

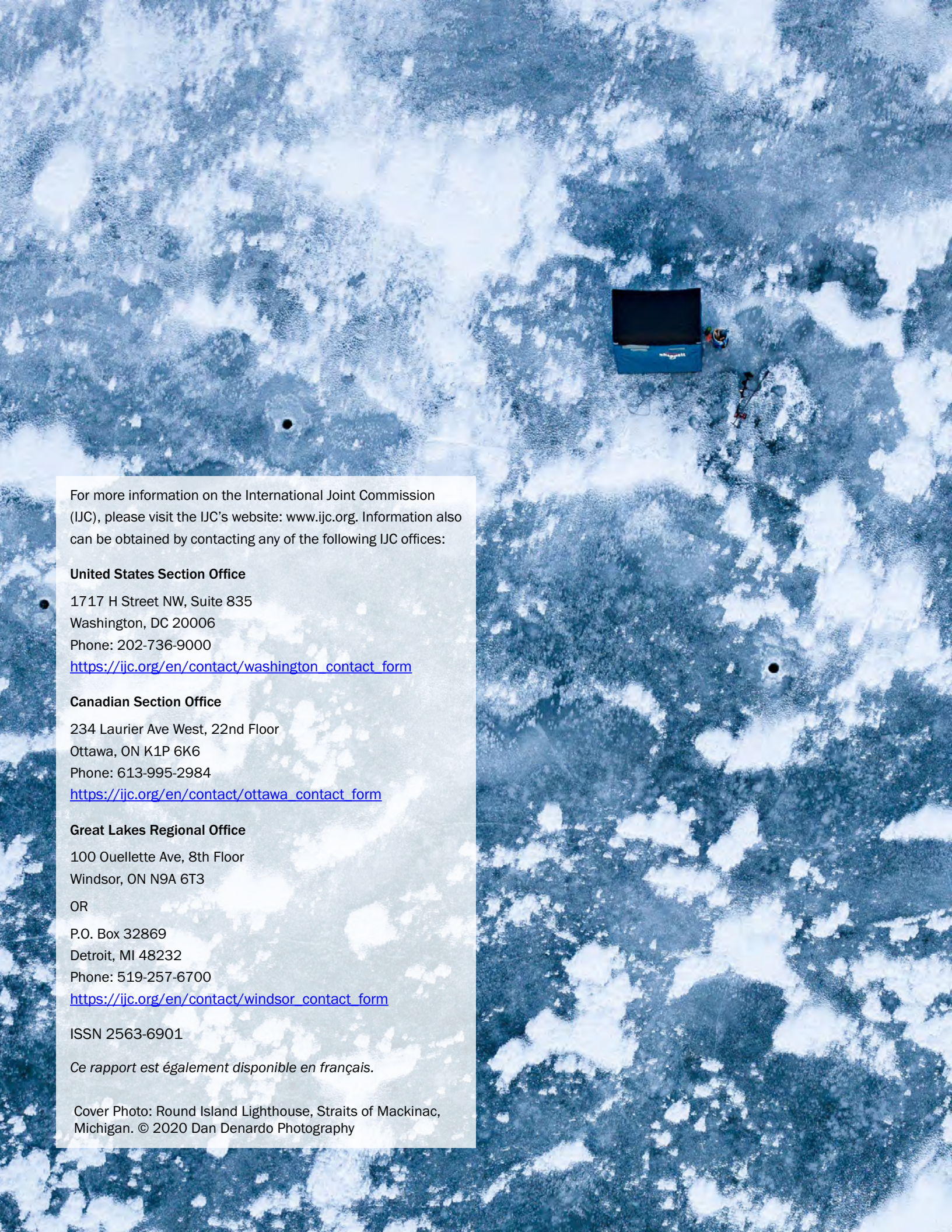


INTERNATIONAL JOINT COMMISSION
FINAL REPORT: DECEMBER 2020

2020

SECOND TRIENNIAL ASSESSMENT OF PROGRESS

— ON GREAT LAKES WATER QUALITY — **Report**



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JOINT COMMISSION**

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MESSAGE FROM THE INTERNATIONAL JOINT COMMISSION

No matter where you go in the Great Lakes region, no matter what diversity of geography, nationality, community, age or gender, one priority unites all: the Great Lakes themselves.

Keeping this in mind, the International Joint Commission presents this second Triennial Assessment of Progress under the 2012 Great Lakes Water Quality Agreement. Our reporting, analysis, and recommendations are founded on universal public appreciation of and commitment to the health and beauty of the Great Lakes. We recognize the goodwill of all sectors in efforts to protect and restore these lakes, and our suggestions on achieving the objectives of the Agreement are meant in that spirit.

We find the Great Lakes, as always, in transition. The Parties to the Agreement—the governments of Canada and the United States—buttressed by robust public participation and stewardship, continue to make progress on many fronts of Great Lakes restoration. While celebrating this progress, all sectors—not governments alone—must address legacy and emerging challenges.

Fortunately, in our meetings across the basin, we witnessed an outpouring of citizen support for restoring healthy Great Lakes. Indeed, we recognize a deep desire on the part of many for a forum where they can convene and contribute to solutions.

The Areas of Concern program is one of the most successful under the Agreement. Its genius resides in bringing together industry, local, regional, state, provincial, national and Indigenous governments at all levels, and the public in a process geared toward a common objective, fostering a constructive, frank dialogue. This in turn leads to meaningful action enjoying widespread support, as, for example, numerous studies have shown that investments in cleanup yield broad economic and societal benefits.

We wish to give special recognition to the Traditional Knowledge of Indigenous Peoples, which is invaluable to stewarding the Great Lakes. The Commission is prioritizing the collaboration with Indigenous governments, organizations and people in our work. We recognize our responsibility to maintain the trust that, together, we are building.

In the views of the public, the status of the lakes as “fair and unchanging,” as characterized in the State of the Great Lakes highlights report, is a sign of inaction and lack of progress. The public assessed the actions enumerated in the Progress Report of the Parties as positive and necessary but requiring greater urgency and accountability to affect meaningful progress. The Commission notes that our ability to assess progress was made more difficult because the governments’ State of the Great Lakes technical report was not available to evaluate alongside the governments’ 2016-2019 Progress Report of the Parties.

Our recommendations do not ask the Parties to alone do more, better, and faster to make the lakes swimmable, fishable and drinkable. To protect the lakes for generations into the future requires increased collaboration. To this end, we offer the Commission's convening capacity to implement our science-based recommendations on the key issues of climate change and nutrient management. We also recommend that the Parties improve their approach to communicating and engaging with the Great Lakes community so that we can all benefit from the diversity of wisdom and understanding that all perspectives can bring to the table. In particular, the Commission wishes to collaborate with the Parties to synchronize and coordinate the Great Lakes reports mandated by the Agreement to enable a more meaningful assessment of progress.

