



International Joint Commission
Great Lakes
Water Levels Boards

Les conseils de régularisation
des eaux des Grands Lacs
de la Commission mixte internationale

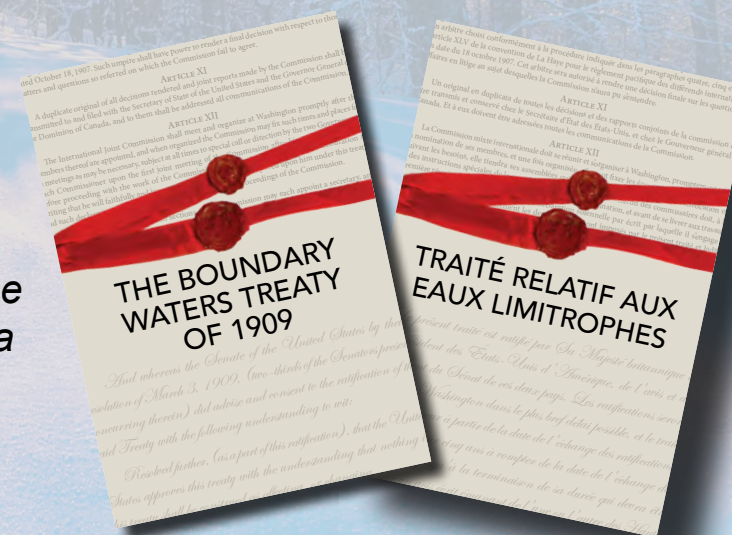
Tri-Board Tribune

The Great Lakes in Depth

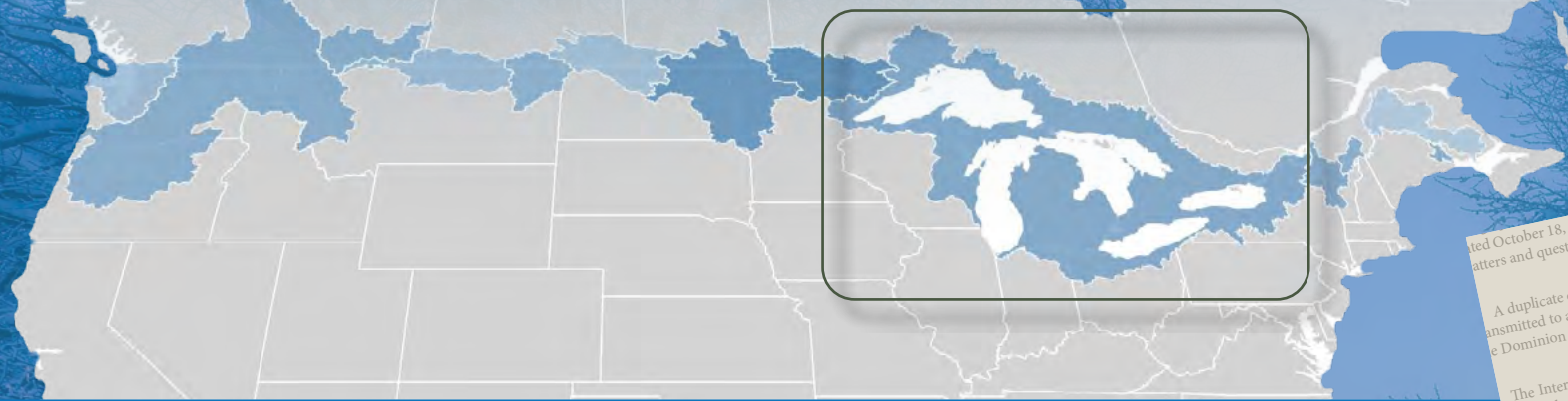
Winter 2023

WELCOME!

