

LAKE ONTARIO

LAKEWIDE ACTION AND MANAGEMENT PLAN



2020
ANNUAL
REPORT

Greece, NY. Source: Rick Balla

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What is the Lake Ontario LAMP?

Under the [2012 Great Lakes Water Quality Agreement \(GLWQA\)](#), the governments of Canada and the United States committed to restore and maintain the physical, biological and chemical integrity of the waters of the Great Lakes.

The [2018-2022 Lake Ontario Lakewide Action and Management Plan \(LAMP\)](#) is an ecosystem-based strategy for protecting and restoring the water quality of Lake Ontario, including the connecting Niagara River and St. Lawrence River to the international boundary. The Lake Ontario Partnership, led by the U.S. Environmental Protection Agency (U.S. EPA) and Environment and Climate Change Canada (ECCC), develops and implements the LAMP and facilitates information sharing, priority setting and coordination of multinational protection and restoration activities.

OVERVIEW

The Lake Ontario Partnership tracked progress under the 2018–2022 Lakewide Action and Management Plan (LAMP) and worked with the International Association for Great Lakes Research to plan and deliver the 2021 State of Lake Ontario Conference to facilitate interactions between researchers and managers on diverse topics related to the Lake Ontario ecosystem and water quality.

We will also be participating in the [2022 Great Lakes Public Forum](#) in September 2022 in Windsor, Ontario. The Forum is held every three years to engage the public on the state of the Great Lakes, progress achieved over the past three years, and priorities to guide the science and actions for the next three years.

Lakewide management is guided by a shared vision of a healthy, prosperous and sustainable Lake Ontario in which the waters are used and enjoyed by present and future generations. Although much effort has gone into the protection and restoration of the lake, some stressors continue to limit the health, productivity, and use of Lake Ontario and its connecting river systems.



A Lake Ontario coastal wetland. Source: ECCC.

Lake Ontario continues to be a good source of high-quality drinking water, and toxic chemicals continue to decline in the environment. Nutrient issues in the lake continue to be a challenge and land-based stressors continue to impact Lake Ontario, including the rapid population growth in the western part of the basin.

In the following sections of this annual report, the Lake Ontario Partnership provides updates on our activities to reduce chemical contamination, manage nutrients and algae, prevent and control invasive species, and restore and protect habitat and species.

REDUCING CHEMICAL CONTAMINATION

Under Annex 3 of the Great Lakes Water Quality Agreement, the U.S. and Canada have identified eight [Chemicals of Mutual Concern](#) (CMCs).

Significant progress has been made in reducing some of these CMCs and other toxic chemicals, but some legacy chemicals still pose a threat to human health, biodiversity, and the environment. These chemicals can accumulate in fish tissues and may harm human health if consumption advisories are not followed.

Significant work continues in Lake Ontario Areas of Concern (AOCs) to reduce legacy chemicals, such as PCBs, and remove Beneficial Use Impairments (BUIs) tied to chemical contamination.

Innovative Approaches Used to Reduce the Release of CMCs

ECCC supports innovative approaches that pilot technologies to help reduce the release of Chemicals of Mutual Concern to the Great Lakes. Preliminary results from a research project in the Lake Ontario Basin have shown that conventional treatment of municipal wastewater is effective at removing chemicals such as certain perfluorinated compounds and brominated flame retardants. Other studies are examining the potential benefits of advanced wastewater treatment technologies, such as ozone disinfection and granular activated carbon

to enhance chemical removal.

Another innovative and collaborative initiative adds filters to household washers and dryers to divert chemicals and microfibers (a type of plastic pollution) that come off clothing from entering the Great Lakes. Although wastewater treatment plants do capture some of these contaminants and microfibers, final effluent from the plant can still discharge these pollutants directly into the lake. Preliminary results from Lakes Ontario and Huron suggest that household filters were effective at reducing some of these unwanted substances.

