

# Lake Ontario - St. Lawrence River 2017 High Water - Questions and Answers



The following background information was prepared and reviewed by staff of the International Joint Commission (IJC) and its International Lake Ontario-St. Lawrence River Board (ILOSRLRB).

## Causes of this 2017 high water event

### What were the causes of high water this year?

The primary cause was extremely wet weather in April and May across the entire Lake Ontario and St. Lawrence River basin that followed wet weather from January-March. Secondary, related causes were the ensuing record high inflows from the Ottawa River in April and May, well above-average inflows from Lake Erie throughout 2017, and unusual ice-formation on the St. Lawrence River that required temporary reductions of Lake Ontario outflows on several occasions during January-March.

### Did precipitation set records?

Yes, many locations in the Lake Ontario basin received record precipitation during the five-month period of January through May 2017, when peak water levels occurred, including the cities of Toronto, ON and Rochester, NY. Combined with high inflows to Lake Ontario from Lake Erie via the Niagara River, the total water supplies to Lake Ontario set a record in May, and April brought the second highest water supplies on record. Precipitation over the Ottawa River basin, which flows into the St. Lawrence River at Montreal, also set records during the spring and for the year of 2017 as a whole.

### Did Plan 2014 cause the high water levels?

No, the record high water levels in 2017 resulted from extreme, and at times unprecedented weather conditions, including extremely high, natural water supplies and highly unusual winter weather conditions. These conditions largely dictated how outflows had to be managed during the first five months of 2017. First, from January through late March, wet weather and unusual temperature fluctuations required that Lake Ontario outflows be almost continuously adjusted to manage highly variable ice conditions in the St. Lawrence River to prevent ice jams that could have severely restricted flows and resulted in immediate localized flooding. Then, from April through May, during this period of record inflows to Lake Ontario and record Ottawa River flows, Lake Ontario outflows were again almost continuously adjusted in order to balance high water impacts upstream and downstream. The outflows during the first five months of 2017 were all made according to the rules of Plan 2014, but these rules—namely, the “I” (ice) limit and “F” (flood) limit – were established on the basis of how the Board had operated during similar conditions in the past when it deviated from Plan 1958-D to achieve the same result.

At the end of April, water levels exceeded the Criterion H14 high triggers, giving the Board authority to deviate from the rules of Plan 2014. Starting on May 24, as flooding conditions subsided downstream, outflows were increased above those prescribed by Plan 2014, up to the maximum possible without stopping commercial navigation on the St. Lawrence Seaway. During this time, outflows exceeded the highest flows ever previously released on a sustained basis, and these unprecedented outflows were maintained from mid-June into August. Outflows were reduced subsequently as Lake Ontario levels declined, once more in order to prevent closure of the St. Lawrence Seaway. Nonetheless, the outflow remained above the rules of Plan 2014 until the start of September.

In summary, the Board managed outflows during the unusual and extreme weather conditions from January through late May according to Plan 2014 rules that were based on Board operations under the previous regulation plan. From late May through August, the Board did not follow the rules of Plan 2014, and instead the Board decided to release higher outflows in order to provide relief to Lake Ontario shoreline property owners. Starting in September, the Board returned to Plan 2014, which generally prescribed maximum possible flows while maintaining commercial navigation operations in the St. Lawrence Seaway throughout the remainder of 2017.

### Did Plan 2014 hold water back on Lake Ontario?

The factors that constrained outflows in 2017 are uncontrolled, natural factors that would have been the same under any regulation plan: highly variable ice conditions in the St. Lawrence River, upstream and downstream flooding and navigation safety. Despite these constraints, total releases were well above average in 2017 and outflows were increased to record-setting rates as downstream flooding subsided from late May to mid-August.

### Could dams on the Ottawa River have been operated to reduce flows to the St. Lawrence River?

The IJC has no authority over the dams in the Ottawa River; however, the dams were operated to reduce high flows into the St. Lawrence River. In response to the extreme flooding, every measure was taken to reduce discharges from upstream reservoirs. The combined flow reduction, due to storage in the northern reservoirs, amounted to approximately 2,800 cubic meters per second in reduced discharge to the St. Lawrence River at the peak on May 8, 2017. During flood events, the safety and security of riparian residents and the integrity of water retention structures take priority over hydropower production.

While flow reductions this year were significant, there are limitations to using the dams to reduce flows on the Ottawa River, particularly under the conditions experienced this year. Storage capacity in the Ottawa River basin is small compared to the total volume of the annual spring freshet, the surge that occurs in the spring when rains combine with snow melt. Total runoff from this year’s spring freshet was three times the total storage volume of the reservoirs in the basin. In addition, approximately 60 percent of the drainage area of the Ottawa River basin is uncontrolled and has no significant storage capacity. The majority of the extreme rainfall received in late April and early May this year was centered over this uncontrolled portion of the basin, which is also at the downstream end of the system, closest to the St. Lawrence River. The physical geography of this area does not allow further development of flood reservoirs – in fact, this was clearly illustrated in 2017 by the extensive and severe flooding that occurred along this stretch of the lower Ottawa River during the record flows in early May. Flow conditions were already above normal due to April precipitation that was double normal values combined with late snow melt runoff.

## Operations in 2017

### Why wasn’t more water released from Lake Ontario in the spring of 2017?

Since flooding was occurring above and below the dam in spring 2017, Lake Ontario outflows were set to balance upstream and downstream flooding impacts.

### Why wasn’t more water released in 2016 when downstream flooding was not an issue?

The Board saw no reason to release more water since Lake Ontario was below its long-term average from May through December 2016 and because the basin experienced severe drought during late summer and fall of that year. The capability to predict whether conditions would be wet or dry in the following year does not exist.

