

# Canadian Laws and Policies to Address Algal Blooms

Claudia Tsang, University of Windsor, Faculty of Law, [tsangi@uwindsor.ca](mailto:tsangi@uwindsor.ca)

Patricia Galvao Ferreira, University of Windsor, Faculty of Law, [patricia.galvao@uwindsor.ca](mailto:patricia.galvao@uwindsor.ca)

## Background

Western Lake Erie has had a long-standing problem of harmful algal blooms (“HABs”), dating back to the 1950s. HABs occur when colonies of algae (simple plant-like organisms that live in the sea and freshwater) grow out of control while producing toxic or harmful effects on people, fish, shellfish, marine mammals, and birds. It has been difficult to create a comprehensive solution to HABs in a lake that is a shared resource among many jurisdictions (e.g., Ontario, Michigan, Ohio, and Pennsylvania). Since Lake Erie borders several states and a province in two countries, it is necessary for legislators and policy-makers to use a transnational approach when developing laws and policy to respond to the algal blooms.

Over the past five decades, Canada and the United States have created several agreements in order to find a solution to reduce algal blooms in western Lake Erie, under the auspices of the International Joint Commission (“IJC”). The IJC is an administrative body created by the 1909 *Boundary Waters Treaty* (“BWT”) signed between the United States and Canada to promote cooperative management measures to protect the Great Lakes and other Boundary Waters. The BWT provides the principles and mechanisms for preventing and resolving disputes concerning water quantity and quality along the entire border. Through the BWT both the United States and Canada must agree to any project that would change the natural levels or flows of any boundary waters. The BWT also states that that waters shall not be polluted on either side of the border to the injury of health or property on the other side.

While a significant legal instrument, the BWT is a set of guiding principles as opposed to mandatory law. The BWT provides guidelines for the IJC to resolve disputes regarding project approvals and transboundary issues that are applied on a case-to-case basis, and to promote joint action. A major shortcoming of the BWT is that it does not provide standards that the Canadian and U.S. governments are obligated to follow in order to fully prioritize the protection of the Great Lakes.

In 1972, Canada and the United States signed the first *Great Lakes Water Quality Agreement* (“GLWQA”) after the IJC released reports on pollution issues in the Great Lakes. One of the driving factors of the GLWQA was algal blooms that occurred as a result of excess phosphorus loadings to the Great Lakes and particularly Lake Erie. This spurred new laws in both Canada and the United States that stipulated phosphorus limitations in household detergents and established phosphorus limits on the discharges from municipal wastewater treatments plants. These measures did reduce the algae bloom problem for many years, although new sources of pollution and stressors such as climate change have brought the problem back in the last few years.

Since its inception, the GLWQA have gone through several revisions to improve restoration efforts in the Lake Erie Basin (Table 1). The Parties (i.e., Canadian and U.S. federal governments) report on progress under the GLWQA and the IJC performs an independent review and evaluation of that progress on a triennial basis.

Table 1. An overview of key IJC milestones related to controlling phosphorus inputs and algal blooms.

Date	GLWQA Milestone
1972	The first GLWQA was signed, committing Canada and the U.S. to a coordinated approach to limiting phosphorus inputs to control cultural eutrophication.
1978	The GLWQA revised to reflect a broadened goal “to restore and maintain the chemical, physical and biological integrity of the waters of the Great Lakes Basin Ecosystem.” The two significant changes were the introduction of the “ecosystem approach” and the call for “virtual elimination” of toxic substances.
1987	The Protocol to the GLWQA was signed incorporating new commitments to reduce toxic pollutants through development and implementation of Lakewide Management Plans for each lake and to clean up Areas of Concern through the implementation of Remedial Action Plans.
2012	A revised GLWQA focussed on preventing environmental threats before they cause ecological harm, while continuing to support work on existing threats to the quality of the waters of the Great Lakes. The revised Agreement included 9 specific goals and 10 annexes, including Annex 4 that addresses nutrients and algal blooms.
2015	Ontario, Michigan, and Ohio signed a pact agreeing to reduce phosphorus by 40% by 2025, with an interim goal of a 20% reduction by 2020.
2017	Canada and the United States committed to present their own progress report every three years at the Great Lakes Public Forum in 2016. IJC reviews these reports before publishing a unified assessment. The first Triennial Assessment of Progress was released in November 2017.
2019	A second Progress Report was released and was discussed at the 2019 Great Lakes Public Form. The Nutrients Annex specifically refers to the reduction of excess nutrients and algal blooms. In 2018, Canada and the United States finalized and began implementation of domestic action plans. The steps Canada has taken to develop legislation, regulation, and policy will be further discussed below. In 2019, a Lake Erie Binational Phosphorous Reduction Strategy was finalized to track progress towards binational targets.

