

ASSESSING PHOSPHORUS TARGETS FOR LAKE ONTARIO

Lake Ontario is a culturally, environmentally and economically invaluable resource. For Lake Ontario to continue to support diverse plants, animals and communities that rely on it, a healthy balance of nutrients is necessary.

Both the amount and distribution of nutrients, like phosphorus, are vital to a healthy ecosystem. Too much phosphorus in the nearshore can cause excessive algae growth, while too little phosphorus in the offshore can affect the food web.

Since the Canada-U.S. Great Lakes Water Quality Agreement (GLWQA) was first signed in 1972, Great Lakes nutrient levels have been monitored and managed. As a result, total phosphorus (TP) loadings to the Great Lakes were reduced dramatically between 1972 and the late 1980s. Since then, climate change, invasive species, and land use changes have further altered how nutrients are used and move through the ecosystem.

In 2020, the GLWQA Nutrients Annex established a science task team for Lake Ontario to assess the lake's interim phosphorus targets and determine whether they should be revised. The assessment found that the lake now functions differently than when the targets were originally set, and the response of the ecosystem to nutrient loads and management actions may differ from original expectations.

Signs of nutrient enrichment, including nuisance lakebed algae growth and localized HABs in some embayments, exist in parts of the Lake Ontario nearshore. These nearshore conditions affect ecosystem health and use of nearshore waters.

There is no evidence of widespread occurrences of hypoxia (low oxygen) or toxin-producing harmful algal blooms (HABs) in the offshore waters of Lake Ontario. Offshore total phosphorus concentrations declined below the GLWQA objective beginning in the late 1980s due to nutrient management efforts and the invasion of zebra and quagga mussels. Low levels of phosphorus have persisted over several decades prompting concern about impacts on the food web including fish populations.



GREAT LAKES WATER QUALITY AGREEMENT LAKE ONTARIO INTERIM TARGETS

7000
metric tonnes
per year

TOTAL PHOSPHORUS
LOADING TARGET

10 µg/L
(spring average)

TOTAL PHOSPHORUS
CONCENTRATION OBJECTIVE
IN THE OFFSHORE



NUTRIENT EXCESS
in parts of the
nearshore

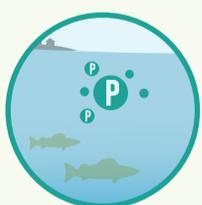
NUTRIENT DECLINE
in the offshore



Based on the Task Team's assessment, the Nutrients Annex does not recommend a revision of the Lake Ontario phosphorus targets, at this time.

Phosphorus concentrations in the offshore waters have not exceeded the objective for more than 30 years and are now about half of this level. In addition, the assessment was not able to evaluate whether the loading target is being met or is still appropriate to protect water quality and aquatic ecosystem health.

The assessment has informed next steps including the following Binational Priorities for Science and Action (2023-2025) for Lake Ontario nutrients:



Conduct coordinated monitoring and modeling to improve understanding of phosphorus inputs, fate, and transport in Lake Ontario.



Update binational estimates of annual phosphorus loads to Lake Ontario.



Identify locations where management actions may be needed to address nearshore algae issues in Lake Ontario.

This assessment marks a key milestone in achieving the GLWQA commitment to review and revise nutrient targets as necessary for each Great Lake. As the Lake Ontario ecosystem changes, periodically reviewing and updating targets will ensure resources are directed to where they are needed most.

For additional information on this assessment, please visit binational.net.