LAKE WINNIPEG COMMUNITY-BASED MONITORING NETWORK

La Salle Redboine Conservation District

2018 Regional Report

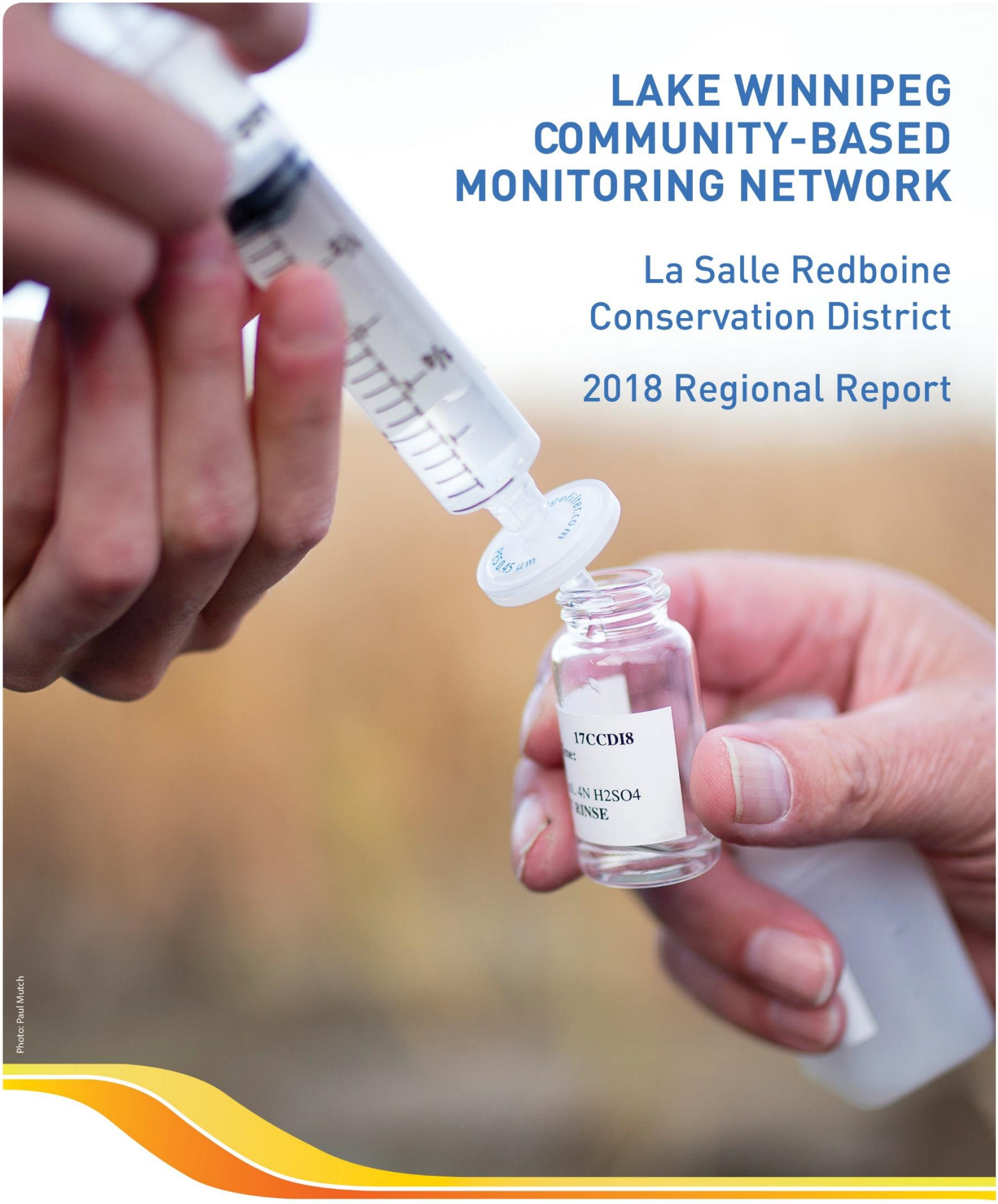


Photo: Paul Mutch

LWF LAKE WINNIPEG FOUNDATION

La Salle Redboine CONSERVATION DISTRICT

Agriculture and Agri-Food Canada

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 on the western side of the Red River valley, Winnipeg River tributaries and in the City of Winnipeg. A total of 1000 samples were collected from 101 sites.

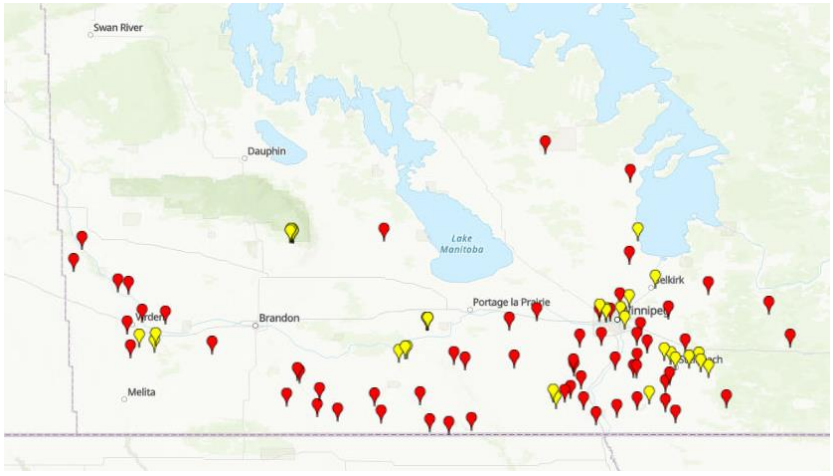


Figure 1. 2018 sample sites. Sites in red are located at Water Survey of Canada flow-metered stations. Sites in yellow are monitored by volunteer samplers where flow is not measured.