This 2020 Triennial Assessment of Progress is concise, focusing on several actionable recommendations aimed at progress the Parties can achieve in the next two years. With an engaged community of individuals and institutions, we have no doubt that progress will continue toward our shared objectives for the Great Lakes that are a source of well-being for all.



Jane Corwin
US Co-chair


Pierre Béland,
Canadian Co-chair

Rob Sisson,
US Commissioner

Henry Lickers,
Canadian Commissioner

Lance Yohe,
US Commissioner

Merrell-Ann Phare,
Canadian Commissioner



INDIGENOUS OPENING WORDS


Understanding the natural world as relatives and not as property is fundamental to our Indigenous way of being. We are but one of the members of a vast natural world family. We do not own the Earth or the beings who live within, upon, and above it. We respect our relatives and strive to do them no harm. In return they help provide us sustenance, shelter and healing.

I am Odawa, a part of the Anishinaabe peoples of the Great Lakes. In my culture we think of the four direction teachings as physical, mental, emotional and spiritual. Finding balance or harmony as we work to acknowledge these forces within our lives is a challenge. But a lack of balance keeps us incomplete, incomplete as individuals, as families, as communities, or as nations. A lack of balance can cause us to make unwise decisions.

As we work on integrating Indigenous and Nonindigenous ways of knowing, ways of being, in the work of protecting the waters, we also need to balance the elements of Earth, Air, Fire and Water. Ignoring some to focus on one can likewise lead to unwise decisions.

Over the years of its history the Great Lakes Water Quality Agreement has grown stronger and more likely to succeed as it has increasingly incorporated Indigenous participation and ways of knowing, ways of understanding. Our goal is not only to engage the mental capacities of our readers, but also to touch the hearts and souls of readers, and to encourage the physical connection to the natural world. We protect the Air which aids the health of the world; we protect the sacredness of Fire while guarding against its dangers; we respect the Earth and all its gifts. All of these are parts of our work to respect and protect the Waters.

This TAP report is a measure of our accomplishments, not only in the science of water, but also in achieving balance in our lives and the lives of all our relatives in the Great Lakes Region.



Frank Ettawageshik
Little Traverse Bay Bands of Odawa Indians
November 9, 2020



1

INTRODUCTION



This close link between identities means that the people, themselves, are diminished if the lakes, or their ecosystems, are allowed to be diminished.

The Great Lakes are unsurpassed treasures. For those fortunate to live around the lakes in Canada and the United States, the watershed's natural resources are our economic, environmental and cultural foundation. Yet the beauty, ecological diversity and vastness of the Great Lakes belie their vulnerability to biological, chemical and physical stresses.

Our interrelationship with the lakes is reflected in the Seven Fires Prophecy of the Anishinaabe people, which tells of the westward migration to their current homelands from the East Coast. A prophet told the Anishinaabe people they would know they had reached their home when they found the 'food that grows on water.' The prophecy was fulfilled when they reached the shores of Lake Superior to find an abundance of Manoomin – wild rice. This close link between identities means that the people, themselves, are diminished if the lakes, or their ecosystems, are allowed to be diminished.








Binational concern about water quality spurred the governments of Canada and the United States to sign the [Great Lakes Water Quality Agreement](#) (hereafter the Agreement) in 1972. Revised four times—most recently in 2012—the Agreement's focus has evolved as advances in science identify additional adverse impacts of human activities on the lakes. From eutrophication and persistent toxic substances, to invasions of nonnative species and the impacts of habitat degradation and a changing climate, each of the Agreement's iterations has reflected the stressors and threats in most urgent need of attention.

The International Joint Commission, an independent binational organization created by Canada and the United States under the [Boundary Waters Treaty](#) of 1909, is charged with aiding in the Agreement's implementation by providing, among other things, an independent assessment of the federal governments' progress toward achieving the Agreement's goals and objectives.

In this Triennial Assessment of Progress report—covering the period 2017 to 2019—we aim to fulfill our responsibilities under [Article 7.1\(k\)](#) of the Agreement. We consider the [Progress Report of the Parties](#) (the PROP), which was released in June 2019 by Canada and the United States, the two Parties to the Agreement (hereafter the Parties). This report summarizes public input on the PROP gathered throughout the summer and autumn of 2019 via in-person meetings and listening sessions, and an online survey. We offer some analysis and commentary on the effectiveness of select

government program activities related to climate change, nutrients and public engagement, giving consideration to the Parties' State of the Great Lakes Highlights Report. To

this end, we offer three recommendations that we believe will better restore and maintain the chemical, physical and biological integrity of the Great Lakes.

TREATY	 <p>Canada and the United States established the International Joint Commission (IJC) under the Boundary Waters Treaty (BWT) of 1909 to assist the governments in the prevention and resolution of disputes over the boundary waters between the two countries. The BWT gave the IJC authority to approve and manage structures that affect levels and flows in the boundary waters.</p>
AGREEMENT	 <p>The Great Lakes Water Quality Agreement (GLWQA) is a commitment between Canada and the United States to restore and maintain the waters of the Great Lakes. The GLWQA provides a framework for identifying binational priorities and implementing actions that improve water quality. First signed in 1972, it was amended several times, most recently in 2012 to modernize and expand its effectiveness.</p> <p>The United States Environmental Protection Agency (USEPA) coordinates United States activities and programs that fulfill the GLWQA, and Environment and Climate Change Canada (ECCC) coordinates those for Canada.</p> <p>In consultation with its Great Lakes Water Quality Board (WQB), Science Advisory Board (SAB) and its transboundary Health Professionals Advisory Board (HPAB), the IJC provides advice to governments, identifies emerging issues, provides public outreach and education, and, every three years, assesses the extent to which progress of the governments' programs and other measures are achieving the GLWQA's objectives.</p>
COORDINATE AND IMPLEMENT	<p>The Great Lakes Executive Committee (GLEC) helps the governments of Canada and the United States coordinate, implement, review, and report on the programs, practices, and measures needed to achieve the purpose of the GLWQA.</p> <div data-bbox="235 1060 1448 1365"> <div> <p>US GLEC CO-CHAIR: Environmental Protection Agency (USEPA) State departments and agencies: IN, IL, MI, MN, NY, OH, PA, WI Federal departments and agencies Tribal governments US municipalities Watershed and local agencies</p> </div> <div> <p>CANADIAN GLEC CO-CHAIR: Environment and Climate Change Canada (ECCC) Provincial ministries (Ontario) Federal departments and agencies First Nations and the Métis Nation Canadian municipalities Watershed and local agencies</p> </div> <div> <p>THE GREAT LAKES EXECUTIVE COMMITTEE (GLEC)</p> </div> <div> <p>OBSERVERS: Province of Quebec, nongovernmental organizations, binational commissions, universities and research programs</p> </div> </div>
GOVERNMENT REPORTS	<p>Every three years, the governments of Canada and the United States publish two sets of reports.</p> <div data-bbox="267 1428 1404 1627"> <div> <p>The Progress Report of the Parties (PROP) documents the domestic and binational actions taken related to the GLWQA.</p>  </div> <div>   </div> <div> <p>The State of the Great Lakes Report (SOGI) uses ecosystem indicators to describe basinwide and lake-specific conditions.</p> </div> </div> <p>The governments also periodically issue reports on: annual updates to each lake's Lakewide Action and Management Plan; reports, meetings and conferences associated with the Cooperative Science and Monitoring Initiative; and other reports documenting activities under each of the GLWQA's ten Annex Committees.</p>
IJC ASSESSMENT	<p>After the PROP is published, the IJC—in consultation with its advisory boards (WQB, SAB and HPAB) and the public—prepares a Triennial Assessment of Progress (TAP) Report which reviews the PROP, provides a summary of public input on the PROP, assesses the extent to which government programs are achieving the objectives of the GLWQA, and offers advice and recommendations to the governments of Canada and the United States.</p> <div data-bbox="1144 1764 1453 1932">   </div>

