



Semi-Annual Progress Report to the International Joint Commission Covering the period March 1 to August 31, 2022



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The Soo Locks, Sault Ste. Marie, Michigan (photo by Richard MacDonald of the US Army Corps of Engineers)

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International Lake Superior Board of Control

Canada
Mr. Jean-François Cantin, Member

United States
BG Kimberly Peeples, Member

International Joint Commission
Ottawa, Ontario
Washington, D.C.

September 29, 2022

Commissioners:

This semi-annual report covers the Board's activities from March 1 to August 31, 2022.

1. Highlights

Wetter than average weather and water supply conditions in the early part of the reporting period caused a much larger than average seasonal rise of Lake Superior, while Lake Michigan-Huron saw just a slightly higher than average seasonal rise. In May, Lake Superior's water level went back above its seasonal long-term average after remaining below the average since August 2021. Lake Michigan-Huron's water level ended the reporting period midway between its seasonal long-term average and its record high values.

Lake Superior outflows were set in accordance with Regulation Plan 2012 throughout the reporting period. The gate setting of the Compensating Works was set to the equivalent of one-half gate fully open in March and April. Higher gate settings were required for the rest of the months because of maintenance activities at the hydropower plants: May (equivalent of one gate fully open), June (equivalent of four gates fully open), July (equivalent of five gates fully open), and August (equivalent of six gates fully open).

The Board continued its ongoing public communications and outreach efforts including co-hosting joint public webinar sessions in English and French on August 30 and 31, respectively. The Board continued to update content on its website and Facebook page, which continue to grow in popularity.

2. Monitoring of Hydrologic Conditions

The Board continuously monitors the water levels of Lakes Superior and Michigan-Huron, as well as the water levels and flows in the St. Marys River. The regulation representatives' monthly reports to the Board provide hydrologic assessments and recommendations for the regulation of outflows from Lake Superior. These reports indicate the amount of water available for hydropower purposes, after the requirements for domestic use, navigation and the fishery (St. Marys Rapids) are met.

Tables 1 and 2 list the recent monthly water levels, net basin supplies and outflows for lakes Superior and Michigan-Huron, respectively. Figures 1 and 2 compare the monthly water levels for this period to long-term averages and extremes for each lake. Figures 3 and 4 show the monthly net basin supplies for each basin.

The net basin water supplies to Lake Superior, which are the net amount of precipitation, evaporation and runoff to the lake, were above average (1900-2008) from March to May and near average from June to August. The March to May (spring) average net basin supply was the third highest on record. Overall, the March through August net basin supplies to Lake Superior would be expected to be exceeded 10 percent of the time.

Lake Superior's monthly mean levels started the reporting period at 8 cm (3.1 in.) below the seasonal long-term average (1918-2021) but ended the period at 11 cm above long-term average. This was a result of wetter than average conditions from March to May. The wet spring conditions resulted in an above-average seasonal spring rise including the 13th largest March rise on record, 10th largest April rise on record, and 3rd largest May rise on record. Monthly mean Lake Superior levels ranged from 26 cm (10.2 in.) below to 11 cm (4.3 in.) above the values from 2021. Lake Superior's water levels remained above chart datum (183.2 m or 601.1 ft.) throughout the reporting period, with the exception of March when the average monthly mean level was 6 cm (2.4 in.) below chart datum. On August 31, the lake was at an elevation of 183.65 m (602.5 ft.), which is 10 cm (3.9 in.) below the seasonal long-term average, and 11 cm (4.3 in.) higher than at the same time last year.

The monthly outflows from Lake Superior were between 96 percent and 112 percent of average (1900-2008) over the past six months, and ranged from 2,020 to 2,360 cubic metres per second (m³/s) (71,340 to 83,340 cubic feet per second (cfs)).

Net basin water supplies to Lake Michigan-Huron were above average in March, April and May, below average in June and July, and near average in August. Overall, the March through August net basin supplies to Lake Michigan-Huron would be expected to be exceeded 33 percent of the time.

Lake Michigan-Huron levels experienced close to their seasonal rise and decline throughout the reporting period. Monthly mean Lake Michigan-Huron levels ranged from 21 cm to 26 cm (8.3 in. to 10.2 in.) above its seasonal long-term average values and from 12 cm to 42 cm (4.7 in. to 16.5 in.) below the values from 2021. Water levels remained consistently above chart datum (176.00 m or 577.4 ft.) throughout the reporting period, and on August 31, Lake Michigan-Huron was at an elevation of 176.76 m (579.9 ft.), 21 cm (8.3 in.) above the seasonal long-term average and 24 cm (9.4 in.) lower than at the same time last year.

The monthly outflows from Lake Michigan-Huron were between 111 percent and 137 percent of average over the past six months, and ranged from 6,070 m³/s to 6,650 m³/s (214,360 cfs to 234,840 cfs).

3. Regulation of Lake Superior Outflows

3.1. Outflows

Lake Superior outflows were set in accordance with Regulation Plan 2012 throughout the reporting period. The plan attempts to bring the lake levels on Lakes Superior and Michigan-Huron into balance with respect to their position relative to their overall historical range by adjusting the monthly outflow up or down from the preproject relationship, depending on the observed lake levels at the start of each month. From March through May, Lake Michigan-Huron's water levels were relatively higher than Lake Superior's water levels and therefore monthly outflows were decreased by an average 300 m³/s from the preproject relationship. This is equivalent to 0.96 cm added to Lake Superior and 0.67 cm removed from Lake Michigan-Huron per month. In June through August, following wet weather and water supplies and a significant rise in the water level of Lake Superior, the monthly outflows were decreased by a smaller amount (50 m³/s on average).

Several scheduled and unscheduled flow reductions continued to occur at the hydropower plants over the past six months (details are provided in *Section 6* of this report). Operational limitations on hydropower flow capacity owing to scheduled maintenance activities in May through August were addressed by adjusting the gate setting at the Compensating Works.

There were very small unintentional deviations from plan-prescribed outflows (i.e. +30 m³/s in May due to underestimated maximum hydropower flow capacities -30 m³/s in July owing to a forced outage at the US Government hydropower plant, +20 m³/s for August due to underestimated maximum hydropower flow capacities), but overall, actual outflows were very close to those prescribed by Plan 2012 during the reporting period.

On June 9, 2022, an oil spill occurred early in the morning within the Algoma Steel plant consisting of "Morgoil" which is used for lubrication of heavy machinery. Most of the oil spilled onto the ground but some oil passed through the Algoma treatment facilities and discharged into the St. Marys river downstream of the Clergue Generating Station. Two small booms were discharged close to the discharge point and a larger boom was deployed further downstream.

The Board took action by reducing US Gates #9-12 to half gate equivalent at 11:30 am at the request of the US Coast Guard, they were reopened at 4:30 pm. On the Canadian side Gates #7-8 were closed 12:30 pm and only reopened at 11:00 am on the morning of June 10. Flow at the Clergue Generating Station was reduced to a minimum through two of the operating units. The net result was an emergency deviations of -10 m³/s in June.

As a follow up to this incident, it was decided that it is necessary to maintain an operational and emergency contact list to all agencies. This will aid in more rapid communication during emergencies so regulation representatives on both side of the border receive the same information and level of communications. It is also recommended that the operation

entities should review and update their contact lists and as well an operationally ready hydrodynamic model would be helpful in such a situation.

3.2. Compensating Works Gate Settings and St. Marys Rapids Conditions

Flow through the Compensating Works continued to be managed by employing multiple, partially open gates in lieu of fully open gates. A complete summary of gate setting changes is provided in Table 3. Throughout the reporting period, Gate #1, which supplies a flow of about 15 m³/s (530 cfs) to the channel north of the Fishery Remedial Dike, remained at its typical setting of 20 cm (8 in.) open. Gate #16 was set to 5 cm (2 in.) open from June 6 through August 5 at the request of US Fish and Wildlife Service to provide a small, concentrated increase in flow to facilitate the sea lamprey trapping program conducted annually.

