

**LAKE WINNIPEG  
COMMUNITY-BASED MONITORING NETWORK**

**2017 REGIONAL REPORTS**

**SEINE-RAT RIVER CONSERVATION DISTRICT**



## LAKE WINNIPEG COMMUNITY-BASED MONITORING NETWORK: OVERVIEW

Lake Winnipeg, the world's 10<sup>th</sup> 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.

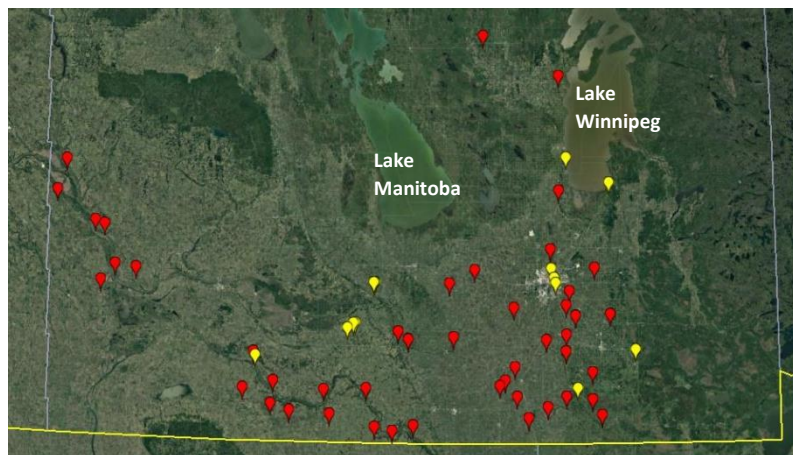
Most community-based monitoring (CBM) sampling is conducted at stations where water flow is continuously monitored by the [Water Survey of Canada](#). By tracking flow online using the Water Survey of Canada's real-time data, the network can mobilize partners and citizen scientists across the watershed 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 sampled.

**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 – 2017*

In 2017, in its second field season, LWCBMN focused its efforts on the Assiniboine and Red River valleys, collecting samples in the East-Interlake, Seine-Rat River, La Salle Redboine, Upper Assiniboine River and Pembina Valley Conservation Districts. A total of 800 samples were collected from 75 sites.



**Figure 1. 2017 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.**

## 2017 RESULTS OVERVIEW

**Table 1. Overview of findings from 2017 LWCBMN phosphorus monitoring data.**

REGION	# years of LWCBMN data	# sites in 2017	# samples collected in 2017	Highest phosphorus export in region (2017)	Regional lead
<i>East Interlake Conservation District</i>	1	4	67	0.33 kg/ha/y (Icelandic River)	Armand Belanger (EICD)
<i>Seine Rat River Conservation District</i>	2	14	151	1.64 kg/ha/y (Manning Canal)	Jodi Goerzen and Chris Randall (SRRCD)
<i>La Salle Redboine Conservation District</i>	2	9	148	0.76 kg/ha/y (La Salle River at Sanford)	Justin Reid (LSRBCD)
<i>Upper Assiniboine River Conservation District</i>	1	6	111	0.62 kg/ha/y (Arrow River)	Ryan Canart (UARCD)
<i>Pembina Valley Conservation District</i>	1	11	138	1.88 kg/ha/y* (Pembina River near Windygates)	Cliff Greenfield (PVCD) and Jason Vanrobaeys (AAFC)

There was high spatial variation in phosphorus loads between **sub-watersheds**, highlighting the importance of sampling at many stations. For example, the Manning Canal sub-watershed, a phosphorus hotspot in both 2016 and 2017, saw an increase in phosphorus export from 1.10 to 1.64 kg/ha/y. In the Upper Seine River sub-watershed directly north of the Manning Canal, phosphorus export declined from 0.48 to 0.29 kg/ha/y. These watersheds are directly adjacent to one another, yet continue to have very different phosphorus contributions and annual trends.

The high phosphorus exports reported by LWCBMN in both 2016 and 2017 also highlight the importance of sampling more frequently during the spring melt and high water events, when most phosphorus runoff occurs. **In 2017, LWCBMN identified 1,348 tonnes of phosphorus**, of which, 96% occurred during the spring.

A **sub-watershed** is the area of land that drains past a particular LWCBMN sampling location. Multiple sub-watersheds flow together to form larger watersheds, such as the Red River Basin.

The average total phosphorus load to Lake Winnipeg is reported to be 7,655 tonnes annually; the average phosphorus load from the Red River is reported to be 5,380 tonnes annually (State of Lake Winnipeg report, 2011).

### *LWCBMN data in context*

**Other phosphorus monitoring projects are also reporting large amounts of spatial variation and high phosphorus exports.** In 2017, an Environment and Climate Change Canada research group published a study, “Quantifying seasonal variation in total phosphorus and nitrogen from prairie streams in the Red River Basin, Manitoba Canada”, that looked at 11 sub-watersheds west of the Red River. Like LWCBMN, researchers sampled frequently during the spring melt and after large rain events, and report a wide range of phosphorus exports for sub-watersheds in a relatively small region, from 0.07-1.88 kg/ha/y.

### *Using the data*

CBM provides valuable information for water management in Manitoba. The LWCBMN’s data complements provincial and federal water-quality data sets, and can help guide the development of evidence-based policies and practices.