2

ASSESSMENT OF PROGRESS



In this report we address the responsibility assigned to us in [Article 7.1\(k\) of the Agreement](#) to provide:

to the Parties, in consultation with the Boards established under Article 8, a triennial “Assessment of Progress” report that includes:

- (i) a review of the Progress Report of the Parties;
- (ii) a summary of Public input on the Progress Report of the Parties;
- (iii) an assessment of the extent to which programs and other measures are achieving the General and Specific Objectives of this Agreement;
- (iv) consideration of the most recent State of the Lakes Report; and
- (v) other advice and recommendations, as appropriate.

The Commission’s first Triennial Assessment of Progress report was published in 2017 and provided a comprehensive overview of the status of Great Lakes health based on the nine General Objectives of the Agreement. The [recommendations](#) resulting from the first assessment remain valid, and the Parties must act in the areas identified to ensure progress on achieving the Agreement’s goals and objectives.

The scope of the assessment and recommendations contained in this second triennial report is more focused than our first for several reasons. We heard from governments that a more focused triennial assessment report will better enable governments to meaningfully address our recommendations. The Commission’s own operational limitations also required a more scoped approach this time; although we had previously planned on an extensive assessment of climate change and nutrients-related programs by our Great Lakes advisory boards for this reporting period, those in-depth assessments did not proceed due primarily to the loss of Commission quorum in December 2018 for an extended period. Finally, and as we discuss later in this report, the timing of release and content of key government reports on activities and ecosystem conditions created challenges to our assessment of progress for the current reporting period.

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

ANNEXES

1	AREAS OF CONCERN	2	LAKEWIDE MANAGEMENT	3	CHEMICALS OF MUTUAL CONCERN	4	NUTRIENTS	5	DISCHARGES FROM VESSELS
6	AQUATIC INVASIVE SPECIES	7	HABITAT AND SPECIES	8	GROUNDWATER	9	CLIMATE CHANGE IMPACTS	10	SCIENCE

2.1 PUBLIC INPUT ON THE PROGRESS REPORT OF THE PARTIES

The Agreement requires that the Parties prepare a progress report to document their domestic and binational actions relating to the Agreement. The PROP was released immediately prior to the June 17 to 19, 2019 Great Lakes Public Forum held at Milwaukee, Wisconsin. Between June and October 2019 the Commission held 21 in-person events that were attended by 1,312 people and included public meetings, local and regional tours, expert roundtables, listening and visioning sessions, and student symposia. The locations of our engagement sessions are depicted in **Figure 1** below.

The Commission is appreciative of the individuals and organizations who hosted our public engagement sessions, and to the scores of volunteers who helped organize the proceedings. The Commission’s engagement events were broadly publicized via print, broadcast and social media,

The Commission is appreciative of the individuals and organizations who hosted our public engagement sessions, and to the scores of volunteers who helped organize the proceedings.

and were particularly well attended by nongovernment organizations and community groups, university and college students and faculty, First Nations and Tribal representatives, and state, provincial and local government agency staff. In the future the Commission will make additional efforts to engage with the business and industry sectors.

In order to seek public input from individuals located outside of the communities where our in-person events were held, the Commission invited input via an online survey. The survey included specific questions related to the

