LAKE WINNIPEG COMMUNITY-BASED MONITORING NETWORK

West Souris River Conservation District

2018 Regional Report

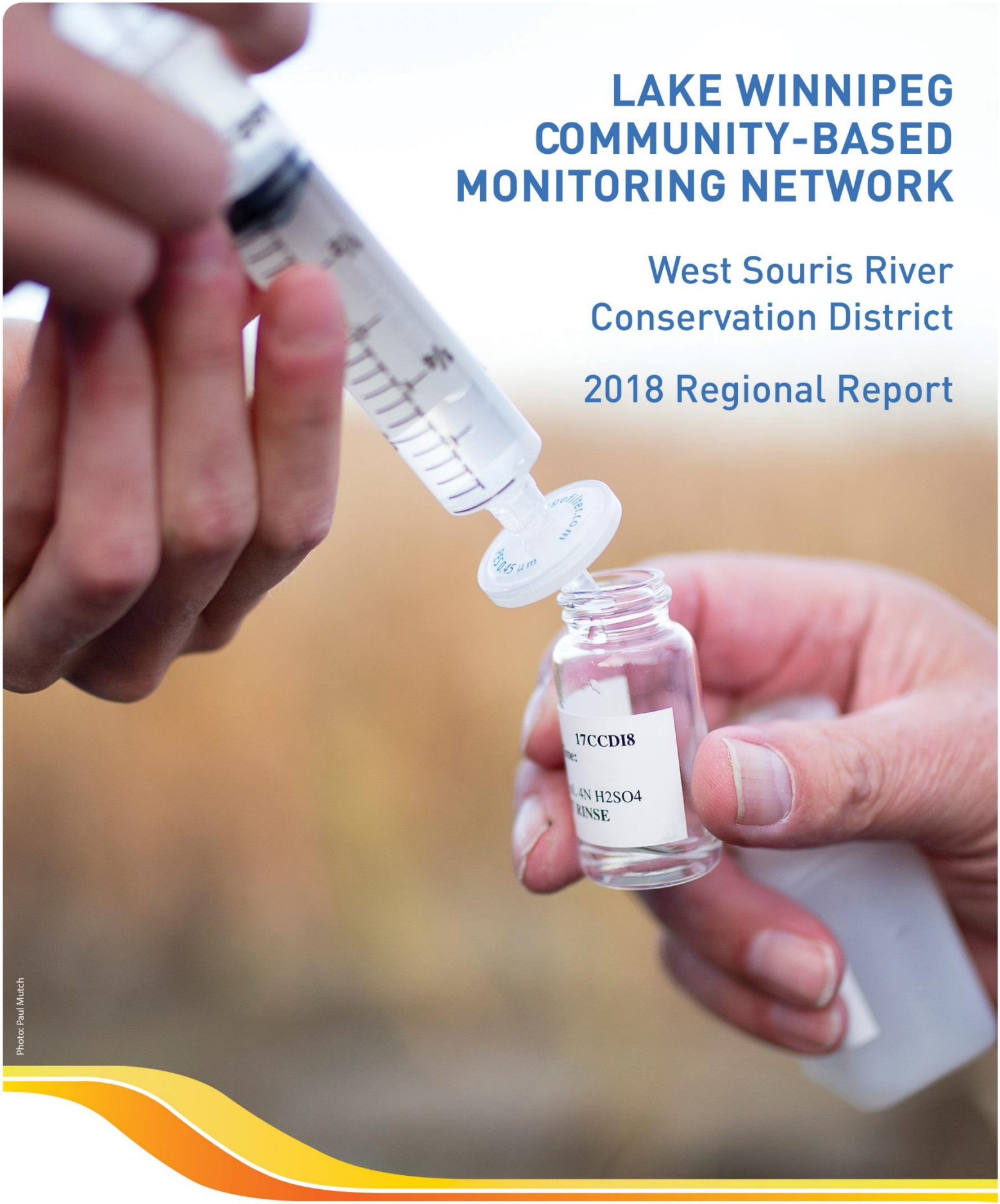


Photo: Paul Mutch

LWF LAKE WINNIPEG FOUNDATION

WEST SOURIS RIVER CONSERVATION DISTRICT

LAKE WINNIPEG COMMUNITY-BASED MONITORING NETWORK: OVERVIEW

Lake Winnipeg, the world's 10th largest freshwater lake, receives its water from a vast watershed – an area of land 40 times larger than the lake itself which includes many smaller sub-watersheds. All human activities across this huge watershed have the potential to impact our water quality. However, the closer you are to Lake Winnipeg, the bigger your impact will likely be.

