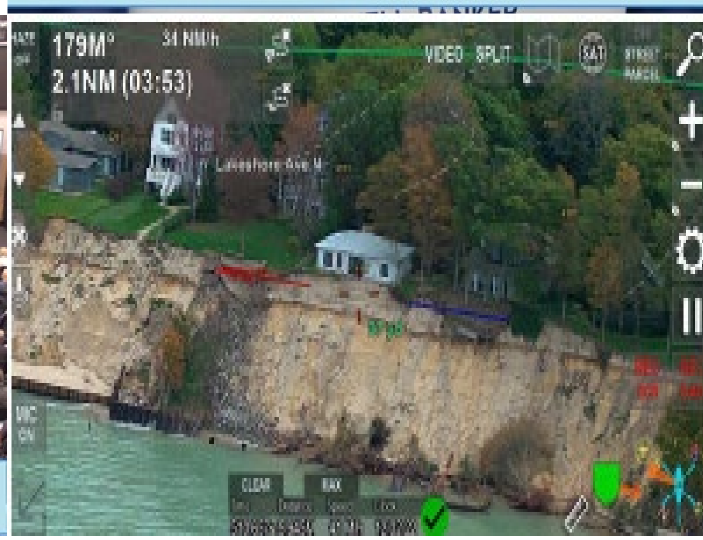
**International Lake Superior**
**Board of Control**

# Semi-Annual Progress Report to the International Joint Commission

**Covering the period September 1, 2019 to February 29, 2020**





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# International Lake Superior Board of Control

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

March 12, 2020

Commissioners:

This semi-annual report covers the Board's activities from 1 September 2019 to 29 February 2020.

## 1 Highlights

From September 2019 through February 2020, the monthly mean water levels of Lake Superior ranged from 32 to 38 cm (13 to 15 in) above average (1918-2018), 5 cm to 16 cm (2 to 6 in) above last year's levels, and from 8 cm (3 in) below to 1 cm (0.4 in) above the record high levels set in September 1985 through February 1986.

The monthly mean levels of Lake Michigan-Huron were also well above average throughout the reporting period, ranging from 76 to 97 cm (30 to 38 in) above average (1918-2018), 33 to 45 cm (13 to 18 in) above the levels of the same period last year, and from 21 cm (8 in) below to 14 cm (6 in) above the record high levels set in 1986 and 1987.

Lake Superior outflows through November 2019 were determined according to a deviation strategy approved 30 April 2019 by the International Joint Commission (IJC). This deviation strategy, employed beginning May 2019, allowed the International Lake Superior Board of Control (Board) to better manage operational limitations on hydropower flow capacity and reduce the potential for adverse impacts of high and fluctuating flows in the St. Marys Rapids.

Lake Superior outflows through the winter beginning in December 2019 were determined according to a deviation strategy approved 13 December 2019 by the IJC. A gate setting equivalent to one gate fully open was maintained over the winter months instead of the typical winter setting equivalent to one-half gate open. This allowed a small amount of additional flow to be released through the St. Marys Rapids to offset expected and potential unscheduled reductions in flows at the hydropower plants that often occur in challenging winter conditions. Outflows during the reporting period ranged from a monthly average high in November of 2,880 $m^3/s$ (101,700 cfs) to a low in February of 2,410 $m^3/s$ (85,100 cfs). The outflow average for the reporting period was 2,650 $m^3/s$ (93,600 cfs).

Flow through the Compensating Works continued to be managed by employing multiple, partially open gates in lieu of fully open gates, with the equivalent gate settings ranging from a high of nine gates open in September, to the setting equivalent to one gate open from the beginning of December through February.

## 2 Monitoring Hydrologic Conditions

The Board continuously monitors the water levels of lakes Superior and Michigan-Huron, and the water levels and flows in the St. Marys River. The regulation representatives' monthly reports to the Board provide hydrologic assessments and recommendations on 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* show the recent monthly water levels, net basin supplies, and outflows for lakes Superior and Michigan-Huron, respectively. *Figures 1* and *2* compare monthly water levels over a two-year period to long-term averages and extremes for each lake. Monthly net basin supplies (which are the net effect of precipitation, evaporation, and runoff to the lake) are depicted in *Figures 3* and *4*.

Lake Superior's water level has been above average since April 2014 and ended the reporting period 33 cm (13 in) above average (1918-2018), equal to the level from last year, and 4 cm (1.6 in) below the record high end-of-February level set in 1986. Lake Superior's monthly mean levels over the reporting period ranged from 32 to 38 cm (13 to 15 in) above average, from 5 cm to 16 cm (2 to 6 in) above last year's levels and from 8 cm (3 in) below to 1 cm (0.4 in) above the record high levels set in September 1985 through February 1986. For the month of February, Lake Superior was at a mean elevation of 183.64 m (602.49 ft), which is 37 cm (15 in) above February's monthly average and 1 cm (0.4 in) above the record high set in February 1986. Lake Superior's February monthly average level was 6 cm (2 in) above the water level one year ago, 22 cm (9 in) below the Criterion "a" level, and 44 cm (17 in) above chart datum.

Lake Superior outflows were between 121 and 133 percent of average (1900-2008) over the reporting period, with monthly flows ranging from 2,370 to 3,100 $m^3/s$ (83,700 to 109,500 $ft^3/s$).

Lake Michigan-Huron levels have been above average since September 2014 and ended the reporting period 94 cm (37 in) above average (1918-2018), 38 cm (15 in) above the level from last year, and 13 cm (5 in) above the record end-of-February level set in 1986. Monthly mean Lake Michigan-Huron levels ranged from 76 to 97 cm (30 to 38 in) above long-term average over the reporting period. Levels were 33 to 45 cm (13 to 18 in) above those from last year during this same period and from 21 cm (8 in) below to 14 cm (6 in) above the record high levels set in 1986 and 1987. For the month of February, Lake Michigan-Huron was at an elevation of 177.25 m (581.53 ft), 97 cm (38 in) above February's monthly average, 14 cm (6 in) above the record high set in February 1986, 42 cm (17 in) higher than one year ago, and 125 cm (49 in) above chart datum.

Lake Michigan-Huron outflows were between 127 and 162 percent of average (1900-2008) over the reporting period, with monthly flows ranging from 6,930 to 7,190 $m^3/s$ (244,700 to 253,900 $ft^3/s$).

The beginning of fall started off warmer than normal in September, but in October, temperatures transitioned to near normal, while in November temperatures were colder than normal. In both September and October, very high water supply was driven by well-above-average precipitation in the Lake Superior and Michigan-Huron basins The winter months of December, January, and February have been warmer than normal, while water supply has been well above average for both lake basins in December and January.

Net basin supplies to Lake Superior this reporting period were above average for every month except November, which was slightly drier than average, and February, which was very dry. The rest of the months were very wet, with December supplies approaching record highs. Water supplies to Lake Michigan-Huron were well above average in every month, except February, which was slightly drier than average. The rest of the months were all very wet, with September and January supplies approaching record highs.

The generally warmer-than-average temperatures experienced during much of this past winter have affected snow and ice conditions observed within the basin. Modeled snow water equivalent (SWE) data from the National Operational Hydrologic Remote Sensing Center (NOHRSC) indicates that SWE was near the mid-range of recorded values in recent years (2009 – 2018) through most of the winter. As of the end of February, the SWE remained at about the mid-range of last year's value for the Lake Superior and Lake Michigan-Huron basins.

An abnormally warm December through February led to little ice cover on the Great Lakes this year. By the end of the reporting period, total Great Lakes ice concentration was approximately 18 percent. Lake Superior, Lake Michigan, and Lake Huron ended the reporting period with approximately 14 percent, 12 percent, and 32 percent ice cover, respectively. Lake Superior's ice concentration peaked at 23 percent in mid-February, at a much lower concentration than the 95 percent peak in early March of last year. Lake Michigan's ice concentration peaked at 17 percent, and Lake Huron's ice concentration peaked at 32 percent. Last year, ice concentrations on Lake Michigan and Lake Huron peaked at 56 percent and 96 percent, respectively.

# 3 Regulation of Lake Superior

### *3.1 Outflows*

On 30 April 2019, the Board received IJC approval to deviate from Lake Superior Regulation Plan 2012 from May through November 2019 in order to better manage operational maintenance at the hydropower plants and limitations on maximum side-channel flow capacity, as well as to reduce the potential for adverse impacts of high and fluctuating water levels and flows in the St. Marys Rapids. From May through November flows ranged between 2,430 $m^3$/s (85,800 cfs) and 3,170 $m^3$/s (111,900 cfs). In accordance with this deviation strategy, total flows below those prescribed by Plan 2012 were released in May (2,430 $m^3$/s or 85,800 cfs) and June (2,860 $m^3$/s or 101,000 cfs). Flows above those prescribed by Plan 2012 were released in July (3,170 $m^3$/s or 111,900 cfs) through September (2,840 $m^3$/s or 100,300 cfs). Flows prescribed by Plan 2012 were released in October (2,880 $m^3$/s or 101,700 cfs) and November (2,820 $m^3$/s or 99,600 cfs).

On 13 December 2019, the Board received IJC approval to temporarily deviate from Plan 2012 from December 2019 through April 2020. A gate setting equivalent to one gate fully open was maintained over the winter months instead of the typical winter setting equivalent to one-half gate open. This allowed a small amount of additional flow to be released through the St. Marys Rapids to offset expected and potential unscheduled reductions in flows at the hydropower plants that often occur in challenging winter conditions. Additionally, the higher rapids flows from December through April provide an increase in wetted habitat for fish that have already spawned in the rapids or that may over-winter in this area. Actual total Lake Superior outflows were close to those prescribed by Plan 2012 in December 2019 through February 2020, as the small amount of additional flow through the St. Marys Rapids offset the reductions in flows at the hydropower plants that occurred. The total amount of water released through the St. Marys River in March and April is expected to be slightly more than what is prescribed by Plan 2012. The effects of this deviation is currently expected to be a reduction of approximately 1.3 cm on Lake Superior and an increase of less than 1 cm Lake Michigan-Huron. However, further, unanticipated hydropower reductions in March and April may offset the additional flow expected, and if this does not occur then slightly lower prescribed outflow will be released this spring to offset any additional water released.