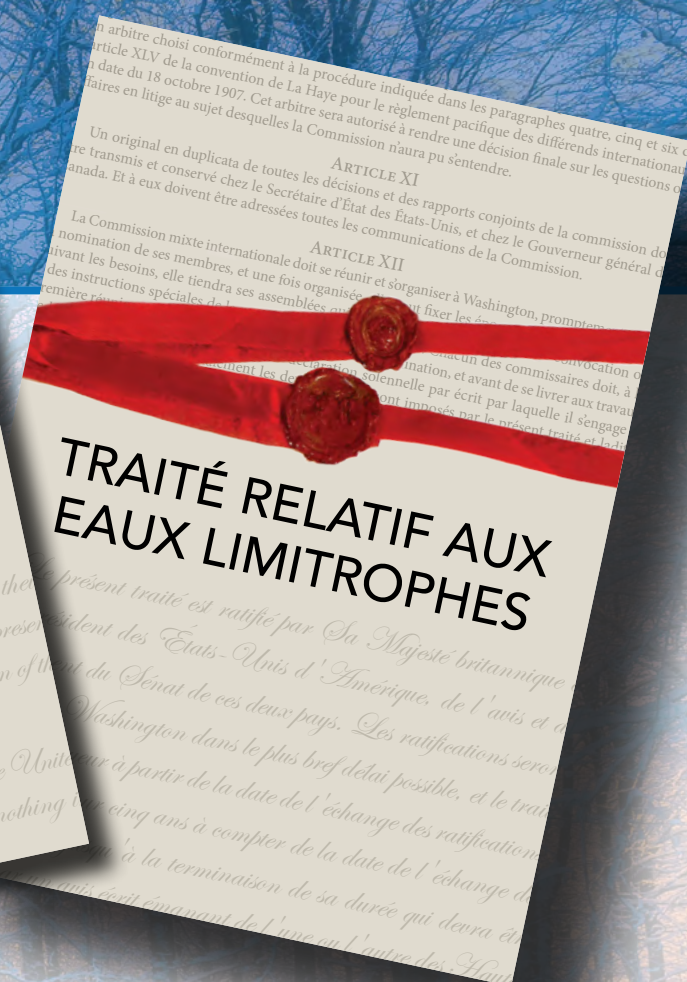
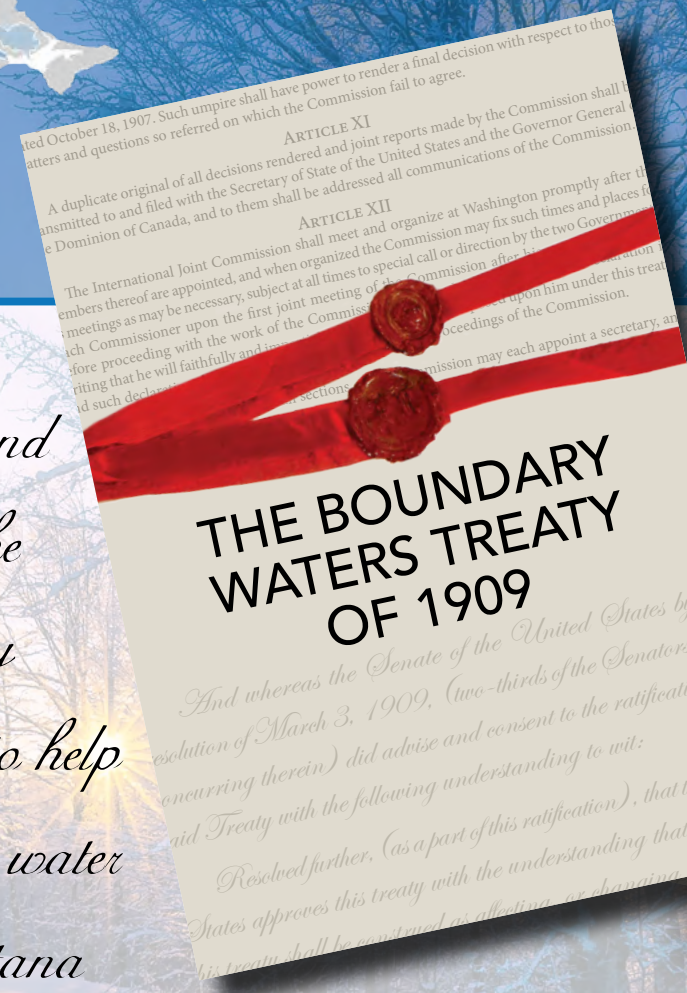
The Tri-Board Tribune is a quarterly newsletter designed by the Great Lakes Water Levels Boards of the International Joint Commission (IJC) to share information and articles related to the entire Great Lakes basin and provide regional updates presented by each Board. The Great Lakes Water Levels Boards includes the International Lake Superior Board of Control, International Niagara Board of Control, and International Lake Ontario-St. Lawrence River Board.



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The Boundary Waters Treaty was signed in 1909 to prevent and resolve disputes over the use of the waters shared by Canada and the United States and to settle other transboundary issues. The treaty established the International Joint Commission (IJC) to help the two countries carry out its provisions. At the time, disputes over water were already creating tension along the border. Settlers in Montana and Alberta were building competing canals to divert the waters of the St. Mary and Milk Rivers for their own use. On the Niagara River, it was increasingly clear that the two countries needed a management plan that could balance the growing demand for hydroelectric power with the interests of navigation, while safeguarding the unique natural beauty of Niagara Falls. The treaty provided a framework to deal with these disputes. The IJC held its first meeting in 1912 and has worked to resolve more than 100 matters raised by the two federal governments.



