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**International Lake Superior
Board of Control**

**Semi-Annual Progress Report to the
International Joint Commission**

Covering the Period March 26, 2014 to September 24, 2014



Table of Contents

Section	Page
1. Highlights	1
2. Monitoring of Hydrologic Conditions	3
3. Regulation of Lake Superior	4
4. Governing Conditions During the Reporting Period	6
5. Inspections and Repairs at the Compensating Works	7
6. Repairs and Maintenance at the Hydropower Facilities	7
7. Flow Verification Measurements	8
8. Water Usage in the St. Marys River	8
9. Long Lac and Ogoki Diversions	10
10. Peaking and Ponding Operations at Hydropower Plants	10
11. Plan 2012 Implementation	11
12. Gate Movement Limits Study	12
13. Public Communications and Outreach	12
14. Board Membership and Meetings	13

Cover photos (credit: Mr. Jacob Bruxer):

St. Marys Rapids and Whitefish Island at 7-gate Setting, 25 June 2014

Figures

Figure 1: Lake Superior Monthly Levels

Figure 2: Lake Michigan-Huron Monthly Levels

Figure 3: Lake Superior Basin Monthly Precipitation

Figure 4: Lake Michigan-Huron Basin Monthly Precipitation

Figure 5: Lake Superior Net Basin Supplies

Figure 6: Lake Michigan-Huron Net Basin Supplies

Figure 7: Hourly U.S. Slip Levels & Lake Superior Outflows – March to August 2014

Tables

Table 1: 2013-2014 Lake Superior Hydrologic Factors

Table 2: 2013-2014 Lake Michigan-Huron Hydrologic Factors

Table 3: 2013-2014 Compensating Works Gate Changes

Table 4: Monthly Distribution of Lake Superior Outflow (metric units)

Table 5: Monthly Distribution of Lake Superior Outflow (customary units)

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24 September 2014

International Joint Commission
Ottawa, Ontario
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Commissioners:

This semi-annual report covers the Board's activities from 26 March to 24 September 2014.

1. Highlights

From March through August, the monthly mean water levels of Lake Superior ranged from 1 to 16 cm (0.4 to 6.3 in.) above average, rose consistently throughout the reporting period, and ranged from 23 to 36 cm (9 to 14 in.) higher than in 2013. Prior to March of this year, the levels of Lake Superior had been consistently below average since May 2005, and near or below average since May 1998.

The monthly mean levels of Lake Michigan-Huron have remained below average since March 1999, the longest period on record of consistently below average levels. In the past six months, monthly mean Lake Michigan-Huron levels ranged from 7 to 34 cm (3 to 13 in.) below average but also rose consistently throughout the reporting period. Daily mean levels rose above average on 7 September. Lake Michigan-Huron ranged from 31 to 40 cm (12 to 16 in.) higher than in 2013.

The Lake Superior outflows were as specified by Regulation Plan 1977-A in March and April. The Board requested and received approval to deviate from the regulation plan in April due to expected maintenance at the Canadian hydropower plant and the inability in winter to increase the Compensating Works gate setting, but this turned out to be unnecessary as the expected maintenance was subsequently delayed. Starting in May, the Board used Commission-approved deviations from Plan 1977-A thereafter to help reduce the risk of expected high flows in the St. Marys Rapids during the summer and prevent undue spillage of water through the Compensating Works gates. After fully opening four gates at the Compensating Works on 5 May, an ice run forced the gate setting to be temporarily reduced, with four gates left partially open on 6 May. To reduce the risk of additional ice related issues, gates 2 to 15 were partially re-opened to achieve a setting equivalent to approximately three gates fully open on 7 May, and further opened to the equivalent of about five gates fully open on 15 May. On 25 June, those 14 gates were again opened further to an equivalent of approximately seven gates fully open, in response to the continued rise of Lake Superior levels. Gate 16 was also opened 5 cm (2 in.) from 6 June

to 3 September to provide a very small amount of attractant flow to sea lamprey traps located downstream. On 3 September, the same 14 gates were partially closed to an equivalent of approximately six gates fully open

Since March, monthly outflows from Lake Superior have been between 105% and 143% of average. The monthly outflows from Lake Michigan-Huron ranged from 94% to 98% of average. Water supplies to Lake Superior were above average from March through August. Water supplies to Lake Michigan-Huron were below average in March, above average from April through June, below average in July and above average again in August.

Board and Commission officials met with Batchewana First Nations (BFN) officials on 23 May to discuss recent flooding of some recreational trails, boardwalks, and structures on Whitefish Island. The Board has continued to communicate with BFN to identify flooding vulnerabilities and encourage BFN officials to address them as soon as possible. Board staff adapted a previously developed hydrodynamic model of the St. Marys Rapids to illustrate the expected floodlines on the island under varying flow and water level conditions.

On 17 July, the Commission signed the new Supplementary Orders of Approval, thereby adopting Regulation Plan 2012. The Board expects to implement Plan 2012 operationally at the beginning of January 2015.

The three Great Lakes Boards of Control proposed the establishment of an Adaptive Management Committee (AMC) on 24 April.

The Board hosted its annual public meeting on 17 June as a webinar/teleconference, and this year offered both an afternoon and evening session. A total of about nine members of the public participated. At the meeting and over the reporting period, stakeholders voiced concerns about how the plan balances lake levels, with citizens on Lake Superior concerned over recent gate openings and recent high levels and citizens on Lake Michigan-Huron concerned over below-average levels. Some remain concerned about potential impacts due to climate change and variability. There remains some apathy regarding the expected performance of Regulation Plan 2012. Several people continued to express their desire for level-restoring structures to be constructed in the St. Clair River.

Ponding by the hydropower companies was permitted throughout the reporting period due to levels at U.S. Slip remaining well above the threshold. However, with all plants running at capacity from May through September, ponding operations were only conducted in March and April.

A review of the water usage and measurement techniques at the U.S. facilities and installations on the St. Marys River in Sault Ste. Marie, MI, was completed on 25-26 June. No major issues were reported, but communication between the two U.S. hydropower entities and the Board could be improved to better ensure allocations are met and water is used efficiently, particularly during the current period of higher water levels and flows

when plants are running at maximum capacities. Another review at the various Canadian facilities will be completed in 2015.

Detailed monthly inspections of the Compensating Works were conducted during the reporting period, with no major issues identified.

There were several changes to Board Membership and staff.

2. Monitoring of Hydrologic Conditions

The Board continuously monitors the water levels of lakes Superior and Michigan-Huron, and also 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 precipitation over the lakes Superior and Michigan-Huron basins. Figures 5 and 6 show the monthly net basin supplies for each basin.

Precipitation over the Lake Superior basin was 108% of average from March through August 2014 and would be expected to be exceeded 46% of the time. According to U.S. National Weather Service officials, there was a high snowpack in the upper Great Lakes basin this spring, and the snowmelt period was delayed until early May following a cold and snowy winter. Ice did not completely melt off of Lake Superior until 9 June. Precipitation was below average in March and August, was near average in April and July, and above average in May and June. The net basin water supplies to Lake Superior, which are the net amount of precipitation, evaporation, and runoff to the lake, were above average throughout the reporting period. On the whole, the March through August net basin supplies to Lake Superior would be expected to be exceeded 2% of the time.

Lake Superior's monthly mean levels over the past six months ranged from 1 to 16 cm (0.4 to 6.3 in.) above average and rose consistently throughout the reporting period. Prior to March of this year, the levels of Lake Superior had been consistently below average since May of 2005, and near or below average since May of 1998. Lake Superior's water levels remained above chart datum (183.2 m or 601.1 ft.) throughout the reporting period, and on 24 September, the lake was at elevation 183.70 m (602.69 ft.), which was 18 cm (7.1 in.) above average, 23 cm (9.1 in.) higher than at the same time last year, and 50 cm (19.7 in.) above chart datum.

Precipitation over the Lake Michigan-Huron basin was 113% of average over the past six months according to provisional data and would be expected to be exceeded 12% of the

time. Net basin water supplies to Lake Michigan-Huron were below average in March, above average from April through June, below average in July and above average again in August. On the whole, the March through August net basin supplies to Lake Michigan-Huron would be expected to be exceeded 8% of the time.

Monthly mean Lake Michigan-Huron levels ranged from 7 to 34 cm (3 to 13 in.) below average but rose consistently throughout the reporting period. Water levels began the reporting period slightly below chart datum (176.00 m or 577.4 ft.), having remained near or slightly below this point since late September of 2013. The monthly mean levels of Lake Michigan-Huron have been below average since March of 1999, the longest sustained period of below-average monthly levels on record. Water levels rose above chart datum on 10 April, and generally continued to rise throughout the remainder of the reporting period. The daily mean water level rose above average on 7 September. On 24 September, Lake Michigan-Huron was at elevation 176.51 m (579.10 ft.), 3 cm (1.2 in.) above average, 49 cm (19.3 in.) higher than last year, and 51 cm (20.1 in.) above chart datum.

3. Regulation of Lake Superior

a. Outflows

The outflows of Lake Superior were as specified by Regulation Plan 1977-A during March and April. On 3 April, the Board requested approval from the Commission to deviate from the regulation plan in April due to expected limited capacity at the Canadian hydropower plant resulting from maintenance scheduled for later in the month, and the inability to increase the Compensating Works gate setting due to ice conditions. The Commission granted approval on 7 April, but this turned out to be unnecessary as the expected maintenance was subsequently delayed.

Beginning in May, the outflows were adjusted over the next several months to provide more consistent flow conditions in the St. Marys River, and reduce the risk of unusually high flows and water levels in the St. Marys Rapids forecasted for the summer months. To allow for these adjustments, in April the Board requested and received approval from the Commission to temporarily deviate from Plan 1977-A. In order to balance the effects on both Lake Superior and Lake Michigan-Huron water levels and minimize impacts on stakeholders, it was proposed to use Regulation Plan 2012 as a guide in setting outflows for the remainder of 2014. Flows less than those prescribed by Plan 1977-A were to be released in the summer months, and it was expected that these flow decreases would be offset by releasing flows greater than Plan 1977-A in the spring, and again in the fall.

Lake Superior outflows were 122% of average over the past six months, with monthly flows ranging from 1,970 to 3,280 m³/s (69,600 to 115,800 cfs). Outflows were limited by Criterion (c) of the Orders during March, April, and May, though the Commission waived its application in May. The net impact of the above deviations on lake levels is anticipated to be small, and should be negligible by the end of 2014.