While international assessment and cooperation are essential, each of the respective governments need to implement IJC’s recommendations by enacting domestic laws and policies. This indicator provides an overview of Canadian laws and policies designed to address algal blooms.

### **Status and Trends of Canadian Law and Policy**

In Canada, the authority to regulate discharges that contribute to the harmful algal blooms is distributed between the federal level and the provincial level, although provinces hold the bulk of authority to regulate environmental and agricultural matters in Canada (Benedickson, 2017). A brief overview of the Canadian legislation and regulations that have been enacted is provided below.

## Provincial Action

Nonpoint sources of pollution are currently considered the main contributors to the Lake Erie algae bloom problem on the Canadian side. Nonpoint sources refer to runoff that enters into the water systems through precipitation, land runoff, and drainage that flows into bodies of water such as ground water, lakes, rivers, and wetlands. The main nonpoint source of phosphorus in Windsor-Essex County is the agricultural industry. Fertilizers and herbicides enter into the river waters flowing into Lake Erie. In 2015, Ontario passed the *Great Lakes Protection Act* (“*GLPA*”), setting a target to reduce phosphorus loading into Lake Erie by 40% by 2025. The Act focuses heavily on commitments and goal-setting, and does not include binding standards. The Act has great potential, but requires further emphasis on implementation schemes to accomplish its purposes.

In February 2018, the federal government and the provincial government of Ontario launched the Canada-Ontario Lake Erie Action Plan (“Lake Erie Action Plan”). The plan reaffirmed the goal of reducing 40% of phosphorous run off into Lake Erie by 2025. The Lake Erie Action Plan was developed in partnership with a number of conservation authorities, agricultural organizations, municipalities, and non-governmental organizations. It provides project funding for supporting organizations, such as the Canada Plan and Infrastructure Canada, to take innovative measures to reduce phosphorus runoff from agricultural land. Canada and Ontario also signed a bilateral agreement implementing the Canadian Agricultural Partnership in 2018 to make environmental sustainability and climate change priorities in Lake Erie agriculture. However, it is unclear what implementation and enforcement mechanisms are used to ensure that targets are being met. Further research should illuminate this point.

The Lake Erie Action Plan was created to help Ontario meet their commitments set out in the Made-in-Ontario Environment Plan (“Made-in-Ontario”). Made-in-Ontario is a roadmap developed by the Ontario government to promote a healthy environment and a healthy economy. Protection of the Great Lakes and reduction of algal blooms is one of the key areas of action identified in the plan. There is other relevant provincial legislation that addresses phosphorus runoff, including the *Nutrient Management Act* and the *Drainage Act*. However, these provincial acts do not address algal blooms specifically.

## Municipal Action

Municipalities and cities are important actors in inducing behavioral change to protect the environment. In accordance with international subsidiarity principles, municipalities are able to implement regulatory schemes and adjust them to their constituencies, where necessary. Three specific actions, which affect municipalities directly, are set out in the Lake Erie Action Plan:

1. Limit loadings from municipal sewage treatment plant discharges and better manage stormwater;
2. Encourage effective techniques to keep phosphorus on farmland; and
3. Restore natural wetlands.

