LAKE WINNIPEG COMMUNITY-BASED MONITORING NETWORK

Red River – Western Tributaries

2018 Regional Report

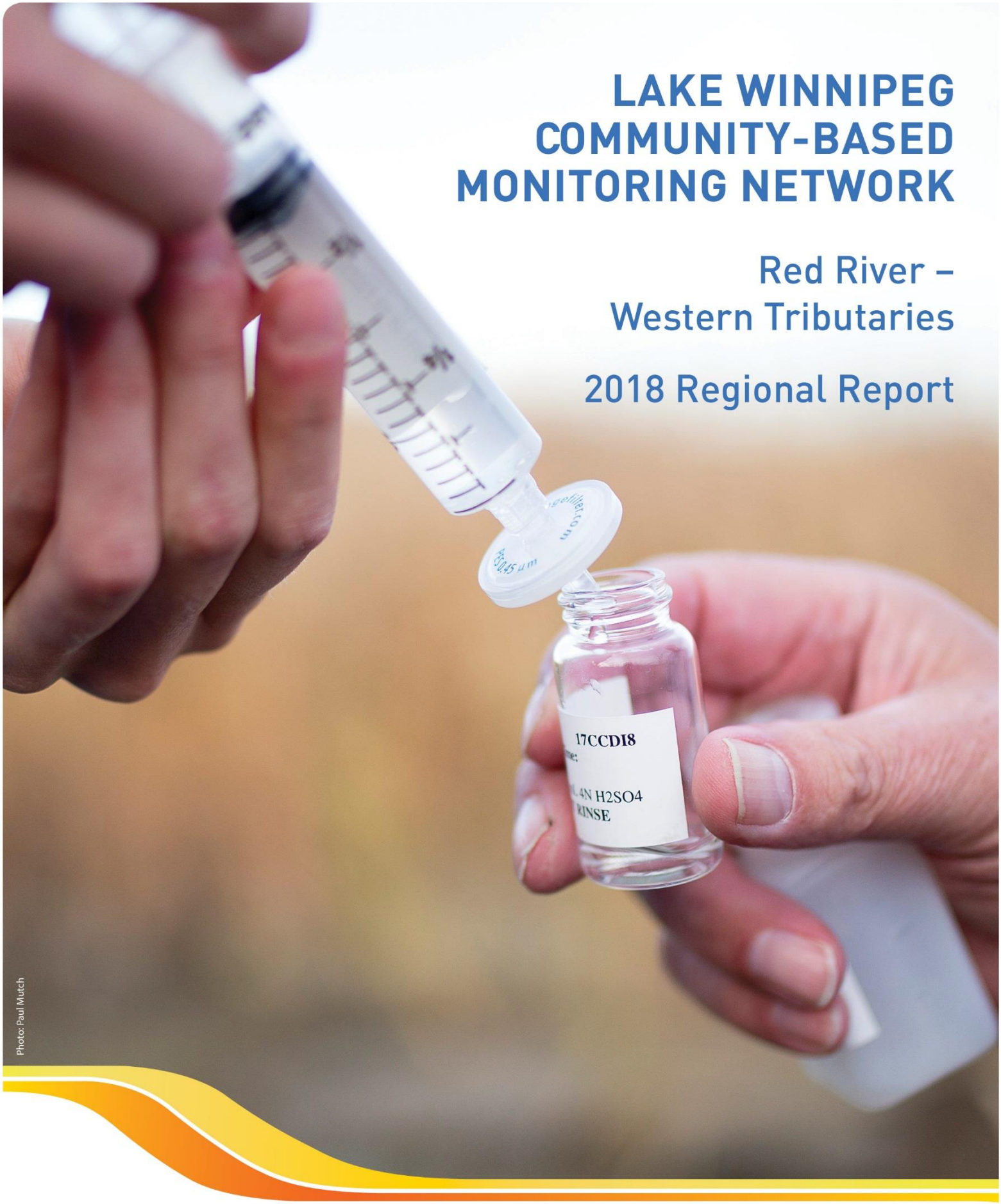

Photo: Paul Mutch

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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.