Several scheduled and unscheduled flow reductions continued to occur at the hydropower plants (details are provided in *Section 6* of this report). Additionally, natural factors, including seasonal water level fluctuations and ice conditions, can also result in reduced hydropower flows. Flow capacity limitations from September through November were addressed by adjusting the gate setting at the Compensating Works in accordance with the Board's approved deviation strategy. From December to April, the Compensating Works gates are typically maintained at the normal winter setting equivalent to one-half gate open. Gates are typically maintained at a constant setting in winter to avoid issues with ice, including frozen gates and the potential for ice jams downstream of the structure in the St. Marys River. This year, in accordance with the approved deviation strategy, the gates were set to a one-gate equivalent.

The Board's deviation strategies, hydropower maintenance activities, and uncontrollable hydrologic factors resulted in total outflows being, on average, slightly higher than the flow prescribed by Plan 2012 during the reporting period.

### *3.2 Compensating Works gate settings and St. Marys Rapids conditions*

During the reporting period, the Board continued to work with the IJC, the hydropower entities, and other stakeholders, to address issues related to the gate settings of the Compensating Works, and the unusually high water level and flow conditions in the St. Marys Rapids, while adhering to the principles of the Boundary Waters Treaty and the Orders of Approval for Lake Superior regulation.

Flow through the Compensating Works continued to be managed by employing multiple, partially open gates in lieu of fully open gates. The equivalent gate settings were achieved throughout the reporting period by using Gates #2 through #16 at various partially open settings. The gates were set to the equivalent of approximately nine gates open in September. Gates were then reduced in October to the equivalent of approximately six gates fully open. The reduction of the gate setting from the equivalent of six gates open to one gate open in late November and early December was staged gradually over a span of nine days to slow the rate of change in hydrodynamic conditions in the St. Marys Rapids. The gate setting was maintained at the equivalent of one gate fully open through the remainder of the reporting period. The equivalent one-gate setting was achieved using Gates #5 to #12 open 26 cm (10 in) each. Flow through Gate #1, which supplies water to the Fishery Remedial Works, was maintained at a rate of approximately 15 $m^3/s$ throughout the reporting period. A complete summary of gate settings for the period is provided in *Table 3*.

# 4 Governing Conditions during the Reporting Period

The monthly mean levels of Lake Superior ranged between 183.64 and 183.88 m (602.49 and 603.28 ft) during the reporting period. The monthly mean level in October 2019 of 183. 88 m (603.28 ft) exceeded the Criterion "a" limit of 183.86 m (603.22 ft) specified in the IJC's Orders of Approval. Criterion "a" states that "the level of Lake Superior shall be maintain within its recorded range of stage when tested with supplies of the past as adjusted. The regulated monthly mean level of Lake Superior shall not exceed elevation 183.86 m (603.22 ft) IGLD 1985 or fall below elevation 182.76 m (599.61 ft) IGLD 1985 under these conditions".

During the reporting period, the daily mean water levels in the lower St. Marys River at the US Slip gauge downstream of the US Locks varied between 177.35 and 177.66 m (581.86 and 582.87 ft). Therefore, Criterion "b" (which restricts outflow to no more than preproject values when the level at US Slip is above 177.94 m (583.79 ft)) was not a concern. Furthermore, daily mean US Slip levels generally stayed well above the ponding restriction threshold (see *Section 10*) of 176.09 m (577.72 ft) for the reporting period. However, while ponding was permitted during the entire reporting period, there was no opportunity for the hydropower plants to perform ponding operations as they were running at full capacity.

# 5 Inspections and Repairs at the Compensating Works

Routine monthly maintenance inspections continued to be conducted on the Canadian portion of the Compensating Works by Evolugen (As of July 2019, Evolugen is the new identity for Brookfield Renewable Canada). 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, the 5-year dam safety assessment is planned for 2020. An independent consulting engineer will be contracted to undertake the inspection of the Compensating Works structure and the earth dam north of the structure. In addition, inspection of the upstream and downstream underwater components of the structure (Gates #1 to #8 inclusive) is planned. A procedure for the operation of Gate #1 has been drafted and submitted to the regulatory agencies for their approval. With this support, application will be made to the International Joint Commission requesting temporary amendment of the 11 December 1985 Supplementary Order of Approval, to facilitate the operation of Gate #1.

The cold joint and crack in the concrete apron downstream of Gate #8 is also planned for repair in 2020.

The monthly maintenance inspections continued as normal on the US portion of the Compensating Works by the US Army Corps of Engineers, and 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 as a result 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 throughout the reporting period. Water level conditions were generally favorable and did not inhibit the plants from passing maximum flows.

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*

As of July 2019, Evolugen is the new identity for Brookfield Renewable Canada. Planned unit outages at Evolugen's Clergue plant totaled zero hours during the reporting period. Unplanned outages during the reporting period totaled 1,911 hours (43.8 percent of the reporting period) and were owing to runner blade repairs on Unit G2. Evolugen has ordered a backup runner blade to ensure that any future issues can be remediated quickly. Annual maintenance on each of Units G1, G2 and G3 is scheduled to take place in April, May and June 2020.

### *6.3 Cloverland Electric Co-operative*

Canal restoration work did not resume on 1 September as originally anticipated due to delays in getting special materials for the repairs. Therefore, Cloverland Electric Co-operative (CEC) ran at capacity for the fall season. The flow was approximately 765 $m^3/s$ (27,000 $ft^3/s$) for the September through November time period. High tailrace water levels have impacted the plant by lowering the available head, affecting power production; however, flows were still near normal for the winter months, averaging 750 $m^3/s$ (26,500 $ft^3/s$).

Mild regional weather has allowed CEC to get through the winter with only one anchor-ice event. On 8 February, CEC was only down for about four hours.

Looking forward, the canal restoration work is expected to resume in late April 2020 and continue through June, with an estimated 595 $m^3/s$ (21,000 $ft^3/s$) total outflow capacity expected. No work is expected in the fall.

CEC is upgrading its static excitation systems and turbine governors in a project that is expected to take around one and half to two years. Two units of the 74 are being upgraded at a time, so impact to flow is expected to be negligible.

### *6.4 US Government Hydropower Plant*

There were 44 unit outages totaling 2,595 hours. Most of the outages(1,557 hours, 60 percent) were due to three significant projects, specifically the modernization of five exciters, replacement of four electrical switchgears, and new turbine scaffold for four hydro generators. An unscheduled outage of Unit 10 accounted for 761 hours (29 percent) and 225 hours (9 percent) were due to other unscheduled outages. Twenty-eight hours (1%) were due to planned maintenance outages, 16 hours were due to anchor ice, and the remaining eight hours were due to external issues.

## 7 Flow Verification Measurements

No flow verification measurements were taken this reporting period.

Hydropower canal flow measurements using Acoustic Doppler Current Profiler (ADCP) technology are scheduled to take place this summer at all three plants during the week of 10 August. These measurements are typically performed every five years to verify the discharge reported by the plants. The measurements are to be taken during times of steady and specified flows so that verification can be made on a range of data. A measurement summary report will be completed shortly thereafter.

## 8 Water Usage in the St. Marys River

The distribution of outflows from Lake Superior for January 2019 through February 2020 can be found in *Table 4* (*Table 5* in English units). 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 Canada and the United States 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 was about 3 to 4 $m^3/s$ (106 to 141 $ft^3/s$) or about 0.1 percent of the total monthly outflow. The monthly flow through the locks depends on traffic volume and varied from 0 to 13 $m^3/s$ (0 to 460 $ft^3/s$) over the reporting period. The locks are closed for navigation in the winter months, beginning 15 January 2020. Water used for navigation accounted for less than one percent of total river flow.

In accordance with the IJC'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, which is usually 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. This winter, however, a one-gate-open equivalent was maintained by having gates 5 through 12 partially open. In addition, a flow of at least 15 $m^3/s$ (530 $ft^3/s$) is normally also maintained in the Fishery Remedial Works through Gate #1. The flow through the St. Marys Rapids, including that through the Fishery Remedial Works, ranged from 193 to 1,324 $m^3/s$ (6,800 to 46,800 $ft^3/s$) over the last six months, or an average of approximately 23 percent of the total monthly outflow.

Hydropower passed an average of 2,040 $m^3/s$ (72,000 $ft^3/s$) over the reporting period and hydropower flows accounted for approximately 77 percent of the total outflow. All plants were requested to run at their maximum capacities throughout the reporting period, which varies depending on hydrologic conditions, but on average, is assumed to be approximately 2,280 $m^3/s$ (80,500 $ft^3/s$) for all three plants. The total average monthly difference of 240 $m^3/s$ (8,500 $ft^3/s$) was due primarily to unit outages as a result of scheduled and unscheduled plant maintenance requirements. Usages at each plant are shown in *Tables 4* and *5*.

## 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 (LLO) Diversions. The Ogoki Diversions into Lake Nipigon (which flows into Lake Superior) averaged 115 $m^3/s$ (4,060 $ft^3/s$) and the Long Lac Diversion averaged 32 $m^3/s$ (1,130 $ft^3/s$) from September through February. Combined, these diversions were about 106 percent of average for the period 1944-2019. The result from reducing LLO outflow to 0 $m^3/s$ for a year is estimated to have a 4 cm and 1 cm effect on Lakes Superior and Michigan-Huron, respectively. There would be very minimal effect on the other Great Lakes.

Slots cut into Waboose Dam provide a minimum flow northward to the Ogoki River of approximately 2 $m^3/s$ (71 $ft^3/s$) to meet fisheries requirements. This "slot flow" averaged 2.2 $m^3/s$ (78 $ft^3/s$) from September through February.

Continuous minimum flows of at least 2 $m^3/s$ (71 $ft^3/s$) are maintained from the Saturday of Victoria Day weekend (in May) through Labor Day from the northern outlet of Long Lake (Kenogami Dam) for environmental enhancement. Outflows through the Kenogami Dam during the reporting period averaged 0.80 $m^3/s$ (28 $ft^3/s$).