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.**

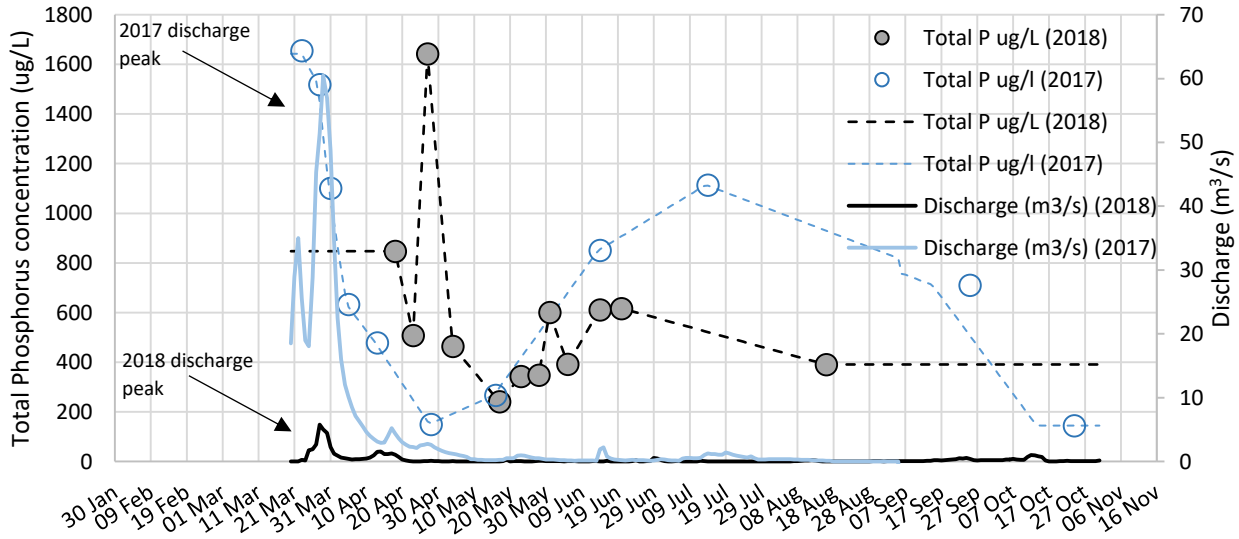


Figure 2. Comparison of phosphorus concentration and discharge in 2017 (blue) and 2018 (black) at the Manning Canal site.

LA SALLE REDBOINE CONSERVATION DISTRICT

The La Salle Redboine Conservation District (LSRBCD) is located west of the City of Winnipeg. LSRBCD consists of two major watersheds: the La Salle and Boyne-Morris River watersheds. The primary land use in LSRBCD is agriculture, specifically annual crops and livestock. LSRBCD comprises many large and small municipalities that pose a potential risk for phosphorus contribution through discharge of wastewater lagoons, sewage treatment plants and urban runoff. Major towns include Elie, Carman and Holland.

In partnership with LWCBMN, LSRBCD staff, volunteers and partners from the Agriculture and Agri-Food Canada (AAFC) Morden Research and Development Center sampled 12 sites in LSRBCD, including three sites along Pelly's Lake, a watershed management project near Holland. For the Pelly's Lake sites, samples were collected upstream, at the site, and downstream of the project. However, flow data was not available for Pelly's Lake sites, so we cannot calculate the phosphorus load because we cannot multiply the concentration by the volume of water flowing by the site.

Partners and volunteers were able to collect samples frequently at all 12 sites, specifically during the spring runoff period, resulting in high-quality data. For all LSRBCD sample sites, most of the water (86%) and phosphorus (88%) contribution occurred during the spring, from March 1st to May 31st.

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

Sampling station	Phosphorus load (tonnes/y)	Phosphorus export (kg/ha/y)
A. La Salle River at Sanford	4	0.04
B. La Salle River at Elie	1	0.07
C. Elm Creek Channel near Elm Creek	2	0.04
D. Boyne River near Carman	-2	-0.06
E. Boyne River near Roseisle	3	0.05
F. Roseisle Creek near Roseisle	3	0.12
G. Morris River near Rosenort	-1	0.00
H. Little Morris River near Rosenort	2.7	0.03

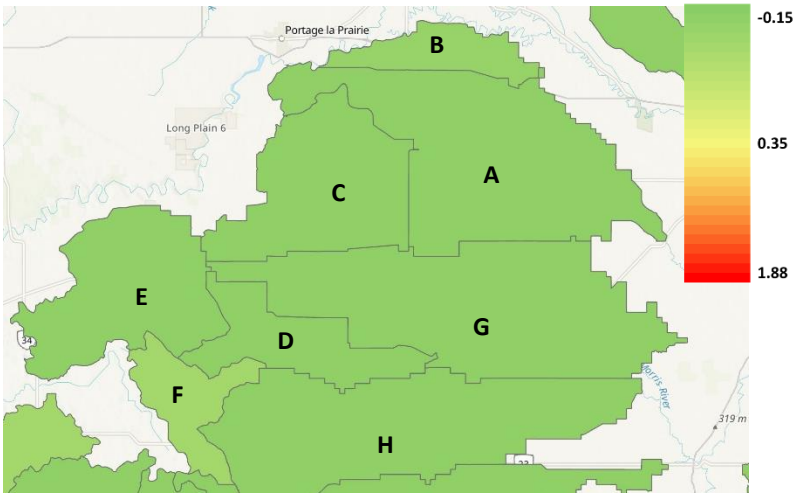


Figure 3. Phosphorus export (kg /ha/y) map for sub-watersheds in the La Salle Redboine Conservation District.

2018 RESULTS BY SAMPLE SITE

La Salle River sample sites

La Salle River at Sanford

This downstream reach of the La Salle River is located west of the Red River and flows easterly. The drainage area for this reach of the river is approximately 1022 km^2 and drains a largely agricultural area including both cropland and livestock (La Salle River Watershed Management Plan, 2007).