The setting equivalent to one-half gate open (i.e. Gates #7 through #10 open 20 cm [8 in.]) was maintained in March and April. In order to offset hydropower flow limitations described in *Section 6.2* and to meet the Plan 2012-prescribed flow in May, the gates were raised to a setting equivalent to one gate fully open. The gates were further raised to a setting equivalent to approximately five gates fully open in June to meet the Plan-2012 prescribed flow for the month. In response to the Algoma Steel oil spill on June 9, the gates were temporarily reduced to a setting equivalent to one-half gate open (Gates #9 through 12 open 20 cm [8 in.] each). In order to offset continued hydropower flow limitations and to meet the Plan 2012-prescribed flow in July, the gates were raised to a setting equivalent to approximately five gates fully open. The Canadian gates were raised as scheduled on July 6 but the gates on the US side of the structure were not raised until July 12 because of scheduling, personnel and communication changes. The gates were further raised to a setting equivalent to approximately six gates fully open to achieve the Plan 2012-prescribed flow in August.

4. Governing Conditions during the Reporting Period

The monthly mean levels of Lake Superior ranged between 183.16 m and 183.65 m (600.9 ft. and 602.5 ft.) during the reporting period, within the limits of 182.76 m and 183.86 m (599.6 ft. and 603.2 ft.) specified in the Commission's Order (Criterion "a").

During the reporting period, the daily mean water levels in the lower St. Marys River at the U.S. Slip gauge downstream of the US Locks varied between 176.62 m and 177.15 m (579.5 ft. and 581.2 ft.). Therefore, Criterion "b" of the Commission's 2014 Orders, which restricts outflow to no more than preproject values when the level at U.S. Slip is above 177.94 m (583.8 ft.), was not a concern. Furthermore, daily mean U.S. Slip levels stayed well above the ponding restriction threshold (see *Section 10*) of 176.09 m (577.7 ft.) for the reporting period and no impacts to navigation were reported.

5. Inspection and Repairs at the Compensating Works

Routine monthly maintenance inspections continue to be conducted on the Canadian portion of the Compensating Works by Evolugen. Monthly inspection observations included public safety features such as fencing and signs, the concrete and masonry structure, gates, and mechanisms, on-site safety equipment such as life jackets and air horns, as well as the noting of anything unusual.

In addition to the monthly inspections, an annual dam safety inspection was conducted by an independent consulting engineer. There were no new issues observed during the annual dam safety inspection.

During gate operations on July 29, 2020, it was determined that Gate 5 is not operable and will not open. An underwater inspection of Gate #5 was completed on June 17, 2021. Gate #5 was found to be out of level causing the gate to be jammed in the sluiceway. Remedial work to free Gate #5 was attempted in June and August 2022. Due to concerns of damaging the existing hoisting equipment, the work to free Gate #5 was deferred until additional hoisting equipment can be designed to raise the gate. As a result, Gate #5 is still considered not operable at this time. Other than Gate #5, no other significant findings were observed during the monthly and annual inspections.

The monthly maintenance inspections also continued as normal on the US portion of the Compensating Works by the US Army Corps of Engineers. The structure and mechanisms were found to be in good working order.

6. General Conditions, Repairs and Maintenance at the Hydropower Facilities

6.1. General Conditions at the Hydropower Facilities

All three hydropower plants experience variations in flow capacity because of changing hydrologic conditions at any given time of the year, which can affect the plants' abilities to use their full allocations. Allocations were set at "maximum capacity" for each plant in June, July and August, while the plants were directed to flow less than their maximum capacities in March, April and May.

In addition to hydrologic constraints, maintenance activities at the plants can also lead to reduced capacity. Scheduled and unscheduled outages that occurred at the plants during the reporting period are described below.

6.2. Evolugen

Planned maintenance activities totalled 237 unit-hours for the reporting period which is equivalent to 5% of the reporting period with at least one unit shut down. From August 8 through 11, a no-flow condition was established in order to facilitate ice boom removal and replacement.

Unplanned outages totalled 3,607 unit-hours for the reporting period which is equivalent to 82% of the reporting period with at least one unit shut down. The majority of the downtime

was due to an ongoing outage affecting Clergue Generating Station Unit 1. On April 4, Unit 1 was shut down to accommodate switching and isolation required for Hydro One to perform maintenance activities. Following the planned shut down, bent wicket gate linkages and damage to the operating ring and outer gate barrel bearing surfaces was discovered. Refurbishment of the unit is underway and the tentative return to service date is May 31, 2023.

Implementation and testing of programmable logic controlled generator ramping functions is ongoing and will be in service for Unit 3 by end of 2022. Implementation and final testing for Unit 1 and Unit 2 will be completed in 2023. The automated ramping will be utilized for planned generator start up and shut down.

Due to mechanical limitations on all three units at the Clergue Generating Station, peaking operations remain suspended indefinitely. The station will be operated at a relatively constant load and flow output until major unit overhauls can be completed.

6.3. US Government Hydropower Plant

During the reporting period, there were 39 unit outages totaling 2,370 hours with 39 hours (2% of the reporting period) for scheduled maintenance, 1,090 hours (46% of the reporting period) due to unscheduled maintenance, 1,220 hours (51% of the reporting period) for contract support, and 21 hours (< 1% of the reporting period) due to anchor ice.

The scheduled maintenance outages were for inspections and preventive maintenance. The main unscheduled outage was due to an electrical fault of the tie line between the Unit 10 powerhouse and the main hydropower plant. The outages for contract support were related to the replacement of the switchgear in the main hydro plant. This project completes a portion of efforts to replace and modernize original 70-year-old protective breakers and associated equipment within the plant. There were two events of anchor ice for a total of three outages.

6.4. Cloverland Electric Cooperative

Cloverland Electric Co-operative (CEC) ran at full allotted capacity for the reporting period. The flow was approximately 684 m³/s (24,160 cfs) for the March through August time period. From June through August, CEC was able to pass its maximum flow capacity, averaging 783 m³/s (27,650 cfs) during that time.

7. Flow Verification Measurements

Flow verification measurements of the US hydropower plants (US Government Plan and Cloverland Electric Cooperative) were completed in May 2022. Measurements at the Canadian hydropower plant (Evolugen) were deferred to 2023 due to ongoing maintenance through 2022 that would not allow for the full flow capacity of the plant to be measured.

8. Water Usage in the St. Marys River

Table 4 (and Table 5 in cubic feet per second) lists the distribution of outflows from Lake Superior for January 2021 to August 2022. Water uses are divided into four categories: domestic, navigation, fishery and hydropower. According to the 1979 Supplementary Order, after the first three water requirements are satisfied, the remaining outflow is shared equally between the United States and Canada for hydropower purposes. Any remainder, beyond the flow capacity of the hydropower plants, is discharged through the Compensating Works into the St. Marys Rapids.

As shown in the tables, water used for domestic and industrial purposes averaged 3 m³/s (110 cfs) over the past six months, or 0.1 to 0.2 percent of the total monthly outflow. The monthly flow through the locks depends on traffic volume and varied from 3 to 12 m³/s (117 to 438 cfs) during the past six months. As a percentage of the total river flow, water allocated for navigation varied from 0.2 to 0.5 percent in the busiest part of the navigation season. The US locks opened on March 25 and the Canadian lock opened on May 15.

In accordance with the Commission's Orders to fulfill the fishery needs in the main rapids, a minimum gate setting of one-half gate open is required at all times at the Compensating Works. A setting equivalent to one-half gate open for the main rapids is maintained by having four gates partially open to supply the same quantity of water. This spreads the flow more evenly across the main rapids, and reduces potential damage from ice floes impacting the gates. In addition, a flow of at least 15 m³/s (530 cfs) is normally also maintained in the Fishery Remedial Works through Gate #1. The flow in the St. Marys Rapids, including that through the Fishery Remedial Works, ranged from 84 to 907 m³/s (2,970 to 32,030 cfs) over the last six months, or approximately 5 to 34 percent of the total monthly outflows.

The hydropower plants passed an average of 1,690 m³/s (59,680 cfs) from March to August for electric power production, or approximately 82 percent of the total river flow. The plants were directed to run at their maximum capacities in June, July and August. The plants were directed to flow less than their maximum capacities in March, April and May and the combined hydropower allocation for this period averaged 1,570 m³/s (55,440 cfs).

9. Long Lac, Ogoki and Chicago Diversions

Ontario Power Generation (OPG) continued to provide the Board with information on the operations of the Long Lac and Ogoki Diversions. The Ogoki Diversion into Lake Nipigon (which flows into Lake Superior) averaged 191 m³/s (6,750 cfs) and the Long Lac Diversion averaged 41 m³/s (1,450 cfs) from March through August. Combined, these diversions were about 130 percent of average for the period 1944-2020.

