

LAKE WINNIPEG COMMUNITY-BASED MONITORING NETWORK

Cooks Creek
Conservation District
2018 Regional Report

Photo: Paul Mutch

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 (SRRCDC)
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 (LSRBDC)
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.

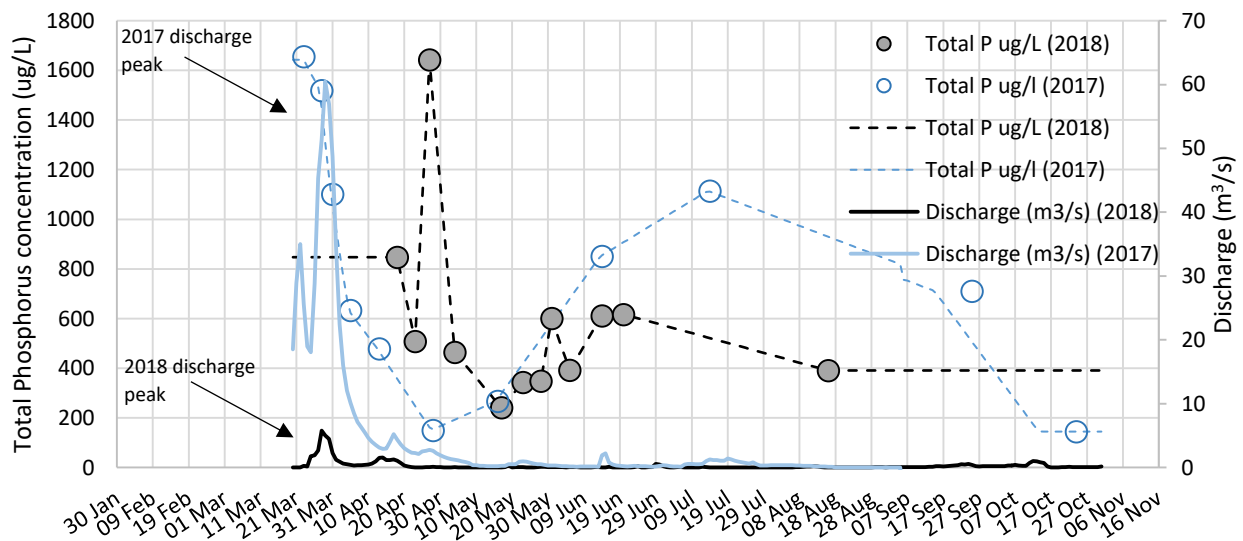


Figure 2. Comparison of phosphorus concentration and discharge in 2017 (blue) and 2018 (black) at the Manning Canal site.

COOKS CREEK CONSERVATION DISTRICT

The Cooks Creek Conservation District (CCCD) is located south east of Winnipeg. CCCD consists of three major sub-watersheds: Cooks Creek watershed, Carr’s Creek watershed and Lower Seine watershed. The primary land use in CCCD is annual crop agriculture (Cooks-Devils Creek Integrated Watershed Management Plan, 2016). In addition to agricultural activities, wastewater treatment plants and lagoons in municipalities throughout CCCD contribute phosphorus to local waterways. Major municipalities include Oakbank and Ste. Anne.

In partnership with LWCBMN, CCCD staff and volunteers sampled five sites in the CCCD region, of which two of them were located at flow meters. For these 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.

In 2017, in their first year of participation, volunteers began sampling after the spring melt and therefore accurate phosphorus loads and exports could not be calculated. In 2018, Volunteers collected samples frequently at all sites, specifically during the spring runoff period, resulting in high-quality data. For the flow-metered sites, 31% of the water load and 50% of the phosphorus load occurred during the spring, from March 1st to May 31st.

Table 2. Overview of findings from 2018 Cooks Creek Conservation District sample sites.

