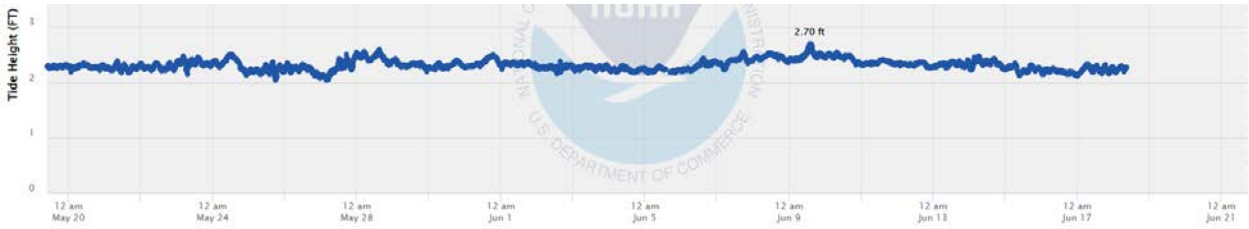
Water Levels: Current Water Loss & Plan 2014 Expedited Review Update
TIA Water Levels Committee 7/4/24) – by Barton, Stewart & White

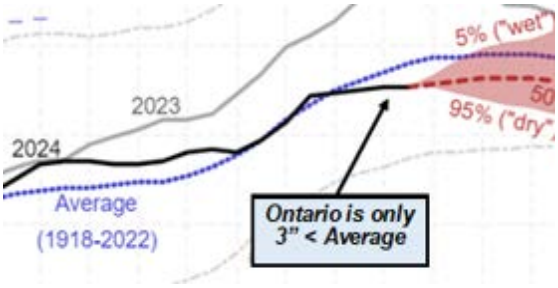
Water Level Flat line?

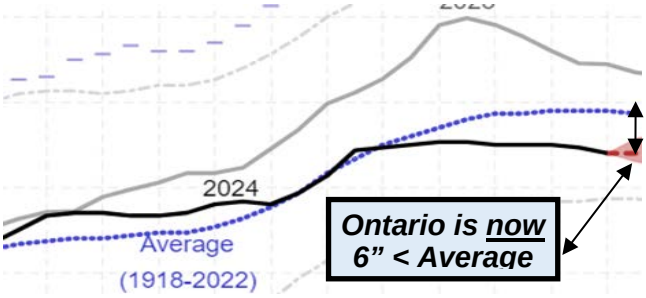


A month ago the Alex Bay water level was at 2.25 ft. & ended at 2.27 ft. *(above chart datum)*

Notice to Mariners - If Peter, Paul, and Mary were long-time residents of the 1000 Islands Upper St. Lawrence region, they might be singing ***"Where has all the water gone, long time passing, where has all the water gone, long time ago…?"***

This month we look at Water Levels "from the outside" and get an "update from the inside". Why does it seem (from the outside) that the outflow continues to remove more water than necessary?





Vince Barton's opinion is that a component of the Plan 2014 outflow algorithm is behind the ongoing drop relative to average this year (see 2 graphs above). Just over 2 months ago, Lake Ontario was at average for mid-April. For the last 9-10 weeks, we've had incoming Net Total Supply (NTS – the total amount of water entering Lake Ontario from Lake Erie + precipitation/runoff – evaporation) very close to average. Last month in River Talk we reported 3" below average. In spite of the initial average level in mid-April and close to average Net Total Supply since - we've now dropped to 6" below average for late June.

Also featured is an "update from the inside", by Ross Stewart on the Expedited Review of Plan 2014, underway by the IJC's **GLAM**, **G**reat

Lakes **A**daptive **M**anagement Committee. He is a TIA Member-At-Large with the **PAG P**ublic **A**dvisory **G**roup team representing the interests of our region. They are on a breakneck schedule and provides an update you can read about on the in-depth article.

The GLAM review focuses primarily on the high-water levels experienced in 2017 and 2019, using new data, modeling techniques, and spatial data to understand the impacts of various scenarios that have occurred in the past and that may occur in the future (including newer **climate change models**).

Read on for the in-depth discussion of both topics!

This month we take a look from the outside and get an update from the inside. Why does it seem (from the Outside) that the outflow (for the last 4 months & 3 of the last 4 years) removes more water than necessary?

