ACHIEVING PHOSPHORUS COMPLIANCE

at Winnipeg's North End Water Pollution Control Centre

SEPTEMBER 2022

Excess phosphorus is causing harmful algal blooms on Lake Winnipeg.

Winnipeg's North End Water Pollution Control Centre (NEWPCC) is the single largest point source of phosphorus flowing into Lake Winnipeg. In 2005, the province set a phosphorus limit of 1.0 mg/L in NEWPCC's operating licence. Seventeen years later, NEWPCC remains non-compliant with this limit.

Proven, cost-effective and efficient solutions to meet phosphorus limits for sewage effluent have been implemented in jurisdictions across North America over the last half century.

Winnipeg's city council must commit to implementing these solutions to achieve phosphorus compliance at NEWPCC – fulfilling the city's responsibility to the lake that bears its name.

LAKE WINNIPEG INDIGENOUS COLLECTIVE

LWF LAKE WINNIPEG FOUNDATION

IISD International Institute for Sustainable Development



Victoria Beach on Lake Winnipeg, 2019; Photo: Mikaela MacKenzie, *Winnipeg Free Press*

PHOSPHORUS AND ALGAL BLOOMS



The Lake 226 experiment clearly demonstrated the connection between phosphorus and algal blooms. This iconic picture has been described as the single most powerful image in the history of limnology. Photo: IISD Experimental Lakes Area, 1973.

Understanding the causes and controls of freshwater eutrophication

Eutrophication – the overfertilization of freshwater ecosystems with the nutrient phosphorus – results in excessive growth of algae, with economic, health and environmental implications. Lake Winnipeg, like many lakes across Canada and around the world, is experiencing increasingly severe algal blooms.

In the 1960s, when algal blooms first plagued the Great Lakes, the government of Canada established the Experimental Lakes Area in northwestern Ontario. This one-of-a-kind research facility was specifically mandated to identify the causes and consequences of freshwater eutrophication, using whole-ecosystem experiments.

In the Lake 226 experiment, a plastic curtain was installed to separate the lake's two basins. Carbon and nitrogen were added to one side, while carbon, nitrogen and phosphorus were added to the other. Only the half of the lake that received phosphorus produced algal blooms.

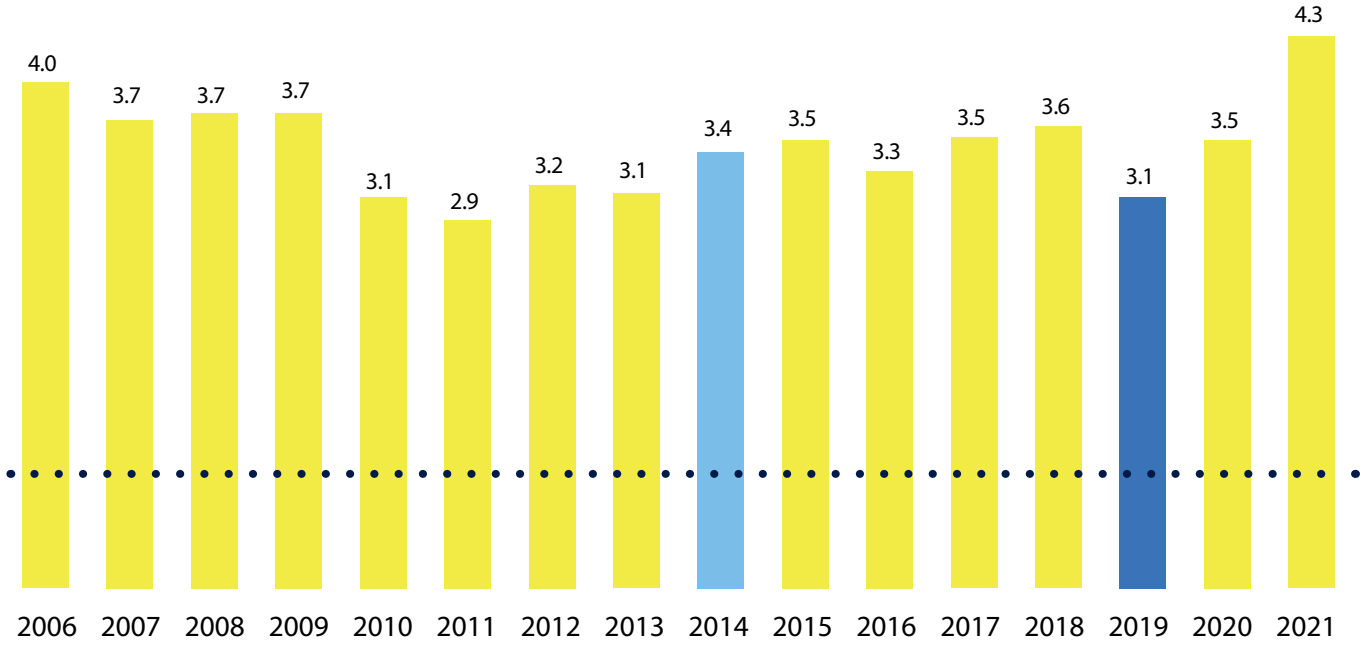
Research on Lake 227 is the world's longest-running experiment on algal blooms, beginning in 1969 and continuing to this day. At first, researchers routinely dosed the lake with both phosphorus and nitrogen. Over the years, the nitrogen dose was gradually decreased and, in 1990, researchers stopped adding it completely. Algal blooms continued to appear in Lake 227 with the same intensity because of the ongoing addition of phosphorus. Nitrogen reduction had no effect.