Slots cut into Waboose Dam provide a minimum flow northward to the Ogoki River of approximately 2 m³/s (to meet fisheries requirements). This "slot flow" averaged 45 m³/s (1,590 cfs) from March through August.

Continuous minimum flows of at least 2 m³/s (70 cfs) are maintained from the Saturday of

Victoria Day weekend (in May) through Labour Day from the northern outlet of Long Lake (Kenogami Dam) for environmental enhancement. Outflows through the Kenogami Dam during the reporting period averaged 18 m³/s (640 cfs).

The Chicago Diversion is comprised of actual withdrawals of water from Lake Michigan, plus the diversion of runoff that once drained to Lake Michigan naturally to the Illinois River. The Chicago District, U.S. Army Corps of Engineers, continues to monitor the measurements and the computation of the diversion of Lake Michigan water by the State of Illinois through the Chicago Diversion. A report is traditionally published annually. These reports typically contain a diversion accounting report for one or more of the previous years, depending on when the diversion accounting data was ready to be reported. A technical committee report is also published every fifth year. Since final numbers are often unavailable for several years, a constant preliminary estimate of 91 m³/s (3,180 cfs) is employed. This equates to the maximum amount of diversion permitted on a yearly basis. Actual monthly values tend to be lower than this maximum annual diversion, but can occasionally be higher. Final monthly diversion estimates are currently coordinated through September 2017.

From March through August, water diverted into the system at Lake Superior (Ogoki Diversion + Long Lac Diversion) averaged 231 m³/s (8,160 cfs). Water diverted from the system at Lake Michigan (Chicago Diversion) was estimated to be 91 m³/s (3,210 cfs). Therefore, the net inflow into the system was approximately 140 m³/s (4,940 cfs).

The combined effects of the Long Lac, Ogoki and Chicago diversions and the Welland Canal have been to permanently raise Lake Superior by an average of 2.1 cm (0.8 in.) and lower Lakes Michigan-Huron by 0.6 cm (0.2 in.), according to the IJC's 1985 Great Lakes Diversions and Consumptive Uses report (<https://www.ijc.org/en/great-lakes-diversions-and-consumptive-uses-report-governments-us-and-canada-under-1977-reference>).

10. Peaking and Ponding Operations at Hydropower Plants

Peaking and ponding operations are the within-day and day-to-day flow variations, respectively, that enable the hydropower plants to better match their electricity production with demand. However, these variations cause the water levels in the St. Marys River downstream of the plants to fluctuate more than they otherwise would. The Commission has approved guidelines within which the Board may restrict peaking and ponding operations under certain conditions (<https://ijc.org/en/labc/who/directives/peaking>). Specifically, if the minimum level at the U.S. Slip gauge on the lower river is expected to be below the threshold level of 176.09 m (577.7 ft.) as a result of ponding operations, then the power entities are required to pass on-peak flows for at least an eight-hour period each day of weekends and holidays. Figure 5 compares the hourly Lake Superior outflow and the hourly levels at U.S. Slip on the lower St. Marys River for the past six months. The Board provides summaries of peaking and ponding in its semi-annual reports. The Board also provides written reviews every five years that are to include any recommendation for adjusting the IJC Directive, if necessary.

Continued above-average Lake Michigan-Huron levels resulted in levels at U.S. Slip remaining well above the established threshold, such that ponding was permitted throughout the report period. Cloverland Electric Cooperative conducted peaking and ponding operations under the supervision of the Board during March, April and May. Evolgen and US Government Hydropower did not peak or pond during this timeframe. In June, July and August, the power entities were unable to conduct peaking and ponding because the plants were operating at maximum capacity. No navigation concerns related to peaking and ponding were called to the Board's attention.

U.S. Army Corps of Engineers (USACE) continued to distribute a schedule of expected flow variations to the commercial shipping community on a monthly basis. No related concerns were reported to the Board during the period.

11. Great Lakes – St. Lawrence River Adaptive Management Committee

Over the last six months, the Great Lakes – St. Lawrence River Adaptive Management (GLAM) Committee focused primarily on executing tasks to support the International Lake Ontario-St. Lawrence River Board and the Expedited Review of Regulation Plan 2014, the outflow management strategy used by the board to set the outflows from Lake Ontario into the St. Lawrence River. The GLAM Committee also has roughly \$700,000 in funding for tasks in support of the International Lake Superior Board of Control.

11.1. 2022 Work Plan Tasks

GLAM Committee staff and the regulation representative offices continue routine Plan 2012 evaluations on an annual basis. These routine annual analyses compare simulated water levels and flows under Plan 2012 and Plan 1977-A. These analyses provide the Board with a general understanding of the differences between the two plans that may be expected to occur over time.

Plans are evolving to execute an agreement with National Oceanic and Atmospheric Administration (NOAA) and its Cooperative Institute for Great Lakes Research (CIGLR) consortium to collect more field data in the St. Marys rapids and downstream to supplement data that was collected in December 2019. This substrate data and lab analysis will be used to better understand the impacts to fish species and other habitat during gate movements at the Compensating Works. This information will be used to supplement an Integrated Environmental Response Model (IERM2D) which predicts areas where various fish species are likely to spawn, and their fry are able to survive. Furthermore, this information will help develop a Performance Indicator (PI) for use in assessing impacts in the St. Marys Rapids for comparing potential alternative outflow management rules.

U.S. Army Corps of Engineers (USACE) staff continue to monitor the St. Clair River for changes in its conveyance. This is important to the Board since large enough changes in conveyance of the St. Clair and Detroit Rivers could cause a minor changes in Michigan-Huron water levels over time and may impact regulation plan performance. Bathymetric

data was collected in the St. Clair River again in 2021. This is a key dataset to capture as the previous two years saw record high flows through the St. Clair River, along with a substantial ice jam early in 2021. The data are still being analyzed.

Potential future water supply conditions in the Great Lakes basin and will be critical as the GLAM Committee considers the water supply sequences that should be used to assess potential alternative outflow management rules during the Phase 2 effort. The hydroclimate team of the GLAM Committee is moving forward on seeking potential partners to undertake some of the required work using available funding.

Initial discussions for public engagement kicked off during the reporting period. The GLAM Committee is working with the Board and IJC advisors to develop the path forward for a phased/tiered approach and a draft potential membership list. A separate Indigenous engagement effort was initiated during the reporting period to connect with the Batchewana First Nation. This activity is only just beginning and will continue in the next reporting period, pending interest from the First Nation. Preliminary internal discussions have been initiated on the U.S. side to plan for potential engagement with the federally recognized tribes and that will be executed concurrently with the Canadian effort as directed by the contractor.

12. Public Communications and Outreach

The Board co-hosted public webinars in English and French on August 30 and 31, respectively, along with the International Lake Ontario-St. Lawrence River Board, the International Niagara Board of Control, the GLAM Committee and the IJC. Nearly 70 people attended the English webinar and 6 attended the French webinar. Board co-chairs presented an overview of the current and forecast conditions throughout the Great Lakes – St. Lawrence River system. The GLAM Committee presented the current work being pursued on behalf of the Board (see *Section 11*) as well as an update on the ongoing review of Regulation Plan 2014. Each webinar included a question-and-answer session that allowed attendees to inquire about topics of interest and seek additional information from members of the boards and committee. The Board was pleased with the success of this event and looks forward to similar collaborations in the future.

As of the end of September, the number of followers on the Facebook page has over 950 followers, this represents an 8.5% increase from the last reporting period. Meltwater is the platform used to distribute monthly press releases and other communications to a list of media, elected officials, and other interested parties in both countries. The Canadian contact list currently includes 66 contacts and there is an open rate of 62%. The American contact list currently includes 105 contacts and there is an open rate of 35.5%.

Soo Locks Engineers Day is hosted annual by the city of Sault Ste. Marie, Michigan, along with the Sault Area Convention and Visitors Bureau and US Army Corps of Engineers. This year's event was held on June 30 and about 100 people visited the Board's exhibit.

Throughout the reporting period, stakeholders voiced concerns and asked questions about water level and flow conditions and how the current regulation plan balances levels. Some remain concerned about potential impacts due to climate change and variability.

