International Niagara Board of Control

One Hundred Thirty Sixth Semi-Annual Progress Report

to the

International Joint Commission

Covering the Period September 1, 2020 through February 28, 2021

Executive Summary

The level of Lake Erie began the reporting period with a September monthly mean level 64 cm (25 inches) above its 1918-2020 period-of-record, long-term average level for the month. The level of Lake Erie remained above average on a monthly basis throughout the remainder of the reporting period. Water levels did recede over the course of the reporting period though and the February mean water level was 56 cm (22 in) above average (Section 2). While still well above average monthly levels, this is a reduction of 34 cm from February 2020 when the February mean level was 90 cm (35 inches) above average.

The level of the Chippawa–Grass Island Pool (CGIP) is regulated under the International Niagara Board of Control's 1993 directive. The Power Entities—Ontario Power Generation (OPG) and the New York Power Authority (NYPA)—were able to comply with the board's directive during the reporting period, except for one occurrence on 15 November 2020. The board approved the INWC's recommendation that this exceedance was acceptable due to the abnormally high flows in the Niagara River resulting from the high water levels of Lake Erie and a wind driven seiche event (Section 3).

Gauges were operating normally during most of the reporting period to provide flow measurements over Niagara Falls. The only interruption to consistent water readings occurred during a sustained power outage at the Fort Erie gauge from 15 November 2020 to 16 November 2020. This power outage resulted from the high winds associated with the seiche event on Lake Erie (Section 4).

During this reporting period, flow over Niagara Falls did not fall below the minimum Treaty requirements (Section 5).

During the reporting period, the Niagara River flow at Queenston averaged 7,084 m^3/s (250,170 cfs), which was 1,416 m^3/s (50,010 cfs) above the 1900-2020 average of 5,668 m^3/s (200,160 cfs) for the same period (Section 7).

Discharge measurements are regularly scheduled in the Niagara River and Welland

Canal as part of a program to verify the gauge ratings used to determine flow in these channels for water management purposes. There were no regularly scheduled discharge measurements completed this reporting period (Section 8).

Installation of the Lake Erie-Niagara River Ice Boom for the 2020-2021 ice season was completed on December 12, 2020. NYPA requested authority to initiate installation early in 2020 due to anticipated scheduling difficulties surrounding the COVID -19 pandemic. Authority was granted to begin installation as early as 30 November 2020, but actual installation commenced on 10 December. The 2020-2021 ice season was shorter than average but also resulted in slightly higher than average ice coverage on Lake Erie in February due to the cold arctic air that moved into the basin. (Section 10).

New York State Parks is in the preliminary design phase of rehabilitation/reconstruction of two bridges spanning the American Falls Channel. Preliminary plans have been reviewed by members of the INWC. New York State Parks has indicated they plan to pursue a permit from the US Department of State. The board will continue to review the plans as requested and advise the IJC of the potential for impact on the operation of the CGIP in accordance with the board's 1993 directive (Section 11).

The board held a virtual public webinar in July of 2020 in coordination with the two other International Great Lakes Boards and the IJC. This webinar was very successful and the board will look to schedule another multi-board webinar style meeting for the summer of 2021 (Section 12).

COVER: Lake Erie Ice Boom, February 2021 (Photo: Paul Pasquarello, NYPA)

Table of Contents

List of Tables

List of Figures

Enclosures

INTERNET SITES

International Joint Commission
https://www.ijc.org/en

International Niagara Board of Control

English: https://ijc.org/en/nbc

French: https://ijc.org/fr/ccrn

Lake Erie-Niagara River Ice Boom
https://iceboom.nypa.gov/

INTERNATIONAL NIAGARA BOARD OF CONTROL

Cincinnati, Ohio
Burlington, Ontario

March 26, 2021

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

Commissioners:

1. General

The International Niagara Board of Control (the board) was established by the International Joint Commission (IJC) in 1953. The board provides advice to the IJC on matters related to the IJC's responsibilities for water levels and flows in the Niagara River. The board's main duties are to ensure the operation of the Chippawa-Grass Island Pool (CGIP) upstream of Niagara Falls within the limits of the Board’s 1993 directive and provide oversight of the operation of the Lake Erie-Niagara River Ice Boom at the outlet of Lake Erie. The board also collaborates with the International Niagara Committee (INC), a body created by the 1950 Niagara Treaty to determine the amount of water available for Niagara Falls and hydroelectric power generation.

The board is required to submit written reports to the IJC at its semi-annual meetings in the spring and fall of each year. In accordance with this requirement, the Board herewith submits it’s One Hundred Thirty Sixth Semi-Annual Progress Report, covering the reporting period September 1, 2020 to February 28, 2021.

All elevations in this report are referenced to the International Great Lakes Datum 1985 (IGLD 1985). Values provided are expressed in metric units, with approximate customary units (in parentheses) for information purposes only. Monthly Lake Erie water levels are based on a network of four gauges to better represent the average level of the lake.

2. Basin Conditions

The level of Lake Erie was above average throughout the reporting period. It began the reporting period with a September mean level at 64 cm (25.2 inches) above its 1918–2020 period-of-record long-term average level for the month. Between September and February, the monthly mean lake level on average lost 26 cm (10.2 inches), which is more than the average lake declines of 18 cm (7.4 inches) during this period. Lake Erie levels ended the reporting period with February mean water level 56 cm (22.0 inches) above average. Recorded monthly water levels for the period September 2020 through February 2021 are shown in Table 1 and depicted graphically in Figure 1. The following paragraphs provide more detail on the main factors that led to the water level changes observed on Lake Erie during the reporting period.

Table 1: Monthly average Lake Erie water levels based on a network of four water level gauges and the International Great Lakes Datum (1985).

	Meters			Feet		
Month	Recorded* 2020-2021	Average 1918-2020	Departure	Recorded* 2020-2021	Average 1918-2020	Departure
September	174.83	174.19	0.64	573.59	571.49	2.10
October	174.72	174.09	0.63	573.23	571.16	2.17
November	174.65	174.02	0.63	573.00	570.93	2.07
December	174.65	174.01	0.64	573.00	570.90	2.10
January	174.69	174.02	0.67	573.13	570.93	2.19
February	174.57	174.01	0.56	572.74	570.90	1.84