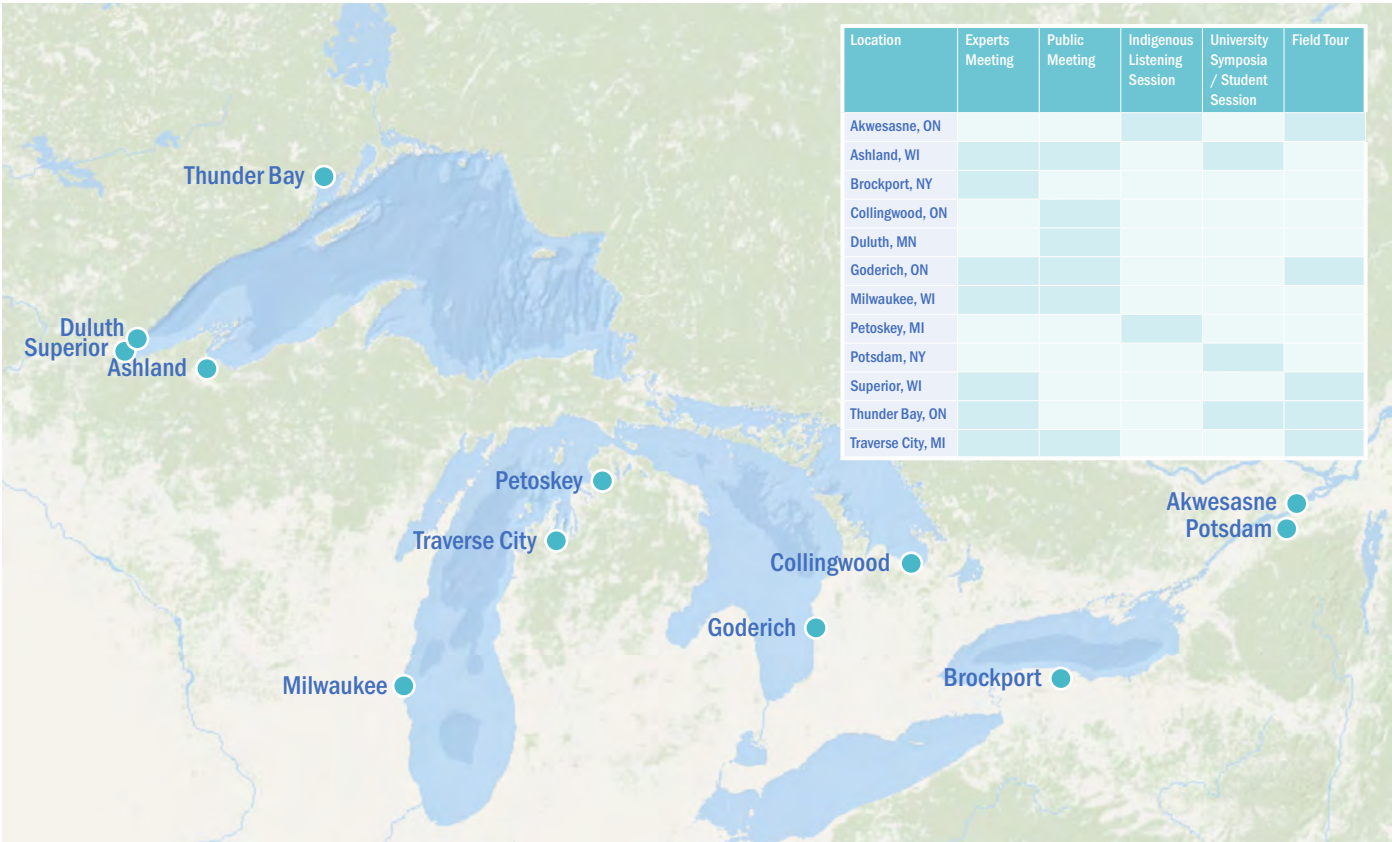


Figure 1: Locations of the Commission’s 2019 public engagement sessions

PROP, and solicited input on the Parties' overall assessment of the ecosystem status and trends for each Great Lake. More than 700 people responded to this survey.

Participants in our public engagement events shared hundreds of comments and concerns of both direct and indirect relevance to the Commission's responsibilities under the Agreement. The five topics that generated the most discussion are summarized below; the full record of comments, along with related resources, is online at our [2020 Triennial Assessment of Progress Story Map](#).

Although many topics raised by the public in our various public sessions are related to the PROP and particularly the Agreement's annexes, few comments were provided on the PROP itself. The Commission heard from public comments that the PROP flows well and includes a detailed description of actions, but it is difficult to determine whether, or how much, those actions are making a difference in the lakes. This disconnect is highlighted by our survey results, where respondents were skeptical about the overall status of "fair" for the Great Lakes that the Parties presented at the Public Forum. Forty-six percent disagreed with the assessment of fair and unchanging for overall Great Lakes water quality, and an additional 21 percent were unsure, while 34 percent agreed.

We also heard that the public appreciates quantitative tracking of progress, and some of the PROP chapters did a better job of this than others. One of the best examples was the Areas of Concern (Annex 1) chapter which includes [detailed tracking](#) of beneficial use impairment removals and Area of Concern delistings. Most other chapters do not provide the same level of specificity in terms of achievements and additional actions needed or taken, and in some cases 'projected' actions describe progress that has not yet occurred. For projected actions, more details about the implementing agencies' timelines, tasks and funding sources would provide greater assurance to readers that those actions will be completed within the reporting period.

In addition to input on the PROP, participants identified several water quality issues and concerns. The five most salient topics that generated the most discussion at several of our events are summarized below.

At every public engagement event, we received comments about the changes people are seeing in weather patterns, and the resulting impacts on shorelines, infrastructure and water quality.

Climate change impacts (Annex 9 in the Agreement)

In the three years since our last [Triennial Assessment of Progress](#) report, the rapid pace of climate change and its many impacts on Great Lakes communities have propelled the issue from the [15th most mentioned in 2017](#) to today's top concern. At every public engagement event, we received comments about the changes people are seeing in weather patterns, and the resulting impacts on shorelines, infrastructure and water quality. Communities are looking to their governments at all levels to provide the best available science, adaptation and resiliency strategies, and new watershed and land use planning models to respond effectively. Many commented that we need the political will to prioritize and respond to the many impacts of climate change.

Nutrients (Annex 4 in the Agreement)

Another topic raised in every engagement event was the effects of excessive nutrients entering the Great Lakes. Comments reflected concern about both agricultural nonpoint source runoff, and point sources associated with combined sewer overflows in urban areas, which have implications for human and ecosystem health. Most people understand the connection between the delivery of excess nutrient loads and resulting nuisance and harmful algal blooms that are present in parts of all the lakes. Input reflected a desire for greater political will and leadership to solve this issue by reducing nutrient loads to the lakes. This includes improvements to government accountability, such as better enforcement of standards, and new and stronger regulations to control identified sources of runoff.

Chemicals of mutual concern (Annex 3 in the Agreement)

The Commission heard during our public engagement activities that progress on chemicals of mutual concern (CMC) is inadequate. The Parties nominated only two substances early in this triennial cycle (lead and polycyclic aromatic hydrocarbons), and the previously publicly nominated substances (radionuclides and sulfates) remain under consideration. A transparent and uniform process for vetting these and other CMC nominations has not been finalized, and none have been assessed and designated or rejected as CMCs by the Parties. Several people expressed concern that binational strategies to reduce inputs of identified CMCs are completed for only three of eight CMCs, and the Commission heard that those strategies may not adequately reflect the Agreement's principles of pollution prevention, zero discharge and virtual elimination of persistent toxic substances. Some comments noted that the strategies should include guidance on chemical substitutions and alternatives, and that entire classes of chemicals should be identified rather than individual compounds.

Aquatic invasive species (Annex 6 in the Agreement)

Many comments demonstrated significant awareness and concern about aquatic invasive species (AIS). People were most vocal about the potential for Asian Carp to invade the lakes, the existence and impacts of Grass Carp already found in the Lake Erie and Huron basins, and the dramatic effects of quagga and/or zebra mussels on all lakes except Lake Superior. Commenters recognized that consistent ballast water regulations and implementation continue to be the primary solution proposed to prevent new introductions but called for coordinated research and effective control measures for existing invasive species. Some pointed out that an early detection system is in place and has proven successful as early surveillance but expressed concern that operational response plans do not exist for potential new invaders. The public's overarching concerns are that AIS prevention and control activities need to be successful. The Commission observes 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 loss of accountability.

