LWF LAKE WINNIPEG FOUNDATION

LAKE WINNIPEG COMMUNITY-BASED MONITORING NETWORK

2018 Report

Cooks Creek; Photo: Paul Mutch

The Lake Winnipeg Community-Based Monitoring Network (LWCBMN), coordinated by the Lake Winnipeg Foundation (LWF), mobilizes citizens to collect water samples across Manitoba in order to measure phosphorus concentration.

Phosphorus is the nutrient responsible for blue-green algae blooms on Lake Winnipeg. Phosphorus comes from diverse sources across the watershed, including municipal wastewater and agricultural runoff.

With the help of conservation partners and citizen scientists, this long-term monitoring program is identifying phosphorus hotspots – localized areas that contribute higher amounts of phosphorus to waterways than other areas.

Targeting remedial action in hotspots will reduce the amount of phosphorus entering Manitoba's lakes and rivers, and improve the health of Lake Winnipeg.

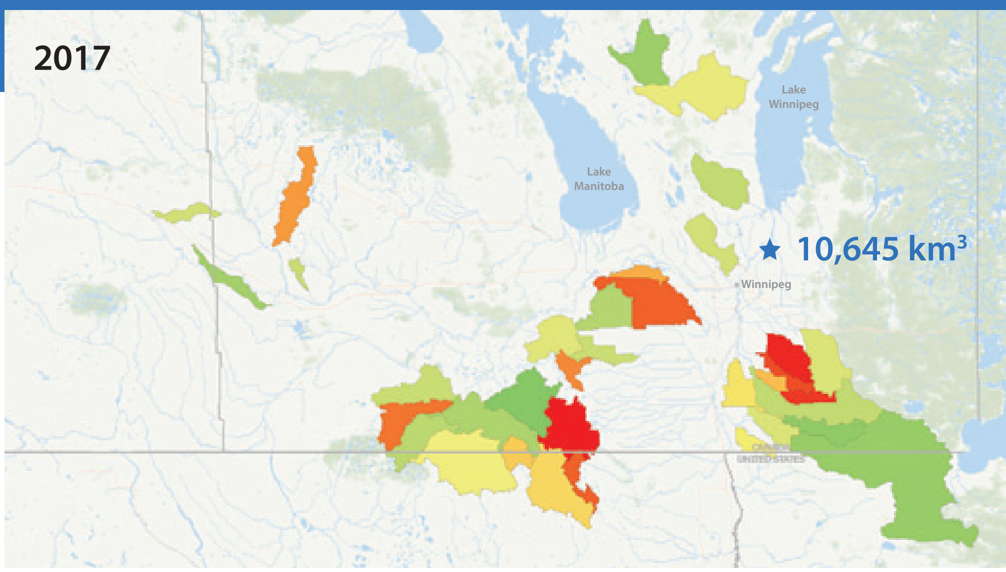
PHOSPHORUS HOTSPOTS EXIST AND WATER FLOW MATTERS

In 2017, LWCBMN identified localized phosphorus hotspots within the Lake Winnipeg watershed, including some of the highest phosphorus exports ever reported in Manitoba.

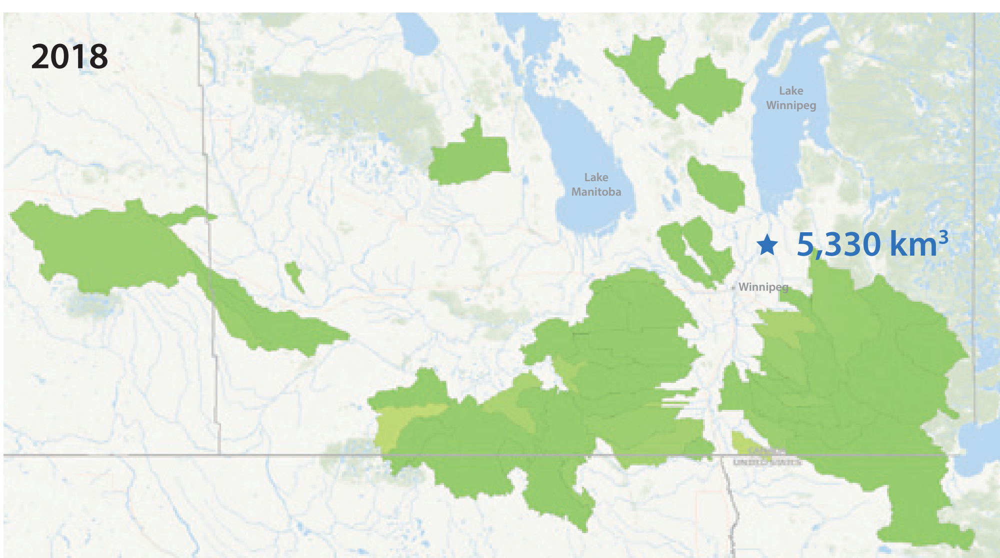
In 2018, LWCBMN efforts expanded across the province; a total of 1,000 samples were collected from 101 sites, including new sites in the western Red River valley, along Winnipeg River tributaries and within the city of Winnipeg.

