

Lakes Champlain and Memphremagog Nutrient Loading and Harmful Algal Bloom Reference

Interim Report

**International Joint Commission
November 2018**



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SECTION 1: INTRODUCTION

1.1 The Reference

On October 19, 2017, Global Affairs Canada (GAC) and the United States Department of State (DOS) gave the International Joint Commission (IJC) a [reference](#), in accordance with Article IX of the Boundary Waters Treaty, to make recommendations that would support current efforts to reduce nutrient loading and the occurrence of harmful algal blooms (HABs) in lakes Champlain and Memphremagog.

For Lake Champlain, the reference states:

- Relevant to the reduction of nutrient loading and the causes of harmful algal blooms in Missisquoi Bay and the broader Lake Champlain and Richelieu River system, gather and review information from federal, provincial, state and municipal agencies, academic institutions, and other entities in the region on existing monitoring programs and measures being taken to address the aforementioned water quality concerns.
- Based on the information collected, provide recommendations on how current efforts can be strengthened (e.g. summarizing gaps or opportunities, identifying possible approaches to strengthen collaboration, efficiency, or impact).

For Lake Memphremagog, the reference states:

- In collaboration with relevant agencies, academic institutions and others entities in the region, identify the range of nutrient loading issues that are of concern in the Lake Memphremagog basin and make recommendations on how current efforts can be strengthened, including consideration of management approaches being taken for Lake Champlain and Missisquoi Bay that may be applicable.

The duration of the reference is two years from the date of issue and it is being carried out using internal IJC resources. This report satisfies the governments' request for updates on progress within one year of receipt of the reference.

1.2 IJC Context

Due to excessive nutrient loading, portions of Lake Champlain (Figure 1) have been experiencing symptoms of eutrophication for many years. In particular, the binational northeastern portion of the lake, Missisquoi Bay, suffers from severe HABs on a regular basis.

Following a reference given to the IJC in 2004 on “questions regarding possible transboundary implications of the Missisquoi Bay Bridge project”, the IJC issued a [final report](#) that included the following recommendation:

- *“Phosphorus levels in Missisquoi Bay are excessively high and are well above the water quality criteria adopted for the bay by the State of Vermont and the Province of Quebec. Reducing phosphorus loading to Missisquoi Bay from the watershed according to the agreements and plans in place in Quebec and Vermont should be the major focus of government action to improve water quality in the bay.”*