Several scheduled and a few unexpected flow reductions occurred at the three hydropower plants to facilitate maintenance and make repairs. Details are provided in Section 6. All flow reductions were easily offset by flow increases at other times within each month, with the exception of Brookfield Renewable Energy Group's unit outages in May and June. When units are taken off-line, water levels immediately downstream of the plants (as indicated by the U.S. Slip gauge) fall, but quickly rise again as the idled units are brought back on-line. No problems related to water levels were reported as a result of these variations. No ships were reported delayed due to the flow variations.

b. Compensating Works Gate Setting and St. Marys Rapids Conditions

During the reporting period, a number of concerns were raised related to the gate setting of the Compensating Works, and the unusually high water level and flow conditions in the St. Marys Rapids. Concerns raised included: the risk of ice damage to the Compensating Works and structures in the lower St. Marys River, the impacts of higher flows and levels on the St. Marys Rapids fishery and recreational anglers, potential flooding of Whitefish Island, the impacts of "spilled" water on hydropower production, and impacts to commercial navigation due to reduced levels in the lower St. Marys River if gate settings were reduced. The Board worked with the Commission, the hydropower entities, and other stakeholders, to try to address these concerns, while adhering to the principles of the Boundary Waters Treaty and the Orders of Approval for Lake Superior regulation. A complete summary of gate setting changes is provided in Table 3.

The gate setting of the Compensating Works was maintained at the minimum half-gate equivalent setting until 5 May. The half-gate setting is employed during winter to reduce the risk of ice-related issues in the St. Marys River. Owing to higher outflows and required maintenance at the hydropower plants, four gates were scheduled to be opened for the month of May. However, after fully opening four gates at the Compensating Works on 5 May, large ice pans were drawn into the upper St. Marys River from Lake Superior and some passed through the gates. This resulted in ice collecting on the Sugar Island boom downstream and the risk of an ice jam, and also raised concerns that gate seals could be damaged by the ice. The gate setting was temporarily reduced to allow conditions to stabilize, with four gates left partially open as of 6 May. As ice conditions stabilized, Gates 2 to 15 were partially re-opened the following day, 7 May, to a setting equivalent to approximately three gates fully open. On 15 May, the 14 partially opened gates were opened further to a setting equivalent to approximately five gates fully open, to offset the lower flows released during the first part of the month, and in anticipation of higher flows expected in the months to come.

Partially opening the gates reduced the amount of ice that was passed through them and reduced the risk of ice-related damages. Fisheries experts and recreational anglers also provided positive feedback to the Board on the potential benefits to the St. Marys River ecosystem of having the flow more evenly distributed across the St. Marys Rapids. As a result, partial gate settings were continued for the remainder of the reporting period.

Owing to the concerns first raised in 2013 by Batchewana First Nation (BFN) regarding flooding of Whitefish Island recreational trails, boardwalks, and structures at higher gate settings (such as that experienced at a 6-gate open setting in August 2013), on 12 May Board staff advised BFN again by e-mail of the possibility of unusually high flows and water levels expected during the spring and summer of 2014. Board and Commission representatives met with Chief Dean Sayers and other BFN officials on 23 May. Anticipated higher outflows were discussed and it was suggested that vulnerabilities on the island should be addressed immediately. As agreed to at the meeting, the Board also resent BFN the supporting documentation on the Whitefish Island Transfer Agreement from 1992 and the floodplain mapping that was conducted by Environment Canada in support of this (the Canadian Regulation Representative's office has since adapted the floodplain modelling using a HEC-RAS model to better illustrate floodlines for Whitefish Island under various gate settings and water level conditions). The Board has continued to communicate with BFN following this meeting, but to the Board's knowledge, no mitigation measures have been initiated thus far, nor have any responses been received.

A 5-gate open equivalent setting was maintained until 25 June, when Gates 2 to 15 were opened further to a setting equivalent to approximately seven gates fully open, in response to the continued rise of Lake Superior levels, and in hopes of minimizing the expected gate settings that would be required in subsequent months when additional hydropower maintenance was expected. Gate 16 was also opened 5 cm (2 in.) from 6 June to 3 September to provide a small amount of flow to attract sea lamprey to the U.S. Fish and Wildlife Service traps located downstream of the gate. Starting on 3 September, a 6-gate open equivalent setting was maintained by closing Gates 2 to 15 partially. Gate 1, which supplies water to the Fishery Remedial Works, remained set at approximately 15 m³/s (530 cfs).

It was reported to the Board that some minor damage to some of the recreational trails on Whitefish Island was evident following the seven-gate equivalent opening on 25 June. Specifically, some of the trail gravel had been scoured away in the more inundated locations and the underlying landscaping fabric had been further exposed. However, apart from this, no damage was reported to any of the observation structures or boardwalks constructed on the island.

4. Governing Conditions During the Reporting Period

The monthly mean levels of Lake Superior ranged between 183.23 and 183.67 m (601.1 and 602.6 ft.) during the reporting period, within the limits of 182.76 and 183.86 m (599.6 and 603.2 ft.) specified in the Commission's Orders of Approval.

During the reporting period, the daily mean water levels in the lower St. Marys River at the U.S. Slip gauge downstream of the U.S. Locks, varied between 176.32 and 177.08 m (578.5 and 581.0 ft.). Therefore, the Criterion B of the Commission's 1979 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. Daily mean U.S. Slip levels did not fall below the ponding

restriction threshold (see Section 10) of 176.09 m (577.72 ft.) during the reporting period and no impacts to navigation were reported.

5. Inspection and Repairs at the Compensating Works

Ongoing routine maintenance and inspections of the Compensating Works occurred in the past six months. The structure is generally in good condition.

Routine monthly maintenance inspections continue to be conducted on the Canadian portion by Brookfield Renewable Energy Group (BREG). Inspection observations include 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 anything unusual. The August monthly inspection found the Compensating Works facilities to be in good condition. The annual fall inspection was postponed until 29 September.

Monthly inspections and routine maintenance continue to be conducted on the U.S. portion by the U.S. Army Corps of Engineers (USACE) Soo Area Office. The September monthly inspection found the Compensating Works facilities to be in good condition.

The USACE Detroit District periodic inspection of the U.S. portion of the Compensating Works was completed on 21-23 July. During the inspection, it was noted that a majority of the gates leaked at the edges, mainly due to deteriorating concrete behind the vertical gate guides. The maintenance crew and inspection team discussed the possibility of automating the remainder of the manual gates by perhaps attaching a drill and using power from the U.S. Government Plant (USGP). Although frequently maintained, the gears on the gates accumulate rust from being out in the elements and, at times, are difficult to crank.

6. Repairs and Maintenance at the Hydropower Facilities

a. U.S. Government Hydropower Plant

Units at the plant were offline for a combined total of 2,069 hours during the reporting period. The majority of these (1,730 hours) were Unit 10 being offline from 10 June to 22 August for transformer replacement. All units were out for 6 hours on 4 September due to the seiche event.

b. Brookfield Renewable Energy Group

Scheduled maintenance outages continued to be performed. Unit G1 was shut down from 22 April to 1 June for annual inspection and rotor arm repairs. Unit G3 was shut down from 8 to 30 June for annual inspection and repairs to several rotor arms. As a result, BREG was unable to pass the allotted flows in May and again in June, and since the U.S. plants were already running at capacity, excess allocated water was passed through the Compensating Works gates. Unit G2 was shut down from 9 to 18 September for annual

inspections. Also, on 8 June, Unit G1 tripped off for about 30 minutes due to transmitter issues.

A five-hour plant shutdown was undertaken on 18 September to facilitate the inspection of public safety booms and caissons in the power canal and tail race.

Sault Ste. Marie Public Utilities Commission will require a plant shutdown this Fall to facilitate the closure and decommissioning of the north City intake chamber located on BREG property. The date and duration of this shutdown have yet to be confirmed. A Lake Superior Power underwater cable inspection is not planned for 2014. Unit G3 is expected to be out for approximately six weeks from mid-April to 1 June 2015 for annual inspection and to complete the rotor arm repairs.

b. Cloverland Electric Coop

Routine maintenance and canal inspections were performed at the plant, which did not affect the plant's ability to pass their allocated flow. There are no planned outages for the next six months. The canal-repair project slated to begin at the end of summer was postponed until the spring of 2015.

7. Flow Verification Measurements

Flow verification measurements were conducted throughout the reporting period. St. Marys Rapids flow measurements were led by the USACE Detroit District on 3 June and 15 July. Board staff used the results of these flow measurements to verify and adjust the sluice gate equations and parameters used to compute provisional rapids flows under the partial gate settings employed from May through September.

Discharge measurements to verify the flows through the hydropower plants (last made in September 2010) will continue on a five-year cycle and are next scheduled for 2015.

The United States Geological Survey (USGS) continued to gather data for rating the acoustic Doppler velocity meter (ADVM) on the St. Marys River. When a satisfactory rating is established, data from this meter will be a second means of estimating the total flow in the river.

8. Water Usage in the St. Marys River

a. Water Usages

Table 4 (Table 5 in cubic feet per second) lists the distribution of outflows from Lake Superior for January 2013 to August 2014. 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 U.S. 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 was 3 m³/s (106 cfs) over the past six months, or 0.1 to 0.2% of the total monthly outflow.

The monthly flow through the locks depends on traffic volume and varied from 0 to 15 m³/s (0 to 530 cfs) during the past six months. As a percentage of the total river flow, water allocated for navigation can vary seasonally from 0.1% (when the locks are closed for the winter) to 1.0% in the busiest part of the navigation season.

The U.S. locks opened on 25 March. The Canadian lock opened on 14 May.

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. Starting on 7 May, 14 partially open gates were used to supply the various multiple-gate-opening equivalents of water this reporting period. This was initiated in May to minimize ice damage, but was maintained for the remainder of the reporting period in an effort to minimize water level changes in the Rapids during gate setting changes, and to better distribute water evenly across the Rapids during periods of higher flows. A setting equivalent to approximately three-gates open was used from 5 May until 15 May, with the exception of a short disruption on 6 to 7 May following a significant ice run. A five-gates open equivalent was employed from 15 May to 25 June, whereupon a seven-gates open equivalent was used until 3 September, when these gates were reset to a six-gates open equivalent. 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 85 to 991 m³/s (3,000 to 35,000 cfs) over the last six months, or approximately 4 to 30% of the total monthly outflow. Table 3 provides a summary of the gate changes that occurred during the reporting period.

The hydropower plants passed an average of 2,008 m³/s (70,910 cfs) from March to August for electric power production, or 77.2% of the total river flow. The allocation for this period averaged 2,021 m³/s (71,370 cfs). The average monthly unintentional difference of 13 m³/s (459 cfs) was due primarily to unit outages. Usages at each plant are shown in Tables 3 and 4.

b. Review of Water Usages

A review of the water usage and measurement techniques at the various U.S. facilities and installations on the St. Marys River was carried out during 25 to 26 June. Board staff are producing a summary report on the findings of this review, but in general, no major issues

were reported in terms of flow measurement and accounting procedures. However, communication between the two U.S. hydropower entities and the Board could be improved to better ensure allocations are met and water is used efficiently, particularly during the current period of higher water levels and flows when plants are running at full capacity.