Another topic raised frequently through our engagement activities was the value of incorporating Indigenous traditional ecological knowledge into the Agreement's framework and programs.

Traditional ecological knowledge (a Task Team under Annex 10 (Science) of the Agreement)

Another topic raised frequently through our engagement activities was the value of incorporating Indigenous traditional ecological knowledge into the Agreement's framework and programs. Traditional ecological knowledge (TEK) represents the collective body of Indigenous knowledge about the relationship of living things and the environment. It relies on observation and has typically been communicated orally. Comments from many Indigenous and non-Indigenous individuals encouraged the Parties and the Commission to meaningfully incorporate TEK into Agreement implementation and include members from many of the Indigenous Nations in the Great Lakes region in research, education and decision-making.



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2.2 TOWARDS AN IMPROVED ASSESSMENT FRAMEWORK

RECOMMENDATION #1

The Parties should coordinate and cooperate with the Commission to develop an assessment framework that fulfills our shared and interconnected responsibilities to evaluate and assess the effectiveness of programs and other measures in restoring and maintaining the chemical, physical and biological integrity of the waters of the Great Lakes. The assessment framework should:

- i. Initially focus on one or a select number of General Objectives, recognizing that the cause-effect signal is stronger for some objectives than for others.
- ii. Review, identify and select empirical approaches that demonstrate that actions taken are influencing conditions in the lake, and share the information required to complete these analyses. Where empirical approaches are lacking, other and multiple lines of evidence that support a causal link between actions and conditions should be selected.
- iii. Confirm optimal reporting formats and timelines that link actions taken with resulting changes in lake status and trends, including the possibility of combining the PROP and State of the Great Lakes report into one integrated report.
- iv. Confirm coordinated responsibilities and accountability mechanisms for the Parties and Commission moving forward that respects the roles and independence of all involved.
- v. Confirm an assessment framework by June 2022—the end of the next reporting cycle—and apply and adapt it as necessary for each triennial reporting cycle thereafter.

RATIONALE:

Through the Commission's public engagement activities, participants identified the water quality stressors and threats that they are most concerned about and provided insights into opportunities to improve the PROP.

The Commission's evaluation of the PROP aligns with what we heard during our engagement sessions. The PROP provides a comprehensive and accessible report that summarizes the actions and investments that governments made for each of the Agreement Annexes over the past three years.

In June 2020, after our engagement sessions concluded, the Parties released their [State of the Great Lakes \(SOGL\) Highlights Report](#). In the Commission's opinion, the SOGL Highlights Report provides an informative, high level overview of the status and trends of a suite of environmental indicators for each General Objective and each Great Lake.

Although the Commission commends the Parties on the content of the PROP and SOGL Highlights Report, we are concerned with the timing of release and interplay between the PROP and SOGL, which together comprise the main reports that fulfill the [accountability principle](#) the Parties have committed to in the Agreement: "Establishing clear objectives, regular reporting made available to the Public on progress, and transparently evaluating the effectiveness of work undertaken to achieve the objectives of this Agreement."

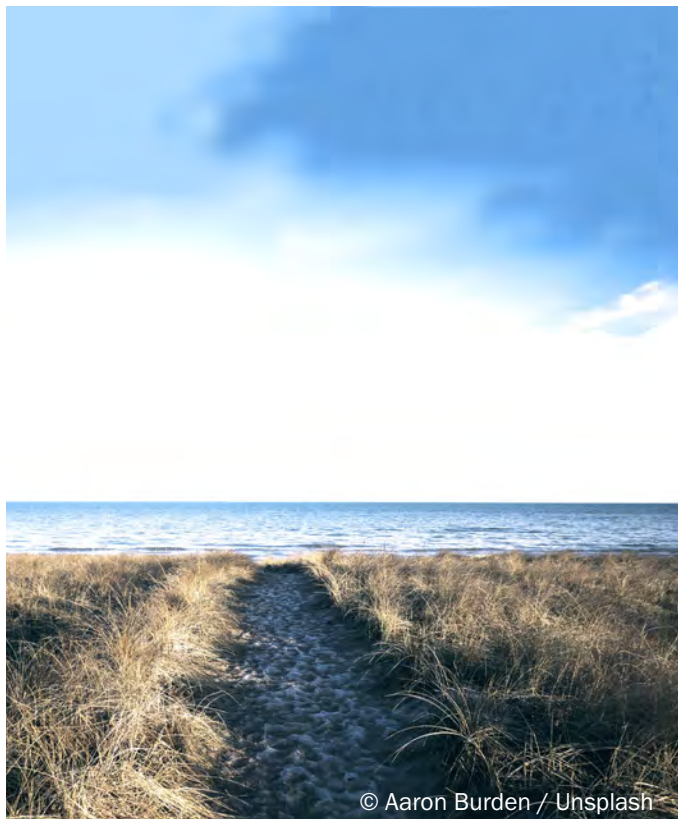
The Parties released the 2019 PROP less than one week before the June 2019 Great Lakes Public Forum, and the report was not well publicized beyond posting to [binational.net](#), GLIN-Announce, and a small number of social media posts. A similar pattern occurred with the 2016 PROP report. Although this meets the Agreement's provisions to release the PROP before the Great Lakes Public Forum, this contrasts with the approach the Parties have taken with advancing report releases for other program areas, including review of Remedial Action Plans under Annex 1 and Lakewide Action and Management Plans under Annex 2. The Commission notes that release of the PROP so close to the Public Forum had consequences for attendance and participation at the Public Forum, with several nongovernment organizations sending a [letter to the Parties](#) describing their decision not to attend because inadequate time was provided to review the PROP.

Similarly, the Parties' release of the SOGL Highlights Report was delayed to June 2020. The timing of release of the PROP and SOGL reports are inconsistent with Article 5.1 of the Agreement which states that the Great Lakes

Public Forum should provide an opportunity for the Parties to receive comments on the state of the lakes, and the Commission to receive public input on the PROP.

In the Commission's opinion, the SOGL Highlights Report must be accompanied by the more detailed, science-based Technical Report. The Technical Report ensures the Commission can assess whether the status and trends rolled up in the Highlights report utilized recent and best available data, analytical approaches and appropriate authorship.

The PROP presents a useful summary of the governments' actions, and the SOGL presents a useful snapshot of overall lake status and trends, but they need to be coupled for the Commission to be able to evaluate, or the public to provide input about, whether and how specific actions have resulted in specific improvements to lake conditions. The causal linkages between program actions and ecosystem conditions are critical to identify. Doing so is consistent with the Agreement's accountability principle which compels the Parties "...to transparently evaluat[e] the effectiveness of work undertaken to achieve the objectives of this Agreement".