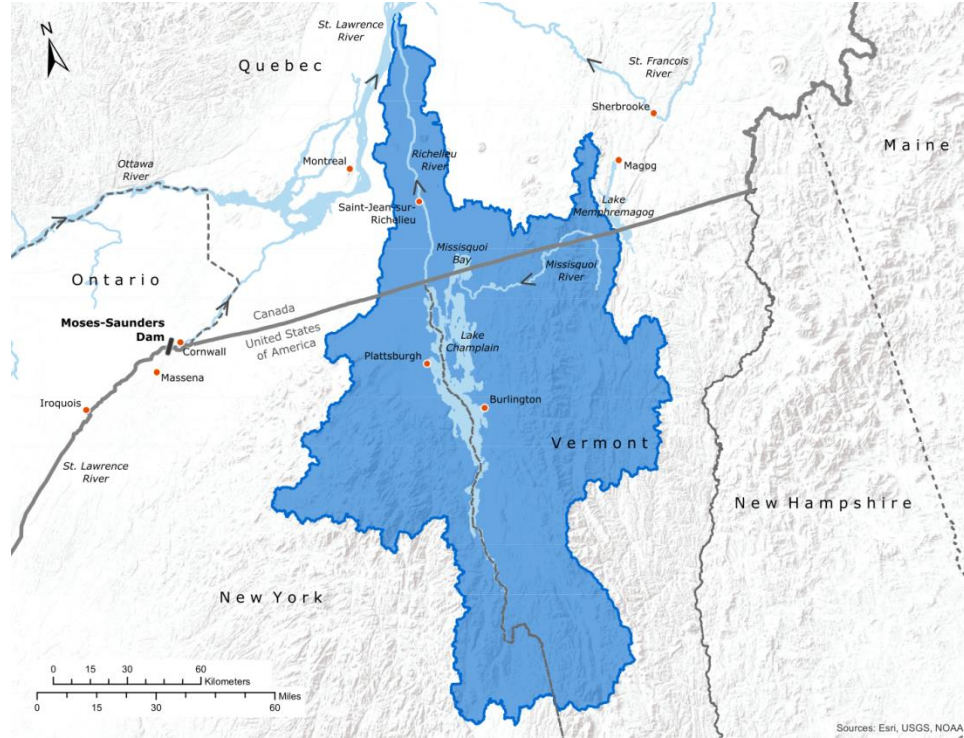


Figure 1. Lake Champlain and its watershed.

While the report recognized that significant work was being done by the governments of Quebec and Vermont to reduce loads of phosphorus to Missisquoi Bay, more needed to be done in order to meet the target levels of load reduction. This resulted in a [reference to the IJC in 2008](#) to assist in the implementation of a complementary transboundary initiative to reduce phosphorus loadings. The final report for this “critical source area” study, issued in 2012, included 14 conclusions and recommendations that ranged from improving technical aspects of nutrient management in agricultural portions of the basin to enhancing the coordination and effectiveness of resource management agencies in the implementation of their respective programs and policies.

Since 2012, the most significant development regarding nutrient loading and HABs in Lake Champlain has been the approval of phosphorus Total Maximum Daily Loads (TMDLs) by the United States Environmental Protection Agency (USEPA) in 2016 for Vermont segments of Lake Champlain ([Read more](#)).

Over the same time period, Lake Memphremagog (Figure 2) has also been experiencing symptoms of eutrophication, particularly in the southern portion of the lake that straddles the border between Quebec and Vermont. In 2017, the USEPA approved a TMDL for the Vermont portion of the lake.



Figure 2. Lake Memphremagog and its watershed.

1.3 Implementation

The overall IJC strategy to deliver on the reference is to work with organizations in the basin to prepare reports that address each of the elements of the reference, acquire information on how the issue of nutrient loading and HABS is being approached outside of the region, create broad-based study advisory groups to provide advice to the IJC, solicit feedback from technical experts and the public on key findings, draft reports and recommendations, and transmit final IJC reports with recommendations to the governments within the two-year time frame of the reference.

SECTION 2: CONTRIBUTIONS OF BASIN ORGANIZATION TO THIS REPORT

Organizations that are well-established and respected in each of the Lake Champlain and Lake Memphremagog basins have been contracted to provide the IJC with reports in support of its development of recommendations to the governments. In the Lake Champlain basin, the IJC is partnering with the Lake Champlain Basin Program (LCBP), a U.S.-based organization with core funding from the USEPA, and l'Organisme de bassin versant de la baie Missisquoi (OBVBM), an organization supported by the province of Quebec. In the Lake Memphremagog basin, the IJC is partnering with Memphremagog Conservation Inc. (MCI), a Quebec-based watershed organization in Quebec, and Memphremagog Watersheds Association (MWA) based in Vermont. One report will be produced for each basin.

As part of the contracts that have been put in place with each of the basin organizations, updates on progress have been provided to the IJC for inclusion in this interim report. Their contributions are inserted in sections 2.1 and 2.2

2.1 Lake Champlain and Missisquoi Bay

Prepared by the Lake Champlain Basin Program (LCBP) and l'Organisme de bassin versant de la baie Missisquoi (OBVBM)

1) Overview of activities that relate directly to nutrient loading and HABs according to the 2017 reference regarding the water quality of Lake Champlain and Richelieu River, with particular attention to Missisquoi Bay.

Organisme de bassin versant de la baie Missisquoi (OBVBM) started work related to the Reference in February 2017 after signing a Memorandum of Understanding (MOU) with the IJC detailing required work.

New England Interstate Water Pollution Control Commission (NEIWPCC) and Lake Champlain Basin Program (LCBP) staff started work related to this reference in April 2017 after signing an MOU with the IJC detailing required work.

The following presents an overview of completed deliverables and activities to date.