Phosphorus is the nutrient responsible for the potentially harmful blue-green algae blooms on Lake Winnipeg and on other lakes within the watershed. Different sub-watersheds contribute different proportions of Lake Winnipeg's total phosphorus load. With the help of a strong network of local organizations and citizen scientists, the Lake Winnipeg Community-Based Monitoring Network (LWCBMN) is identifying phosphorus hotspots on the landscape, creating opportunities to target funding and action to achieve the greatest return on investment.

Snow melts, floods and heavy rainfall events are responsible for most of the phosphorus that is flushed from the land and carried into our waterways. LWCBMN samples frequently throughout the season, and particularly during the spring melt, to ensure we capture phosphorus runoff during these high-water events.

Most community-based monitoring (CBM) sampling is conducted at stations where water flow is continuously monitored by the Water Survey of Canada. By tracking flow online using the Water Survey of Canada's real-time data, the network can mobilize partners and citizen scientists across the watershed to ensure frequent sampling during peak flows. Sampling at these stations provides corresponding flow data, allowing CBM data to be used to calculate **phosphorus loads**. We need several samples throughout the season to accurately calculate these loads. Phosphorus loads can subsequently be used to calculate **phosphorus exports**, based on the area of the watershed.

Phosphorus load is the total amount of phosphorus flowing past a sample site over a given period of time.

Phosphorus export is the amount of phosphorus exported by each hectare of land in a year, expressed as kg/ha/y.

The network in action – 2018

In 2018, in its third field season, LWCBMN grew to cover more drainage areas across the province, collecting samples at new sites in the western Red River valley, along Winnipeg River tributaries and in the City of Winnipeg. A total of 1000 samples were collected from 101 sites.

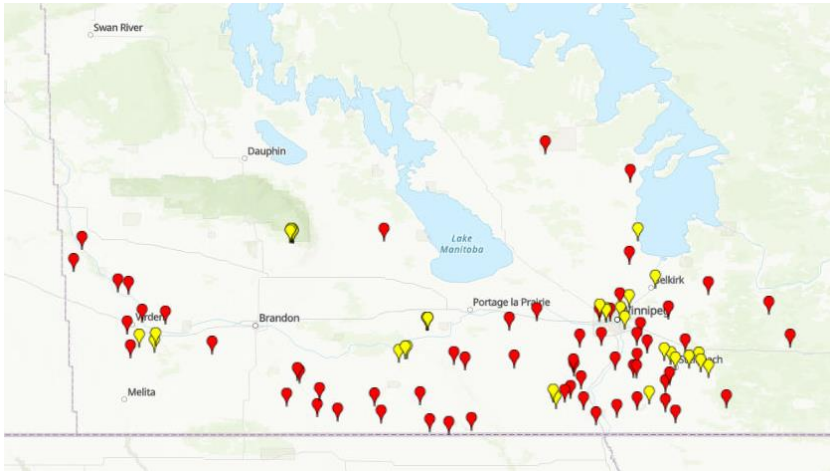


Figure 1. 2018 sample sites. Sites in red are located at Water Survey of Canada flow-metered stations. Sites in yellow are monitored by volunteer samplers where flow is not measured.

2018 RESULTS: OVERVIEW

Table 1. Overview of findings from 2018 LWCBMN phosphorus monitoring data.