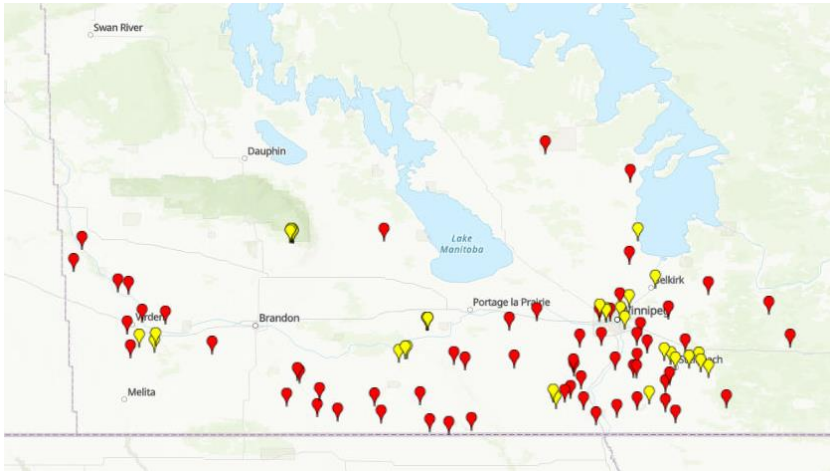

Figure 1. 2018 sample sites. Sites in red are located at Water Survey of Canada flow-metered stations. Sites in yellow are monitored by volunteer samplers where flow is not measured.

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.**

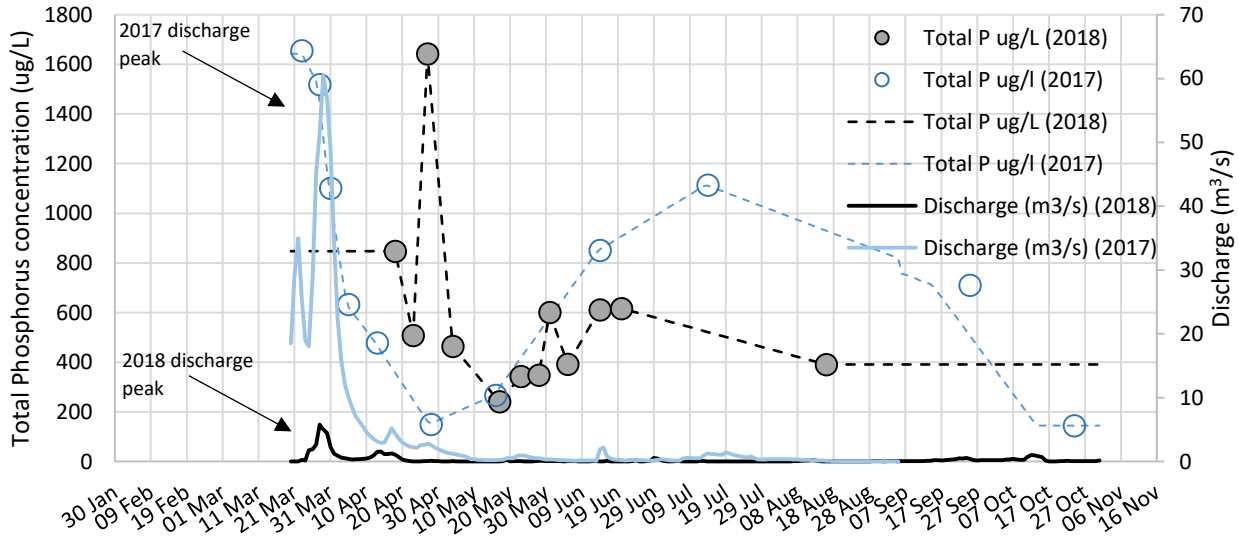

Figure 2. Comparison of phosphorus concentration and discharge in 2017 (blue) and 2018 (black) at the Manning Canal site.

RED RIVER – WESTERN TRIBUTARIES

The western tributaries of the Red River are located between Winnipeg and the United States and east of Winkler. The primary land use in the area is agricultural (Government of Manitoba, Land Use and Development). In addition to agricultural activities, wastewater treatment plants and lagoons in municipalities contribute phosphorus to local waterways. Major municipalities include Morris and Altona.

In partnership with LWCBMN, volunteers sampled five sites to the west of the Red River. All of these sites are located at flow meters.

Regional volunteers collected samples frequently at all sites, specifically during spring runoff period, resulting in high-quality data that captured all discharge peaks. For all western tributaries sample sites, most of the water (97%) and phosphorus (96%) contribution occurred during the spring, from March 1st to May 31st.

Table 2. Overview of findings from 2018 Western Tributaries of the Red River sample sites.

