International Lake Ontario-St. Lawrence River Board

International Lake Ontario - St. Lawrence River Board
Conseil international du lac Ontario et du fleuve Saint-Laurent

Quarterly Newsletter: Summer 2021

Summer Forecast

The drought conditions that have impacted the Great Lakes-St. Lawrence River watershed this spring have continued to persist into summer. The North American drought monitor maps show abnormally dry to moderate drought conditions within most of the basin, both upstream (around Lake Erie and Lake Ontario) and downstream (along the St. Lawrence River) https://www.ncdc.noaa.gov/temp-and-precip/drought/nadm/maps. The Ottawa River basin, which drains into the lower St. Lawrence River, is also under drought conditions.

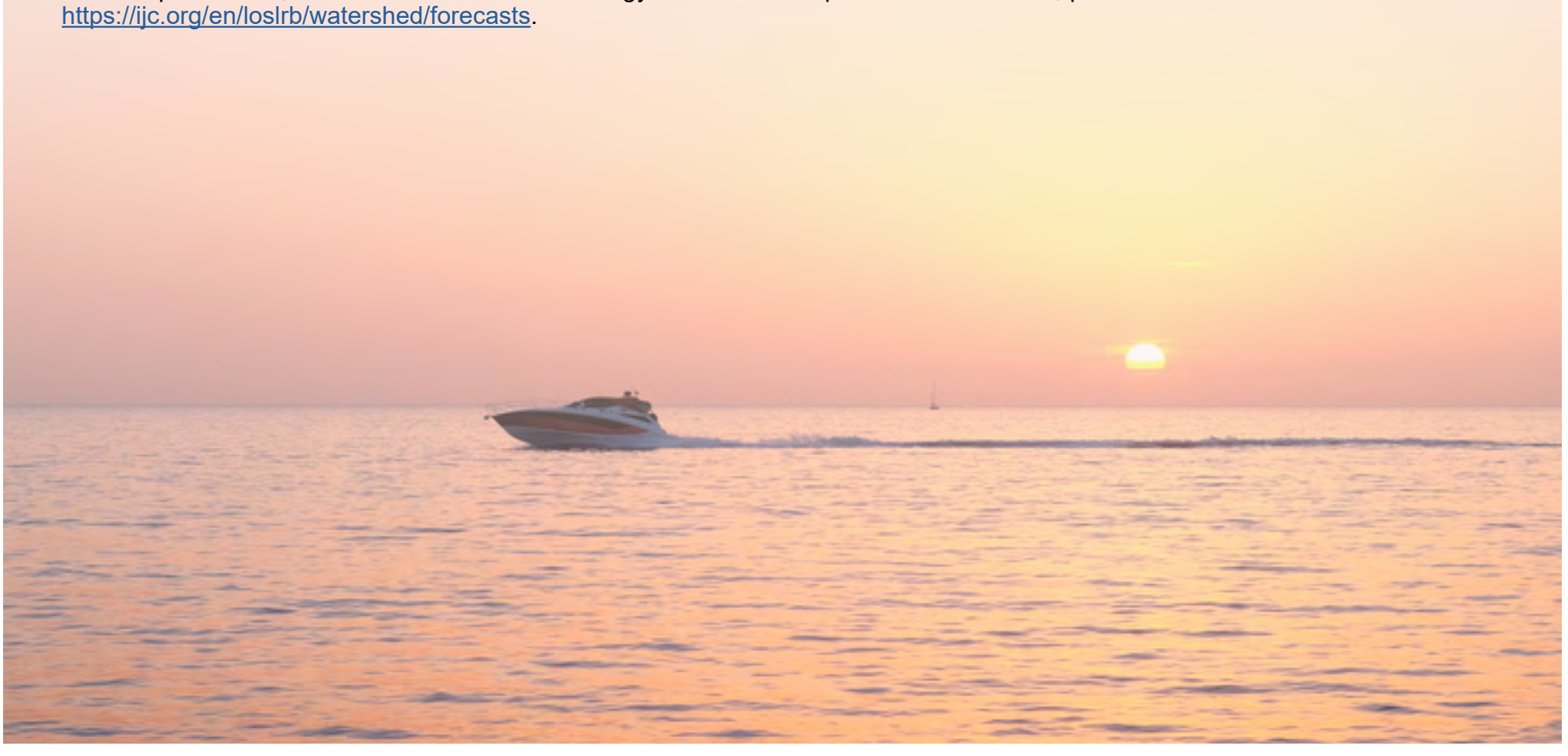
Although forecast predictions can be prepared for a given season, there is a lot of variability that impacts accuracy. Long range forecasts provide a summary of expected conditions weeks to months in advance. Britannica explains that long range forecasting of precipitation is less reliable than long range temperature forecasts, and monthly forecasts prove more accurate than seasonal forecasts (https://www.britannica.com/science/weather-forecasting/Long-range-forecasting). Therefore, it is no surprise that most people rely on forecasts provided by the local weather person to plan activities. Short term forecasts are typically five to seven-day forecasts. Long term (not long range) forecasts are typically 10-day forecasts. But do you know the reliability of short and long term forecasts? According to the National Oceanic and Atmospheric Administration, a five-day forecast is accurate approximately 80 percent of the time whereas a 10-day forecast has an accuracy of about 50 percent.