In contrast to 2017, 2018 was very dry. All sampling sites had low water flow, resulting in low phosphorus export from all monitored drainage areas.

Phosphorus export maps (below) illustrate the impacts of water flow. The difference in phosphorus export between 2017 and 2018 is a result of annual variation due to changes in climate and water runoff; it is not a trend of declining phosphorus load over time. However, LWCBMN's 2018 findings highlight the potential to replicate dry conditions – and correspondingly low phosphorus exports – by holding water on the land in natural wetlands, and constructed ponds and dams.



Phosphorus export (kg/ha/y) from 35 drainage areas sampled in 2017. Key finding: Phosphorus hotspots exist and resources should be targeted to these areas to reduce phosphorus loading.



Phosphorus export (kg/ha/y) from 52 drainage areas sampled in 2018. Key finding: Water flow drives phosphorus export in hotspots. In 2018, water load in the Red River at Selkirk (5,330 km^3) was half the water load recorded in 2017 (10,645 km^3).

Phosphorus concentration: the amount of phosphorus in a defined volume of water, measured in micrograms per litre (µg/L)

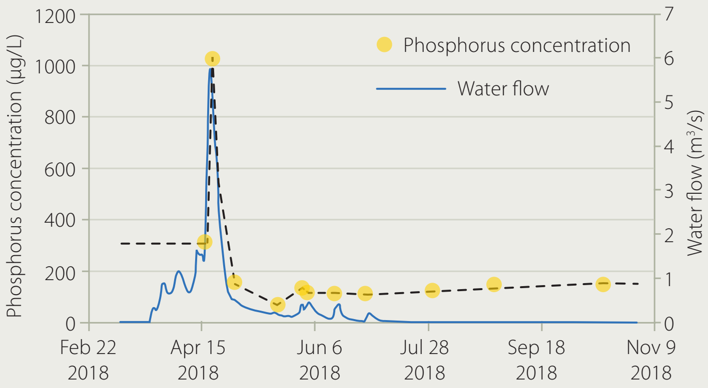
Water flow: the rate at which water flows past a sampling site, measured in cubic metres per second (m^3/s)

Phosphorus load: the total amount, in tonnes, of phosphorus flowing past a sampling site in a field season, calculated by multiplying phosphorus concentration by water flow

Phosphorus export: the amount of phosphorus exported from each hectare of land in a year (kg/ha/y), calculated by dividing the phosphorus load by the drainage area

Water load: the total volume of water flowing past a sampling site in a field season, measured in cubic kilometres (km^3)

FREQUENT AND RESPONSIVE SAMPLING



Want to explore other LWCBMN sampling sites? All data is available at ***LakeWinnipegDataStream.ca.***

High-water events are high-phosphorus events – if samples are not collected during these times, phosphorus loads may be underestimated.

Because LWCBMN samplers live, work or commute near their sites, they can collect samples frequently during the spring melt and after large rain events, capturing phosphorus peaks and identifying when concentrations drop.

This hydrology graph shows 2018 water flow and phosphorus concentration of samples collected from Roseisle Creek. When flow increases, so too does phosphorus concentration. This highlights the importance of frequent and responsive sampling.

STORING WATER TO PROTECT LAKE WINNIPEG

LWCBMN data show that phosphorus export can be reduced by holding water on the land, with the greatest potential impact occurring in phosphorus hotspots. Limited resources must be strategically invested in these hotspots. Otherwise, we may be wasting time, money and effort.

Reduced phosphorus exports in 2018 were due to naturally dry conditions. Two phosphorus hotspots show marked reductions: from 2017 to 2018, phosphorus export in the Manning Canal and La Salle River drainage areas declined by 96 and 95 per cent, respectively.