Sampling station	Phosphorus load (tonnes/y)	Phosphorus export (kg/ha/y)
A. Buffalo Creek near Rosenfeld	10	0.11
B. Deadhorse Creek near Rosenfeld	8.4	0.09
C. Kronsgart drain near Sewell	0.9	0.14
D. Riviere Aux Marais near Christie	1.1	0.05
E. Shannon Creek near Morris	0.7	0.01

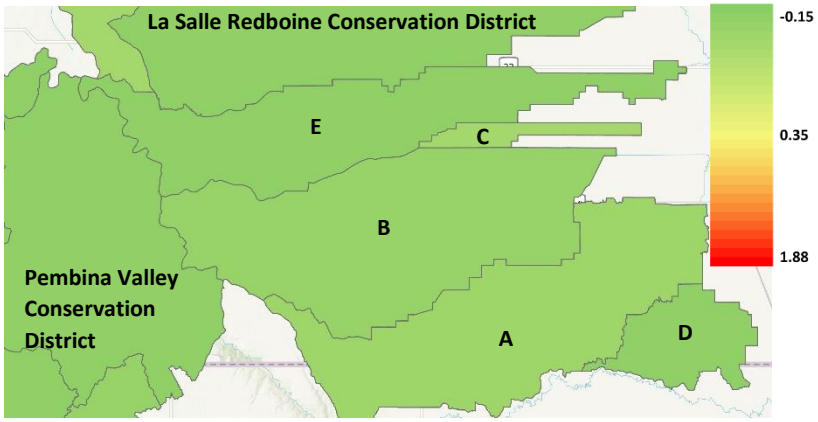

Figure 3. Phosphorus export (kg /ha/y) map for sub-watersheds in the Red River – Western Tributaries.

2018 RESULTS BY SAMPLE SITE

Buffalo Creek near Rosenfeld

This sample site is located downstream of Rosenfeld, and upstream of Saint John Baptiste. The area that drains into this site is 927 km^2 of mostly agricultural land.

This sample site is located at Water Survey of Canada flow meter 05OC019, near Rosenfeld. In 2018, 5 samples were collected between April 18th and October 18th.

	2018
Discharge peaked:	April 7th
Greatest phosphorus concentration:	692 µg/L* (April 18th)
Total phosphorus load:	10 tonnes
Total water load:	0.015 km^3
Phosphorus export:	0.11 kg/ha/y
Percent water load in spring:**	96%
Percent phosphorus load in spring:	96%

*The "µg" symbol is used to express micrograms

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

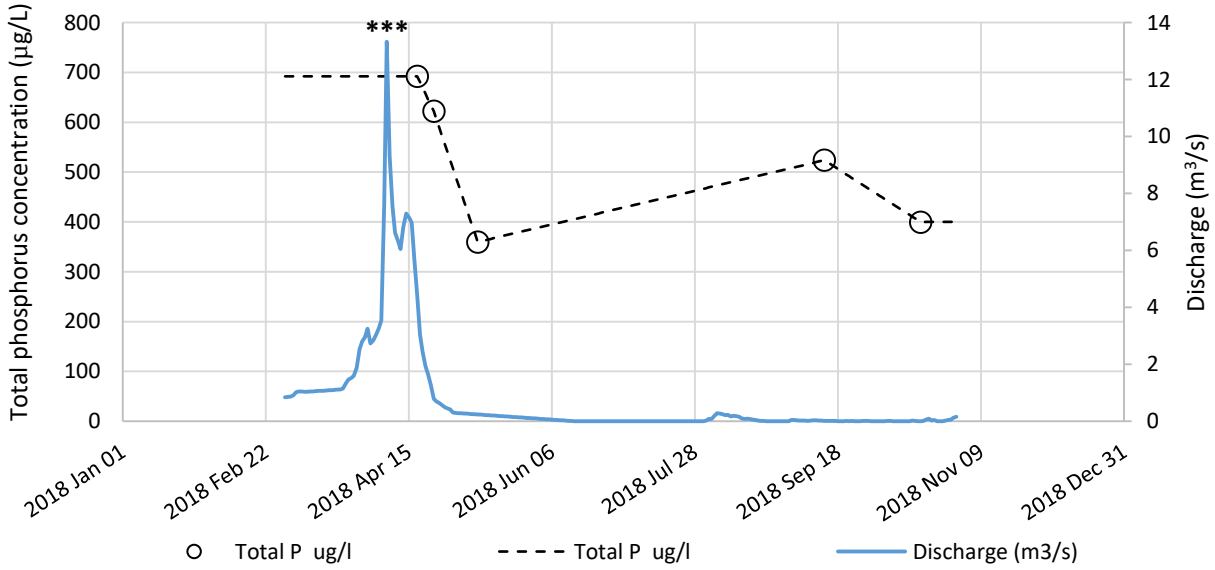

Figure 4. Discharge and total phosphorus concentration over the 2018 sampling season at Buffalo Creek near Rosenfeld (Water Survey of Canada Station 05OC019).