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 first US Supreme Court decree in limiting the Chicago diversion was effective in 1925, and the latest decree of 1967, modified in 1980, limits the annual diversion to 91 cubic meters per second (3,200 cubic feet per second). The Chicago District, 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 $m^3/s$ (3,210 $ft^3/s$) is employed in regulatory computations. 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 2015.

During the reporting period, it was reported that the water diverted into the System at Lake Superior (Ogoki Diversion + Long Lac Diversion) was 147 $m^3/s$ (5,190 $ft^3/s$). Water diverted from the System at Lake Michigan (Chicago Diversion) was estimated to be 91 $m^3/s$ (3,210 $ft^3/s$). Therefore, the net inflow into the Lake Superior – Michigan-Huron System was approximately 56 $m^3/s$ (1,980 $ft^3/s$). The combined effects of the Long Lac, Ogoki and Chicago diversions have been to permanently raise Lake Superior by an average of 2.1 centimeters (0.8 inches), lower Lakes Michigan-Huron by 0.6 cm (0.2 in).

## 10 Peaking and Ponding Operations at Hydropower Plants

Peaking and ponding operations are the within-day and day-to-day flow variations that enable the hydropower plants to better align 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 IJC has approved guidelines within which the Board may restrict peaking and ponding operations by the hydropower entities under certain conditions.

Specifically, if the minimum level at the US Slip gauge on the lower river is expected to be below the threshold level of 176.09 m (577.72 ft) as a result of ponding operations, then the power entities are required to pass peak flows for at least an eight-hour period each weekend and holiday day to provide periods of relatively higher levels on the lower St. Marys River each day. The Board provides summaries of peaking and ponding in its semi-annual reports.

Water levels at US Slip remained above the established threshold, such that ponding was permitted during the entire reporting period. However, the power entities were unable to perform peaking and ponding operations as they were operating at maximum capacity.

To continue to provide timely information on expected flow variations, the USACE Detroit District distributes monthly notices during the shipping season (March through January) on expected Lake Superior outflows, and a schedule of flow variations at the hydropower plants.

*Figures 7a-7f* compare the hourly Lake Superior outflow and the hourly levels at US Slip on the lower St. Marys River. In general, US Slip levels were higher than last year's levels during the same 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 has focused primarily on executing tasks to support the International Lake Ontario-St. Lawrence River Board (ILOSRB) with decisions related to managing the extremely high water levels and flows. This includes beginning a roughly $3million expedited review of Plan 2014, which is the current regulation plan operated by the Board. GLAM has also made progress on a range of tasks to support the upper Great Lakes as well.

## *11.1 2020 Work Plan Tasks*

In October 2019 the IJC was given funding from US government to begin an expedited review of the Lake Ontario – St. Lawrence River Regulation Plan 2014. Despite the focus of GLAM activities on the lower Great Lakes basin, several key intiatives continued in support of the ILSBC. GLAM staff are currently working on the plan evaluation and review process for 2019. This analysis will be very similar to what was done for reviewing the 2018 and 2017 conditions. Water levels and flows recorded in 2019 will again be compared to simulated water levels and flows under Plan 2012 and Plan 77-A. These plan evaluations should be completed during the spring of 2020, and results will be ready for discussion at the Fall Board meeting. The results will allow the board to compare the water levels and flows experienced last year due to the implemented regulation strategy with what would have happened if the board had followed the plan. This analysis will allow the Board to verify whether or not the intended benefits of the deviation plan were actually realized.

Data was collected in late 2019 in support of the Integrated Environmental Response Model (IERM2D). The IERM2D predicts areas where various fish species are likely to spawn and their fry are able to survive. More detailed information about the substrate in the St. Marys Rapids was collected, along with Side Scan Sonar (SSS) and aquatic plant species information in portions of the river just downstream of the rapids. These data will then be used in 2020 to improve the IERM2D. This modelling work will ultimately assist in the development of performance indicators for the St. Marys Rapids. The summary report for this data collected will be completed in spring of 2020.

Additional field data was collected in December of 2019 as gates were closed down to the winter setting at the Compensating Works. Staff from the United States Geological Service (USGS) were able to walk areas of the rapids at the reduced gate setting to inventory spawning nests and look for stranded fish in areas of the rapids that had been previously inundated at the higher gate setting. The USGS staff found very few stranded fish, which provided good confirmation that the gates were reduced at a slow enough rate to allow fish time to escape areas of the rapids that were drying up. This should be an annual practice for the next few years to help gather this information that will be important to further development of the IERM2D.

Corps 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 change in Michigan-Huron water levels over time and may impact regulation plan performance. Bathymetric data was collected in the St. Clair River in 2019 and a report will be completed by fall of 2020 comparing the channel geometry to the last bathymetry collected in 2012.

Due to the record high water levels during this reporting period, there was significant flooding and erosion all across the Great Lakes. Corps staff met with many local communities, municipal entities, and emergency managers to discuss the impacts of these high water levels on the local communities. Much information about the impacts have been gathered for use in future evaluations of regulation plans. One piece of this effort is the creation of a GIS database of all Corps regulatory permits that were issued for shore protection on the upper Great Lakes. This database can be used in the future to update any coastal impact models with updated details on shore protection type, location, and proposed height.

## 12 Public Communications and Outreach

The Board intends to participate in a joint Great Lakes high Water webinar with the IJC and the other Great Lakes Boards in May or June 2020. Depending on effectiveness and number of people reached through this event the Board may consider holding a separate Lake Superior specific webinar in July 2020.

The Board expects to have a presence again this year at the Soo Locks in Sault Ste. Marie, Michigan, as part of the USACE's annual Engineer's Day festivities on 26 June. At the Board's information booth, Board representatives will have the chance to speak directly with the public regarding the regulation plan, current conditions and answer any specific questions they may have.

Throughout the reporting period, stakeholders voiced concerns regarding high water levels and flow conditions, and asked how the current regulation plan balances levels. Reports of erosion on Lake Superior and on Lake Michigan-Huron have been received. Some citizens on both lakes remain concerned about potential impacts due to climate change and variability.

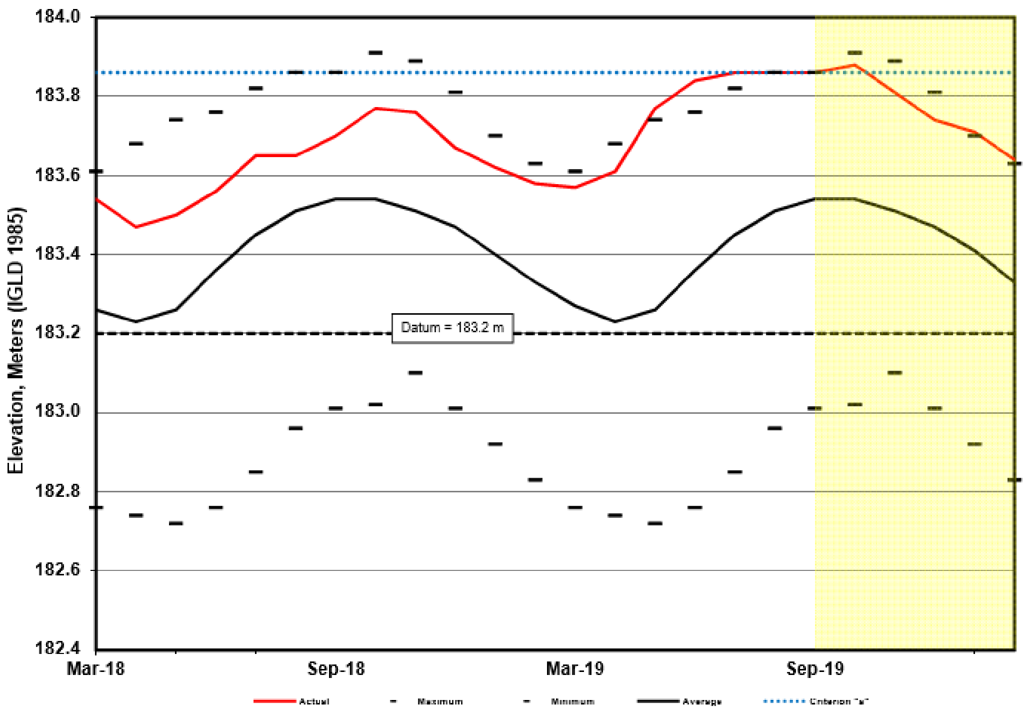
The Board continues to issue, at the beginning of each month (and before any significant change in outflows), news releases informing the public about Lake Superior regulation and water level conditions. These news releases are sent by both the Canadian and US regulation representative offices to e-mail distribution lists that include various agencies, stakeholders and media outlets. The Board also makes these news releases available to the public online through the Board's Website (https://ijc.org/en/lsbc) and the Board's Facebook page (facebook.com/InternationalLakeSuperiorBoardOfControl), both of which continue to grow in popularity. A new infographic was also developed to describe hydrologic conditions, water levels and flows within the basin, and is updated and shared monthly on the Board's Facebook page.

With the continuation of near- and record-high water levels on the Upper Great Lakes, the Board and its supporting staff through the US and Canadian regulation representative offices continue to engage in outreach and information exchange with the public.