MANAGING NUTRIENTS AND ALGAE

Lake Ontario has beaches and nearshore areas that continue to provide good opportunities for swimming and recreational use. However, nutrient issues in the lake remain a challenge. Offshore phosphorus concentrations are below the target objective and are limiting productivity. In contrast, *Cladophora* is problematic in some nearshore areas due, in part, to increased water clarity caused by the filtering effects of invasive mussels. Harmful algal blooms occur in some embayments of the lake.

Nutrient Concentrations and Loadings from the Niagara River (1975-2018)

ECCC has monitored Niagara River water quality in support of the GLWQA since establishing a fixed site at Niagara-on-the-Lake in 1975.

Using over 40 years of data from this site along with the Fort Erie location added in 1983, ECCC has examined the status and trends of concentrations and loadings of nutrients and major ions, assessed evidence of sources between the two stations, and have recently [reported the findings](#).

One of the trends identified based on data produced by this monitoring program is that concentrations and loadings are generally higher at the downstream monitoring location; however, upstream/downstream differences indicate that relatively little nutrient loading occurs along the

length of the river itself.

Additionally, total phosphorus inputs from Lake Erie via the Niagara River account for the majority of phosphorus load to Lake Ontario and, in some years, exceeds the Lake Ontario target of 7,000 metric tonnes per annum (MTPA) (7,716 tons per annum; TPA). Using the most recent data (2014–2018), ECCC calculated the mean Niagara River total phosphorus load to be 5,275 MTPA (5,815 TPA).



ECCC upstream (Fort Erie) and downstream (Niagara-on-the-Lake) sampling locations on the Niagara River. Source: Adapted from Hill and Dove (2021).

ECCC's long and rich Niagara River dataset includes results of year-round sampling and provides detailed tracking of water quality. The data can be used to assess the impacts of nutrients, enhance understanding of climate change impacts on Lake Ontario and provide needed information to determine management actions that will be beneficial to improving water quality and ecosystem health. Datasets are now publicly available on [Canada's open data portal](#).

New York's Great Lakes *Cladophora* Reporting Tool Available

Excessive growth of *Cladophora*—a type of native filamentous benthic algae that occurs in nearshore areas of the Great Lakes—negatively

impacts recreational uses of shoreline areas, including bathing beaches.

Great Lakes agencies are focusing efforts to better understand the distribution and extent of *Cladophora* growth in the Great Lakes and the relationship between accumulation of algae and associated washups along the shoreline.



Cladophora on the Lake Ontario Shoreline at Four Mile Creek State Park. Source: NYSDEC.

To help better understand the occurrence of *Cladophora* and its impacts to the ecological health of New York's Great Lakes shoreline, the New York State Department of Environmental Conservation developed a *Cladophora* web page and launched a GIS-based online reporting tool. Through this portal, the public can report *Cladophora* conditions along New York's portion of Lake Ontario, the Niagara River and St. Lawrence River shorelines.

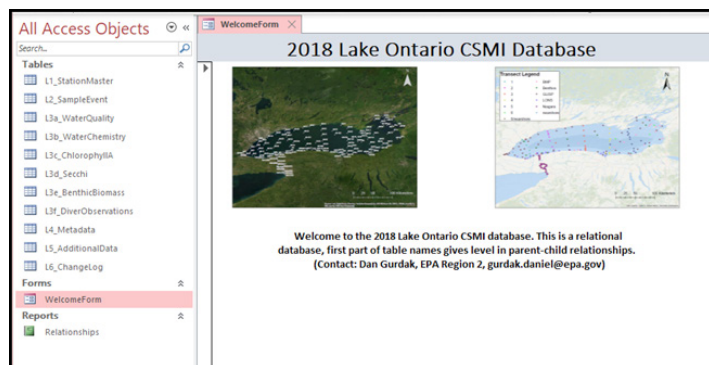
This reporting tool supports a priority action under [New York's Great Lakes Basin Interim Action Agenda](#) to "gain a better understanding of nearshore effects from nutrient loading and links to land-based sources to inform target locations for management actions." This tool provides a mechanism through which residents can help fill a significant gap in the understanding of *Cladophora* biomass and contribute to protecting water quality. For more information about *Cladophora* and how to access the portal visit New York State's [Cladophora page](#).