[Read the entire treaty.](#)

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International Lake Superior Board of Control

The current regulation plan, Plan 2012, was implemented in January 2015. The primary goal of the plan is to regulate the flow through the St. Marys River in consideration of levels and interests both upstream and downstream of the control works at Sault Ste. Marie. The plan maintains much of the natural variability in the water levels of Lake Superior and Lake Michigan-Huron, while being consistent with the capacities of the current discharge structures at Sault Ste. Marie, and with winter flow restrictions to reduce the risk of ice jams that could cause flooding in the lower St. Marys River. This winter, a higher than customary gate setting is being maintained to offset the reduced flow capacity during maintenance at Evolgen's Clergue hydropower facility in Canada. The gates of the Compensating Works at the head of the St. Marys Rapids are currently set to an equivalent of two gates fully open. A setting equivalent to one-half gate open is typically used during the winter months. A setting of two gates fully open is the maximum allowable winter gate setting under Plan 2012.



Conseil international
de contrôle du lac Supérieur

Current and Forecasted Conditions

Water levels in Lake Superior declined through January, while water levels in Lake Michigan-Huron remained relatively stable. Lake Superior is expected to continue its seasonal decline heading into the spring. The long-term average seasonal pattern for Lake Superior is to begin its seasonal rise in April. Lake Michigan-Huron appears to be near its seasonal low point. The long-term seasonal average pattern for Lake Michigan-Huron is to begin the seasonal rise in March. Lake Superior and Lake Michigan-Huron are expected to remain above long-term average water levels for the next six months. The most up to date [monthly water levels and forecast](#) data are available on the Board's website.

International Niagara Board of Control

Despite the heavy snowfall in November and below freezing air temperature that accompanied the late December blizzard, there was still no ice behind the ice boom at the head of the Niagara River throughout the month of January. Lake Erie had less than one percent ice cover and the entire Great Lakes measured less than five percent ice cover at the end of January. The most up to date information about the [ice boom](#) is available on the Board's website.



Conseil de contrôle
international du Niagara

"Freeze up" is a term that refers to the length of time, typically one to two weeks, for ice to appear under typical conditions. However, the weather in the region has been unseasonably warm this season. As experienced in recent winters, the air temperature has fluctuated frequently from below freezing to above freezing which has kept the water of Lake Erie and the Niagara River at temperatures too warm for ice to form.

There are various stages of lake ice formation:

- New lake ice: less than 5 cm (~2 inches) thick
- Thin lake ice: 5-15 cm (~2-~6 inches) thick
- Medium lake ice: 15-30 cm (~6-11.8 inches) thick
- Thick lake ice: 30-70 cm (11.8-19.7 inches) thick
- Very thick lake ice: greater than 70 cm (19.7 inches) thick

Since weather forecasts can only be accurately predicted 7-10 days in advance, it is unclear what weather conditions the region will experience the remainder of winter, and how much ice may form and to what thickness.

Current and Forecasted Conditions

Water levels in Lake Erie increased in January and are expected to continue to rise into spring. The seasonal long-term average pattern for Lake Erie is to reach a seasonal peak in July. Lake Erie water levels are expected to remain above long-term average for the next six months. Water levels and flows in the Niagara River continue to be above average.

International Lake Ontario-St. Lawrence River Board

Regulation of Lake Ontario outflows has greatly reduced the incidence of ice jams in the St. Lawrence River, both upstream and downstream of the Cornwall-Massena area. Prior to regulation, the frequent occurrence of ice jams in the river was a major cause of extreme fluctuations in water level and flooding of adjacent shoreline properties.

During the winter, the Board, in conjunction with the Operations Advisory Group, closely monitors ice formation in the St. Lawrence River. Outflows from Lake Ontario can be increased or decreased, as conditions require, for ice management purposes. For example, Lake Ontario outflows may be decreased, in accordance with the I-limit rules of Plan 2014, to reduce the flow velocity to facilitate the formation of a stable ice cover. A stable ice cover helps prevent chunks of ice from accumulating and causing ice jams and associated flooding. A stable ice cover also prevents unconsolidated ice from flowing into and clogging hydropower intakes, and potentially reduce diversion/outflow capacity. In some cases, outflows can be increased to help break up and flush unconsolidated ice chunks that have become caught at certain locations. Any flow changes consistent with the I limit that are needed to manage ice conditions are considered operational adjustments and do not require offsetting flows at a later time.