**\* 1.88 kg/ha/y is a relatively high phosphorus export for the PVCD region. We recommend that no conclusions be drawn until we have additional data from this sample site.**

## SEINE-RAT RIVER CONSERVATION DISTRICT

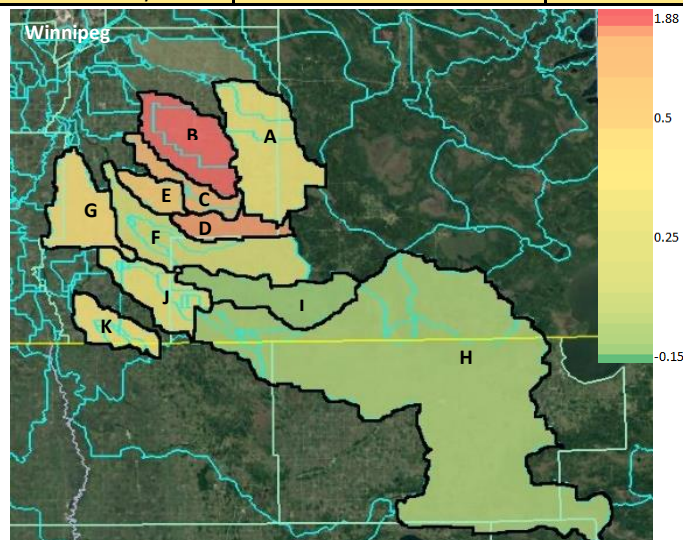
The Seine-Rat River Conservation District (SRRCD) is located east of the Red River, extending to Ontario and the United States. SRRCD consists of three major sub-watersheds: the Seine, Rat and Roseau River watersheds. The primary land use in SRRCD is agriculture, specifically cereal crops and livestock. The Seine River watershed has the most intensively developed hog industry of all watersheds in Manitoba (Seine River Watershed Management Plan, 2010). In addition to agricultural activities, wastewater treatment plants and lagoons in municipalities throughout SRRCD contribute phosphorus to local waterways. Major municipalities include Steinbach, St. Pierre-Jolys and Lorette.

In partnership with LWCBMN, SRRCD staff and volunteers sampled 14 sites in the SRRCD region, of which 13 sites were at flow meters. For the site 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. Flow data from two sites in SRRCD (Seine River Diversion and Seine River at Prairie Grove) are currently being reassessed. This report will be updated with data from those sites once quality-assured data is available.

SRRCD and volunteers collected samples frequently at all sites, specifically during the spring runoff period, resulting in high-quality data that captured all discharge peaks. For all sample sites, most of the water (90%) and phosphorus (94%) contribution occurred during the spring, from March 1<sup>st</sup> to May 31<sup>st</sup>

**Table 2. Overview of findings from 2017 SRRCD sample sites.**

Sampling station	Phosphorus load (tonnes/y)	Phosphorus export (kg/ha/y)
A. Seine River near Ste. Anne	17	0.30
B. Manning Canal near Île-des-Chênes	79	1.64
C. Tourond Creek near Tourond	17	0.81
D. Joubert Creek near Pansy	23	1.10
E. Joubert Creek near St. Pierre-Jolys	8	0.57
F. Rat River near St. Pierre Jolys	24	0.23
G. Marsh River near Otterburn	16	0.41
H. Roseau River at Gardenton	16	0.10
I. Vita Drain near Stuartburn	2	0.05
J. Roseau River near Dominion City	4	0.29
K. Main Drain near Dominion City	8	0.36



**Figure 2. Phosphorus export (kg /ha/y) map for sub-watersheds in the Seine-Rat River Conservation District.**

## 2017 RESULTS BY SAMPLE SITE

### Seine River sample sites

#### Seine River near Ste. Anne

The upper Seine River sample site drains a largely forested area of approximately 580 km<sup>2</sup>. The drainage area includes a portion of Sandilands Provincial Forest.

This sample site is located at Water Survey of Canada flow meter 05OH007, near Ste. Anne. In 2017, 11 samples were collected between March 23<sup>rd</sup> and September 25<sup>th</sup>.



	2016	2017
• Discharge peaked:	March 16 <sup>th</sup>	April 1 <sup>st</sup>
• Greatest phosphorus concentration:	643 µg/L* measured on March 15 <sup>th</sup>	517 µg/L measured on March 28 <sup>th</sup>
• Total phosphorus load:	28 tonnes	17 tonnes
• Total water load:	0.128 km <sup>3</sup>	0.073 km <sup>3</sup>
• Phosphorus export:	0.28 kg/ha/y	0.3 kg/ha/y
• Percent water load occurred during spring**:	66%	64%
• Percent phosphorus load occurred during spring:	82%	85%

\*The “µg” symbol is used to express micrograms

\*\* Spring was considered to be March 1<sup>st</sup> to May 31<sup>st</sup>

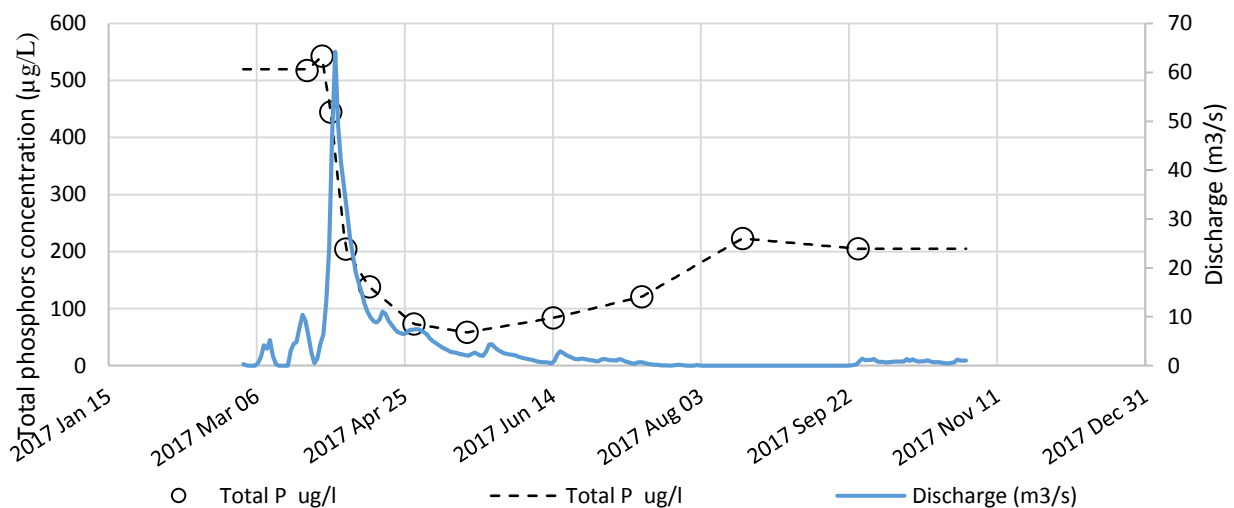


Figure 3. Discharge and total phosphorus concentration over the 2017 sampling season at Seine River near Ste. Anne (Water Survey of Canada Station 05OH007).