REGION	# years of LWCBMN data	# sites in 2018	# samples collected in 2018	Highest phosphorus export in region (2017)	Highest phosphorus export in region (2018)	Regional lead
East Interlake Conservation District	2	4	74	0.33 kg/ha/y (Icelandic River)	0.03 kg/ha/y (Icelandic River and Grassmere Creek)	Armand Belanger (EICD)
Seine Rat River Conservation District	3	20	204	1.64 kg/ha/y (Manning Canal)	0.22 kg/ha/y (Main Drain near Dominion City)	Jodi Goerzen and Chris Randall (SRRCD)
La Salle Redboine Conservation District	3	12	139	0.76 kg/ha/y (La Salle River at Sanford)	0.12 kg/ha/y (Roseisle Creek near Roseisle)	Justin Reid (LSRBCD)
Upper Assiniboine River Conservation District	2	6	102	0.62 kg/ha/y (Arrow River)	0.08 kg/ha/y (Bailey's Creek near Oak Lake)	Ryan Canart (UARCD)
Pembina Valley Conservation District	2	12	102	1.88 kg/ha/y* (Pembina River near Windygates)	0.21 kg/ha/y (Pembina River near Lorne Lake)	Cliff Greenfield (PVCD) and Jason Vanrobaeys (AAFC)
West Souris River Conservation District	1	5	97	-	0.01 kg/ha/y (Pipestone Creek near Pipestone)	Dean Brooker and Scott Hainsworth (WSRCD)
City of Winnipeg	1	6	68	-	0.03 kg/ha/y (Omand's Creek near Empress Street)	Lake Winnipeg Foundation
Western Tributaries of Red River	1	5	27	-	0.11 kg/ha/y (Buffalo Creek near Rosenfeld)	Lake Winnipeg Foundation
Little Saskatchewan River Conservation District	1	6	47	-	No flow metered stations	Colleen Cuvelier (LSRCD)
Cooks Creek Conservation District	2	4	34	-	0.01 kg/ha/y (Cooks Creek below Diversion and at Diversion)	Lake Winnipeg Foundation

In the 2018 field season, southern Manitoba was very dry with low discharge at all sampling sites, resulting in low phosphorus exports and low spatial variation between sub-watersheds. The dry conditions in 2018 highlight the important relationship between water discharge and phosphorus load entering Lake Winnipeg: high water years are high phosphorus loading years and low water years are low phosphorus loading years. For example, the Manning Canal was a phosphorus hotspot in 2016 and 2017 with phosphorus exports of 1.10 kg/ha/y and 1.62 kg/ha/y respectively. In contrast, the Manning Canal had a phosphorus export of 0.07 kg/ha/y in 2018. Though peak phosphorus concentrations were similar in all three years, the water load was ten times lower in 2018 (Figure 2). **Results from the 2018 field season demonstrate that we can reduce the phosphorus entering our lakes by reducing water runoff across the watershed.**