# 13 Board Membership and Meetings

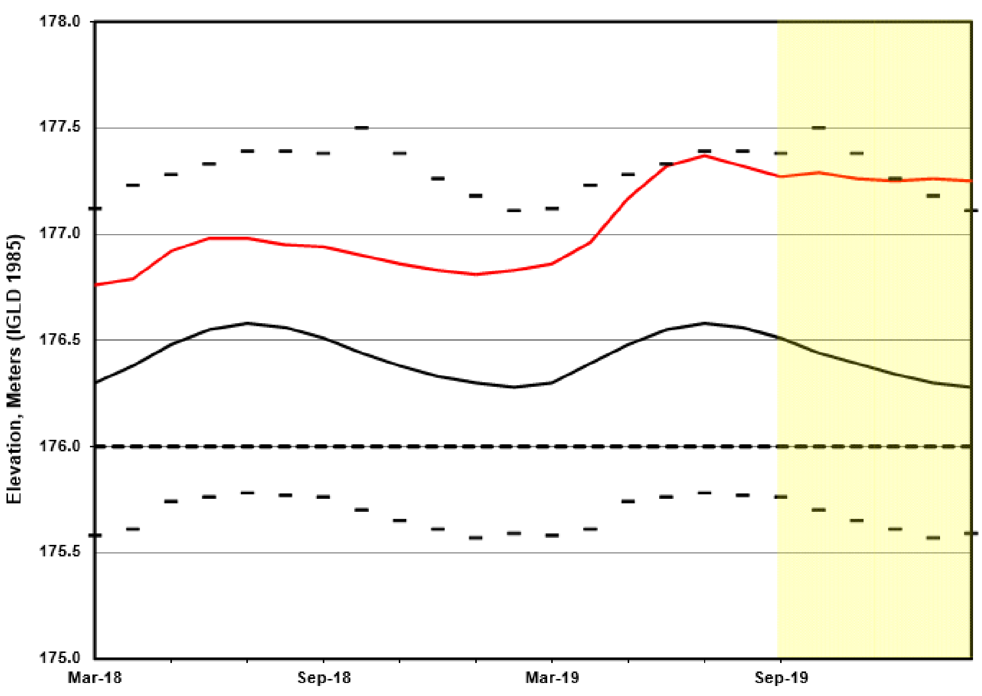
The Board held its spring semi-annual meeting on 12 March 2020 in Ann Arbor, Michigan. The next meeting is scheduled for 17 September 2020 in Montreal, Quebec.

## Figure 1: Monthly Mean Levels Lake Superior



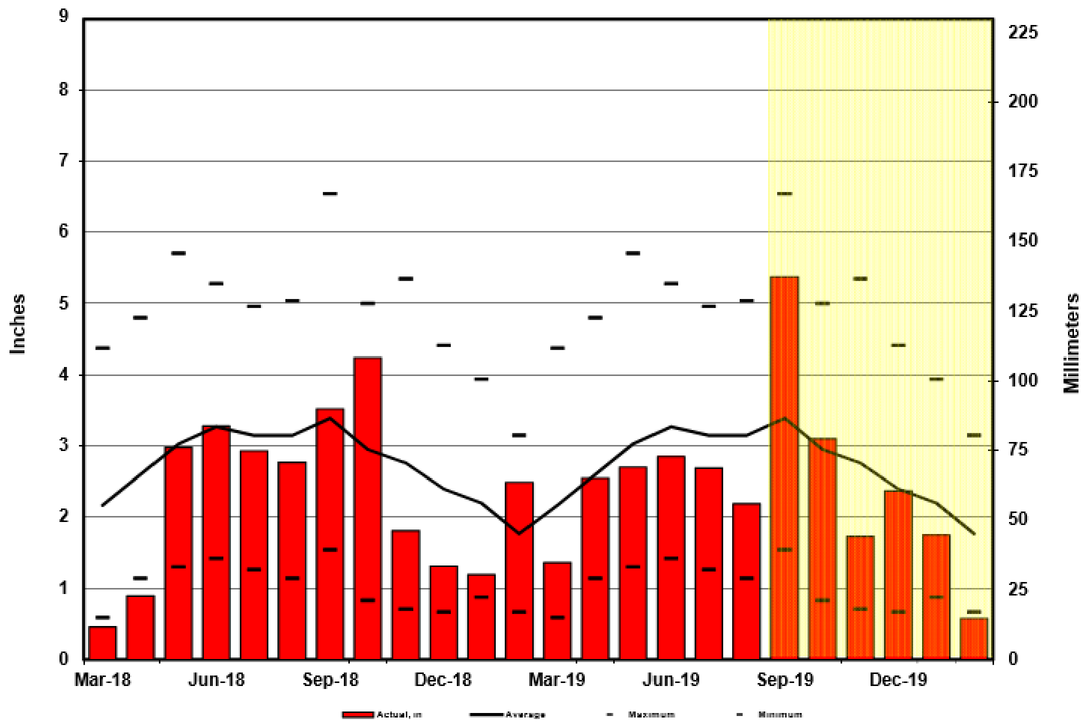

Based on a mean of 5 gages. Average, Maximum and Minimum values for the Period of Record 1918-2018

## Figure 2: Monthly Mean Levels Lake Michigan-Huron



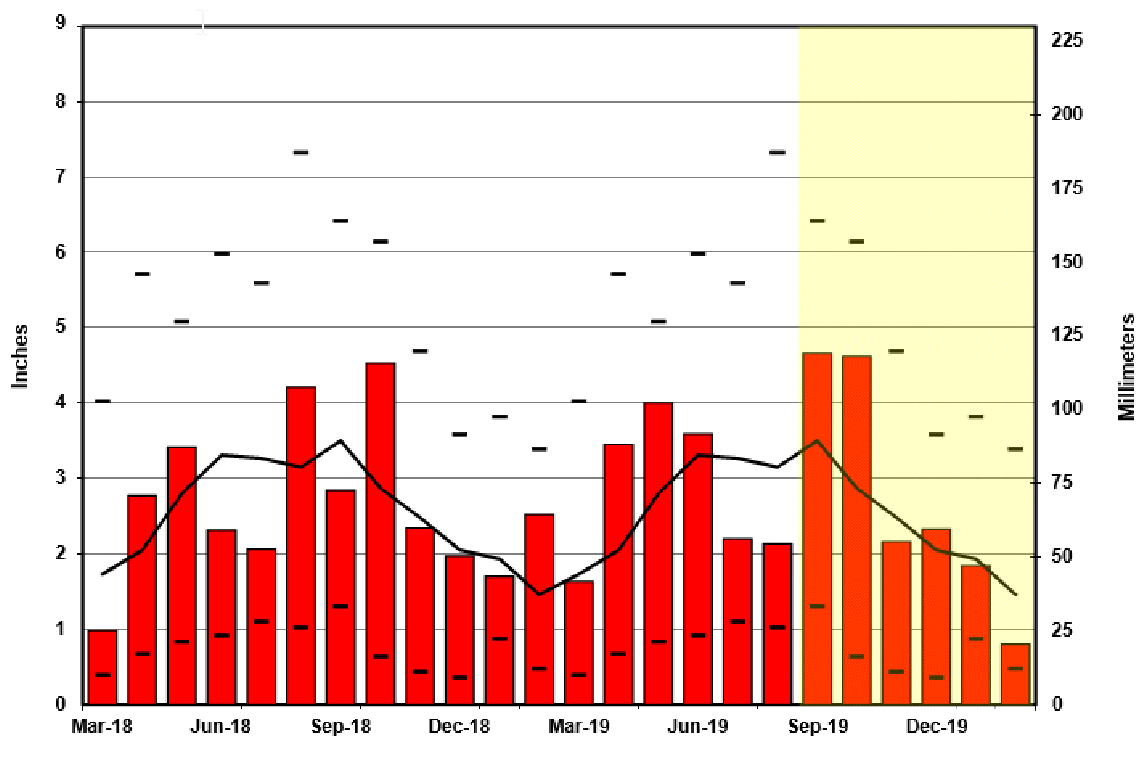

Based on a mean of 6 gages. Average, Maximum and Minimum values for the Period of Record 1918-2018

## Figure 3: Monthly Precipitation Lake Superior



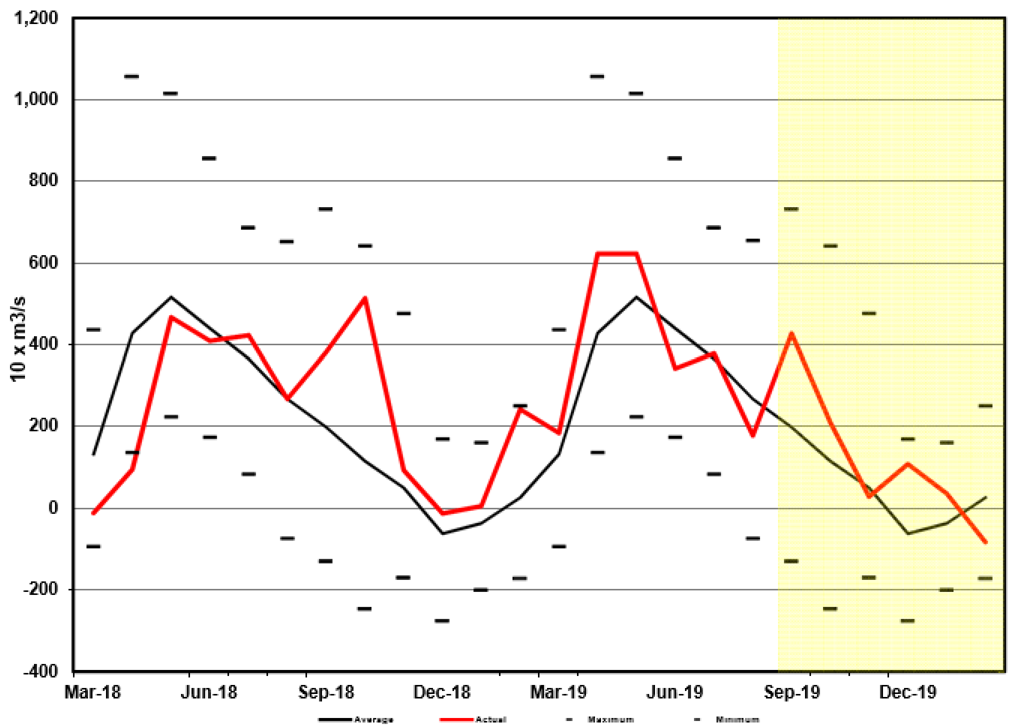

Maximum, Minimum and Average Precipitation Values based on Period of Record 1900 - 2017