* Provisional

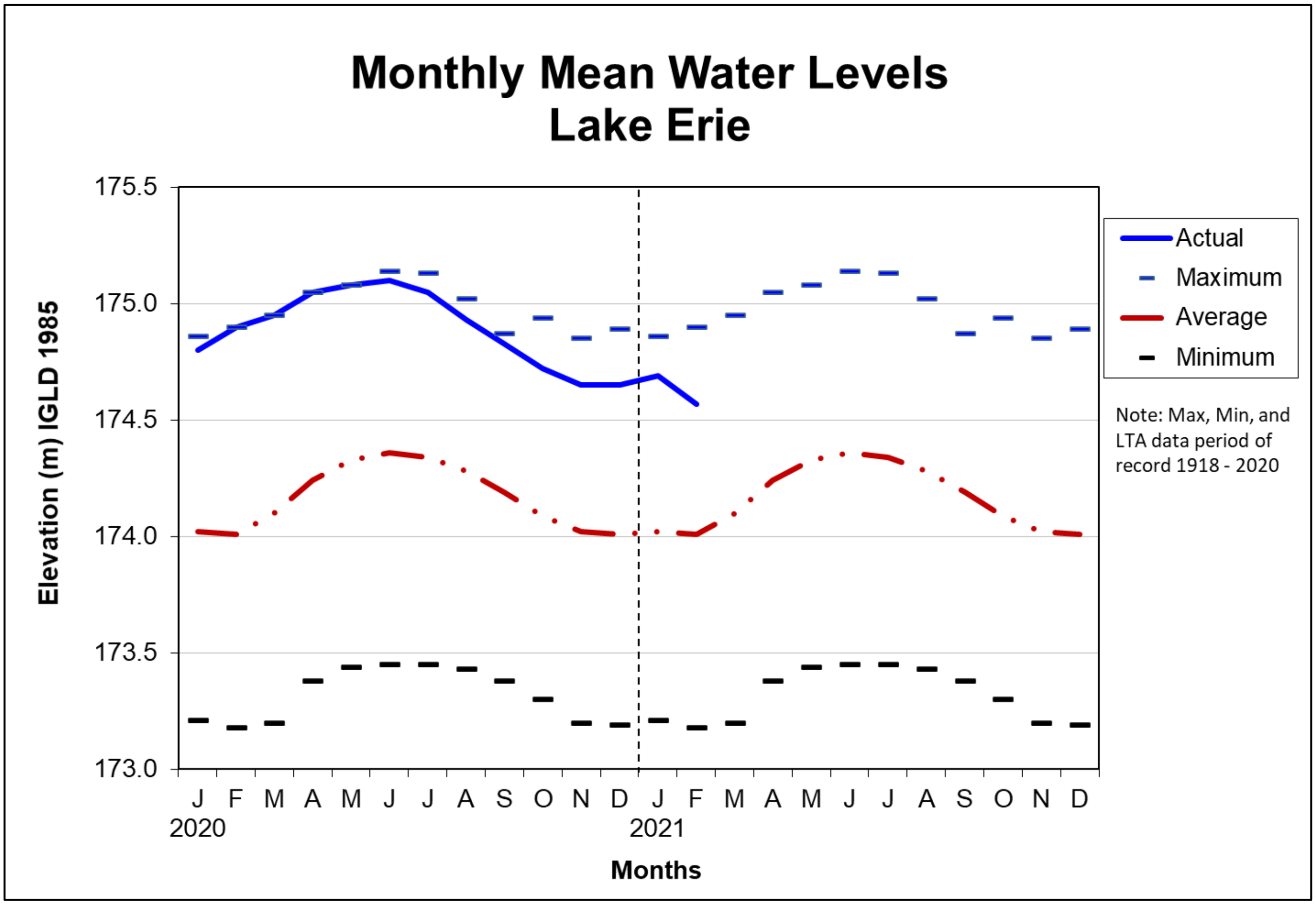


Figure 1: Lake Erie mean monthly and, long-term maximum, minimum and average water levels.

Lake Erie receives water from its local drainage basin and from upstream lakes. The water supplied to a lake from its local drainage basin is referred to as its net basin supply (NBS). A lake's NBS is the sum of the amount of water the lake receives from precipitation falling directly on its surface and runoff (including snow melt) from its surrounding land area, minus the amount of water that evaporates from its surface. The sum of Lake Erie's NBS and the inflow from Lake Michigan–Huron via the St. Clair-Detroit Rivers system is its net total supply (NTS).

Precipitation is a major contributor to NBS, both directly on the lake and through runoff due to rain and snowmelt. Recent precipitation data and departures from the long-term average are shown in Table 2 and depicted graphically in Figure 2. Overall, precipitation on the Lake Erie basin was dryer than average for the reporting period, with the basin receiving 29.7 cm (11.7 inches) of precipitation from September 2020 to February 2021, which is approximately 10.7 percent below average for the period. Precipitation was below average all months during the reporting period, except for October.

TABLE 2 – MONTHLY AVERAGE PRECIPITATION ON THE LAKE ERIE BASIN

	Centimeters			Inches			
Month	Recorded* 2020-2021	Average 1900-2017	Departure	Recorded* 2020-2021	Average 1900-2017	Departure	Departure (in percent)
September	6.22	8.20	-1.98	2.45	3.23	-0.78	-24
October	7.65	7.20	0.45	3.01	2.83	0.18	6
November	6.48	7.30	-0.82	2.55	2.87	-0.32	-11
December	3.81	6.80	-2.99	1.50	2.68	-1.18	-44
January	3.07	6.30	-3.23	1.21	2.48	-1.27	-51
February	2.46	5.30	-2.84	0.97	2.09	-1.12	-54

* Provisional

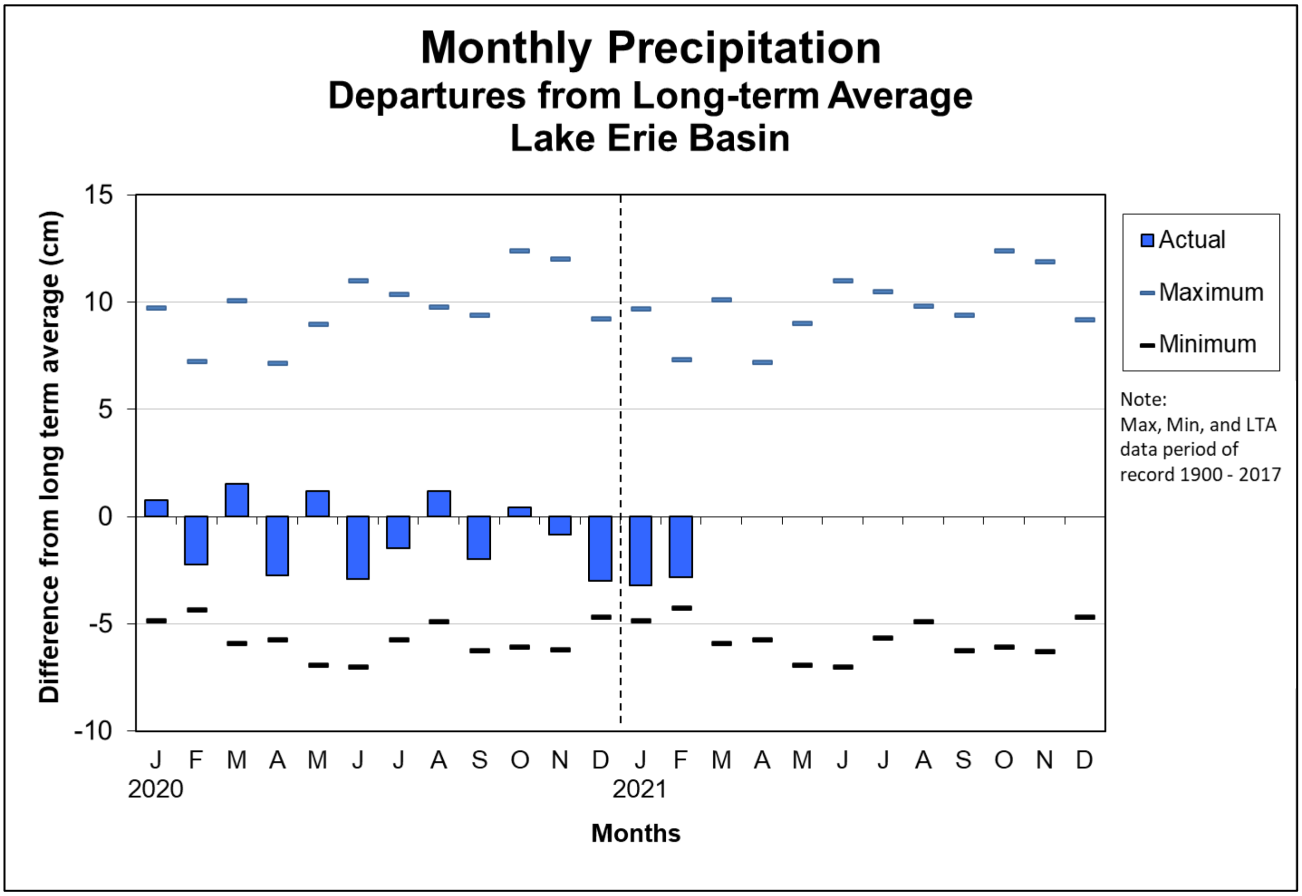


Figure 2: Monthly actual, maximum and minimum precipitation departures from the long-term average on Lake Erie basin.

The recent NBS to Lake Erie is shown relative to average on a monthly basis in Figure 3. A negative NBS value indicates that more water left the lake during the month due to evaporation than entered it through precipitation and runoff. On Lake Erie, average NBS is negative from August through November. For the remainder of the year, average combined precipitation and runoff are greater than the water lost to evaporation. During the reporting period, the lake's NBS was near average for October, November, and December and well below average for September, January, and February.