And from the Inside of the GLAM process and the PAG members, it looks like the Mountain of Work and short time schedule may leave our question (from the Outside) "on the list" but as of yet unanswered.

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From the Outside:

It wasn't too long ago that Lake Ontario's (and therefore the upper St. Lawrence River) water level was tracking about as close to long-term average as it gets. It followed the average line for most of January… then it was a few inches above average in February… then a couple of inches below average in early April… yet it ended the month of April at 245.90', spot on long-term average for the end of April.

What's happened since? The water level has basically flat-lined ever since, ending June 30th at the very same 245.90' that we saw on April 30th. It's varied by just over an inch either above or below that 245.90' for those entire 2 months. Typically, water levels rise during those couple of months, with long term average increasing from the 245.90' at the end of April to a peak of 246.29' in mid to late June. So even though the actual level has remained the same, it dropped by about 5" relative to average.

Why has that been happening? Was it really dry in the Lake Ontario basin in the months of May and June? Well, no – while May was a little drier than average,

receiving 88% of average precipitation for the month, June was actually pretty wet, with the Lake Ontario basin receiving 139% of average June precipitation. So in total, the basin received MORE rain than average for that two month span.

Then is it because less water is coming in from Lake Erie? Well, no, it's not that, either. Lake Erie flows to Lake Ontario have been above average that entire time.

In fact, when you put the precipitation and runoff (minus evaporation) together with Lake Erie flows, you get something known as NTS: Net Total Supply. This is the total amount of water entering Lake Ontario. NTS has been above average during that two-month span – not a lot, but above average nonetheless.

So with "extra" water coming in above the average, why has the water level been dropping vs. the average? For that answer, we have to look at the other side of the equation – outflow.

For any given inflow – if the outflow is higher, the water level goes down. That's what we've been seeing over the past two months. Outflows have been considerably above average during these last two months… and by more than the amount that inflows have been above average. The end result – the level has dropped relative to average.

So then why have outflows been so much higher than average? To help answer that question, we need to cover a little background on terminology and how the Plan 2014 algorithm works.

- **Net Total Supply –** as mentioned earlier, this is the total amount of water entering Lake Ontario through precipitation, runoff from its basin, and flows from Lake Erie, minus evaporation.
- **Pre-Project Outflow** – the amount of water that would have outflowed from Lake Ontario for any given Lake Ontario level. (Prior to the existence of the Seaway and the control dams at Moses Saunders and Long Sault, the outflow of Lake Ontario was effectively controlled naturally by an underwater rock wall/ledge – an equation known as the Caldwell-Fay equation is used to calculate how much water would have flowed given this natural dam for any given Lake Ontario level.)
- **52-Week Lookback** – this is not an official term used by the IJC, GLAM, or the ILOSLRB, but it's a common term used for a part of the Plan 2014 algorithm that adjusts outflows based upon Net Total Supplies over the prior 52 weeks.
- **Long Forecast** – this is the official term for what we just dubbed the 52-Week Lookback. The "Long Forecast" is looking at the water supplies of

the PAST 52 weeks. That's sure not what we typically think of when hearing the word "forecast" – forecasts don't usually refer to something that's happened in the past! For our further discussion, we'll use the term 52-Week Lookback, as it makes more intuitive sense.

With all that in mind, the Plan 2014 algorithm to determine outflow really breaks down into 2 main parts:

1. a calculation of the Pre-Project Outflow, and
2. an adjustment factor based in large part upon the 52-Week Lookback. That adjustment factor can either increase or decrease the outflow vs. the Pre-Project Outflow. The higher the water supplies have been under that 52-Week Lookback, the larger the increase in outflows.

Even though Lake Ontario levels dropped below average in early May and fell further and further below average through all of May and much of June, outflows from Lake Ontario still remained well above average over those entire two months. Why? A major reason is the 52-Week Lookback.

We're not going to say it's the ONLY factor – it would take a lot of heavy number crunching to determine the exact impact. However, here's one way to look at it for the last week of June. On June 20th, the level of Lake Ontario was 245.8', nearly a half foot lower than the average level of 246.29' at that time. Pre-Project Outflow at 245.8' is calculated to be approximately 6,960 m3/s (meters cubed per second). The average outflow for that time of year is 7,550 m3/s.