## Figure 4: Monthly Precipitation Lake Michigan-Huron



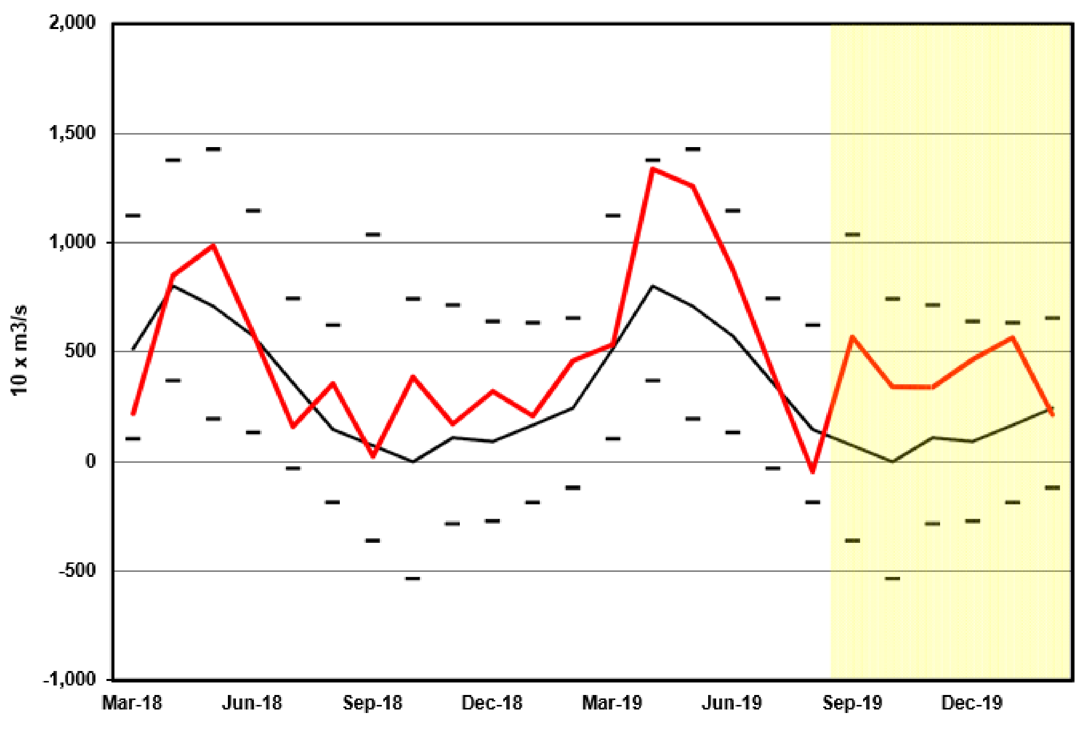

Maximum, Minimum and Average Precipitation Values based on Period of Record 1900 - 2017

## Figure 5: Monthly Net Basin Supplies Lake Superior

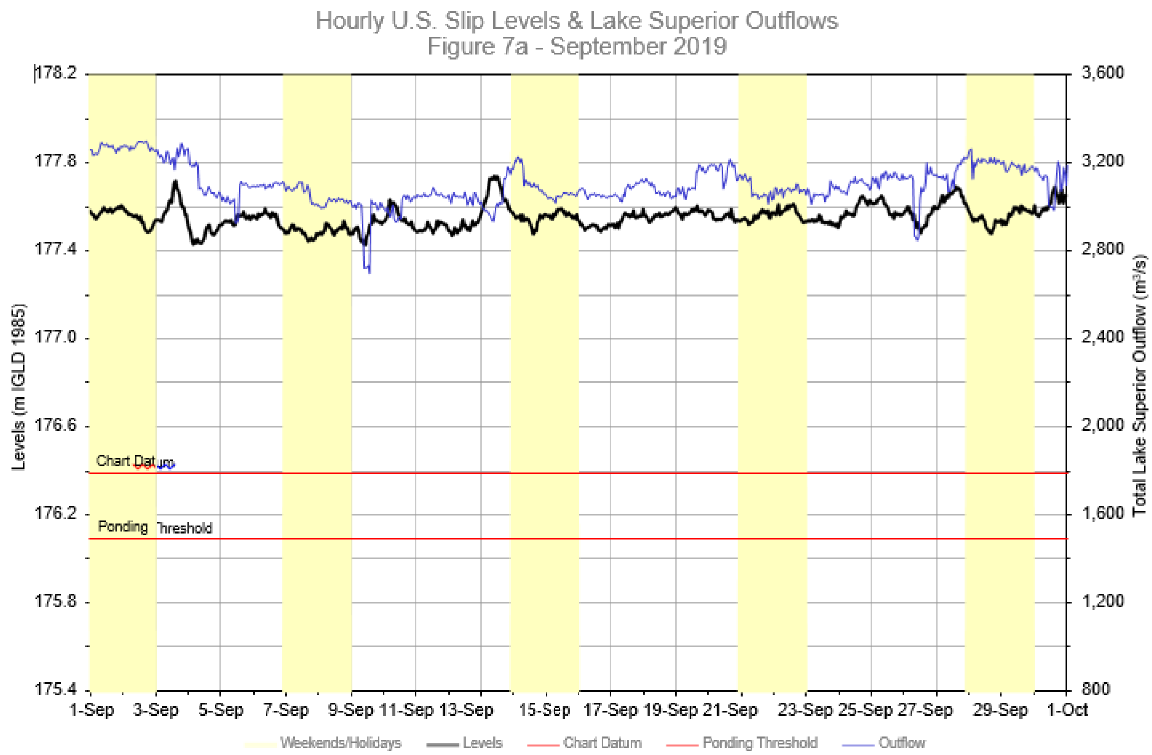


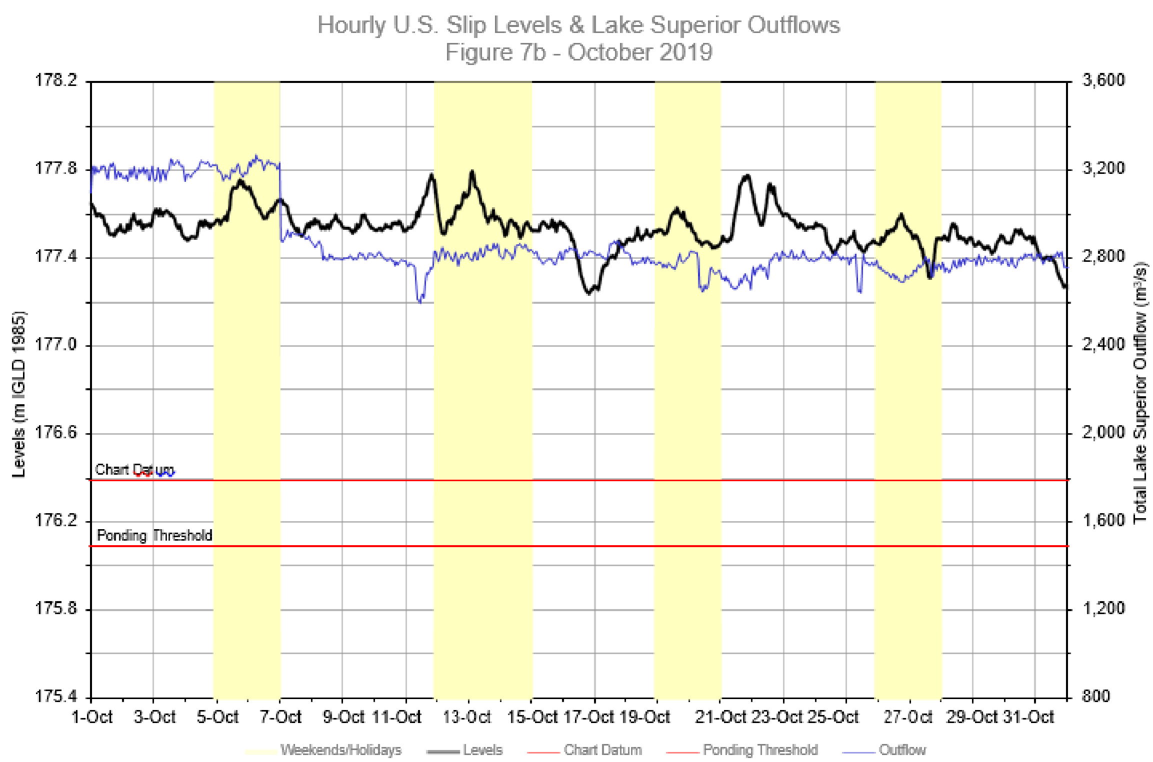

Average, Maximum and Minimum Based on Coordinated Period of Record 1900-2008

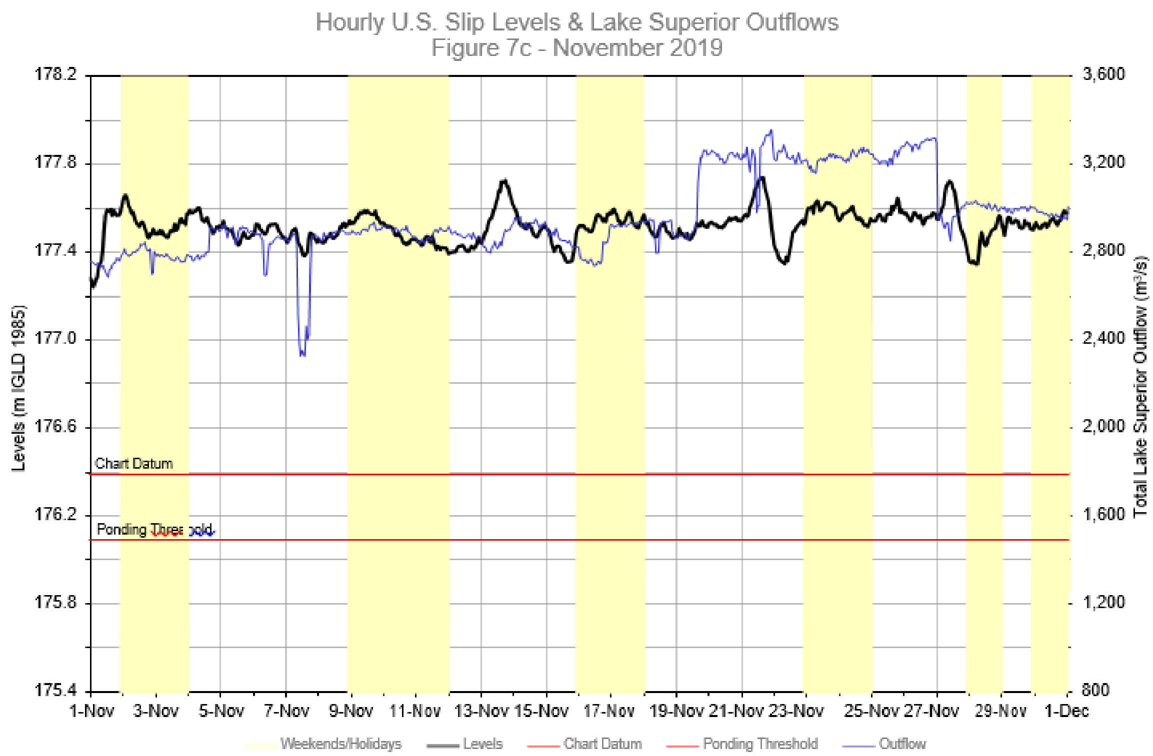
## Figure 6: Monthly Net Basin Supplies Lake Michigan-Huron

