a need for more clarity around targets and goals for most of its Annexes to increase accountability, better measure progress and ensure alignment between the Parties. It was also suggested that ensuring Annexes are more proactive in their language and focus would help with preventing new and emerging threats to the Great Lakes. It was noted that relevant language should be incorporated into each Annex to address the need for further recognition of physical integrity being as important as the chemical and biological integrity of the lakes.

While 54% of respondents of the WQB 50th Anniversary Work Group survey felt that no additional changes to the Agreement's Annexes were necessary, others identified a range of potential options for new annexes, including those that would address binational policy, climate change mitigation, ecological and human health, Tribal Governments, First Nations and Métis, the ecosystem approach and environmental justice.

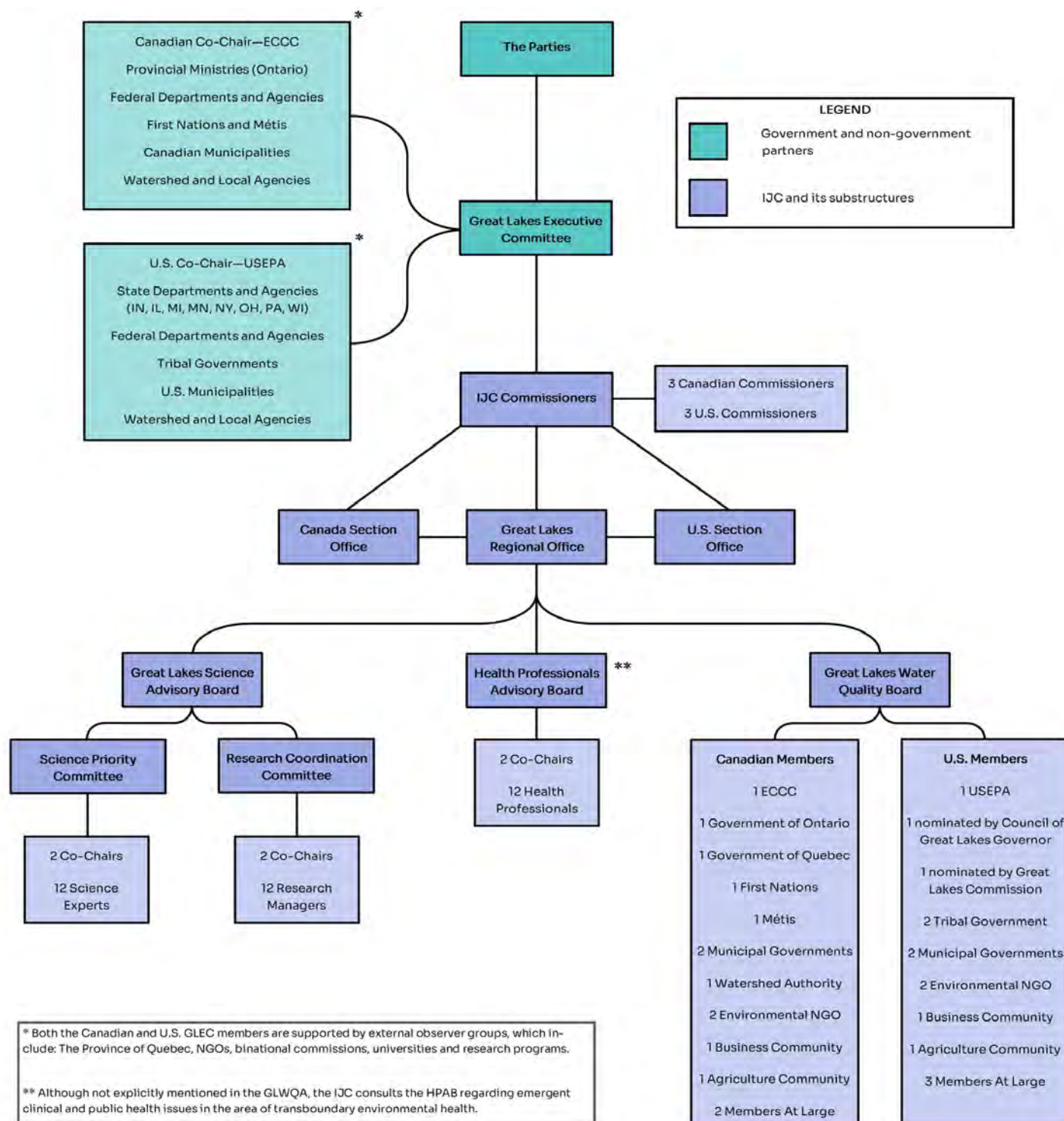
Suggested Additional Annexes

- Binational policy – address accountability
- Climate change mitigation
- Ecological/Human health
- Environmental justice
- Oil transport
- Nuclear issues
- New and emerging issues
- Social systems – beliefs, behaviour, stewardship
- St. Lawrence River

3.3. Governance

Successive iterations of the Agreement have established structures and relationships among federal, provincial, state, and municipal governments, and between them and the IJC and its boards, which have varied with each update. While sometimes improving governance under the Agreement, these changes, according to some WQB survey and project interviewees, have also fostered new issues that should be addressed.

Figure 4: Structures and Relationships under the Great Lakes Water Quality Agreement



Source: Adapted from 2020 Triennial Assessment of Progress Report; IJC [2012a](#), [2012b](#), [2015](#)

3.3.1. Role of the Parties

A key principle of the Agreement is the binational relationship between the two countries to meet common goals. This includes creating coherent, coordinated programs that identify roles and responsibilities, integrate with state and provincial actions, and provide the ability to effectively measure and report on their results. In the GLWQA 50th Anniversary Work Group survey, 74% of interviewees identified binational or multinational governmental cooperation and partnerships as one of the Agreement's top successes, particularly for specific programs such as for AOCs and LAMPs. Many interviewees, however, felt that this binational approach has deteriorated over the past several years. One interviewee said the leadership framework is one of the Agreement's key aspects, but the federal governments have not invested in that framework.

Another interviewee echoed this sentiment, stating that the Agreement had provided the basis to look at the entire Great Lakes rather than each government's portion only, whether at the federal or state/provincial levels. And yet, said another, "The paradox is the Parties created the Agreement, and yet they seem to sometimes engage with that Agreement in a very grudging way."

In the WQB's survey, 61% felt that governance, implementation and accountability was the Agreement's top weakness, even in instances when the Parties worked well together. Fifty one percent listed improvements in these three areas as the most important changes that should be made to the GLWQA, with some listing a binational policy to address accountability as a suggested additional annex.

The 2012 Agreement was most mentioned in interviews as the point at which many responsibilities were transferred to the Parties, essentially taking the IJC out of any opportunities to assist with coordination and to be able to assess progress. In previous Agreement versions the IJC was responsible to hold the governments accountable, said one interviewee, but that has eroded through the Parties' SOGL process that took back the IJC's reporting, which the Parties are receding in fulfilling that responsibility. Others felt the IJC could provide more leadership if the governments were willing to rely on it as they did in the first two versions of the Agreement.

Several interviewees pointed to the U.S. GLRI for bringing needed funding, organization, and coordination to that country's efforts, as the COA has done in Canada, to a certain extent. One interviewee said the GLRI's competitive funding process has resulted in significant and measurable restoration successes. "The GLWQA is aspirational... it doesn't have the enforcement tools, and the IJC doesn't either." While the interviewee felt that the Agreement has been wonderful at stimulating research, Agreement progress can get bogged down in more studies because it does not have the ability to make the Parties abide by the terms of the Agreement.



Photo Courtesy of Sally Cole-Misch

3.3.2. Role of the International Joint Commission Great Lakes Regional Office and its Director

The 1972 Agreement suggests, and the 1978 Agreement formalizes, the establishment of the GLRO to provide administrative support and technical assistance to the Great Lakes WQB and SAB, and to provide a public information service for the programs undertaken by the IJC and by the Boards. Housed in Windsor, the GLRO is, per the Agreement, headed by a director chosen by the Commission. The position of director alternates between a Canadian citizen and a U.S. citizen. Currently, the term of service for the GLRO director is a maximum of four years.

Interviewees raised concerns about the following issues associated with the Regional Office:

- The fixed term of the GLRO director is unwise, as it deters some capable, experienced candidates from competing for the position, and cuts short the service of successful GLRO directors.
- GLRO budgets have shrunk over time, particularly in the 1990s after several IJC biennial meetings and resulting reports proved controversial. The budget and staff reductions have undermined the effectiveness of the work of the GLRO, reduced its public information and engagement activities and made it more difficult for the Great Lakes boards to conduct independent evaluations.
- Attempts by U.S. and Canadian sections to control the GLRO have cut into its independence.

3.3.3. International Joint Commission Great Lakes Boards

Water Quality Board

Following the signing of the 2012 Agreement, the Commission revamped the WQB, significantly expanding membership. Prior to 2012, the Board included representatives from the Parties, states and provinces, with the leaders of the U.S. EPA Great Lakes National Program Office and ECCO's Great Lakes programs as co-chairs. Under the 2012 Agreement, the Commission expanded membership to twenty-eight seats, including two seats for federal agencies, four for provincial and state governments, four for municipal governments, four for Tribal Governments, First Nations and Métis, four for environmental non-governmental organizations, two representing the agricultural sector, two representing the business sector, four at-large members, and two co-chairs.

Interviewees had differing views about the merits of this change. Some praised the new composition of the board, saying its diversity of membership and viewpoints brought additional breadth and depth to its work. Particularly noted was the inclusion of Tribal Government, First Nations and Métis members.

Others found the size of the board unwieldy. Still, others said the original composition of the board, reaching back to the 1970s and consisting of a majority of government members, resulted in useful interaction among Great Lakes program administrators. One interviewee said, "When they made a recommendation, they went back and worked on implementing it immediately...They are part of a consensus for the next steps, so they could go back and implement it." It provided an avenue for governments to discuss and coordinate possible actions and programs behind closed doors, whereas the current GLEC meetings do not offer such an opportunity given the large membership and inclusion of observers. Finally, some interviewees said the former board composition posed a conflict of interest, placing staff of the two federal governments in the position of evaluating the effectiveness of their governments' programs and other measures.

Science Advisory Board

Interviewees generally said the SAB is functioning well. The merger of the former Council of Great Lakes Research Managers with SAB has proven satisfactory, several said. The system of two SAB subcommittees (Science Priority and Research) has proven cohesive. However, one interviewee said some "intricately linked" issues within the SAB and between it and other IJC boards are addressed in fragmented ways through separate working groups. The

interviewee suggested regularly scheduled meetings among the co-chairs of all the boards to sort out leadership roles and mutual support. Clear definitions of how they will support one another should be instituted. Another interviewee noted a tension between the SAB's independence in identifying key Great Lakes matters and the commissioners' requests that the board consider science matters of interest to the commissioners.

Appointment of Commissioners

The U.S. and Canadian governments each appoint three IJC commissioners. The President appoints U.S. commissioners, subject to the advice and consent of the U.S. Senate. U.S. commissioners serve at the pleasure of the President. The Governor in Council of Canada appoints Canadian commissioners, with the advice of the Prime Minister. Canadian commissioners serve four-year terms.

Interviewees offered a variety of observations about the qualifications and terms of appointment of commissioners. One interviewee remarked that the current appointment methodology, particularly on the U.S. side, promotes frequent changes in philosophy on the Commission regarding Great Lakes concerns. Some appointments lead to a lack of cohesiveness between the U.S. and Canadian sections that undermines the Commission's Great Lakes work.

Delays in appointing commissioners to either section frustrated one interviewee. At alternating times, the lack of commissioners in either section brought IJC Great Lakes activities to a near-standstill. The interviewee suggested "corporate measures" to protect the entire Great Lakes ecosystem during government change in terms of institutional arrangements that allow the organization to continue to function. "If we can apply corporate measures to protect the economy due to change in government, why can't we apply corporate measures to protect the environment during government change?" he said, adding that delays in actions due to lack of commissioners is "extremely risky to the quality of the Great Lakes."

3.3.4. Tribal Governments, First Nations, and Métis

As discussed elsewhere in this report, the Agreement's binational, rather than multilateral structure raises concerns. Tribal Governments, First Nations and Métis are not signatories to the Agreement and are sometimes inappropriately characterized as stakeholders. Some interviewees recommended that sovereign nations participate on an equal footing with the U.S. and Canadian governments. The appointment of the Commission's First Nations member was viewed as a positive step.

3.3.5. Independent Assessment of Progress by the International Joint Commission

The quality of the Commission's TAP under the 2012 Agreement generated commentary. While the 2017 TAP report featured dozens of recommendations, the 2020 TAP contained three. Some interviewees criticized the 2017 TAP recommendations as unmanageable in number and said some advice and recommendations went beyond the scope of the Agreement. The 2020 TAP, they observed, contained a recommendation regarding climate change and algal blooms in Lake Superior that they considered a low priority, and another regarding the transformation of LAMP outreach and engagement activities whose justification they disputed.

Several interviewees faulted the 2012 Agreement for deliberately limiting the role of the Commission in the meaningful independent evaluation of the governments' performance, while others said the Commission is failing to exercise the independence that is available to it. Ensuring accountability was the most mentioned need for the IJC to improve (32%) by the GLWQA 50th Anniversary Work Group survey respondents.

A reference from the governments regarding eutrophication of the Great Lakes led to the 1972 Agreement, one interviewee said, but the governments have shied away from initiating IJC references even when the Commission requested them. Further, commissioners have at times been uncomfortable with, and edited advice from their Great Lakes boards. The suggestion was made that the boards should be able to submit their reports directly to governments as their best advice.



Photo Credit: NOAA GLERL

3.3.6. Governance Indicators

One interviewee noted a previous IJC effort to develop Great Lakes governance indicators that were not completed. “How do you measure how well you’re governing if there are no indicators to test yourself against?” the interviewee asked. “If the lakes aren’t getting a whole lot better, it might be something wrong with science and engineering, but it might be something wrong with the way we’re governing, and they don’t measure that.”

3.3.7. Opportunities for Improvement

The GLWQA 50th Anniversary Work Group survey and this project’s survey respondents and interviewees expressed the most concern about overall cooperation and accountability under the 2012 Agreement. This report’s Matrix of Action lists several steps for the Parties to enhance governance both by altering their approach to the GLEC’s composition, meetings, and level of cooperation within and between meetings with all partners and stakeholders, creating and supporting stakeholder participation (outlined in section 3.5), and through timely and complete reporting (also addressed in section 3.6). The IJC’s role in ensuring accountability can be strengthened by improving its internal organization, funding for Agreement work, and by creating and coordinating opportunities for its boards and all stakeholders to develop and participate in effective governance indicators.

3.4. Roles and Engagement of Tribal Governments, First Nations and Métis

The Great Lakes Basin is home to a diversity of Indigenous Nations and traditions. First Nations, Tribes and Métis have been living in the area for a very long time. They are not “stakeholders” interested in the area; they are Rights Holders and must be considered as equal to other governments that have shared authority in the Great Lakes Basin, such as the federal, provincial and state governments.

There are a large number of Tribes, First Nations and Métis throughout the Great Lakes with a diversity of governance systems, mechanisms and processes, resulting in a complex and evolving jurisdictional picture within the Great Lakes area. In addition, for many Indigenous communities in the Great Lakes, the U.S.-Canadian border doesn’t mean anything. There are families that live and commingle from both sides of the international border. The border is something that settlers developed, that has little meaning for Indigenous communities in the Great Lakes Basin.