Samples were taken at Water Survey of Canada flow meter 05OG001 located at Sanford. In 2018, 11 samples were collected between April 26th and October 26th.

	2016	2017	2018
Discharge peaked:	April 18th	April 6th	April 23rd
Greatest phosphorus concentration:	611 µg/L* (March 14th)	797 µg/L (April 12th)	949 µg/L (July 24th)
Total phosphorus load:	45 tonnes	78 tonnes	3.6 tonnes
Total water load:	0.074 km^3	0.082 km^3	0.007 km^3
Phosphorus export:	0.44 kg/ha/y	0.76 kg/ha/y	0.04 kg/ha/y
Percent water load in spring:**	82%	98%	78%
Percent phosphorus load in spring:	83%	99%	72%

*The "µg" symbol is used to express micrograms

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

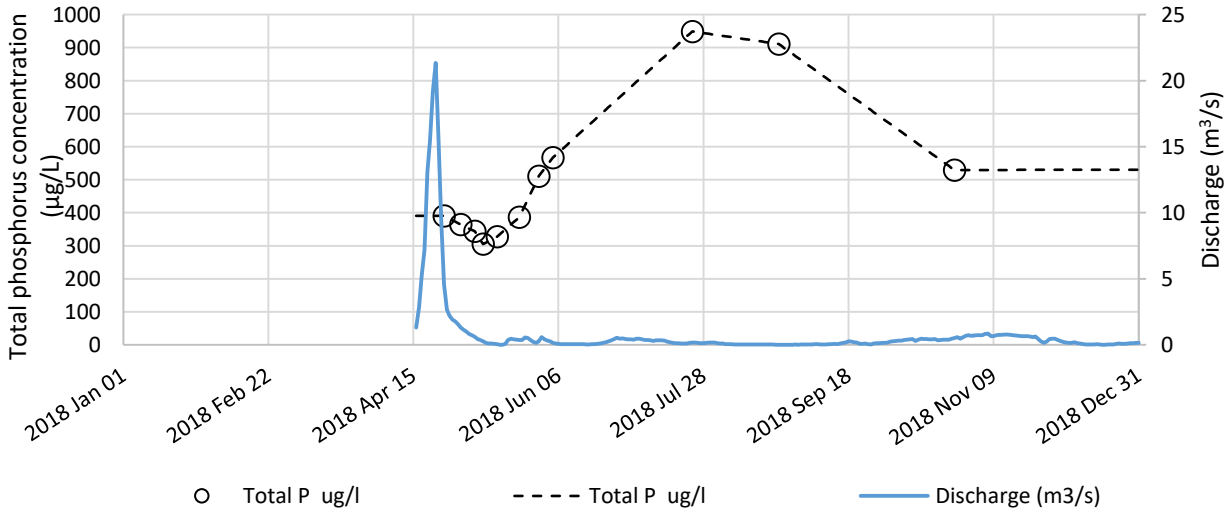


Figure 4. Discharge and total phosphorus concentration over the 2018 sampling season at La Salle River at Sanford (Water Survey of Canada Station 05OG001).

La Salle River at Elie

The upstream reach of the La Salle River is located east of Portage La Prairie and runs easterly. The drainage area for this sample site is approximately 189 km^2 and drains a largely agricultural area, including both cropland and livestock (La Salle River Watershed Management Plan, 2007).

Samples were taken at Water Survey of Canada flow meter 05OG008 located near Elie. In 2018, 8 samples were collected between April 16th and August 21st.

	2016	2017	2018
Discharge peaked:	April 18th	April 5th	April 23rd
Greatest phosphorus concentration:	865 µg/L (March 14th)	795 µg/L (March 28th)	962 µg/L (April 16th)
Total phosphorus load:	8 tonnes	11 tonnes	1.4 tonnes
Total water load:	0.014 km^3	0.020 km^3	0.003 km^3
Phosphorus export:	0.44 kg/ha/y	0.60 kg/ha/y	0.07 kg/ha/y
Percent water load in spring:	69%	86%	42%
Percent phosphorus load in spring:	69%	93%	70%

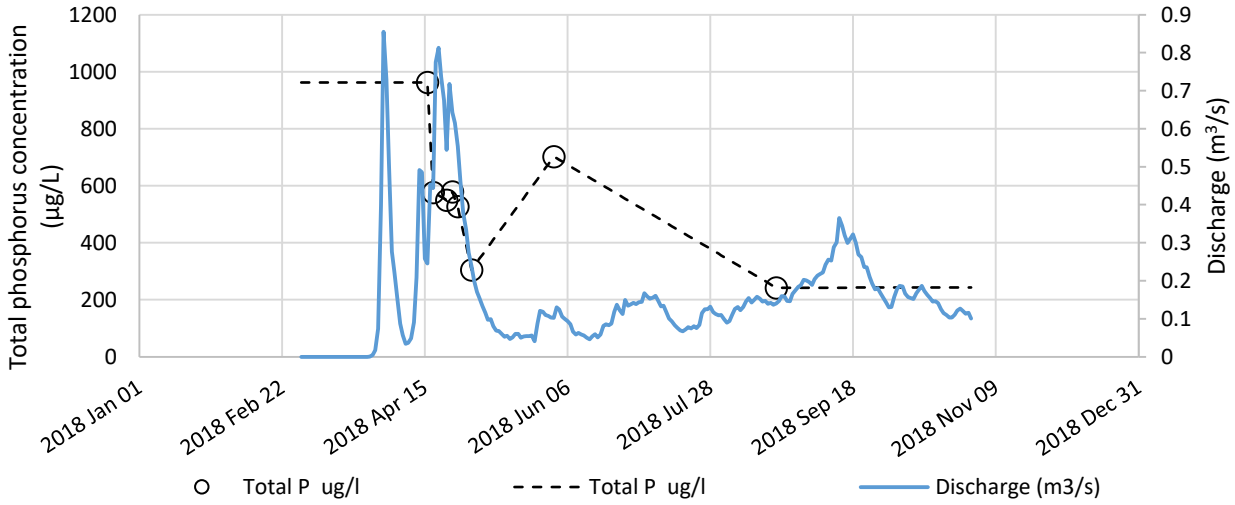


Figure 5. Discharge and total phosphorus concentration over the 2018 sampling season at La Salle River at Elie (Water Survey of Canada Station 05OG008).