A report on the 2012 review of the Canadian facilities is nearing completion, and Board staff have continued to follow up on the issues identified. A new round of audits at the various Canadian facilities is expected to be completed in 2015.

9. Long Lac and Ogoki 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 95.9 m³/s (3,400 cfs) and the Long Lac Diversion averaged 44.5 m³/s (1,600 cfs) from March through August. Combined, these diversions were about 83 percent of average for the period 1944-2013.

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 1.9 m³/s (74 cfs) during March and April 2014. Due to wet conditions, starting near the end of May and continuing through August, additional water was spilled northward, such that the average rate of flow was 188.9 m³/s (6,700 cfs) during this period.

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. However, this year, wet conditions required additional water to be spilled northward through the Kenogami Dam starting on 12 May and continuing through 24 June. As a result, the May and June flows through the Kenogami Dam averaged 32.9 m³/s (1160 cfs) and 100.3 m³/s (3540 cfs), respectively.

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. 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 8-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.

During the reporting period, the power entities undertook peaking and ponding operations under the supervision of the Board during March and April. Above-average outflows from Lake Superior combined with a continued recovery in Lake Michigan-Huron levels resulted in levels at U.S. Slip remaining above the established threshold, such that ponding was permitted during the entire reporting period. Due to the plants being at capacity, however, they were unable to conduct ponding during the months of May through August. No navigation problems related to peaking and ponding were called to the Board's attention.

To continue to provide timely information on expected flow variations to the users, the USACE distributes monthly notices during the shipping season (March through January) on expected Lake Superior outflows, and a schedule of flow variations. No related concerns were reported to the Board during the period.

Figure 7 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. U.S. Slip levels were generally higher than during the same period in 2013.

11. Plan 2012 Implementation

On 17 July, the Commission signed the new Supplementary Orders of Approval, thereby adopting Regulation Plan 2012, and on 22 August, the Board received the final Supplementary Orders of Approval.

The Regulation Representatives and IJC Engineering Advisors have completed draft directives on peaking and ponding and deviation authority and are awaiting their approval. The Commission now requires that the Board demonstrate coordination and communication of all proposed deviations with stakeholder groups prior to invoking any minor deviations, but leaves it to the Board to decide when to elevate concerns to the IJC. The Regulation Representatives are preparing a final draft of the Operations Guide to Plan 2012.

The Board expects to officially implement the new plan at the start of January 2015. Board staff previously developed the operational tools required, and these have been used operationally since May 2014 as a guide in setting monthly outflows and forecasting expected conditions under the Board's approved deviation strategy.

The three Great Lakes Boards of Control proposed the establishment of an Adaptive Management Committee (AMC) of technical experts in a joint letter dated 24 April to the Commission and requested their concurrence and support to adopt adaptive management methods as part of an on-going review and evaluation of regulation plans, as well as to implement the outstanding science of past studies. The Boards wish to evaluate regulation plan performance on an ongoing basis over time with regard to a broad range of environmental and economic indicators. The Boards see benefits from the above proposed activities and would like to establish the AMC as soon as practicable. The Boards will establish priorities, scope, and makeup of the AMC. Full funding has not been confirmed and is limited to current resources at this time. The Boards asked the IJC for help

identifying and leveraging further funding opportunities.

12. Gate Movement Limits Study

A study, proposed by the Board in 2013 and partially funded through the IJC's International Watershed Initiative (IWI), intends to measure and analyse flow, velocity, and water level data in the St. Marys Rapids under varying Compensating Works gate settings to establish field-verified limits on the rate of gate changes in an effort to prevent harm to fish and other organisms caused by stranding or flushing. The study has been postponed since October 2013 due to scheduling issues and recent high flow conditions in the St. Marys Rapids. A tentative proposal to complete the field work during the Fall of 2014 was abandoned based on advice received from fisheries experts, who noted that this was a critical spawning period for salmonid species. The Board now expects that the study will be completed in the Summer of 2015. To complement this study, Board staff are also investigating whether use of numerous partially-opened gates in lieu of the traditional use of fully open gates may help facilitate limiting the rates of gate changes, while also providing additional fishery or water management benefits.

13. Public Communications and Outreach

The Board hosted its annual public meeting on 17 June using a combined Webinar and teleconference format. Based on feedback received during the 2013 public meeting, this year the Board offered two sessions - the first in the afternoon at 1400 hours, followed by a second session in the evening at 1800 hrs - to permit people the choice to attend and listen in during or outside of regular business hours. About nine members of the public participated in total, along with IJC staff, Board Members, staff, and associates. Canadian Chair, Mr. Jaymie Gadal, presented information describing the IJC, the Board, the control structures, the regulation plan, and the current and expected water levels. The meeting was then opened for public comment, questions, and concerns. The slide presentation shown during the Webinar was also made available online to callers beforehand, and callers were able to interact with the Chair and other participants during the event.

Board staff also attended and participated in Soo Locks Engineer's Day on 27 June, hosted by the USACE – Soo Area Office. The event was well-attended by the public, with an estimated 7,000 in attendance, many of whom stopped at the Board's display table to view a slide show, browse the display and brochures, and discuss their concerns and interests with the Board's representatives in an informal manner.

The date of the next meeting with the public will be set at the spring business meeting. The Board will hold a similar Webinar/teleconference again in 2015. An open house tied with the Soo Locks Engineer's Day in June will again be attended by Board staff in June 2015.

During these events and informally throughout the reporting period, stakeholders voiced concerns about water level and flow conditions, and how the current regulation plan balances levels. Despite recently increased water levels, some citizens on Lake Superior

remain concerned about the previous period of low water levels and its causes, and in particular how recent gate openings may be affecting levels of Lake Superior. Some on Lake Superior are also now concerned about high water levels, and the potential for flooding and impacts on beaches and shore protection. Stakeholders in the St. Marys River, including anglers, hydropower entities, commercial navigation and Batchewana First Nations have also expressed concerns over recent gate settings and the resulting high St. Marys River flows. However, there was also some positive feedback received with regards to the Board's deviation strategy, and with regards to the use of multiple partially-open gates in lieu of multiple gates open fully. Citizens on Lake Michigan-Huron also continue to express concern over the below-average levels there for the past 15 years, though some optimism over the recent higher levels has also been expressed. Some remain concerned about potential impacts due to climate change and variability. There remains some apathy regarding the expected performance of Plan 2012 from some, while others have stated they are eager to see the new plan implemented and are optimistic about its potential benefits. Several people continued to express their desire for structures to be constructed in the St. Clair River (to restore upstream water levels).

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 U.S. 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 (http://ijc.org/en/_ilsbc) and the Board's Facebook page (<https://www.facebook.com/InternationalLakeSuperiorBoardOfControl>), both of which continue to grow in popularity. Additional content available online includes information on Board Members and responsibilities, semi-annual reports, meeting minutes, regulation updates, and hydrologic data summaries.

14. Board Membership and Meetings

Brigadier General Margaret Burcham relinquished command as Commander, U.S. Army Engineer Division, Great Lakes and Ohio River, and stepped down as U.S. Board Chair on 28 May. Colonel Robert Peterson retired as Deputy Commander and stepped down as U.S. Alternate Board Chair on 2 July. Ms. Deborah Lee was approved by Commissioners to serve as the Alternate U.S. Chair of the three Great Lakes Control Boards from 3 July to 30 September, when Col. Peterson's successor, Col. Steven Roemhildt, is expected to start. BG Richard G. Kaiser will assume Command on 26 September.

Mr. Kyle McCune replaced Mr. John Kangas as U.S. Secretary effective 24 April. Mr. Kangas retired from the U.S. Army Corps of Engineers, Chicago District after nearly 36 years of service to the Corps with almost 21 years in support of the Commission.

LTC Michael Sellers replaced LTC Robert Ells as Detroit District Commander and U.S. Regulation Representative on 10 July.

The Board held a meeting on 24 September in Cornwall, Ontario.

Respectfully submitted,

Jaymie Gadai
Chair for Canada

Deborah Lee
Alternate Chair for United States

TABLE 1. 2013-2014 Lake Superior Hydrologic Factors

Month	Levels				Net Basin Supplies			Outflows		
	Monthly Mean Recorded ¹		Difference From Average ²		Monthly Mean Recorded		Exceedence Probability ³ (%)	Monthly Mean Recorded		Percent of Average ⁴
	metres	feet	metres	feet	m3/s	tcfs		m3/s	tcfs	
Mar-13	182.90	600.07	-0.32	-1.05	830	29	64	1540	54	82
Apr-13	182.92	600.13	-0.33	-1.08	3990	141	55	1540	54	80
May-13	183.11	600.75	-0.24	-0.79	8910	315	1	1570	55	74
Jun-13	183.26	601.25	-0.18	-0.59	4840	171	36	2050	72	94
Jul-13	183.37	601.61	-0.13	-0.43	5760	203	5	2190	77	96
Aug-13	183.44	601.84	-0.09	-0.30	3850	136	17	2690	95	114
Sep-13	183.48	601.97	-0.05	-0.16	2050	72	45	2790	99	120
Oct-13	183.45	601.87	-0.05	-0.16	1350	48	41	2790	99	123
Nov-13	183.40	601.71	-0.06	-0.20	840	30	36	2280	81	103
Dec-13	183.35	601.54	-0.04	-0.13	460	16	10	2180	77	106
Jan-14	183.29	601.35	-0.03	-0.10	-560	-20	59	2070	73	107
Feb-14	183.24	601.18	-0.02	-0.07	1560	55	6	1970	70	104
Mar-14	183.23	601.15	0.01	0.03	1580	56	38	1970	70	105
Apr-14	183.27	601.28	0.02	0.07	5400	191	19	2020	71	105
May-14	183.47	601.94	0.12	0.39	8420	297	3	2360	83	112
Jun-14	183.60	602.36	0.16	0.52	5210	184	28	2700	95	123
Jul-14	183.66	602.56	0.16	0.52	4430	156	24	3260	115	143
Aug-14	183.67	602.59	0.14	0.46	3530	125	24	3280	116	140

Notes: m3/s = cubic metres per second tcfs = 1000 cubic feet per second

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

² Average levels are for period 1918-2013, based on a mean of five gauges. Differences computed as metres and then converted to feet.

³ Exceedence probabilities are based on the period 1900-2008.

⁴ Average flows are for the period 1900-2008.