Sampling station	Phosphorus load (tonnes/y)	Phosphorus export (kg/ha/y)
A. Cooks Creek Diversion at Inlet and Cooks Creek below diversion	0.33	0.01

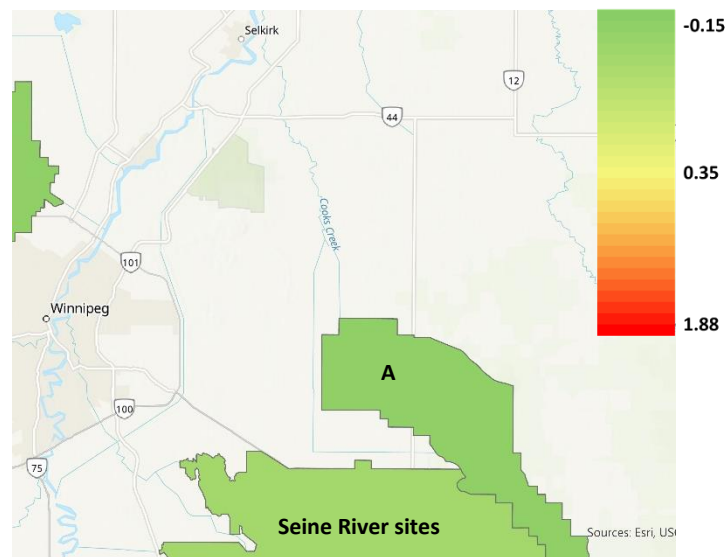


Figure 3. Phosphorus export (kg /ha/y) map for sub-watersheds in the Cooks Creek Conservation District.

2018 RESULTS BY SAMPLE SITE

Flow metered stations

Cooks Creek Diversion and Cooks Creek below Diversion

Together, the Cooks Creek Diversion and Cooks Creek below Diversion sites drain a largely agricultural area of 278 km². Water flowing down Cooks Creek towards the inlet is diverted into the Cooks Creek Diversion when water levels and flows are high. Both sites share a drainage area, therefore phosphorus and water loads are added together to accurately calculate the phosphorus export for the drainage area.



These sample sites are located at Water Survey of Canada flow meters 05OJ019 and 05OJ020. In 2018, a total of 11 samples were collected between April 19th and August 9th at the two sites.

	2018
Total phosphorus load:	0.33 tonnes
Total water load:	0.004 km ³
Phosphorus export:	0.01 kg/ha/y

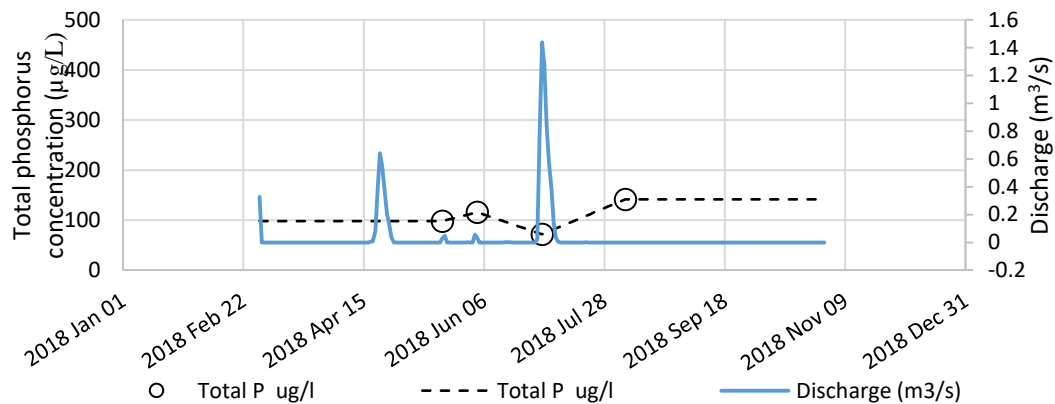


Figure 4. Discharge and total phosphorus concentration over the 2018 sampling season at Cooks Creek Diversion (Water Survey of Canada Station 05OJ020).