On the St. Lawrence River, the ice formation process usually begins in the downstream portion of the river, and progresses upstream past Montreal through the Beauharnois Canal, followed by formation upstream of Moses-Saunders Power Dam through the International Section of the river. The speed at which ice formation progresses depends on the weather. If a stable ice cover forms far enough upstream in the International Section, the Iroquois Dam gates may also be lowered slightly to further assist ice formation from this point further upstream toward Lake Ontario. Ice booms are also used in the Beauharnois Canal and at key locations in the upper river to assist in ice formation.

This winter, ice began to form in the Beauharnois on January 27. As of February 4, an ice cover had also formed on Lake St. Lawrence, extending from the Moses-Saunders Dam to approximately Morrisburg, Ontario.



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International Lake Ontario- St. Lawrence River Board (continued)

This [video](#) demonstrates the importance of ice management in the St. Lawrence River.

This [video](#) discusses winter operations under Plan 2014.



Conseil international
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Current and Forecasted Conditions

Water levels in Lake Ontario increased in January and are expected to rise into spring. If weather and water supply conditions are near average, Lake Ontario water levels are expected to be within 3-10 cm (1-4 inches) of long-term average. However, when the full range of potential water supply conditions are considered, water levels may range from 46 cm (18 in) above to 25 cm (10 in) below average within the next 6 months. Water levels in Lake St. Lawrence, Lake St. Louis, and Montreal Harbor were near average throughout January. The most up to date [water levels data](#), [forecast conditions](#), and [outflow changes](#) are available on the Board's website.



Great Lakes-St. Lawrence River Adaptive Management Committee

The Great Lakes-St. Lawrence River Adaptive Management (GLAM) Committee continues to work on the [second phase](#) of an expedited review of the binational regulation plan for Lake Ontario and the St. Lawrence River, known formally as Plan 2014. Regulation Plan 2014 went into effect in January 2017 and regulates outflows from Lake Ontario into the St. Lawrence River.

The review is part of the International Joint Commission (IJC) integrated [adaptive management](#) approach, which seeks to help address plausible future climate sequences due to uncertainties such as climate change. A long-term comprehensive review of Plan 2014 was scheduled when the Plan was implemented in January 2017. However, the timetable for the review was shortened after extreme high water in 2017 and 2019 caused damage and disruption throughout the lake-river system. The Expedited Review refers to this shortened review period.

- The Phase 1 report is available online at ijc.org/en/glam. The focus of Phase 1 was to provide the International Lake Ontario-St. Lawrence River Board with better information to help explore alternative deviation decisions should extremely high water as seen in 2017 and 2019 be repeated in coming years.
- Phase 2 includes looking at how Plan 2014 addresses extreme high and low water levels over the longer term. The GLAM Committee will conduct the research and analyses required by the International Lake Ontario-St. Lawrence River Board to assess plan alternatives under a range of current and potential future conditions and decide whether to recommend adjustments to the plan. Any recommended changes to Plan 2014 by the Board would need to be approved by the IJC and agreed to by the governments of Canada and the United States.
- The results from the Phase 2 effort are expected to be submitted to the IJC in the spring of 2025.

Winter in the Great Lakes



How do you define winter? By the date on the calendar, the temperature on the thermometer, or the depth of snow outside your window?

The more common definition of winter is based on the astronomical season. The astronomical season is determined by the position of Earth in relation to the sun. We often hear the terms solstice and equinox, which correlate to dates on the calendar. Using the astronomical season, winter in the Northern Hemisphere is typically around December 21 to March 20 but can shift by a day depending on the particular year. This is the period between the winter solstice and spring equinox.

Meteorologists and climatologists divide the 12-month calendar into three-month groupings to identify the four seasons. This allows scientists to analyze seasonal variations including temperature and precipitation over the same period. Meteorological winter in the Northern Hemisphere includes December, January, and February.

In the Great Lakes, some people correlate winter to snow and ice. But the amount of precipitation and ice cover each year varies greatly. Ice formation can begin as early as December and can sometimes linger into May on the upper lakes. As a result, a given ice season in the Great Lakes may include, and exceed, both the [astronomical and meteorological](#) winter. Of course, there are some people who rely on a rodent in early February to determine if winter will continue for six more weeks. However, whether the groundhog sees his shadow or not, there are always six more weeks of winter on the astronomical calendar.