Compilation of relevant data, documents and reports

In accordance with the first element of the Reference, OBVBM and NEIWPCC have compiled preliminary lists of data, documents and reports relevant to the reduction of nutrient loading and the causes of harmful algal blooms (HABs) in Missisquoi Bay, Lake Champlain and the Richelieu River system. Information on existing research and monitoring programs (i.e., mitigation, volunteering, pilot projects, etc.) and policies that relates to the aforementioned water quality concerns was gathered from federal, provincial, state and municipal agencies, academic institutions, and other entities in Québec. The OBVBM list of source material was submitted to the IJC in accordance with Annexe 1 of the agreed MOU that spanned the time period from February 28th 2018 to March 31st 2019.

OBVBM will work in collaboration with the Comité de concertation et de valorisation du bassin de la rivière Richelieu (COVABAR) for the overview concerning the Richelieu River system.

It was agreed that work related to the broader Lake Champlain system will be done by the NEIWPCC and Lake Champlain Basin Program.

It was also agreed that OBVBM will gather and analyse documents concerning nutrient loading and the causes of HABs from Québec, Canada and that the LCBP would focus on Vermont, USA.

Development of project timeline

OBVBM produced a Gantt chart listing all tasks relevant to the Reference and consistent with the preliminary work plan written by the IJC. This Gantt chart was submitted to the IJC in March 2018 and updated with NEIWPC/LCBP elements at the request of the IJC in July 2018.

Networking component – Key stakeholder identification and interviews

OBVBM produced a list of key provincial, federal, local agencies and stakeholders relevant to the region under investigation that have science and policy information relevant to the reduction of nutrient loading and the causes of HABs in Missisquoi Bay and this list was submitted to the IJC in March 2018. Representatives from identified agencies and stakeholders are being contacted and the OBVBM will complete interviews to ground truth information on programs and measures for the system. Interviews will focus on the following example questions to identify key information and advice to incorporate into the report:

- What is working?
- What is not working?
- What do you recommend?
- What needs improvement?

The binational set of common questions was validated in the fall of 2018. OBVBM started interviews in September 2018 with members of the agricultural sector and municipalities.

NEIWPC and LCBP have reviewed the project with the LCBP Technical Advisory Committee, which consists of approximately 20 watershed management experts from around the Lake Champlain region. This group does not currently have any members from Quebec due to a recent retirement. The NEIWPC/LCBP team intends to fill in any information gaps with individual interviews on an ad hoc basis through the fall 2018 to complete their literature review deliverable to the IJC.

Binational coordination meetings

OBVBM helped organize and participated in a kick-off meeting with the LCBP and the IJC held by teleconference on March 26th, 2018 to coordinate and plan future joint efforts throughout this project.

Follow up meetings have been held monthly by teleconference between basis between representatives from OBVBM, LCBP and the IJC and occasionally include members of the CSAG.

Development of a common table of contents

A preliminary table of contents was produced, reviewed and validated by OBVBM, NEIWPC/LCBP and the IJC. It contains main elements and will be detailed throughout completion of the report and will serve as the guiding format for the report over the next eight months.

Literature review and preliminary report

OBVBM and NEIWPC have each started their literature review documents and will soon start writing their respective portions of the preliminary report.

2) Insight into findings or approach – are current efforts affecting change?

This portion of the report will be completed later in the project timeline. This “synthesis” part of the project is meant to be informed by meetings and technical advisors who will be providing information later in 2018 and early 2019.

3) Challenges that the Commission would want to be aware of

No specific challenges that the Commission would want to be aware of have surfaced to date.

2.2. Lake Memphremagog

Prepared by Memphremagog Conservation Inc. (MCI) and Memphremagog Watersheds Association (MWA)

Introduction

The strategy for the Lake Memphremagog sub-watershed is to synthesize what is known about nutrient loading issues and harmful algal blooms (HABs) in the system and, through a sub-basin-wide binational science workshop, revisit and strengthen current collaborative efforts between federal agencies as well as in Quebec and Vermont. The IJC will then develop a report with recommendations to improve binational collaboration (e.g., integrated watershed resource management approaches) and enhance communications regarding the reduction of nutrients into Lake Memphremagog. Public consultations on the draft IJC report will be held in the second year.