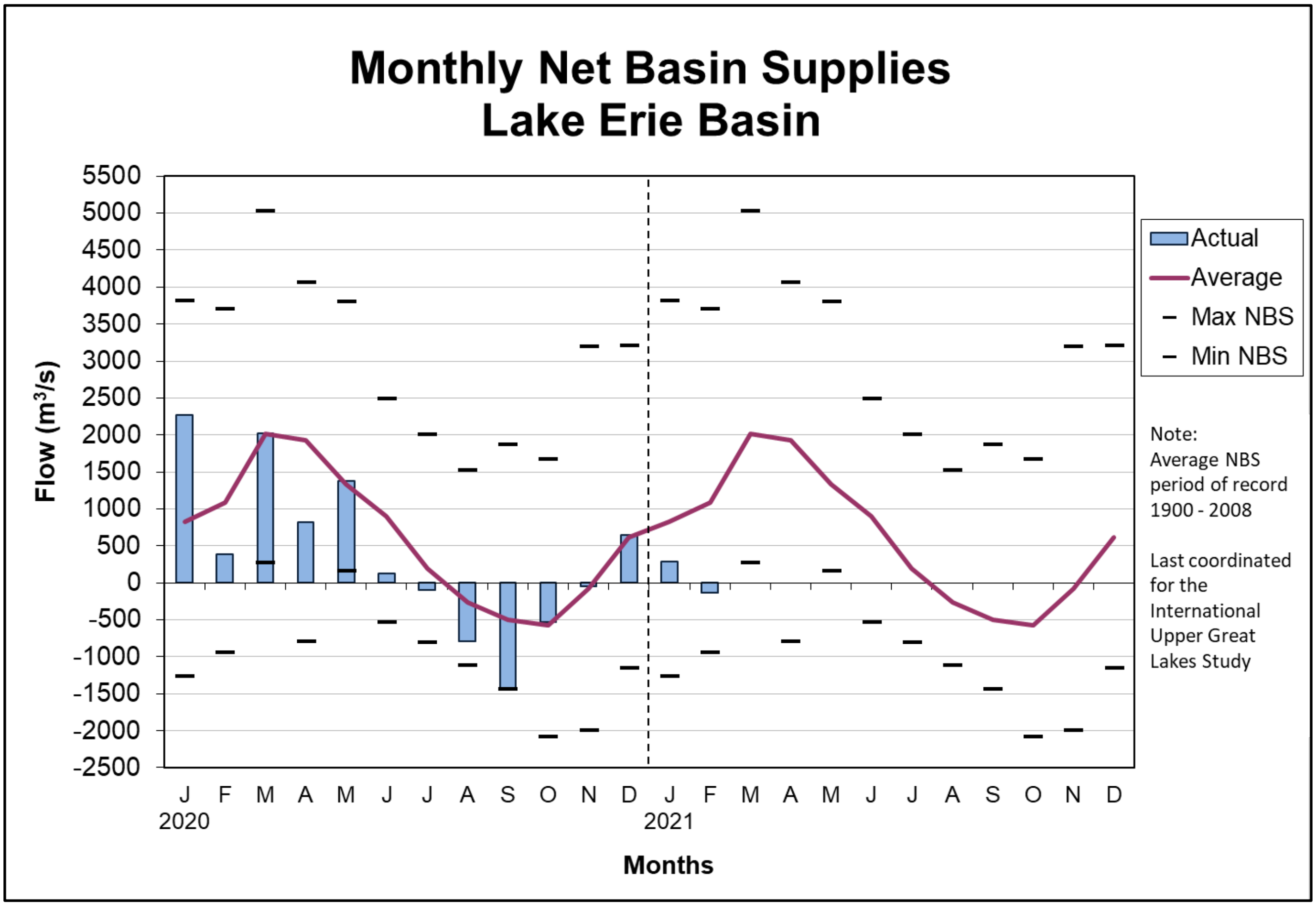


Figure 3: Mean monthly and long-term maximum, minimum and average net basin supplies on Lake Erie basin.

Inflow via the Detroit River is the major portion of Lake Erie's NTS, and is greatly influenced by the level of Lake Michigan–Huron. Similar to the last reporting period, the level of Lake Michigan–Huron was at very high levels throughout the reporting period. The high lake levels resulted in above average flows into the Detroit River for the entire reporting period. The monthly mean water level on Lake Michigan–Huron and the monthly mean flow in the Detroit River are provided in Figures 4 and 5, respectively.

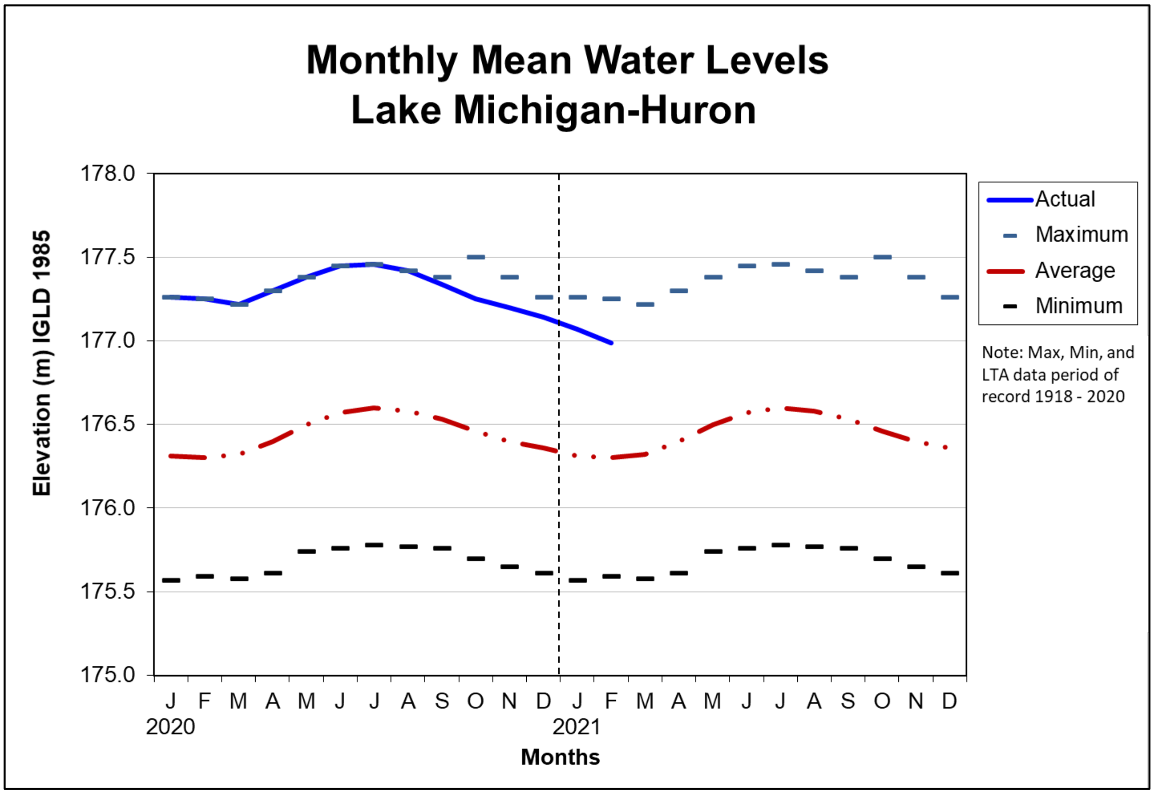


Figure 4: Lake Michigan-Huron mean monthly, and long-term maximum, minimum and average water levels.

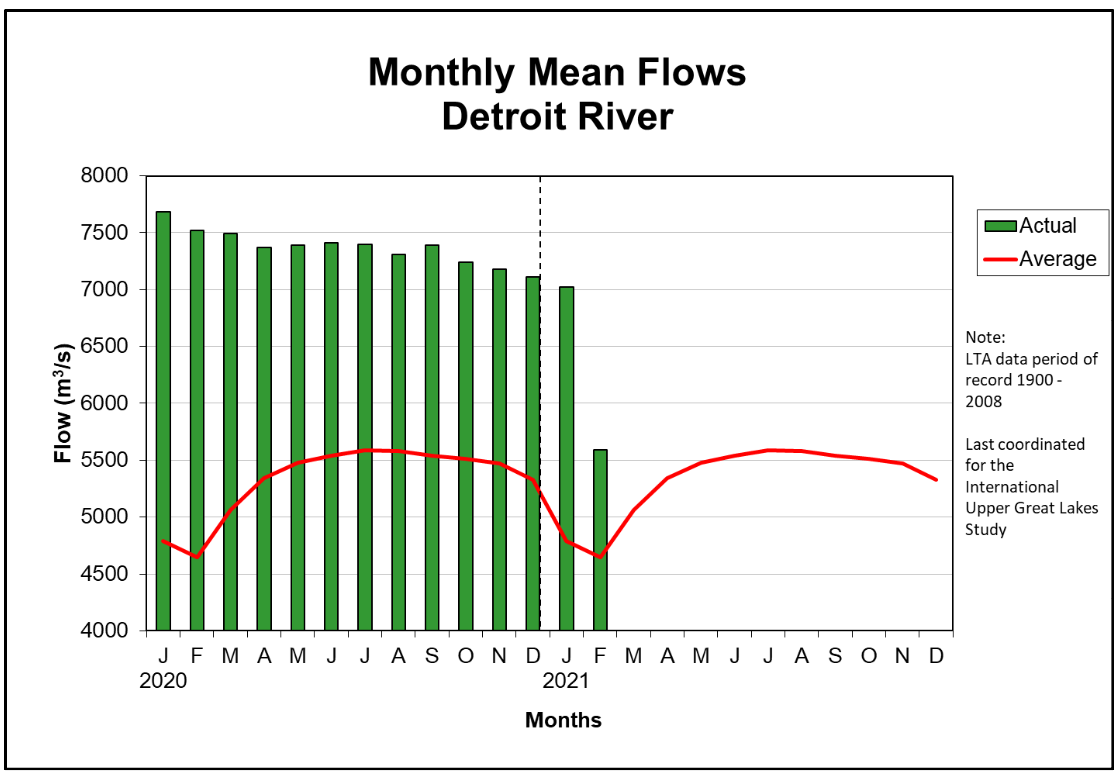


Figure 5: Detroit River mean monthly and long-term average flows.