The Board continues to issue news releases informing the public about outflow changes and water level conditions. These news releases are issued at the beginning of each month and before any significant change in outflows or gate movements at the Compensating Works. The news releases are sent to an e-mail distribution list via Meltwater that includes various agencies and media outlets. The news releases are also available to the public online through the Board's website (<https://ijc.org/en/labc>) and Facebook page (<https://www.facebook.com/InternationalLakeSuperiorBoardOfControl>). Additional content available online includes information about the Board's responsibilities, semi-annual reports (<https://ijc.org/en/labc/library/publications>), meeting minutes (<https://ijc.org/en/labc/library/minutes>) and an interactive map describing some of the important features related to the regulation of outflows through the St. Marys River (<https://ijc.org/en/labc/watershed/story-map>).

13. Board Membership and Meetings

Brigadier General Kimberly A. Peeples assumed command of the Great Lakes and Ohio River Division (LRD), U.S. Army Corps of Engineers (USACE) was appointed US Chair of the International Lake Superior Board of Control in June 2022. There were no other changes to the composition of the Board.

The Board held its spring semi-annual meeting virtually on March 16, 2022.

Figure 1 - LAKE SUPERIOR MONTHLY WATER LEVELS

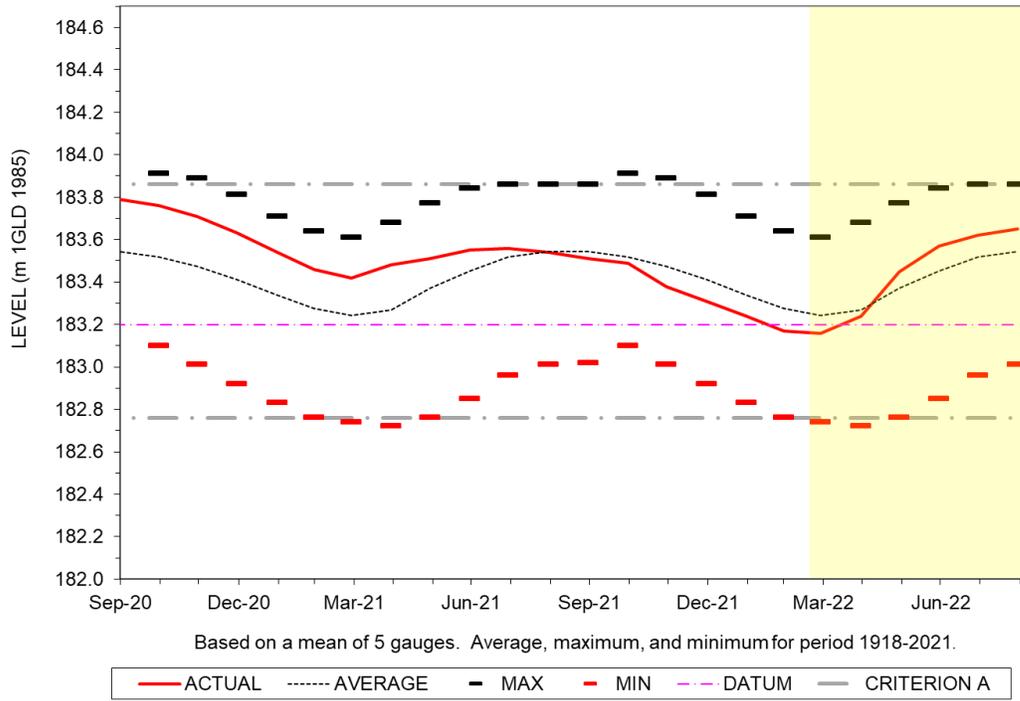


Figure 2 - LAKE MICHIGAN-HURON MONTHLY WATER LEVELS

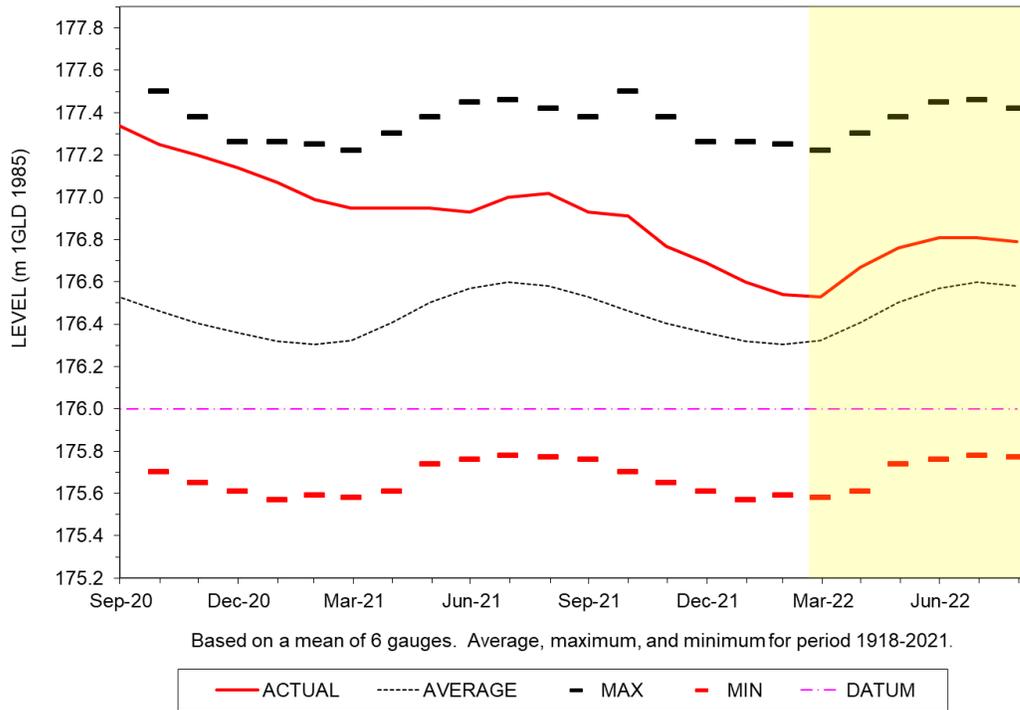


Figure 3 - LAKE SUPERIOR MONTHLY NET BASIN SUPPLIES

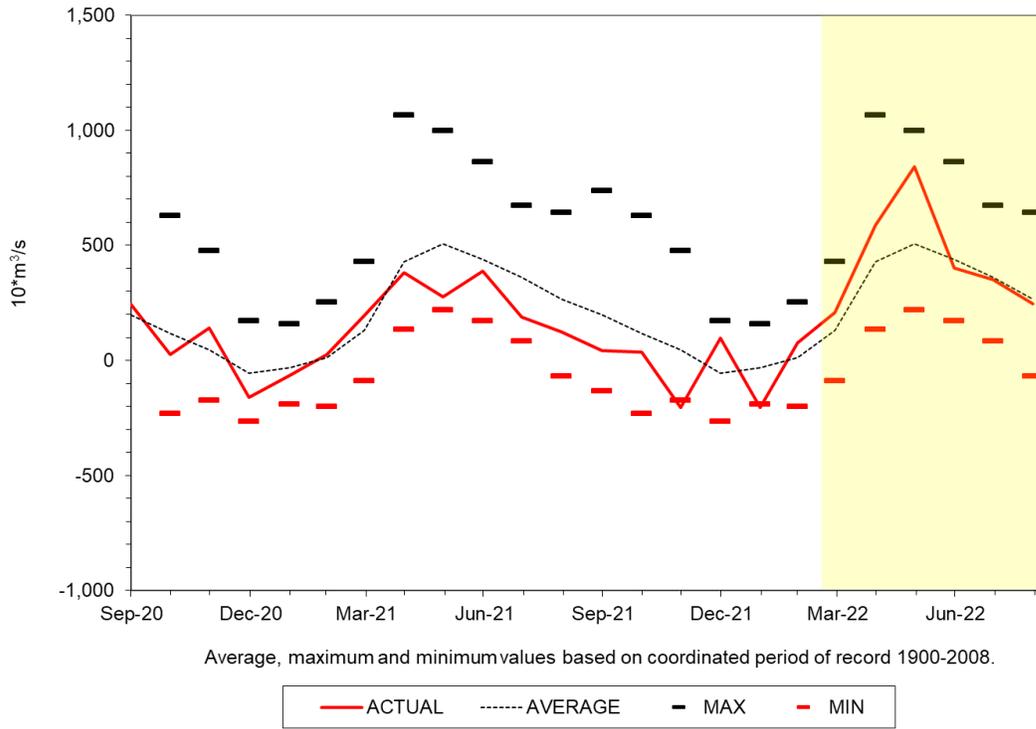
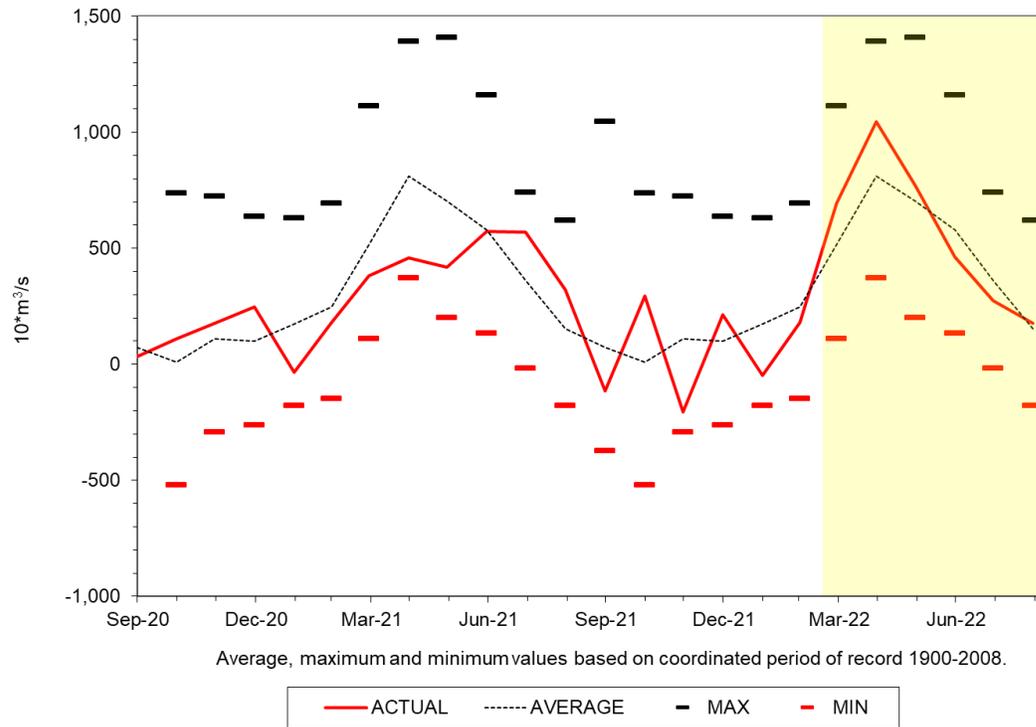
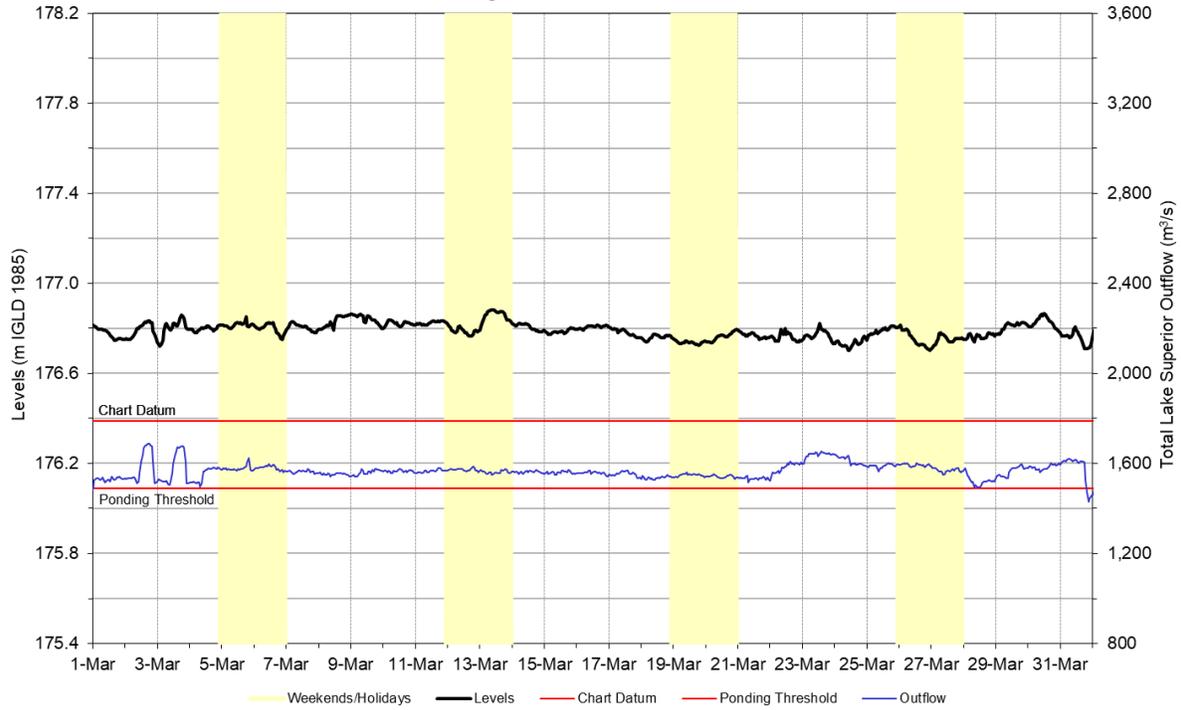


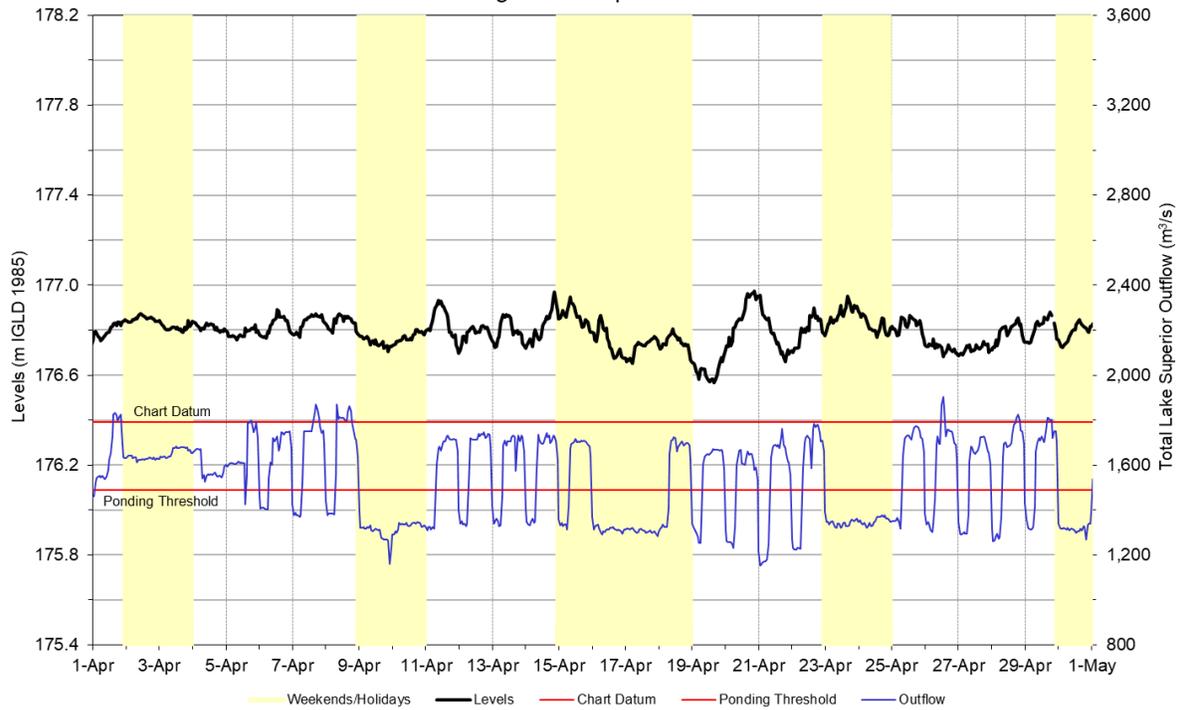
Figure 4 - LAKE MICHIGAN-HURON MONTHLY NET BASIN SUPPLIES