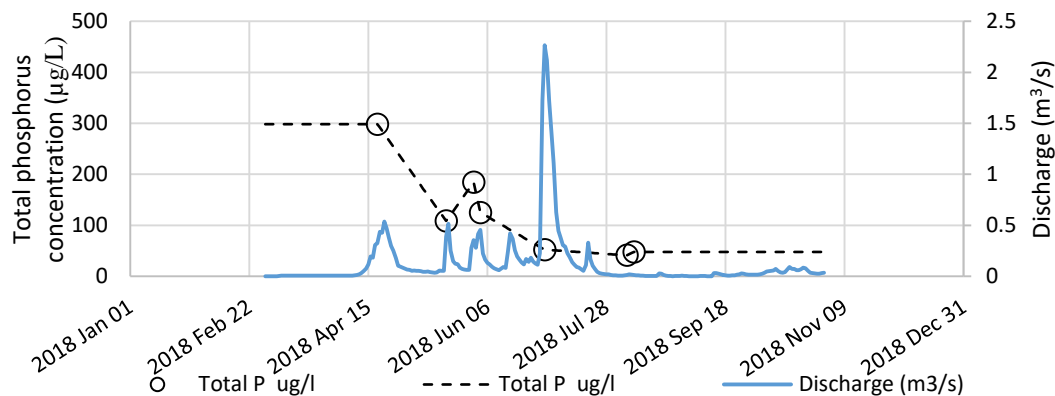


Figure 5. Discharge and total phosphorus concentration over the 2018 sampling season at Cooks Creek below Diversion (Water Survey of Canada Station 05OJ019).

Sites without flow data

Cooks Creek Downstream

This sample site is located near East Selkirk. The area that drains into this site is residential as well as agricultural.

The Water Survey of Canada does not measure flow at this site, and therefore the phosphorus load and export cannot be calculated.



In 2018, 10 samples were collected between May 19th and September 25th.

- **2018 greatest phosphorus concentration: 319 µg/L* (April 4th)**

*The "µg" symbol is used to express micrograms

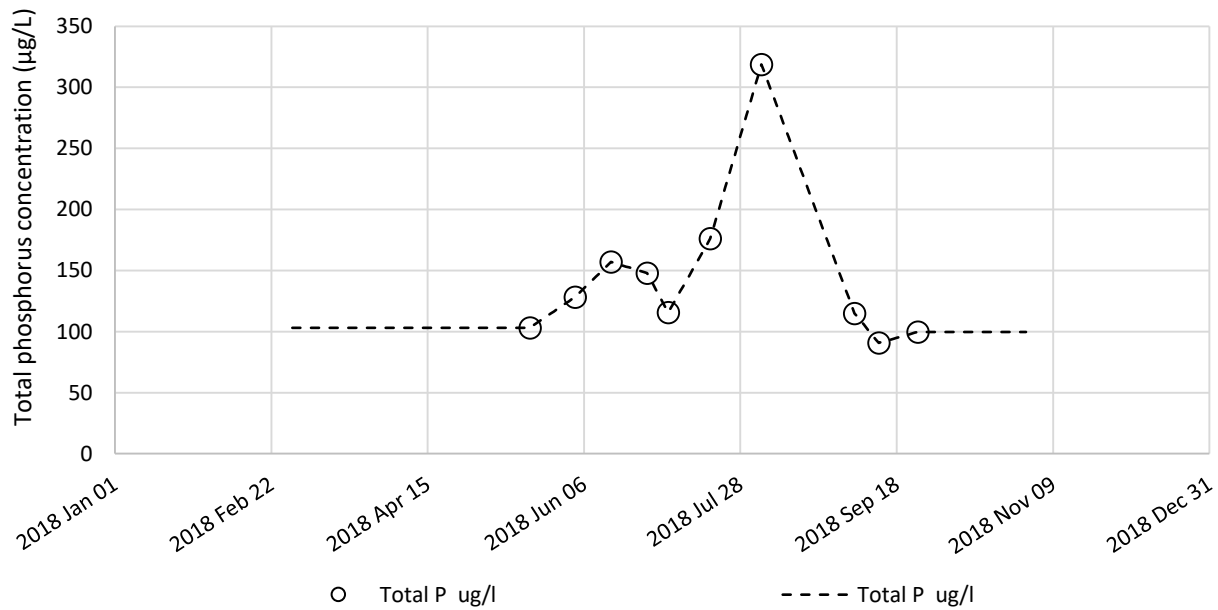


Figure 6. Total phosphorus concentration over the 2018 sampling season at Cooks Creek Downstream.

Cooks Creek east drain

This sample site is located upstream from the diversion site. The area that drains into this site is agricultural.

The Water Survey of Canada does not measure flow at this site, and therefore the phosphorus load and export cannot be calculated.

In 2018, 6 samples were collected between April 19th and August 6th.