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The Commission can only assess progress if the governments are evaluating the effectiveness of their programs. The Commission calls attention to the need for the Parties and the Commission to coordinate and align our evaluation and assessment activities to ensure we can meet our commitments under the Agreement, while maintaining and complementing our respective individual roles and independence. This will improve transparency and accountability for Agreement actions, may leverage increased public awareness and support for the Parties' efforts, and build trust and confidence that program-related actions and investments demonstrably lead to expected outcomes.

2.3 CLIMATE CHANGE IN THE GREAT LAKES BASIN

Climate change was the top issue raised by the public during the Commission's in-person engagement sessions, and 321 respondents identified it as a top concern in our online survey. That is hardly surprising: the scientific literature, and print and social media all report on changing weather and climate, and their impacts on water quality and the daily lives of residents including our homes, property, and public and private infrastructure. Consistent with our recent public engagement activities, the Commission's Great Lakes Water Quality Board's 2018 [Great Lakes Binational Poll](#) found that 73 percent of the 4,250 respondents believe that climate change is having highly negative or extremely negative impacts on water quality and environmental and human health in the Great Lakes.

The most recent national climate assessments released by both Canada and the United States report a high scientific consensus that climate change is occurring, and that it will continue. Canada's 2019 [Changing Climate Report](#) and the United States' 2018 [Fourth National Climate Assessment](#) report that daily extreme precipitation events are likely to increase in frequency and severity in both countries, and identified other impacts as a result of climate change such as reduced winter ice cover, increased lake evaporation and increased summer temperatures. Both reports acknowledge large variability in Great Lakes water levels and a rapid shift between record low levels on Lake Michigan and Huron in 2013, and above average levels in 2014.

... climate change is the most pervasive stressor that merits further consideration in terms of its interaction with toxic chemicals, invasive species, habitat loss, nutrients and pathogens.

The 2020 [SOGL Highlights Report](#) shows increasing trends in total annual precipitation, and decreasing ice cover, in the Great Lakes basin over the last several decades. These and other effects of changing climate influence virtually all aspects of the Great Lakes ecosystem, including [redistribution of land and fish species](#) and the [overloading of the ecosystem's adaptive capacities](#). Increased precipitation impacts human health from [more frequent and intense sewage overflow events](#) and from the [transportation of pathogens that cause gastrointestinal illness after more frequent heavy storms](#). There are also socioeconomic impacts on many critical activities, including [navigation](#), [hydropower generation](#), and [tourism and recreation](#).

Compounding the effects of climate change on the Great Lakes is the interaction of changing climate on other stressors. A recent Commission Great Lakes [Science Advisory Board report](#) found that climate change is the most pervasive stressor that merits further consideration in terms of its interaction with toxic chemicals, invasive species, habitat loss, nutrients and pathogens.

First Nations, Tribes and the Métis Nation are particularly affected by changing climate. During its engagement sessions, the Commission heard how species, habitats and ecosystems are changing and the resulting effects on Indigenous peoples' access to resources for sustenance and spiritual needs. Many plants and animals important to Indigenous peoples are particularly vulnerable to climate change, including moose, wild rice, and walleye. As a result, some Indigenous nations have developed adaptation strategies and plans to support traditional agriculture, hunting and fishing harvests, and other economic and spiritual activities. Examples include the Great Lakes Indian

Fish and Wildlife Commission's [Tribal Climate Adaptation Menu](#) and Canada's [First Nation Adapt Program](#).

2.3.1 Adapting to climate change

The Agreement requires coordination of the Parties' activities related to climate change impacts. As enumerated in the 2019 PROP, the Annex 9 Committee has established its priorities for science and action in compliance with the Agreement, published regular [climate outlook summaries](#) and [annual reports](#) on climate trends and impacts, prepared a [compilation of approaches](#) to vulnerability assessments, and surveyed the Agreement Annex committees to identify climate science knowledge gaps across the Agreement.

The Commission believes it is important that the Parties focus on climate adaptation and managing for resilience ...

The Commission finds that the Annex 9 Committee has completed considerable work to characterize climate change impacts in the basin, including useful background analyses. The Commission also commends the Parties and their partners for establishing domestic programs to tackle climate change – one good example being the [2014 Canada-Ontario Agreement](#) which includes commitments to integrate knowledge of climate change impacts into Great Lakes adaptation strategies, with similar commitments in the [draft 2020 Canada-Ontario Agreement](#). The Commission believes it is important that the Parties focus on climate adaptation and managing for resilience since mitigation measures at a regional scale like the Great Lakes basin may have limited potential to ameliorate impacts in the region, despite the incremental value that those actions have.

In 2003, the Commission was advised by its Great Lakes Water Quality Board (WQB) in its report, [Climate Change and Water Quality in the Great Lakes Basin](#), that an adaptation strategy should be developed and implemented that responds to climate change impacts in the Great Lakes basin. The WQB recently completed a two-phase,

Therefore, to assist the Parties in advancing work on a coordinated binational strategy, the Commission offers to exercise its convening capacity to identify and further explore essential elements of a binational climate adaptation and resiliency strategy.

multi-year project that again examined climate change adaptation in the Great Lakes. The first phase of the project, entitled [Climate Change and Adaptation in the Great Lakes](#) was completed in 2017, and found that while various communities as well as state, provincial and federal agencies were engaging in some aspects of adaptation planning and implementation, there is no coordinated regional perspective, approach or strategy.

The WQB concluded that a coordinated binational approach is needed to protect Great Lakes water quality to the extent possible in a rapidly changing climate. Climate change cannot adequately be addressed solely through the actions of myriad communities. The board recommended that Canada and the United States develop a binational approach to climate change adaptation and resilience in the Great Lakes, and that a vulnerability assessment be conducted to identify areas at risk of adverse impacts on the chemical, physical or biological integrity of the Great Lakes. The [second phase of the WQB's climate work](#), which involved various engagement and outreach activities and was completed in 2019, found that there was support from people around the Great Lakes for a binational approach to climate adaptation but that the Parties had not done anything to advance the concept.

In its first Triennial Assessment of Progress Report (2017), the Commission concurred with the WQB's findings that the unprecedented threat of climate change should compel both community and basinwide responses, and [recommended](#) that the Parties develop a binational approach to climate change adaptation in the Great Lakes as well as invest in a binational vulnerability assessment. The Parties have not acted on this recommendation, and the Commission again calls attention to this important and unfulfilled need.