3.4.1. Historical Considerations

The 1972 GLWQA was silent on Indigenous peoples, communities, nations and rights. The underlying assumption was that Indigenous peoples living in the Great Lakes Basin were not different from others and would fall under the broad category of “stakeholders” or “the general public”.

The 2012 GLWQA is the first time Indigenous peoples in the Great Lakes Basin are recognized in the Agreement as a distinct group or groups. While Indigenous Rights are not specifically referred to, the Agreement identifies “Tribal Governments”. Interestingly, First Nations and Métis are also referred to in the Agreement, but there is no mention of “government” in their case. Essentially, Tribal Governments, First Nations and Métis are put on the same level as other interested parties, without any real power or decision-making authority, as stated in the Preamble:

RECOGNIZING that, while the Parties are responsible for decision-making under this Agreement, the involvement and participation of State and Provincial Governments, Tribal Governments, First Nations, Métis, Municipal Governments, watershed management agencies, local public agencies, and the Public are essential to achieve the objectives of this Agreement.

Since then, there have been genuine but limited efforts from the Parties to implement the GLWQA in a way that would be inclusive and consistent with Indigenous interests. These efforts have been limited by several challenges and focused on engagement (as directed to in the Agreement) rather than on empowerment of Indigenous peoples in the Great Lakes Basin.

In 2017, the IJC TAP Highlights Report demonstrated an evolution in the thinking around Indigenous peoples in the Great Lakes Basin. The report refers to “other governments, including Tribal, First Nations and Métis Peoples”. It also refers to Indigenous governments and organizations as “other government jurisdictions”. In addition, the report provides a list of the Top 20 issues of public concern for the Great Lakes and “First Nation/Tribes/Métis involvement” ranked as #9.¹⁸¹

The broader context around Indigenous history and Indigenous Rights at the global level may have played a role in this evolution. This includes the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP), as well as the Government of Canada’s Reconciliation Agenda and the desire from a growing number of national and sub-national governments to implement a Nation-to-Nation relationship with Indigenous Peoples.

While setting the stage through the recognition of Indigenous jurisdictions, the 2012 GLWQA still falls short of providing decision-making authority to Tribal Governments, First Nations and Métis. The Agreement is almost silent on Indigenous Knowledge and ways of knowing, except for a mention of TEK in Annex 10. Article 7 of the Agreement tasks the IJC with engaging Tribal Governments, First Nations and Métis in relation to data, scientific research and the provision of advice to the Parties. These may be the enabling provisions that led to some recent efforts to include Indigenous Knowledge in various initiatives.



3.4.2. Current Provisions and Practices

As noted in previous sections, the current GLWQA requires the Parties to engage with Tribal Governments, First Nations and Métis. This engagement is being implemented through various formal mechanisms (e.g., membership in WQB, participation in Committees and Subcommittees), informal engagement mechanisms (e.g., consultation and review of draft strategies and plans) and through some mechanisms for incorporation of Indigenous Knowledge. For example, the Great Lakes SAB has struck a TEK Work Group and much is being done to better understand how the IJC can respectfully welcome and integrate Indigenous Knowledge into its work.

The GLWQA provides a framework for Indigenous engagement and participation. The Agreement allows Indigenous peoples in the Great Lakes Basin who want to participate in the GLEC to do so. They can participate like any other GLEC members in the implementation of a particular Annex of their interest or choice. Under the WQB, the Engagement Work Group is co-chaired by an Indigenous person and listening sessions are being held with Tribal Governments, First Nations and Métis.

The umbrella, structure and framework are there, but outstanding questions remain about the capacity of Tribal Governments, First Nations and Métis to be involved, what their engagement really means and how Indigenous Knowledge is considered and integrated in the implementation of the Agreement.

Capacity

Several survey respondents and interviewees mentioned the lack of sufficient funding to enable Indigenous participation in the implementation of the Agreement. One Canadian respondent indicated that steps have been taken in Canada to fund Indigenous participation, but it is not sufficient to enable meaningful engagement. There is simply not enough funding to build capacity in each of the interested First Nations and Métis communities to support their participation to the extent that they wish.

In short, the capacity of Indigenous peoples to be part of the implementation of the GLWQA is dependent upon the Parties' financial mechanisms to provide travel and other financial support to build and provide capacity for meaningful participation from Tribal Governments, First Nations and Métis.

According to the interviews conducted during this project, the GLRI has been able to give Tribes in the U.S. more capacity to participate and to engage with the Parties and the IJC on Great Lakes water quality objectives. For example, Tribes and intertribal organizations in the U.S. are very much a part of the implementation of the Lake Superior LAMP. This may flow from the unique treaty relationship and trust responsibility between the U.S. federal government and the tribes.

Engagement versus Empowerment

It is fair to say that Indigenous peoples are engaged through various mechanisms in the implementation of the GLWQA, but they cannot be fully empowered given the governance structure of the Agreement and the fact that Tribal Governments, First Nations and Métis are not Parties to the Agreement.

In 2017, the WQB released its [Indigenous Peoples Engagement Principles and Practices](#). This may be the most significant progress to-date, enabling more effective and respectful relationships between the Parties and Tribal Governments, First Nations and Métis in the Great Lakes. This document establishes the framework upon which real engagement and empowerment of Indigenous Peoples in the Great Lakes Basin can happen.

**Excerpt from the Great Lakes Water Quality Board's
[Indigenous Peoples Engagement Principles and Practices Policy](#)**

1. First Nations, Métis and Tribes are not “stakeholders”. Within the distinct legal landscapes of the United States and Canada, First Nations, Métis and Tribes hold distinct rights. This makes striving for a nation-to-nation relationship appropriate. In its work, including its deliberations, research and advice to the Commission, the WQB will recognize the ways in which Tribes, Métis and First Nations are distinct rights holders, and will act accordingly.
2. Tribes, First Nations and Métis peoples have diverse interests, needs and concerns, distinct knowledge and ways of knowing, and their own institutions for governance. Differences also exist among the various Tribes, Métis communities and First Nations in the basin. In its work, including its deliberations, research and advice to the Commission, the WQB will recognize these interests, needs and concerns, distinct ways of knowing and institutions for governance.

Through this document, the WQB made the commitment to ensure that Tribal Governments, First Nations and Métis are engaged as “rights holders” rather than “stakeholders” or members of the “general public”. In practice, this involves identifying and consulting with official Tribal Government, First Nations and Métis representatives. In addition, the IJC’s Directive to the Great Lakes Water Quality Board specifies that the Canadian members should include one member from First Nations and one from the Métis peoples, and that the U.S. members should include two members from Tribes.

There are a number of ways through which the Parties and the IJC are striving for more meaningful Indigenous engagement. In the U.S., Tribes are members of the Great Lakes Advisory Board. One interviewee for this project mentioned that the St. Lawrence AOC is really interesting because it is the only AOC where a tribe is actually one of the partners.

The Distinct Tribe Program is set in legislation, where a certain allocation of GLRI is set aside for a program that is run under the auspices of the U.S. Bureau of Indian Affairs (BIA). It’s an effort to allow the Tribes to have more autonomy in running programs that address their needs. The Tribes strongly feel that they need to have self-direction in the program to be able to set priorities that are unique to them and their experiences, their land, and their holdings.

According to the survey and the interviews, there seems to be a recognition from some key players that the Agreement, which is currently binational, should evolve to become multi-national and include Tribal Governments, First Nations and Métis. This could be the path from recognition and engagement to meaningful empowerment.

Indigenous Knowledge

While the GLWQA is almost completely silent on the topic of Indigenous Knowledge, the Parties and the IJC have implemented some mechanisms to explore the inclusion of such knowledge in their activities. The Great Lakes WQB, for example, strives to ensure that Indigenous Knowledge from Tribal Governments, First Nations and Métis is included in its work plans, research and deliberations, and the advice provided to the IJC, and that this knowledge is treated appropriately according to the customs of the knowledge holders.

In practice, several respondents have reported seeing Traditional Indigenous Knowledge be incorporated into the agendas of certain Annex meetings. One respondent indicated: “In the last couple of years, we have seen a real trend, and especially in the last year, we have seen a real movement in articulating TEK, and BIA and the U.S. has taken a big role, as has treaty organizations, like the Chippewa Ottawa Resource Authority and the Great Lakes Indian Fish and Wildlife Commission, in integrating TEK and starting that communication with the tribes. Those frameworks are being developed right now and they can easily be transferred to the GLWQA and the IJC.”

3.4.3. Opportunities for Improvement

The 2012 GLWQA recognizes that Tribal Governments, First Nations and Métis must be engaged but it does not elevate them as decision-makers or Parties to the Agreement. Even the simple recognition of the need for stronger engagement does not necessarily mean that it will actually happen. As one of the interviewees said: “it’s one thing to say we want more engagement. It’s another thing to find and make that engagement possible”. The implementation of the Agreement comprises many initiatives aimed at better engagement of Tribal Governments, First Nations and Métis compared to previous versions of the Agreement. This is positive in and of itself but there are still many challenges and barriers to full recognition of Indigenous Rights in Great Lakes water quality initiatives. These issues are discussed below under three main categories: capacity, complexity and barriers to move from a settler’s perspective to an Indigenous way of knowing and being.

Capacity

As previously noted, funding is a significant challenge and currently insufficient to allow Indigenous policy thinkers and Indigenous leaders to sit across the table from their counterparts from government agencies and other organizations.

Many Tribal Governments, First Nations and Métis and Indigenous organizations are small and represent a small number of people. They are often tasked with filling the same roles as the much larger state, provincial and federal agencies, making it difficult to get people involved at the right time and the right level of engagement.

Diversity of Indigenous Organizations and Complexity of Governance

Indigenous Peoples are established across the Great Lakes. There are a large number of Indigenous communities, governments and organizations, all with their own specific needs, interests and characteristics. It becomes difficult to ensure full engagement of all of them. The Parties and the IJC do not always know whom they should talk to and even within Tribal Governments, First Nations and Métis, there are diverging views and sometimes complex and inefficient governance mechanisms. For example, one interviewee mentioned that often times, tribal consultations go directly to a Tribal Chief, and then they might not trickle down to the appropriate departments in a timely manner.

Many Indigenous interviewees insisted on the fact that Indigenous governance is convoluted and difficult to understand for non-Indigenous peoples. In Ontario for example, a community would have a Chief and a Council, and there is a provincial organization (Chiefs of Ontario) that is an umbrella organization for 133 First Nations. There are treaty organizations and independent organizations. There is also the national Assembly of First Nations, as well as some secretariats and tribal organizations and tribal councils. The Métis have their own governance system which is also complex. This example illustrates how difficult it can be to develop a general approach to Indigenous engagement and Indigenous knowledge for the Great Lakes Basin as a whole, since identifying collective interest is a real challenge.

The diversity of Indigenous peoples in the Great Lakes Basin and complex governance can result in a disconnect between what comes out of an engagement process and what specific Indigenous leaders or communities expect. There is a real risk of having some of the Indigenous people in the Great Lakes Basin saying: “this means nothing to me because I wasn’t at the table, I haven’t been in the discussion and signing of the GLWQA; it’s between two governments, so it doesn’t reflect our image of how the lakes work”.

How the engagement is conducted also matters greatly. It’s more than inviting Tribal Governments, First Nations and Métis to a workshop in a big city. A more holistic approach works better. For example, it would be appropriate to start with workshops in Indigenous communities, with their own Indigenous facilitators, using caterers from the community.

Indigenous Knowledge and Ways of Being and Knowing

As previously noted, Indigenous Knowledge is not specifically referred to in the Agreement. While the Parties and the IJC could help with its integration into decision-making through current engagement initiatives, the fact remains that such knowledge is based on a completely different world view which is not always easy to understand from a western perspective. It is not easily incorporated into federal, state, and provincial regulatory programs, therefore it is most often “considered” but not necessarily “integrated” or “adhered to”.

Tribal Governments, First Nations and Métis who were interviewed during this project gave examples of where the integration of Indigenous Knowledge could be beneficial to make Indigenous people feel they are part of the GLWQA implementation. Specifically, they referred to the metrics that are used to report on the health of the lakes and progress towards meeting the objectives of the Agreement. The Parties rarely track the things that the Tribes, First Nations and Métis would track to assess how well the lakes are meeting the cultural, spiritual and economic needs of their communities.

The inclusion of Indigenous ways of knowing into the implementation of the GLWQA is also likely to be a long and comprehensive process. Survey respondents indicated that for the most part, they have found tribal consultation to be a very productive process, but a process that can take time. The same comment was made with respect to the participation of the St Regis Mohawk Tribe as a formal AOC partner.



Photo Credit: Timothy Neesam

Lessons Learned and Best Practices

Despite a recognition of Tribal Governments, First Nations and Métis in the 2012 GLWQA and a commitment from the Parties and the IJC to engage with Indigenous governments and Indigenous peoples, progress has been slow. The lack of dedicated funding from the Parties, the complexity of Indigenous governance, the lack of capacity within Indigenous organizations and the slow uptake of Indigenous Knowledge in current processes all contribute. In short, Tribal Governments, First Nations and Métis are somewhat recognized by the existing GLWQA but they are not empowered by the existing mechanisms and processes. In addition, they have no authority under the Agreement.

To address these issues, the Agreement should either be amended or implemented in a way that includes opportunities to strengthen the role of Tribal Governments, First Nations and Métis not as stakeholders but as sovereign governments. There are no silver bullets that would suddenly make this happen. A series of changes will be necessary over the coming years to create and support the implementation of new ways of working with Tribal Governments, First Nations and Métis.

3.5. Roles and Engagement of Governments, Stakeholders and the Public

While the Parties are signatories to, and responsible for, the Agreement's successes and failures, they rely on a wide array of entities from all sectors of society to organize and implement its provisions. Thirteen Canadian federal agencies are involved at varying levels to accomplish the Agreement's goals and objectives, led by [ECCC](#). The EPA and its [Great Lakes National Program Office](#) carry primary responsibility in the U.S., and eleven other federal agencies contribute to programs to meet specific Agreement sections. Federal governments work with and through the eight governments of the states and Ontario, who then work with municipal governments to carry out much of the on-the-ground work for land and water use management. Local entities may range from city, township and county governments to regional watershed councils and/or conservation authorities.

The other entity in the Agreement with specific responsibilities, the IJC, carries out its work in cooperation with the federal agencies, but through Global Affairs Canada and the U.S. State Department for its funding and coordination. Other binational organizations with significant Agreement roles, particularly in coordinating projects and ensuring binational or regional cooperation, include the [Great Lakes Fishery Commission](#), also created through a treaty between the two countries, the [Great Lakes Commission](#), organized via a compact between the states and with Ontario and Quebec as associate members, and the more recently created [Conference of Great Lakes-St. Lawrence Governors and Premiers](#) and the [Great Lakes and St. Lawrence Cities Initiative](#), which brings together the region's mayors.

Other entities also play significant roles. Tribal Governments, First Nations and Métis and governing bodies have their own organizations that focus on the lakes and their ecosystems, such as the [Great Lakes Indian Fish](#)

[and Wildlife Commission](#). Nongovernment groups are representative of a wide range of stakeholders, including businesses and industries that played a role through the Council of Great Lakes Industries for many years, and now through the [Council of the Great Lakes Region](#), which focuses on the region’s sustainability. The basin’s universities and colleges also contribute valuable research, education, and engagement opportunities via their scientists, researchers, and Great Lakes-focused curricula, including through the [International Association of Great Lakes Research](#) and their conferences and journals. Hundreds of regional, state, provincial and local nongovernment organizations also contribute to Agreement work, from longstanding national groups such as [The Nature Conservancy](#), [National Wildlife Federation](#) and U.S. and Canadian [Waterkeeper Alliances](#) to local community groups focused on specific issues facing their part of a Great Lake.