The third goal of restoring natural wetlands is notable, particularly to the Windsor-Essex County region. In March 2019, Ontario lifted the “significant wetland” designation for fifty acres of a

woodlot in the County. The previous designation meant that no residential developments would be permitted to take place. Removal of this designation now allows for urban growth that can pose as a potential threat to a number of wildlife species. This created additional obstacles to any potential restoration of wetlands as the Windsor-Essex County region already has the greatest rate of wetland and woodland loss in Ontario, resulting in only 3% of original trees and 1.5% of original wetlands remaining, a disproportionate percentage based on the area the County covers.

To address the issue of the algal blooms in western Lake Erie, Essex Region Conservation Authority is taking a series of actions, including cost-share programs, watershed monitoring, research projects, education and outreach programs specifically reaching agricultural parties, and implementation of a Regional Phosphorous Reduction Strategy. What can bolster these algal bloom reduction programs is more coordinated efforts between all actors and buy-in from all parties. Areas that require additional research include how to improve regulation and management of drainage systems and flat land.

### Federal Legislation

Canada has a few federal laws that impact algal blooms. Under the *Canada Environmental Protection Act*, phosphorus concentration levels were included as a CEPA regulated toxic in 2010, however the standards apply only for point sources of pollution including household detergents. This regulation is therefore not effective to address algal blooms, as currently the main causes of the problem in Ontario were identified as being non-point sources of pollution from agricultural runoff. The approach to reduce nonpoint sources of pollution was through data collection and the promotion of agricultural stewardship programs to support farmers in best management practices, a more collaborative approach than CEPA. *Canada Water Act* (“CWA”) provides broad guidelines, rather than enforceable standards that policymakers can rely on, so it does not set limits to phosphorous or other non-point sources of pollution. The Canada-Ontario Lake Erie Action Plan is now the main direct policy and regulation on nonpoint sources of pollution in Lake Erie at the Federal level, relying heavily on action undertaken at the provincial and municipal levels.

### **Next Steps**

Some areas for future research include how to improve law and policy regulations at the provincial, municipal and federal levels.

### Provincial and/or Municipal Action

#### a. Nutrient Act

As the Great Lakes ecosystems constantly change, nutrient management must constantly adapt to address challenges to Lake Erie (Environment Canada, 2013). Climate change and invasive species have for example compounded the challenge of preventing HABs (Thornton, et al., 2013). In-depth research to investigate whether the Ontario Nutrient Act is fit for the purpose of addressing the algal bloom problem in the 2020 context is needed. This research should also take into consideration the role of industry-led initiatives to address nutrient management such as the

4R Nutrient Stewardship strategy by Fertilizer Canada, which seeks to raise awareness on the sustainable use of fertilizers around Canada (Whyte, 2015).

b. Drainage Act

To address algal blooms, many environmental advocates suggest that new drainage infrastructure should be implemented. Potential projects can include two-stage ditch systems for subsurface drainage and implementation of upgraded sewage treatment technology. In Ontario, drains are regulated by municipalities. The *Drainage Act* provides mainly for implementation and maintenance requirements. As a next step, further research among scientists, environmentalists, engineers, the agriculture sector, and policymakers will be required to identify how to efficiently prevent runoff and what upgrades to existing infrastructure or new infrastructure are needed.

c. Wetlands Restoration

Wetlands are a living filter that purifies water naturally. In areas where there is nutrient-rich water, wetlands absorb and filter the excess nutrients and sediment before it enters open water. Wetland restoration is one of the action steps set out in the Canada-Ontario Lake Erie Action Plan. Wetland restoration has been proposed by Bill Mitsch, a renowned ecologist specializing in wetlands. Mitsch and his colleagues found that potentially reverting as little as 10% of the Great Black Swamp back to its natural state could help reduce algal blooms significantly in the Maumee River watershed in Ohio. As previously discussed, some wetlands in the Windsor-Essex County region are no longer protected by the wetland designation. Legislation can be used to recognize the value of wetlands and create limits where urban growth will threaten the ecological health and sustainability of these designated areas.