La Salle River at La Salle

This sample site is located on the La Salle River in the town of La Salle. The area that drains into this stretch of the La Salle River is 513 km^2 and drains a largely agriculture area and the community of La Salle.

This sample site is located at Water Survey of Canada water level meter 05OG002, in La Salle. Because flow is not measured we cannot calculate phosphorus loads and exports. In 2018, 9 samples were collected between May 16th and Sept 15th.

- **2018 greatest phosphorus concentration**: 1132 µg/L (August 11th)

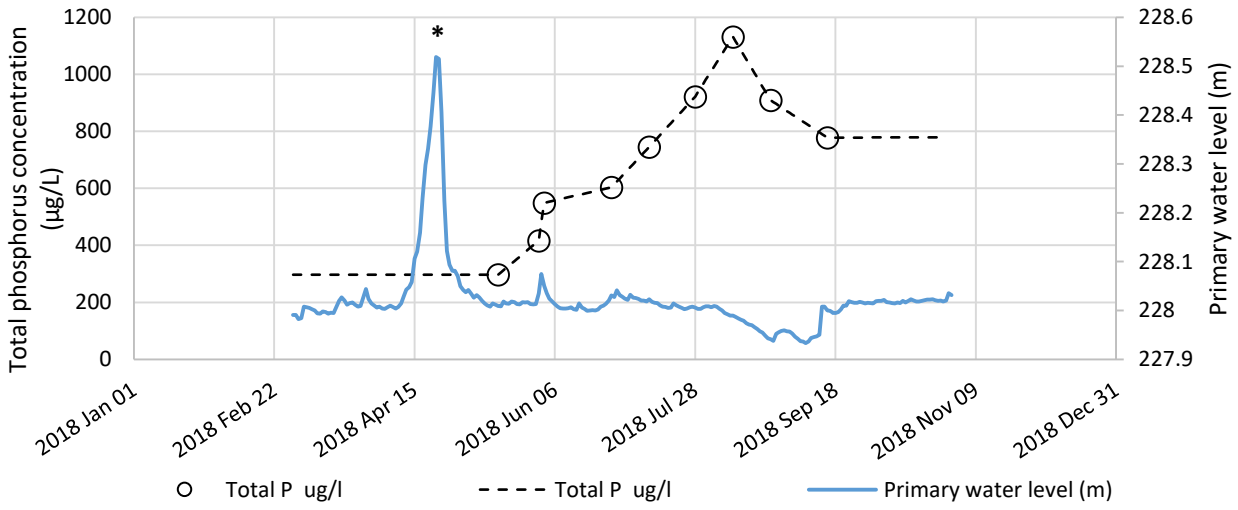


Figure 6. Primary water level and total phosphorus concentration over the 2018 sampling season at La Salle River at La Salle (Water Survey of Canada Station 05OG002).

***In 2018 La Salle River at La Salle water level peaked prior to when the volunteer began sampling. This may have resulted in missed peak phosphorus concentrations.**

Elm Creek Channel near Elm Creek

Elm Creek Channel is situated south-east of Portage La Prairie and flows easterly towards the La Salle River. The drainage area for this sample site is approximately 589 km^2 and drains a largely agricultural area and the community of St. Claude. Cropland is limited in this drainage area relative to others in the La Salle watershed. However, there are slightly more livestock (La Salle River Watershed Management Plan, 2007).

Samples were taken at Water Survey of Canada flow meter 05OG005 located near Elm Creek. In 2018, 6 samples were collected between April 16th and May 2nd.

	2016	2017	2018
Discharge peaked:	April 17th	March 31st	April 15th
Greatest phosphorus concentration:	602 µg/L (March 17th)	452 µg/L (April 3rd)	521 µg/L (April 18th)
Total phosphorus load:	4 tonnes	11 tonnes	2.4 tonnes
Total water load:	0.014 km^3	0.043 km^3	0.006 km^3
Phosphorus export:	0.07 kg/ha/y	0.19 kg/ha/y	0.04 kg/ha/y
Percent water load in spring:	74%	99%	100%
Percent phosphorus load in spring:	78%	100%	100%