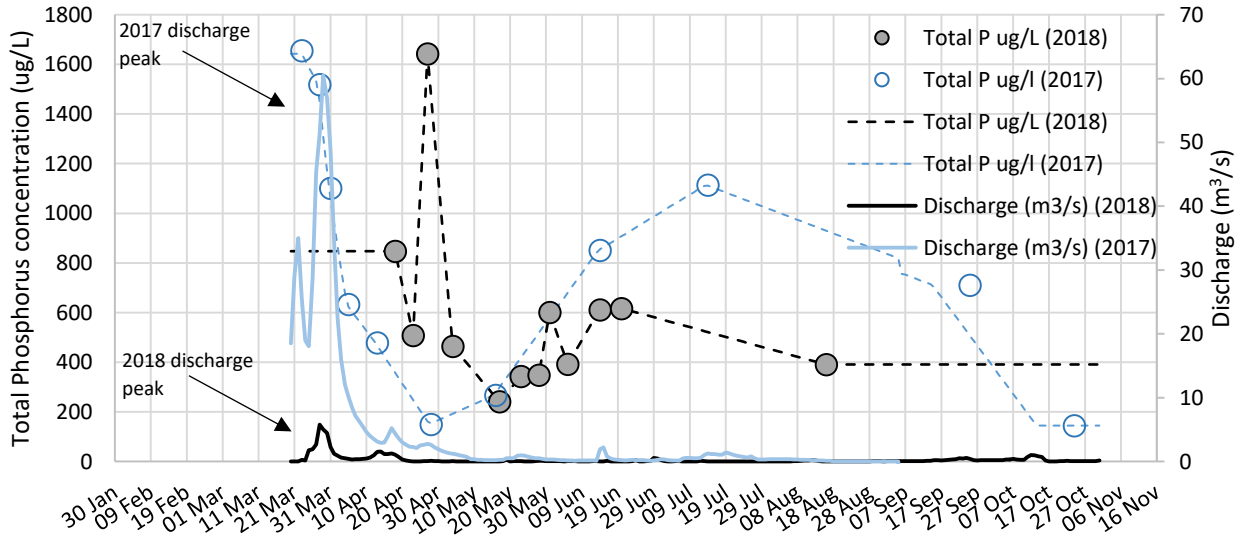


Figure 2. Comparison of phosphorus concentration and discharge in 2017 (blue) and 2018 (black) at the Manning Canal site.

WEST SOURIS RIVER CONSERVATION DISTRICT

The West Souris River Conservation District (WSRCD) is located in south-western Manitoba, and is bordered by Saskatchewan to the west, the United States to the south and Souris River to the east. A major sub-watershed in WSRCD is Plum Creek, which drains Oak Lake, a popular cottage destination that has been experiencing an increase in algae blooms in recent years. In 2018, WSRCD partnered with LWCBMN through the Lake Winnipeg Foundation's Grants Program to monitor phosphorus inputs to Oak Lake.

The primary land use in WSRCD is agriculture, specifically cropland and grazing land, as well as oil extraction in the north-east portion of the district (West Souris River Integrated Water Management Plan, 2012). In addition to agricultural activities, wastewater treatment plants and lagoons in municipalities throughout WSRCD contribute phosphorus to local waterways. Major municipalities include Pipestone, Sifton, Two Borders and Glenwood-Souris.

In partnership with LWCBMN, WSRCD staff sampled five sites in the Plum Creek watershed, of which two sites were at flow meters. For the sites where flow is not measured, useful information can be drawn from the phosphorus concentrations; however, we cannot calculate the phosphorus load because we cannot multiply the concentration by the volume of water flowing by the site.

WSRCD collected samples frequently at all sites, specifically during the spring runoff period, resulting in high-quality data that captured all discharge peaks. For sites in WSRCD, 30% of the water and 31% of the phosphorus contribution occurred during the spring, from March 1st to May 31st.

Table 2. Overview of findings from 2018 WSRCD sample sites.

Sampling station	Phosphorus load (tonnes/y)	Phosphorus export (kg/ha/y)
A. Pipestone Creek near Pipestone	5	0.01
B. Plum Creek near Souris	-3.9	-0.03

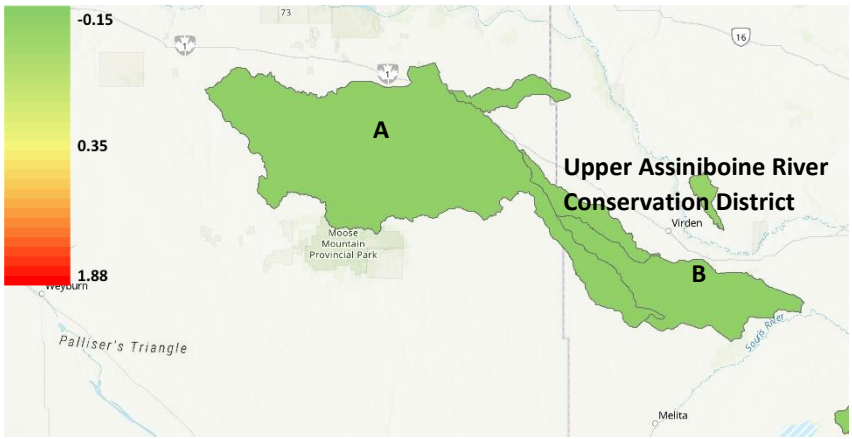
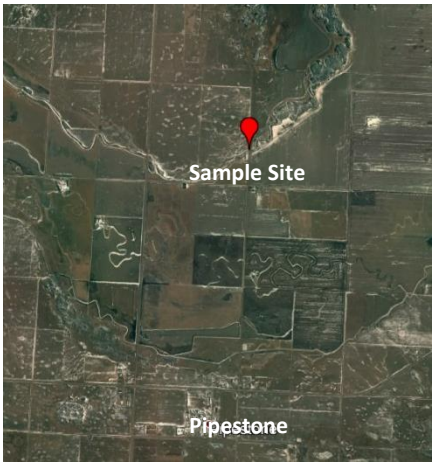


Figure 3. Phosphorus export (kg /ha/y) map for sub-watersheds in the West Souris River Conservation District.