*****In 2018 Buffalo Creek discharge peaked while the creek was covered by ice and therefore we were unable to collect samples during this time. This may have resulted in a portion of the phosphorus load being missed.**

Deadhorse Creek sample sites

Deadhorse Creek near Rosenfeld

This sample site drains a largely agricultural area as well as the City of Morden. Wastewater lagoons in Morden, Winkler and Plum Coulee are within the 926 km^2 drainage area of this site.

This sample site is located at Water Survey of Canada flow meter 05OC016, near Rosenfeld. In 2018, 7 samples were collected between April 18th and October 18th.

	2018
Discharge peaked:	April 17th
Greatest phosphorus concentration:	1147 µg/L (August 24th)
Total phosphorus load:	8.4 tonnes
Total water load:	0.014 km^3
Phosphorus export:	0.09 kg/ha/y
Percent water load in spring:	89%
Percent phosphorus load in spring:	84%

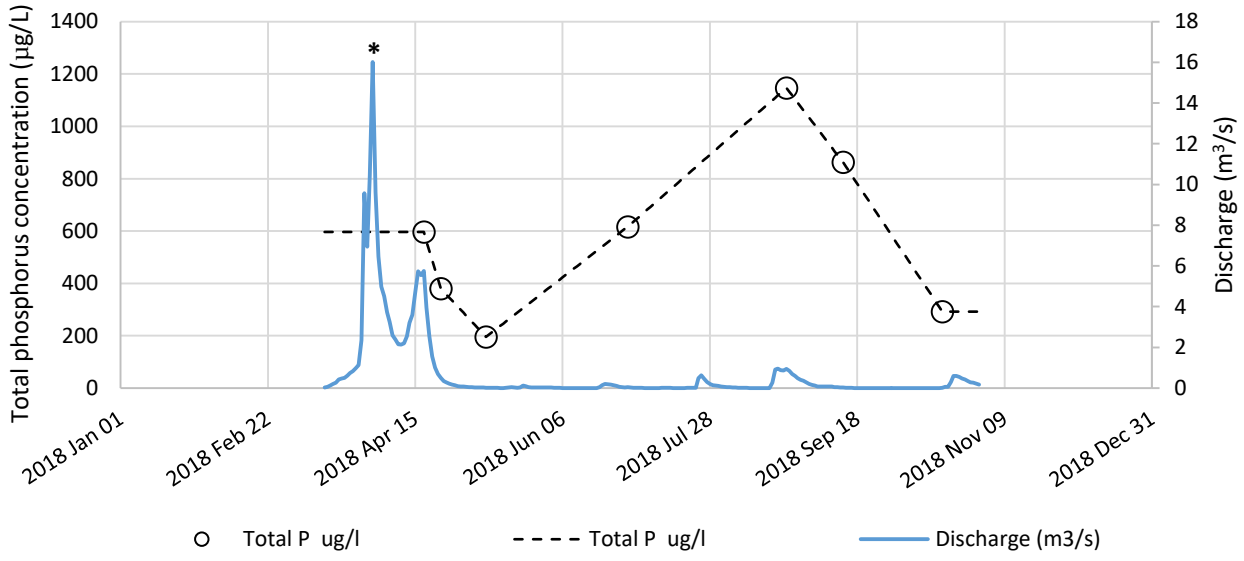

Figure 5. Discharge and total phosphorus concentration over the 2018 sampling season at Deadhorse Creek near Rosenfeld (Water Survey of Canada Station 05OC016).

***In 2018 Deadhorse Creek discharge peaked while the creek was covered by ice and therefore we were unable to collect samples during this time. This may have resulted in a portion of the phosphorus load being missed.**

Kronsgart drain near Sewell

This sample site is a drain located upstream of Sewell. The majority of this 62.1 km^2 drainage area is located near a rural residential property in a mainly agricultural area.

This sample site is located at Water Survey of Canada flow meter 05OC024, near Sewell. In 2018, 3 samples were collected between April 18th and April 24th.