The IJC provided governments with an initial [work plan](#) for the Lake Memphremagog portion of the reference on February 19, 2018. Soon thereafter, the IJC contracted with Memphremagog Conservation Inc. (MCI) from Magog, Quebec and the Memphremagog Watershed Association (MWA) from Newport, Vermont to examine current programs and measures that address elevated nutrient levels and algal blooms, and to assist the IJC in making recommendations on how to strengthen these efforts. Project lead from MCI is Ariane Orjikh, General Manager, and from MWA, Kendall Lambert, Administrative Director.

This progress report outlines the collaborative work that the basin organizations and the IJC have undertaken since November 2017. It should be noted that the progress report does not contain any initial findings or overview of the effectiveness of current management efforts, as the project has not yet progressed to that stage.

1. Development of a Gantt Chart

The first task completed was the development of a Gantt chart. The Gantt chart presents the list of tasks needed to accomplish the project and timeline for task completion. The project was completed in September 2018.

This project includes four major components as outlined in the work plan: 1. Networking with key agencies; 2. Preliminary Memphremagog Report writing; 3. Review of findings, gap analysis, and initial recommendations (includes a binational science and policy forum); 4. Development of recommendations by the IJC to strengthen current efforts. The progress report is broken up by those categories.

2. Networking with key agencies

In May, the key stakeholders from Quebec and Vermont were identified and their contact was compiled. The list includes contacts from municipalities, state/provincial government, NGOs, the private sector, universities, and national and international governments.

A list of binational common questions was also produced in French and English. The key stakeholders will be interviewed using these questions, and their responses will be analyzed and compiled into a separate Networking Report. Their answers will also be used throughout the Memphremagog Report to support conclusions and recommendations.

The IJC worked closely with MCI and MWA during the months of June and July to establish a study group for this reference called the Memphremagog Study Advisory Group (MSAG). This group is comprised of six Quebecois and six Vermonters who have expertise in the Memphremagog Basin.

The first formal meeting of the MSAG occurred on August 29th, 2018 in Newport, Vermont. At that time, the MSAG nominated Julie Grenier (COGESAF) and Ben Copans (VTDEC) to be co-chairs. The MSAG also began the review process of the relevant documents.

Through that review process and with MSAG guidance, MCI and MWA, at the writing of this progress report, have finalized the Gantt chart, the list of common questions, and have begun stakeholder interviews. The second meeting of the MSAG is November 15th in Magog, Quebec.

Finally, a communication plan was done to raise public awareness about the project, to inform the public at regular intervals of the progress being made and to encourage broad participation in the reference study through a public consultation on final reports.

3. Preliminary Memphremagog Report writing

Both MCI and MWA have produced extensive list of references and begun the research process for this report. The lists of references will likely be appended as the report writing progresses, but have been reviewed by MSAG members at the August meeting and additions were suggested at that time.

Prior to the first MSAG meeting, a draft table of contents was produced for the Memphremagog Report. This document was reviewed by the MSAG at the August meeting, and after incorporating MSAG member comments and suggestions, there is now a final table of contents for the report.

Based on the Gantt chart, the preliminary report will be available for MSAG review on January 25, 2019.

4. Review of findings, gap analysis, and initial recommendations

Work on this portion of the project will be in earnest in January of 2019. Milestones for this category of work as laid out in the Gantt chart and include:

A binational science and policy forum to review the preliminary report and refine recommendations is scheduled to occur in late March of 2019. Planning for this forum will begin with MSAG guidance in January 2019.

The public comment period for the report will occur June 1st to June 30th, 2019.

5. Development of recommendations by the IJC to strengthen current efforts

MCI and MWA will submit a final report to the IJC on July 19th, 2019 for the IJC to review, strengthen, and translate over a three-month period.

Conclusion

Although the timetable for this project had to be pushed back due to delays in striking the MSAG and the calling of the first MSAG meeting, the project is on target to meet our deadlines and produce an in-depth, quality report.