In the long-term, restoring wetlands is cost effective for agricultural industries. There would also be positive impacts on tourism and provide other benefits. Farmers could work with governmental agencies to promote “wetaculture” to merge sustainable practices, switching land use from farmland to wetland every 10 years. Mandatory federal funding can be used to finance a wetlands project, a step that can be enacted within federal legislation.

### Federal Action

While a unified national piece of legislation is desirable, Canada faces jurisdictional obstacles. The environment is an area that does not fall well within either provincial or federal jurisdiction under the *Constitution Act, 1867*. As the causes of algal blooms are activities concentrated within the provinces, issues of jurisdictional conflict can arise if the federal government tries to assert its regulatory power too broadly. Hence the approach adopted by the federal government is to work collaboratively with the province of Ontario. Whether it is possible to enact federal laws to address algal blooms remains an open question. To preserve jurisdictional boundaries according to the division of powers in the *Constitution Act, 1867*, Canada should be cautious that any federal laws designed to reduce algal blooms do not infringe too much on areas of provincial jurisdiction such as industries, agriculture, natural resources, and provincial waterways.

With this disclaimer, federal legislation designed to specifically address phosphorus runoff from nonpoint sources could ensure a consistent and efficient way of reaching the target goals set out in the Canada-Ontario Lake Erie Action Plan. In the United States, the federal government enacted *The Harmful Algal Bloom and Hypoxia Research and Control and Hypoxia Research and Control Amendments Act of 2013*. The reauthorization of the Act will allow for federal funds to be directed towards programs and research conducted to combat algal blooms deemed as of “national significance”. In addition to funding research and innovation, a national assessment will be completed every five years to monitor the progress in reduction efforts.

Research to understand whether the Lake Erie Action Plan provides the same tools as the US 2013 Act, or if a similar legal instrument specific to algae blooms would be beneficial in Canada, would be helpful. Is the Lake Erie Action Plan, as currently designed and implemented, able to support the research and project funding needed to ensure that Ontario and municipalities can properly address the algal blooms within their jurisdiction? Despite the challenges, if designed in collaboration with provinces and municipalities, there could be a chance to approve a strong federal legal instrument while avoiding jurisdictional conflicts.

## References

### Legislation:

*Canadian Environmental Protection Act, 1999*, S.C. 1999, c. 33.

*Clean Water Act*, 33 U.S.C. §1251 et seq. (1972).

*Drainage Act*, R.S.O. 1990, c. D. 17.

*Great Lakes Protection Act, 2015*, S.O. 2015, c. 24.

*The Harmful Algal Bloom and Hypoxia Research and Control and Hypoxia Research and Control Amendments Act*. 33 U.S.C. §1254 (2013).

### Other:

Benidickson, J., 2017. The Evolution of Canadian Water Law and Policy: Securing Safe and Sustainable Abundance. *McGill Journal of Sustainable Development Law*, 13, 1, 61-104.

Bridgeman, T., 2019. Harmful Algal Blooms in Western Lake Erie.

<http://web2.uwindsor.ca/softs/keyindicators/indicators-algal-blooms.pdf> (accessed 12 Oct. 2019).

Environment and Climate Change Canada and the Ontario Ministry of the Environment and Climate Change, 2018. Canada-Ontario Lake Erie Action Plan.

[https://www.canada.ca/content/dam/eccc/documents/pdf/great-lakes-protection/dap/action\\_plan.pdf](https://www.canada.ca/content/dam/eccc/documents/pdf/great-lakes-protection/dap/action_plan.pdf) (accessed 17 Dec. 2019).

Government of Canada, 2012. Great Lakes Water Quality Agreement.

<https://www.canada.ca/en/environment-climate-change/services/great-lakes-protection/2012-water-quality-agreement.html/> (accessed 14 Dec. 2019).