Until the Agreement’s 2012 version, entities other than the federal and regional governments and the IJC were not formally recognized for their respective roles. The governments’ focus was on cooperative science and policy rather than inclusiveness or accountability to the broader Great Lakes community. Governments relied on the IJC’s responsibilities under the 1909 BWT to ensure that “all parties interested therein shall be given convenient opportunity to be heard” for citizen engagement on Agreement goals and programs.

3.5.1. The International Joint Commission, Citizen Engagement and Biennial Meetings 1978–2012

The IJC was charged with assisting the Parties with coordination in the 1978 Agreement through its WQB and the Research (later named Science) Advisory Board. They released annual reports on Agreement progress from 1973 to 1980, and biennial reports as required under the 1978 Agreement starting in 1982. Public meetings to receive information for its reports began in 1979. These, as well as research completed in 1974–1980 as a result of a 1972 request from the Canadian and U.S. governments to study the extent of [Pollution from Land Use Activities](#), which relied extensively on work groups that included representatives from several Great Lakes scientific and policy institutions and local governments, drove emerging environmental organizations, local communities and the media to notice the IJC’s work and to attend these meetings.

Biennial Meetings under the Great Lakes Water Quality Agreement		
2011 Detroit, Michigan	1999 Milwaukee, Wisconsin	1987 Toledo, Ohio
2009 Windsor, Ontario	1997 Niagara Falls, Ontario	1985 Kingston, Ontario
2007 Chicago, Illinois	1995 Duluth, Minnesota	1983 Indianapolis, Indiana
2005 Kingston, Ontario	1993 Windsor, Ontario	1981 Windsor, Ontario
2003 Ann Arbor, Michigan	1991 Traverse City, Michigan	1980 Cleveland, Ohio
2001 Montreal, Quebec	1989 Hamilton, Ontario	1979 Toronto, Ontario

Source: <https://www.ijc.org/en/what/glwq-you>

As several reports from the IJC and others revealed the widespread and extensive effects of toxic pollutants on species throughout the Great Lakes food chain, environmental organizations, scientists and the general public saw the IJC’s biennial meetings as the perfect opportunity to voice their concerns about these findings and urge the governments to act. What had been relatively small, quiet meetings of governments and scientists involved directly in Agreement work became three-day events attended by a substantially broader range of Great Lakes stakeholders.¹⁸²



This shift in media and citizen attention began with the 1987 biennial meeting in Toledo, where approximately 300 people from a range of regional governments, citizen groups, scientific and research organizations and media attended to listen to the Commission's advisory boards present their latest findings. Two years later in Hamilton, Ontario, attendance rose to almost 1,000, followed by more than 2,400 at the 1991 meeting in Traverse City, Michigan. Similar but slightly smaller numbers attended the 1993 meeting in Windsor, Ontario (1,890) and in Duluth, Minnesota in 1995 (1,900). Environmental group representatives, scientists, local and state/provincial governments, Indigenous representatives, businesses and industries attended and stated their concerns during public comment sessions. From the late 1980s until the mid-1990s, the IJC was generally viewed as the lakes' primary "watchdog, an advocate for an ecological perspective on both sides of the border" and "an indispensable instrument for both countries."¹⁸³

Several nongovernment organizations—including the binational coalition created in 1983, Great Lakes United (GLU)—coordinated efforts to bring attendees as well as media to these meetings, presenting their own thoughts and findings through dramatic methods. The international environmental organization Greenpeace joined with GLU's and other groups' efforts by touring 40 regional cities leading up to the IJC's 1991 biennial meeting in Traverse City, Michigan, which further encouraged attendance. Organized labour also participated in biennial meetings during this time.

The Commission responded to information provided at these meetings and its boards' findings in its subsequent biennial reports by issuing more direct criticism for the lack of Agreement progress. While these biennial reports (the fifth, sixth, seventh and eighth biennial reports, in particular) were well received in the broader Great Lakes community, they indirectly illuminated the conflicting roles that the IJC was asked to fulfill in the Agreement: coordination and engagement to assist with implementation, yet also review and assess progress.¹⁸⁴

This conflict was apparent at every biennial meeting, when the same Canadian and U.S. government representatives who served as co-chairs of the IJC's WQB presented the board's findings, and again stood to present the governments' findings and assessment of their own progress. WQB members who represented the federal, state and provincial agencies working to fulfill Agreement goals and objectives became increasingly uncomfortable at biennial meetings and lessened their attendance at subsequent board meetings.

3.5.2. Changes via the 1987 Protocol

Other changes in governments' participation in IJC engagement efforts became apparent over time, which impacted subsequent stakeholder engagement. When the Agreement was amended via protocol in 1987, the changes and additions were generally applauded for the increased emphasis on cleaning up the lakes' most heavily polluted locations through RAPs and LaMPs. Citizen advisory groups created for AOCs, LAMPs, and multi-stakeholder work groups organized by governments to develop a Great Lakes Binational Strategy provided many

opportunities for citizens to participate in local and basin-wide restoration efforts. Great Lakes United played a central role in the protocol's provisions by holding 19 hearings around the region where thousands of residents expressed their concerns, and which GLU presented to governments as they negotiated the Agreement revisions.

But the Protocol also changed the two federal governments' roles. In Article X.3, Consultation and Review, the Parties were required, in cooperation with state and provincial governments, to "meet twice a year to coordinate their respective workplans with regard to the implementation of this Agreement and to evaluate progress made."¹⁸⁵ This change allowed the governments to formally lessen their participation in the IJC's WQB since it provided a separate opportunity for the governments to convene. The Board's role changed to that of a policy advisor—no longer was it required to undertake an assessment role.¹⁸⁶ The Parties also committed to coordinating directly with the states and provinces rather than the IJC, including for the newly established RAPs and LAMPs in Annex 2.2(e), where the Parties committed to cooperate with state and provincial governments to "ensure that the public is consulted in all actions undertaken pursuant to this Annex."¹⁸⁷

As the governments responded less to the IJC's biennial reports in the 1990s and generally gave less reliance and attention to the organization in their own reports and public correspondence, it became clear that the IJC's perceived role as an advocate for the lakes had weakened its credibility with the Parties. In response, engagement lessened at IJC biennial meetings and media coverage of Great Lakes water quality issues waned. New commissioners appointed in the mid-1990s responded to the governments' lack of interest and lessened funding by pulling back on the organization's engagement efforts to try to regain the governments' trust. When the IJC stepped back from this leadership role, many in the Great Lakes community and the media became less engaged with IJC processes because they saw their involvement as unproductive and, as a result, not worth the time.¹⁸⁸ Stakeholder groups for citizens, business, labour and others coordinated within their own sectors to create new avenues for engagement about Great Lakes issues, particularly through public advisory groups created for RAPs in AOCs.

3.5.3. Agreement Review, 2006–2012

When the Parties completed a detailed internal review of the Agreement in 1999, environmental nongovernment organizations voiced their distrust for this closed approach and successfully lobbied for an end to the internal review.¹⁸⁹ In June 2005, the governments asked the IJC to conduct five public meetings across the region about the Agreement's upcoming review. Over 1,000 people attended 15 meetings and another 3,100 contributed via a four-day webinar. In its report synthesizing this input, the IJC concluded that the "high level of participation and depth of commentary demonstrate once more that there is a strong constituency for the Great Lakes Water Quality Agreement."¹⁹⁰

The Parties created nine working groups on various Agreement topics, whose members came from federal, state, provincial and local governments, from Indigenous groups in the Great Lakes Basin and environmental organizations, as well as scientists in academia, industry and business, and interested citizens. Throughout 2006, the groups evaluated each section of the existing Agreement for its clarity, relevancy, whether it was achieving results, if it had a successful management framework, and if accountability was clear and present.¹⁹¹



By 2010, however, the Parties' negotiation for a revised Agreement was still not complete. Thirty-six citizen organizations tried to engage the process again by sending recommendations to the Parties, such as providing a draft of the proposed new Agreement to the public for comment, conducting dialogue sessions where residents could discuss issues with negotiators, and holding public meetings on the final draft.¹⁹²

The governments responded by holding seven conference calls with stakeholder groups in 2011. Participants felt the calls included productive exchanges and steps forward in the renegotiation process, and a large change from previous government efforts to engage with others to create a comprehensive new Agreement. The role of citizens with proven credentials to be engaged in the renegotiation process was clearly recognized in these last revisions to the Agreement.¹⁹³

3.5.4. The 2012 Great Lakes Water Quality Agreement

When the new Agreement was signed on September 7, 2012, its language suggested that the Parties were committing to a new approach to engage with a broad range of stakeholders. In its opening acknowledgments and affirmations they added: "Recognizing that, while the Parties are responsible for decision-making under this Agreement, the involvement and participation of State and Provincial Governments, Tribal Governments, First Nations, Métis, Municipal Governments, watershed management agencies, local public agencies, and the Public are essential to achieve the objectives of this Agreement."¹⁹⁴ This recognition is echoed in virtually every Article and Annex, with a commitment to cooperate and consult with all groups to accomplish specific tasks, programs and goals.

"Public" is defined in specific rather than broad terms in the 2012 Agreement's definitions ("...individuals and organizations such as public interest groups, researchers and research institutions, and businesses and other non-governmental entities,") as is "public engagement" in its Principles and Approaches: "...incorporating Public opinion and advice, as appropriate, and providing information and opportunities for the Public to participate in activities that contribute to the achievement of the objectives of this Agreement."¹⁹⁵ These are important distinctions compared with the broader definition that environmental nongovernment organizations, businesses or even state, provincial and municipal governments might assign to the region's residents and reflects the limited focus the Parties have since placed on their engagement efforts under the current version of the Agreement.

The Parties also added Article 5, Consultation Management and Review, which commits them to hold a Great Lakes Public Forum every three years to discuss and receive comments on their progress, on their state of the lake reports, and for binational priorities for science and action. A Great Lakes Summit is to be held in conjunction with the Forum to coordinate with the IJC and other "binational and international governmental organizations."¹⁹⁶ A GLEC made up of members from the various federal, state and provincial, municipal, Indigenous and watershed agencies, with observers from the IJC, Great Lakes Commission and Great Lakes Fishery Commission, the Province of Québec, and 14 Canadian and 11 U.S. nongovernment organizations, is required to meet twice a year to coordinate, implement, review and report on Agreement progress.

The 2012 Agreement assigns significant responsibilities to the IJC for engagement: consult “on a regular basis with the Public about issues related to the quality of the Waters of the Great Lakes, and about options for restoring and protecting these waters, while providing the Public with the opportunity to raise concerns, and render advice and recommendations to the Commission and the Parties;” engage “with the Public to increase awareness of the inherent value of the Waters of the Great Lakes, of the issues related to the quality of these waters, and the benefit of taking individual and collective action to restore and protect these waters;” and coordinate “with other binational or international institutions that address concerns relating to the Great Lakes Basin Ecosystem.”¹⁹⁷ While the same definition of “public” applies, these responsibilities suggest a much broader reach into the region’s general public.

3.5.5. Engagement and the Agreement, 2012–Today

With a significant portion of the region’s residents included as essential stakeholders in the 2012 Agreement, it would be reasonable to conclude that engagement and even meaningful dialogue and participation between and among governments and stakeholders have improved over the past ten years. Unfortunately, the literature and results of surveys completed by the GLWQA 50th Anniversary Work Group and interviews for this project point to even less commitment by the Parties to engage more than a small segment of stakeholders since the 2012 Agreement was signed. Even then, informing and consulting processes are used, rather than engagement and participation strategies.

Project interview and survey respondents reported that overall Agreement engagement activity has lessened considerably due to the lack of effort and direction by the Parties, the disbanding of binational organizations Great Lakes United and the Council of Great Lakes Industries, and a general movement to decentralized, localized approaches that rarely provide the basin-wide perspective needed to engage all stakeholders in Agreement progress. While the IJC continues efforts to fulfill its informing and engagement responsibilities through public meetings around the basin, its newsletter and recommendations in its triennial reports on Agreement progress that encourage the Parties to strengthen their engagement programs, interviewees feel its results are mixed.

In the GLWQA 50th Anniversary Work Group’s own survey of Agreement successes and weaknesses, public engagement was mentioned by 21% of respondents as a positive outcome but an area of weakness by 15%. For the IJC, survey respondents listed the organization’s engagement/communications/cooperation as most successful (26%) compared with five other areas, while 10% felt the IJC did not do well in this arena. Thirty-three percent felt that the Parties and/or the IJC can improve outreach and communications about the lakes to enhance awareness by focusing on local engagement. Other suggestions included increasing social media and virtual outreach (27%), providing additional resources and funding (15%), or developing partnerships (also 15%).

This project's interviewees point to the two Great Lakes Public Forums held thus far as examples of the Parties' limited efforts to fulfill its Agreement engagement obligations. While the first forum in 2016 was held in Toronto and well-attended by those informed and established in Agreement work, interviewees felt that the PRP's release only days before the event prevented participants from reading, let alone commenting on its contents at the forum. Opportunities for attendee questions and comments after each presentation were brief, and a Great Lakes Summit was not held between the Parties and other binational and international governmental organizations in conjunction with the forum, as required. Promotion for the meeting and report was limited to online announcements, rather than broad promotion via traditional and social media throughout the region.

To assist the governments in broadening the forum's reach, the IJC organized live video streaming for the event through Detroit Public Television and TV Ontario. At least 8,600 people from 14 countries watched during the event, and another 16,000 watched various portions via videos provided on the Participate IJC website and via links from both television stations. In its first triennial report, the IJC concluded that these figures illustrated the keen interest the public has in learning more about the lakes and how they can contribute to their restoration and protection.¹⁹⁸

Interviewees and survey respondents felt that the Parties' second Great Lakes Public Forum in Milwaukee in 2018 had even fewer engagement opportunities. The PRP was again released only days before the event and promotion was limited in scope. Only a few hundred people attended the conference, almost all from government agencies responsible for presenting some aspect of the report.

Minutes of the GLEC meetings are posted on www.binational.net, as are all requests for comment on initiatives, proposed standards or programs under the two governments' Agreement work. Those who attend GLEC meetings as members or observers noted in interviews that governments report on progress for specific initiatives under each Annex, but little, if any dialogue or coordination occurs. One person stated that "when it comes to actually coordinating action, that's when things fall down," while another felt that the concept of GLEC is effective, but its implementation is wrong: "We have lots of people coming together for GLEC meetings, but there's no discussion about what we should do, or in-depth discussions."

For the first and second triennial cycles, the IJC completed consultation and engagement programs throughout the region. After the first Great Lakes Public Forum in October 2016 and through March 2017, it held thirteen public meetings, roundtables and listening sessions and encouraged and received input through its online democracy platform, Participate IJC, as well as through its newsletters, social media and website. The IJC reported in its first TAP report that residents who attended sessions expressed appreciation that the IJC travelled to meet with them, and that they would like governments at all levels to provide greater and meaningful engagement opportunities.¹⁹⁹

During the second triennial cycle, the IJC held a variety of sessions to obtain input on Agreement progress: seven expert roundtables, six public meetings, two Indigenous listening sessions, three University symposia, and five field trips. In its second TAP report, the IJC reiterated the previous report's recommendation that the Parties provide funding and support for renewed public engagement for the LAMPs, and specifically for the Lake Superior Binational Forum.²⁰⁰

One respondent involved in the Lake Superior Binational Program said that measuring and reporting on progress is difficult because of the lack of ongoing programs that involve citizen groups. As nice as the IJC's occasional meetings might be to garner interest, "these discrete events that are planned around the basin [aren't] as effective as these ongoing programs that involve citizen groups and education." Another stated that "in terms of having the conversation and raising the profile of issues ... they've [the IJC] been quite successful." But, as long as the governments don't choose to accept and act on the IJC's recommendations, "its actual success is zero."