Lake Ontario 2018 Cooperative Science and Monitoring Initiative Database Developed

In collaboration with various agencies, the U.S. EPA led the creation of a new database

containing both water quality and biological data. For the first time for Lake Ontario, a database will combine specific parameters tied to the ecological health of the lake.

The data contained within the database were collected during the 2018 Lake Ontario Cooperative Science and Monitoring Initiative (CSMI) year of intensive field work. CSMI is part of a binational effort between Canada and the U.S. to monitor and report on the state of the Great Lakes on a 5-year rotational basis.



Database showing CSMI data for Lake Ontario.

The database will help agencies assess the state of Lake Ontario and focus resources to address important management challenges such as invasive species impacts, coastal wetland status, nearshore and offshore nutrient dynamics, whole-lake nutrient transport, and algae growth, including nuisance algae. The combined datasets include water quality parameters (nitrogen and phosphorus), physical parameters (temperature, conductivity), water chemistry (dissolved oxygen) and food web health indicators (chlorophyll, phytoplankton, zooplankton).

Using a single database to store information on all these parameters allows us to identify data gaps, see relationships, as well as provide opportunities for collaboration, learning and public engagement. The longer-term goal is to make selected parts of the database available and accessible to the public through a user-friendly, web-based platform to engage, educate and provide useful information to emphasize the importance of lake monitoring and ecosystem health. The database will also support outreach efforts such as use in school curricula.

PREVENTING AND CONTROLLING INVASIVE SPECIES

Invasive species, including the Sea Lamprey, invasive mussels and *Phragmites* (*Phragmites australis* subsp. *australis*), have significantly changed the habitat and food web in Lake Ontario. Coastal wetlands have been impacted by invasive species such as *Phragmites*. However, coastal wetland fish, amphibians and birds are showing improving trends. Lake Trout populations are improving, due in part to successful Sea Lamprey control.

Invasive Species Featured at the Toronto Zoo

The Canadian Department of Fisheries and Oceans (DFO), the Ontario Ministry of Natural Resources and Forestry (MNRF) and the City of Toronto collaborated to raise public awareness of threats posed by invasive Asian Carp.



Top to bottom: The Bighead, Black, and Grass Carps. Credit: asiancarp.ca.

Asian Carp are voracious eaters and grow very large very quickly. They can quickly outgrow predators and can out compete native species for

food and resources. They are a serious threat to the Great Lakes and Lake Ontario, ecologically and economically.

The Toronto Zoo exhibit houses three of the four species of Asian Carp: Bighead Carp, Grass Carp and Black Carp to highlight and explain the risk they pose to the Lake Ontario ecosystem, native fish species and the Canadian economy. The project also helps the public identify Asian Carp species, increasing the prospect of early detection.

The Zoo's 58,000-litre (15,000-gallon) tank is specially designed and equipped with an eDNA filtration system, so the carp do not pose any risk to Toronto's waterways.

For additional information on this project, please visit [The Toronto Zoo - Asian Carp](https://www.torontozoo.com/AsianCarp), and for additional information on Asian carp in the Great Lakes and how to identify them, please visit asiancarp.ca or asiancarp.us. If you find or catch an Asian Carp in the Great Lakes or any of its tributaries, freeze the fish in a sealed plastic bag, note the date and location, and call your [state or provincial natural resource agency](#).

PROTECTING AND RESTORING HABITAT AND NATIVE SPECIES

Coastal wetlands have been impacted by development, water levels and invasive species such as Phragmites. At the same time, impaired habitat connectivity between tributaries and the lake are impacting some native species.