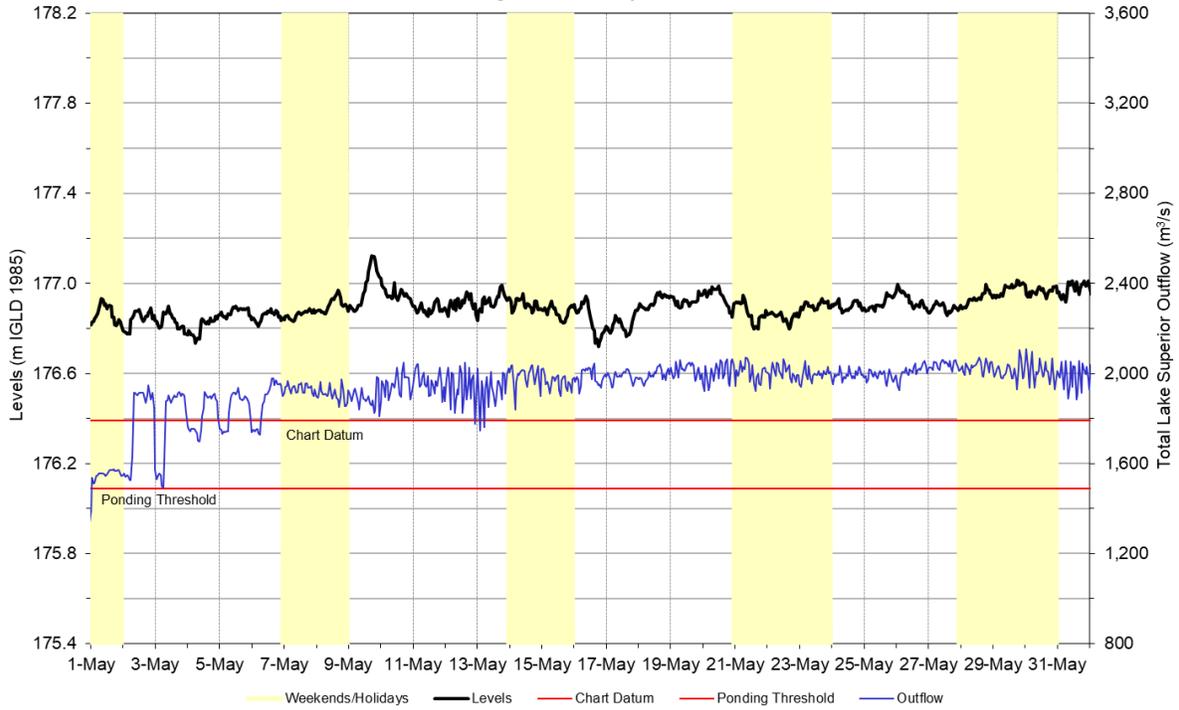
Hourly U.S. Slip Levels & Lake Superior Outflows
Figure 5a - March 2022



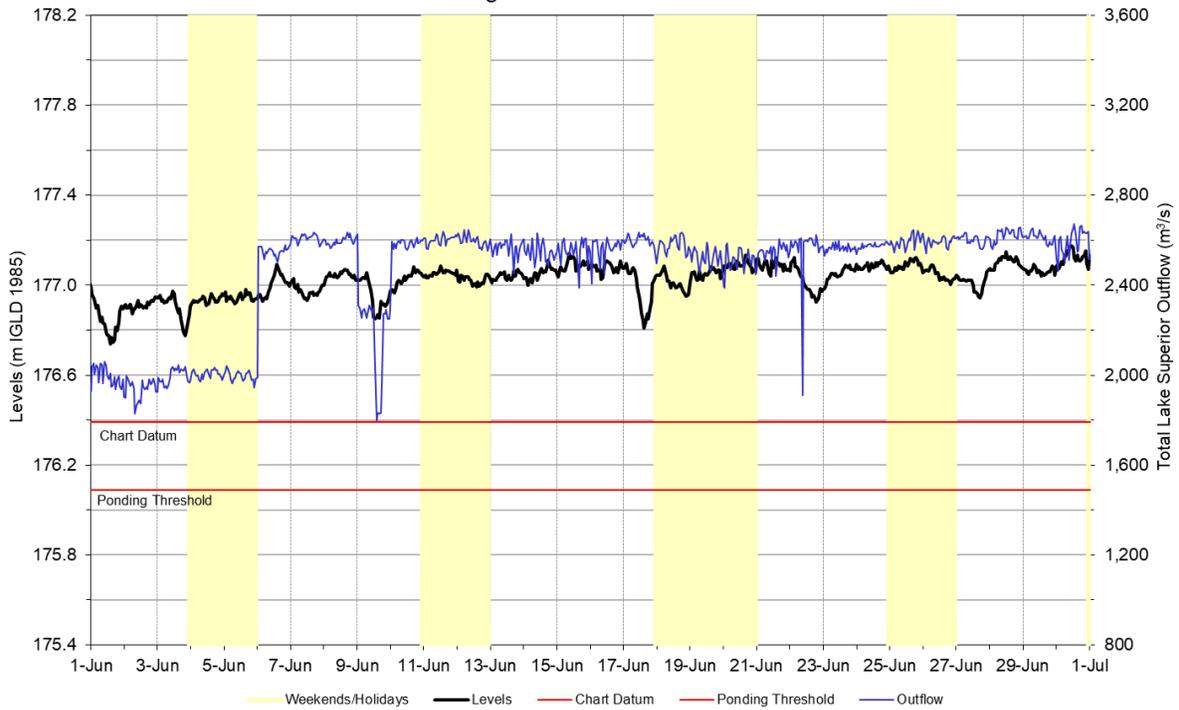
Hourly U.S. Slip Levels & Lake Superior Outflows
Figure 5b - April 2022



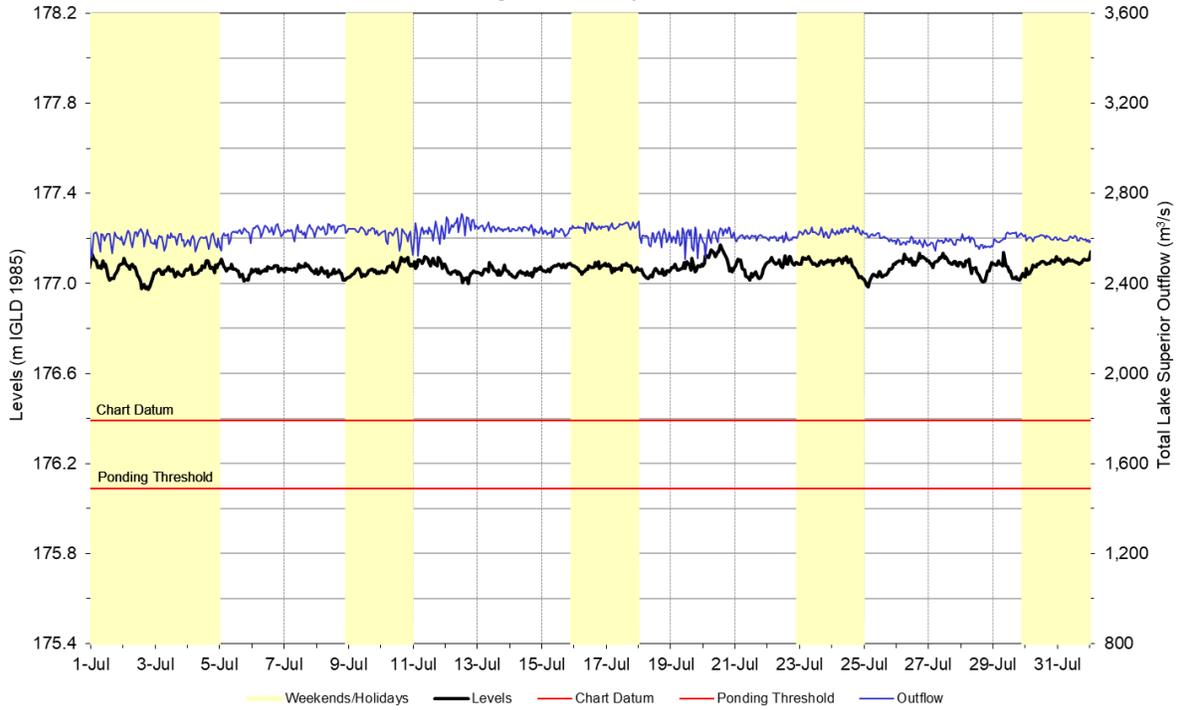
Hourly U.S. Slip Levels & Lake Superior Outflows
Figure 5c - May 2022