For the Memphremagog Report, a binational analysis of the effectiveness of current management efforts and sources of nutrient loading has not yet begun. However, it should be noted that there is currently strong binational effort in the Lake Memphremagog Basin to monitor nutrient concentrations and coordinate binational management strategies. For example, the governments of Vermont and Québec signed an

Environmental Cooperation Agreement on Managing the Waters of Lake Memphremagog in 1989 and in 2003. Further, in 2017, the US Environmental Protection Agency approved a Total Daily Maximum Load (TMDL) for phosphorus which was produced by the Vermont Agency of Natural Resources. The TMDL outlines estimated current phosphorus loading by sector from Vermont and the necessary reductions needed by sector to meet clean water goals.

The final Memphremagog report will highlight and build from these current efforts in the basin.

SECTION 3: WORLD LITERATURE REVIEW

To inform and support recommendations on nutrient loading and HABs in Missisquoi Bay-Lake Champlain and Lake Memphremagog, a review is underway regarding how other jurisdictions outside of the southern Quebec and New England region and around the world are addressing this water quality issue. The focus is on the frameworks, approaches and processes employed by government agencies and departments, academic institutions, and non-governmental organizations (NGOs) – both within countries and in transboundary contexts.

Once completed, the review and its findings will be integrated with the reports produced by the basin organizations to produce a final report with recommendations.

SECTION 4: STUDY ADVISORY GROUPS

The IJC has created study advisory groups for each project: the Champlain Study Advisory Group (CSAG) for the Missisquoi Bay-Lake Champlain system and the Memphremagog Study Advisory Group (MSAG) for the Lake Memphremagog system. The CSAG and the MSAG are charged with assisting the IJC in developing recommendations that will be transmitted to the governments. Over the course of the study, this involves assimilating key findings, input and recommendations of reports prepared by the basin organizations, the world literature review report, and comments received during study forums and through online comment periods.

The CSAG and the MSAG were struck in August 2018. They are populated by a broad cross-section of individuals representing the research community, government agencies, NGOs and the public (Table 1 and Table 2). Each study advisory group functions as a binational entity.

Table 1. Champlain Study Advisory Group (CSAG)

Canadian CSAG Members	U.S. CSAG Members
<p>Sébastien Bourget Environmental Scientist, Ministère du Développement durable, de l'Environnement et de la Lutte contre les changements climatiques (MDDELCC), Quebec</p>	<p>Ryan Davies Director/Engineer at Clinton County Health Department, New York</p>
<p>Gerardo Gollo-Gil Deputy Director Client Services and Programs, Ministry of Agriculture, Fisheries and Food, Quebec</p>	<p>Laura Dipietro Deputy Director, Division of Agricultural Resource Management Vermont Agency of Agriculture Food and Markets</p>
<p>Simon Lajeunesse Regional Water Courses Management Coordinator, MRC Brome-Missisquoi, Quebec</p>	<p>Fred Dunlap New York Lake Champlain Coordinator, New York State Department of Environmental Conservation</p>
<p>Daniel Leblanc Estrie and Montérégie Regional Director, Ministère du Développement durable, de l'Environnement et de la Lutte contre les changements climatiques (MDDELCC), Quebec</p>	<p>Neil Kamman Senior Policy Advisor, Department of Environmental Conservation, Vermont Agency of Natural Resources</p>
<p>Pierre Leduc Vice President, l'Organisme de bassin versant de la baie Missisquoi (OBVBM), Quebec</p>	<p>Eric Perkins Environmental Protection Specialist, Vermont TMDL Coordinator, U.S. Environmental Protection Agency</p>
<p>Aubert Michaud Researcher, Institut de Recherche et de Développement en Agroenvironnement (IRDA), Quebec</p>	<p>Andrew Schroth Research Associate Professor, University of Vermont</p>
	<p>Angela Shambaugh Lakes and Ponds Management and Protection Program, Vermont Department of Environmental Conservation</p>

Table 2. Memphremagog Study Advisory Group (MSAG)