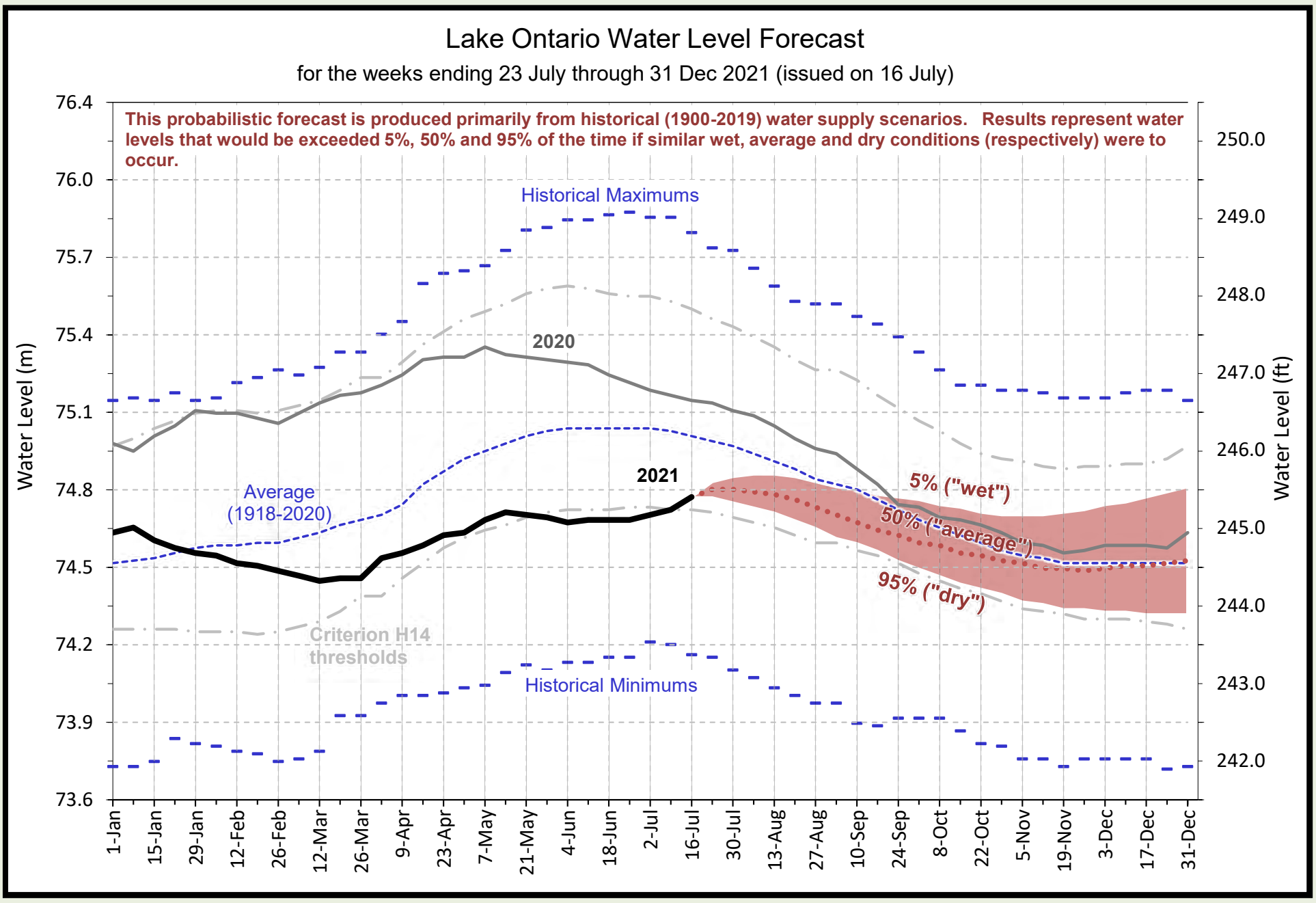
Many people wonder with all the advances in science and technology, why is it so hard to predict an accurate weather forecast? The challenge is the chaotic nature of Earth's atmosphere. Forecasts begin with computer models that use the current weather as a starting point. These models apply physics to the current weather conditions to predict how the weather will evolve in the coming hours and days. But if the computer model, or observations used as input to the model are a tiny bit incorrect about the weather conditions six hours into the future, the error will carry forward in time, making the model even more inaccurate a week into the future. For example, consider a weather model that is predicting rain to occur along a cold front 100 km in length, three days into the future. On the day of the predicted rain event, the cold front is actually only 85 km in length, so a town on the edge of the forecast cold front does not get any rain at all. In this example, the forecast model was mostly correct, but small deviations in weather, like a butterfly effect, can create forecast inaccuracy.