But did you know, the [earliest measurable snowfall](#) in the Great Lakes was September 1942 and it has snowed in many Great Lakes communities as late as May? Regardless of how a person may define winter, the one commonality is that the amount of snow, ice, and temperature ranges we will experience in a given winter in the Great Lakes, will vary from year to year.

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Snowpack – An Unreliable Indicator of Spring Water Levels

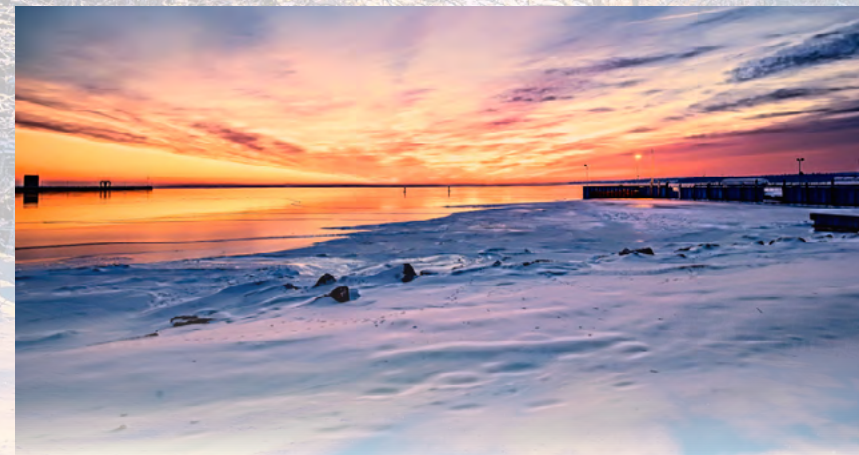
Although you may see a vast amount of snow covering the landscape in any given year, the snowpack alone is not a reliable indicator of water supplies for the spring season in the Great Lakes. Meteorologists characterize snow as [wet snow](#) and [dry snow](#). Both are defined by the amount of water in the snow. The [snow to liquid ratio](#) helps meteorologists forecast the depth of snow expected. The [snow water equivalent](#) (SWE), over a watershed is tracked because it is one indicator of the potential amount of spring runoff. The SWE is the water content of the snowpack expressed as a depth of water. That is why local authorities will perform periodic snow surveys where the density of the snow as well as its depth are recorded. While it is true that SWE alone is not a great indicator of spring runoff in the Great Lakes basin, it is a more highly correlated indicator of spring runoff on some northern river basins.

The correlation between the snowpack in the Great Lakes drainage basin and its subsequent spring and summer water level is very low. There are many other factors that need to be considered and which are difficult to estimate or predict. These include how frozen the ground is when the snow melts, how dry the soil is, how fast the snow melts and whether the snow sublimates (this is the process where the precipitation changes from snow into water vapor without first melting into liquid). Most crucial is whether it rains at the same time as the snow is melting, which can increase runoff dramatically.

In addition, [climate model predictions](#) show the Great Lakes winter air temperatures will be warmer. As a result, the Great Lakes region should expect more winter precipitation in the form of rain and freezing rain versus snow, and ice cover will likely decline. These variables further complicate the ability to accurately forecast weather conditions beyond 7 to 10 days and predict water levels from one season to another.

Boaters and Marina and Yacht Club Owners - Take the Survey!

The International Lake Ontario-St. Lawrence River Board has discretionary authority granted by the IJC to temporarily alter flows from Plan 2014 prescribed flows at the Moses-Saunders Dam on the St. Lawrence River within specific parameters. The Board temporarily reduced outflows from Lake Ontario October 7 through October 10, 2022, to increase water levels on Lake St. Lawrence. This was intended to provide marinas and shoreline dock owners on Lake St. Lawrence with assistance at the end of the season to remove recreational boats more easily.



The Board issued a [news release](#) February 3, 2023, to announce that it was collecting information specifically related to the reduced outflows from Lake Ontario (October 7-10, 2022) to support boat haul out and learn more about where people access the water to remove their boats, when and how boats are removed, and whether recreational boaters took advantage of the opportunity provided by the minor deviation. This information will help the Board in the future when considering minor deviation strategies to improve conditions within the system that would facilitate the removal of boats from the water.

Surveys are available through March 3, 2023, at the links below.

- Survey for boaters – October 2022:
<https://www.surveymonkey.com/r/oct22boat>
- Survey for marinas and yacht club owners – October 2022:
<https://www.surveymonkey.com/r/Oct22marinas>

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