### Manning Canal near Île-des-Chênes

The Manning Canal is a sub-watershed of the larger Seine River watershed. The Manning Canal drains a largely agricultural area of 481 km<sup>2</sup>, which includes dense livestock and crop land as well as the growing city of Steinbach.



This sample site is located at Water Survey of Canada flow meter 05OE006, near Île-des-Chênes. In 2017, 11 samples were collected between March 27<sup>th</sup> and October 24<sup>th</sup>.

	<b>2016</b>	<b>2017</b>
• <b>Discharge peaked:</b>	March 14 <sup>th</sup>	March 30 <sup>th</sup>
• <b>Greatest phosphorus concentration:</b>	1569 µg/L measured on March 15 <sup>th</sup>	1656 µg/L measured on March 23 <sup>rd</sup>
• <b>Total phosphorus load:</b>	53 tonnes	79 tonnes
• <b>Total water load:</b>	0.059 km <sup>3</sup>	0.066 km <sup>3</sup>
• <b>Phosphorus export:</b>	1.1 kg/ha/y	1.64 kg/ha/y
• <b>Percent water load occurred during spring:</b>	77%	94%
• <b>Percent phosphorus load occurred during spring:</b>	85%	97%

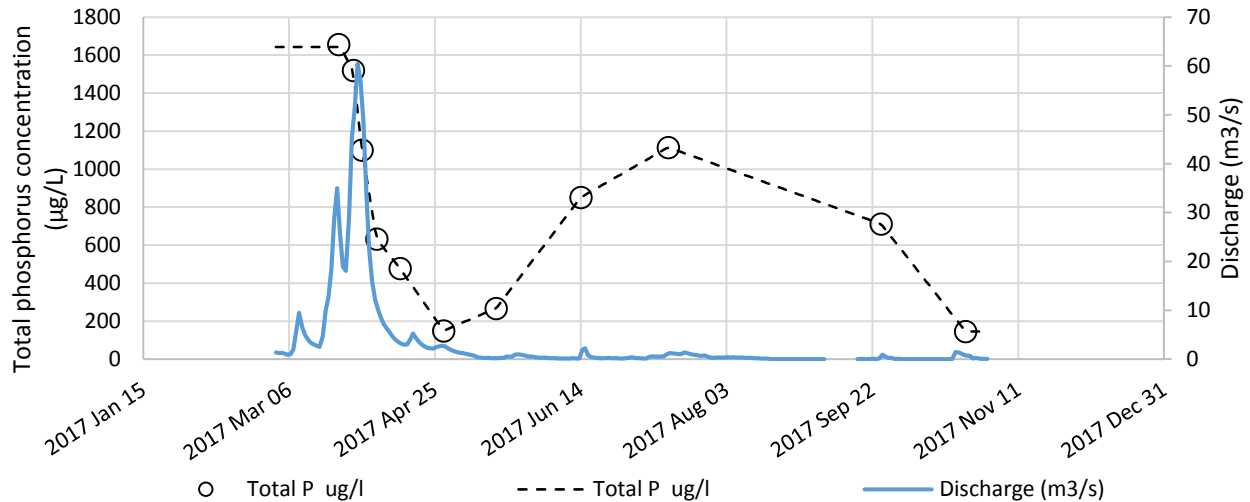


Figure 4. Discharge and total phosphorus concentration over the 2017 sampling season at Manning Canal (Water Survey of Canada Station 05OE006).

Note: Discharge data at the **Seine River Diversion** and **Seine River at Prairie Grove** sample sites is currently being checked for quality. This report will be updated with data from these sites when quality-assured discharge data is available.

## Tourond Creek sample site

### Tourond Creek near Tourond

Tourond Creek drains a largely agricultural area of 210 km<sup>2</sup> before flowing into the Red River south of Saint Adolphe.

This sample site is located at Water Survey of Canada flow meter 05OE009, near Tourond. In 2017, 11 samples were collected between March 23<sup>rd</sup> and September 25<sup>th</sup>.



	<b>2016</b>	<b>2017</b>
• <b>Discharge peaked:</b>	March 14 <sup>th</sup>	March 31 <sup>st</sup>
• <b>Greatest phosphorus concentration:</b>	1105 µg/L measured on March 15 <sup>th</sup>	1641 µg/L measured on March 23 <sup>rd</sup>
• <b>Total phosphorus load:</b>	13 tonnes	17 tonnes
• <b>Total water load:</b>	0.020 km <sup>3</sup>	0.018 km <sup>3</sup>
• <b>Phosphorus export:</b>	0.61 kg/ha/y	0.81 kg/ha/y
• <b>Percent water load occurred during spring:</b>	72%	93%
• <b>Percent phosphorus load occurred during spring:</b>	82%	95%