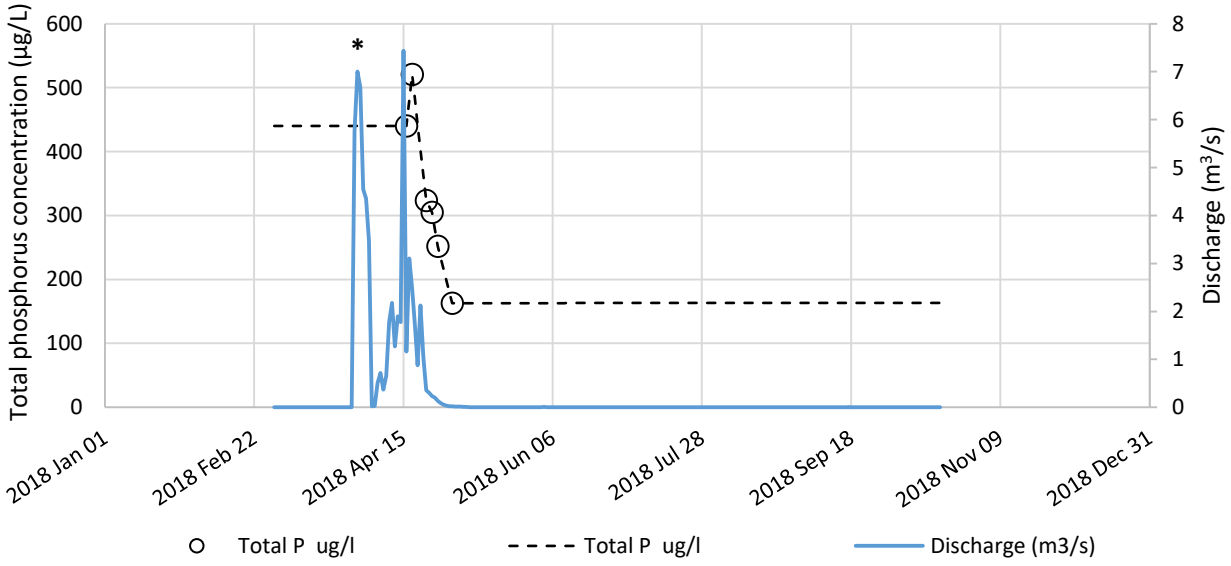


Figure 7. Discharge and total phosphorus concentration over the 2018 sampling season at Elm Creek Channel near Elm Creek (Water Survey of Canada Station 05OG005).

***In 2018 Elm Creek Channel discharge peaked while the channel 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.**

Boyne-Morris watershed sample sites

Boyne River near Carman

This downstream reach of the Boyne River begins directly upstream of Stephenfield Lake and flows to Carman. The drainage area for this sample site is approximately 318 km^2 and drains a largely agricultural area.

Samples were taken at Water Survey of Canada flow meter 05OF003 located near Carman. In 2018, 12 samples were collected between April 17th and October 16th.

	2017	2018
Discharge peaked:	April 3rd	April 21st
Greatest phosphorus concentration:	1148 µg/L (July 17th)	2226 µg/L (October 16th)
Total phosphorus load:	8 tonnes	-1.2 tonnes*
Total water load:	0.014 km^3	-0.004 km^3
Phosphorus export:	0.25 kg/ha/y	-0.04 kg/ha/y
Percent water load in spring:	91%	83%
Percent phosphorus load in spring:	93%	73%

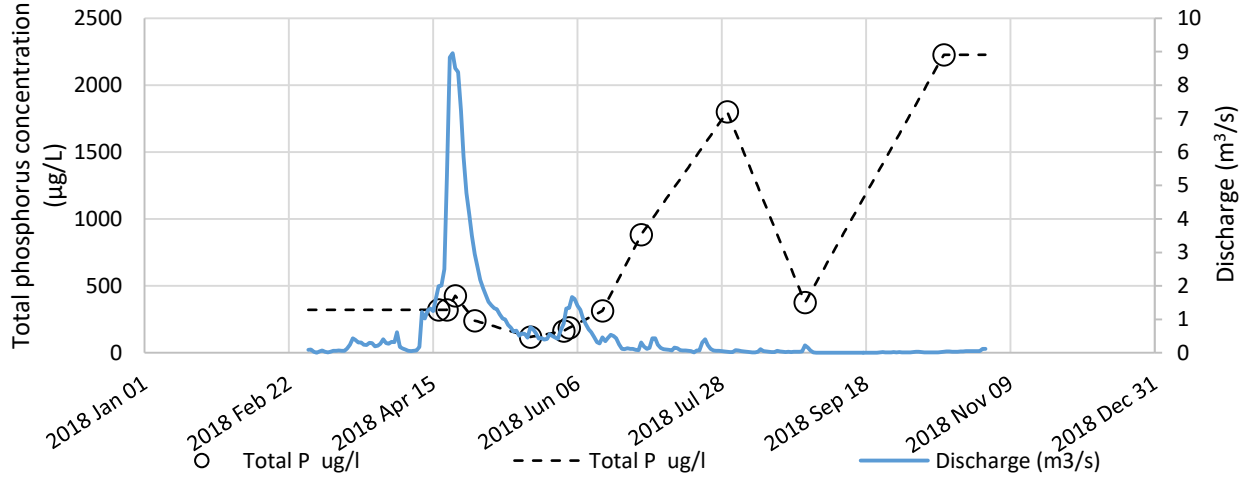


Figure 8. Discharge and total phosphorus concentration over the 2018 sampling season at Boyne River near Carman (Water Survey of Canada Station 05OF003).

***When there are multiple sites along a waterway, phosphorus and water 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.**

Boyne River near Roseisle

This upstream reach of the Boyne River begins near Holland and flows into Stephenfield Lake. The drainage area for this sample site is approximately 589 km^2 and drains the towns of Holland, Treherne and Rathwell as well as a mixture of cropland and forested areas.

Samples were taken at Water Survey of Canada flow meter 05OF011 located near Roseisle. In 2018, 12 samples were collected between April 17th and October 16th.

	2017	2018
Discharge peaked:	April 4th	April 22nd
Greatest phosphorus concentration:	591 µg/L (March 31st)	432 µg/L (April 20th)
Total phosphorus load:	19 tonnes	2.8 tonnes
Total water load:	0.052 km^3	0.010 km^3
Phosphorus export:	0.32 kg/ha/y	0.05 kg/ha/y
Percent water load in spring:	90%	99%
Percent phosphorus load in spring:	93%	99%