Some interviewees did not view the IJC's public engagement or the WQB's basin-wide poll as meaningful or worthwhile input. They stated that they prefer to focus on consulting with state or provincial governments directly implementing Great Lakes restoration work or connecting virtually with residents in particular geographic areas who are impacted by a particular issue. "The IJC has a history of going community to community to engage, but I don't think they get quality engagement," said one respondent, who stated that his government agency relies on input from a small advisory board "that represent many of these broad stakeholder groups ... because they are going to provide us with one recommendation that is reflective of all 15 perspectives."

Beyond the two entities specifically responsible for Agreement progress, stakeholders such as the region's nongovernment organizations have changed considerably over the past ten years. While a few NGOs still attempt to organize binational coalitions, the broader community has taken a more localized approach to engagement for issues specific to that area. One interviewee questioned whether there is a collective priority to organize citizens to engage with the governments or the IJC about Agreement progress.

3.5.6. Opportunities for Improvement

Significant research and results of effective stakeholder engagement both point to its value. When executed effectively, public engagement and participation can improve the quality and legitimacy of a decision. Better results for both environmental and social outcomes can be achieved, and the building of trust among all stakeholders is clearly beneficial. Engagement also ensures accountability for actions and strengthens the commitment by citizens, government agencies and academia to progress, in the short- and long- term.

Citizen engagement has been central in the Great Lakes regime and relying exclusively on national governments for compliance ignores the potentially powerful role that citizens can and do play in environmental law and policy.²⁰¹ In its second TAP report, the IJC agreed with these findings and stated that, "There is little question that effective ecosystem-based management requires participation of the public and other stakeholders in an engaged dialogue."²⁰²

This project's surveys and interviews garnered several actions to enhance Agreement engagement and to share knowledge, as listed in the Matrix of Action (Section 4.3). Some point directly to the strengths and weaknesses highlighted previously, but all focus on efforts that are needed not only by the Parties and the IJC, but also by government partners, Tribal Governments, First Nations and Métis, nongovernment groups and the public.

In the 2012 Agreement, the Parties recognize the valuable role that the region's stakeholders can play in restoring and protecting the lakes, commit to engage with them to accomplish its binational work, and require the IJC to do the same. Stakeholder groups and the informed public continue to express their sincere interest in participating in and contributing to this work and have provided—through the IJC'S triennial engagement sessions as well as this project's interviews and surveys—examples of successful past engagement. The Agreement can provide the basis for a basin-wide stakeholder and public engagement model that informs and enhances program design, decision-making and accountability for Agreement and Great Lakes programs, as outlined in the engagement recommendations in section five. With a commitment and resources, this model will reap substantial benefits throughout the region and will provide the Parties with the assistance and cooperation that is essential if the



3.6. Progress and Measurement

3.6.1. Historical Considerations

Agreement's goals and objectives, as well as each country's Great Lakes programs, are to be fulfilled. The Parties under the original 1972 Agreement charged the IJC with reporting "no less frequently than annually" concerning progress toward attainment of the objectives, including an assessment of the effectiveness of the programs and other measures undertaken by the Parties. The Agreement also authorized the IJC to offer advice and recommendations in such reports and to verify independently the data provided to it by the Parties. The 1978 Agreement called for the IJC to report at least biennially on progress toward water quality objectives, designated the Great Lakes WQB as "the principal advisor to the Commission" and created a SAB, replacing the RAB, to provide advice on research and to review science matters referred to it by the IJC.

The 1987 Protocol to the Agreement continued to require the Commission to report at least once every two years on progress toward the water quality objectives, with the option of a summary report in alternating years. The SAB was to be populated with managers of Great Lakes research programs and "recognized experts on Great Lakes water quality problems and related fields." It also authorized the Parties, in cooperation with state and provincial governments, to meet twice a year "to coordinate their respective work plans with regards to the implementation of this Agreement and to evaluate progress made." Originally convened under the banner of the Binational Executive Committee, these meetings were formalized in the 2012 Agreement as sessions of the GLEC.

In 1994, the Parties convened the first of their biennial State of the Lakes Ecosystem (SOLEC) conferences. They described SOLEC as "a forum for the exchange of information on the ecological condition of the Great Lakes and surrounding lands. A major purpose of this is to reach a large audience of people in the government (at all levels), corporate and not-for-profit sectors who make decisions that affect the lakes." In the year following each conference since then, the governments have prepared a report on the state of the Lakes based in large part upon the conference process. SOLEC conferences are intended to focus on the state of the Great Lakes ecosystem and the major factors impacting it rather than the status of programs needed for its protection and restoration. SOLEC also became a showcase for the development of indicators of Great Lakes ecosystem health "to inform the public and report progress in achieving the purpose of the Agreement."

In 2012, the Agreement lengthened the reporting cycle to every three years. The Parties were given the lead role in measuring the state of the Great Lakes ecosystem and progress toward the Agreement's water quality objectives through a PRP, in addition to the existing SOGL reports and LAMPs. The Agreement also created a triennial Great Lakes Public Forum to provide an opportunity for:

- a) the Parties to discuss and receive public comments on the state of the lakes and binational priorities for science and action to inform future priorities and actions; and
- b) the Commission to discuss and receive public input on the PRP.

The Commission's own assessment of progress (TAP) was to be provided triennially, and the Commission was tasked with summarizing public comment at the Forum. The Parties were charged with transmitting any comments to the Commission within six months of receipt of the Assessment of Progress Report.

The Parties and the Commission have pursued the development and reporting of indicators to measure the health of the Great Lakes ecosystem and progress toward achievement of the Agreement's water quality objectives for 30 years. In 2011, the Parties reported on over 70 indicators. Seeking to streamline and make the indicators more accessible to the public, the IJC, in a 2014 report, recommended a smaller set of sixteen indicators of Great Lakes health, composed of 41 separate measures, and the Parties embraced some of the IJC's recommendations. The Parties' 2019 SOGL report uses nine overarching indicators of ecosystem health supported by 45 science-based sub-indicators.

3.6.2. Discussion and Findings

In surveys and in interviews conducted for this report, interviewees identified several successes in evaluating progress and reporting under the 2012 Agreement. Successes included some LAMP outreach efforts such as annual public meetings and reporting that reached key stakeholders, helping to increase overall water basin understanding. Others included a broader participation in Agreement activities, including Tribes, First Nations and Métis, clear articulation of the principles that guide the implementation of the Agreement, and a focus on measuring progress through established indicators.

Interviewees offered suggestions on additional indicators, with one noting disproportionately few indicators of physical integrity, adding that restoration and protection of stream flows should be considered. As noted elsewhere in this report, one interviewee proposed development of governance indicators. While applauding the development of ecosystem indicators, one interviewee urged the creation of a set of human health metrics as well as ecosystem service, social, cultural, and socio-economic indicators.

Interviewees and survey respondents criticized different approaches that the Parties have taken to monitoring, evaluating, and reporting on the nearshore framework. The gap between the Agreement and the public was also noted, with one survey respondent saying, "it would be better to get it outside of its rather insular, though large and important, circle and down to the community and personal level."

One survey respondent said that the IJC needs to improve communications with the public. "Increased visibility on the state of the lakes can be prioritized in the IJC's outreach efforts. A communications focus (like a subcommittee) for each GLWQA board could be helpful," the respondent said. Another said, "The GLWQA is the IJC. I don't think that the messages are truly getting down to the 'public' on a broad scale. My neighbours have no clue what the IJC is or what the GLWQA provides. I think this is a missed opportunity." Another interviewee offered a diametrically opposed view. The role of the IJC in the Agreement is misunderstood not only by the public, but also by Great Lakes activists, "who [errantly] think that the Water Quality Agreement is the IJC's" and that the Commission has the responsibility of implementing it.

An interviewee observed that the fluctuation in the detail and number of recommendations in the Commission's first two TAP reports is a sign that the IJC is struggling to define an appropriate level of engagement and how to produce consistent oversight through the triennial process, adding that the IJC is not an operational agency, and sometimes strays into recommendations regarding operations, which is perceived by the Parties as an incursion into their responsibilities.

One interviewee suggested that the Agreement be revised to require that the Parties set up a working group to review the IJC TAP recommendations and to prepare a formal response within a fixed period of time. Several interviewees said that the IJC should be required to issue the TAP within a fixed period of time after release of the SOLEC and PRP.

Another interviewee said the evaluation of progress might be assigned to an independent, external review body, perhaps an academic institution outside the Agreement's current institutional structures. Another suggested a model could be the U.S. Government Accountability Office, which independently evaluates U.S. government agencies and programs. Finally, an interviewee proposed an amendment to the Agreement, or domestic legislation in the U.S. and Canada, requiring legislative committee meetings after each IJC TAP report at which public comment would be encouraged on the recommendations.

The role of the IJC's WQB and SAB in progress measurement and reporting generated comments and recommendations. The Agreement articles defining the roles of these boards are not sufficiently specific, said one interviewee, and could be revised to articulate a role for the boards in evaluating progress and reporting on the health of the ecosystem.

Great Lakes progress reporting is not reaching the public and not sufficiently clear to be accessible, several interviewees said. One expressed frustration at the lack of progress in addressing algal blooms in western Lake Erie and said with better reporting the public would "be mad about it. And that anger would fuel more Erie accountability."

The IJC's diminishing importance as an independent evaluator of the Parties' progress in Agreement objectives was noted by multiple interviewees. Governments could rely on IJC as they did under previous versions of the Agreement, one suggested. The erosion of the IJC's role began with the advent of SOLEC, which superseded in importance the biennial meetings the Commission hosted from the 1970s on. "You could put something in the Agreement that would require a formal role of the IJC in terms of coordinating and reporting," said one.

Continuous changes in the two federal governments lead to inconsistency in attitudes of IJC commissioners toward the Commission's evaluation and reporting responsibilities, an interviewee observed. Some are concerned about offending the governments, refraining from outright advocacy for the Great Lakes. Interviewees questioned the IJC's recommendations for failing to recognize higher priorities to which the governments must attend. An example of an influential IJC recommendation was its nearshore water quality framework, the interviewee said, which colored the 2012 Agreement language on the topic.

The IJC needs to define its scope, priorities, and analysis, according to one interviewee. The Commission needs to do a better job of staying within the scope of the Agreement, limit its priority recommendations to a manageable number, and support those recommendations with persuasive analysis, the interviewee said.



3.6.3. Opportunities for Improvement

One of the most important features of the Agreement is accountability. And accurate, timely and insightful reporting is a critical element in accountability. The Parties and the IJC can contribute to greater accountability through several practices.

The value of reporting may be enhanced by consideration of human health and governance indicators. The Parties and IJC should tap the knowledge of Indigenous peoples in the Great Lakes Basin if they choose to develop human health indicators. As defined in the Agreement, the Great Lakes Basin ecosystem includes “the interacting components of air, land, water and living organisms, including humans.” Human health is inextricably linked to the condition of the ecosystem itself.

The Parties and the IJC should consider changes in their approach to reporting. The PRP should be released well in advance of the triennial Great Lakes Forum to enable meaningful public review of the document. The IJC’s TAP report should address high-priority issues and recommendations rather than a broad gamut of matters and should be issued consistently and promptly after the governments’ Great Lakes reports, enabling timely and meaningful response by the Parties. The Parties, in turn, should comply with the Agreement requirement that such a response be provided within six months of receipt of the TAP.



Photo Credit: National Parks Gallery

SECTION FOUR: Summary of Findings and Future Considerations

4.1 Summary of Findings

Emerging from this project are a wealth of insights and perspectives from a broad range of partners and stakeholders, including representatives from federal governments, Tribal Governments, First Nations and Métis, provincial, state, and municipal governments, past and current members of IJC Great Lakes boards and the GLRO, and engaged citizens. A review of historical versions of the GLWQA allowed for a better understanding of approaches and progress made in implementing the Agreement over time and highlighted key successes, challenges and lessons learned that could be applied to the current version. The assessment of the focus and organization of the 2012 GLWQA provided further insights into what is considered to be working well and where there are opportunities to strengthen the Agreement to facilitate further progress towards meeting its objectives and goals. Key findings emerging from this work are summarized below.

4.1.1 What is Working Well?

Interviewees and survey respondents highlighted a number of ways in which the Agreement is currently working well.

Scope , Purpose & Objectives

- The Agreement provides an overarching binational framework and space for two countries, eight states, one province and a wide range of partners and stakeholders to come together, establish a focus on critical Great Lakes issues, express commitments, and communicate, coordinate, and collaborate with each other.
- Several interviewees and survey respondents remarked that perhaps the most significant success of the Agreement is that the Parties continue to support it, demonstrating that Canada and the U.S. acknowledge the importance of working together to protect and enhance Great Lakes water quality, despite ever-changing political and cultural contexts, various administrations, and a long list of competing priorities. Interviewees felt it is important to recognize the importance of domestic governance frameworks and tools to address commitments under the Agreement, while increasing accountability.
- Overall, the purpose of the Agreement remains relevant and broad, enabling a focus on protecting and restoring the lakes, while remaining flexible enough to address new and emerging threats. General and Specific Objectives under the 2012 GLWQA were also noted to be comprehensive and relevant. These findings align with the results of the GLWQA 50th Anniversary Work Group survey, where 59% of participants felt that no changes were needed to the purpose of the Agreement, while 31% indicated that no change was needed to the General or Specific Objectives.
- A strength of the Agreement frequently cited by interviewees and survey respondents is the use of the ecosystem approach. While there was a lack of agreement about how successful this approach has been in realizing practical, on-the-ground improvements over time, there was consensus on the need to further support this holistic approach under the Agreement.
- As emphasized in interviewee feedback, the underpinning of the Agreement is cooperative science and the belief that the issues affecting the Great Lakes cannot be addressed without sound science and monitoring. Interviewees felt strongly that this was a critical success of the GLWQA.

Structure and Implementation

- There was broad agreement that the use of Annexes to structure the Agreement and its implementation and to address priority issues is appropriate and necessary. Many interviewees and survey respondents felt that existing Annexes provide sufficient flexibility to address new issues as they arise. However, perspectives on the effectiveness of implementation varied by Annex.
- Annex 1 (Areas of Concern), including RAPs, and Annex 2 (Lakewide Management) were cited by interviewees as successful. These annexes were commended for bringing together various partners and stakeholders for constructive dialogue that translates into meaningful action with widespread support. Increased emphasis on the nearshore under Annex 2 was also praised by interviewees for recognition of the relationship between the nearshore area, the shoreline and the lake proper.

Governance

- A key Agreement principle is the binational relationship between the two countries to meet common goals. This includes creating coherent, coordinated programs that identify roles and responsibilities, integrate with state and provincial actions, and provide the ability to effectively measure and report on their results. In the GLWQA 50th Anniversary Work Group's survey, 74% of interviewees identified binational or multinational governmental cooperation and partnerships as one of the Agreement's top successes, particularly for specific programs such as for AOCs and LAMPs.
- Oversight and reporting by the IJC were noted to have brought attention to serious water quality issues in the Great Lakes over time. The IJC has also played a key role in bringing together partners and stakeholders to achieve GLWQA objectives.