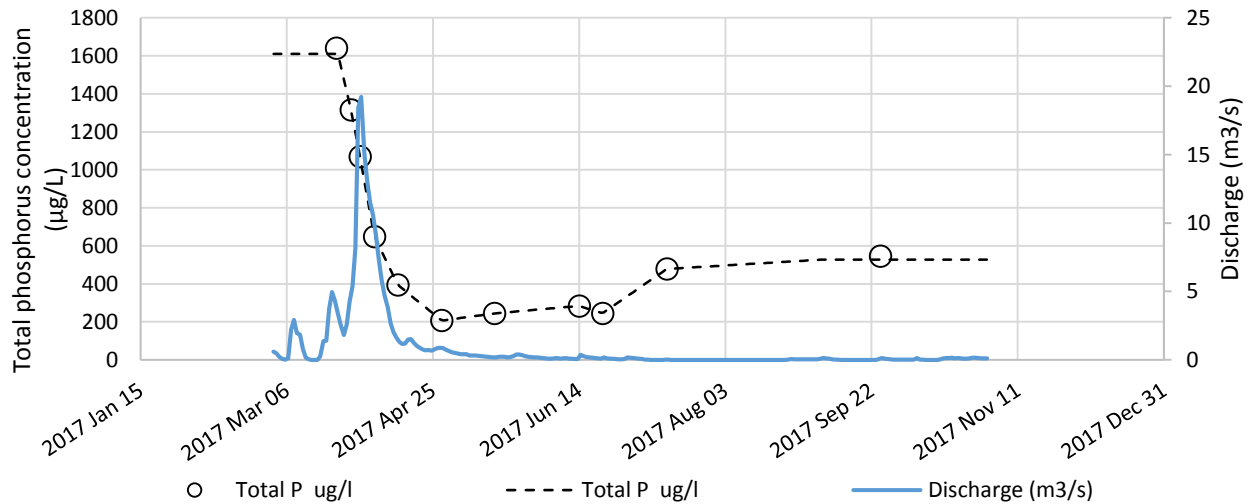


Figure 5. Discharge and total phosphorus concentration over the 2017 sampling season at Tourond Creek (Water Survey of Canada Station 05OE009).

## Rat River sample sites

### Joubert Creek near Pansy

This sample site is the most upstream sample site on the Joubert Creek, a tributary of the Rat River. The area that drains into this site is 208 km<sup>2</sup> and drains pasture and forage crop land.

This sample site is located at Water Survey of Canada flow meter 05OE015, near Pansy. In 2017, 9 samples were collected between March 23<sup>rd</sup> and July 14<sup>th</sup>.



- **Discharge peaked:** March 30<sup>th</sup>
- **Greatest phosphorus concentration:** 1957 µg/L measured on March 23<sup>rd</sup>
- **Total phosphorus load:** 23 tonnes
- **Total water load:** 0.034 km<sup>3</sup>
- **Phosphorus export:** 1.1 kg/ha/y
- **Percent water load occurred during spring:** 97%
- **Percent phosphorus load occurred during spring:** 100%

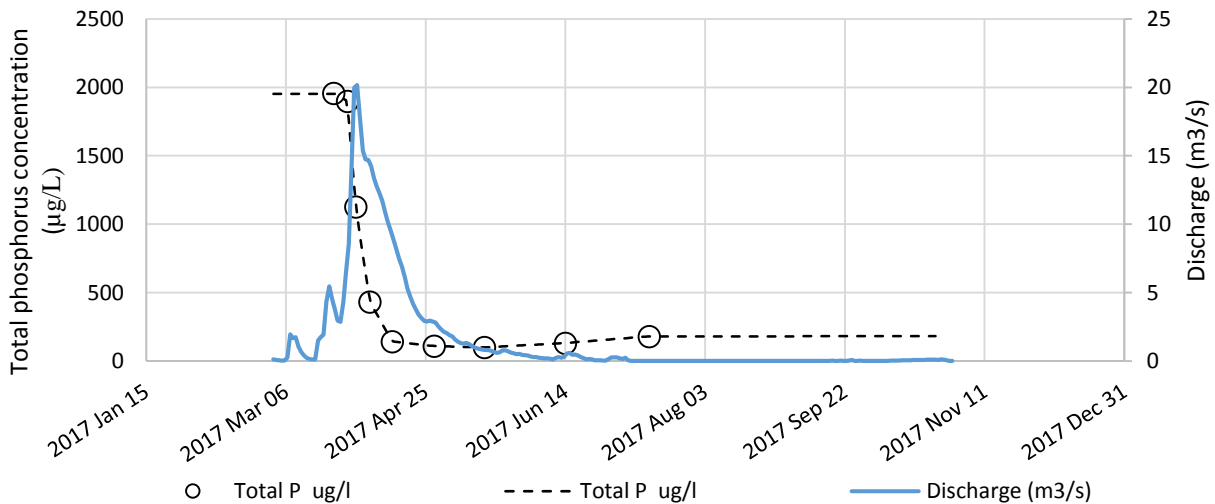


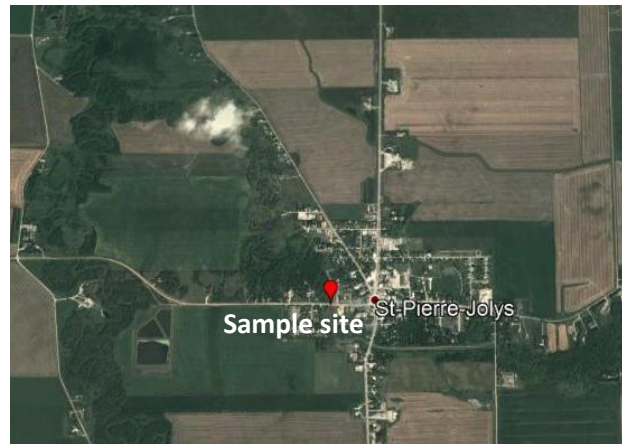
Figure 6. Discharge and total phosphorus concentration over the 2017 sampling season at Joubert Creek near Pansy (Water Survey of Canada Station 05OE015).



### Joubert Creek near St. Pierre-Jolys

Located just before the Joubert Creek flows into the Rat River, this is the most downstream sample site on the Joubert Creek. The area that drains into this sample site is 140 km<sup>2</sup> and drains mainly pasture and forage crop land as well as a portion of the community of St. Pierre Jolys.

This sample site is located at Water Survey of Canada flow meter 05OE007, near St. Pierre-Jolys. In 2017, 11 samples were collected between March 23<sup>rd</sup> and September 25<sup>th</sup>.