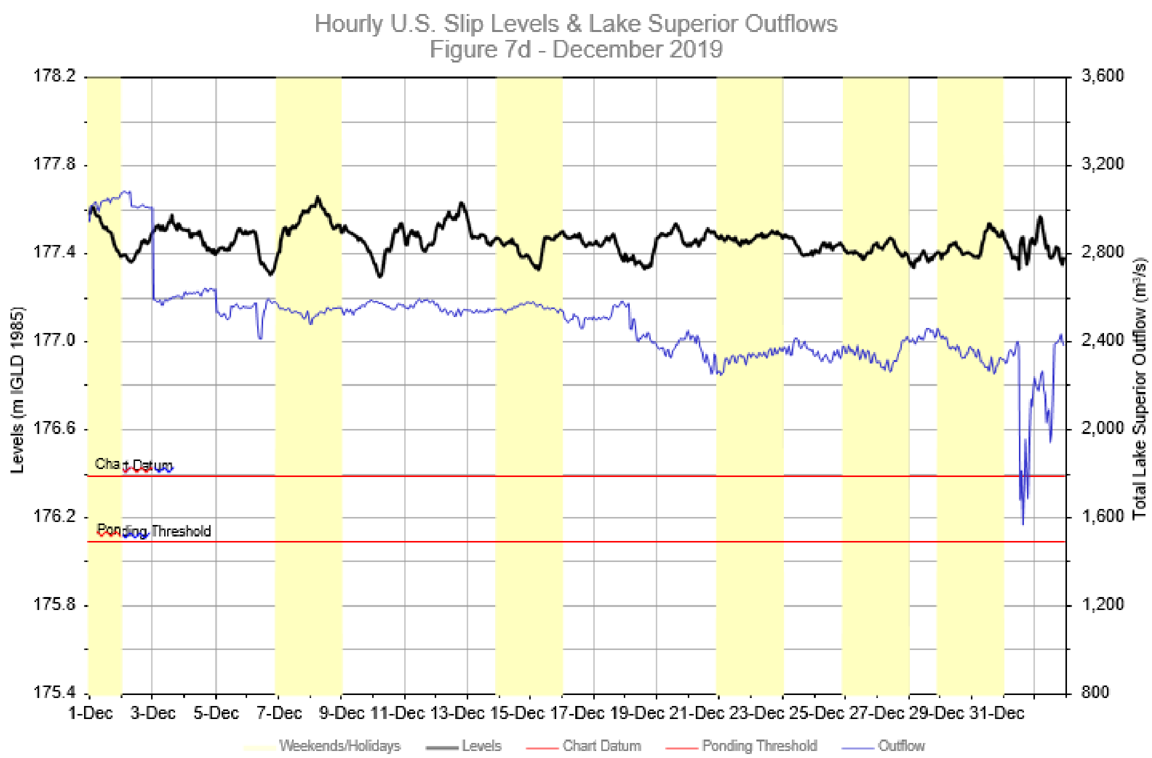


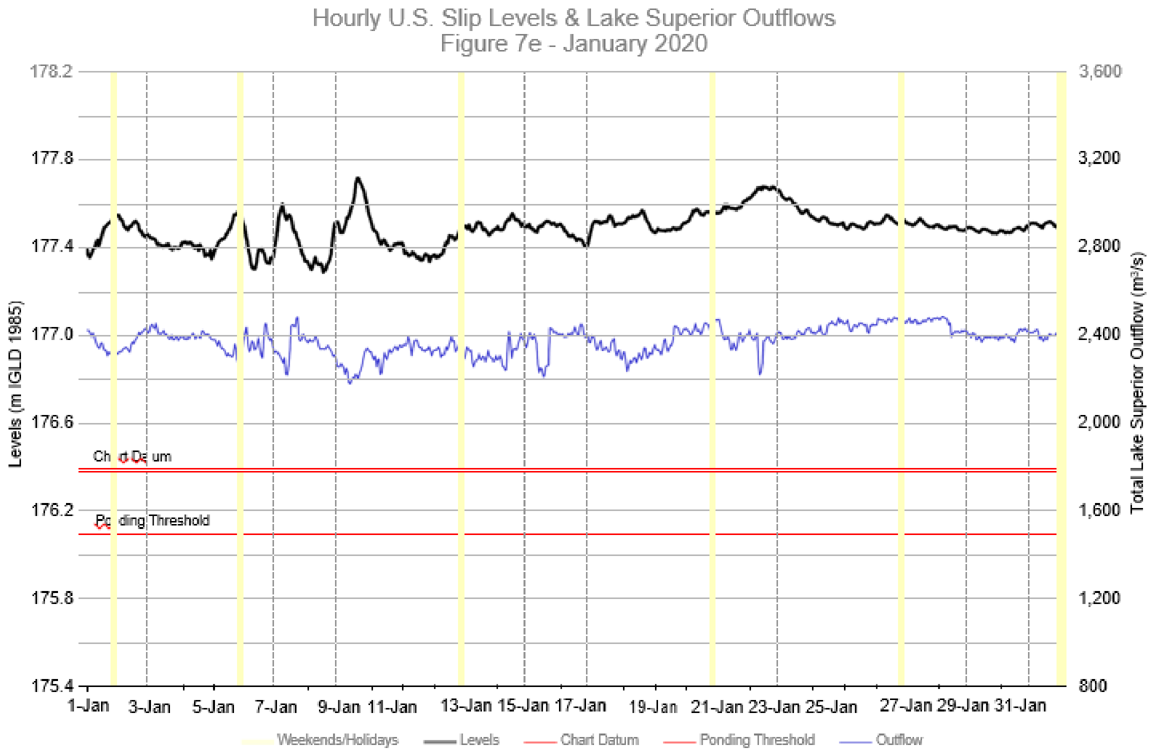

Average, Maximum and Minimum Based on Coordinated Period of Record 1900-2008


Hourly U.S. Slip Levels & Lake Superior Outflows
Figure 7a - September 2019
Levels (m IGLD 1985)
Total Lake Superior Outflow (m³/s)
178.2
177.8
177.4
177.0
176.6
176.2
175.8
175.4
3,600
3,200
2,800
2,400
2,000
1,600
1,200
800
Chart Datum
Ponding Threshold
1-Sep 3-Sep 5-Sep 7-Sep 9-Sep 11-Sep 13-Sep 15-Sep 17-Sep 19-Sep 21-Sep 23-Sep 25-Sep 27-Sep 29-Sep 1-Oct
Weekends/Holidays
Levels
Chart Datum
Ponding Threshold
Outflow


Hourly U.S. Slip Levels & Lake Superior Outflows
Figure 7b - October 2019
Levels (m IGLD 1985)
Total Lake Superior Outflow (m³/s)
178.2
177.8
177.4
177.0
176.6
176.2
175.8
175.4
3,600
3,200
2,800
2,400
2,000
1,600
1,200
800
Chart Datum
Ponding Threshold
1-Oct 3-Oct 5-Oct 7-Oct 9-Oct 11-Oct 13-Oct 15-Oct 17-Oct 19-Oct 21-Oct 23-Oct 25-Oct 27-Oct 29-Oct 31-Oct
Weekends/Holidays
Levels
Chart Datum
Ponding Threshold
Outflow


Hourly U.S. Slip Levels & Lake Superior Outflows
Figure 7c - November 2019
Levels (m IGLD 1985)
Total Lake Superior Outflow (m³/s)
178.2
177.8
177.4
177.0
176.6
176.2
175.8
175.4
3,600
3,200
2,800
2,400
2,000
1,600
1,200
800
Chart Datum
Ponding Threshold
1-Nov 3-Nov 5-Nov 7-Nov 9-Nov 11-Nov 13-Nov 15-Nov 17-Nov 19-Nov 21-Nov 23-Nov 25-Nov 27-Nov 29-Nov 1-Dec
Weekends/Holidays
Levels
Chart Datum
Ponding Threshold
Outflow


Hourly U.S. Slip Levels & Lake Superior Outflows
Figure 7d - December 2019
Levels (m IGLD 1985)
Total Lake Superior Outflow (m³/s)
178.2
177.8
177.4
177.0
176.6
176.2
175.8
175.4
3,600
3,200
2,800
2,400
2,000
1,600
1,200
800
Chart Datum
Ponding Threshold
1-Dec 3-Dec 5-Dec 7-Dec 9-Dec 11-Dec 13-Dec 15-Dec 17-Dec 19-Dec 21-Dec 23-Dec 25-Dec 27-Dec 29-Dec 31-Dec
Weekends/Holidays
Levels
Chart Datum
Ponding Threshold
Outflow


Hourly U.S. Slip Levels & Lake Superior Outflows
Figure 7e - January 2020
Levels (m IGLD 1985)
Total Lake Superior Outflow (m³/s)
178.2
177.8
177.4
177.0
176.6
176.2
175.8
175.4
3,600
3,200
2,800
2,400
2,000
1,600
1,200
800
Chart Datum
Ponding Threshold
1-Jan 3-Jan 5-Jan 7-Jan 9-Jan 11-Jan 13-Jan 15-Jan 17-Jan 19-Jan 21-Jan 23-Jan 25-Jan 27-Jan 29-Jan 31-Jan
Weekends/Holidays
Levels
Chart Datum
Ponding Threshold
Outflow