TABLE 2. 2013-2014 Lake Michigan-Huron Hydrologic Factors

Month	Levels				Net Basin Supplies			Outflows		
	Monthly Mean Recorded ¹		Difference From Average ²		Monthly Mean Recorded		Exceedence Probability ³ (%)	Monthly Mean Recorded		Percent of Average ⁴
	metres	feet	metres	feet	m3/s	tcfs		m3/s	tcfs	
Mar-13	175.63	576.21	-0.66	-2.17	3860	136	70	4420	156	91
Apr-13	175.75	576.61	-0.63	-2.07	13730	485	1	4460	158	87
May-13	175.93	577.20	-0.54	-1.77	9160	323	17	4830	171	90
Jun-13	176.05	577.59	-0.49	-1.61	6050	214	41	4880	172	90
Jul-13	176.09	577.72	-0.48	-1.57	3110	110	62	4760	168	86
Aug-13	176.08	577.69	-0.47	-1.54	1840	65	41	4890	173	89
Sep-13	176.04	577.56	-0.46	-1.51	-470	-17	73	4910	173	90
Oct-13	176.01	577.46	-0.42	-1.38	830	29	31	4870	172	90
Nov-13	176.01	577.46	-0.36	-1.18	3230	114	15	4970	176	93
Dec-13	175.97	577.33	-0.35	-1.15	1030	36	46	4910	173	95
Jan-14	175.95	577.26	-0.34	-1.12	1960	69	41	3940	139	87
Feb-14	175.95	577.26	-0.33	-1.08	2040	72	61	4370	154	98
Mar-14	175.95	577.26	-0.34	-1.12	3580	126	74	4570	161	94
Apr-14	176.06	577.62	-0.32	-1.05	11910	421	6	4910	173	95
May-14	176.27	578.31	-0.20	-0.66	10000	353	10	5120	181	96
Jun-14	176.38	578.67	-0.16	-0.52	7560	267	17	5260	186	97
Jul-14	176.46	578.94	-0.11	-0.36	3120	110	62	5400	191	98
Aug-14	176.48	579.00	-0.07	-0.23	4030	142	7	5430	192	98

Notes: m3/s = cubic metres per second tcfs = 1000 cubic feet per second

¹ Water Levels are a mean of six gauges on Lake Michigan-Huron, IGLD 1985

² Average levels are for period 1918-2013, based on a mean of six gauges. Differences computed as metres and then converted to feet.

³ Exceedence probabilities are based on the period 1900-2008.

⁴ Average flows are for the period 1900-2008.

TABLE 3
COMPENSATING WORKS GATE CHANGES

Date	Gate Change	Final Gate Settings *	Gate Equivalent (approx.)	Notes
<i>2013</i>				
01-Aug	Opened 6 - 8, 10 - 11 & 13; closed 15-16	6 - 8, 10 - 11 & 13 fully open	6	Plan-prescribed
03-Sep	Closed 6 & 13	7 - 8, 10 - 11 fully open	4	Plan-prescribed
04-Nov	Lowered 7 - 8 & 10; raised 9; closed 11	7 - 10 open 20 cm (8 in.)	1/2	Plan-prescribed
<i>2014</i>				
05-May	Opened 7 - 10	7 - 10 fully open	4	Plan-prescribed
06-May	Lowered 7 - 10	7 - 8 open 1.72 m (68 in.); 9 - 10 open 25 cm (10 in.)	2	Ice issues
07-May	Partially opened 2 - 15	** 2 - 8 open 56 cm (22 in.); 9 - 15 open 25 cm (10 in.)	3	Ice issues
15-May	Further opened 2 - 15	2 - 15 open 68 cm (27 in.)	5	Ice conditions improved, offset below-Plan flows start of May
09-Jun	Partially opened 16	2 - 15 open 68 cm (27 in.); 16 open 5 cm (2 in.)	5	Sea Lamprey trapping starts
25-Jun	Further opened 2 - 15	2 - 15 open 94 cm (37 in.); 16 open 5 cm (2 in.)	7	Offset below-Plan flows start of June, high flows expected July
22-Jul	Raised 10 & 16 temporarily, then lowered to initial position	2 - 15 open 94 cm (37 in.); 16 open 5 cm (2 in.)	7	Periodic inspections
03-Sep	Partially lowered 2 - 15, closed 16	2 - 15 open 80 cm (31 in.)	6	Plan-prescribed; Sea Lamprey trapping finished for season

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

** 07-May: Initially gates 2 - 15 were to be opened 56 cm (22 in.), but after opening gates 9,10,14,15 by this amount and opening gate 13 by 30 cm (12 in.), ice concerns forced all U.S. gates 9-15 to be set to 25 cm (10 in.)

TABLE 4
MONTHLY DISTRIBUTION OF LAKE SUPERIOR OUTFLOWS
(UNITS: m³/s)

YEAR AND MONTH	US GOVT HYDRO	POWER CANALS			TOTAL POWER CANALS	NAVIGATION CANALS			DOMESTIC USAGE			TOTAL DOM USAGE	FISHERY ST MARYS RAPIDS	TOTAL LAKE SUPERIOR OUTFLOW
		CEC	US TOTAL	BREG		UNITED STATES	CANADA	TOTAL NAV CANALS	SAULT STE MARIE US + CAN	ESSAR ALGOMA STEEL	ST MARYS PAPER			
2013														
JAN	411	329	740	736	1476	4	0	4	0.3	2.6	0	3	83	1566
FEB	405	334	739	736	1475	1.4	0	1	0.3	2.6	0	3	82	1561
MAR	411	322	733	720	1453	3	0	3	0.3	2.5	0	3	82	1541
APR	405	322	727	718	1445	9.1	0	9	0.3	2.6	0	3	81	1538
MAY	413	352	765	707	1472	10.4	0.4	11	0.3	2.6	0	3	84	1570
JUN	342	620	962	987	1949	11.5	1.1	13	0.3	2.5	0	3	85	2050
JUL	353	681	1034	1049	2083	12	1.8	14	0.3	2.7	0	3	86	2186
AUG	408	718	1126	744	1870	11.5	1.9	13	0.3	2.7	0	3	893	2779
SEP	400	739	1139	982	2121	10.9	0.8	12	0.3	2.8	0	3	657	2793
OCT	354	734	1088	1062	2150	9.2	0.3	10	0.3	2.6	0	3	622	2785
NOV	401	694	1095	1024	2119	9.1	0	9	0.3	2.3	0	3	145	2276
DEC	397	646	1043	1041	2084	7	0	7	0.3	2.1	0	2	86	2179
2014														
JAN	393	585	978	998	1976	2.4	0	2	0.3	2.6	0	3	85	2066
FEB	393	541	934	950	1884	0	0	0	0.3	2.7	0	3	85	1972
MAR	395	518	913	966	1879	0.3	0	0	0.4	2.6	0	3	85	1967
APR	389	595	984	949	1933	3.7	0	4	0.3	2.6	0	3	85	2025
MAY	401	737	1138	663	1801	10.6	0.3	11	0.3	2.7	0	3	545	2360
JUN	366	771	1137	763	1900	12.5	1.2	14	0.3	2.7	0	3	783	2700
JUL	350	774	1124	1132	2256	13.6	1.5	15	0.3	2.8	0	3	991	3265
AUG	358	774	1132	1144	2276	13	1.4	14	0.3	2.8	0	3	991	3284

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

TABLE 5
MONTHLY DISTRIBUTION OF LAKE SUPERIOR OUTFLOWS
(UNITS: cfs)

YEAR AND MONTH	US GOVT HYDRO	POWER CANALS			TOTAL POWER CANALS	NAVIGATION CANALS			DOMESTIC USAGE			TOTAL DOM USAGE	FISHERY ST MARYS RAPIDS	TOTAL LAKE SUPERIOR OUTFLOW
		CEC	US TOTAL	BREG		UNITED STATES	CANADA	TOTAL NAV CANALS	SAULT STE MARIE US + CAN	ESSAR ALGOMA STEEL	ST MARYS PAPER			
2013														
JAN	14500	11600	26100	26000	52100	141	0	141	11	92	0	103	2930	55300
FEB	14300	11800	26100	26000	52100	49	0	49	11	92	0	103	2900	55200
MAR	14500	11400	25900	25400	51300	106	0	106	11	88	0	99	2900	54400
APR	14300	11400	25700	25400	51100	321	0	321	11	92	0	103	2860	54400
MAY	14600	12400	27000	25000	52000	367	14	381	11	92	0	103	2970	55500
JUN	12100	21900	34000	34900	68900	406	39	445	11	88	0	99	3000	72400
JUL	12500	24000	36500	37000	73500	424	64	488	11	95	0	106	3040	77100
AUG	14400	25400	39800	26300	66100	406	67	473	11	95	0	106	31500	98200
SEP	14100	26100	40200	34700	74900	385	28	413	11	99	0	110	23200	98600
OCT	12500	25900	38400	37500	75900	325	11	336	11	92	0	103	22000	98300
NOV	14200	24500	38700	36200	74900	321	0	321	11	81	0	92	5120	80400
DEC	14000	22800	36800	36800	73600	247	0	247	11	74	0	85	3040	77000
2014														
JAN	13900	20700	34600	35200	69800	85	0	85	11	92	0	103	3000	73000
FEB	13900	19100	33000	33500	66500	0	0	0	11	95	0	106	3000	69600
MAR	13900	18300	32200	34100	66300	11	0	11	14	92	0	106	3000	69400
APR	13700	21000	34700	33500	68200	131	0	131	11	92	0	103	3000	71400
MAY	14200	26000	40200	23400	63600	374	11	385	11	95	0	106	19200	83300
JUN	12900	27200	40100	26900	67000	441	42	483	11	95	0	106	27700	95300
JUL	12400	27300	39700	40000	79700	480	53	533	11	99	0	110	35000	115300
AUG	12600	27300	39900	40400	80300	459	49	508	11	99	0	110	35000	115900

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

NOTE: Flows for individual users were originally coordinated in m³/s, and are converted here to U.S. customary units (cfs) and rounded to 3 significant figures. Total flow for each category and total Lake Superior flow in this table are computed from the individual flows in cfs.