- **Discharge peaked:** March 30<sup>th</sup>
- **Greatest phosphorus concentration:** 1604 µg/L measured on March 23<sup>rd</sup>
- **Total phosphorus load:** 8 tonnes
- **Total water load:** 0.010 km<sup>3</sup>
- **Phosphorus export:** 0.57 kg/ha/y
- **Percent water load occurred during spring:** 93%
- **Percent phosphorus load occurred during spring:** 98%

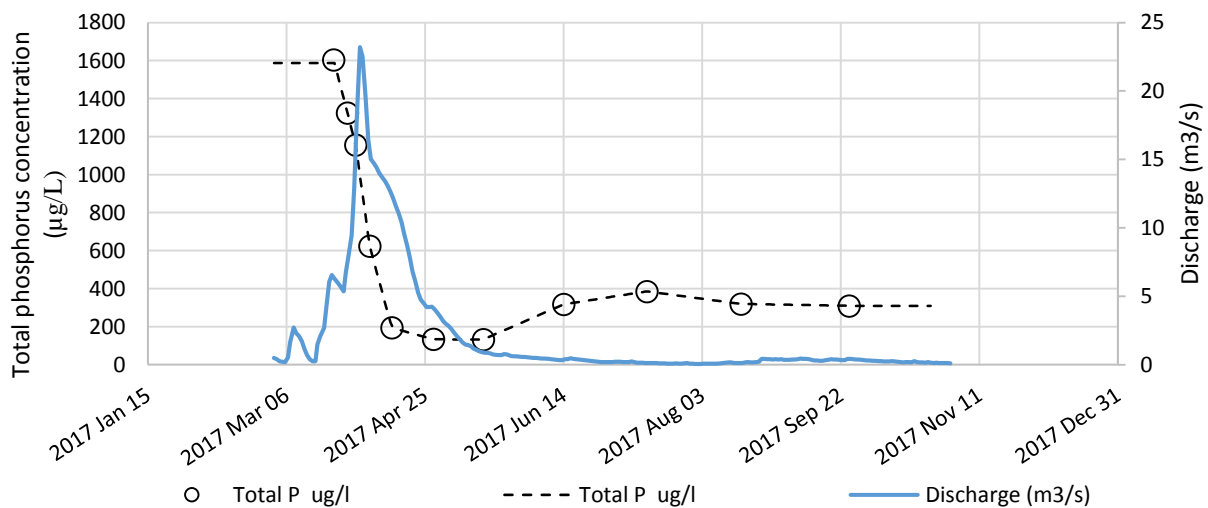


Figure 7. Discharge and total phosphorus concentration over the 2017 sampling season at Joubert Creek near St. Pierre Jolys (Water Survey of Canada Station 05OE007).

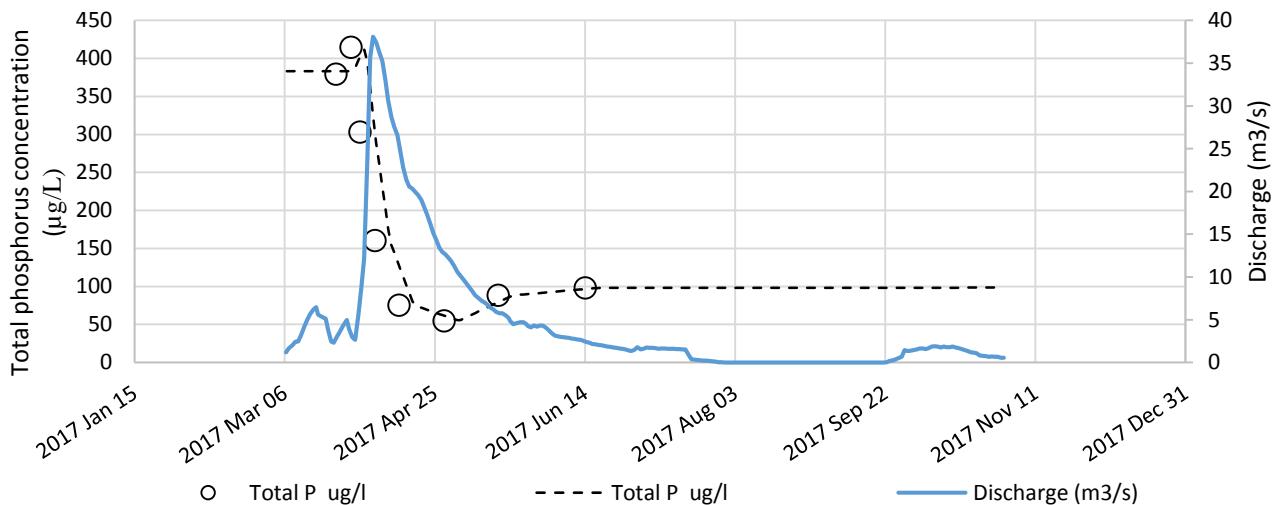
### Rat River near St. Pierre Jolys

The Rat River site is located slightly upstream from where Joubert Creek flows into the Rat River. The area that drains past this sample site is 1075 km<sup>2</sup> and includes the community of St. Malo.

This sample site is located near Water Survey of Canada flow meter 05OE001, which is slightly downstream from where Joubert Creek flows into the Rat River\*. In 2017, 8 samples were collected between March 23<sup>rd</sup> and June 14<sup>th</sup>.



- **Discharge peaked:** April 5<sup>th</sup>
- **Greatest phosphorus concentration:** 415 µg/L measured on March 28<sup>th</sup>
- **Total phosphorus load:** 24 tonnes
- **Total water load:** 0.098 km<sup>3</sup>
- **Phosphorus export:** 0.23 kg/ha/y
- **Percent water load occurred during spring:** 96%
- **Percent phosphorus load occurred during spring:** 98%



**Figure 8. Discharge and total phosphorus concentration over the 2017 sampling season at Rat River (estimated from Water Survey of Canada Stations 05OE001 and 05OE007).**

**\*Discharge for this sample site was estimated by subtracting Joubert Creek near St. Pierre-Jolys discharge (flow meter 05OE007) from the Rat River near Otterburne discharge (flow meter 05OE001). Sites were selected this way to separate the Rat and Joubert drainage areas.**

### Marsh River near Otterburn

The Marsh River site drains an area of approximately 403 km<sup>2</sup>, consisting mainly of agricultural land. This sample site is located directly upstream of where the Marsh River flows into the Rat River.



The sample site is located at Water Survey of Canada flow meter 05OE010, near Otterburn. In 2017, 10 samples were collected between March 28<sup>th</sup> and September 25<sup>th</sup>.