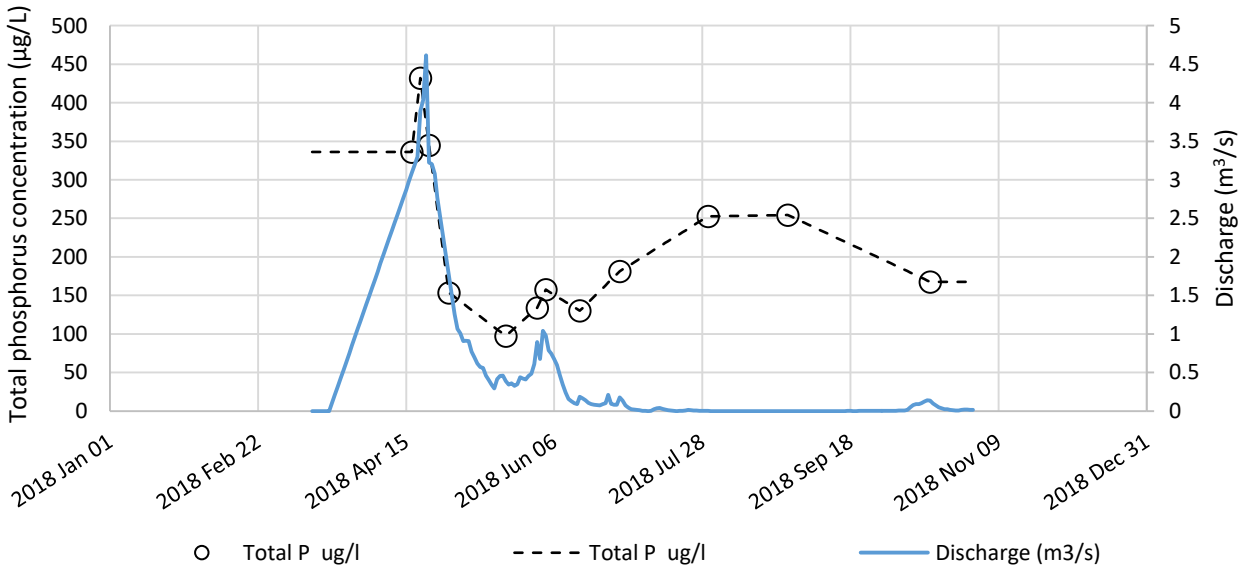


Figure 9. Discharge and total phosphorus concentration over the 2018 sampling season at Boyne River near Roseisle (Water Survey of Canada Station 05OF011).

Roseisle Creek near Roseisle

Roseisle Creek flows easterly towards the Boyne River, where the two waterways join slightly upstream of Stephenfield Lake. The drainage area for this sample site is approximately 223 km^2 and drains a mixture of agricultural cropland and forest areas, as well as the town of Roseisle (Stephenfield Lake Watershed Management Plan, 2005).

Samples were taken at Water Survey of Canada flow meter 05OF009 located near Roseisle. In 2018, 11 samples were collected between April 17th and August 27th.

	2017	2018
Discharge peaked:	March 31st	April 29th
Greatest phosphorus concentration:	1206 µg/L (April 3rd)	1029 µg/L (April 20th)
Total phosphorus load:	14 tonnes	2.7 tonnes
Total water load:	0.018 km^3	0.006 km^3
Phosphorus export:	0.63 kg/ha/y	0.12 kg/ha/y
Percent water load in spring:	91%	96%
Percent phosphorus load in spring:	96%	99%

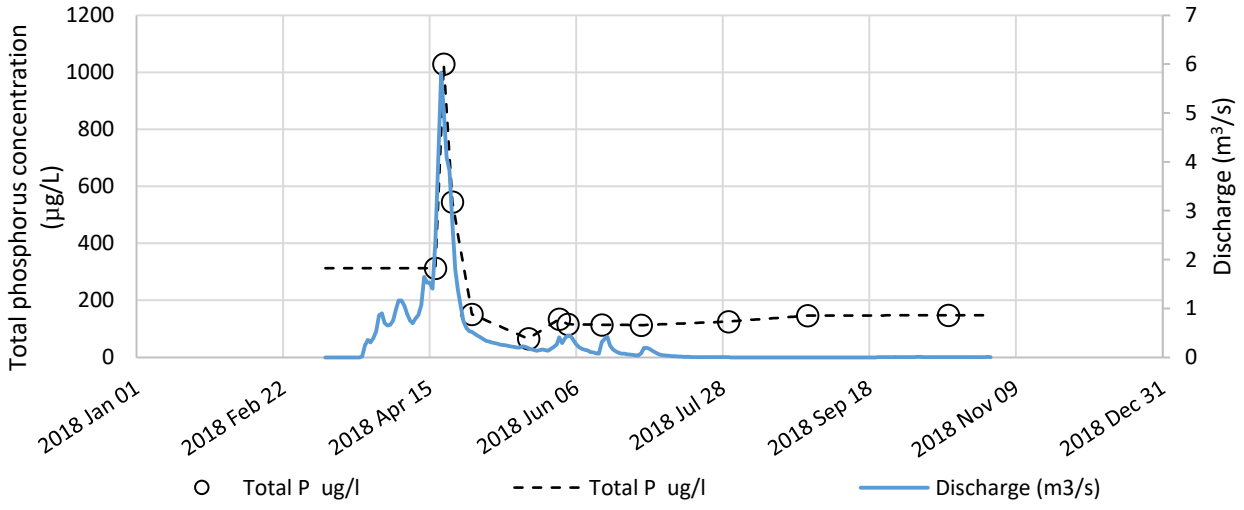
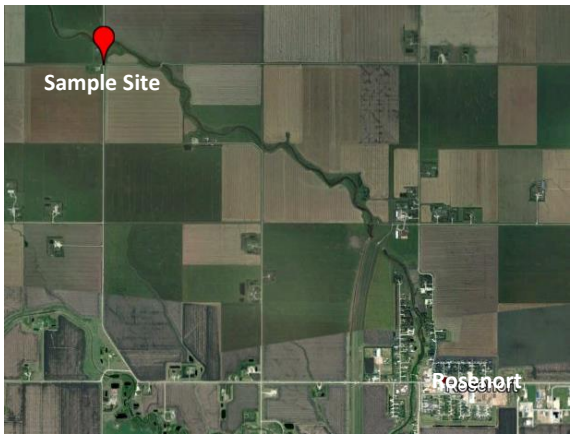


Figure 10. Discharge and total phosphorus concentration over the 2018 sampling season at Roseisle Creek near Roseisle (Water Survey of Canada Station 05OF009).

