

Water Levels – Ice Formation – Thaws – Looking toward Spring

Full Article - TIA Water Levels Committee (3/1/22)

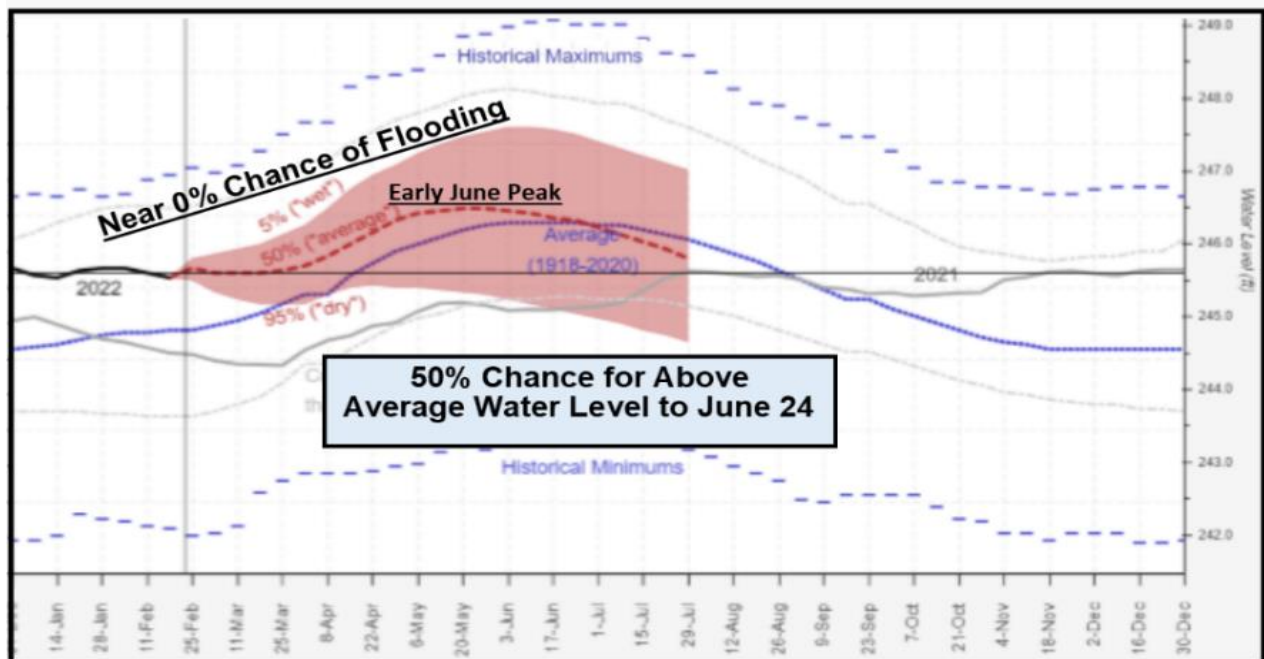
It's "**Farch**" on the River, a February-March time of wild weather, sudden scenery changes with ice and level swings. *Back and forth like a Yo-Yo we go.* Such extremes! After ice formation success in frigid late January, two mid-month thaws with 50° F days, bookended by 0° F plunges, saw open channels replace miles of ice cover.

TIA member reports on 2/19: Janet Smith-Staples said the first thaw did break up a lot of the channel ice off Clayton and even into French Creek, behind her house. Ross Stewart noted that near the Brockville narrows, the channel was wide open from the Canadian to the US side, with lots of ice chunks floating by. Shoreline ice extended out to 50 yards. Trumpeter Swans brought life to an otherwise silent River.

- The good news is that the ice booms and established sheets can handle the arrival of a fair amount of broken frazil ice which flows downstream.
- There are no reports on the Board's Facebook page of major ice sheet damage in critical areas of the River, and they are planning to further increase outflows to a substantial 8,520 m³/sec February 26 to March 5, as per regulation plan rules.
- Melt from these two thaws have purged a fair amount of water stored in snowpack from the Lake Ontario Basin, flowing into the Lake for an early release downstream.