Very high inflows from Lake Michigan–Huron via the Detroit River combined with Lake Erie's NBS, resulted in above-average NTS throughout the reporting period except for the month of February. Inflows from Lake Michigan- Huron were significantly reduced in February due to the formation of a large ice dam on the St. Clair River just downstream of Algonac, MI. This ice dam reduced flows into Lake St. Clair and subsequently Lake Erie contributing to water level reductions on both Lakes for the month of February. The recent NTS to Lake Erie is depicted relative to average in Figure 6.

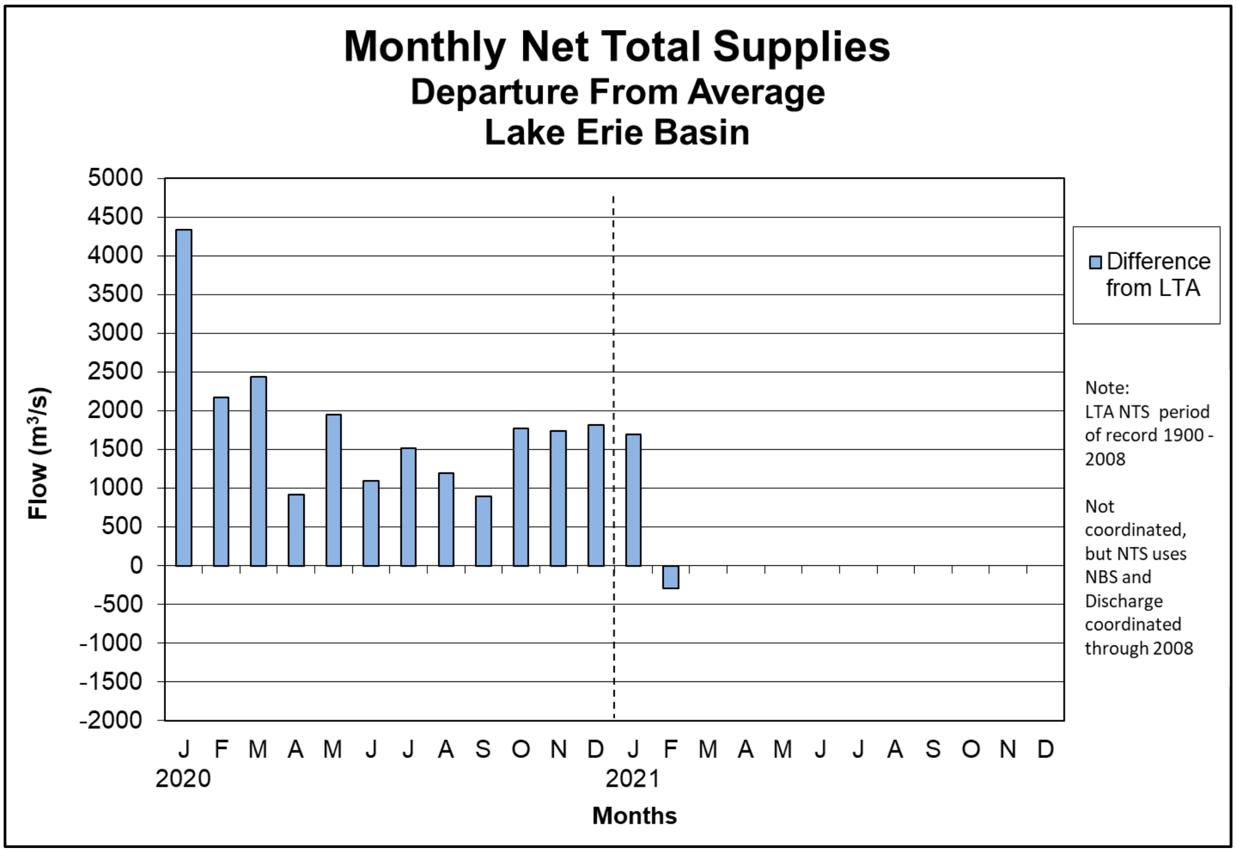


Figure 6: Lake Erie basin monthly net total supplies difference from the long-term average.

Lake Erie discharges water to Lake Ontario through the Niagara River and the Welland Canal. The portion of Lake Erie outflow that is diverted through the Welland Canal is relatively small, about 4 to 5% of the total Lake Erie outflow, and is used for navigation purposes through the canal and generation of electricity at Ontario Power Generation's (OPG's) DeCew hydroelectric plants. Most of the outflow from Lake Erie occurs through the Niagara River and depends on the level of the lake at its outlet. Generally speaking, above-average lake levels result in above-average outflow, and below-average lake levels lead to below-average outflow. Flow in the river is also influenced by ice during the winter and aquatic plant growth during the summer, both of which can reduce the flow. Additionally, seasonal trends in prevailing winds typically raise levels at the eastern end of Lake Erie relative to levels at the western end and the lake's average level. Recent monthly outflow via the Niagara River is graphically depicted in Figure 7. The lake's well-above average water level conditions from September 2020 through February 2021 resulted in Niagara River flow at Buffalo also being well above average during those months. Flows ranged from 6,930 m^3/s (244,700 cfs) to 7,470 m^3/s (263,800 cfs) (Figure 7) due to above average levels on Lake Erie.

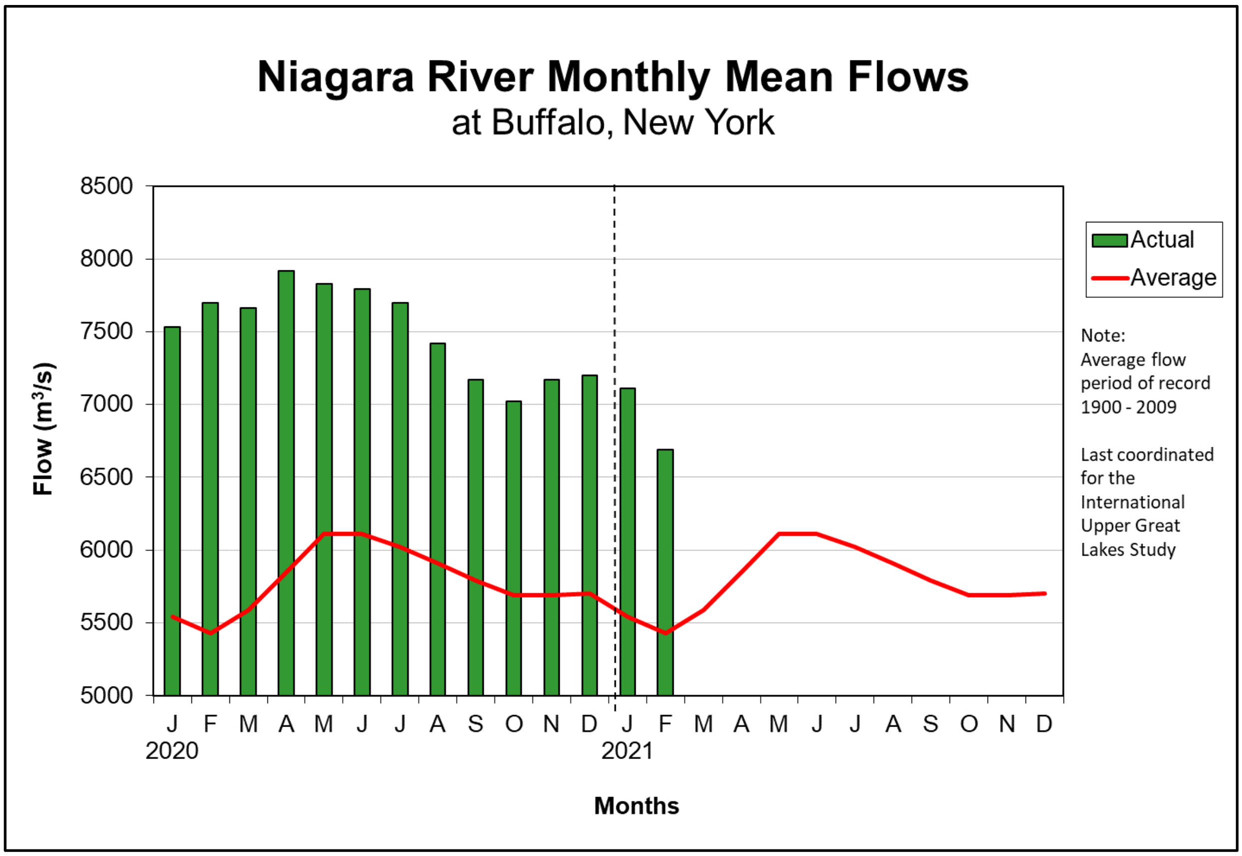


Figure 7: Niagara River mean monthly and long-term average flows at Buffalo, New York.