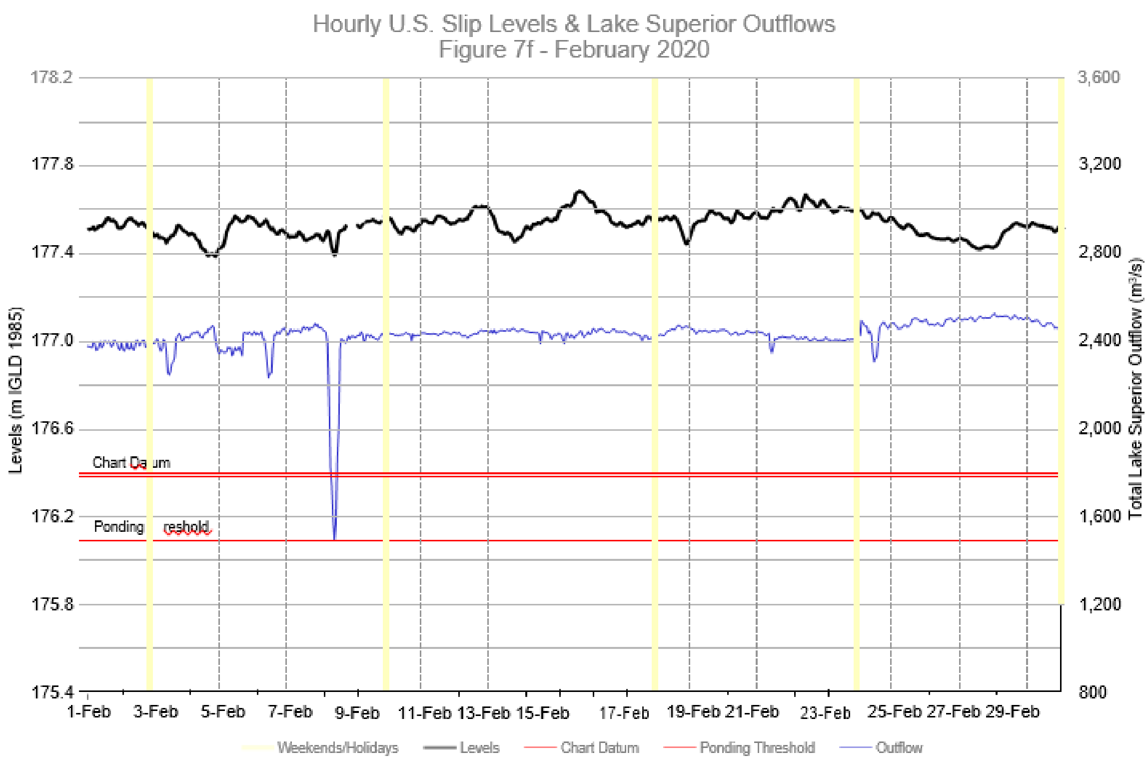

Hourly U.S. Slip Levels & Lake Superior Outflows
Figure 7f - February 2020
Levels (m IGLD 1985)
Total Lake Superior Outflow (m³/s)
178.2
177.8
177.4
177.0
176.6
176.2
175.8
175.4
3,600
3,200
2,800
2,400
2,000
1,600
1,200
800
Chart Datum
Ponding Threshold
1-Feb 3-Feb 5-Feb 7-Feb 9-Feb 11-Feb 13-Feb 15-Feb 17-Feb 19-Feb 21-Feb 23-Feb 25-Feb 27-Feb 29-Feb
Weekends/Holidays
Levels
Chart Datum
Ponding Threshold
Outflow

**TABLE 1: 2019-2020 Lake Superior Hydrologic Factors**

| Month | Levels | | | | Net Basin Supplies | | | Outflows | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Monthly Mean Recorded[1] | | Difference From Average[2] | | Monthly Mean Recorded | | Exceedance Probability[3] | Monthly Mean Recorded[4] | | Percent of Average[5] |
| | Meters | Feet | Meters | Feet | $m^3/s$ | tcfs | (%) | $m^3/s$ | tcfs | |
| **2019** | | | | | | | | | | |
| JAN | 183.62 | 602.43 | 0.29 | 0.95 | 40 | 1 | 26 | 2,370 | 84 | 122 |
| FEB | 183.58 | 602.30 | 0.31 | 1.02 | 2410 | 85 | <1 | 2,510 | 89 | 132 |
| MAR | 183.57 | 602.26 | 0.34 | 1.12 | 1,830 | 65 | 31 | 2,550 | 90 | 136 |
| APR | 183.61 | 602.40 | 0.35 | 1.15 | 6,200 | 219 | 9 | 2,210 | 78 | 115 |
| MAY | 183.77 | 602.92 | 0.41 | 1.35 | 6,200 | 219 | 26 | 2,320 | 82 | 110 |
| JUN | 183.84 | 603.15 | 0.39 | 1.28 | 3,400 | 120 | 74 | 2,710 | 96 | 124 |
| JUL | 183.86 | 603.22 | 0.35 | 1.15 | 3,770 | 133 | 39 | 3,030 | 107 | 133 |
| AUG | 183.86 | 603.22 | 0.32 | 1.05 | 1,770 | 63 | 76 | 3,180 | 112 | 135 |
| SEP | 183.86 | 603.22 | 0.32 | 1.05 | 4,250 | 150 | 8 | 3,100 | 109 | 133 |
| OCT | 183.88 | 603.28 | 0.37 | 1.21 | 2,080 | 73 | 23 | 2,870 | 101 | 127 |
| NOV | 183.81 | 603.05 | 0.34 | 1.12 | 270 | 10 | 55 | 2,960 | 105 | 133 |
| DEC | 183.74 | 602.82 | 0.33 | 1.08 | 1,070 | 38 | 2 | 2,510 | 89 | 122 |
| **2020** | | | | | | | | | | |
| JAN | 183.71 | 602.72 | 0.38 | 1.25 | 350 | 12 | 15 | 2,460 | 87 | 127 |
| FEB | 183.64 | 602.49 | 0.37 | 1.21 | -840 | -30 | 92 | 2,430 | 86 | 128 |

Notes: $m^3/s$ = cubic meters per second tcfs = 1,000 cubic per second

[1] Water Levels are a mean of five gauges on Lake Superior, IGLD 1985

[2] Average levels are for the period 1918-2019, based on a mean of five gauges. Differences computed as meters and then converted to feet.

[3] Exceedance probabilities are based on 1900 - 2008.

[4] Outflows are rounded to the nearest 10 $m^3/s$.

[5] Average flows are for the period 1900 - 2008.

**TABLE 2: 2019-2020 Lakes Michigan-Huron Hydrologic Factors**

| Month | Levels | | | | Net Basin Supplies | | | Outflows | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Monthly Mean Recorded[1] | | Difference From Average[2] | | Monthly Mean Recorded | | Exceedance Probability[3] | Monthly Mean Recorded[4] | | Percent of Average[5] |
| | Meters | Feet | Meters | Feet | $m^3/s$ | tcfs | (%) | $m^3/s$ | tcfs | |
| **2019** | | | | | | | | | | |
| JAN | 176.81 | 580.09 | 0.51 | 1.67 | 2,120 | 75 | 37 | 5,290 | 187 | 116 |
| FEB | 176.83 | 580.15 | 0.55 | 1.80 | 4,640 | 164 | 8 | 5,270 | 186 | 119 |
| MAR | 176.86 | 580.25 | 0.56 | 1.84 | 5,370 | 190 | 44 | 6,040 | 213 | 124 |
| APR | 176.96 | 580.58 | 0.57 | 1.87 | 13,380 | 473 | 2 | 6,570 | 232 | 128 |
| MAY | 177.17 | 581.27 | 0.69 | 2.26 | 12,600 | 445 | 2 | 6,790 | 240 | 127 |
| JUN | 177.32 | 581.76 | 0.77 | 2.53 | 8,810 | 311 | 7 | 6,960 | 246 | 128 |
| JUL | 177.37 | 581.92 | 0.79 | 2.59 | 4,110 | 145 | 40 | 7,050 | 249 | 128 |
| AUG | 177.32 | 581.76 | 0.76 | 2.49 | -410 | -14 | 87 | 7,150 | 252 | 130 |
| SEP | 177.27 | 581.59 | 0.76 | 2.49 | 5,710 | 202 | 2 | 6,930 | 245 | 127 |
| OCT | 177.29 | 581.66 | 0.85 | 2.79 | 3,450 | 122 | 6 | 7,120 | 251 | 131 |
| NOV | 177.26 | 581.56 | 0.87 | 2.85 | 3,430 | 121 | 13 | 7,190 | 254 | 134 |
| DEC | 177.25 | 581.53 | 0.91 | 2.99 | 4,700 | 166 | 3 | 7,100 | 251 | 137 |
| **2020** | | | | | | | | | | |
| JAN | 177.26 | 581.56 | 0.96 | 3.15 | 5,680 | 201 | 2 | 7,070 | 250 | 155 |
| FEB | 177.25 | 581.53 | 0.97 | 3.18 | 2,180 | 77 | 57 | 7,180 | 254 | 162 |

Notes: $m^3/s$ = cubic meters per second tcfs= 1,000 cubic per second

[1] Water Levels are a mean of five gauges on Lake Superior, IGLD 1985

[2] Average levels are for the period 1918-2019, based on a mean of five gauges. Differences computed as meters and then converted to feet.

[3] Exceedance probabilities are based on 1900 - 2008.

[4] Outflows are rounded to the nearest 10 $m^3/s$.

[5] Average flows are for the period 1900 - 2008.