Lake Ontario Water Level Forecast

25 February through 29 July 2022 — (issued on 17 February)



<https://ijc.org/en/loslrb/watershed/forecasts> Edits by TIA

- Amazingly, water levels have generally hovered within a 2 inch range during 2022.
- 2 feet above chart datum seems to be the holding limit for both the Lake and River.

Looking toward Spring:

- Early spring water levels appear to be acceptable as flows converge at Montreal..
- Lowering of the 6month forecast curve suggests Area Wide Flooding is unlikely.
- Snow cover is a big driver of the Ottawa River freshet. The snow pack doesn't look too bad this year - especially compared to what it looked like in 2019 and even 2020.

(See Full Article discussions on this topic next)

The Ottawa River, Snowpack, and Impacts to the 1000 Islands Region

Below is a map depicting the water basins which affect water levels in Lake Ontario and the St Lawrence River.

Did you know that the Ottawa River Basin (shown in Yellow) doesn't flow into our region? Flows from the Ottawa River during their spring freshet (or melt) arrive just upstream of Montreal and merge with Lake Ontario spring flows. **Record Ottawa River Flows in 2017 and 2019 were partially responsible for our record flooding.**



*** Great Lakes Basin Maps from the IJC <https://ijc.org/en/loslr/watershed/map>

How spring flows from the Ottawa River impact Lake Ontario

A brief explanation: *A Tale of Two Basins – and Regulation*

When the Ottawa River freshet flows into the St. Lawrence River near Montreal, it has a significant impact on water levels in the Montreal Region. At the same time, all outflows from the Great Lakes flow through the St. Lawrence River, the Moses-Saunders Dam (located at Cornwall ON / Massena NY) and continue towards Montreal.

Both river systems converge at Montreal. During the freshet, water levels naturally rise very quickly, creating possible flood conditions in the river and lakes surrounding the island of Montreal.

To minimize the impact of flooding downstream of the dam near Montreal, high-water level limits are set which in turn regulate the outflow rates for the Moses-Saunders. These limits are now referred to as the **F-limit in Plan 2014**, but the basic concept has been present in all previous regulation plans since the Seaway was established in 1958.

It is important to note that the F-limit was established to protect downstream interests. The dredging necessary during the building of the St. Lawrence Seaway increased the natural conveyance capacity (amount of water the River can pass) and actually increased the potential flooding risk (post-dredging), both above and downstream of the Moses-Saunders Hydro dam.

When outflows are reduced at the dam, Lake Ontario rises slowly. During the spring freshet, water levels downstream can rise quickly due to the high volume of water supply entering from all systems. The regulation plans have attempted to balance flooding downstream and upstream. This balancing act is quite controversial during both flood and drought conditions. It has led to many discussions, inquiries and lobbying for changes to the existing limits.

These limits are a complex aspect of water regulation between Lake Ontario and the Lower St. Lawrence River. It's too much to include in this summary article. If you wish to understand the more complex nature of these regulations, please feel to reach out to the TIA Water Levels Committee at thousandislandsassociation@gmail.com for further information, dialogue and links to various sources.