Morris River near Rosenort

This sample site is on the Morris River, upstream of Rosenort. This stretch of the Morris River drains approximately 1,097 km^2, which includes mostly agricultural areas.

This sample site is located at Water Survey of Canada flow meter 05OF020, near Rosenort. In 2018, 9 samples were collected between April 10th and September 14th.



	2018
Discharge peaked:	April 22nd
Greatest phosphorus concentration:	472 µg/L (April 20th)
Total phosphorus load:	-0.1 tonnes *
Total water load:	-0.001 km^3*
Phosphorus export:	0 kg/ha/y
Percent water load in spring:	86%
Percent phosphorus load in spring:	94%

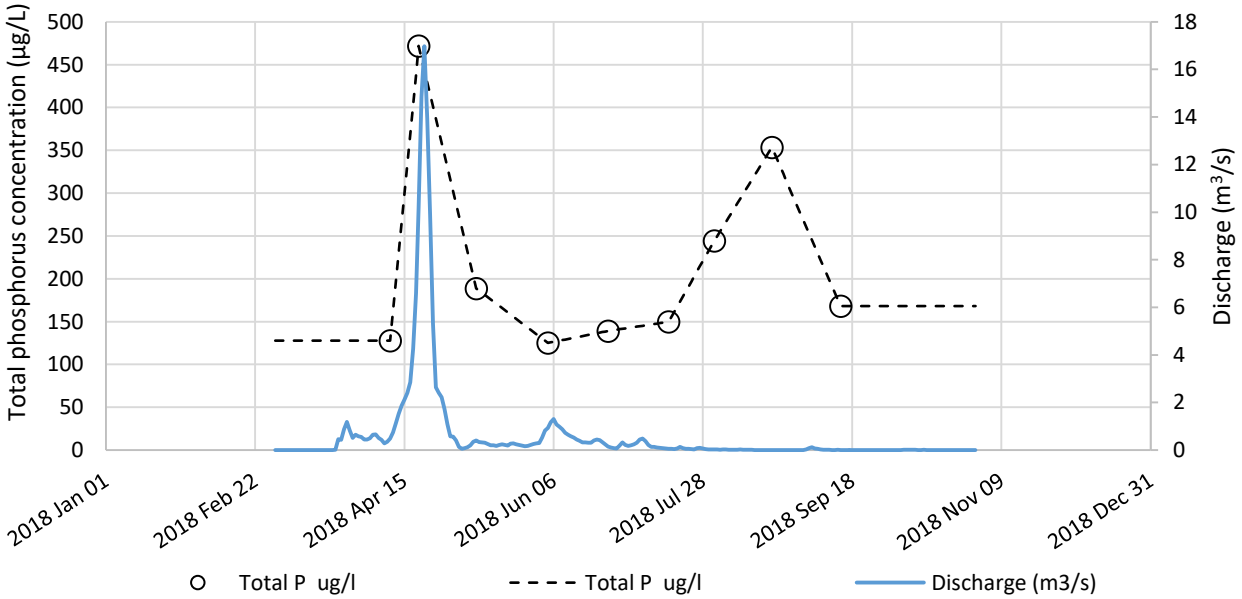


Figure 11. Discharge and total phosphorus concentration over the 2018 sampling season at Morris River near Rosenort (Water Survey of Canada Station 05OF020).

***When there are multiple sites along a waterway, phosphorus and water 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.**

Little Morris River sample site

Little Morris River near Rosenort

This sample site is on the Little Morris River, located upsteam of Rosenort and Morris. The drainage area is approximately 982 km^2, and includes mainly agricultural land.

This sample site is located at Water Survey of Canada flow meter 05OF024, near Rosenort. In 2018, 10 samples were collected between April 10th and September 14th.

	2018
Discharge peaked:	April 19th
Greatest phosphorus concentration:	624 µg/L (August 21st)
Total phosphorus load:	2.7 tonnes
Total water load:	0.007 km^3
Phosphorus export:	0.03 kg/ha/y
Percent water load in spring:	100%
Percent phosphorus load in spring:	100%

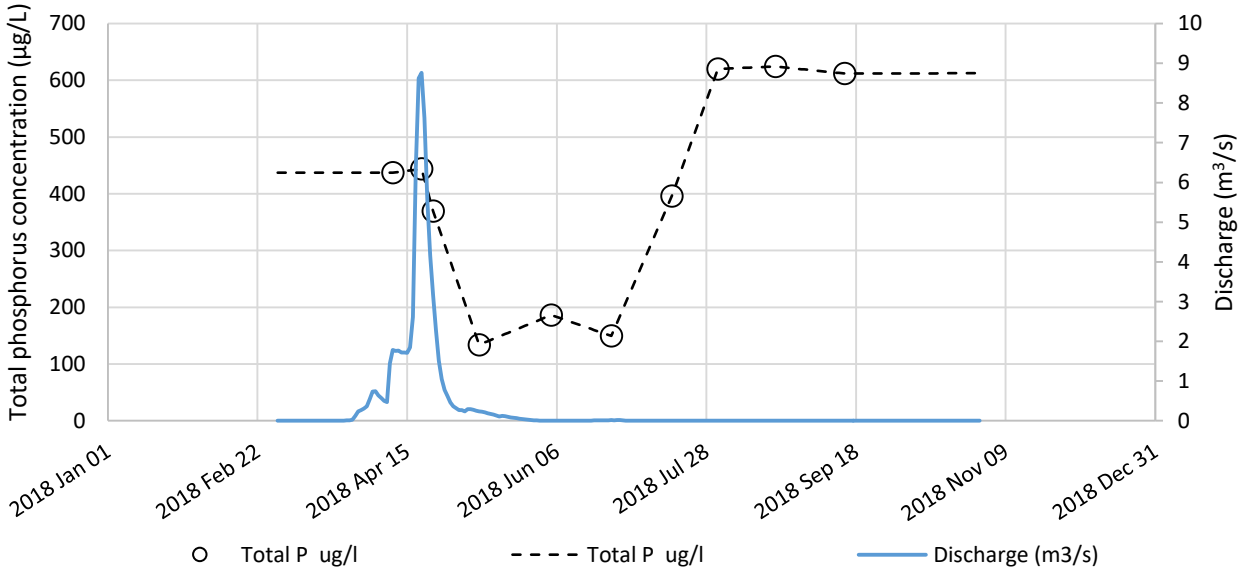


Figure 12. Water level and total phosphorus concentration over the 2018 sampling season at Little Morris River near Rosenort (Water Survey of Canada Station 05OF024).