In short, despite advances in science, technology capabilities, and computer models, accurately predicting Mother Nature beyond a few days remains challenging.

It is important to remember that the Great Lakes are a natural system and the major factors affecting water supply to the Great Lakes are precipitation, evaporation, and runoff. None of these can be controlled and all are difficult to accurately predict. Due to the variability of long range forecast predictions, and the limited accuracy of short and long term forecasts, the International Lake Ontario-St. Lawrence River Board shares long range seasonal predictions but also updates forecasts weekly to show current water levels and a range of potential water level conditions for the weeks and months ahead.

The forecast is based on current levels of Lake Erie and Lake Ontario, an ensemble of historical water supplies, short-term weather predictions, and the current outflow strategy. For the most up to date information, please visit: https://ijc.org/en/loslrb/watershed/forecasts.





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It is our hope that these weekly updates help property owners, businesses, and recreation users plan for and anticipate the range of possible circumstances caused by the natural variability of the Great Lakes.

Lake Ontario water levels rose 20 cm from the beginning of March through the end of May, while the average seasonal spring rise is 43 cm(https://ijc.org/en/loslrb/watershed/water-levels). Lake Ontario water levels are the lowest they have been at this time of year since 1964 and 1965. Similarly-low levels were last observed in 1999 and 2010.

Water levels have remained relatively stable through June and are expected to begin a slow, seasonal decline through the summer and fall.

Upstream of the Moses-Saunders Dam

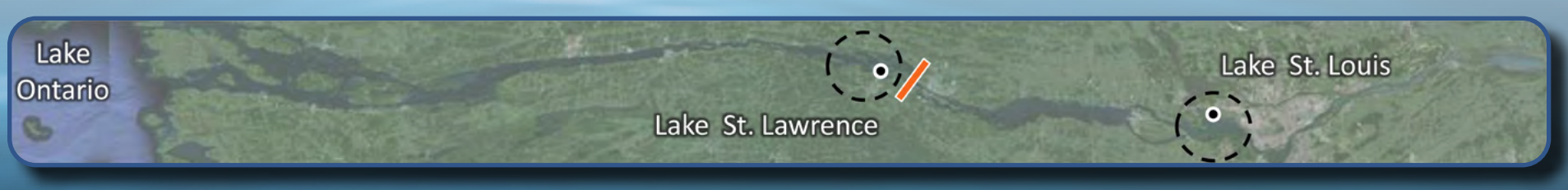
Lake St. Lawrence water levels are near the lowest on record for this time of year. Similarly-low levels were observed last year, and in 2018, as well as previously in 1998 and 1997.

Lake St. Lawrence water levels are expected to be between approximately 72.80 m and 73.20 m (average of approximately 73 m) through the recreational boating season. Daily water levels may fluctuate outside of this range owing to temporary wind effects.

Downstream of the Moses-Saunders Dam

Ottawa River flows are near seasonal record lows for this time of year (https://ijc.org/en/loslrb/watershed/flows).