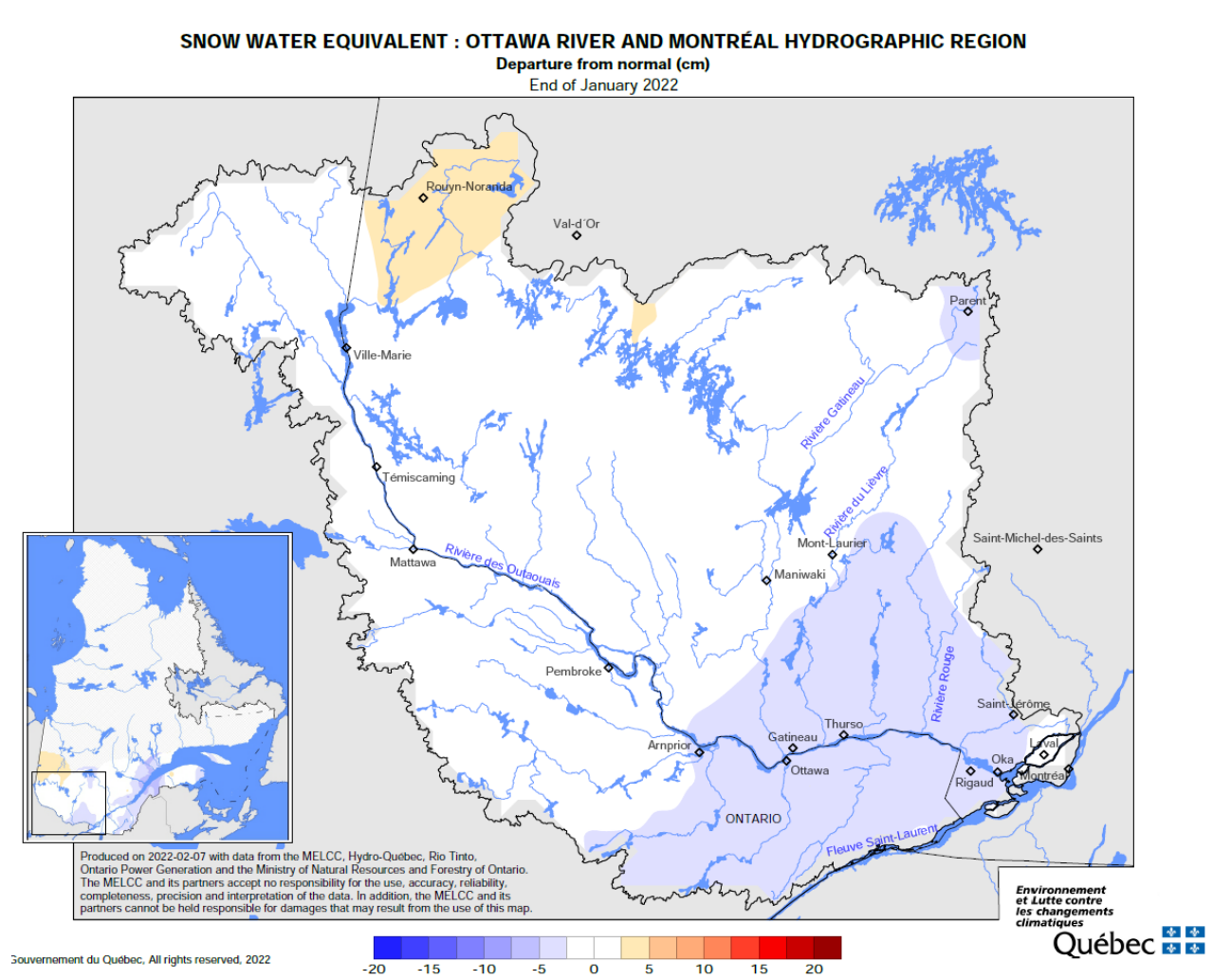
So what determines the intensity of the Ottawa River Basin's spring freshet?

- 1) Snowpack and snow water equivalent accumulated over the winter months
- 2) Timing and speed of the melt of the snowpack
- 3) Precipitation & temperatures during the freshet

In this portion of the article we are focused on the established snowpack's snow water equivalent in the Ottawa River Basin, as this can be monitored and measured.

It is important to remember that the factors above (timing, temperature and precipitation) are unknown and uncontrollable variables at any given time: It may be helpful to remember this approximation: **1 inch of rain = 10 inches of snow**