## TABLE 3
## COMPENSATING WORKS GATE CHANGES

| Date | Gate Change | Final Gate Settings * | Gate Equivalent (approx.) | Notes |
|---|---|---|---|---|
| *2019* | | | | |
| 6-May | Raised 11 - 14 | 2 - 10, 15, 16 open 26 cm (10 in.); 11 - 14 open 165 cm (65 in.) | 4 | Deviation strategy to better manage operational limits on hydropower flow capacity |
| 3-Jun | Temporarily closed 14, closed 15 - 16 | 2 - 9, 15 open 26 cm (10 in.); 10 open 71 cm (in.); 11 - 14 open 254 cm (100 in.); 16 open 5 cm (2 in.) | 6 | Gates temporarily adjusted to facilitate underwater inspections of the International Bridge piers; Continue deviation strategy to better manage operational limits on hydropower flow capacity; Sea lamprey trapping** |
| 5-Jun | Closed 9 - 14 | | | |
| 6-Jun | Temporarily closed 2 - 8 | | | |
| 7-Jun | Raised 10 - 14, partially opened 15 - 16 | | | |
| 18-Jul | Closed 7 - 8 | 2 - 6, 15 open 26 cm (10 in.); 10 open 71 cm (in.); 11 - 14 open 254 cm (100 in.); 16 open 5 cm (2 in.) | 5 | Gates 7-9 closed to facilitate concrete repair; Continue deviation strategy to better manage operational limits on hydropower flow capacity; Sea lamprey trapping** |
| 22-Jul | Closed 9 | | | |
| 5-Aug | Partially opened 9 - 10 | 2 - 7, 15 open 26 cm (10 in.); 8 open 122 cm (48 in.); 9 - 14 | 9 | Continue deviation strategy to better manage operational limits on hydropower flow capacity; |
| 6-Aug | Partially opened 7 - 8 | | | |
| 4-Sep | Raised 2 - 8 and partially opened 9 - 10 | 2 - 10 open 140 cm (55 in.) | 6 | Construction project to automate Gates 11 - 14; Deviation strategy to better manage operational limits on hydropower flow capacity and to offset effects of previous unintentional under-discharge deviations from Plan 2012 |
| 7-Oct | Closed 7 - 9 and partially opened 13 - 16 | 2 - 6 open 140 cm (55 in.); 10 - 16 open 91 cm (36 in.) | 6 | |
| | Closed 1 - 3 and partially opened 7 - 9 | 4 - 6 open 140 cm (55 in.); 7 - 16 open 91 cm (36 in.) | 6 | |
| | Partially opened 1 - 3 and lowered 4 - 6 | 2 - 16 open 91 cm (36 in.) | 7 | |
| 19-Nov | Lowered 2 - 8 | 2 - 8 open 81 cm (32 in.); 9 - 16 open 91 cm (26 in.) | 6 | Gate settings adjusted to meet Plan 2012 flow and due to expected limited capacity of the hydropower plants |
| | Lowered 9 - 16 | 2 - 16 open 81 cm (32 in.) | 6 | |
| | Raised 9 - 14 | 2 - 8 and 15 - 16 open 81 cm (32 in.); 9 - 14 open 97 cm (38 in.) | 6 | |
| | Raised 9 - 14 | 2 - 8 and 15 - 16 open 81 cm (32 in.); 9 - 14 open 173 cm (68 in.) | 9 | |
| 3-Dec | Lowered 2 - 10 and 15-16 | 2 - 10 and 15 - 16 open 26 cm (10 in.); 11 - 14 open 173 cm (68 in.) | 5 | Deviation strategy in consideration of the continuing high water levels and to accommodate ongoing maintenance at the hydropower plants |
| 5-Dec | Lowered 11 - 14 | 2 - 16 open 26 cm (10 in.) | 2 | |

* Gate 1 remained open 20 cm (8 in.) throughout reporting period (fishery requirement of approximately 15 $m^3/s$) except during temporary closure on 23 August.

** Gate 16 set to 5 cm (2 in.) open at request of US Fish and Wildlife Service to allow for sea lamprey trapping

**TABLE 4**
**MONTHLY DISTRIBUTION OF LAKE SUPERIOR OUTFLOWS (cubic meters/second)**

| | POWER CANALS | | | | | NAVIGATION CANALS | | | DOMESTIC USAGE | | | | FISHERY | TOTAL LAKE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year and Month | U.S. Gov't Hydro | Cloverland | U.S. Total | Brookfield | Total Power | United States | Canada | Total Navigation | Sault Ste. Marie U.S. + CAN | Algoma Steel | St. Marys Paper | Total Domestic Usage | St. Marys Rapids | Superior Outflow |
| **2019** | | | | | | | | | | | | | | |
| JAN | 381 | 742 | 1123 | 908 | 2031 | 4.8 | 0.0 | 5 | 0.2 | 3.5 | 0 | 4 | 333 | 2373 |
| FEB | 385 | 718 | 1103 | 1068 | 2171 | 0.0 | 0.0 | 0 | 0.2 | 3.5 | 0 | 4 | 331 | 2506 |
| MAR | 397 | 749 | 1146 | 1069 | 2215 | 3.7 | 0.0 | 4 | 0.2 | 3.2 | 0 | 3 | 331 | 2553 |
| APR | 262 | 766 | 1028 | 836 | 1864 | 9.2 | 0.0 | 9 | 0.2 | 3.0 | 0 | 3 | 333 | 2209 |
| MAY | 397 | 688 | 1085 | 540 | 1625 | 11.3 | 0.2 | 10 | 0.2 | 3.2 | 0 | 3 | 679 | 2319 |
| JUN | 391 | 651 | 1042 | 717 | 1759 | 11.7 | 1.1 | 13 | 0.2 | 3.2 | 0 | 3 | 931 | 2706 |
| JUL | 396 | 781 | 1177 | 843 | 2020 | 12.0 | 1.5 | 14 | 0.3 | 3.2 | 0 | 3 | 992 | 3029 |
| AUG | 397 | 786 | 1183 | 634 | 1817 | 12.4 | 1.6 | 14 | 0.2 | 3.2 | 0 | 3 | 1342 | 3176 |
| SEP | 307 | 771 | 1078 | 684 | 1762 | 11.9 | 1.0 | 13 | 0.2 | 3.3 | 0 | 4 | 1324 | 3102 |
| OCT | 339 | 770 | 1109 | 702 | 1811 | 10.3 | 0.3 | 11 | 0.2 | 3.1 | 0 | 3 | 1046 | 2871 |
| NOV | 386 | 763 | 1149 | 869 | 2018 | 9.7 | 0.0 | 10 | 0.2 | 3.1 | 0 | 3 | 933 | 2964 |
| DEC | 367 | 753 | 1120 | 1121 | 2241 | 8.8 | 0.0 | 9 | 0.2 | 3.2 | 0 | 3 | 235 | 2507 |
| **2020** | | | | | | | | | | | | | | |
| JAN | 350 | 755 | 1105 | 1067 | 2172 | 4.2 | 0.0 | 4 | 0.2 | 3.1 | 0 | 3 | 195 | 2374 |
| FEB | 375 | 742 | 1117 | 1116 | 2233 | 0.0 | 0.0 | 0 | 0.2 | 3.2 | 0 | 3 | 193 | 2429 |

NOTE: (1) Power canals columns include flows through power plants and spillways

**TABLE 5**
**MONTHLY DISTRIBUTION OF LAKE SUPERIOR OUTFLOWS (cubic feet/second)**

| | POWER CANALS | | | | | NAVIGATION CANALS | | | DOMESTIC USAGE | | | | FISHERY | TOTAL LAKE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year and Month | U.S. Gov't Hydro | Cloverland | U.S. Total | Brookfield | Total Power | United States | Canada | Total Navigation | Sault Ste. Marie U.S. + CAN | Algoma Steel | St. Marys Paper | Total Domestic Usage | St. Marys Rapids | Superior Outflow |
| **2018** | | | | | | | | | | | | | | |
| JAN | 13,455 | 26,203 | 39,658 | 32,066 | 71,724 | 106 | 0 | 106 | 8 | 124 | 0 | 131 | 11,760 | 83,785 |
| FEB | 13,596 | 25,356 | 38,952 | 37,716 | 76,668 | 0 | 0 | 0 | 7 | 124 | 0 | 131 | 11,689 | 88,490 |
| MAR | 14,020 | 26,451 | 40,471 | 37,751 | 78,222 | 127 | 0 | 127 | 8 | 113 | 0 | 121 | 11,689 | 90,163 |
| APR | 9,252 | 27,051 | 36,303 | 29,523 | 65,827 | 325 | 0 | 325 | 8 | 106 | 0 | 114 | 11,760 | 78,025 |
| MAY | 14,020 | 24,296 | 38,316 | 19,070 | 57,386 | 360 | 11 | 371 | 8 | 113 | 0 | 121 | 23,979 | 81,892 |
| JUN | 13,808 | 22,990 | 36,798 | 25,321 | 62,118 | 378 | 42 | 420 | 8 | 113 | 0 | 121 | 32,878 | 95,569 |
| JUL | 13,985 | 27,581 | 41,565 | 29,770 | 71,336 | 611 | 67 | 678 | 9 | 113 | 0 | 122 | 35,032 | 106,966 |
| AUG | 14,020 | 27,757 | 41,777 | 22,389 | 64,167 | 692 | 60 | 752 | 8 | 113 | 0 | 121 | 47,392 | 112,175 |
| SEP | 10,842 | 27,228 | 38,069 | 24,155 | 62,224 | 417 | 35 | 452 | 7 | 117 | 0 | 124 | 46,757 | 109,561 |
| OCT | 11,972 | 27,192 | 39,164 | 24,791 | 63,955 | 367 | 11 | 378 | 7 | 109 | 0 | 117 | 36,939 | 101,385 |
| NOV | 13,631 | 26,945 | 40,577 | 30,688 | 71,265 | 339 | 0 | 339 | 8 | 109 | 0 | 117 | 32,949 | 104,673 |
| DEC | 12,960 | 26,592 | 39,552 | 39,588 | 79,140 | 339 | 0 | 339 | 7 | 113 | 0 | 120 | 8,299 | 88,548 |
| **2019** | | | | | | | | | | | | | | |
| JAN | 12,400 | 26,700 | 39,100 | 37,700 | 76,800 | 170 | 0 | 170 | 7 | 109 | 0 | 106 | 6,900 | 83,800 |
| FEB | 13,200 | 26,200 | 39,400 | 39,400 | 78,800 | 0 | 0 | 0 | 7 | 113 | 0 | 106 | 6,800 | 85,800 |

NOTE: (1) Power canals columns include flows through power plants and spillways
(2) Flows for individual users were originally coordinated in m3/s, and are converted here to U.S. customary units (cfs) and rounded to 3 signficant figures.
(3) Total flow for each category and total Lake Superior flow in this table are computed from the individual flows in cfs.

Respectfully submitted,


Mr. Jean-François Cantin
Member for Canada

Mr. Stephen Durrett
Member for United States