Figure 1 - LAKE SUPERIOR MONTHLY WATER LEVELS

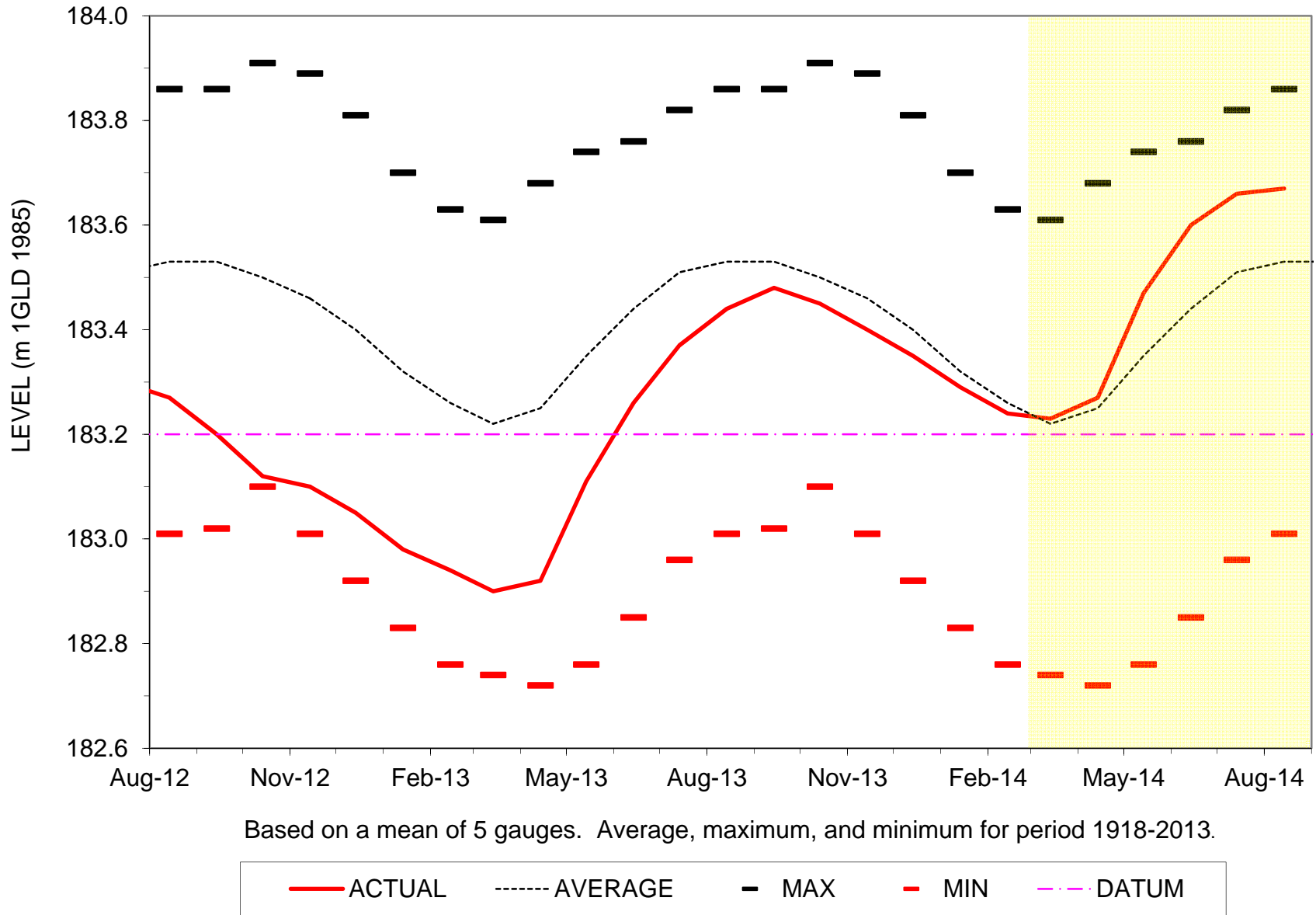
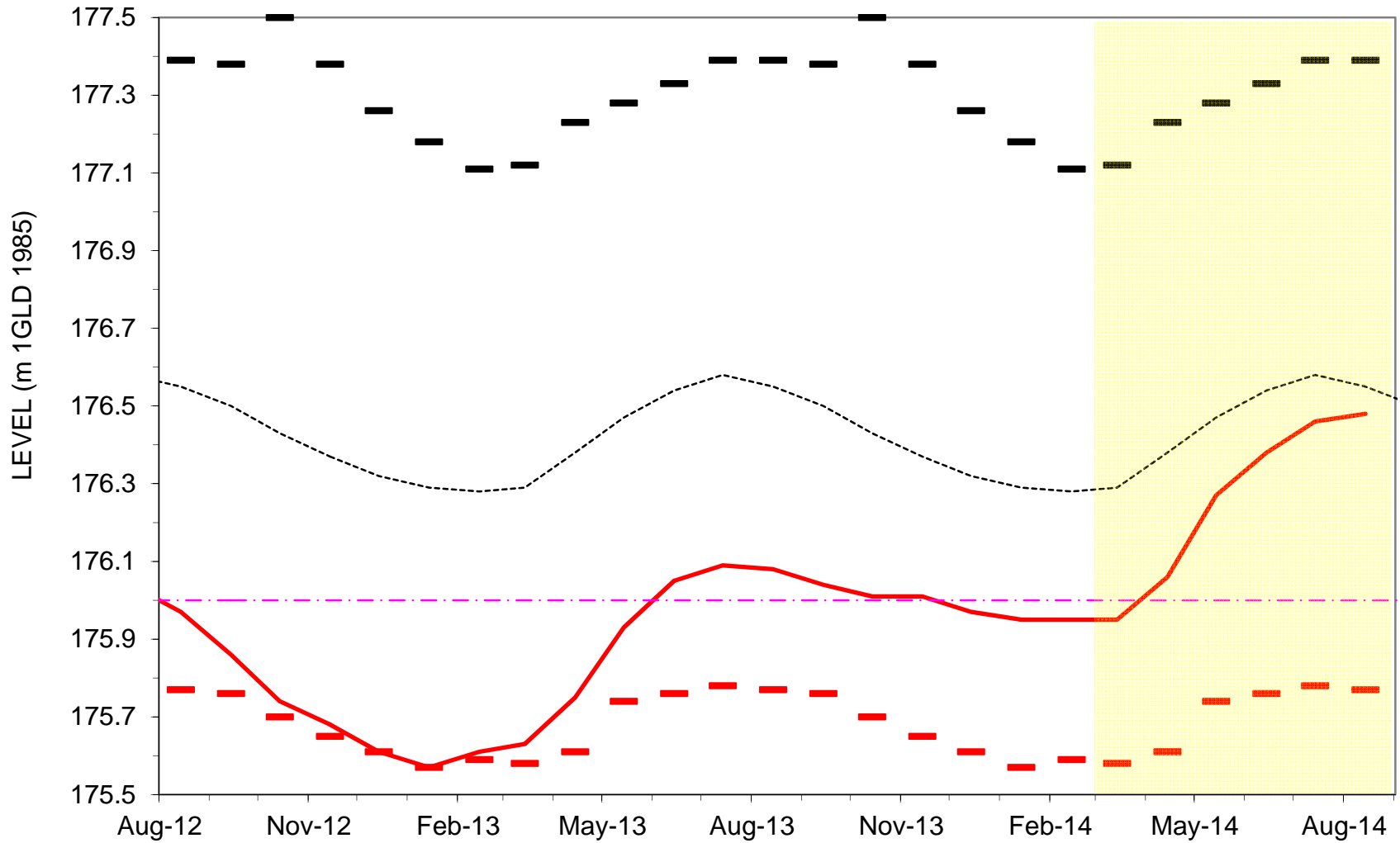


Figure 2 - LAKE MICHIGAN-HURON MONTHLY WATER LEVELS



Based on a mean of 6 gauges. Average, maximum, and minimum for period 1918-2013.