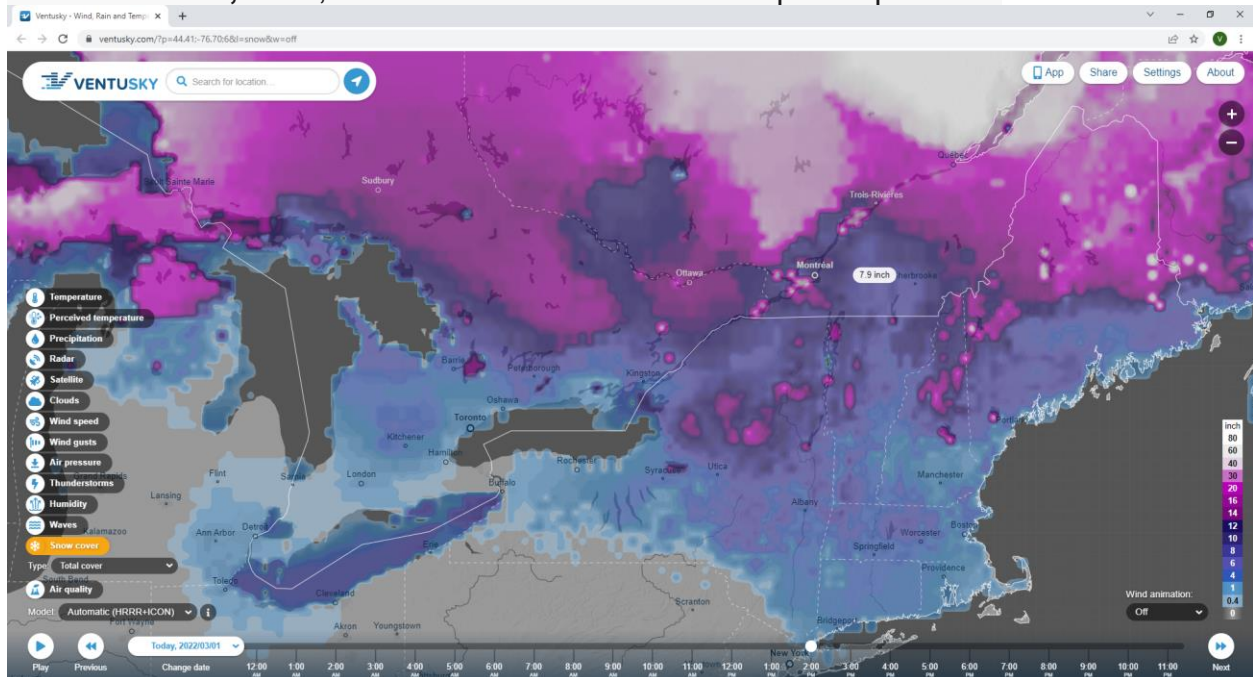
The following graphic shows the **snow water equivalent** (amount of precipitation) in the Ottawa River Basin at the end of January 2022



As you can see, the latest snow water equivalent is normal or below average for this time of year (blue/white). This is a good indicator for limited flooding this spring. In previous flooding years, the basin depicted above average (orange and red) snow water equivalent.