It is possible to replicate dry conditions in wet years by protecting existing wetlands, and by storing water using constructed ponds and dams.

Many of Manitoba's conservation districts are working with local landowners to store water on the land in large, shallow ponds. These ponds slow water flow, allowing phosphorus to settle to the bottom.

Using conservation district estimates, LWF calculated the cost of storing the difference in water load between 2017 and 2018 in the Manning Canal and La Salle River phosphorus hotspots.

	Manning Canal	La Salle River
2017 water load (km^3)	0.066	0.082
2018 water load (km^3)	0.005	0.007
Difference in water load (km^3)	0.061	0.075
Cost per acre-foot*	$1,000	$1,000
Cost to retain difference	**$49 million**	**$61 million**

*An acre-foot is an empirical measurement that refers to the volume of one acre of surface area to a depth of one foot.

A variety of water-retention methods exist, each with unique benefits and challenges. The Deerwood Soil and Water Management Association, in partnership with local farmers, has built a network of small dams to slow water flow. University of Manitoba soil scientist Dr. David Lobb is studying deep-water ponds that take up less space on commercially valuable crop land. The Manitoba Habitat Heritage Corporation and Ducks Unlimited Canada are restoring previously drained wetlands, to increase water filtration and preserve natural habitats.

To find the best water-retention method for a given location, we need to consider not just environmental factors, but also the social and economic contexts in which these methods are deployed. Retention projects must be carefully evaluated for both effectiveness and feasibility.

Nutrient-rich water stored on working farms can be recycled for irrigation and livestock watering, offering practical benefits to land owners while reducing the phosphorus load to Lake Winnipeg.

Of course, the success of any new water-retention projects is dependent on strong protection of existing wetlands, which play an important role in retaining water across the watershed. If ongoing wetland drainage is allowed, natural water-storage capacity will decrease and the cost of water-quality protection will increase.

LWF PROUDLY ACKNOWLEDGES THE FOLLOWING FUNDERS

RBC Foundation

This project was undertaken with the financial support of the Government of Canada.
Ce projet a été réalisé avec l'appui financier du gouvernement du Canada.
Canada

The Thomas Sill Foundation Inc

Walter & Duncan Gordon Foundation

CIRA – Building a better online Canada

Tides Canada

Manitoba

patagonia

Assiniboine Credit Union

Co-op Red River

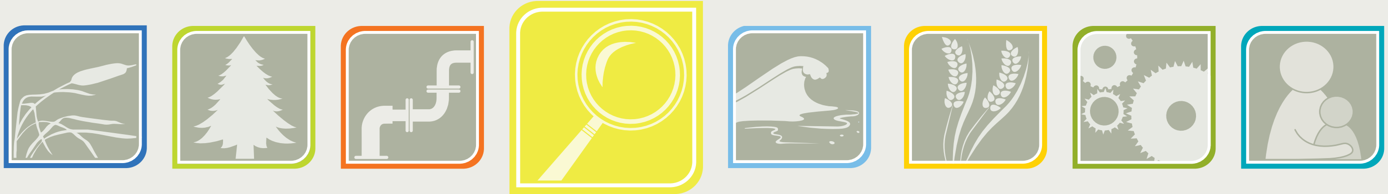
Jeunesse Canada au travail – JCT YCW – Young Canada Works

CÉCS – Conseil économique et coopératif de la Saskatchewan

LWCBMN is a collaborative initiative delivered in partnership with Manitoba's conservation districts, LWF's science advisors, volunteer citizen scientists and Agriculture and Agri-food Canada.

MONITORING OUR WATERWAYS

To reduce phosphorus loading, we need to know how, when and from where phosphorus is reaching Lake Winnipeg. The Lake Winnipeg Community-Based Monitoring Network (LWCBMN) is a long-term phosphorus monitoring program that engages citizen volunteers to collect water samples across Manitoba using scientific protocols. Because citizen scientists live, work or commute near their sampling sites, they can sample frequently in response to weather events and water conditions, generating critical data to inform research and policy.



The Lake Winnipeg Foundation (LWF) advocates for change and coordinates action to improve the health of Lake Winnipeg. LWF's flagship initiative, the Lake Winnipeg Health Plan, is a set of eight evidence-based actions to reduce phosphorus loading. By addressing the root causes of potentially harmful algae blooms, the plan provides a blueprint for cost-effective decision-making and long-term, adaptive freshwater management.