- **Discharge peaked:** April 1<sup>st</sup>
- **Greatest phosphorus concentration:** 699 µg/L measured on March 30<sup>th</sup>
- **Total phosphorus load:** 16 tonnes
- **Total water load:** 0.047 km<sup>3</sup>
- **Phosphorus export:** 0.41 kg/ha/y
- **Percent water load occurred during spring:** 99%
- **Percent phosphorus load occurred during spring:** 99%

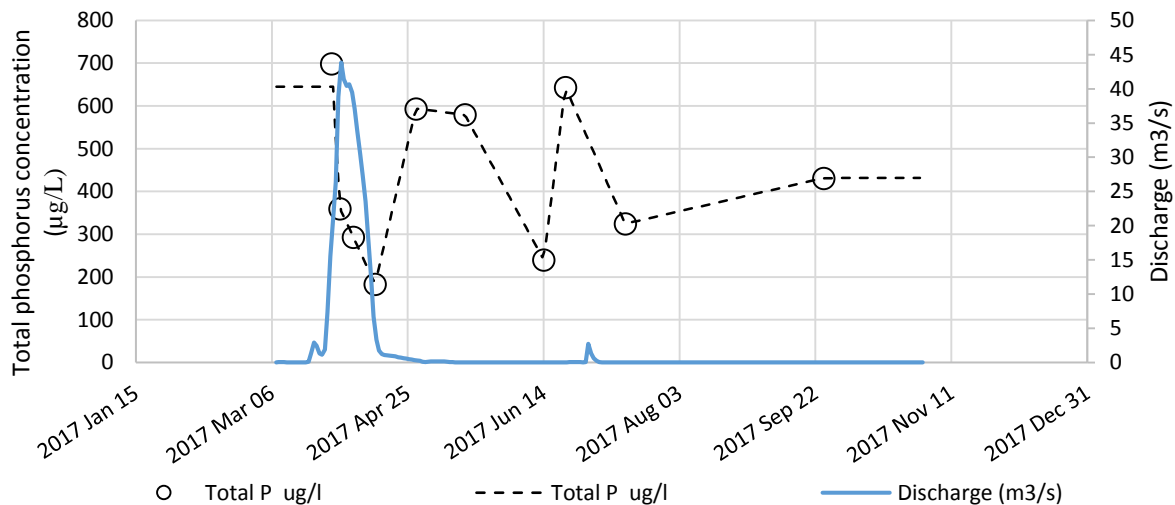


Figure 9. Discharge and total phosphorus concentration over the 2017 sampling season at Marsh River (estimated from Water Survey of Canada Station 05OE010).

## Roseau River sample sites

### Roseau River near Gardenton

This sample site is the most upstream sample site on the Roseau River. The majority of this 4440 km<sup>2</sup> drainage area is located in Minnesota and Ontario. This drainage area is not densely populated and is largely forested.

This sample site is located at Water Survey of Canada flow meter 05OD004, near Gardenton. In 2017, 9 samples were collected between March 31<sup>st</sup> and June 29<sup>th</sup>.



- **Discharge peaked:** April 15<sup>th</sup>
- **Greatest phosphorus concentration:** 157 µg/L measured on March 31<sup>st</sup>
- **Total phosphorus load:** 46 tonnes
- **Total water load:** 0.439 km<sup>3</sup>
- **Phosphorus export:** 0.10 kg/ha/y
- **Percent water load occurred during spring:** 74%
- **Percent phosphorus load occurred during spring:** 68%

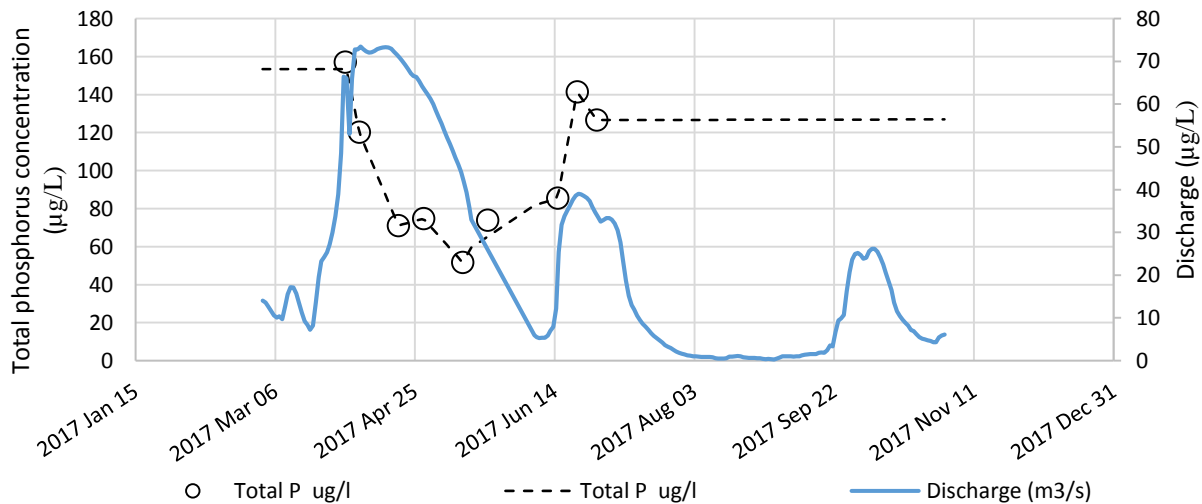


Figure 10. Discharge and total phosphorus concentration over the 2017 sampling season at Roseau River near Gardenton (Water Survey of Canada Station 05OD004).

### Vita Drain near Stuartburn

This sample site is located directly upstream from where the Vita Drain flows into the Roseau River. This 442 km<sup>2</sup> area drains largely forested land, with some agriculture and the community of Vita, Manitoba.

This sample site is located at Water Survey of Canada flow meter 05OD034, near Stuartburn. In 2017, 10 samples were collected between March 31<sup>st</sup> and July 20<sup>th</sup>.