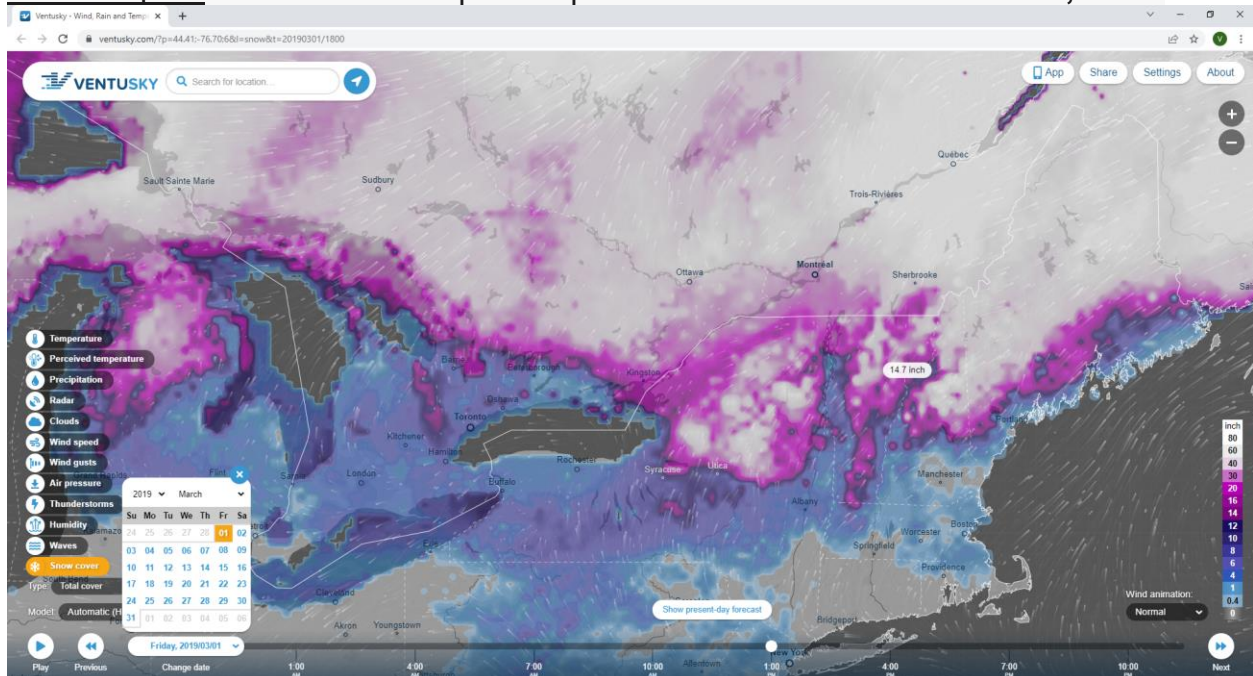
Another way to look at the snowpack is through [Ventusky](#) Weather Forecast Maps, which is a great source for all kinds of weather-related maps and views with color-coding to get a quick sense of the information they're presenting. You can also change the date near the bottom left to compare a given day in one year vs. another year. **One view they include is snow cover** – [here's a link](#) that goes directly to that map.

As of **March 1st, 2022**, here's what that snow cover depth map shows:



As you can see, much of the Ottawa River Basin shows blue and purple, indicating 30 inches or less of snow. It's only in some of the eastern edge and northeastern portion of the basin that shows some grey for 40 inches and up to 3x above.

Now compare the current snow pack depth to the view below for **March 1st, 2019**:



What an incredible difference! Nearly the whole Ottawa River Basin was grey in 2019, with just a few small patches of purple here and there. Clearly, there was a LOT more snow on the ground in 2019 than there is this year.

*If you're interested in playing with Ventusky, they have a nice [help section](#) to get you started! **Try out the Ventusky Help.** What a great place to play and learn. Turn on and off various features on the left, and see the descriptions on the right. (The maps displayed are the current ones unless you change the date.)*

Significance of History: Keep in mind that this 2019 spring freshet resulted in record Ottawa River peak and volume outflows with a duration several weeks long. This was the Ottawa River Basin's part of several factors which formed a 'perfect storm' for 2019.

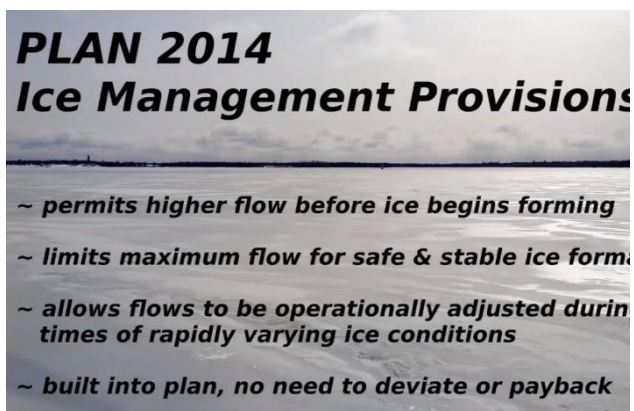
To keep the Montreal area from massive flooding, the F-Limit called for a significant reduction in Lake Ontario outflow for a number of weeks. Meanwhile, water was rapidly accumulating in Lake Ontario from both precipitation in its basin and inflows from record levels in the other Great Lakes through Lake Erie. The result was record flood levels in Lake Ontario and both the Upper and Lower St. Lawrence River. This situation was uncontrollable as the flows/levels were beyond the capacity and design capabilities of the Seaway and therefore Plan 2014, perfect or not.