- **2018 greatest phosphorus concentration: 271 $\mu\text{g/L}$ (April 19th).**

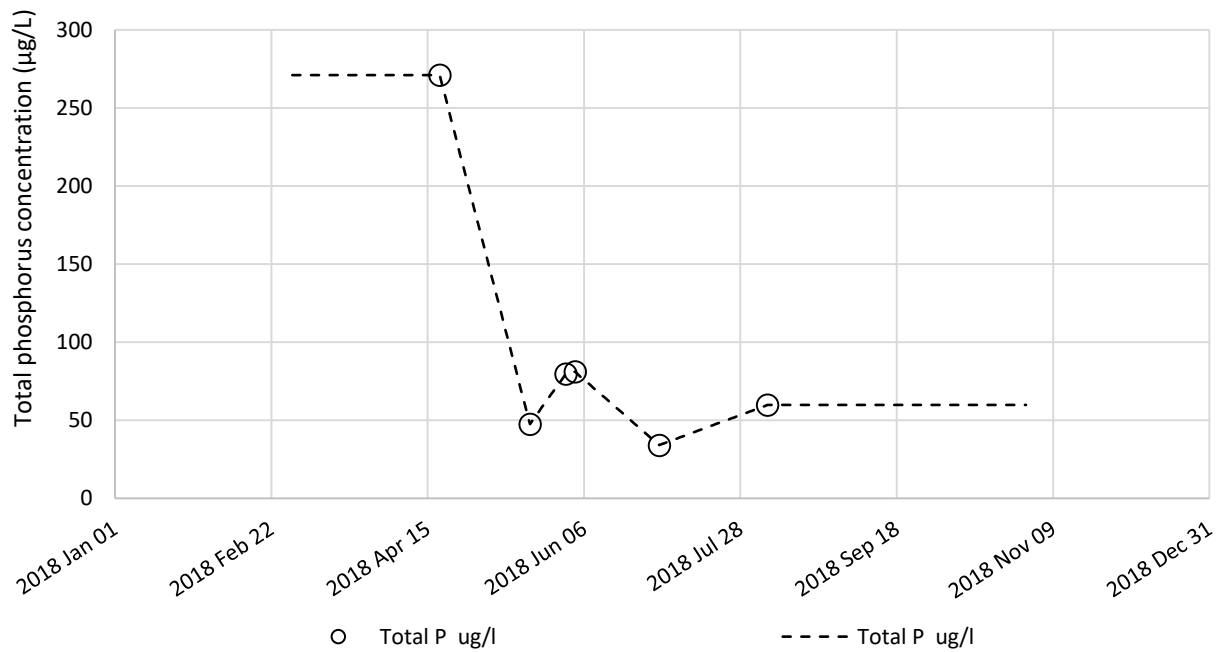
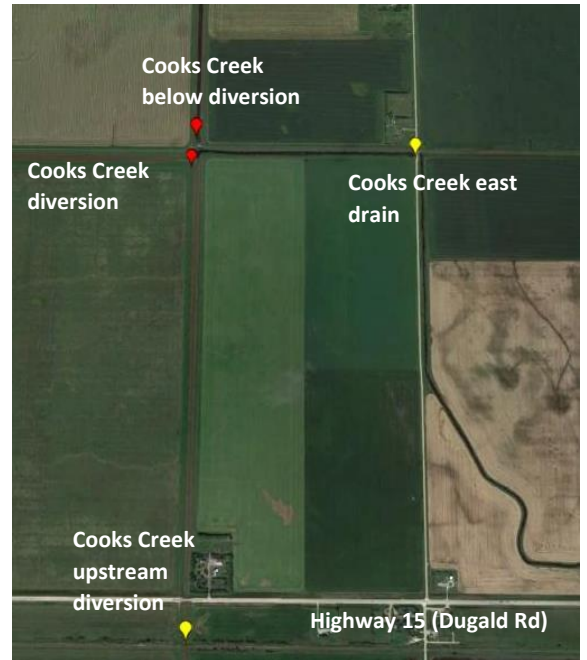


Figure 7. Total phosphorus concentration over the 2018 sampling season at Cooks Creek East Drain.

Cooks Creek upstream diversion

This sample site is located upstream of the Cooks Creek Diversion site. The area that drains into this site is agricultural.

The Water Survey of Canada does not measure flow at this site, and therefore the phosphorus load and export cannot be calculated.