Roles and Engagement of Tribal Governments, First Nations and Métis

- The 2012 GLWQA is the first time Indigenous peoples in the Great Lakes Region are recognized in the Agreement as a distinct group or groups. While Indigenous Rights are not specifically referred to, the Agreement identifies "Tribal Governments, First Nations and Métis".
- In 2017, the WQB released its [Indigenous Peoples Engagement Principles and Practices](#). This may be the most significant progress enabling more effective and more respectful relationships between the Parties and Tribal Governments, First Nations and Métis in the Great Lakes. The document establishes the framework upon which real engagement and empowerment of Indigenous Peoples can happen.
- The WQB made the commitment to ensure that Tribal governments, First Nations and Métis are engaged as "rights holders" rather than "stakeholders" or members of the "general public". The IJC's Directive to the Great Lakes Water Quality Board specifies that the Canadian members should include one member from First Nations and one from the Métis peoples, and that the U.S. members should include two members from Tribes.

Roles and Engagement of Governments, Stakeholders and the Public

- The GLWQA is credited by interviewees with bringing together a diverse set of government and nongovernmental partners and stakeholders to contribute to the implementation of the Agreement. Much of the progress achieved to-date is the result of a strong Great Lakes community comprised of citizens, scientists, Tribal Governments, First Nations and Métis, governments, and other partners and stakeholders. This has facilitated considerable information-sharing between the Parties and across the community and provided opportunities for learning from each other and improving understanding on important issues. The 1972, 1978 and 1987 versions of the Agreement fostered a sense of basin-wide community that contributed to constructive problem-solving. The strength of the Great Lakes community is also credited with providing the space and relationships necessary for creative solutions and common goals to emerge grounded in trust and respect.
- The 2012 Agreement is noted for reinvigorating the need to engage with a broader audience and expand the range of actors in supporting implementation. In addition, the 2012 Agreement introduced the GLEC, which provided a forum for the Parties to coordinate, review, and report on programs and practices related to the implementation of the GLWQA. This was important not only for the Parties, but also for state and provincial governments, Tribal Governments, First Nations, Métis, watershed agencies, and public agencies.
- Binational forums, particularly the Lake Superior Binational Forum, were a creative way of engaging with communities, and very successful at providing space to discuss the issues that were core to the GLWQA and for citizens to provide feedback to the Parties.

Progress and Measurement

- Some LAMP outreach efforts were noted to be successful, such as annual public meetings and reporting that reached key stakeholders, helping to increase overall water basin understanding. Other successes include broader participation in Agreement activities, including Tribal Governments, First Nations and Métis, clear articulation of the principles that guide the implementation of the Agreement and a focus on measuring progress through established indicators.

4.1.2 Opportunities for Improvement

The following summarizes key opportunities to strengthen and improve the Agreement and its implementation mechanisms based on findings outlined in this report.

Scope, Purpose & Objectives

- Interviewees suggested that additional language should be incorporated into the GLWQA to reinforce a need to be proactive and to recognize the importance of foresight, forecasting and the identification of potential threats before they emerge.
- The limited emphasis on human health in the Agreement was remarked upon by several interviewees. While referenced in the preamble, interviewees and survey respondents noted that the Agreement would also benefit from the inclusion of a more explicit statement or focus on the social dimensions associated with the Great Lakes ecosystem.

- The commitment to the physical integrity of the lakes was suggested to have been largely overlooked and even damaged in the pursuit of other goals like restoring and maintaining chemical and biological integrity. It was suggested that strengthening language related to protections for physical integrity in the Agreement should be made a priority.
- The 2012 GLWQA was noted to be lacking a focus on equity, diversity, inclusion and environmental justice with interviewees suggesting that these principles are critical for recognizing and further addressing the disproportionately negative environmental impacts experienced by a wide range of underserved and underrepresented communities. It was suggested that a commitment to equity and environment justice could be integrated effectively into the principles and approaches to ensure that they guide the Parties in achieving the purpose of the Agreement. They could also be further articulated as a Specific Objective to proactively develop, support and encourage inclusion of diverse communities.

Structure and Implementation

- Interviewees identified a lack of clear targets and goals for most Annexes in the 2012 Agreement, contributing to challenges related to accountability, measuring progress and ensuring alignment between the Parties.
- It was noted that the Agreement should be strengthened to ensure a more holistic approach to addressing Great Lakes water quality issues. While some compartmentalization of priority issues will likely always be required, there is also a need for greater recognition of the interconnectedness of Annexes and the importance of incorporating cross-cutting issues (e.g., climate change, watershed approach, TEK) into each.
- With regards to specific Annexes, the majority of interviewees and survey respondents felt that the existing Agreement structure provides sufficient flexibility to address issues as they arise. However, perspectives on the effectiveness for implementation varied significantly by Annex. Those identified as working well included Annex 1 (AOCs), Annex 5 (Discharges from Vessels), Annex 7 (AIS) and Annex 10 (Science). Annexes noted to need improvement included Annex 3 (CMCs), Annex 8 (Groundwater) and Annex 9 (Climate Change).
- Insufficient funding for implementation was identified as a contributing factor to the lack of progress under a number of the Agreement's Annexes. In fact, funding and support for Great Lakes activities and programming is identified in the literature and by study participants as a critical challenge affecting the success of many aspects of implementation.

Governance

- In the GLWQA 50th Anniversary survey, 61% felt that governance, implementation and accountability was the Agreement's top weakness, even in instances when the Parties worked well together. Fifty one percent listed improvements in these three areas as the most important changes that should be made to the GLWQA.
- The 2012 Agreement was most mentioned in interviews as the point at which many responsibilities were transferred to the Parties, essentially taking the IJC out of any opportunities to assist with coordination and to be able to assess progress. The IJC's ability to hold the Parties accountable has eroded through the State of the Lakes process.
- The IJC's role in ensuring accountability can be strengthened by improving its internal organization, increasing funding for Agreement work, and by creating and coordinating opportunities for its boards and all stakeholders to participate in the development of effective governance indicators.

Roles and Engagement of Tribal Governments, First Nations and Métis

- The future of the GLWQA demands a more substantial role for Tribal Governments, First Nations and Métis, who have lived in the Great Lakes region for millennia. Historically, engagement of Indigenous communities in the Great Lakes Basin has been poor, but the Parties and the IJC have made significant efforts to continue to build trust and ensure that their important perspectives and concerns are addressed.
- Despite these welcome changes, much work remains to ensure appropriate and successful engagement of Tribal Governments, First Nations and Métis, including the need to acknowledge and incorporate the use of TEK.
- There is insufficient funding allowing Indigenous policy thinkers and Indigenous leaders to sit across the table from their counterparts from government agencies and other organizations. Many of the Tribal Governments, First Nations and Métis and other Indigenous organizations are small and represent a small number of people. They are often tasked with filling the same roles as the much larger state, provincial and federal agencies, so sometimes the capacity is missing to get people involved at the right time and the right level of engagement.

Roles and Engagement of Governments, Stakeholders and the Public

- The elimination of the Lake Superior Binational Forum and other mechanisms for public engagement symbolized to some a change in approach by the Parties and a shift towards an engagement model geared towards top-down communicating, rather than a two-way exchange of ideas and information.
- A large proportion of the public is unaware of the existence of the Agreement and who is responsible for its implementation. Taking Agreement information-gathering and reporting activities into communities across the Great Lakes watershed was frequently suggested as a means of improvement, as was using the best possible social engagement methods to ensure basin-wide collaboration versus top-down, directed communication methods.
- Beyond an augmented role for Tribal Governments, First Nations and Métis, it was reported that greater coordination among all government and nongovernment partners would strengthen implementation.

Measurement and Reporting

- More constructive methods to build accountability are needed. This includes regular and publicly available reporting on progress and timely public access to information to enable partners, stakeholders and the public to evaluate the effectiveness of work undertaken to achieve the objectives of the Agreement.

4.2 Emerging Issues and Considerations

Many of the issues and threats affecting the Great Lakes are well known, including those already addressed in the 2012 Agreement. However, a range of others are currently poorly understood and deemed to be “emerging.” These also include issues that may have emerged more recently or that have become more prominent. In the context of the Great Lakes, there is also a recognized lack of understanding of the complex interactions of multiple threats or stressors on the lakes.

The GLWQA outlines a role for the IJC and its advisory boards to play in identifying emerging issues and recommending strategies and approaches to resolve them. In recognition of this commitment, the SAB has long recognized the need for preventative efforts to resolve the complex challenges facing the lakes, including those associated with the early identification and monitoring of emerging issues. For example, the SAB has begun work on the development of a framework for a Great Lakes Early Warning System (GLEWS), which will allow scientific and management communities to address emerging and anticipated issues before they threaten the integrity of the lakes.²⁰³ The first phase of this work identified and prioritized a wide range of threats, including AIS, nanoparticles, natural disasters, airborne contaminants, microplastics, emerging diseases and groundwater quantity. Stressors that would further exacerbate these issues were also identified, including population growth, climate change, legacy contamination and economic drivers.

This section summarizes key emerging issues requiring further consideration within the context of the GLWQA that were identified through the review of the literature and in discussion with interviewees and survey respondents.

4.2.1. Plastic Pollution and Other Marine Debris

Marine debris is defined as anything that does not naturally belong in the water and in the Great Lakes, it can include plastic and discarded fishing gear. Modelling points to an estimated 10 million kilograms of plastic, including bottles, food packaging and microplastics flowing into the Great Lakes each year and approximately 80% of all litter found during shoreline cleanups is plastic.²⁰⁴ Plastic waste pollutes the water and has been shown to be hazardous to fish and wildlife. Sampling studies have identified microplastics in both water samples and organism tissue within the Great Lakes.²⁰⁵ Research has also linked microplastics to a range of health impacts for aquatic organisms, including inflammation, oxidative stress, changes to gene expression and reduced growth and feeding.²⁰⁶

Studies concerning the prevalence, transport and fate of plastics in the environment have increased in number over the past decade but those specific to the Great Lakes remain limited. There is a need for more data to better understand the amount and types of plastic debris found and their impacts on the unique Great Lakes Basin ecosystem. Plastics, and more specifically, microplastics, were identified by interviewees as an important emerging concern. The 2017 TAP report noted that microplastics, microbeads and microfibers were #33 on the list of issues raised most often by the public, with plastic pollution gaining even more attention in recent years. Also in 2017, the IJC released a report and recommendations to the governments of Canada and the U.S. regarding microplastics in the Great Lakes, citing growing evidence that significant amounts of small pieces of plastic are entering the lakes and outlining recommended actions to prevent their entrance. These included a need for a binational plan, science, pollution prevention, and education and outreach.²⁰⁷ Interviewees noted that addressing the enormity of the plastic pollution problem will require collaboration across a range of stakeholders and levels of government, together with local communities.

As previously noted in this report, plastic does not currently fit easily within binational screening criteria for nominated CMCs under Annex 3 of the Agreement. There are many types of plastic and microplastic, each one comprised of thousands of chemicals, potentially entering the lakes from a wide range of pathways. It was suggested by one interviewee that a way around this may be to change the name of the Annex to “substances of mutual concern” to ensure that substances that are chemically synthesized, rather than chemicals, can still be considered.

4.2.2. Pharmaceuticals and Personal Care Products

Interviewees also suggested that there is a need to explore a mechanism that more effectively incorporates and addresses pharmaceuticals and personal care products (PPCPs) — a class of contaminants that include prescription (e.g., antibiotics) and non-prescription drugs (e.g., ibuprofen), fragrances, harmful pollutants (e.g., PFAS), detergents, hormone drugs and others that may be used for personal health or cosmetic reasons (e.g., Triclosan). PPCPs play an important role in the treatment of disease and are widely used to improve the quality of life for humans and animals however, they can end up in the aquatic environment via agricultural runoff, discharges from pharmaceutical plants and wastewater effluents. Primary pathways include human excretion, improper disposal of unused or expired medication or personal care products that are washed off in the shower, which are then carried to wastewater treatment plants (WWTPs) that have not been designed to remove them.

There are hundreds of PPCPs in use, each with unique characteristics, and different fates and distribution patterns. Acute ecotoxicity guidelines and thresholds are only available for a small portion of these and chronic toxicity data is even more limited. The continuous use and discharge of many PPCPs into the Great Lakes has contributed to their being considered pseudo-persistent — chemicals whose supply is continually replenished in the aquatic environment — even if they degrade easily, contributing to the potential for constant low-level exposures. Once they have entered the lakes, they can be absorbed by other media (e.g., soil, suspended particles, sediment), organic matter (e.g., plants), and biological organisms (e.g., algae, fish). Some pharmaceuticals have been shown to degrade rapidly or transform into other substances, which may be more or less harmful than the original form, and more or less available to media in the aquatic environment.

There are a number of other concerns related primarily to pharmaceuticals entering the Great Lakes. For example, a 2013 study on the risks of medicinal products found that antibiotics, anti-cancer or anti-parasitics are groups that are especially intended to kill target organisms or target cells.²⁰⁸ If these were to find their way into the environment in any measurable level, there may be a need for protective measures for more vulnerable or sensitive populations (e.g., children or elderly populations).

Some PPCPs may have the potential to contribute to the development or spread of antibiotic resistance, yet another issue of emerging concern. This subject is explored in the literature, including one study that found that decaying and free-floating *Cladophora* sampled near a WWTP had the highest bacterial densities on antibiotic-treated plates, indicating some level of antibiotic resistance was present. It was not clear, however, whether this was a direct result of exposure to WWTP effluent.²⁰⁹

4.2.3. Multiple Stressors

Several interviewees discussed the need to consider an effective mechanism under the GLWQA for addressing the complex interactions of multiple stressors on the Great Lakes Basin ecosystem. It was noted by one interviewee that the issue of multiple stressors gets right at the heart of the question of how to incorporate new and emerging water quality issues more effectively under the Agreement. As previously noted in this report, there has been increasing recognition in recent years of the importance of the interaction of multiple environmental stressors by the IJC and the Parties. For example, SOGL reports dedicate space to illustrating the interrelationships that occur in the ecosystem and between various sub-indicators.

The interactions of multiple stressors generally remain poorly understood. Interviewees felt that additional studies are needed to quantify the effects of key multiple stressors, such as climate change and changes to land use to better understand how to mitigate their impacts. It was also suggested that the Agreement could be strengthened through a directive or even an annex that specifically focuses on multiple stressors, as a means of recognizing the significant impact they could have and to try to get ahead of the curve in addressing them.

4.2.4. Population Growth and Climate Migration

Population growth across the Great Lakes region is expected to contribute to a number of additional challenges that will impact water quality. Interviewees noted that there is a need for greater understanding of the potential environmental impacts that often come with urbanization, including shoreline hardening, loss of habitat, increased stormwater runoff and stress on aging water infrastructure. A need to take a long-term view and to put additional guidelines in place for land use were also noted. One interviewee discussed the “nibbling effect”, referring to development that occurs “bit by bit, piece by piece, and there is just this very slow and insidious kind of change in how the Great Lakes are used and developed.” It was noted that this is a critical concern that should be considered under the Agreement and by the IJC as it relates directly to protecting the lakes with the future in mind.