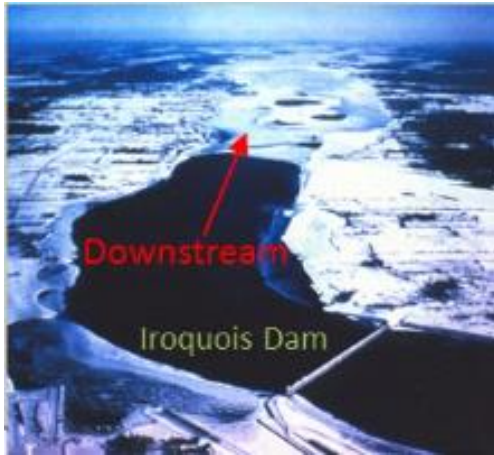
So what does this mean for 2022? There is a higher probability that this year the Ottawa River will have a limited sustained impact on the outflows of the Moses-Saunders dam, hence allowing high outflows from the Great Lakes. Therefore, with the limited impact from the Ottawa River basin, 2022 System Water Levels should be manageable!

Learning about Ice Formation

Winter Operations Under Plan 2014

- 4 min **Overview Video** from the IJC's ILOSLR Board. See lots of River ice!
- **It's worth watching.** Click [HERE](#) or on either of the following two IJC images





This special emphasis section is edited and continued from last month (Feb), and covers some amazing facts about the importance & process of ice formation in critical areas of the St. Lawrence River.

This Full Article, now referenced in the March 1, 2022 issue of TIA's **River Talk** magazine, is available at TIA's website <https://www.thousandislandsassociation.com/water-levels/> or directly from [HERE](#)

The first step is to learn how to pronounce [Beauharnois](#) Canal, as that's usually where mention of ice formation first begins, and second is to know its location...*keep reading*.

Simply say **bow-haarn-waa** (*emphasis on haarn*)

To hear it <https://www.howtopronounce.com/beauharnois> then press 

The Basic River Winter Need:

A solid ice sheet is a must, as Frazil Ice is “fragile” ice, prone to ice jams, and will not accommodate the high flowrates necessary during cold winter months into the spring.

The overall goal is a solid ice sheet in high flow zones (at manmade structures or in restrictive narrow channels), smoothed on the bottom so flows are laminar (parallel), rather than rough on the bottom, which produces swirling turbulence. **No Frazil Ice!**

Frazil Ice is a collection of loose, randomly oriented, plate or large free floating chunks & disk shaped [ice crystals](#) notorious for bunching together, blocking flows with flooding.

Frazil Ice can make the ILOSLR Boards nerves “frazzled”. (mentally exhausted). Or, worse yet, drive them “Cactus & Frazzled” (Cactus, in Australian slang, means: beaten, finished, ruined, and kaput). See https://en.wikipedia.org/wiki/Frazil_ice

Did You Know (DYK) the name of this type of Frazil Ice?

CNN 5 Things Weekly News Quiz

Bitter cold weather conditions caused mysterious ice formations to show up along Chicago's Lake Michigan shoreline. What do the ice figures resemble, which also lends them their unique name?



turtles

pancakes

tents

baguettes

DYK the correct answer? It is 'ice pancakes' – round flat discs made of ice. These were found at Roger's Park, which is about 10 miles north of downtown Chicago.