2018 RESULTS BY SAMPLE SITE

Flow metered stations



Pipestone Creek near Pipestone

This sample site is located on Pipestone Creek, which flows into Oak Lake. The area that drains into this site is 4,240 km^2 and drains mainly agricultural land.

This sample site is located at Water Survey of Canada flow meter 05NG003, near Pipestone. In 2018, 20 samples were collected between April 20th and September 26th.

	2018
Discharge peaked:	April 27th
Greatest phosphorus concentration:	169 µg/L* (August 16th)
Total phosphorus load:	5.0 tonnes
Total water load:	0.038 km^3
Phosphorus export:	0.01 kg/ha/y
Percent water load in spring:**	46%
Percent phosphorus load in spring:	46%

*The "µg" symbol is used to express micrograms

** Spring is considered to be March 1st to May 31st

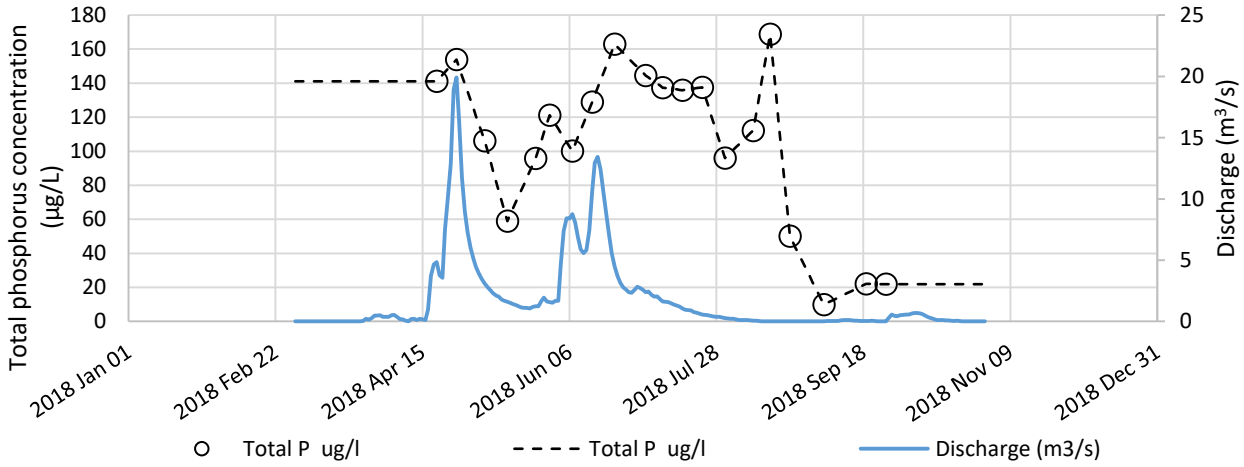


Figure 4. Discharge and total phosphorus concentration over the 2018 sampling season at Pipestone Creek near Pipestone (Water Survey of Canada Station 05NG003).

Plum Creek near Souris

This sample site is located upstream of the City of Souris along Plum Creek, which flows into the Souris River. The drainage area of this site includes Oak Lake. The majority of this 5,420 km^2 drainage area is agricultural and forested areas.

This sample site is located at Water Survey of Canada flow meter 05NG007, near Souris. In 2018, 20 samples were collected between April 20th and September 26th.