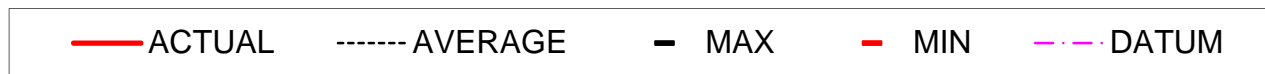


Figure 3 - LAKE SUPERIOR MONTHLY PRECIPITATION

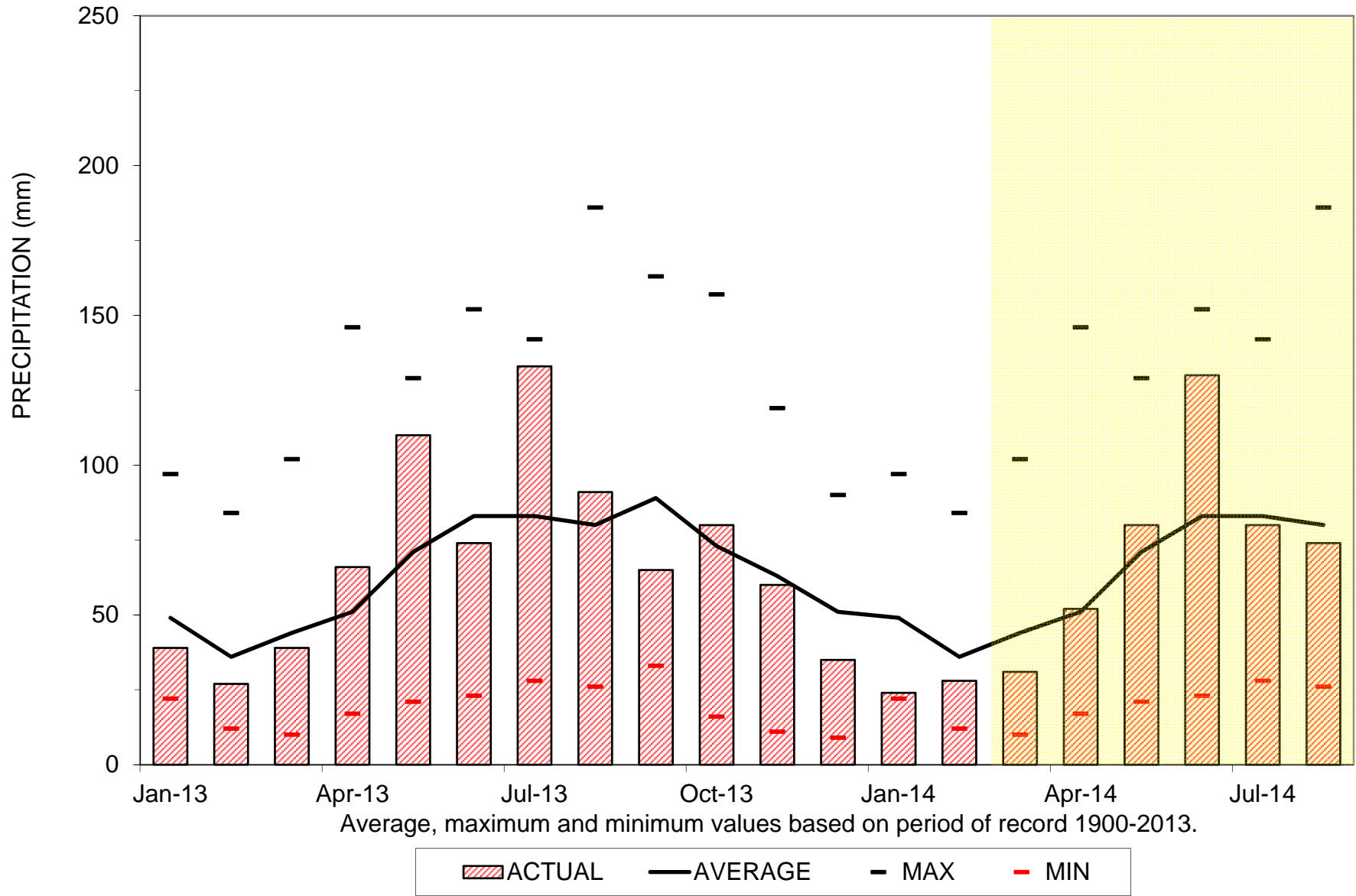


Figure 4 - LAKE MICHIGAN-HURON MONTHLY PRECIPITATION

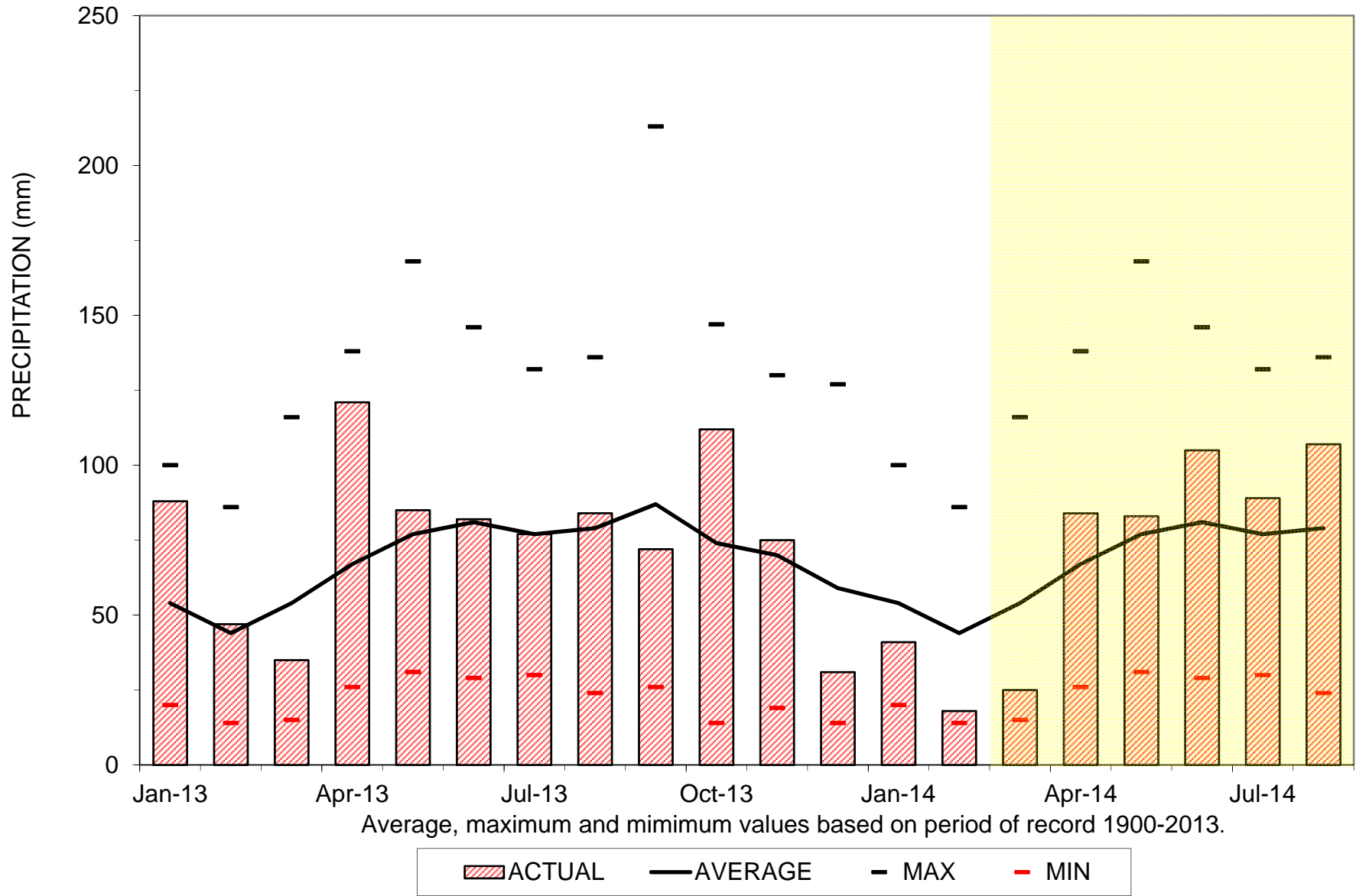
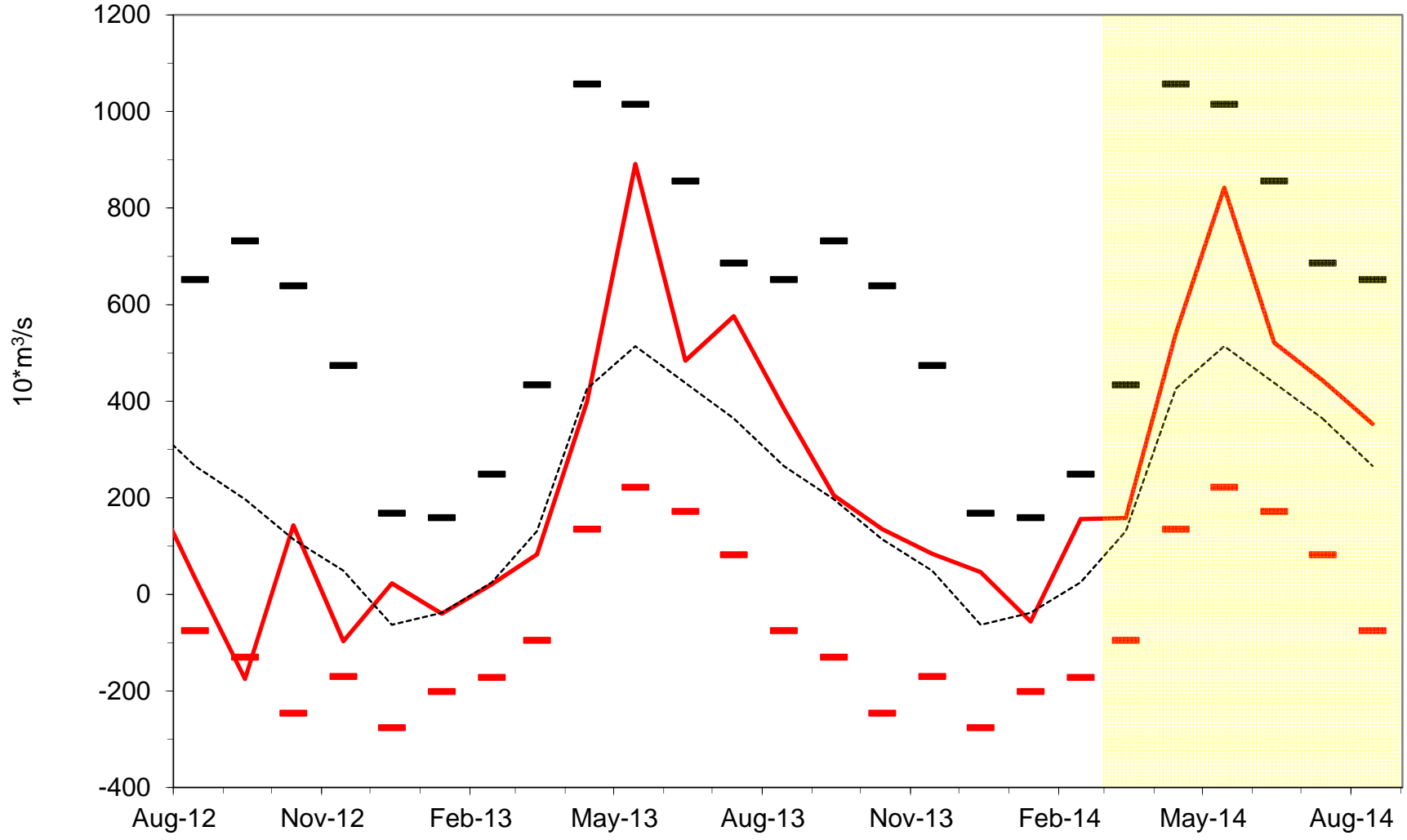


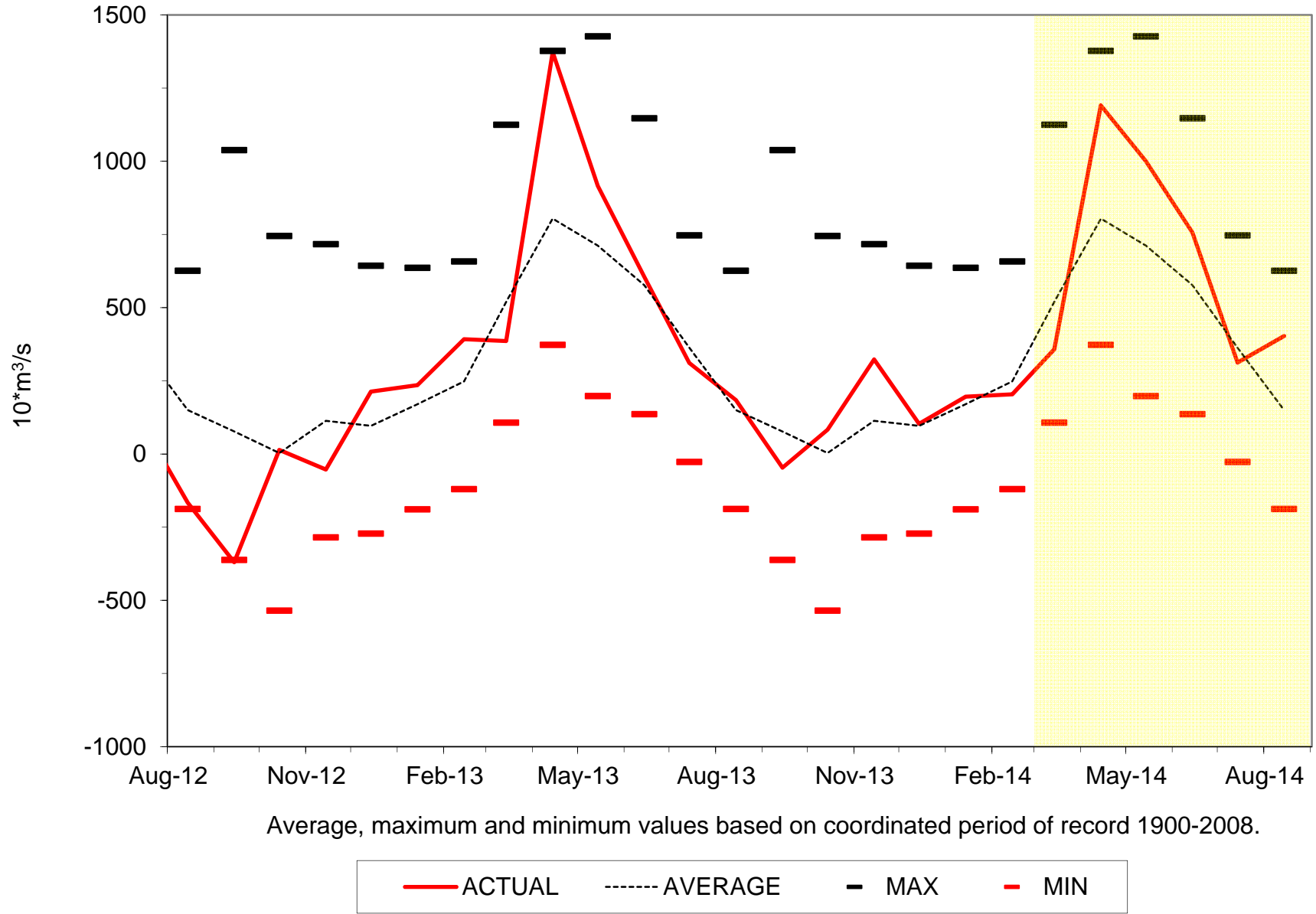
Figure 5 - LAKE SUPERIOR MONTHLY NET BASIN SUPPLIES