The six-month water level forecast prepared at the beginning of March by the U.S. Army Corps of Engineers (USACE) and Environment and Climate Change Canada (ECCC) indicates that Lake Erie water levels will likely remain well above average throughout the spring and summer. This forecast is made using historical water supplies and current lake levels, and it should be noted that the accuracy of this prediction is limited and actual conditions could vary from the prediction.

3. Operation and Maintenance of the International Niagara Control Works

**Water levels in the CGIP are regulated in accordance with the board's 1993 directive (revised 2017). The directive requires that the Power Entities– OPG and the New York Power Authority (NYPA)–operate the International Niagara Control Works (INCW) to ensure the maintenance of an operational long-term average CGIP level of 171.16 m (561.55 feet) to reduce adverse high or low water levels in the CGIP. The Directive also establishes tolerances for the CGIP's level as measured at the Material Dock gauge.

During this reporting period, one exceedance of the board's Directive occurred on November 15,2020 at 23:00 hours EST when the elevation of the Chippawa-Grass Island Pool went above the abnormal flow conditions limit of 171.77 meters (563.55 feet) by 5 cm (1.97 in). As a result of strong westerly winds on November 15, 2020, the level of Lake Erie at Buffalo rose rapidly by 2.35 m (7.71 feet), resulting in a rapid rise in the flow in the Niagara River, with the hourly flow rising from 6,699 m^3/s at 10:00 on November 15 to a maximum hourly flow of 11,101 m^3/s at 21:00. Hourly flows receded to 7254 m^3/s at 03:00 on November 16. Since the Directive was put in place in 1973 there have been only six reported exceedances of the limits in the Directive prior to this reporting period, three of these have been a result of the water level in the CGIP exceeding the upper limit. The INWC was not aware of any negative impacts to riparian interests due to the high water level in the CGIP. The tolerances of the Directive in place for this reporting period appear to continue to function well in high water periods. The INWC and board will continue to monitor and assess if abnormally high flows continue.

The accumulated deviation of the CGIP's level from March 1, 1973 through February 28, 2021 was -0.05 meter-months above the long-term operational average elevation. The accumulated deviation was within the maximum permissible accumulated deviation of ±0.91 meter-months for this reporting period.

Tolerances for regulation of the CGIP were suspended on a number of occasions for ice, and abnormally high flows during the reporting period. Ice suspensions occurred on February 8-16, 19-20, 22-23, 25-26 (15). Suspensions for abnormally high flows occurred on September 7,30, October 1, 15, 16, November 1-3, 15,16, December 09, 25, 26, 28 and February 5-7 (17).

Due to the persistence of abnormally high flows throughout the reporting period, the board and INWC continued to review the 1993 Directive to assess whether the Directive would need to be updated in light of the high water conditions on Lake Erie. The Directive was reviewed after the high flow conditions of 1986 and the limits were found to be satisfactory. Comparing operations of the INCW during this reporting period to those of 1986 found levels of the CGIP less impacted by the high Niagara River flows. After review and discussion it was concluded that the current version of the 1993 Directive adequately addresses the current high water conditions and no updates or revisions to the Directive is recommended at this time. Currently water levels of the Great Lakes in general are receding. Should high flow conditions in the Niagara River continue, the board will continue to monitor as abnormally high flows continue.

The locations of the water level gauges on the Niagara River are shown in Enclosure 1. Recorded daily Material Dock water levels covering the reporting period are shown in Figure 8.

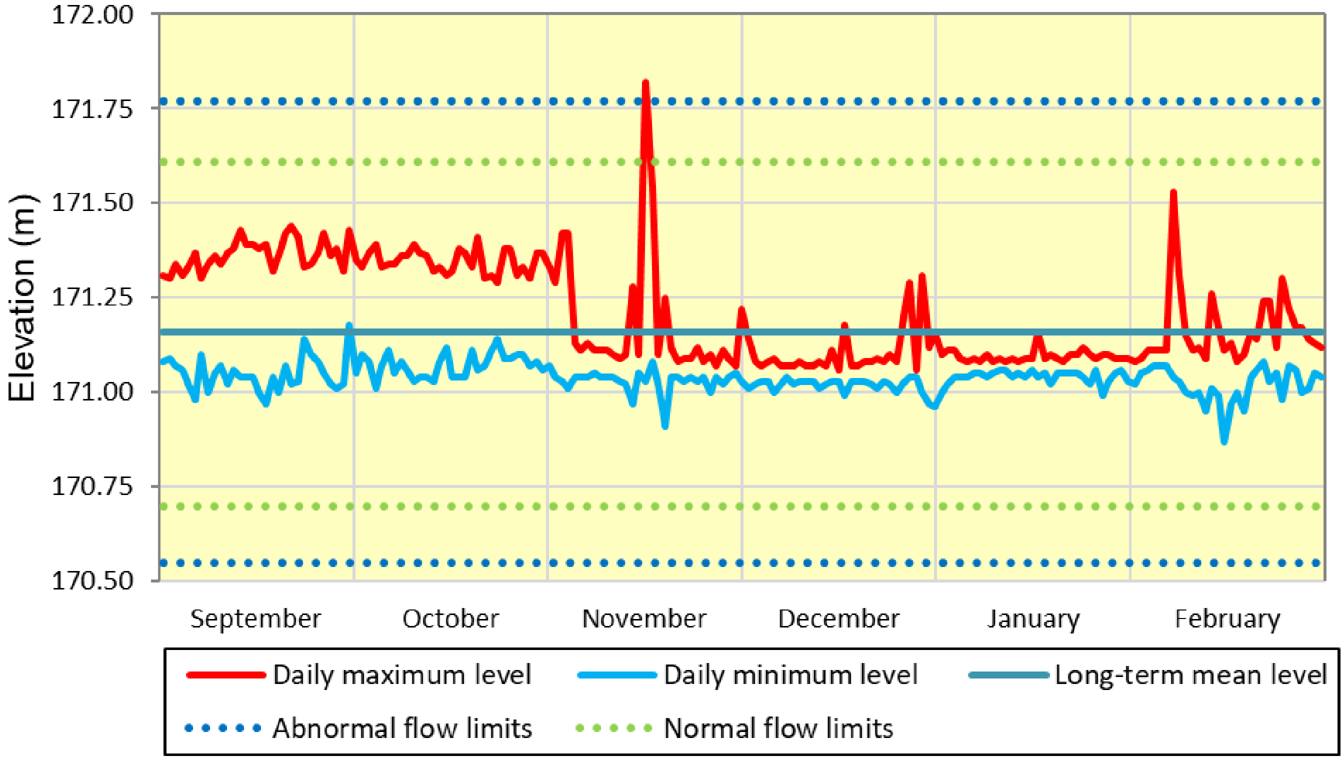


Figure 8: Niagara River daily maximum and minimum water levels at Material Dock gauge from September 2020 through February 2021

4. Gauging Stations

The Fort Erie, Material Dock and Ashland Avenue gauges (as shown in Enclosure 1) are used to determine flows in the Niagara River, monitor the CGIP levels and monitor the flow over Niagara Falls. The Buffalo, Slater's Point, and U. S. National Oceanic and Atmospheric Administration (NOAA) Ashland Avenue gauges are used as alternatives in the event of primary gauge failure. The Slater's Point and Material Dock gauges are owned and operated by the Power Entities. NOAA and the Power Entities own and operate water level gauges at the Ashland Avenue location. All gauges required for the operation of the INCW were in service during this reporting period, except the Fort Erie gauge had a power outage on November 15, 2020 beginning at 20:10 and lasting through November 16 ending at 08:22. This power outage was a result of the high wind event that caused a seiche on Lake Erie.

5. Flow over Niagara Falls

The International Niagara Treaty of 1950 sets minimum limits on the flow of water over Niagara Falls. During the tourist season (April-October) day time hours, the required minimum Niagara Falls flow is 2,832 cubic metres per second (m^3/s) (100,000 cubic feet per second (cfs)). At night and at all times during the non-tourist season months (November-March), the required minimum Falls flow is 1,416 m^3/s (50,000 cfs). Appropriate operation of the INCW, in conjunction with power diversion operations, maintains sufficient flow over the Falls to meet the requirements of the 1950 Niagara Treaty. During this reporting period, there were no flow violations and flows over Niagara Falls did not fall below the minimum Treaty requirements. The recorded daily flow over Niagara Falls, covering the period September 2020 through February 2021, is shown in Figure 9.