<https://www.cnn.com/interactive/2022/01/us/cnn-5-things-news-quiz-january-28-sec/>

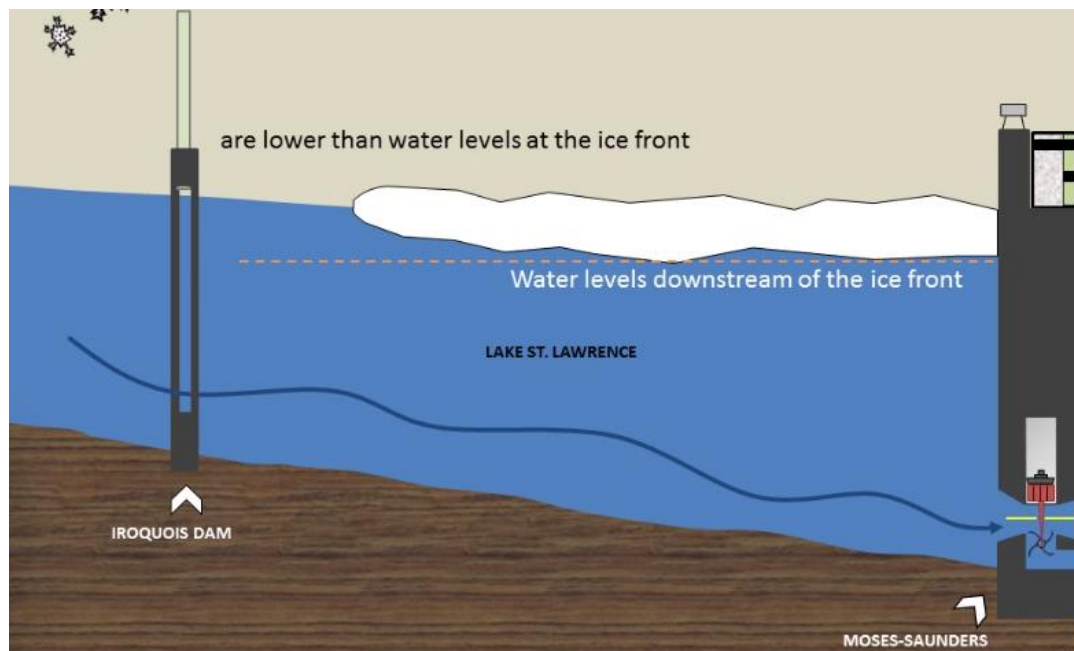
DYK that before "The Project" (construction of the Seaway), ice jams and flooding were frequent occurrences in several critical areas upstream of Montreal region?

DYK "ice jams" are often called "ice dams". They can occur on either side of winter... "Ice jam floods are less predictable and potentially more destructive than open-water flooding and can produce much deeper and faster flooding."

https://en.wikipedia.org/wiki/Ice_jam (*this is a fascinating reference*)

For a worthwhile video overview, go to the IJC's ILOSLR Board Module 5 (3 ½ minutes) at <https://ijc.org/en/loslr/library/modules>, scroll down to **Module 5 – Ice Formation**, then play the video by clicking the Vimeo play triangle. (*or keep reading for now*)

The short video explains how a stable ice sheet is built from downstream to upstream, in critical areas using the example below from the Morris-Saunders Power Dam upstream toward the Iroquois Dam, which was built to aid in this process.



Ice formation on Lake St. Lawrence and the potential for [frazil ice](#) generation can have a major effect on regulation of outflows in the St. Lawrence River.

Temporary outflow reductions are often required to ensure the formation of a safe and stable ice cover, but modern ice management practices have significantly reduced the frequency and magnitude of [ice jams](#) as localized flooding was a frequent occurrence along the river historically. <https://ijc.org/en/loslrb/lake-st-lawrence/levels>

To learn more, consult the following from the IJC's FAQs.

2.7 What actions does the ILO-SLRB take to manage ice conditions in the St. Lawrence River during the winter? <https://ijc.org/en/loslrb/watershed/faq/2>