	2018
Discharge peaked:	June 4th
Greatest phosphorus concentration:	402 µg/L (April 16th)
Total phosphorus load:	-3.9 tonnes*
Total water load:	-0.019 km^3
Phosphorus export:	-0.03 kg/ha/y
Percent water load in spring:	13%
Percent phosphorus load in spring:	16%

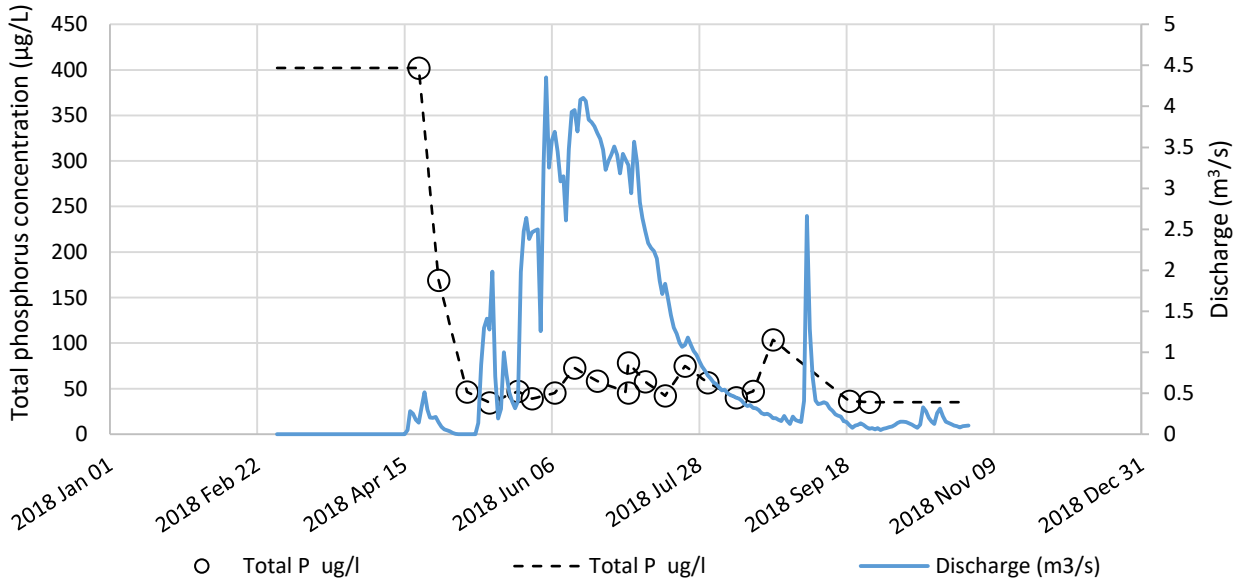


Figure 5. Discharge and total phosphorus concentration over the 2018 sampling season at Plum Creek near Souris (Water Survey of Canada Station 05NG007).

***When there are multiple sites along a waterway, phosphorus loads are calculated by subtracting the upstream load from the downstream load resulting in the amount of phosphorus contributed by the stretch of the waterway between the two sites. A negative phosphorus load means that the upstream site had a greater phosphorus load than the downstream site and therefore phosphorus was sequestered in that stretch of the waterway, as indicated by the negative export.**

Oak Lake sample sites

Upstream Oak Lake

This sample site is located upstream of Oak Lake on Pipestone Creek. The drainage area consists of mainly agricultural land.

In 2018, 20 samples were collected between April 20th and September 26th. Because flow is not measured at this site, we cannot calculate phosphorus loads and exports.

- **2018 greatest phosphorus concentration**: 860 µg/L (September 26th)