- **Discharge peaked:** March 29<sup>th</sup>
- **Greatest phosphorus concentration:** 98 µg/L measured on March 31<sup>st</sup>
- **Total phosphorus load:** 2 tonnes
- **Total water load:** 0.043 km<sup>3</sup>
- **Phosphorus export:** 0.05 kg/ha/y
- **Percent water load occurred during spring:** 93%
- **Percent phosphorus load occurred during spring:** 94%

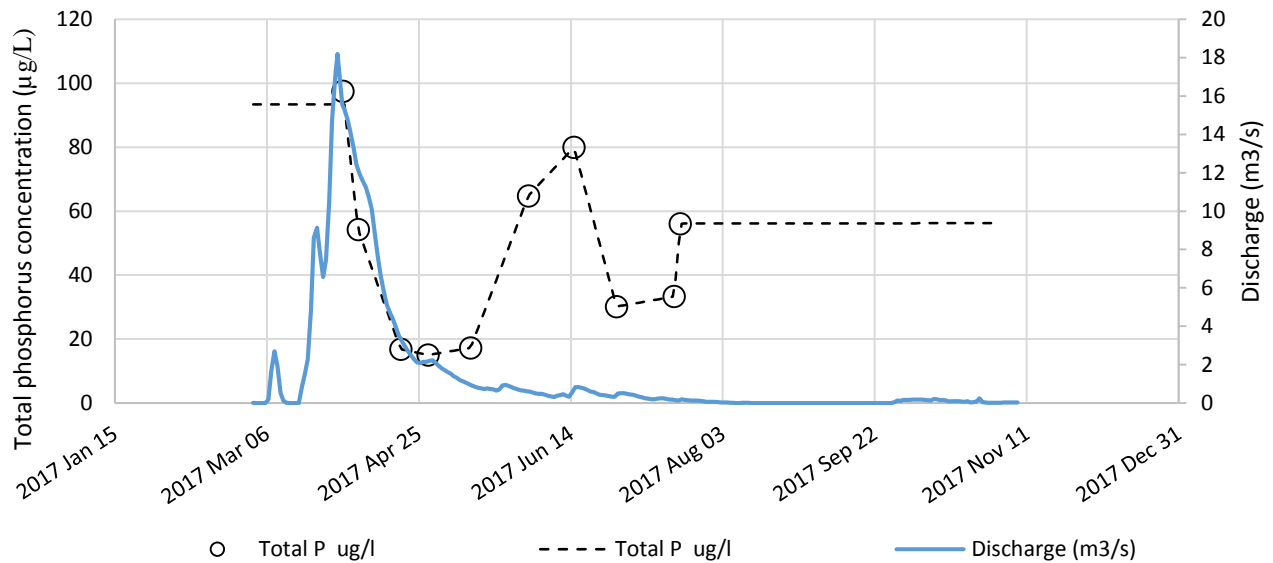


Figure 11. Discharge and total phosphorus concentration over the 2017 sampling season at Vita Drain (Water Survey of Canada Station 05OD034).

### Roseau River near Dominion City

This downstream stretch of the Roseau River drains a 137 km<sup>2</sup>, largely forested area, and the community of Stuartburn.

This sample site is located at Water Survey of Canada flow meter 05OD001, near Dominion City. In 2017, 11 samples were collected between March 31<sup>st</sup> and September 5<sup>th</sup>.



- **Discharge peaked:** April 1<sup>st</sup>
- **Greatest phosphorus concentration:** 194 µg/L measured on March 31<sup>st</sup>
- **Total phosphorus load:** 4 tonnes
- **Total water load:** 0.025 km<sup>3</sup>
- **Phosphorus export:** 0.29 kg/ha/y
- **Percent water load occurred during spring:** 70%
- **Percent phosphorus load occurred during spring:** 71%

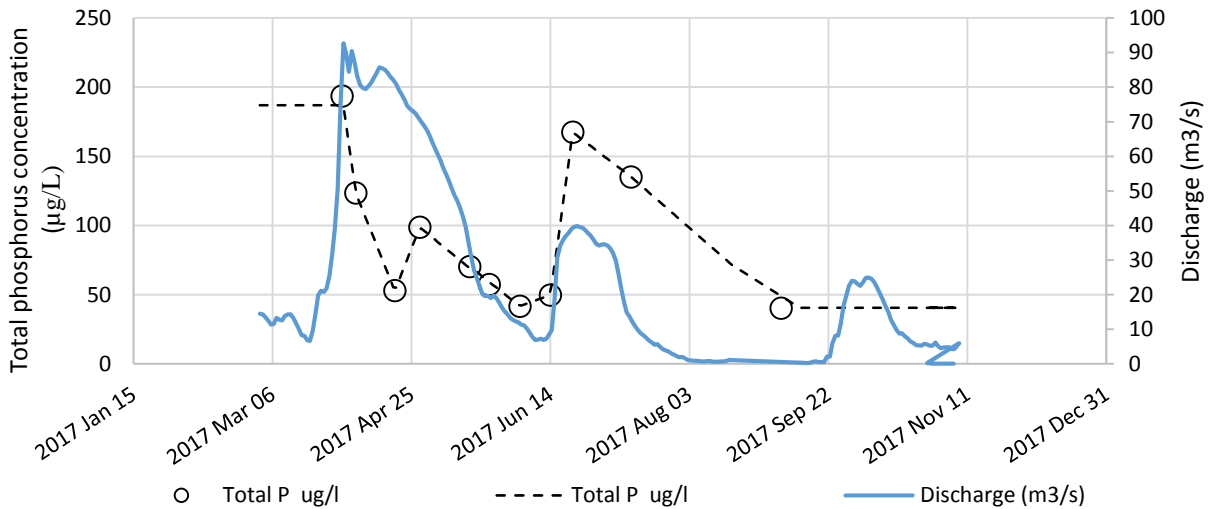
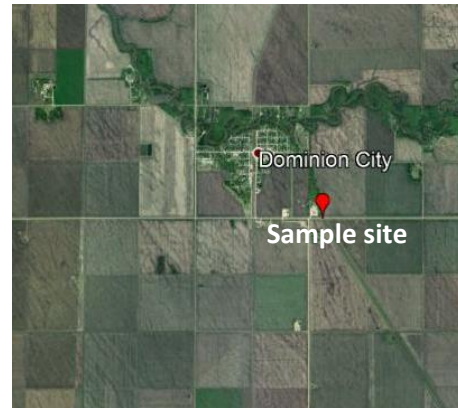


Figure 12. Discharge and total phosphorus concentration over the 2017 sampling season at Roseau River near Dominion City (Water Survey of Canada Station 05OD001).