	2018
Discharge peaked:	April 19th
Greatest phosphorus concentration:	438 µg/L (April 20th)
Total phosphorus load:	0.9 tonnes
Total water load:	0.002 km^3
Phosphorus export:	0.14 kg/ha/y
Percent water load in spring:	100%
Percent phosphorus load in spring:	100%

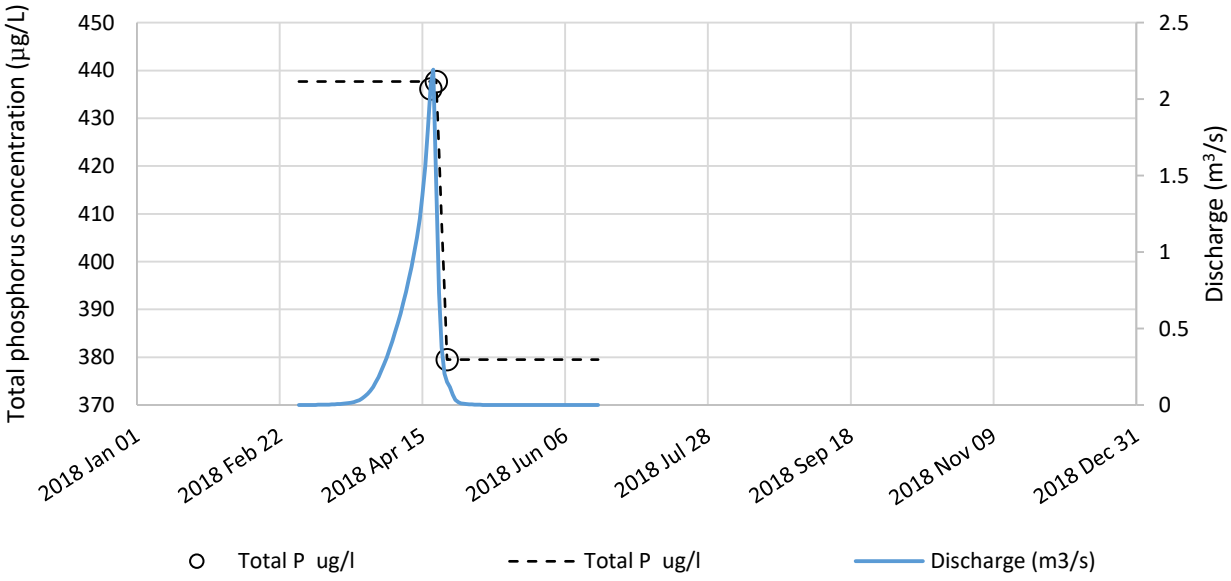

Figure 6. Discharge and total phosphorus concentration over the 2018 sampling season at Kronsgart drain near Sewell (Water Survey of Canada Station 05OC024).

Riviere Aux Marais near Christie

This Riviere Aux Marais site drains approximately 195 km^2, the majority of which is agricultural land.

This sample site is located at Water Survey of Canada flow meter 05OC022, near Christie. In 2018, 6 samples were collected between April 18th and June 29th.

	2018
Discharged peaked:	April 17th
Greatest phosphorus concentration:	1100 µg/L (April 18th)
Total phosphorus load:	1.1 tonnes
Total water load:	0.001 km^3
Phosphorus export:	0.05 kg/ha/y
Percent water load in spring:	100%
Percent phosphorus load in spring:	100%