Hourly U.S. Slip Levels & Lake Superior Outflows
Figure 5d - June 2022



Hourly U.S. Slip Levels & Lake Superior Outflows
Figure 5e - July 2022



Hourly U.S. Slip Levels & Lake Superior Outflows
Figure 5f - August 2022

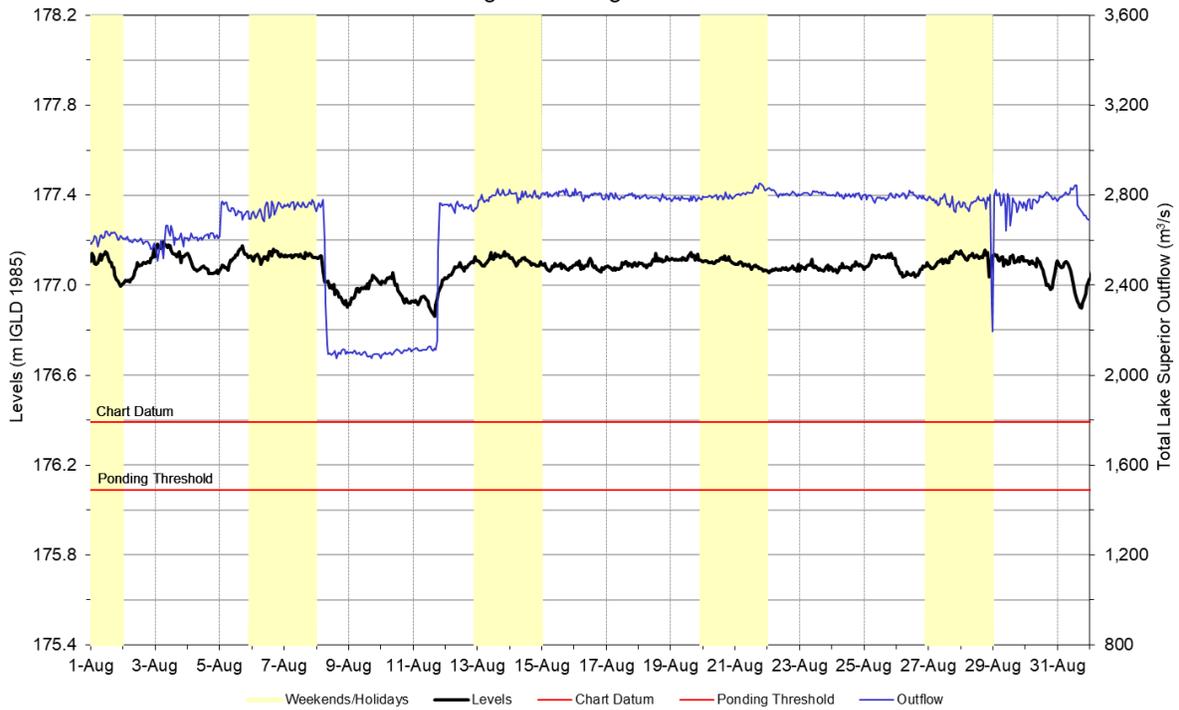


Table 1 - 2021-2022 Lake Superior Hydrologic Factors

Month	Lake-Wide Average Water Levels				Residual Net Basin Supplies			Outflows		
	Monthly Mean Recorded		Difference From Average (1918-2021)		Monthly Mean Recorded		Exceedance Probability (1900-2008)	Monthly Mean Recorded		Percent of Average (1900-2008)
	metres	feet	metres	feet	m ³ /s	cfs	(%)	m ³ /s	cfs	(%)
Mar-21	183.42	601.77	0.18	0.59	1,960	69,000	27	2,040	72,000	109
Apr-21	183.48	601.97	0.21	0.69	3,800	134,000	61	2,020	71,000	105
May-21	183.51	602.07	0.14	0.46	2,760	97,000	93	2,360	83,000	112
Jun-21	183.55	602.20	0.10	0.33	3,880	137,000	61	2,250	79,000	103
Jul-21	183.56	602.23	0.04	0.13	1,890	67,000	94	2,360	83,000	104
Aug-21	183.54	602.17	0.00	0.00	1,230	43,000	87	2,260	80,000	96
Sep-21	183.51	602.07	-0.03	-0.10	420	15,000	86	2,120	75,000	91
Oct-21	183.49	602.00	-0.03	-0.10	360	13,000	71	2,070	73,000	92
Nov-21	183.38	601.64	-0.10	-0.33	-2,040	-72,000	99	1,900	67,000	86
Dec-21	183.31	601.41	-0.10	-0.33	980	35,000	3	1,700	60,000	83
Jan-22	183.24	601.18	-0.10	-0.33	-2,060	-73,000	99	1,720	61,000	89
Feb-22	183.17	600.95	-0.11	-0.36	750	26,000	22	1,540	54,000	81
Mar-22	183.16	600.92	-0.08	-0.26	2,090	74,000	24	1,570	55,000	84
Apr-22	183.24	601.18	-0.03	-0.10	5,880	208,000	13	1,530	54,000	79
May-22	183.45	601.87	0.08	0.26	8,420	297,000	2	1,940	69,000	92
Jun-22	183.57	602.26	0.12	0.39	4,000	141,000	58	2,460	87,000	112
Jul-22	183.62	602.43	0.10	0.33	3,490	123,000	52	2,620	93,000	115
Aug-22	183.65	602.53	0.11	0.36	2,440	86,000	55	2,680	95,000	114

Table 2 - 2021-2022 Lake Michigan-Huron Hydrologic Factors

Month	Lake-Wide Average Water Levels				Residual Net Basin Supplies			Outflows		
	Monthly Mean Recorded		Difference From Average (1918-2021)		Monthly Mean Recorded		Exceedance Probability (1900-2008)	Monthly Mean Recorded		Percent of Average (1900-2008)
	metres	feet	metres	feet	m ³ /s	cfs	(%)	m ³ /s	cfs	(%)
Mar-21	176.95	580.54	0.63	2.07	3,820	135,000	70	6,650	235,000	137
Apr-21	176.95	580.54	0.54	1.77	4,600	162,000	94	6,530	231,000	127
May-21	176.95	580.54	0.45	1.48	4,180	148,000	92	6,450	228,000	120
Jun-21	176.93	580.48	0.36	1.18	5,720	202,000	49	6,070	214,000	111
Jul-21	177.00	580.71	0.40	1.31	5,680	201,000	9	6,200	219,000	113
Aug-21	177.02	580.77	0.44	1.44	3,200	113,000	16	6,250	221,000	113
Sep-21	176.93	580.48	0.40	1.31	-1,140	-40,000	83	6,320	223,000	116
Oct-21	176.91	580.41	0.45	1.48	2,940	104,000	8	6,230	220,000	115
Nov-21	176.77	579.95	0.36	1.18	-2,070	-73,000	95	6,080	215,000	113
Dec-21	176.69	579.69	0.33	1.08	2,140	76,000	26	5,940	210,000	114
Jan-22	176.60	579.40	0.28	0.92	-470	-17,000	96	5,540	196,000	122
Feb-22	176.54	579.20	0.23	0.75	1,790	63,000	66	4,700	166,000	106
Mar-22	176.53	579.17	0.21	0.69	6,950	245,000	21	5,800	205,000	118
Apr-22	176.67	579.63	0.26	0.85	10,460	369,000	16	6,010	212,000	116
May-22	176.76	579.92	0.26	0.85	7,720	273,000	35	6,060	214,000	112
Jun-22	176.81	580.09	0.24	0.79	4,620	163,000	71	6,080	215,000	111
Jul-22	176.81	580.09	0.21	0.69	2,640	93,000	74	6,050	214,000	111
Aug-22	176.79	580.02	0.21	0.69	1,760	62,000	44	6,100	215,000	110