Government of Canada. (n.d.). Canada-U.S. Boundary Waters Treaty.

<https://www.canada.ca/en/environment-climate-change/corporate/international->

affairs/partnerships-countries-regions/north-america/canada-united-states-boundary-waters-treaty.html/ (accessed 14 Dec. 2019).

Government of Canada and the Government of the United States of America, 2019. Progress Report of the Parties. <https://binational.net/wp-content/uploads/2019/10/Final-2019-PROP-English-Oct.23.pdf> (accessed 16 December 2019).

Government of Ontario, 2019. Canada-Ontario Lake Erie Action Plan. <https://www.ontario.ca/page/canada-ontario-lake-erie-action-plan/> (accessed 16 Dec. 2019).

Great Lakes Commission. (n.d.). Reducing Phosphorous into Lake Erie. <https://www.glc.org/work/eriestat/phosphorus/> (accessed 17 Dec. 2019).

Great Lakes Protection Act Alliance, 2017. Protecting and Restoring the Ecological Health of Our Waters. [https://d36rd3gki5z3d3.cloudfront.net/wp-content/uploads/2017/05/FINAL\\_ProtectingRestoringEcologicalHealthofWaters-1.pdf?x82561/](https://d36rd3gki5z3d3.cloudfront.net/wp-content/uploads/2017/05/FINAL_ProtectingRestoringEcologicalHealthofWaters-1.pdf?x82561/) (accessed 16 Dec. 2019).

Henry, T., 2019. Economics might support grandiose Great Black Swamp restoration. *The Toledo Blade*. <https://www.toledoblade.com/local/environment/2019/08/03/great-black-swamp-restoration-lake-erie-algae-bloom/stories/20190803126/> (accessed 12 Oct. 2019).

International Joint Commission. (n.d.). History of the Great Lakes Water Quality Agreement. <https://www.ijc.org/en/what/glwqa-history/> (accessed 5 Dec. 2019).

International Joint Commission. (n.d.). The IJC and the Great Lakes Water Quality Agreement. <https://www.ijc.org/en/what/glwqa-ijc/> (accessed 5 Dec. 2019).

McCandless, M., 2019. Canada could take inspiration from U.S. environmental policy preventing algal blooms. <https://www.iisd.org/library/us-policy-algal-blooms/> (accessed 7 Nov. 2019).

Mahl, U. H., Tank, J. L., Roley, S. S., Davis, R. T., 2015. Two-Stage Ditch Floodplains Enhance N-Removal Capacity and Reduce Turbidity and Dissolved P in Agricultural Streams. *Journal of the American Water Resources Association*. *Journal of the American Water Resources Association*, 51, 4, 923-940.

Ministry of Environment, Conservation, and Parks, 2018. A Made-in-Ontario Environment Plan. <https://prod-environmental-registry.s3.amazonaws.com/2018-11/EnvironmentPlan.pdf> (accessed 16 Dec. 2019).

Pan, F., 2019. Part of Windsor wetland now potentially open to development. *CBC News*. <https://www.cbc.ca/news/canada/windsor/south-cameron-woodlot-windsor-wetlands-flood-1.5038392/> (accessed 7 Nov. 2019).

Stammler, K., 2019. Eutrophication and Algal Blooms. *State of the Strait*. Talk presented at the 2019 State of the Strait conference, Windsor, Ontario, Canada.

Thornton, J.A., Harding, W.R., Dent, M., Hart, R.C., Lin, H., Rast, C.L., Rast, W., Ryding, S.O., Slawski, T.M., 2013. Eutrophication as a ‘wicked problem’. *Lakes and Reservoirs: Research and Management*, 18, 298–316.

Whyte, G., 2015. Fertilizer Canada Response to Bill 66, Great Lakes Protection Act, 2015. <http://fertilizercanada.ca/ontario-great-lakes-protect-act-submission/> (accessed 7 February 2020).