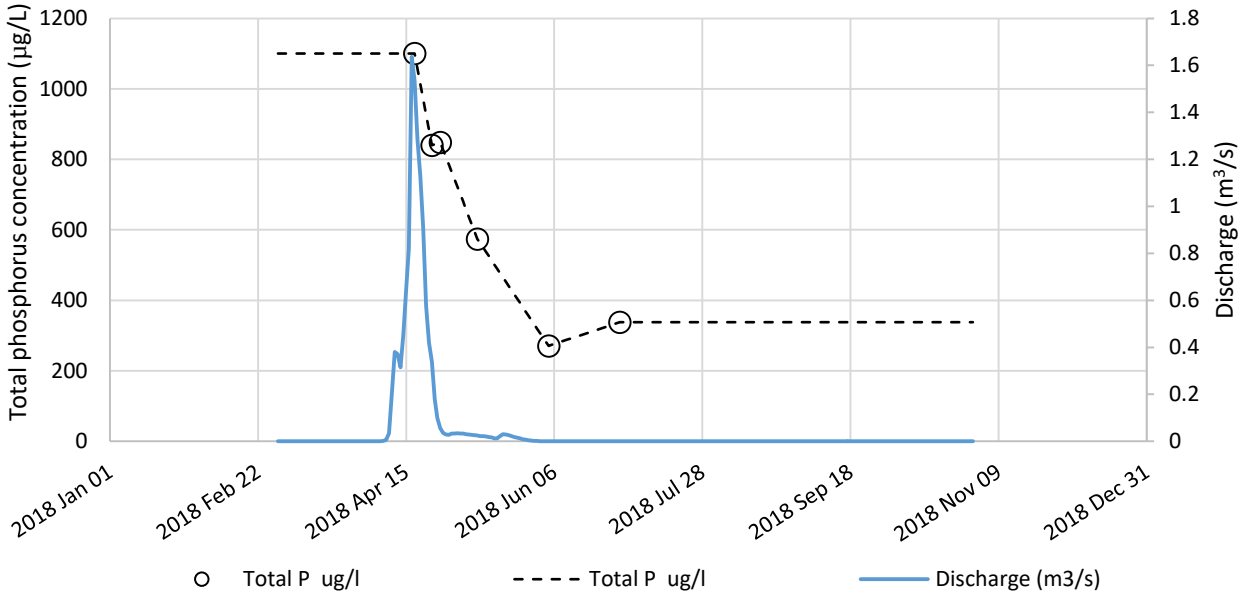

Figure 7. Water level and total phosphorus concentration over the 2018 sampling season at Riviere Aux Marais near Christie (Water Survey of Canada Station 05OC022).

Shannon Creek near Morris

This site is located along Shannon Creek, upstream of Morris. The drainage area is approximately 617 km^2, and includes primarily agricultural land.

This sample site is located at Water Survey of Canada flow meter 05OF014, near Morris. In 2018, 6 samples were collected between April 19th and July 24th.

	2018
Discharge peaked:	April 20th
Greatest phosphorus concentration:	397 µg/L (April 19th)
Total phosphorus load:	0.7 tonnes
Total water load:	0.003 km^3
Phosphorus export:	0.01 kg/ha/y
Percent water load in spring:	100%
Percent phosphorus load in spring:	100%

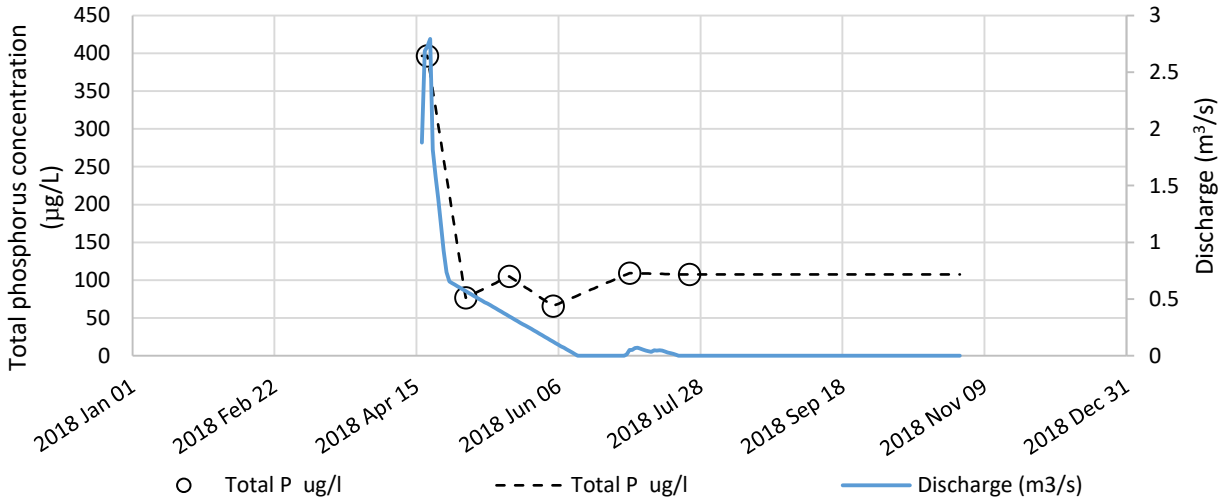

Figure 8. Water level and total phosphorus concentration over the 2018 sampling season at Shannon Creek near Morris (Water Survey of Canada Station 05OF014).

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

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Canada

THE THOMAS SILL FOUNDATION INC

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