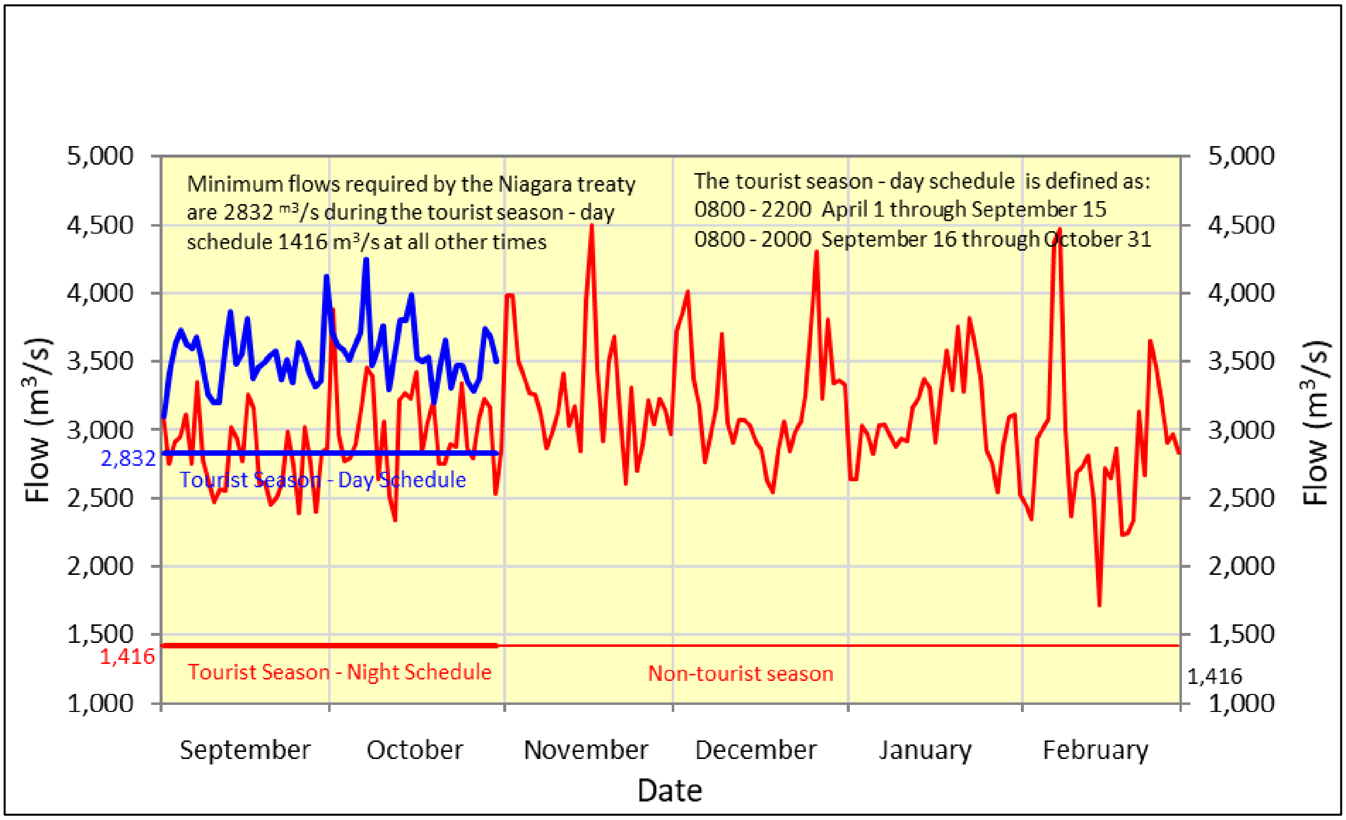


Figure 9: Daily flow over Niagara Falls (flow at Ashland Avenue in m³/s from September 2020 through February 2021).

6. Falls Recession

As per article 2.B.b of the Niagara Board's Directive from the IJC, the board monitors the Horseshoe Falls for changes in its crestline that might result in a broken curtain of water along its crestline or suggest the formation of a notch in the crestline. The formation of a notch could signal a period of rapid Falls recession that has not been seen in more than a century. The review of recently available imagery (the most recent image found was taken on February 26, 2021) suggests that no notable changes in the crestline of the Falls have occurred.

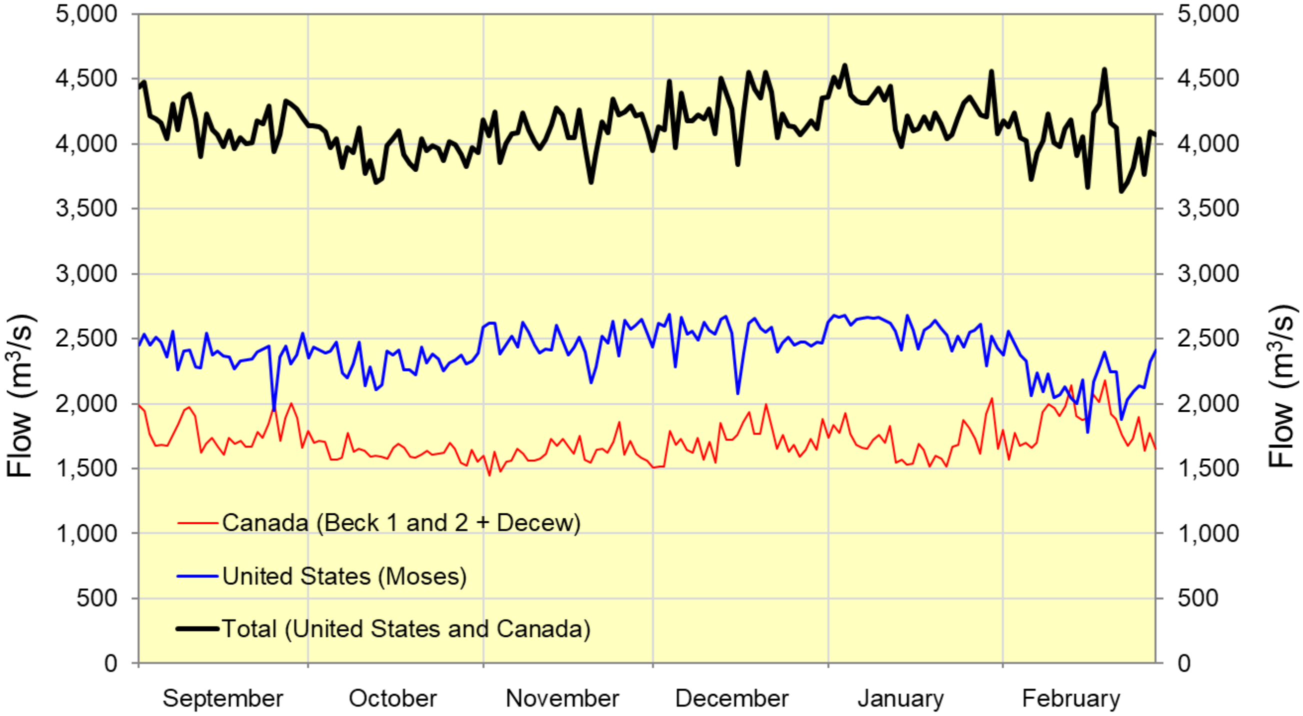
7. Diversions and Flow at Queenston

Diversion of water from the Niagara River for power purposes is governed by the terms and conditions of the 1950 Niagara Treaty. The Treaty prohibits the diversion of

Niagara River water that would reduce the flow over Niagara Falls for scenic purposes to below the amounts specified previously in Section 5 of this report. The hydroelectric power plants, OPG's Sir Adam Beck (SAB) I and II in Canada and NYPA's Robert Moses Niagara Power Project in the United States, withdraw water from the CGIP upstream of Niagara Falls and discharge it into the lower Niagara River at Queenston, ON and Lewiston, NY, respectively. During the period of September 2020 through February 2021, diversion to the SAB I and II plants averaged 1,516 m^3/s (53,540 cfs) and diversion to the Robert Moses Niagara Power Project averaged 2,413 m^3/s (85,210 cfs).

Diversion from the Welland Canal to OPG's DeCew Falls Generating Stations averaged 199.1 m^3/s (7,030 cfs) for the period September 2020 through February 2021.

Records of diversions for power generation covering the period September 2020 through February 2021 are shown in Figure 10.



Note: For purposes of the Niagara treaty, the Canadian diversion includes water diverted from the Niagara River and water diverted through the Welland ship canal for power purposes

Figure 10: Daily diversion of Niagara River water for power purposes from September 2020 through February 2021.

The monthly average Niagara River flows at Queenston, Ontario, for the period September 2020 through February 2021, and departures from the 1900–2020 long-term average are shown in Table 3. Maximum and minimum monthly average flows for the 1900–2020 period of record are shown in Table 4. During the period September 2020 through February 2021, the flow at Queenston averaged 7,084 m^3/s (250,170 cfs), which was 1,416 m^3/s (50,010 cfs) above the 1900-2020 average of 5,668 m^3/s (200,160 cfs) for the same period. Monthly values ranged between 6,749 m^3/s (238,340 cfs) and 7,248 m^3/s (255,960 cfs).

Table 3: Monthly Niagara River flows at Queenston.