So what was the actual outflow determined for the following week by the Plan 2014 algorithm? 7,800 m3/s. That's 245 m3/s above average outflows, even though Lake Ontario was nearly half a foot below average. That's also 840 m3/s above the pre-project outflow – so we can see there was a significant adjustment upwards of the outflow due to the 2nd part of the Plan 2014 algorithm, the adjustment factor that is in large part due to the 52-Week Lookback. For reference, an outflow of approximately 810 m3/s for one week is equivalent to a 1" change in the level of Lake Ontario over the course of that week.

Let's put that another way… with Lake Ontario nearly half a foot below average levels, outflows are HIGHER than average by 245 m3/s? Yep, exactly – and the 52-Week Lookback sure looks like the main culprit.

2024 is not the first time we've seen this effect. You probably remember 2022 as having pretty low water levels the later we got into the summer. The 52-Week Lookback was a big driver that year – helping to drive Lake Ontario from levels about 9" above average in early May to nearly 9" below average by late August.

Things were headed on a similar path in 2021, too – until an incredibly wet July "saved" us from the rapid decline we saw the next year in 2022.

This is now 3 out of 4 years we're seeing this effect. While the current past 52 week's Net Total Supplies are not nearly as high as they were in 2021 and 2022, they're still high enough to result in an outflow that is pretty high relative to average outflows and relative to the actual current level of Lake Ontario.

On the bright side, because the last 52 weeks' NTS has not been nearly as high as it was back in 2022 – the 52-Week Lookback adjustment factor increasing outflows Plan 2014 algorithm is not increasing them nearly as much as it did in 2022. This means the slope of any decline in levels should be far more gradual than we saw in 2022.

The GLAM (Great Lakes Adaptive Management) IS aware of this issue. Hopefully we'll see some recommendations on how to mitigate this challenge in their final conclusions!

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From the Inside:

Summer Public Advisory Group (PAG) Update for Plan 2014 expedited review:

Those who read TIA's water levels update, or attended the AGM during summer of 2023, are likely aware of TIA's involvement in reviewing the current IJC regulation plan (P2014) that regulates water levels in Lake Ontario and the St. Lawrence River. Ross Stewart is TIA's representative to PAG.

The **G**reat **L**akes **A**daptive **M**anagement Committee (**GLAM**) is working on all cylinders reviewing various scenarios that would impact water levels to determine if Plan 2014 is meeting the requirements and goals as outlined in the various Treaties and Orders. The GLAM review of Plan 2014 (the regulation plan) is focused on accomplishing a huge amount of work in a very short timeframe.

This GLAM review focuses on the high-water levels that were experienced in 2017 and 2019, using new data, modeling techniques, and spatial data to understand the impacts of various scenarios that have occurred in the past and may occur in the future (including climate change models).

The new data sets, and the addition of this spatial data, have provided much more detailed insights on the overall system impacts. To understand and compare impacts on interest groups in various parts of the Lake & Upper St.

Lawrence River, measurements called “performance indicators”, (at the soul of P2014), are analyzed in detail.

These “**performance indicators**’’ include flooding impacts to shorelines and structures, environmental impacts on flora and fauna, commercial navigation, hydroelectric generation, and recreational boating to name just a few. It should be noted that drought scenarios (aka low-water levels) based on the above data are also part of the overall analysis.

Currently, the GLAM is focused on process and models are continuously being updated and revised with the goal to complete the analysis in the fall of 2024. A report with recommendations to the International Lake Ontario St. Lawrence River Board (ILOSLR Board) will follow.

If any changes to P2014 are put forth, these would have to be reviewed by the IJC and the federal governments in both Canada and the US. A new communication plan is also in the works to educate and inform various audiences, including the public.

For more information, please visit: https://www.ijc.org/en/glam/phase2

If you have enjoyed this in-depth journalistic deep-dive, and know someone else who would benefit (inside or outside of TIA), ***pass along the following link to our July 2024 Water Levels Full Article!***

https://www.thousandislandsassociation.com/water-levels-july-2024-river-talk-full-article/

Vince Barton, Ken White, Ross Stewart