Canadian MSAG Members	U.S. MSAG Members
<p>Sébastien Bourget Environmental Scientist, Ministère du Développement durable, de l'Environnement et de la Lutte contre les changements climatiques (MDDELCC), Quebec</p>	<p>Ben Copans Watershed Coordinator, Vermont Department of Environmental Conservation, Watershed Management Division, (VTDEC)</p>
<p>Alain Gagnon, Agroenvironmental and Water Quality Advisor, Ministère de l'Agriculture, des Pêcheries et de l'Alimentation (MAPAQ), Quebec</p>	<p>Frank Maloney Planner, Northeastern Vermont Development Association (NVDA)</p>
<p>Julie Grenier Project Coordinator, Conseil de gouvernance de l'eau des bassins versants de la rivière Saint-François (COGESAF), Quebec</p>	<p>Mark Mitchell Environmental Scientist V, Vermont Department of Environmental Conservation, Lakes and Ponds Program (VTDEC)</p>
<p>Daniel Leblanc Estrie and Montérégie Regional Director, Ministère du Développement durable, de l'Environnement et de la Lutte contre les changements climatiques (MDDELCC), Quebec</p>	<p>Perry Thomas Program Manager, Vermont Department of Environmental Conservation, Lakes and Ponds Management and Protection Program (VTDEC)</p>
<p>Alexandra Roy Project Coordinator in sustainable Development, Municipalité régionale de comté de Memphrémagog (MRC), Quebec</p>	<p>Beth Torpey Professor Community College of Vermont, Director Memphremagog Watershed Association (MWA)</p>
<p>Serve Villeneuve Ecology and Water Principal Analyst, Environment and Climate Change Canada (ECCC), Quebec</p>	<p>Bruce Urie Regional Stewardship Manager Vermont Land Trust (VLT)</p>

SECTION 5: COMMUNICATIONS

The IJC has developed a communications strategy to keep target interests informed and optimize opportunities for public input. While the primary objective is to promote transparency and encourage broad public participation throughout the reference study, the strategy also proposes an approach to manage emerging issues and coordinate activities with the Lake Champlain-Richelieu River flooding study. Communications plans outlining a schedule of activities specific to the work plans in each of the two project watersheds will be implemented in close collaboration with basin organizations.

In year one, public engagement focused on maintaining a website with relevant project documents, and links to the basin organizations assisting with the groundwork for the final report. The IJC is building a subscriber list to share news and updates from the reference study to facilitate more effective information sharing.

Both traditional and social media are components of the communications plans. The IJC issued two news releases in the first year of the reference: the first on February 20, 2018 announcing the project work plans; and the other on July 30, 2018 announcing the establishment of the study advisory groups. Similarly, basin media will be informed when this interim report is posted to the website in both official languages. An infographic and regular blog posts in the IJC digital newsletter, Water Matters, rounds out the communications products in year one.

Basin organizations and study advisory group members are kept apprised as communications activities roll out; individuals in these organizations are key points of contact to extend the reach of IJC communications through a wider network. The communications team also sought opportunities in the recent set of public meetings for the flooding study, cross-referencing promotional material with links to the water quality work ongoing in the basin.

The bulk of public engagement will occur in the second year of the reference, during which both projects will hold science and policy forums, as well as online public consultations on the draft IJC report. The larger Lake Champlain and Missisquoi Bay project will also host face-to-face public meetings on both sides of the border near the time of the public consultation.

Feedback from the public consultations will be taken into consideration in the drafting of the IJC's final recommendations.

SECTION 6: NEXT STEPS

Draft reports from the basin organizations and a draft of the world literature review are expected in the first quarter of 2019. These reports will be reviewed by the CSAG and the MSAG. In coordination with IJC staff, the CSAG and the MSAG will identify key findings from the reports and develop draft recommendations. Revised reports for each of the basins, including the key findings and draft recommendations, will then be shared with experts through science and policy forums in the second quarter of 2019. In consideration of feedback received during the forums, final draft reports will be prepared by IJC staff and the CSAG and the MSAG. These penultimate reports will be posted online for public comment during the first half of 2019.

Following a consensus-building process between the IJC and the CSAG and the MSAG for each of the basins, final reports will be transmitted to governments by October 19, 2019.