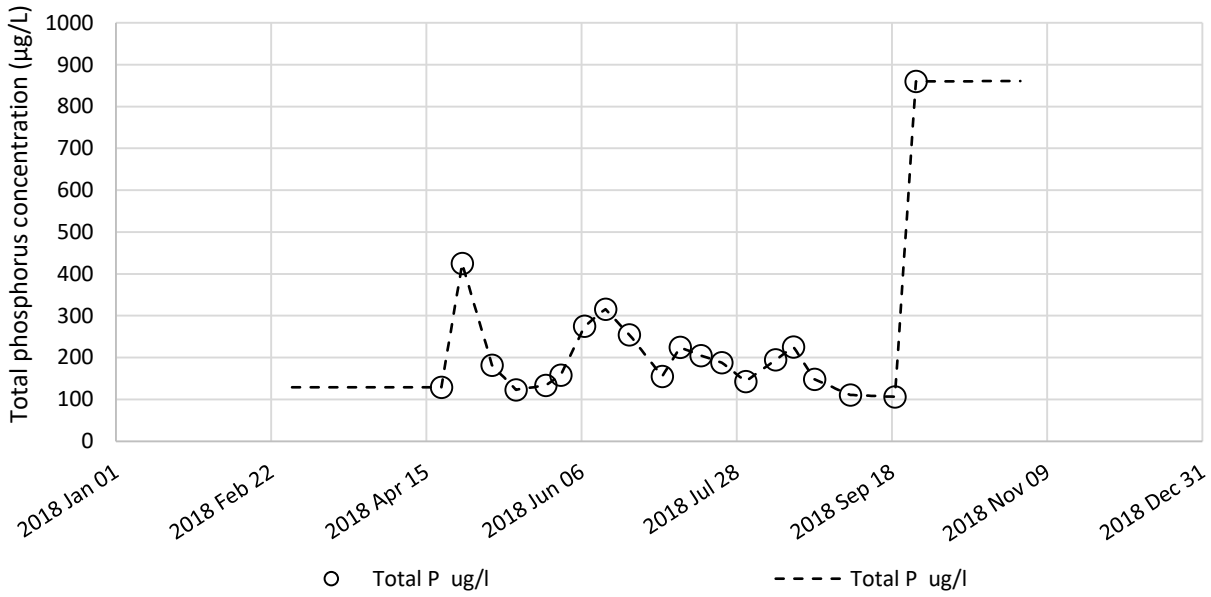


Figure 6. Total phosphorus concentration over the 2018 sampling season upstream of Oak Lake.

Oak Lake

This sample site is located on Oak Lake. In 2018, 17 samples were collected between May 15th and September 26th. Because flow is not measured at this site, we cannot calculate phosphorus loads and exports.

- **2018 greatest phosphorus concentration:** 247 µg/L (May 25th)

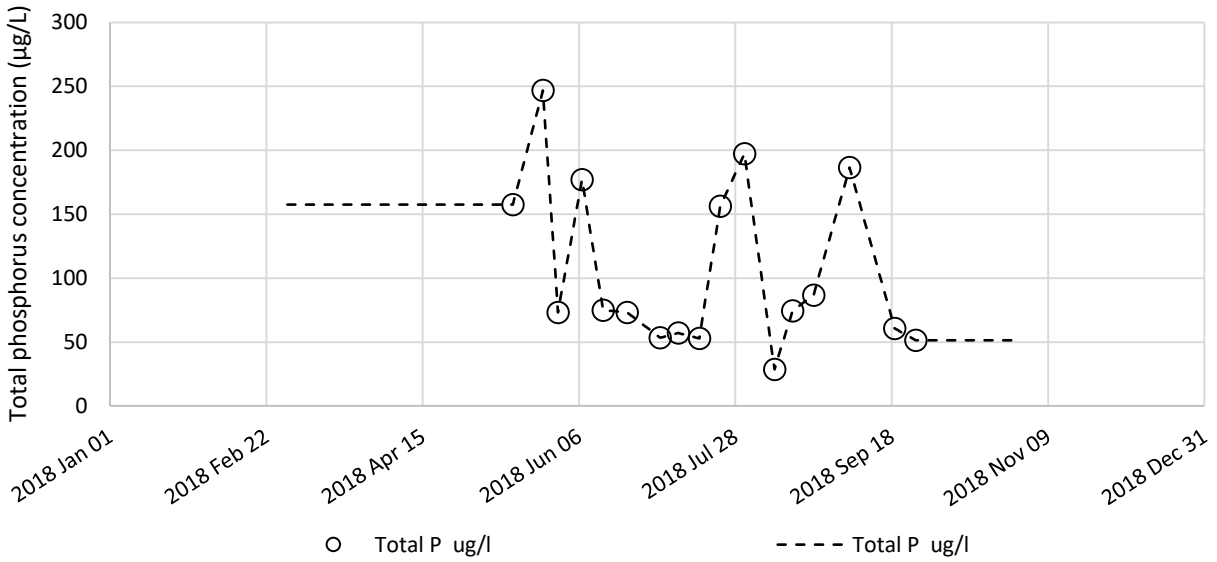


Figure 7. Total phosphorus concentration over the 2018 sampling season at Oak Lake.