Building an emphasis on green infrastructure solutions into the Agreement was suggested by a number of interviewees and survey respondents as an effective means of countering potential environmental impacts associated with urban development. Green infrastructure can encompass a wide array of practices but is generally understood to be an approach to water management that protects, restores or mimics the natural water cycle. It is effective, economical and can enhance community resilience. Examples include those designed to naturally filter and absorb stormwater, or the use of water-permeable infrastructure including conserved natural areas, street trees, rain gardens, porous asphalt, infiltrating bioretention basins and green roofs.²¹⁰ Literature indicates that most green infrastructure intervention methods provide municipalities direct and indirect financial benefits and interviewees of this study noted that greater investments to build capacity at a community level would help to accelerate the adoption of green infrastructure and mitigate a range of contamination issues facing the Great Lakes.

Several interviewees suggested that environmental issues associated with urban development will only become more prevalent when taking human migration patterns into consideration. The Great Lakes region has often been referred to as a “climate refuge”, where those from areas that are rapidly warming would seek shelter based on the more moderate temperatures, relative safety and rich natural resources.²¹¹ As one interviewee noted, “we’re going to see massive migration of humans into the Great Lakes Basin with climate change, water scarcity and increasing frequency of droughts and fires.”

Important research and projects have already begun to look at what has been referred to by some as the “next logical phase of climate research: whether meteorological disruption will not only force people out of their home, but also compel them to move away, perhaps to the Great Lakes.”²¹² More importantly, there is a need to better understand how receiving communities will be able to address the potential influx of people to the region. It was suggested that this will “put even greater pressure on the Great Lakes” and that there will be a critical need to support many communities in the region in the coming years.

4.2.5. Environmental Equity

As previously noted in this report, a number of interviewees and survey respondents discussed the need for greater focus in the GLWQA on equity, diversity and environmental justice in recognition of the fact that not all populations have the same experiences within the Great Lakes. Underserved and underrepresented communities are disproportionately experiencing negative environmental impacts associated with issues such as water affordability and water quality. For example, Tribal Governments, First Nations and Métis continue to experience long-term drinking water advisories. Vulnerable communities are also anticipated to face the greatest risks and suffer the worst impacts of climate change based on where they live, their health and more limited access to resources.

The literature emphasizes that early engagement and partnerships at the community level are often successful approaches to addressing environmental equity issues.^{213,214} Building these relationships in the short-term will be important for better understanding how to meaningfully engage marginalized populations and to avoid implementing climate solutions that do not take their unique perspectives and circumstances into consideration.

4.3. Matrix of Actions

A matrix of action has been shown to be an effective tool for orienting thinking and visually mapping potential future actions to address complex challenges. The matrix provides a framework to explore those actions identified through this study that should be considered by relevant partners and stakeholders to address specific issues and opportunities associated with the GLWQA and its implementation. Knowledge of the broader interconnections that exist across a complex challenge provides opportunities to determine appropriate and complementary actions with a good understanding of their potential implications, preventing the introduction of unintended consequences.

This matrix is one of several tools that were used to help guide the development of recommendations for consideration by the GLWQA 50th Anniversary Work Group as part of this report. It was also an important means of confirming with interviewees and survey respondents that the information shared had been accurately reflected, while identifying any outstanding gaps.

4.3.1. Potential Actions

The following broad categories were used to organize potential actions related to the GLWQA, including measures that could be taken to respond to identified challenges, or realize opportunities:

- **Governance by the Parties:** This category includes actions associated with the signatory Parties (i.e., federal governments in Canada and the U.S.) and their delegate agencies/ministries under the GLWQA (e.g., U.S. EPA and ECCO), as they relate to governance. This may include considerations related to leadership, priority setting, authority, transparency and public involvement related to the decision-making processes, clarity on roles and responsibilities, and the appointment process.
- **Roles and Responsibilities of the IJC:** This category is comprised of actions related to the roles and responsibilities of the IJC, including its advisory boards and substructures. This may include considerations related to leadership, priority setting, authority, diversity/representation, and the appointment process. This category also focuses on relationships and interactions within the IJC and with the Parties (and delegate agencies/ministries).
- **Agreement Structure and Implementation:** This category includes actions related to the overarching implementation of the Agreement's framework and Annexes, along with various binational and domestic instruments, measures and programs that have, or can be, used in support of the GLWQA agenda. This may include considerations related to the structure, objectives, scope, programs and measures included in all Annexes, as well as frameworks or mechanisms for addressing new and emerging water quality issues. Note that any actions related to specific Annexes are found in a separate table (Table 7).
- **Coordination of Partners:** This category covers actions related to the formal coordination, cooperation, and communication of the Parties (and delegate agencies/ministries) and the IJC (and its advisory boards and substructures), with government partners and non-government stakeholders as part of the implementation of the Agreement. This may include the creation of partnerships (e.g., RAP Team) and formal structures (e.g., appointments to Annex sub-committees).
- **Engagement and Knowledge-Sharing:** This category is comprised of actions related to mechanisms and initiatives that are used to engage, share knowledge, collect input and information, and raise awareness of the GLWQA with key partners and stakeholders and the broader public (e.g., public forums, consultations, information gathering and knowledge-sharing activities and tools).
- **Funding and Resource Allocation:** This category of actions includes those related to financial and other types of support (e.g., capacity-building and human resources, the production of guidelines and frameworks) for the implementation of the GLWQA.

- **Science and Data Collection:** This category of actions focuses on those related to the collection and generation of data and knowledge to support decision-making under the GLWQA.
- **Progress Measurement and Accountability:** The actions in this category include those that aim to address challenges and opportunities related to the metrics, mechanisms and timelines used for measuring and reporting on overall progress under the Agreement and accountability in achieving its objectives.

Note that the actions outlined in the matrix may apply to more than one of these categories. For example, actions related to funding and resource allocation may be used to address barriers related to the coordination of partners, as well as those related to engagement and knowledge-sharing. The purpose of the matrix is not to recommend any one action over another.

4.3.2. Involvement of Partners and Stakeholders

The following key partners and stakeholders have been identified as having a potential role to play in addressing challenges and realizing opportunities related to the GLWQA:

1. Parties (i.e., federal governments in Canada and the U.S.) and delegate agencies or ministries
2. IJC and its substructures (e.g., advisory boards, committees, etc.)
3. Government partners:
 - o Tribal Governments, First Nations and Métis
 - o Great Lakes provinces, states, municipal governments, binational/national commissions, watershed management agencies, local public agencies, etc.
4. Non-government stakeholders and groups (e.g., academia, industry or business, nongovernmental and civil society organizations, community groups, foundations, etc.)
5. Communities and the public (e.g., representatives of local groups and communities, including Indigenous communities in the Great Lakes Basin)

While different partners, stakeholders and groups may have specific actions that they are more suited to leading, there are also opportunities to support the actions of others. The partners and stakeholders attributed to various actions in the matrix below are those who are believed to have an interest or responsibility for undertaking these actions, as opposed to those who suggested their inclusion as part of this project.

4.3.3. Important Considerations Prior to Exploring the Matrix of Action

It is important to note that a wide range of challenges and opportunities related to the GLWQA were identified by interviewees and survey respondents through this project, and that this matrix represents a high-level summary of potential actions only. As such, it is unable to provide a thorough overview and capture the complexity of the context within which these actions are discussed in the literature and with interviewees or survey respondents. This broader context and the full diversity of perspectives, including areas of commonality and agreement or lack of consensus, have been explored in earlier sections of this report.

Table 6: Matrix of Action for the Review of the Great Lakes Water Quality Agreement

Governance by the Parties	Roles & Responsibilities of the IJC	Agreement Structure & Implementation	Coordination of Partners	Engagement & Knowledge Sharing	Funding & Resource Allocation	Science & Data Collection	Progress Measurement & Accountability
Strengthen binational alignment of approaches to priority water quality issues (e.g., ballast water regulations, binational climate resiliency and adaptation), while providing space for complementary domestic legislation, policy frameworks and priorities	Leverage the strength of the IJC as a convener, facilitator and advisory body, to further support the Parties in convening and building capacity for the development of strategies on priority issues, and to synthesize best practices within and beyond the Great Lakes region	Ensure that the implementation of the GLWQA focuses on advancing programs that promote new, leading-edge solutions beyond those that governments have already committed to under domestic programs	Explore models to improve coordination and communication on the implementation of the GLWQA with various partners, stakeholders and groups (e.g., Tribal Governments, First Nations and Métis, academia, industry, state and local governments)	Invest in new communications tools, technologies, and expertise (e.g., communications experts and social scientists) to strengthen reporting processes and provide targeted engagement and information for various audiences (e.g., Indigenous and local governments, industry, the public.)	Increase capacity-building and financial support for participation of partners and stakeholders, and particularly for Tribal Governments, First Nations and Métis, in important GLWQA consultations, meetings, and discussions	Leverage innovative research methods (e.g., foresight, forecasting, horizon scanning) to identify potential threats and issues before they emerge & support a more proactive and preventative approach under the GLWQA	Improve coordination of progress measurement and reporting activities across binational agencies involved in assessing and reporting on Great Lakes issues (e.g., Great Lakes Fishery Commission)
Explore options to expand the number of signatories on the GLWQA as a multilateral, rather than binational agreement, in recognition of the important role of Tribal Governments, First Nations and Métis	Strengthen recommendations in TAP reports by ensuring they are focused, actionable, prioritized, within the scope of the Agreement, and underpinned by strong, science-based analysis	Explore options for acknowledging the GLWQA as a multilateral, rather than binational agreement, in recognition of the important role of Tribal Governments, First Nations and Métis	Enable GLEC members and observers to have a stronger role in decision-making processes by providing opportunities for more in-depth discussions, input, and meaningful comments or critiques	Implement a coordinated, well-resourced and sustained effort to engage and educate citizen groups and the public about ongoing programs (using past initiatives like the Lake Superior Binational Forum as inspiration), contributing to long-term participation in efforts under the GLWQA	Develop a binational funding strategy to coordinate concurrent appropriations in a way that supports the goals of the Agreement across local, regional or national borders	Evaluate gaps related to the development and use of water quality indicators to improve performance measurement and reporting	Incorporate a broader range of metrics (e.g., human health, social, ecosystem services, cultural, economic, and good governance) into progress measurement and reporting

Legend

	Parties and delegate agencies/ministries		Government partners (Great Lakes provinces, states, municipal governments, binational/national commissions, watershed management agencies, local public agencies)
	IJC and its substructures		Non-government stakeholders and groups
	Government partners (Tribal Governments, First Nations and Métis)		Communities and the public

Governance by the Parties	Roles & Responsibilities of the IJC	Agreement Structure & Implementation	Coordination of Partners	Engagement & Knowledge Sharing	Funding & Resource Allocation	Science & Data Collection	Progress Measurement & Accountability
Strengthen accountability under the GLWQA by fully and publicly responding to how recommendations for improving water quality from the IJC have been addressed (or reasons for why they have not been)	Strengthen the oversight role of the IJC by providing opportunities for a more balanced and rigorous review of progress under the Agreement, including the recognition of successes, while offering constructive criticism	Include a stronger focus in the GLWQA on social issues, including drivers of water disparity, inequality, and unaffordability; and recognize the importance of equitable distribution of resources and access to safe and affordable drinking water	Provide further opportunities for meaningful, effective, and genuine engagement of partners on Annex sub-committees, and ensure their input is taken into consideration	Ensure that public forums include dedicated time and opportunities for stakeholders, groups and the public to actively participate in problem-solving and to ask questions and receive responses directly from the Parties and the IJC	Encourage a proportional level of funding contributed by both countries to address Great Lakes issues and look to the Great Lakes Restoration Initiative as a successful funding mechanism that may provide inspiration for allocating resources under the GLWQA	Improve and centralize the coordination of data and information sharing across the full range of GLWQA groups, partners and stakeholders	Explore mechanisms to strengthen accountability for progress in constructive ways (e.g., firm deadlines on AOC progress)
Strengthen coordination within and between federal departments on both sides of the border to address challenges associated with decision-making that occurs in silos	Review the extent to which the IJC's governance structure advances the principles and objectives of the Agreement to help identify gaps or redundancies	Ensure greater consideration is given to the specific priorities and concerns of Tribal Governments, First Nations and Métis (e.g., access to clean water, destruction of wild rice fields and impacts of blue-green algal blooms on fisheries)	Improve coordination with state and provincial governments through a commitment to convening on an ongoing basis, more effective use of existing structures to encourage thinking beyond jurisdictional boundaries, and alignment on approaches to finding collaborative, basin-wide solutions	Improve the communication of report findings to local communities and the public, including Indigenous communities in the Great Lakes Basin, by making them more interesting and leveraging modern, innovative tools such as maps, digital visualizations, videos, art, music and culture	Prioritize the provision of financial resources to support Annex programming, including identifying specific needs under each Annex	Develop a "network of networks" of organizations, agencies and researchers working on Great Lakes issues to collect, aggregate and share information, and to coordinate on initiatives	Measure and report more comprehensively on the impacts, metrics and improvements specific to Tribal Governments, First Nations and Métis

Governance by the Parties	Roles & Responsibilities of the IJC	Agreement Structure & Implementation	Coordination of Partners	Engagement & Knowledge Sharing	Funding & Resource Allocation	Science & Data Collection	Progress Measurement & Accountability
Establish governance mechanisms to ensure that IJC Commissioners are appointed in a timely manner, regardless of changes to the leadership of the Parties	Develop policies that commit to working with Tribal Governments, First Nations and Métis to acknowledge calls to action identified in the Canadian Truth and Reconciliation Report; and encourage the sharing of Traditional Knowledge	Develop policies that commit to working with Tribal Governments, First Nations and Métis to acknowledge calls to action identified in the Canadian Truth and Reconciliation Report; and encourage the sharing of Traditional Knowledge	Improve coordination between the IJC and regional/binational Great Lakes institutions and commissions to identify cross-cutting issues and collaborative solutions	Explore ways to communicate with Indigenous governments and communities in the Great Lakes Basin more effectively (e.g., through organizations representing them, specialized groups or government environment/natural resource departments)	Increase financial support for the IJC, its substructures, and other partners to enable them to fulfill their responsibilities more effectively under the Agreement (e.g., provide timely response to draft government documents)	Improve temporal and spatial monitoring to better understand changes at more granular scales, collect the type of data needed to set meaningful ecosystem targets and develop criteria to meet them	Report on progress under the GLWQA at a more granular temporal and spatial scale (e.g., more localized than lake-wide) to identify and communicate successes quickly
	Increase diversity & strengthen representation within the IJC and its substructures (e.g., Tribal Governments, First Nations and Métis, youth, Black, Hispanic, and Arab communities, among others)	Explore how to incorporate emerging issues into the GLWQA, including climate resilience and adaptation; multiple stressors; contaminants of emerging concern (e.g., microplastics, pharmaceuticals); environmental justice; and increasing migration to the Great Lakes region	Improve coordination and communication with industry stakeholders (e.g., chemical, energy, automobile, steel, pulp and paper) on ways to improve the implementation of the principles and approaches of the GLWQA (e.g., zero discharge and virtual elimination of chemicals of mutual concern)	Enhance opportunities for Tribal Governments, First Nations and Métis, stakeholders, groups and the public, to review and provide input on draft strategies and policies by posting them for comment for at least 90 days and describing how comments have been taken into consideration	Develop a directory of Great Lakes funding sources to help Tribal Governments, First Nations and Métis and other partners navigate and leverage available programs more efficiently	Develop a comprehensive plan that identifies longer-term science and monitoring needs and priorities under the GLWQA to better address existing knowledge gaps and uncertainties, as well as emerging and future water quality issues	Explore best practice models for conducting an in-depth review and evaluation of progress that results in specific recommendations (e.g., model used by U.S. Government Accountability Office (GAO))