In 2018, 7 samples were collected between April 19th and August 6th.

- **2018 greatest phosphorus concentration: 270 µg/L (April 19th).**

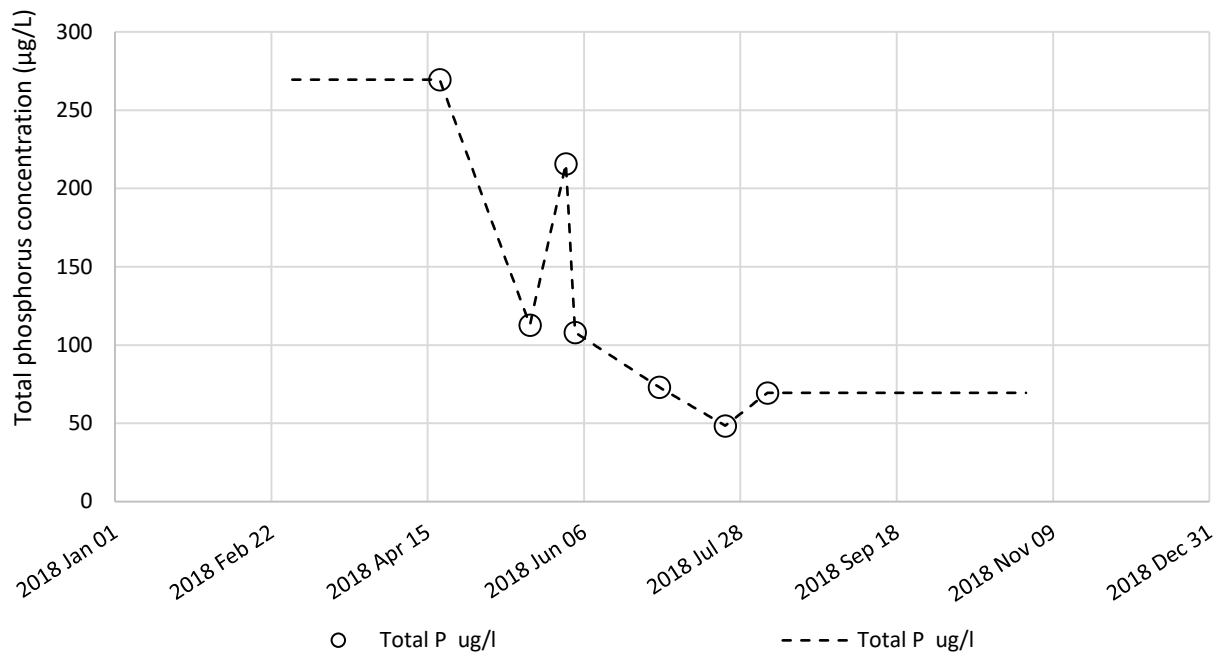
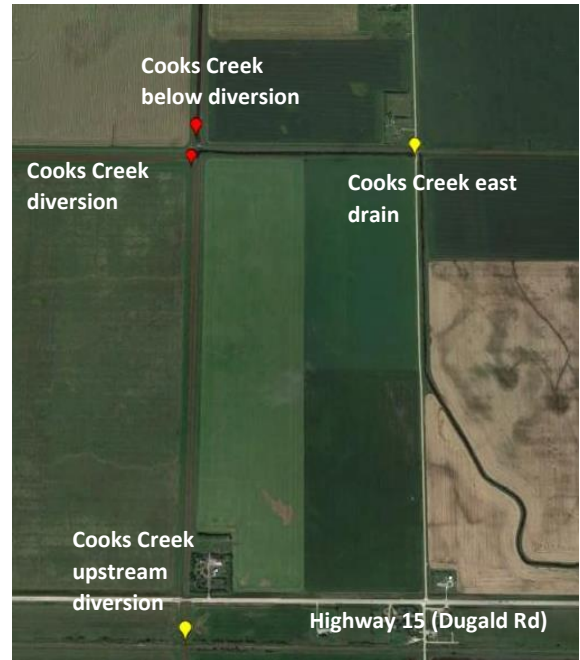


Figure 8. Total phosphorus concentration over the 2018 sampling season at Cooks Creek Upstream Diversion.

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.

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Canada 

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THOMAS SILL
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