Oak Lake Dam

This sample site is located at the outlet of Oak Lake, at the dam. In 2018, 20 samples were collected between April 20th and September 26th. Because flow is not measured at this site, we cannot calculate phosphorus loads and exports.

- **2018 greatest phosphorus concentration:** 681 µg/L (April 20th)

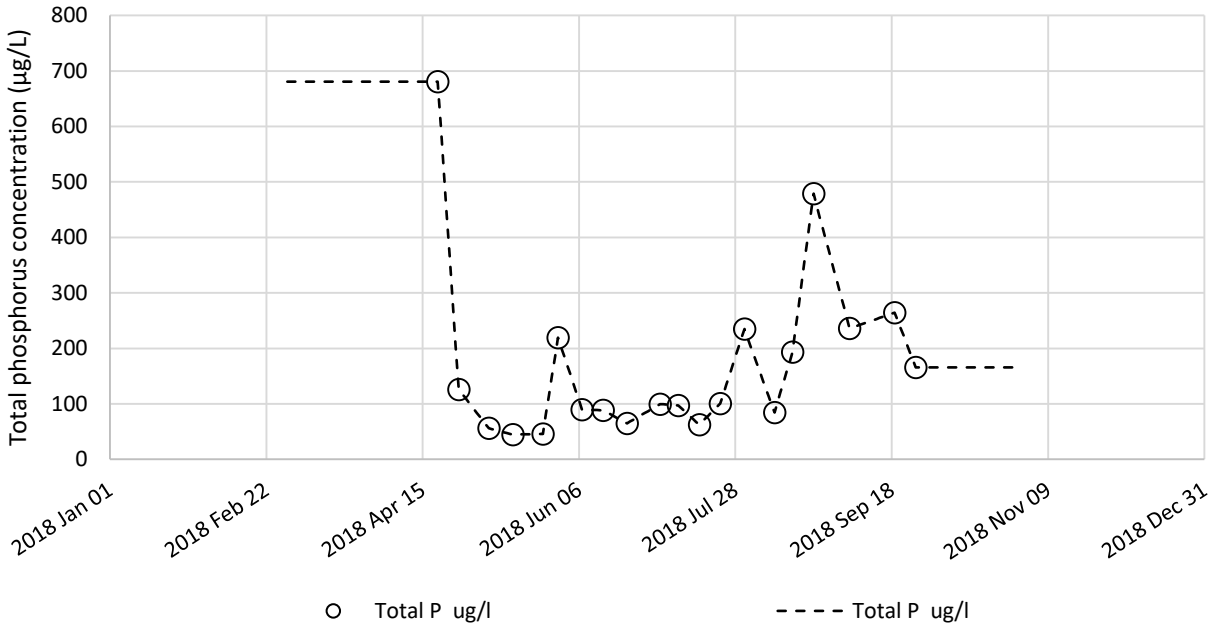


Figure 8. Total phosphorus concentration over the 2018 sampling season at Oak Lake Dam.

INTERESTED IN SAMPLING WITH LWCBMN?

LWCBMN provides hands-on opportunities for citizens to get involved in water sampling activities. We are looking for volunteers to sample at Water Survey of Canada stations in 2019. You can find a map of potential sites **here**.

If you are interested in sampling, please contact the LWCBMN program manager at **cbm@lakewinnipegfoundation.org**. Together, we can choose a sample site near where you live, work or commute and begin collecting valuable information to measure phosphorus loading to local waterways.

THANK YOU TO OUR 2018 FUNDERS

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

CO-OP Red River

CÉCS CONSEIL ÉCONOMIQUE ET COOPÉRATIF DE LA SASKATCHEWAN

Tides Canada

patagonia

cira BUILDING A BETTER ONLINE CANADA

Assiniboine CREDIT UNION

JEUNESSE CANADA AU TRAVAIL JCT YCW YOUNG CANADA WORKS

eco canada