Water levels of Lake St. Louis and Port of Montreal are also below average. Similarly-low levels were observed in 2015, 2012, and 2010. Water levels downstream of the Moses-Saunders Dam are expected to remain below average this summer.



News from the GLAM Committee

The Great Lakes-St. Lawrence River Adaptive Management (GLAM) Committee is a subcommittee to the Lake Superior Board of Control, Niagara Board of Control, and Lake Ontario-St. Lawrence River Board (Board). The GLAM Committee supports ongoing evaluation of the outflow regulation strategies, and reports findings to the respective boards.

What is adaptive management?

Adaptive management is a comprehensive approach to assess a system with the intent to improve management, sustainability, and resiliency by learning from the outcomes of previous conditions and experiences. Adaptive management is often referred to as an iterative process providing a framework for decisions to be reviewed, adjusted and revised as new information and knowledge becomes available and/or as conditions change. Adaptive management for Lake Ontario outflows is a long-term process.

To improve the understanding of constraints in the system and better inform decision-making, the GLAM Committee solicited direct feedback from persons impacted by the high waters in recent years via on-line questionnaires (https://ijc.org/en/glam/questionnaires).

Due to the ongoing drought conditions that have led to recent below average water levels throughout the watershed, the GLAM Committee plans to update its previous questionnaire to ensure opportunities to report on low water impacts. The updated questionnaire is expected to be available later in 2021 via the GLAM Committee website.

It is important to note that outflow regulation will not eliminate the potential for impacts during extremely wet or dry conditions. Under any regulation plan, the ability to regulate the outflow from Lake Ontario does not mean that full control of lake levels is possible. This is because the major factors affecting water supply to the Great Lakes, including precipitation, evaporation, and runoff cannot be controlled, and are difficult to accurately predict.

Public Advisory Group

The Public Advisory Group (PAG) includes 18 individuals representing the diverse interests and issues across the Lake Ontario-St. Lawrence River system, spanning the shorelines of Lake Ontario in Ontario and New York downstream to Lake Saint Pierre on the lower St. Lawrence River in Quebec. In May 2020 the IJC established the PAG as a voice representing the public, and all interests within the system, and to work closely with the GLAM Committee during Phase I of the Plan 2014 review process (https://ijc.org/en/glam/expedited-review/public-involvement). The PAG involvement included:

- learning about the Treaty, directives, and authorizations that dictate the Board's responsibilities
- receiving regular updates on current water level conditions
- participating in meetings and providing feedback regarding development of a Decision Support Tool that will further support the Board in assessing impacts associated with high water levels throughout the lake and river system
- sharing community concerns and regional perspectives related to high water levels experienced in recent years and current low water levels caused by the drought conditions throughout the watershed

As Phase I concludes, the PAG is discussing their possible role in Phase II of the Plan 2014 review process and considering ways in which they could contribute and continue to collaborate with the GLAM Committee. Phase II is expected to begin later in 2021 and last about three years, pending available funding. Phase II will provide a comprehensive assessment of Plan 2014 to include impacts associated with both high and low water levels throughout the lake and river system under a wide range of possible future conditions. Potential focus areas for PAG involvement include broader outreach to stakeholders and communities, and exploring ways to enable two-way information sharing in communities and building transparency through on-going information sharing.

Benefits of a Healthy Great Lakes Ecosystem

We are fortunate to live in a region that has abundant supplies of water. The Great Lakes contain more than 20 percent of the world's surface freshwater and more than 40 million people depend upon them for drinking water.

The health of the Great Lakes is a key priority for the International Joint Commission. In the Great Lakes, environmental health can be measured by water quality and by the condition of native flora, fauna, and natural ecosystems like wetlands and shorelines.

Short and long-term natural fluctuations in water levels, which have been documented for over 100 years in the Great Lakes, are an important element of the health of the Great Lakes. https://lre-wm.usace.army.mil/ForecastData/GLBasinConditions/LTA-GL-WL-Graph.pdf.

Variability in water levels, both seasonal and long-term, is an essential component to maintain the diverse habitat and ecological health of the Great Lakes. That is especially true for the 64,000 acres of wetlands along Lake Ontario and the St. Lawrence River. Low water periods allow germination of seeds in buried soils. High water periods decrease dominance of cattails, which would otherwise take over a marsh. Taken together, these rhythms of low and high water provide for diverse and resilient wetlands and shorelines.