	Cubic Meters per Second			Cubic Feet per Second		
Month	Recorded 2020-2021	Average 1900-2020	Departure	Recorded 2020-2021	Average 1900-2020	Departure
September	7155	5766	1389	252,680	203,620	49,060
October	7036	5691	1345	248,470	200,980	47,490
November	7164	5713	1451	252,990	201,750	51,240
December	7248	5749	1499	255,960	203,020	52,940
January	7150	5594	1556	252,500	197,550	54,950
February	6749	5492	1257	238,340	193,950	44,390
Average	7084	5668	1416	250,170	200,160	50,010

Table 4: Monthly maximum and minimum Niagara River flows at Queenston.

	Maximum Flows			Minimum Flows		
Month	Year	m^3/s	ft^3/s	Year	m^3/s	ft^3/s
September	2019	7274	256,880	1934	4340	153,270
October	1986	7220	254,970	1934	4320	152,560
November	2019	7228	255,250	1934	4190	147,970
December	1985	7410	261,680	1964	4270	150,790
January	2020	7593	268,140	1964	3960	139,850
February	2020	7751	273,720	1936	3320	117,240

8. Flow Measurements in the Niagara River and Welland Canal

Discharge measurements are regularly scheduled in the Niagara River and Welland Canal as part of a program to verify the gauge ratings used to determine flow in these channels for water management purposes. Measurements are obtained through joint efforts of the USACE and ECCC. Measurement programs require boats, equipment and personnel from both agencies to ensure safety, quality assurance checks between equipment and methods, and bi-national acceptance of the data collected. The USACE and ECCC continue efforts to standardize measurement equipment and techniques. Historically, measurements were made at several locations as described below. Due to COVID-19 restrictions there were no discharge measurements taken in 2020.

Upper Niagara River: Regularly scheduled measurements are taken near the International Railway Bridge, located in the Upper Niagara River, on a 3-year cycle to provide information to evaluate stage-discharge relationships for flow entering the Niagara River from Lake Erie. The regularly scheduled discharge measurements near the International Railway Bridge were taken in May 2018. The regularly scheduled measurement at the International Railway Bridge has been postponed due to COVID-19 travel restrictions and is now scheduled for spring 2022. These measurements may need to be delayed if COVID-19 restrictions prohibit the collection of this data. These measurements support the stage-discharge relationship known as the Buffalo rating equation, due to the use of water level data from the Buffalo NOAA gauge. The Buffalo rating equation is used in the Great Lakes water supply routing models to estimate the flow in the Niagara River.

Lower Niagara River: Discharge measurements are made on a 3-year cycle at the Ashland Avenue Gauge Rating Section, located just upstream of the OPG and NYPA hydroelectric generating stations at Queenston–Lewiston, to verify the 2009 Ashland Avenue gauge rating of the outflow from the Maid-of-the-Mist Pool below the Falls. The Ashland Avenue gauge rating is used to determine the flow over Niagara Falls for purposes of the 1950 Niagara Treaty. Measurements taken in September 2019 have been compiled in a final report currently awaiting review from the INWC. The next measurements at this location are scheduled for September 2022. This set of measurements has been coordinated between ECCC, USACE and the Power Entities.

American Falls Channel: Discharge measurements are made in the American Falls Channel on a 5-year cycle to verify the rating equation used to determine the amount of flow in the American Falls channel and to demonstrate that a dependable and adequate flow of water is maintained over the American Falls and in the vicinity of Three Sisters Islands as required by the IJC directive to the board. Since the American Falls flow is directly related to the operation of the CGIP, the board monitors this relationship. The measurements are made using a section near the upper reach of the American Falls channel near the American Falls Gauge site. Following the 5-year cycle, the next scheduled measurements at this location are expected to be made in the spring of 2022.

Welland Canal: Discharge measurements are made on a 3-year cycle in the Welland Supply Canal above Weir 8 to verify the index-velocity rating for the permanently installed Acoustic Doppler Velocity Meter (ADVM), which are used in the determination of flow through the Welland Canal. Measurements were made in the Welland Supply Canal in May 2018. These measurements are currently under review. The next measurement series in the Welland Supply Canal is planned for the fall of 2021, subject to changing COVID-19 travel restrictions.

9. Power Plant Upgrades

COVID-19 restrictions have impacted maintenance schedules and all scheduling projections are subject to changes. OPG continues a unit rehabilitation program began in 2007, with Sir Adam Beck 1 unit G5 overhaul scheduled from January 2020 to June 2021 is still ongoing. Currently the G10 Gibson draft report is undergoing revision due to a conditional change. SAB 1 units G1 and G2 are undergoing a frequency conversion from 2021 to 2022 with the installation of new 60 Hz units. The G2 is scheduled to be in service in January 2022, and the G1 is scheduled to be brought online in May 2022. SAB 2 unit overhauls will begin in September 2023. The DeCew 1 runner replacement for G8 is scheduled from September 2020 to July 2021.

NYPA continues to improve the Lewiston Pump Generating Plant with PG 10 back in service in December 2020. PG 1 will be undergoing an 8 month replacement outage started January 2021, and returning to service August 13th. This is the last of the 12 LPGP unit upgrades. Starting September 2020, maintenance is returning to Units PG5, PG7, and PG2 for motor generator re-work due to conditions discovered on the upgraded units. Expected completion is the first quarter of 2023. At the Robert Moses Plant planned control upgrades started in October 2020. The Robert Moses Unit 1 refurbishment is scheduled to be completed in June 2021, and unit mechanical upgrades will begin in 2023.

10. Ice Conditions and Ice Boom Operation

In accordance with Condition (d) of the Commission's October 5, 1999 supplementary Order of Approval, installation of the ice boom may begin when the Lake Erie water temperature, as measured at the Buffalo Water Intake, reaches 4ºC (39ºF) or on December 16, whichever occurs first. NYPA approached the INWC at the end of November with concerns over COVID-19 complications affecting Boom crew availability. NYPA requested the flexibility to begin boom installation as early as 30 November to accommodate any impacts from COVID-19 related delays. After requesting public input on the proposal to allow early Boom installation the INWC received eight comments from the public. Four responses were in support of the proposed early boom installation, or expressed no concerns with the proposal. Three replies were against the installation of the ice boom in general, and expressed the following three concerns: deleterious ecological impacts to the Niagara River; the ice boom decreasing the local winter weather; and the ice boom increasing the local winter season. An additional response was a non-specific "No."

After consideration of these comments, and on assumption of adequate advance public notice of the boom installation, the Board made a formal request to the IJC on 23 November for approval of NYPA's early boom installation for 2020 only. On 27 November the IJC issued a temporary Supplemental Order of Approval to allow NYPA to begin installation of the ice boom as early as November 30, 2020. This Order only applied to the 2020-2021 ice boom season and expired on December 31, 2020. As required by the Order, the board issued a media advisory to the public on December 8, informing the public that installation of the boom would start as early as December 10. Installation of the ice boom was initiated starting from the Canadian side on December 10, with the first of the boom pontoon spans attached to the anchor buoys on Lake Erie. All twenty-two spans of the boom were placed by the end of day December 12.

Weekly reports on the ice conditions for Lake Erie and the Niagara River were prepared and submitted to the board by the Power Entities beginning on November 28, 2020. Data compiled by NOAA shows long term average ice coverage compared with this winter's ice coverage for Lake Erie in Figure 11. The 2020 -2021 ice season was shorter than average but had higher than average coverage at its peak in February.