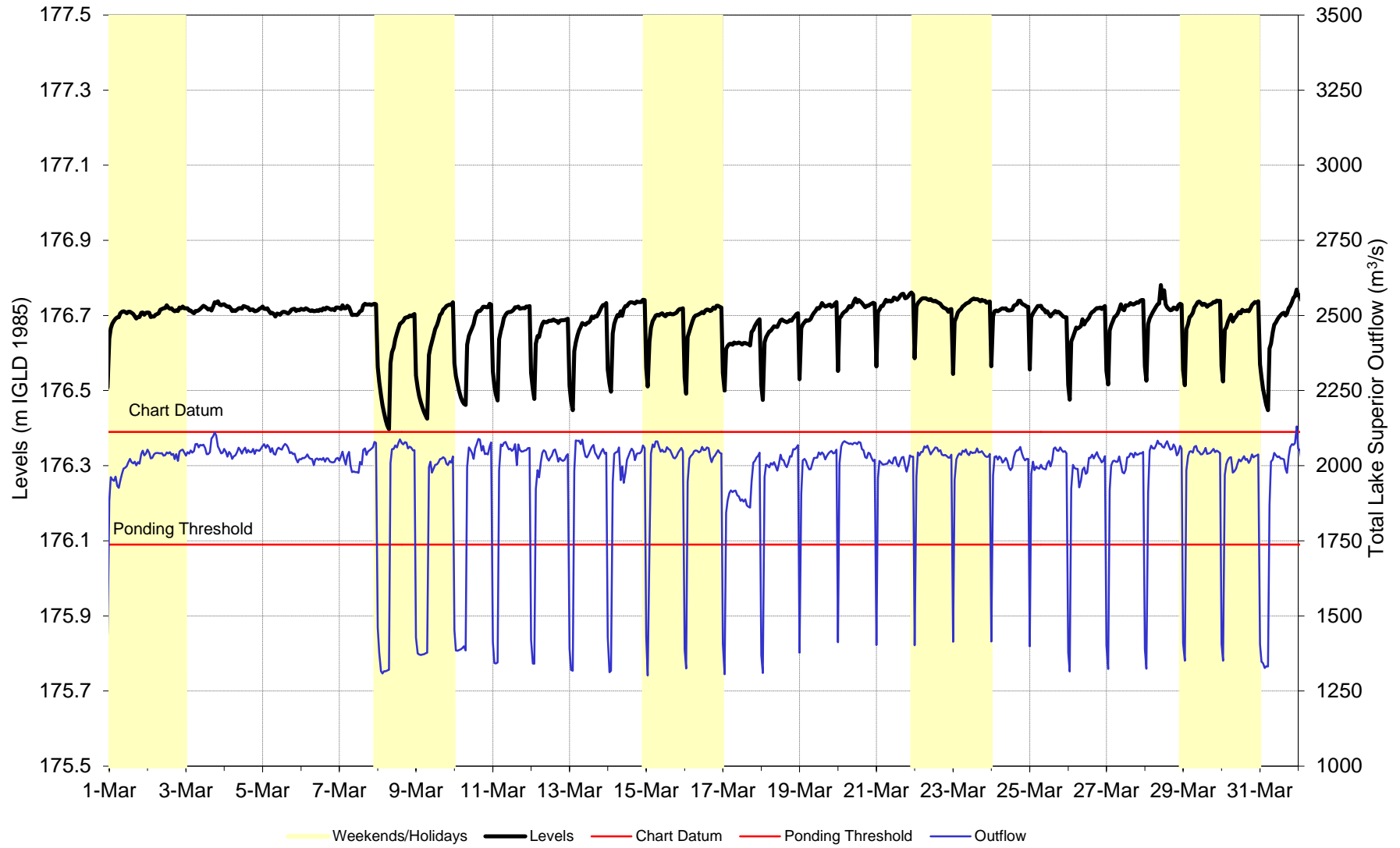
Average, maximum and minimum values based on coordinated period of record 1900-2008.



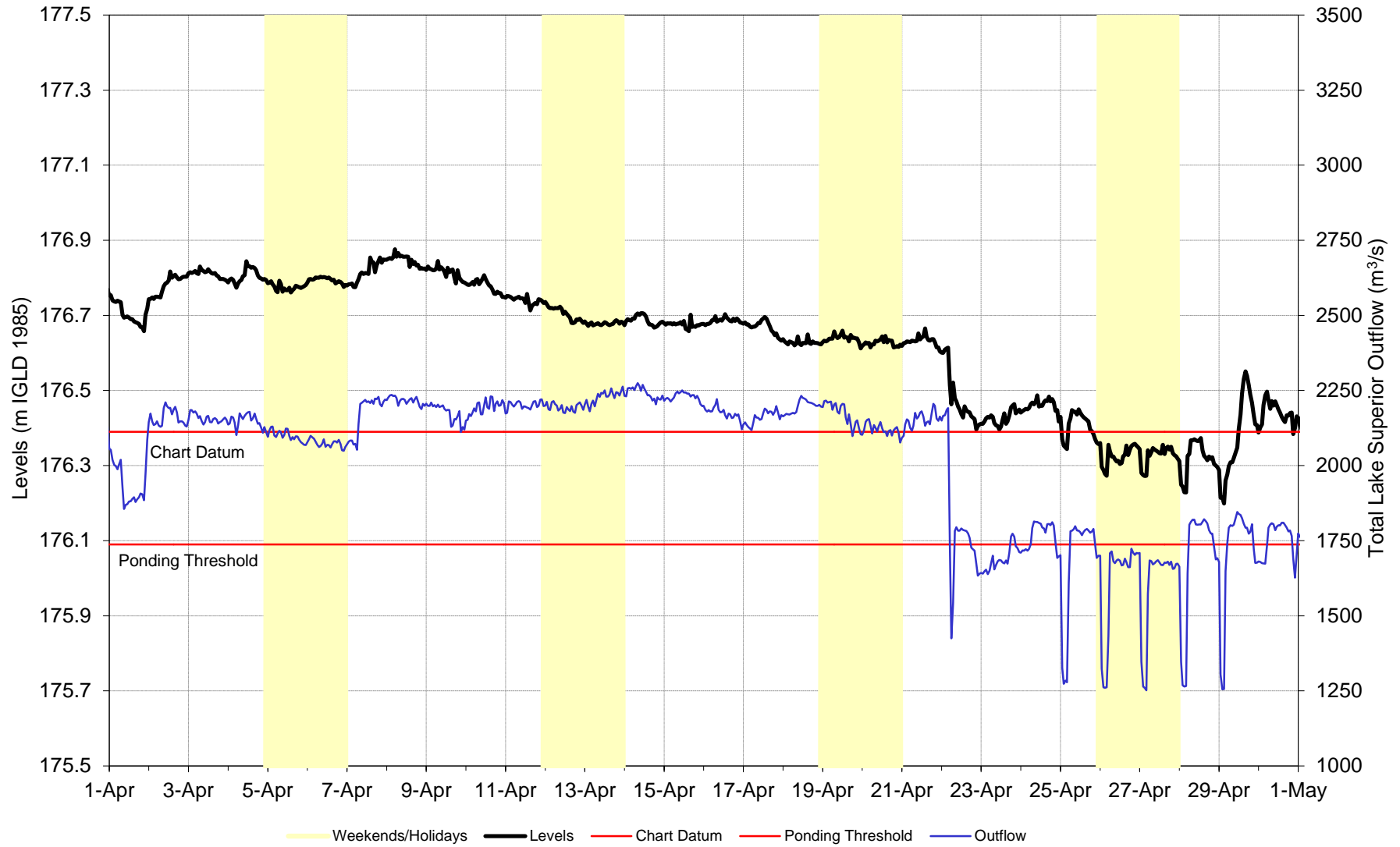
Figure 6 - LAKE MICHIGAN-HURON MONTHLY NET BASIN SUPPLIES