According to the United States Environmental Protection Agency, wetlands provide countless benefits to people, fish, and wildlife. Wetlands act as filters that purify and cleanse our lakes, rivers, oceans, and drinking water. Because wetlands are rich ecosystems that teem with life, the plants, animals, and microbes that live in them can trap, eat, and absorb sediments, nutrients, and bacteria.

Wetlands also provide critical habitat for fish and wildlife. In North America, fully one-third of our bird species, 190 species of amphibians, and 5,000 species of plants depend upon wetlands at some point in their life cycle. Ninety percent of the fish species in the Great Lakes are dependent upon wetlands for at least part of their life cycle. The economic value of fish and wildlife is enormous. According to the U.S. Fish & Wildlife Service, every year nearly 90 million Americans take part in wildlife-oriented recreation such as hunting, fishing, birding, and wildlife watching, spending more than $122 billion annually on their hobby.

Like sponges, wetlands also absorb water during storm events, preventing flood damage and moderating the levels of rivers and lakes. Wetland vegetation slows floodwaters and distributes them more slowly over a floodplain. Taken together, the dual functions of water storage and slowing of floodwater performed by wetlands reduce not only high water levels, but erosion caused by high water.

In the Great Lakes, water level fluctuations are a major factor that supports sustainable wetlands and the Great Lakes ecosystem that sustains us.

People are part of the Great Lakes ecosystem and we benefit when the ecosystem is healthy and strong.

According to the National Oceanic and Atmospheric Administration (NOAA), Great Lakes Sea Grant Network at the Great Lakes Environmental Research Laboratory, the Great Lakes are home to a large variety of aquatic flora and fauna including:

- More than 190 species of fish
- More than 100 species of clams and snails
- More than 200 genera of insects
- More than 60 genera of worms
- Approximately 100 species of macrozooplankton
- Approximately 275 species of rotifers (rotifers are clear, microscopic organism that are very important in freshwater environments because they recycle nutrients in the water column)
- More than 350 genera of algae

Lake Ontario is home to 122 species of native fish, as well as at least 13 non-natives.

Ecological Ripple Effect

Species: Piping Plover (the Great Lakes population is endangered, meaning the species is in danger of becoming extinct)

Primary habitat: sandy beaches and shorelines

Breeding areas: open sand, gravel, or cobble beaches

Plover prey: worms, crustaceans, insects, and occasionally bivalve mollusks found along beaches and intertidal mud and sand flats

Plover predators: racoons, skunks, and foxes

What happens if the piping plover becomes extinct?

- The prey that piping plovers eat would increase in population and possibly become a nuisance. For example, mollusks can clog water intakes, damage infrastructure, and shutdown operations.
- The predators that feed on plovers would not have enough food to survive and decrease in population
- Lack of biodiversity. Biodiversity within an ecosystem creates function and a working system that can provide oxygen, clean air and water, pollinate plants, and promote natural pest control
- Biodiversity supports recreation activities such as birdwatching and fishing.

The species has been threatened by habitat loss due to shoreline development throughout its habitat zones (https://ijc.org/en/far-end-lakes-designing-resilient-habitat-st-louis-river-lake-superior). Negative impacts to a single species can disrupt the entire ecosystem. In order for the Great Lakes ecosystems to support native species that rely on the environment, including people, the Great Lakes natural function must also be maintained including the natural water level fluctuations that create a healthy, biodiverse system.

Then and Now: High and Low Water Levels in the Great Lakes

According to a 2012 report written by The Nature Conservancy and National Oceanic and Atmospheric Administration, “Climate change projections suggest continued changes in the hydrology (the movement of water) of the Great Lakes region, including higher risk of more intense drought and flooding, and changes in the factors that influence Great Lakes water levels.”

We know that high and low water fluctuations are the norm on the Great Lakes. Over 100 years of data shows the natural variability experienced in each of the five Great Lakes https://lre-wm.usace.army.mil/ForecastData/GLBasinConditions/LTA-GLWL-Graph.pdf. Multiple flood events have been observed in the 1940s, 50s 70s, 80s, 90s, and as recent as 2017 and 2019. Similarly, multiple low water events have been observed in the 1920s, 30s, 60s, and early 2000s, just prior to the record high events of our recent memory.