4.8.4 What is the I Limit? <https://ijc.org/en/loslrb/watershed/faq/4>

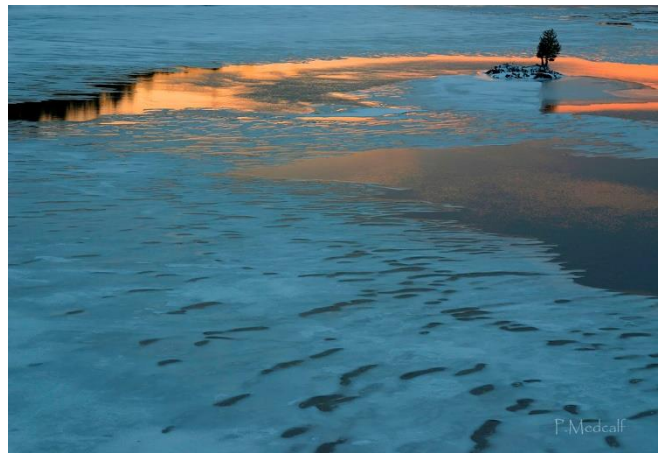
2022 Ice Formation Was Successful by the End of January.

Good News Update – The Ice Sheets Formed at critical locations by the very end of January have held and remained intact, in spite of two successive 3 day thaws mid-February.

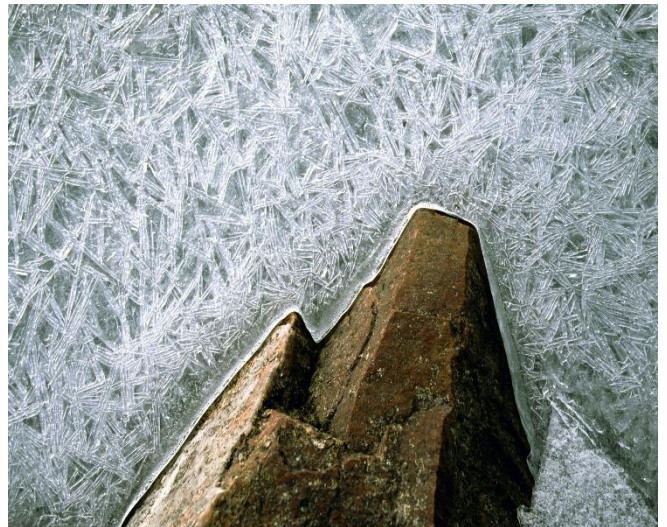
Aerial Documentation – A great series of photos from the IJC's International Lake Ontario – St. Lawrence River [Board's Facebook page](#) (January 28 & 29, 2022) Showing elegant results from their Ice Formation effort.

After the next page of Ice Photos, see 3 pages of the Board's FB aerial photos from six important ice formation sites, beginning downriver at the Beauharnois Canal and moving sequentially upstream to the Ogdensburg – Prescott Bridge

Late January Ice Photos of Interest



These Ice Photos are compliments of former TIA Board member Pete Medcalf. They depict some sheet ice, frazil ice & other artful ice formations. All are from the Rockport area and current except the one with sunset reflections from west of Hill Island's upstream tip.





International Lake Ontario - St. Lawrence River Board

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January 28 at 6:06 PM · 🌐

Ice has formed in the critical sections of the St. Lawrence River in the Beauharnois Canal and on Lake St. Lawrence. As ice conditions stabilize, outflows from Lake Ontario will be increased in accordance with the rules of the plan.



IJC.ORG

Lake Ontario Flows 4th Highest on Record in January Despite Plenty of Ice | International Joint Commission



International Lake Ontario - St. Lawrence River Board

...

19h · 🌐

Ice conditions at Moses-Saunders Dam. January 29, 2022. Photo credit: International Joint Commission.





International Lake Ontario - St. Lawrence River Board

19h · 🌐



Ice conditions at Iroquois Dam. January 29, 2022. Photo credit: International Joint Commission.



International Lake Ontario - St. Lawrence River Board

19h · 🌐



Ice conditions at Long Sault Dam. January 29, 2022. Photo credit: International Joint Commission.





International Lake Ontario - St. Lawrence River Board

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Ice conditions at the Prescott ice boom. January 29, 2022. Photo credit: International Joint Commission.



International Lake Ontario - St. Lawrence River Board

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Ice conditions at the Ogdensburg-Prescott Bridge. January 29, 2022. Photo credit: International Joint Commission.