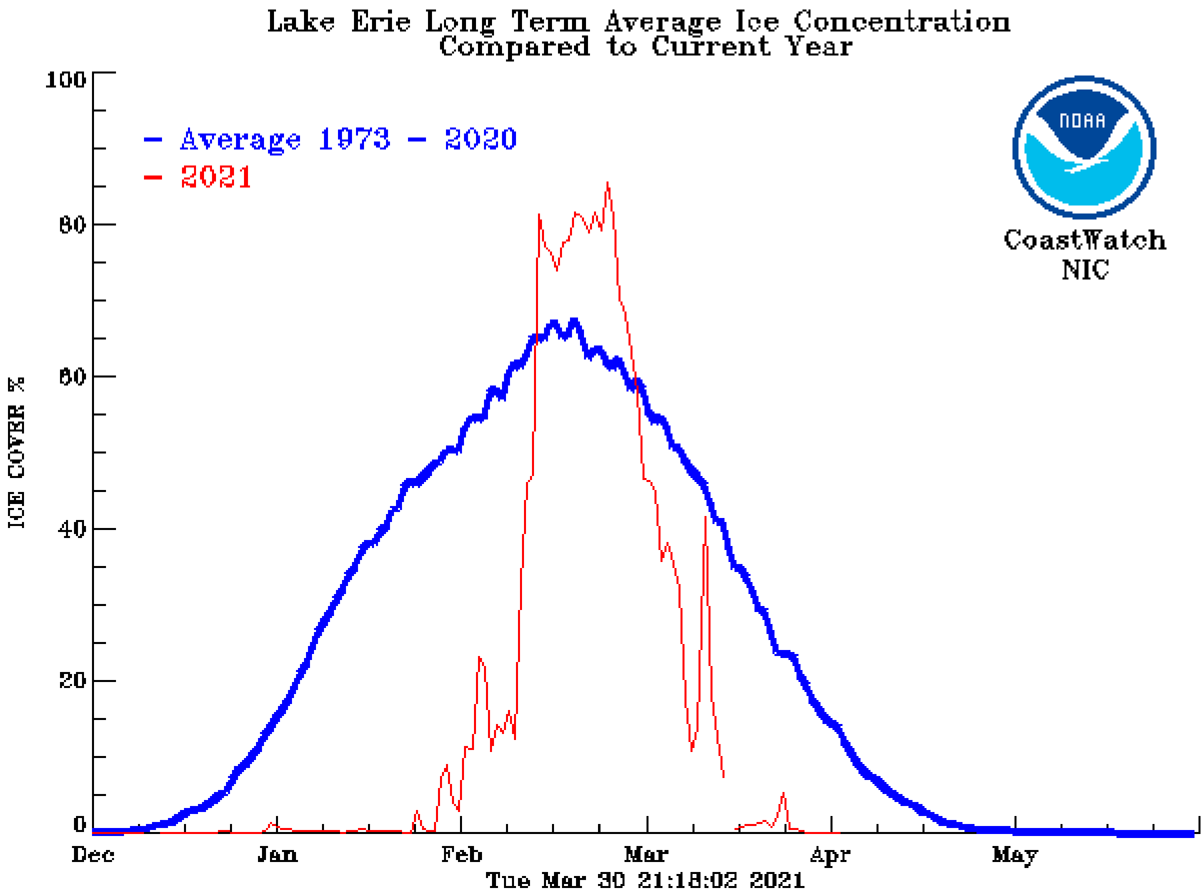


Figure 11: Average ice coverage for Lake Erie compared to the 2020-2021 season.

Given that ice coverage this winter dissipated faster than usual, helicopter flights to measure ice thickness on the eastern part of Lake Erie were not required in March. Safety risks due to COVID-19 made it impossible to undertake the fixed-wing ice flights during the 2020-21 ice season to determine the extent of ice cover in the eastern basin of Lake Erie. Therefore, only the satellite imagery was used for the ice boom removal decision making for the 2020-21 ice season, and no fixed-wing ice flights were conducted. The satellite imagery proved to be a good alternative to estimate the lake ice cover.

11. Other Issues

American Falls Bridges Project:

The New York State Office of Parks, Recreation and Historic Preservation (Parks), in conjunction with the New York State Department of Transportation (NYSDOT) and their contractor Greenman-Pedersen, Inc. (GPI), have been developing a feasible path towards the reconstruction of the Goat Island Road bridges. The two bridges cross the American channel of the Niagara River and traverse very turbulent water flows. These challenging conditions require a higher level of preliminary planning including a greater emphasis on constructability. The most formidable challenge will be diverting water flows to construct the bridge foundations. Beyond the difficulties associated with constructing water diversion structures such as cofferdams, the implications of diverting water flow may greatly affect international waters. The ramifications of various cofferdam options need to be considered with a heightened focus on the rise and reduction of water flow levels within the Niagara River, specifically within the Canadian channel and further upstream.

Recent discussions with the New York State agencies and their contractor indicate they will be preparing a permit application for submittal to the US Department of State sometime later this year.

12. Meeting with the Public

There were no public meetings held during this reporting period. In accordance with the Commission's requirements, the Board held a webinar style meeting in conjunction with the other two Great Lakes Boards in July of 2020. This meeting was very successful with high public participation. The Board will plan for another webinar style meeting over the summer months of 2021.

13. Membership of the Board and the Working Committee

There were no membership changes on the Board or Working Committee during his reporting period.

14. Attendance at Board Meetings

The Board met once during this reporting period. The meeting was held on September 30, 2020 through a virtual platform. Mr. Aaron Thompson, Canadian Section Chair, and Mr. Kyle McCune, alternate U.S. Section Chair, were in attendance, along with Canadian and US members, Mr. David Capka and Ms. Jennifer Keyes. The Canadian and US Secretaries were also in attendance.

Aaron Thompson

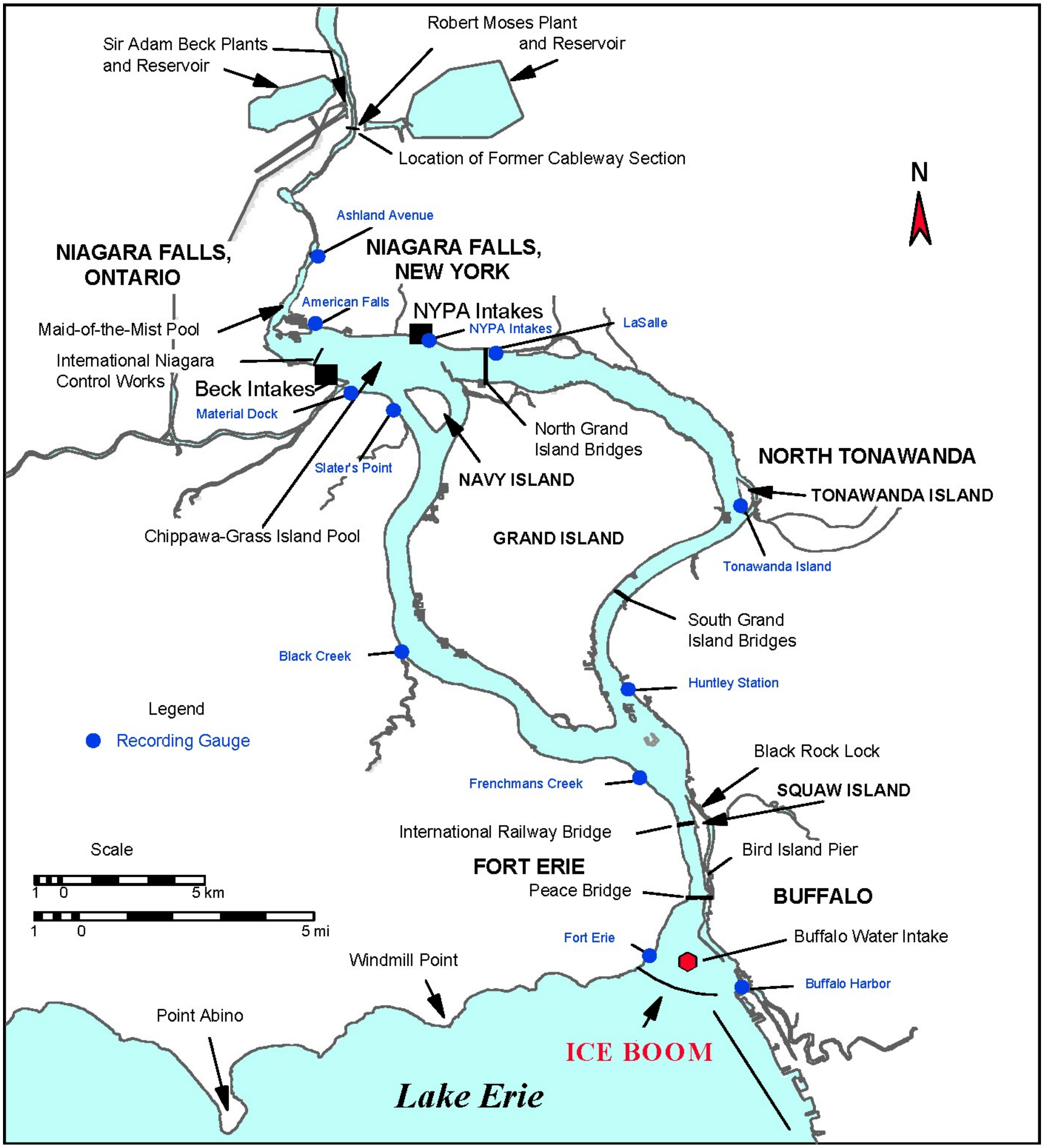
Digitally signed by: Aaron Thompson
DN: CN = Aaron Thompson email = aaron.thompson@canada.ca C = CA O = ECCC OU = NHS East
Date: 2021.04.01 17:00:22 -04'00'

Mr. Aaron F. Thompson
Chair, Canadian Section

Mr. Stephen G. Durrett
Chair, United States Section

Ms. Jennifer L. Keyes
Member, Canadian Section

Mr. David Capka
Member, United States Section



Enclosure 1: Map of the upper Niagara River showing water level gauge locations.