Great Lakes water levels are directly affected by the water cycle:

- Precipitation onto the land and lakes
- Evaporation off the lakes and evapotranspiration from the land
- Runoff from the land and rivers into the lakes

Approximately 85 percent of the water supply to Lake Ontario is from the upper Great Lakes: Superior, Michigan, Huron, St. Clair, and Erie and the water source of those lakes is largely precipitation. The remaining 15 percent of water supply to Lake Ontario comes from the drainage basin.

Testimony from Major General Robert L. Moore from the United States Senate Hearing on Lake Ontario in September 1976: “The Lake Ontario levels have been high this year in spite of the Board’s actions to make greater flow releases since December 1975. Primarily, it is the result of persistent above average precipitation. Considering the last 12 months, September 1975 through August 1976, Lake Ontario’s precipitation has been about 29 percent above average.”

Henry P. Smith III, Chair of the United States Section of the International Joint Commission from 1975-1978 stated at the US Senate Hearing on Lake Ontario, September 1976 “The Commission has viewed with great concern and misgiving the fact that development continues in vulnerable areas of the shorelines of the Great Lakes, including Lake Ontario. I do not believe that adequate information is available, particularly on historical erosion rates, to enable the present or prospective shoreline owner to plan properly the development of his property. “

During a hearing in 2017 to discuss Lake Ontario high waters, Ms. Lana Pollack, the U.S. chair of the IJC, presented testimony before the state legislative group and explained that neither Plan 2014 nor any other plan to regulate Lake Ontario could prevent high water when natural factors are the cause.

In May 2017, New York Senator Charles Schumer explained and was quoted in the Rochester Democrat and Chronicle “the above average precipitation and snowmelt has dramatically increased water levels in lakes, streams, and rivers across the Great Lakes including Lake Ontario.”

Similar to the above average precipitation that was the cause of the high-water levels throughout history, below average precipitation is the cause of low water levels and drought conditions.

In 2013, warm air and lake temperatures, coupled with severe drought caused low water levels. The PBS report from 2013 could be reported in 2021, as it relates to Lake Ontario and the St. Lawrence River, and be just as relevant now regarding the causes of low water levels in the eastern portion of the Great Lakes basin. https://www.pbs.org/video/chicago-tonight-january-24-2013-great-lakes-hit-low-water-levels/

Although the plans are named regulation plans, the IJC can only influence water levels on Lake Ontario in the realm of centimeters and inches, not meters and feet. Water level influence is greatest when water supplies, namely precipitation and snow melt, are near average. However, under extreme supplies this influence is diminished as shown throughout history. For some communities coastal planning criteria may be based on long term water level averages, but averages are determined by high and low water levels. There is an unpredictable natural supply of water for the Great Lakes. To protect coastal assets, experts suggest that the full historic extent of high and low water levels should be considered when defining the potential range of variation that coastal communities could experience in the future (International Upper Great Lakes Study 2012).

Do you know how the Great Lakes were formed?

“Creation of the Great Lakes” is a 45 minute video produced by the History Channel as part of the “How the Earth Was Made” series and includes information on the similarities and differences among the five Great Lakes, interesting facts about the formation of the lakes, and summarizes changes that may occur within the Great Lakes due to climate change, geologic movement known as crustal rebound, and how this will impact lake levels now and in the future. #HowtheEarthWasMade

Watch the video at https://www.youtube.com/watch?v=wztD2yxuyhI

or

http://www.infocobuild.com/books-and-films/science/HowTheEarthWasMadeSe1/episode-07.html

Virtual Public Information Meetings

The International Lake Ontario-St. Lawrence River Board hosted two virtual public meetings on June 15 and 17 to discuss drought conditions that have led to low water throughout the system, and explain the Treaty language and directives that determine the Board’s authority to deviate from plan flows. Due to Covid-19 pandemic restrictions in various communities in both Canada and the United States, the Board decided virtual public meetings were the most effective way to share information with a large audience. The meetings were presented in English and offered simultaneous French translation as well as a live question and answer session.

Approximately 265 people attended the June 15 meeting and approximately 110 people attended the June 17 meeting. Nearly 75 questions were submitted on June 15 and 45 questions on June 17. There was not enough time during the one-hour meetings to answer all submitted questions, but all unanswered questions were recorded. The Board is currently preparing responses to these questions, which will be posted to the Board’s website in the coming weeks. Video recordings of the meetings are available at https://ijc.org/en/loslrb/videos.

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