Legend

- Parties and delegate agencies/ministries
- IJC and its substructures
- Government partners (Tribal Governments, First Nations and Métis)
- Government partners (Great Lakes provinces, states, municipal governments, binational/national commissions, watershed management agencies, local public agencies)
- Non-government stakeholders and groups
- Communities and the public

Governance by the Parties	Roles & Responsibilities of the IJC	Agreement Structure & Implementation	Coordination of Partners	Engagement & Knowledge Sharing	Funding & Resource Allocation	Science & Data Collection	Progress Measurement & Accountability
	Embrace innovative technologies and invest in communications expertise to establish strategic engagement and reporting programs that deliver the most relevant information tailored to specific audiences 	Address conflict between prioritizing action under GLWQA Annexes, and population growth and economic development within the Basin (e.g., by incorporating the spirit of the GLWQA into federal impact assessments for development projects)     	Promote the integration of GLWQA principles into local and provincial/state planning and decision-making   	Increase number of visits to communities and facilitate in-person public engagement sessions, particularly in underrepresented and Indigenous communities in the Great Lakes Basin to ensure their voices are heard and to facilitate collaborative solutions    	Incentivize local investment in on-the-ground protection of the Great Lakes by providing matching funds at the federal and provincial/state levels   	Unify approaches to monitoring, evaluating and reporting on conditions and trends under the Nearshore Framework to collect data that can be integrated across the Great Lakes Basin   	
	Streamline and specify how priorities for boards and work groups are determined, and how they could be better integrated 	Build relationships and work with Tribal Governments, First Nations and Métis to explore how TEK could be integrated into GLWQA implementation (e.g., transferring existing frameworks and best practices from other fields/areas)   	Strengthen linkages between scientific findings and policy development, by bringing the scientific community working on Great Lakes issues further into policy discussions    	Empower Tribal Governments, First Nations and Métis to take a stronger leadership role in organizing, structuring, and running forums and conferences to better incorporate their perspectives/approaches  	Provide capacity-building and financial resources to help local partners manage and share their water quality data    	Conduct more studies to quantify the effects of multiple stressors (e.g., climate change, land use change) to better understand how to manage and mitigate their impacts     	

Governance by the Parties	Roles & Responsibilities of the IJC	Agreement Structure & Implementation	Coordination of Partners	Engagement & Knowledge Sharing	Funding & Resource Allocation	Science & Data Collection	Progress Measurement & Accountability
	Increase opportunities for the IJC and/or the Water Quality Board to work with the Parties to raise awareness and ensure consideration is given to the impacts on water quality of decisions made in other important policy domains (e.g., transportation, agriculture, social welfare)	Build consensus among partners on the meaning and definitions of fundamental principles within the GLWQA (e.g., ecosystem approach, precautionary principle) to improve implementation	Use best practices from AOCs (e.g., Muskegon Lake and St. Marys River) to develop guidance on determining priorities and establishing projects through local Public Advisory Councils (PAC) to facilitate quicker progress on delisting AOCs	Enhance outreach and engagement of groups, stakeholders, and the public by partnering with credible organizations and associations that work directly with these groups and that can support discussions, education, and information-sharing in a structured, informed, and credible manner	Explore mechanisms that would enable the transfer of funding for GLWQA-related activities between departments in the Canadian government to enable a more integrated approach to addressing issues	Mobilize citizen scientists to support large-scale and long-term water quality monitoring programs in the Great Lakes – St. Lawrence Basin	
	Explore opportunities to incorporate a democratic public review into the nomination process for IJC Commissioners	Identify priority geographies where the model employed to address AOCs could be used to further collaboration, coordination and communication to address Great Lakes issues and implement the principles of the GLWQA	Explore models for increased cooperation between the U.S. federal government and Great Lakes states (through existing or new structures, such as an inter-state compact or the creation of a U.S. mechanism like the Canada Ontario Agreement)	Make stronger connections between Great Lakes issues/science and what they mean for communities, with a focus on opportunities for people to directly engage with the lakes	Set aside a portion of funding dedicated to addressing priority issues (e.g., phosphorus in Lake Erie) for the purpose of communicating lessons learned and other knowledge-sharing activities related to them	Conduct a study or asset mapping exercise to highlight the location of success stories across the Great Lakes region, as well as identifying priorities in communities and where programming, engagement, and research and science efforts are underway	

Legend

- Parties and delegate agencies/ministries
- IJC and its substructures
- Government partners (Tribal Governments, First Nations and Métis)
- Government partners (Great Lakes provinces, states, municipal governments, binational/national commissions, watershed management agencies, local public agencies)
- Non-government stakeholders and groups
- Communities and the public

Governance by the Parties	Roles & Responsibilities of the IJC	Agreement Structure & Implementation	Coordination of Partners	Engagement & Knowledge Sharing	Funding & Resource Allocation	Science & Data Collection	Progress Measurement & Accountability
	Ensure that a fluvial geomorphologist or someone with a similar background sits on the WQB so that decisions made give the same consideration to implications for the physical integrity of the lakes as for chemical and biological integrity 	Explore a rewrite of the GLWQA and/or restructuring of Annexes to address complex environmental issues, and to enable shared responsibility for the Agreement through meaningful engagement of underserved or marginalized communities 	Develop a hybrid model (e.g., in-person and virtual) for working with partners, to better build personal relationships, bring on new partners and promote an environmentally-conscious approach that reduces the need for travel 	Explore factors that have contributed to the success of binational forums (e.g., the Lake Superior Binational Forum) in engaging communities, allowing for space to discuss the issues core to the GLWQA and providing citizen feedback to the Parties 	Dedicate a greater proportion of funding and resources for the IJC specifically to GLWQA activities and implementation 		
	Eliminate bureaucratic obstacles at the IJC to enable more effective communication with partners and speed up the implementation of actions 	Provide more specificity in each Annex around priorities for action, responsibility for taking the lead, roles and expectations for other partners, funding availability and timelines for action 		Undertake sustained efforts to communicating TAP findings, including presentations in local communities, social media campaigns and by leveraging ambassadors and influencers to help with promotion 	Explore opportunities to move beyond funding mechanisms that prioritize short-term rather than sustained investment, to ensure commitment to sound science, including as it relates to data collection 		
	Explore and implement leading edge solutions to systemic issues with the Agreement and move beyond those that have been used to-date 	Explore approaches for increasing the impact of the GLWQA by ensuring it effectively informs and complements other enforceable legislation and regulation 		Improve the timing of the release of State of the Great Lakes reports to provide stakeholders, groups and the public with ample opportunity for review & preparation of responses 			

Governance by the Parties	Roles & Responsibilities of the IJC	Agreement Structure & Implementation	Coordination of Partners	Engagement & Knowledge Sharing	Funding & Resource Allocation	Science & Data Collection	Progress Measurement & Accountability
		Explore opportunities to better incorporate cross-cutting issues into all Annexes and their implementation (e.g., watershed approach, climate change, etc.) 		Implement more systematic and rigorous awareness campaigns that focus on educating citizens about how the health of the Great Lakes is tied to their lives and livelihoods 			
		Consider revising the language of certain parts of the Agreement to make them more relevant (e.g., ensure data is collected and compared year-round) and action-oriented 		Engage stakeholder groups not heavily involved in Great Lakes issues (e.g., insurance industry, financial institutions) to introduce innovative ideas and solutions 			
		Amend the Agreement to include Lake Michigan within the binational scope of oversight, based on an understanding that Lake Michigan and Lake Huron are one lake 		Consider opportunities to hold events and public consultations in locations where local successes under the GLWQA can be highlighted and celebrated (e.g., delisted AOCs) 			
		Ensure that the physical integrity of the lakes is given as much consideration as the chemical and biological integrity 		Increase the use of virtual engagement approaches to reach a broader cross-section of communities 			
		Ensure that Annex co-leads have appropriate facilitation skills 					

Actions for Specific Annexes under the Great Lakes Water Quality Agreement

Table 7 outlines potential actions for specific Annexes under the GLWQA, as discussed in the literature or identified by interviewees or survey respondents. The table includes those actions that are applicable to all 10 Annexes (these also appear in the Matrix of Action), as well as highlighting those specific to only one or more. This table acts as a complement to the matrix by outlining further detail on those actions suggested for specific Annexes. It should be reiterated that this table notes mentions from the literature, interviews and surveys and where an action has been suggested for one annex, it does not mean that it could not apply to others as well.

Table 7: Actions for specific Annexes under the Great Lakes Water Quality Agreement

Action	Annex 1: Areas of Concern	Annex 2: Lakewide Management	Annex 3: Chemicals of Mutual Concern	Annex 4: Nutrients	Annex 5: Discharge from Vessels	Annex 6: Aquatic Invasive Species	Annex 7: Habitat & Species	Annex 8: Groundwater	Annex 9: Climate Change Impacts	Annex 10: Science
Provide more specificity in each Annex with regards to priorities for action, responsibility for taking the lead, roles and expectations for other partners and timelines for action		✓						✓		
Provide further opportunities for meaningful, effective and genuine engagement of partners on Annex sub-committees, and ensure their input is taken into consideration		✓						✓		
Prioritize the provision of financial resources to support Annex programming, including identifying specific needs under each Annex with a view to supporting designated leads		✓						✓		
Explore opportunities to better incorporate cross-cutting issues into all Annexes and their implementation (e.g., watershed approach, climate change, etc.)		✓						✓		
Ensure that Annex co-leads have appropriate facilitation skills	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Provide more guidance, clarity, and detail on desired outcomes and how progress has or will be achieved and measured		✓	✓					✓		✓
Ensure swifter progress on implementation or set realistic timelines/schedules	✓	✓	✓							

Action	Annex 1: Areas of Concern	Annex 2: Lakewide Management	Annex 3: Chemicals of Mutual Concern	Annex 4: Nutrients	Annex 5: Discharge from Vessels	Annex 6: Aquatic Invasive Species	Annex 7: Habitat & Species	Annex 8: Groundwater	Annex 9: Climate Change Impacts	Annex 10: Science
Ensure timely engagement of IJC advisory boards in Annex activities		✓								
Explore how the public could be better engaged in Annex activities		✓								
Undertake deeper research and analysis to support Annex activities			✓							
Clarify definitions of key concepts and approaches										
Expand the scope of the issue, sources, factors, or programs that are considered under the Annex		✓	✓					✓		
Promote more harmonized binational approaches and better coordination		✓	✓	✓	✓				✓	
Conduct more comprehensive mapping, monitoring, research and science								✓		
Better align activities with the principles and approaches of the Agreement			✓	✓		✓				
Engage senior level decision-makers or empower government representatives from participating agencies in work groups to explore issues and policy solutions										
Appoint dedicated coordinators to oversee the LAMP process for each of the lakes and to provide necessary leadership and direction on process and deliverables, including communications expertise										
Improve linkages with other Annexes		✓							✓	



Photo Courtesy of Sally Cole-Misch

SECTION FIVE: Recommendations

Findings from the literature review, surveys and interviews contributed to the development of a set of 16 recommendations aimed at the Parties, the IJC and the broader Great Lakes community. The first set of recommendations can be implemented without changes to the Agreement, and are focused on strengthening governance, implementation and accountability to meet the existing objectives and fulfill the purpose of the GLWQA.

The second set of recommendations would likely require consideration for amendments to the Agreement to better recognize the multiple, complex and ever-evolving Great Lakes water quality issues of today and the future. Revisions should consider clarifying and strengthening of language, accountability and the need to incorporate a more proactive, equitable, future-focused vision for the Great Lakes Basin ecosystem with consideration for both the environment and human health.

It is important to note that grouping recommendations according to when they should be implemented is not a reflection of their importance or priority. In addition, it is anticipated that the outcomes from many short-term recommendations will be necessary to inform those that should be considered over the longer-term.

I. Recommendations to Strengthen the Implementation of the Agreement in the Short-Term

For the Parties:

Recommendation 1: Strengthen the role of Tribal governments, First Nations and Métis, by broadening the Agreement's governance and implementation mechanisms. This should include:

- Ensuring greater consideration is given to the specific priorities and concerns of Tribal Governments, First Nations and Métis (e.g., access to clean water, destruction of wild rice fields, impacts of blue-green algal blooms on fisheries, human health and wellbeing), including the need for sufficient funding to enable meaningful engagement.
- Building relationships and working with Tribal governments, First Nations and Métis to explore how traditional ecological knowledge (TEK) and ways of knowing could be better integrated into the implementation of the Agreement (e.g., transferring existing frameworks and best practices from other fields or areas).
- Explore options for acknowledging the GLWQA as a multilateral, rather than binational Agreement, in recognition of the vital role of Tribal Governments, First Nations and Métis.

Recommendation 2: Recognize that meaningful public engagement should be a priority and actualize the stated commitment in the Agreement to cooperate and consult with state and provincial governments, Tribal Governments, First Nations, Métis, municipal governments, watershed management agencies, local public agencies, and the public (i.e., individuals and organizations such as public interest groups, researchers and research institutions, and businesses and other nongovernmental entities), by creating a coordinated, well-resourced and sustained model of engagement and education. The model should maintain long-term, cooperative consultations and engagement in each lake basin, and also in a basin-wide collaboration via virtual and/or in-person participation, discussion and reporting at Great Lakes Executive Committee (GLEC) meetings, and during triennial Great Lakes Public Forum and Summit meetings. This model should also include:



- Adequate resources to allow Tribal Governments, First Nations, Métis and stakeholders in each lake basin to design and create an ongoing engagement group that meets at least quarterly, and with representatives to serve on a basin-wide engagement group to encourage and ensure ongoing discussions and collaboration.
- Partnering with credible organizations and associations who work directly with Tribal Governments, First Nations, Métis and stakeholders that can support discussions, education, and action by each lake group in a credible manner.
- Allotting adequate time at GLEC meetings and the Great Lakes Public Forum for each lake basin stakeholder group and the basin-wide engagement group to report on findings, comment on the Parties' reports and propose innovative ideas and actions.
- Devoting adequate time to hold a Great Lakes Collaborative at each Great Lakes Public Forum that brings together lake and basin-wide stakeholder groups and all others interested in in-depth discussions, brainstorming and consensus on cooperative actions that can contribute to reaching Agreement goals and objectives.

Recommendation 3: Create opportunities within GLEC meetings, and between meetings on a quarterly basis, for interactive and in-depth discussions among members to identify issues and solutions that will enhance governance, implementation and accountability. Reorient GLEC administration to prioritize interactive, collaborative approaches and discussions for each meeting to ensure that all members and their ideas and work are recognized, respected and contribute to the best solutions for the Great Lakes ecosystem. GLEC should also consult with Tribal Governments, First Nations and Métis, as well as external organizations and stakeholders regarding solutions to enhance governance, implementation and accountability. The results of these consultations should be reported publicly within one month after each quarterly meeting.

Recommendation 4: In recognition of collaborative science as the underpinning of the Agreement, prioritize the funding of scientific studies and monitoring efforts, and the collection, analysis and reporting of data that will contribute to a more proactive and preventative approach to addressing threats to the Great Lakes.

For the International Joint Commission:

Recommendation 5: Clearly define the scope and depth of the Triennial Assessment of the Parties (TAP) report by prioritizing a shortlist of recommendations aimed at increasing the likelihood for in-depth review and detailed response, acceptance and implementation by the Parties. The IJC should issue the TAP within a consistent and prompt timeframe after the release of the governments' Great Lakes reports, or within six months. The governments should be required to respond to the TAP publicly and promptly as well, or no later than four months of receipt of the TAP report. The IJC should also outline a process for continued dialogue between the IJC and the Parties to address accountability for actions recommended in the TAP report.