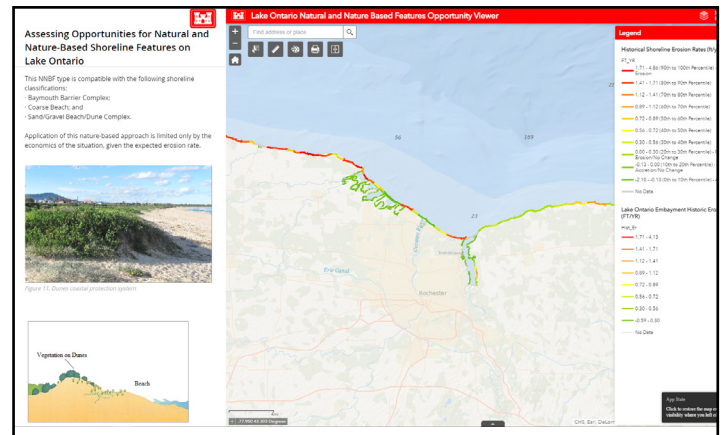
Diporeia, a shrimp-like zooplankton that is an important food source for many fish species, is in poor condition. However, some native prey fish, such as Deepwater Sculpin, are recovering naturally and restoration efforts for populations of other native prey fish are proving successful. Lake Sturgeon populations are showing some signs of recovery.

Natural and Nature-Based Feature Opportunity Viewer Developed

The U.S. Army Corps of Engineers Buffalo District developed a web-based Natural and Nature-

Based Feature (NNBF) Opportunity Viewer to help inform public and private landowners about the potential for a natural or a nature-based shoreline. Natural and nature-based features are shorelines that are actively developed and/or maintained for both shore protection and ecosystem enhancement.

Landowners using the NNBF web-viewer are able to determine whether their property is suited for a natural or nature-based shoreline where good habitat and associated native species can thrive.



Web-based Natural and Nature-Based Feature (NNBF) Opportunity Viewer.

Use of the viewer supports Lake Ontario lakewide management actions that help reduce loss of habitat and native species. The NNBF viewer captures and displays local erosion rates along Lake Ontario's southern shoreline and embayments based on historical observation and a lakeshore bluff erosion model that uses time series water level data that is consistent with the current water level regulation plan (beach erosion and accretion are not modeled due to model limitations).

Users can search by address or simply navigate to a portion of the shoreline to view the historic and modeled erosion rates for the area of interest. With the viewer, users also learn the basics of coastal processes. Through the web-viewer's identification of stretches of shoreline with lower erosion potential, property owners and land managers can identify opportunities to contribute to lakewide management on an individual level.

Landowners are afforded the opportunity to

balance their own values, the type of NNBF considered and site-specific economics to provide for a sustainable solution to protecting shorelines while also considering the value of habitat and native species.

It should be noted that identification of an opportunity using NNBF is not a substitute for engineering design. The viewer can be found online at [Natural and Nature-Based Feature Opportunity Viewer](#).

Ellicott Creek Park Planting Project Exceeds Expectations

The non-profit agency Buffalo Niagara Waterkeeper (BNW), in partnership with Erie County Parks, used a U.S. Department of Agriculture Forest Service Great Lakes Restoration Initiative grant to plant 792 trees, comprising 27 species, throughout Ellicott Creek Park.



Volunteers at work at Ellicott Creek Park. Source: [BNW](#).

The goals were to reforest areas in need of improvement and allow increased infiltration of standing or pooling water. BNW selected a range of native floodplain species of different sizes and ages, including American sycamore, red maple and swamp white oak, and sited them strategically so that the next generation of trees will absorb runoff and floodwater and die out gradually. This fulfilled the Forest Service's objective to increase tree diversity and decrease urban runoff in a critical floodplain area.

Over the course of the effort, BNW organized 17 volunteer planting events for 800 volunteers,

totaling 2,411 volunteer hours, more than 200% of the initial estimates. Volunteers spread 233 cubic yards (178 cubic metres) of mulch, donated by Erie County Parks and planted 1,300 flower bulbs.

This reforestation project inspired significant community interest by involving and educating the public through all the planting events. For more information about upcoming events sponsored by the Buffalo Niagara Waterkeeper, visit [Buffalo Niagara Waterkeeper](#).

OUTREACH AND ENGAGEMENT

GLWQA Engagement Opportunities

You can keep up to date on GLWQA engagement opportunities in the [Engagement](#) section of [Binational.net](#). Information on many of our partner organizations' upcoming outreach and engagement opportunities can also be found at the Great Lakes Commission's "[Great Lakes Calendar](#)".

CONTACT INFORMATION

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