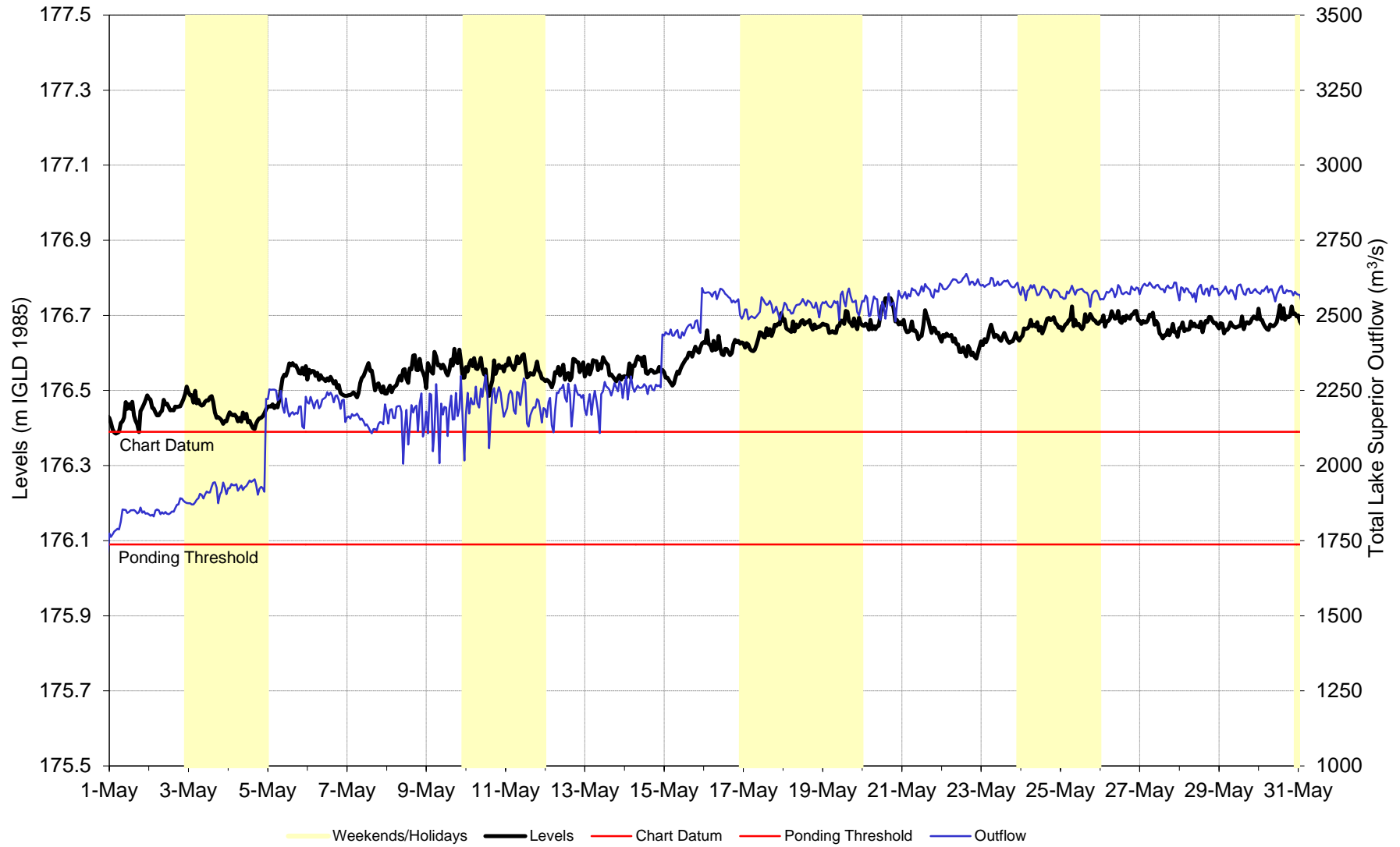
Hourly U.S. Slip Levels & Lake Superior Outflows
Figure 7a - March 2014



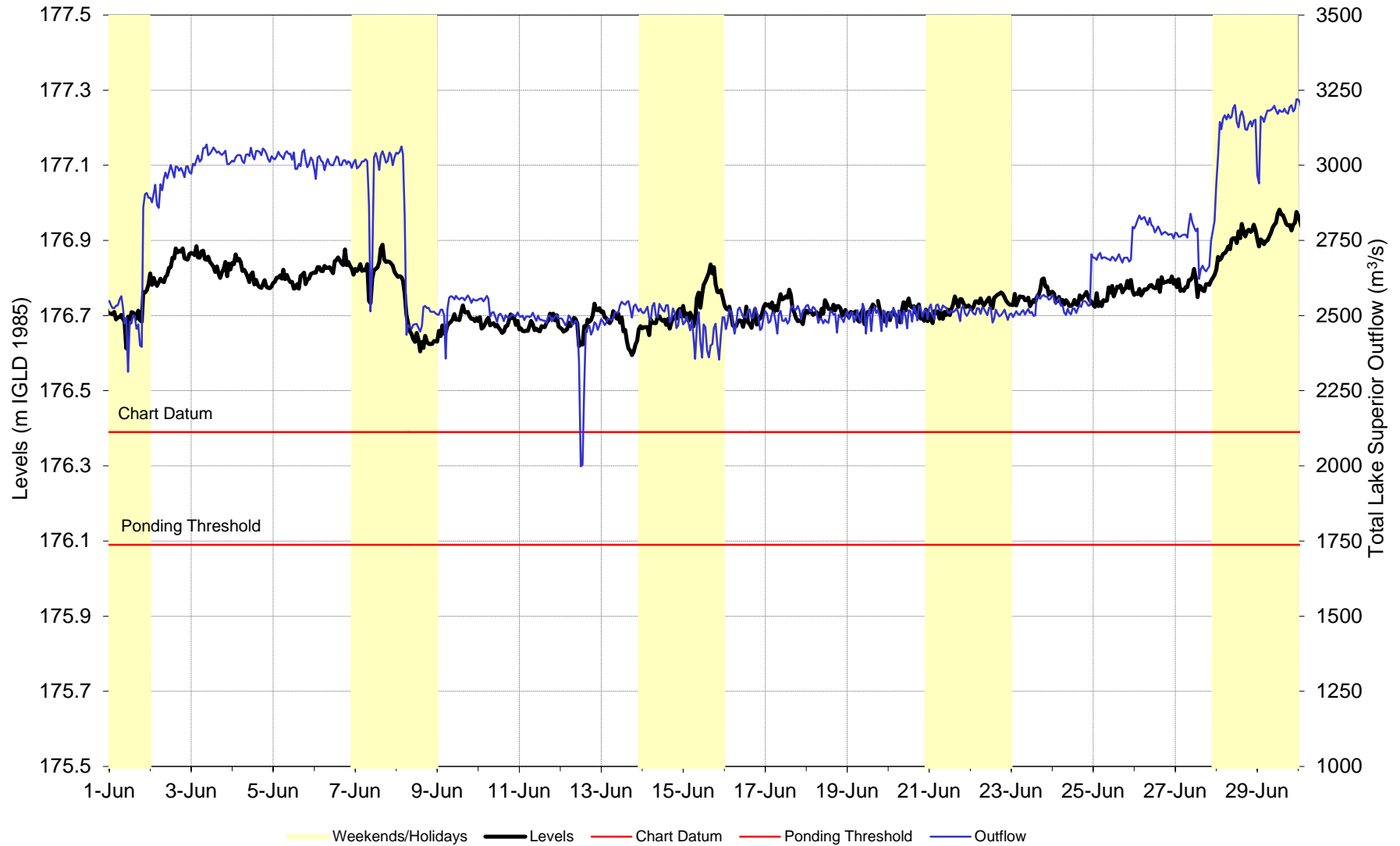
Hourly U.S. Slip Levels & Lake Superior Outflows
Figure 7b - April 2014



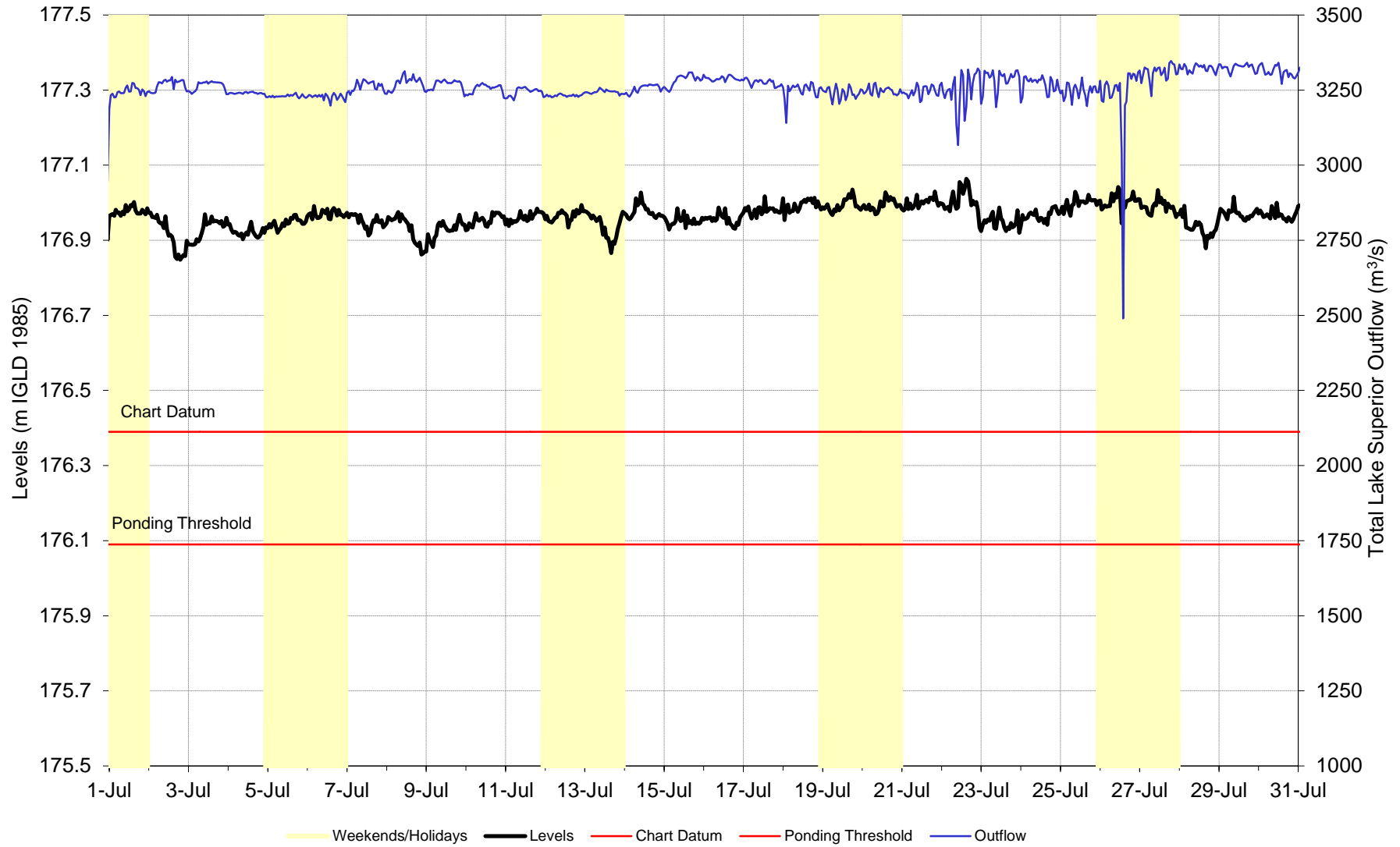
Hourly U.S. Slip Levels & Lake Superior Outflows
Figure 7c - May 2014



Hourly U.S. Slip Levels & Lake Superior Outflows
Figure 7d - June 2014



Hourly U.S. Slip Levels & Lake Superior Outflows
Figure 7e - July 2014



Hourly U.S. Slip Levels & Lake Superior Outflows
Figure 7f - August 2014