We have heard informally from governments that it would be helpful if our earlier recommendation provided greater specificity in terms of next steps. Therefore, to assist the Parties in advancing work on a coordinated binational strategy, the Commission offers to exercise its convening capacity to identify and further explore essential elements of a binational climate adaptation and resiliency strategy. The elements that we shall seek to advance include a shared vision, coordinated action, accountability, information and knowledge, and implementation considerations. We hope this anticipated contribution—which will be completed by late 2022—will facilitate binational dialogue among the Parties and Great Lakes leadership to advance our earlier recommendation.

2.3.2 Climate change and nutrients in Lake Superior

Recommendation #2:

The Parties should protect Lake Superior's high existing resource values by leading a collaborative and coordinated effort to eliminate cyanobacterial algal blooms from Lake Superior. The Parties' efforts should include the following key components:

- i. Characterize Lake Superior nutrient loads and cyanobacterial bloom formation and dynamics by optimizing monitoring activities, developing bloom predictive models, and complete any necessary experimental and observational analyses.
- ii. Based on the results of improved scientific understandings, as appropriate, develop nutrient load reduction targets to reduce point source and nonpoint source pollution.
- iii. Apply the precautionary principle and increase investments in urban and nonpoint source controls and best management practices that will have the greatest effect in reducing nutrient loadings to Lake Superior.
- iv. Incorporate science characterization findings and initiate load reduction targets into the 2025 update of the Lake Superior Lakewide Action and Management Plan.

RATIONALE:

During the Commission’s engagement sessions in the Lake Superior watershed—including Thunder Bay, Ontario, the twin ports region of Duluth, Minnesota and Superior, Wisconsin, and Ashland, Wisconsin—we frequently heard how climate is affecting those communities. The southwestern shore of the lake experienced at least three extreme (500- or 1,000-year) storms since 2012. Numerous public comments also expressed concern about the appearance of cyanobacterial algal blooms in the western end of Lake Superior near Duluth and Ashland in 2012, 2016, 2017 and 2018, and east of Thunder Bay in 2019. Cyanobacteria capable of producing toxic secondary metabolites (such as [*Dolichospermum lemmermannii*](#)) were detected in recent blooms, although fortunately those toxins were found at low concentrations that did not exceed recreational or human health thresholds.



Cyanobacterial blooms in Lake Superior have not been documented in the scientific literature until recently, and increasing evidence points to their resurgence as a climate-driven phenomenon.

Lake Superior is the [least hospitable](#) to algal blooms of all of the Great Lakes, in part because of its relatively cool temperatures and low ambient phosphorus concentrations in the lake. Published research shows that Lake Superior experienced an increase in primary productivity from [1900 to 1970](#), followed by a period of [declining nutrient status](#). Cyanobacterial blooms in Lake Superior have not been documented in the scientific literature until recently, and increasing evidence points to their resurgence as a [climate-driven phenomenon](#). They have been observed most frequently in the western arm of the lake.

Although the Commission has prepared several recent nutrients-related reports, they have focused on the lower lakes. The Parties’ considerable nutrients-related activities have also focused on the lower lakes, and little information exists on cyanobacterial blooms on Lake Superior as evidenced by the “undetermined” subindicator on harmful algal bloom trends in Lake Superior in the Parties’ 2020 [State of the Great Lakes Highlights Report](#).

The Commission accessed the limited scientific literature and spoke to several agency and academic scientists who study the lake to understand what is known about the recent blooms that have been observed in Canadian and US waters of Lake Superior.

An important contributor to the blooms’ formation is the increase in extreme precipitation events. As described in an [initial assessment of cyanobacterial blooms in Lake Superior](#), the two largest blooms in western Lake Superior (2012 and 2018) followed unprecedented floods when higher stream flows were associated with nutrient delivery to the lake. The largest blooms also occurred in years with warmer water temperatures (e.g., an elevated number of cumulative degree days over 10 degrees Celsius) than were observed during non-bloom years. Bloom events occurred around the



same time as peak summer water temperatures but lagged considerably behind flood events, suggesting that nutrient delivery may create conditions favorable for a bloom, but water temperatures play a role in triggering the events.

Projections for the Great Lakes basin include [ongoing warming of the lakes](#) and storm events of increased intensity, that, among other climate-related impacts, are likely to have implications for cyanobacterial algal blooms. [Since Lake Superior is warming more rapidly](#) than any of the other lakes, conditions may become more favorable for blooms in the future unless additional actions are taken; the [2017 State of the Great Lakes report](#) suggests that reductions from Lake Superior tributaries hold potential for overall nutrient load reductions.

Warming and precipitation patterns cannot be controlled in the short term, and the primary management lever available to reduce or eliminate cyanobacterial algal blooms in Lake Superior is through reductions in nutrient delivery to the lake. A focus on managing loads to the lakes is consistent with the nutrients-related work of Annex 4 in other parts of the Great Lakes basin, including the focused effort on the western and central basins of Lake Erie. There, scientific understanding of phosphorus loads and bloom dynamics were refined to inform the collaborative development of binational nutrient load reduction targets, which were formalized in Domestic Action Plans that included implementation actions to achieve the load reductions. This stepwise approach to controlling algal blooms has also been applied at the regional scale elsewhere in North America and internationally, but is missing for Lake Superior.

In addition to continuing to implement actions to reduce phosphorus loads to Lake Erie, Saginaw Bay, Green Bay, Bay of Quinte and other locations in the lower lakes, the Commission urges the Parties to also place a high priority on addressing cyanobacterial algal blooms in Lake Superior. That lake's high resource values offer perhaps the best opportunity to showcase a government-led response to adapt to the impacts of changing climate on our shared Great Lakes. We may have only one chance to protect its high-quality condition.

2.4 THE PARTIES' PUBLIC ENGAGEMENT

Recommendation 3:

That the Parties transform their LAMP outreach and engagement activities to provide broader, more meaningful opportunities for the public and stakeholders to contribute to the programs and other measures described in Annex 2 by:

- i. Provide more and better opportunities for the public to influence the Parties' Annex 2 programs and projects. To help identify and describe those opportunities, the Commission commits to convening key stakeholders and constituencies to examine the conditions and characteristics that made the Lake Superior Binational Forum successful. The Commission's engagements will include the entities identified in the Agreement, including State and Provincial governments, Tribal Governments, First Nations, Municipal governments, watershed management agencies, other local public agencies, and the public. We will also seek the perspectives of industry, maritime transportation, and the resource and agriculture sectors.
- ii. Develop and apply a modified LAMP public outreach and engagement model in Lake Superior, for subsequent application in other lake basins.
- iii. Extend the new model in the next cycle of the Parties' Priorities for Action in 2023.