Table 3 - Compensating Works Gate Changes

Date	Gate Change	Final Gate Settings *	Gate Equivalent (approx.)	Notes
<i>2022</i>				
11-May	Raised Gates 9 - 10, partially opened Gates 11 - 12	7 - 8 open 20 cm (8 in.) 9 - 12 open 33 cm (13 in.)	1	Gates adjusted to meet Plan 2012-prescribed flow
6-Jun	Raised Gates 7 - 12, partially opened Gate 16	7 - 12 open 162 cm (64 in.) 16 open 5 cm (2 in.)	5	Gates adjusted to meet Plan 2012-prescribed flow and to facilitate sea lamprey trapping**
9-Jun	Closed Gates 7 - 8, lowered Gates 9 - 12	9 - 12 open 20 cm (8 in.) 16 open 5 cm (2 in.)	1/2	Gates adjusted in emergency response to Algoma Steel oil spill to facilitate monitoring and reduce dispersion
9-Jun	Raised Gates 9 - 12	9 - 12 open 162 cm (64 in.) 16 open 5 cm (2 in.)	3	
10-Jun	Raised Gates 7 - 8	7 - 12 open 162 cm (64 in.) 16 open 5 cm (2 in.)	5	
6-Jul	Raised Gates 7 - 8	7 - 8 open 175 cm (69 in.) 9 - 12 open 162 cm (64 in.) 16 open 5 cm (2 in.)	5	Gates adjusted to meet Plan 2012-prescribed flow
12-Jul	Raised Gates 9 - 12	7 - 12 open 175 cm (69 in.) 16 open 5 cm (2 in.)	5	US gates were not adjusted until July 12 because of scheduling, personnel and communication changes
5-Aug	Partially opened Gates 13 - 14, closed Gate 16	7 - 12 open 175 cm (69 in.) 13 - 14 open 97 cm (38 in.)	6	Gates adjusted to meet Plan 2012-prescribed flow Sea lamprey trapping completed for the season**

* Gate 1 remained open 20 cm (8 in.) throughout reporting period (fishery requirement of approximately 15 m³/s).

** Gate 16 set to 5 cm (2 in.) open from June 6 - August 5, 2022 at request of US Fish and Wildlife Service to allow for sea lamprey trapping.

Table 4 - Monthly Distribution of Lake Superior Outflow (cubic metres per second)

YEAR AND MONTH	POWER CANALS					NAVIGATION CANALS			DOMESTIC USAGE			FISHERY	TOTAL LAKE SUPERIOR OUTFLOW
	US GOVT HYDRO	CEC	US TOTAL	BREG	TOTAL POWER CANALS	UNITED STATES	CANADA	TOTAL NAV CANALS	SAULT STE MARIE US + CAN	ESSAR ALGOMA STEEL	TOTAL DOM USAGE	ST MARYS RAPIDS	
<i>2021</i>													
JAN	394	654	1,048	1,046	2,094	5.2	0	5	0.2	3.3	4	89	2,192
FEB	385	597	982	979	1,961	0	0	0	0.2	3.2	3	88	2,052
MAR	395	582	977	972	1,949	4.4	0	4	0.2	3.2	3	87	2,043
APR	317	677	994	928	1,922	9.9	0	10	0.2	3.1	3	88	2,023
MAY	396	745	1,141	773	1,914	11.1	0.1	11	0.2	3.2	3	435	2,363
JUN	399	744	1,143	849	1,992	11.5	0.5	12	0.3	3.2	4	243	2,251
JUL	398	733	1,131	1,100	2,231	12.8	1.1	14	0.3	3.2	4	109	2,358
AUG	395	684	1,079	1,077	2,156	11.9	1.1	13	0.2	3.1	3	89	2,261
SEP	378	631	1,009	1,002	2,011	11.4	0.3	12	0.2	3.2	3	89	2,115
OCT	342	661	1,003	965	1,968	10.0	0	10	0.2	3.2	3	88	2,069
NOV	342	570	912	894	1,806	8.7	0	9	0.2	3.1	3	87	1,905
DEC	342	462	804	800	1,604	9.1	0	9	0.2	3.1	3	86	1,702
<i>2022</i>													
JAN	337	477	814	818	1,632	4.6	0	5	0.2	3.1	3	85	1,725
FEB	339	386	725	726	1,451	0	0	0	0.2	3.1	3	84	1,538
MAR	337	400	737	739	1,476	3.3	0	3	0.3	3	3	84	1,566
APR	359	360	719	716	1,435	7.9	0	8	0.2	3.2	3	85	1,531
MAY	398	695	1,093	699	1,792	9.6	0.1	10	0.3	2.9	3	136	1,941
JUN	396	769	1,165	667	1,832	10.4	0.3	11	0.3	2.8	3	616	2,462
JUL	376	788	1,164	666	1,830	11.3	1.1	12	0.2	3	3	771	2,616
AUG	348	792	1,140	619	1,759	11	1.2	12	0.2	2.5	3	907	2,681
<i>NOTE: Power canals columns include flows through power plants and spillways</i>													

Table 5 - Monthly Distribution of Lake Superior Outflow (cubic feet per second)

YEAR AND MONTH	POWER CANALS					NAVIGATION CANALS			DOMESTIC USAGE			FISHERY	TOTAL LAKE SUPERIOR OUTFLOW
	US GOVT HYDRO	CEC	US TOTAL	BREG	TOTAL POWER CANALS	UNITED STATES	CANADA	TOTAL NAV CANALS	SAULT STE MARIE US + CAN	ESSAR ALGOMA STEEL	TOTAL DOM USAGE	ST MARYS RAPIDS	
<i>2021</i>													
JAN	13,900	23,100	37,000	36,900	73,900	184	0	184	7	117	124	3,100	77,300
FEB	13,600	21,100	34,700	34,600	69,300	0	0	0	7	113	120	3,100	72,500
MAR	13,900	20,600	34,500	34,300	68,800	155	0	155	7	113	120	3,100	72,200
APR	11,200	23,900	35,100	32,800	67,900	350	0	350	7	109	116	3,100	71,500
MAY	14,000	26,300	40,300	27,300	67,600	392	4	396	7	113	120	15,400	83,500
JUN	14,100	26,300	40,400	30,000	70,400	406	18	424	11	113	124	8,600	79,500
JUL	14,100	25,900	40,000	38,800	78,800	452	39	491	11	113	124	3,800	83,200
AUG	13,900	24,200	38,100	38,000	76,100	420	39	459	7	109	116	3,100	79,800
SEP	13,300	22,300	35,600	35,400	71,000	403	11	414	7	113	120	3,100	74,600
OCT	12,100	23,300	35,400	34,100	69,500	353	0	353	7	113	120	3,100	73,100
NOV	12,100	20,100	32,200	31,600	63,800	307	0	307	7	109	116	3,100	67,300
DEC	12,100	16,300	28,400	28,300	56,700	321	0	321	7	109	116	3,000	60,100
<i>2022</i>													
JAN	11,900	16,800	28,700	28,900	57,600	162	0	162	7	109	116	3,000	60,900
FEB	12,000	13,600	25,600	25,600	51,200	0	0	0	7	109	116	3,000	54,300
MAR	11,900	14,100	26,000	26,100	52,100	117	0	117	11	106	117	3,000	55,300
APR	12,700	12,700	25,400	25,300	50,700	279	0	279	7	113	120	3,000	54,100
MAY	14,100	24,500	38,600	24,700	63,300	339	4	343	11	102	113	4,800	68,600
JUN	14,000	27,200	41,200	23,600	64,800	367	11	378	11	99	110	21,800	87,100
JUL	13,300	27,800	41,100	23,500	64,600	399	39	438	7	99	106	27,200	92,300
AUG	12,300	28,000	40,300	21,900	62,200	388	42	430	7	88	95	32,000	94,700
<p><i>NOTES: Power canals columns include flows through power plants and spillways. Flows for individual users were originally coordinated in m³/s, and are converted here to cfs and rounded to three significant figures. Total flow for each category and total Lake Superior flow in this table are computed from the individual flows in cfs.</i></p>													