### Main Drain near Dominion City

The drainage area for this sample site is 225 km<sup>2</sup>. The majority of this drainage area is located in Manitoba with a small portion extending into the United States. This sample site drains a more densely agricultural area than the other sample sites in the Roseau River watershed.

This sample site is located at Water Survey of Canada flow meter 05OD028, near Dominion City. In 2017, 7 samples were collected between March 31<sup>st</sup> and June 29<sup>th</sup>.



- **Discharge peaked:** March 31<sup>st</sup>
- **Greatest phosphorus concentration:** 372 µg/L measured on March 31<sup>st</sup>
- **Total phosphorus load:** 8 tonnes
- **Total water load:** 0.022 km<sup>3</sup>
- **Phosphorus export:** 0.36 kg/ha/y
- **Percent water load occurred during spring:** 100%
- **Percent phosphorus load occurred during spring:** 100%

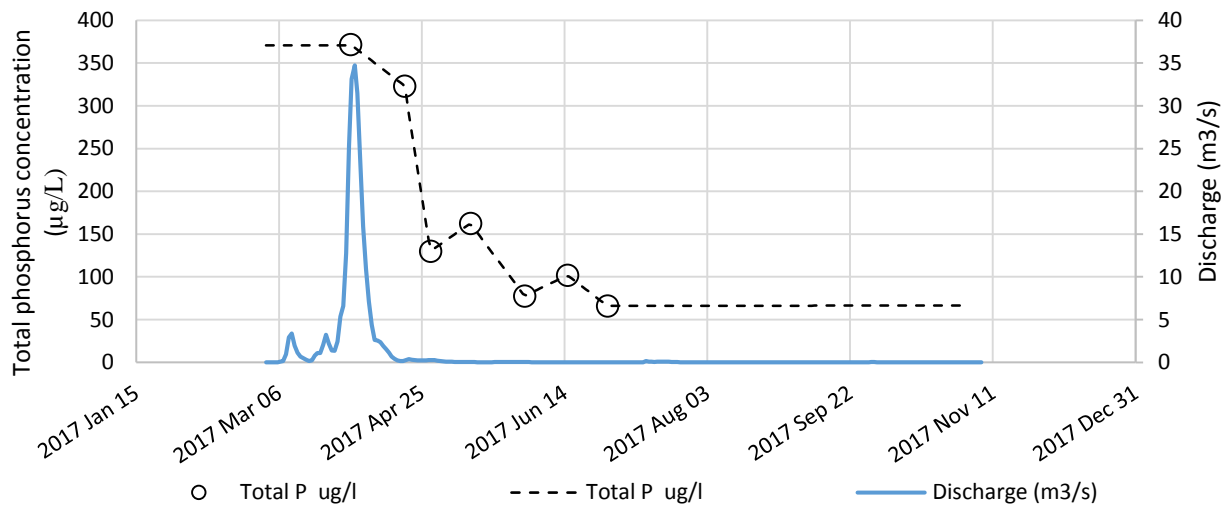


Figure 13. Discharge and total phosphorus concentration over the 2017 sampling season at Main Drain (Water Survey of Canada Station 05OD028).

## Sample site without flow data

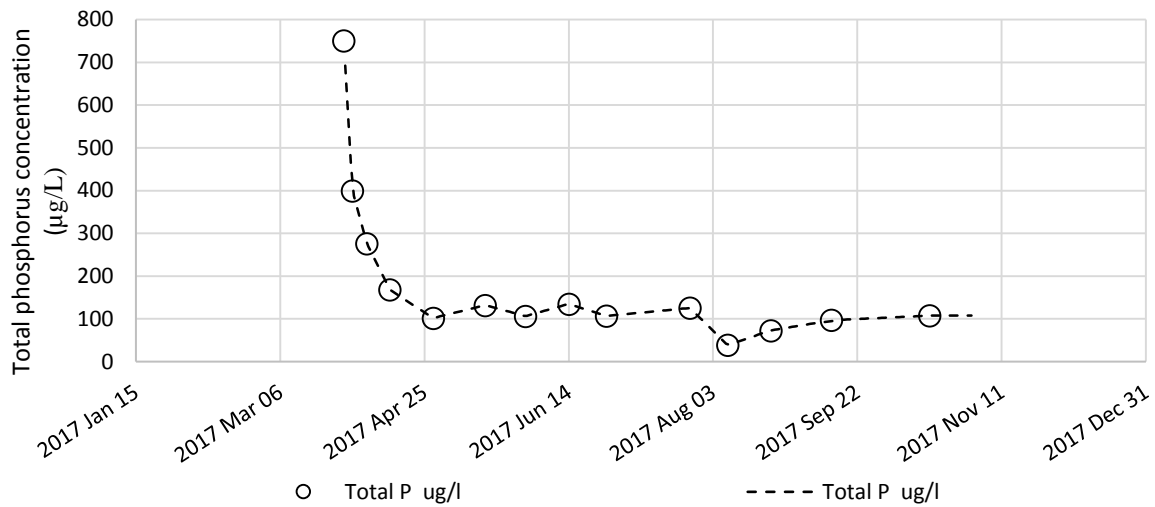
### *Seine River at Marchand*

The Seine River at Marchand sample site drains the headwaters of the Seine River watershed, which mainly includes drained low-lying land and cattle pasture.

This sample site is located near Marchand. In 2017, 14 samples were collected between March 28<sup>th</sup> and October 17<sup>th</sup>. Because flow is not measured at this site, we cannot calculate phosphorus loads and exports.



- **Greatest phosphorus concentration:**  
750  $\mu\text{g/L}$  measured on March 28<sup>th</sup>



**Figure 14. Total phosphorus concentration over the 2017 sampling season at the Seine River at Marchand.**



## 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 2018. You can find a map of potential sites [here](#).

If you are interested in sampling, please contact the LWCBMN co-ordinator at [cbm@lakewinnipegfoundation.org](mailto: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 2017 FUNDERS



Tides Canada

patagonia®