Pelly's Lake sample sites

Pelly's Lake watershed management project

Pelly's Lake is a watershed management area that is designed to slow the flow of floodwaters. Water is held back by a dam that helps delay the release of spring runoff.

Samples were taken upstream at the inlet, at the dam and at a downstream culvert. In 2018, a total of 17 samples were collected from all three sites.

Based on the data currently available, it is not possible to determine if the Pelly's Lake project is effectively sequestering phosphorus, due to the lack of discharge data for these three sites. Because flow is not measured, we cannot calculate phosphorus loads and exports.

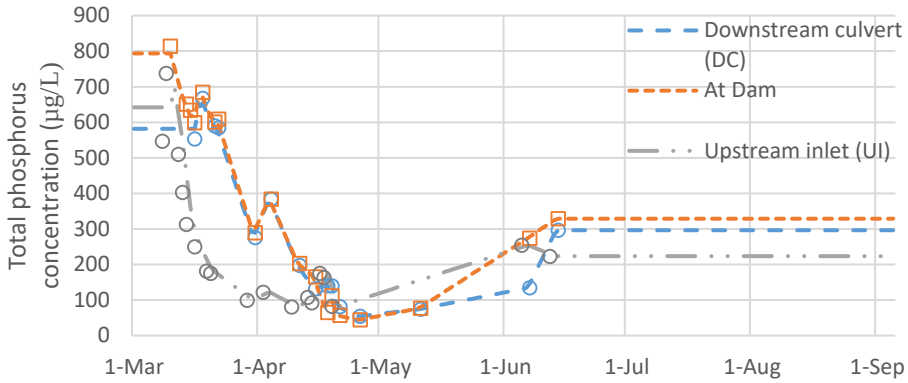


Figure 13. Total phosphorus concentration over the 2016 sampling season at three locations along Pelly's Lake watershed management area.

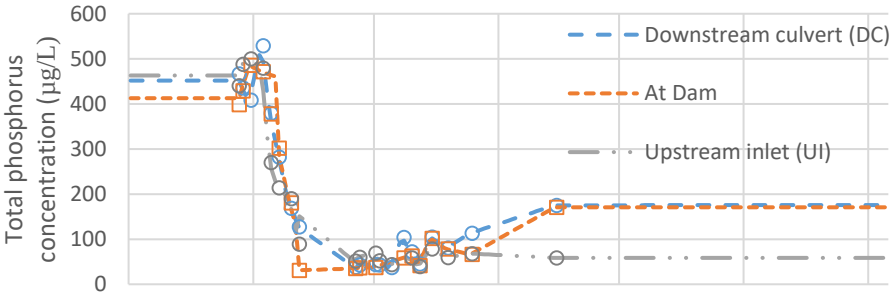


Figure 14. Total phosphorus concentration over the 2017 sampling season at three locations along Pelly's Lake watershed management area.

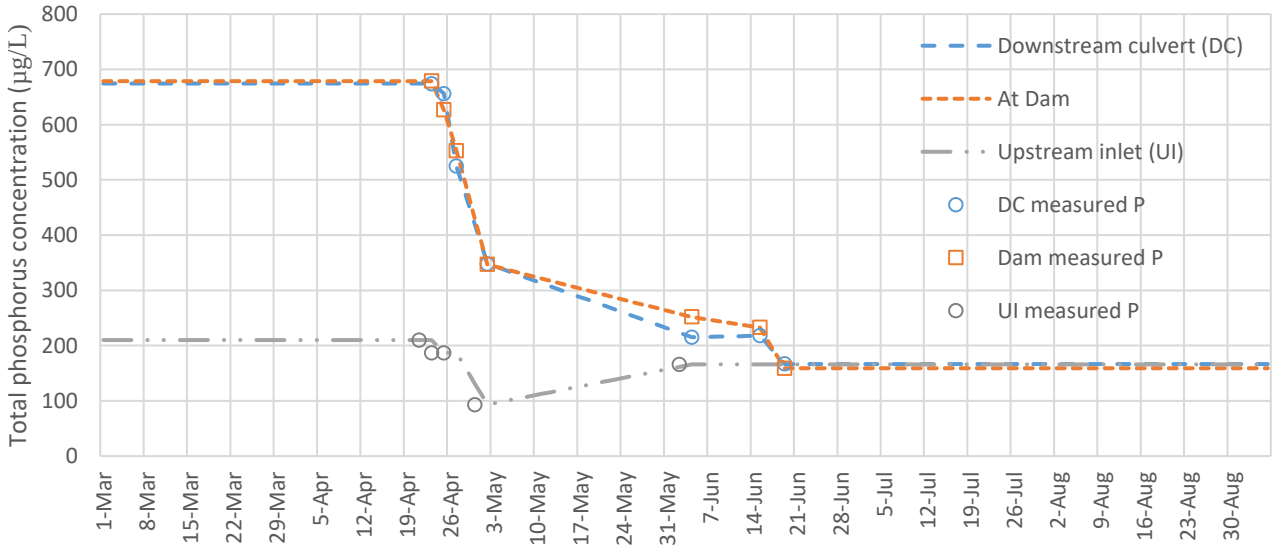


Figure 15. Total phosphorus concentration over the 2018 sampling season at three locations along Pelly's Lake watershed management area.

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

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