Over five decades of peer-reviewed research at the facility (now known as IISD Experimental Lakes Area, or IISD-ELA) have demonstrated conclusively that phosphorus is the driver of algal blooms in freshwater ecosystems. This research has been applied around the world to limit phosphorus levels in sewage effluent – successfully reducing algal blooms in Lake Erie (Canada), Lake Geneva (Switzerland, France); Lake Balaton (Hungary); Lake Maggiore (Italy); Lake Washington (US); and Lake Constance (Switzerland, Austria, Germany).

Now, in line with IISD-ELA research and provincial licensing requirements, Winnipeg's water and waste department has put forward a plan to achieve phosphorus compliance at the North End Water Pollution Control Centre – much sooner and at much reduced cost than previously projected. Winnipeg's city council must confirm its support for this plan and allocate sufficient funding to complete the project by 2030.

ANNUAL AVERAGE PHOSPHORUS CONCENTRATION IN NEWPCC EFFLUENT

NEWPCC phosphorus concentrations (mg/L) have consistently exceeded the provincial licence limit since public reporting began.



Phosphorus limit of 1.0 mg/L specified in NEWPCC provincial operating licence

First missed NEWPCC compliance deadline: Dec. 31, 2014

Second missed NEWPCC compliance deadline: Dec. 31, 2019

CITY COUNCIL COMMITMENTS FOR PHOSPHORUS COMPLIANCE

FERRIC CHLORIDE DOSING SYSTEM

City council approved funding for the updated design of the NEWPCC Interim Phosphorus Removal Capital Project on July 21, 2022.

+ INCREASED BIOSOLIDS DIGESTER CAPACITY

Winnipeg's next city council must approve funding in the 2024 - 27 budget for increased digester capacity for the NEWPCC Biosolids Facilities Project.

PHOSPHORUS COMPLIANCE

NEWPCC effluent meets 1.0 mg/L provincial phosphorus limit by 2030.

HOW PHOSPHORUS REMOVAL WORKS: Ferric chloride binds to phosphorus and settles out of the liquid waste. The resulting solid waste is treated by increasing biosolids digester capacity.

ROAD MAP TO PHOSPHORUS COMPLIANCE

- FERRIC CHLORIDE DOSING SYSTEM
- INCREASED BIOSOLIDS CAPACITY

2022

- Winnipeg election
- Award dosing-system construction contract
- Commit to increasing biosolids capacity

2023

- Complete construction of dosing system
- Procure biosolids project contractor

2024

- Test and optimize ferric chloride dosing
- Approve biosolids funding in 2024 - 2027 budget

2025

- Optimize ferric chloride dosing
- Award biosolids construction contract

2026

- Winnipeg election
- Optimize ferric chloride dosing
- Design and construct biosolids facilities

2027

- Optimize ferric chloride dosing
- Design and construct biosolids facilities

2028

2029

2030

- Winnipeg election
- **ACHIEVE PHOSPHORUS COMPLIANCE**

North basin of Lake Winnipeg; Photo: Mike Stainton