RATIONALE:

Public engagement is essential for successful implementation of the Great Lakes Water Quality Agreement. This is reflected strongly in [Article 2.4\(a\)](#) of the Agreement, which requires the Parties to incorporate public opinion and advice, as appropriate, and provide information and opportunities for public participation in activities related to the Agreement. Public participation is also emphasized in Articles 3, 4, 5 and 7.1(k)(ii), and every Agreement Annex requires the Parties to cooperate and consult with the public when implementing programs. There is little question that effective ecosystem-based management requires participation of the public and other stakeholders in an engaged dialogue.

The expectation of public engagement in the Parties' Great Lakes activities was clearly signaled in the Commission's Great Lakes Water Quality Board's Great Lakes Binational Polls, wherein the public, and particularly youth and Indigenous and Métis stakeholders, view Great Lakes protection as a shared responsibility, and are interested in opportunities to participate. When asked who is currently responsible for protecting the health of the Great Lakes basin, respondents answered "everyone/all" at 42 percent in [2015](#) and 39 percent in [2018](#). The poll also found that youth and Indigenous stakeholders have a higher level of interest in participation than other segments of the public.

Yet, for some stakeholders and rights holders the Commission was told that the Parties' engagement is lacking. Commenters noted that the Agreement does not adequately formalize a 'seat at the table' to engage or institutionalize the participation of Indigenous and Métis governments in implementation decisions, and a number of individuals representing community groups and nongovernment organizations expressed concern about the adequacy of engagement of frontline communities in government decisions about the Great Lakes. They noted that, although opportunities exist for them to receive information online and at open houses and participate in community-based environmental restoration projects, the opportunities to influence policies and programs are very limited. Some even lamented that there has been a loss of opportunities for public influence over Great Lakes programs where 'informing' and 'consulting' are more typical than 'partnerships' and 'delegated power' on the [ladder of citizen participation](#).

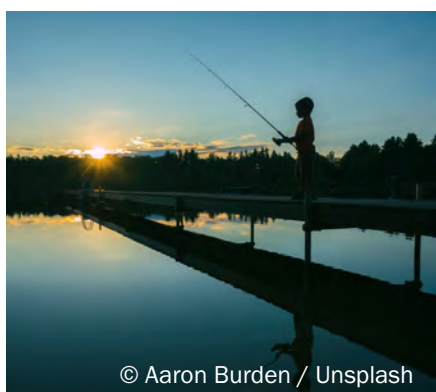
However, during our engagement sessions the Commission heard that changes to public engagement for Lakewide Action and Management Plans (Annex 2) have diminished the efficacy and community connection to LAMP projects and programs.

The Commission observes that public engagement is relatively more important for some Agreement activities than for others, which is appropriately reflected in an uneven approach to engagement between Annexes. For example, in most Areas of Concern (Annex 1) there are meaningful opportunities for public participation in events and Remedial Action Plan report review, and the Parties are to be commended for institutionalizing public and stakeholder engagement in those processes through the establishment and support of community-centric Public Advisory Councils. However, during our engagement sessions the Commission heard that changes to public engagement for Lakewide Action and Management Plans (Annex 2) have diminished the efficacy and community connection to LAMP projects and programs. This is at odds with Annex 2 of the Agreement, which assigns a role for action by the public to address priority threats to water quality. Public concerns were voiced most clearly when we visited the Lake Superior watershed, where several years ago the replacement of the Lake Superior Binational Forum with the current LAMP structure that includes agency-centric Lake Partnership Outreach and Engagement Subcommittees is still viewed by many as an inadequate forum for broader stakeholder engagement.

Lakewide Action and Management Plans, and the Lake Partnerships that support them, provide key institutionalized and place-based forums for public engagement under the Agreement. This is especially important for communities that are not designated as Areas of Concern and those who wish to continue participating in decision-making following Area of Concern delisting. Lakewide Action and Management Plans operate at an ecosystem-based lake basin scale and may be the most important forum for stakeholder and public participation in ecosystem-based management under the Agreement.

3

LOOKING AHEAD



*... we have an opportunity to
reinvigorate our economies while
considering our place as part of
the natural world, not separate
from it.*

As we collectively endure the most severe global public health crisis in a century, the immense power of the natural world—whether seen through the lens of a naturally-occurring virus, the damage caused by wetter and wilder weather as a result of climate change, or through the resiliency that nature exhibits to restore itself—all serve as reminders that we have an opportunity to reinvigorate our economies while considering our place as part of the natural world, not separate from it.

In the next three years the Commission—supported by the work of its Great Lakes Water Quality Board and Science Advisory Board that were established by the Agreement, as well as our transboundary Health Professionals Advisory Board—will provide additional advice to strengthen our collective ability to restore and maintain the chemical, physical and biological integrity of the waters of the Great Lakes and improve the effectiveness of the Agreement in achieving its purpose. Our Water Quality Board’s activities will include an examination of Great Lakes governance to effectively advance the Agreement’s goals and objectives, and a separate project that will seek to understand possible future scenarios for the Great Lakes that are driven by system-scale influences (such as climate, land use and water use patterns) that ultimately impact resource demands and water quality. From these scenarios, emerging threats to the Great Lakes can be inferred and governance strategies can be developed to anticipate and respond to these threats. Building on this work, the Science Advisory Board will develop a scientifically based framework for detecting and identifying specific emerging stressors and threats, including the development of a risk analysis framework capable of predicting their likelihood and severity, so that the highest priority risks can be identified and managed appropriately. The Commission’s advisory boards will complete a suite of integrated projects that will deepen our collective understanding of the ecological, economic, social and cultural landscape of the Great Lakes basin today and well into the future.

The year 2022 will mark the 50th anniversary of the establishment of the Agreement. The 50th anniversary will be an important milestone to celebrate and, more importantly, an opportunity to recommit to the essential work of restoring and protecting the public trust resources of the Great Lakes.

The Commission's next assessment of progress report is scheduled for release in 2023 and will trigger the Parties' requirement to review the Agreement's operation and effectiveness. The planned activities of the Commission's

advisory boards will be available to inform the Parties' and the public's Agreement review, and its future role in Great Lakes restoration and protection.

The collective efforts of the Parties and all partners and stakeholders to the Agreement, including the International Joint Commission, are essential to fulfill the Agreement's promise to restore and maintain the chemical, physical and biological integrity of the Great Lakes. We offer this triennial report with its advice and recommendations in the spirit of cooperation, so that it may benefit our shared Great Lakes.



2020

SECOND TRIENNIAL ASSESSMENT OF PROGRESS

— ON GREAT LAKES WATER QUALITY — **Report**