For example, Lake Ontario was at the same level at the end of March 2017 as it was at the end of March 2016. An extreme drought followed in 2016 while extremely high rainfall followed in 2017. Neither scenario could have been predicted, nor were they.

### Would the Board have had more flexibility to release water if Plan 1958DD had been in place in 2017?

While the Board would have had greater authority to deviate and release flows other than those prescribed by the plan, this greater authority may not have been exercised during the extreme weather conditions in 2017, including highly variable temperatures and ice conditions in the St. Lawrence River in winter and the extreme rainfall and flooding conditions upstream and downstream in the basin during spring. Therefore, it likely would have made little or no difference if the Board had been operating under Plan 1958DD.

For example, while the Board had the authority to deviate from Plan 2014 flows when Lake Ontario reached its high water trigger level on April 28, the Board chose to follow Plan 2014 until May 24 to balance the flooding that was occurring simultaneously both upstream and downstream. The outflow decisions that the Board made once it began to deviate from the Plan 2014 flow may have been the same outflow decisions it would have made under the Plan 1958DD because the Board would have been faced with the same considerations.

### Why were flows reduced for navigation?

The Board’s priority in 2017 was to reduce the impacts from high water upstream and downstream. However, in setting the outflow, the Board must consider the degree of relief that can be provided as well as the consequences to all interests. Higher flows than those set by the Board would have increased currents in the international section of the St. Lawrence River to an extent that would have effectively forced the stoppage of commercial navigation. This would have further impacted people’s lives and the economy throughout the Great Lakes region by disrupting the transport of raw materials and finished products, without providing a great deal of relief on Lake Ontario.

Starting on May 24, as flooding conditions subsided downstream, outflows were increased above the flows that would otherwise have been prescribed by Plan 2014. In fact, outflows exceeded the highest flows ever previously released on a sustained basis, and these unprecedented outflows were maintained from mid-June into August. To maintain safe conditions for navigation during the sustained, record high flows, the Seaway entities imposed speed limits, no passing restrictions and other mitigation measures.

The gradual decline of Lake Ontario through the summer months caused the velocity in the upper St. Lawrence River to gradually increase. This presented additional challenges, and eventually, maintaining record high flows was no longer safe for navigation. As a result, starting in August, flows had to be gradually reduced in order to ensure safe conditions and allow ship transits to continue.

In summary, outflows were set at or near the maximum possible rate consistent with safe navigation from the end of May through December in order to lower Lake Ontario levels as quickly and safely as possible.

### Why did the Board not set flows at a rate that would have resulted in temporary navigation stoppages, such as those that occurred in 1993?

The interruptions of Seaway operations in 1993 were a short-term, experimental measure and removed just over an inch of water from Lake Ontario. In 2017 Lake Ontario outflows were comparable to, or higher than, those released in 1993 on a weekly basis and were sustained over an extended period while balancing all interests in the system. This resulted in record releases and a greater rate of lowering of Lake Ontario than that which was achieved in 1993, and with fewer impacts on other stakeholders. In the four months following the peak water level (June through September), Lake Ontario dropped a record 93 centimeters (36.6 inches); the next largest decline during this period was 86 centimeters (33.9 inches) in 1993.

### Why were flows reduced in October for boat haul out?

As the end of 2017 approached, Plan 2014 continued to specify very high outflows, but whether or not a flood occurs during the spring of 2018 will depend on weather conditions and water supplies over the winter and spring months, not the regulation plan. While the Board and the Plan are doing all that can be done, no flow management plan can eliminate the risk of future flooding.

### What actions can be taken to lower water levels and prevent a flood in 2018?

As we near the end of 2017, Plan 2014 continues to release very high outflows to draw down the level of Lake Ontario and reduce the risk of flooding next year, but whether or not a flood occurs next spring will depend on weather conditions and water supplies, not the regulation plan. While the Board and the plan are doing all that can be done, no flow management plan can eliminate the risk of flooding.

### Why not draw Lake Ontario down each fall so that there is sufficient storage to prevent flooding in the spring?

The physical capacity simply does not exist to prevent flooding in years when water supplies upstream and downstream are as extreme as those experienced in 2017. Previous IJC studies have shown that it is not possible to prevent all flooding on Lake Ontario, even if this was the only objective of the regulation plan. Furthermore, the impacts that can occur to other interests, such as navigation and recreational boating, during low water years must be considered. For example, if there is a drought in the following spring, drawing down Lake Ontario as much as possible each fall would result in significant economic impacts to other interests, which may actually exceed the reduction in economic damages to Lake Ontario shoreline property. Lastly, fall drawdowns are also known to have detrimental impacts to environmental restoration interests as well.

### How did outflows under Plan 2014 during fall 2017 differ from those that would have occurred under Plan 1958DD?

This cannot be determined with exact confidence since decisions that may have been made by the Board in this situation under Plan 1958DD are not entirely predictable and, hence, are unknown. However, from April through August 2017, the Board had authority to deviate from Plan 2014. It did so, starting at the end of May as downstream flooding subsided, and released the maximum flow possible while maintaining commercial navigation in the St. Lawrence River throughout the summer. Starting in September, the Board returned to following Plan 2014 which continued to set outflows at the maximum that could be released while maintaining commercial navigation operations in the upper St. Lawrence River throughout the fall and until ice formation began in late-December. Had outflows been increased further, whether under any regulation plan or through deviations, it would have increased the risk to ships and may have suspended commercial navigation operations in the St. Lawrence River. Finally, Lake Ontario water levels are primarily influenced by natural water supplies, whereas outflow regulation has a lesser influence. Especially under extreme conditions, one can expect the same extreme water levels to occur under either regulation plan.

## Contact Us

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