Recommendation 6: To fulfill its responsibilities under the Agreement to consult on a regular basis with the public, provide the public with the opportunity to raise concerns, and to increase awareness of the inherent value of the Great Lakes and the benefit of taking individual and collective action to restore and maintain them, the IJC should:

- Continue to travel to at least one location in every lake basin during a triennial cycle to meet with residents, stakeholders, Tribal Governments, First Nations and Métis and underrepresented communities.
- Assist in the creation and coordination of lake and basin-wide stakeholder groups. This includes assigning staff to attend meetings and report on their findings and activities to the IJC's Water Quality Board.
- Seek and ensure adequate funding and staff to carry out these duties.

Recommendation 7: To enhance its role and function as part of its Agreement responsibilities, the IJC should provide organizational support to the Great Lakes Regional Office (GLRO). This should include:

- Extend the director's term to a minimum of six, and maximum of eight years to attract highly qualified candidates who may be unable, for career or other reasons, to commit to a term limited to four years. This will also ensure that the director, GLRO staff and Agreement boards have adequate time to develop a rapport and team approach to goal setting and implementation of Agreement responsibilities.
- Clearly articulate the GLRO's status within the IJC family as a binational office with specific Agreement responsibilities that are separate from those of its Ottawa and Washington, DC offices.
- Provide targeted budget increases to ensure adequate scientific and public affairs staff to assist its boards in assessing Agreement progress and to provide effective communications and public engagement.

For the Great Lakes community:

Recommendation 8: The Great Lakes region is rich with nongovernment organizations that are committed to restoring and protecting the lakes and have played an essential role in Agreement progress in the past. To recognize and fulfill this essential role, these business/industry, citizen, environmental, scientific, Indigenous, and cultural organizations should:

- Recommit to engaging in lake-wide and Great Lakes basin-wide actions to ensure Agreement progress, while still undertaking local initiatives that contribute to this progress. This includes participating in the design and ongoing work of the lake stakeholder groups and their basin-wide coordination efforts, and engaging with the Parties and the IJC via a variety of direct and indirect methods to ensure that Agreement goals and Annexes receive the resources, attention and action required for their success.

Recommendation 9: To recognize and communicate the value of the Great Lakes to every resident in the region, the Parties, IJC, and the full range of government and non-government partners and the public should invest in creative online and in-person communications tools such as stakeholder mapping, digital visualizations, video streaming and others to strengthen the exchange of information, education, and engagement for a variety of audiences. These tools should reflect the scientific, musical, artistic, and cultural richness of the Great Lakes binational region.

II. Recommendations for Potential Future Amendments to the Agreement over the Longer-Term

For the Parties:

Recommendation 1: Strongly consider creating a new governance structure that could lead to a multi-party version of the GLWQA. Through this process, which would be rooted in the principles of Reconciliation, Tribal Governments, First Nations and Métis would be asked if they would like to be signatories to the Agreement, and if so, how the negotiation of a renewed Agreement could be facilitated. They would also be asked what else they would like to see included in an updated Agreement and its implementation mechanisms.

Recommendation 2: Strengthen Agreement implementation in recognition that physical integrity is as important as the chemical and biological integrity of the lakes. This could include incorporating additional language across the Agreement's Annexes specific to addressing aspects of physical integrity.

Recommendation 3: Reinforce a holistic approach to addressing threats to the Great Lakes by further linking and integrating commitments under the Agreement's Annexes. This may include:

- Exploring alternatives to the Annex structure for addressing complex, interrelated issues
- Determining how overarching, cross-cutting issues (e.g., climate change, watershed approach, TEK) can be better integrated across all Annexes and their implementation.
- Provide opportunities for knowledge-sharing, collaborative discussions, and interrelated programming between subcommittees on specific areas of intersection beyond regularly scheduled meetings, such as those of GLEC.

Recommendation 4: Strengthen existing principles and approaches outlined in the 2012 Agreement and broaden them through a stronger focus on social and environmental equity issues, including drivers of water disparity, inequality, and unaffordability; and recognize the importance of an equitable distribution of resources and access to safe and affordable drinking water.

Recommendation 5: Support improved progress measurement and accountability by:

- Enhancing the governance model by developing an overarching plan for the Great Lakes that outlines a clear and strong management and implementation framework to address challenges related to accountability on implementation, monitoring, reporting and review.
- Providing greater specificity in each Annex on priorities for action, clearly identifying who is responsible for taking the lead and the roles and expectation for other partners, identifying accountability and measurement targets and goals, and outlining realistic timelines for action that align with short-, medium- and long-term targets.

- Providing clear language, detail and guidance on desired outcomes and how progress has or will be achieved and measured so that the public can understand and hold the Parties accountable.
- Ensure alignment of recommendations, targets and goals with SMART principles (i.e., specific, measurable, achievable, relevant, and time-bound) and require that progress is consistently reported on.

Recommendation 6: To improve and strengthen the implementation and accountability of commitments under each Annex:

- Prioritize the provision of financial resources to support programming, including identifying specific needs under each Annex.
- Identify priority geographies where the model employed to address AOCs could be used to further collaboration, coordination, and communication to address Great Lakes issues and implement the principles of the Agreement.

Recommendation 7: Commit sufficient financial resources to ensure that each Party can achieve the objectives identified in Agreement, in the timeframes specified. Long-term, sustainable funding is critical to successfully addressing the targets and objectives of the Agreement.



Conclusions

The Great Lakes form the largest group of freshwater lakes on Earth, making up about one-fifth of the world's surface fresh water. The region around the lakes has grown to be one of the most economically powerful and culturally diverse in the world. Protecting the Great Lakes environment is vital to the economic, social and ecological wealth of the region and the continent.

Recognizing the need for a framework to coordinate efforts to manage and protect the Great Lakes, Canada and the U.S. signed the GLWQA in 1972 to “restore and maintain the chemical, physical, and biological integrity of the waters of the Great Lakes.” The Agreement provides a framework for identifying binational priorities and implementing actions that improve water quality. Revised in 1978, amended in 1983 and 1987, and updated in 2012, the Agreement has continued to evolve over time to align with advances in science, to address threats requiring urgent attention and to reinforce efforts on existing issues.

To assist the IJC with its preparations for the 50th anniversary of the GLWQA, this project sought to assess the context for how the Agreement is focused and organized, and whether there are opportunities for facilitating further progress towards its objectives and goals. This report summarizes key findings from this work and examines whether there are opportunities for implementation mechanisms to be strengthened to facilitate progress towards the overall goals of the Agreement. It provides a review of historical versions of the GLWQA and identifies key themes of relevance to the current Agreement. The report also outlines strengths, barriers and opportunities for improvement related to the current version of the Agreement and identified through interviews and surveys of key partners, stakeholders and subject-matter experts.

A matrix of action was developed as a means of visually mapping potential future actions to address the complex challenges facing the Great Lakes under the GLWQA. It highlights the broader interconnections that exist and provides an opportunity to determine appropriate and complementary action with a good understanding of potential implications. The matrix was one of several tools that was used to help guide the development of a set of key recommendations for consideration by the GLWQA 50th Anniversary Work Group in determining how to effectively support the Agreement in meeting its purpose and objectives.

Taken together, the findings outlined in this report provide a foundation for consideration of where the Agreement could be better implemented or strengthened to meet its purpose and objectives more effectively.

APPENDIX A: Select Definitions and Abbreviations

DDT	Dichlorodiphenyltrichloroethane is a synthetic insecticide used in agriculture and considered a persistent toxic substance.
Ecological integrity	Ecological integrity is when ecosystems have their native components intact. For the purposes of this report, it is when the physical, chemical, and biological components of the water of the Great Lakes Basin ecosystem are restored and maintained in an unimpaired condition.
Ecosystem approach	Formally introduced as a means of managing environmental stressors within the Great Lakes Basin in the 1978 amendment to the Agreement. The ecosystem approach emphasizes principles that flow from a scientific understanding of the nature of ecosystems and the relationship between organisms and their environment, rather than focusing on only air, water, or land.
Great Lakes Public Forum	Convened by the Parties and the IJC every three years to provide an opportunity to discuss and receive public input on the state of the Great Lakes, binational priorities for science and action and progress achieved.
Great Lakes Summit	Convened every three years in conjunction with the Great Lakes Public Forum, the Great Lakes Summit promotes coordination among the Parties, the IJC and other governmental organizations, and to increase their effectiveness in managing Great Lakes resources.
Invasive Species	Non-native species that have become established in the Great Lakes Basin and are capable of causing significant harm to the lakes by disrupting local ecosystems. They can affect local habitats, introduce parasites and disease, and put native species at risk by outcompeting them for food.
Nonpoint Source Pollution	Pollution originating from a diffuse source, rather than a single, distinct, identifiable source.
PCBs	Polychlorinated biphenyls are considered a persistent toxic substance and are mainly used as additives to oils and industrial fluids.
Persistent Toxic Substances	Compounds that do not break down into less harmful substances and which pose a particular challenge for remediation.
PFAS	Refers to Per- and Polyfluoroalkyls – a group of over 4,700 synthetic substances that are used as surfactants, lubricants, or repellents.
Point Source Pollution	Pollution that originates from a single, distinct, identifiable source.
Precautionary Principle	Opinions differ on the definition of the precautionary principle and its means of implementation. The most widely cited definition was formulated during the Rio Earth Summit in 1992: “Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.”
Tributary Waters	A stream or river that flows into a larger stream or waterbody. Under the GLWQA, tributary waters are those of the Great Lakes Basin that are not boundary waters.

Acronyms

AIS	Aquatic Invasive Species are non-native water-dwelling animals, plants, or invertebrates that are introduced in a new aquatic environment, causing severe harm to the aquatic environment in the absence of any natural predators.
AOC	An Area of Concern (AOC) is a geographic area that fails to meet the General or Specific Objectives outlined in the GLWQA. AOCs are designated by assessing the state of local environmental conditions against 14 different Beneficial Use Impairments.
BWM	Ballast water allows ships to operate safely by ensuring they stay level and stable. Ballast Water Management reduces the risk that vessels might accidentally introduce and spread aquatic invasive species by treating ballast water to minimize the number of organisms.
BUIs	The designation of an AOC is based on an evaluation against fourteen specific problems, referred to as Beneficial Use Impairments (BUIs), known to be the result of reduced chemical, physical, and/or biological integrity of the Great Lakes. When all BUI removal criteria at an AOC have been met, it is delisted.
BWT	The Boundary Waters Treaty was signed in 1909 to prevent and resolve disputes over the use of the waters shared by Canada and the U.S. and to settle other transboundary issues. The treaty established the IJC to help the two countries carry out its provisions.
CMC	Chemicals of Mutual Concern are anthropogenic pollutants that pose a threat to human health and the environment and are identified for binational action.
COA	The <i>Canada-Ontario Agreement on Great Lakes Water Quality and Ecosystem Health</i> is a federal-provincial agreement supporting the restoration and protection of the Great Lakes. It is the means by which Canadian federal departments interact with Ontario provincial ministries to meet Canada's obligations under the GLWQA.
CSMI	The Cooperative Science and Monitoring Initiative is a binational program to coordinate science and monitoring activities under Annex 10 (Science Annex) of the 2012 GLWQA.
ECCC	Environment and Climate Change Canada is a federal department with responsibility for coordinating environmental policies and programs as well as preserving and enhancing the natural environment and renewable resources.
EPA	The Environmental Protection Agency is an independent executive agency of the U.S. federal government with responsibility for environmental protection matters, including environmental assessment, maintaining national standards within environmental laws, and the delegation of some permitting, monitoring, and enforcement responsibilities.
GLEC	The Great Lakes Executive Committee was established under the 2012 GLWQA to assist in coordinating and implementing programs and other measures. Chaired by ECCC Change Canada and the U.S. EPA with membership consisting of senior representatives from the governments of Canada and the U.S. state and provincial governments, Tribal Governments, First Nations and Métis, municipal governments, watershed management agencies, and other local public agencies.
GLRI	The Great Lakes Restoration Initiative is a U.S., multi-agency funding mechanism tasked with accelerating efforts to protect and restore the Great Lakes.
GLRO	The IJC's Great Lakes Regional Office provides administrative support and technical assistance to the WQB and SAB and provides public information services for the programs undertaken by the IJC and its boards.
GLU	Great Lakes United was a binational coalition that developed and promoted effective policy initiatives, carried out education programs, and promoted citizen action and grassroots leadership to assure clean water and clean air for all, better safeguards to protect the health of people and wildlife and a conservation ethic to ensure a healthy Great Lakes.

HPAB	The Health Professionals Advisory Board was established in 1995 to provide advice to the IJC and its boards about current and emergent clinical and public health issues related to transboundary environmental health.
IJC	International Joint Commission is an independent binational organization created by Canada and the U.S. under the Boundary Waters Treaty of 1909 and charged with aiding in the implementation of the GLWQA.
LAMPs	Lakewide Action and Management Plans are used to assess, restore, protect, and monitor ecosystem health in each lake and its connecting rivers.
PPCP	Pharmaceuticals and personal care products are a class of contaminants that include prescription (e.g., antibiotics) and non-prescription drugs (e.g., ibuprofen), fragrances, toxic substances (e.g., PFAS), detergents, hormone drugs and others that may be used for personal health or cosmetic reasons (e.g., Triclosan).
PRP	The Progress Report of the Parties is issued every three years to report on achievements in restoring and protecting Great Lakes water quality and ecosystem health under the GLWQA.
RAB	Refers to the IJC's Research Advisory Board (RAB), established under the 1972 GLWQA to review research activities determine their adequacy and reliability, identify additional research to be undertaken and provide advice and recommendations of a scientific nature to the IJC. The RAB was the predecessor to the Scientific Advisory Board.
RAPs	Remedial Action Plans are site-specific cleanup plans required for all designated AOCs in the Great Lakes Basin.
SAB	The Science Advisory Board is one of two binational boards of the IJC established under the GLWQA. The SAB provides advice on scientific matters to the Commission or the WQB.
SOGL	State of the Great Lakes reports provide an overview of the status and trends of the Great Lakes ecosystem based on nine indicators of ecosystem health.
SOLEC	The State of the Lakes Ecosystem Conference (SOLEC) was a series of conferences hosted by the U.S. EPA and ECCC every two years from 1994–2011. SOLEC provided a forum for the exchange of information regarding the condition of the Great Lakes.
TAP	Triennial Assessment of Progress reports are produced by the IJC to fulfill its responsibilities under the GLWQA to provide an independent assessment of the Parties' progress towards achieving its goals and objectives.
TEK	Traditional Ecological Knowledge, or Indigenous Knowledge, is an Indigenous knowledge system encapsulating knowledge, practice, and beliefs, namely concerning the relationship of living beings with the environment. For the purposes of this report, Traditional Ecological Knowledge is the term that has come to be recognized as one component of Indigenous Knowledge systems. While inseparable from the broader system as a whole, TEK is recognized as that subset that is specific to ecology.
WWTP	Wastewater treatment plants remove contaminants from wastewater.
WQB	The Water Quality Board is the principal advisor to the IJC under the GLWQA. The Board assists the Commission by reviewing and assessing the progress of the governments of Canada and the U.S. in implementing the Agreement, identifying emerging issues and recommending strategies and approaches for preventing and resolving complex challenges facing the Great Lakes, and providing advice on the role of relevant jurisdictions to implement these strategies and approaches.
ZDDP	The Zero Discharge Demonstration Program was an IJC program active between 1990 and 2010 that targeted nine contaminants of concern in Lake Superior and made progress towards addressing them.

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