LAKE WINNIPEG FOUNDATION

Deadhorse Creek; Photo: Paula Kent

INTER-MOUNTAIN WATERSHED DISTRICT

2021 regional report

LAKE WINNIPEG

community-based monitoring network

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Lake Winnipeg Community-Based Monitoring Network: Overview

The Lake Winnipeg Community-Based Monitoring Network (LWCBMN), coordinated by the Lake Winnipeg Foundation (LWF), mobilizes citizens and watershed partners to collect water samples across Manitoba in order to measure phosphorus concentration. Phosphorus is the nutrient responsible for blue-green algae blooms on Lake Winnipeg. Phosphorus comes from diverse sources across the watershed, including municipal wastewater and agricultural runoff.

Different sub-watersheds contribute different proportions of Lake Winnipeg's total phosphorus load. With the help of a strong network of watershed partners and citizen scientists, this long-term monitoring program is identifying phosphorus hotspots – localized areas that contribute higher amounts of phosphorus to waterways than other areas. Targeting actions to reduce phosphorus loading in hotspots will reduce the amount of phosphorus entering Manitoba's lakes and rivers, and improve the health of Lake Winnipeg.

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 LWCBMN sampling is conducted at stations where water flow is continuously monitored by the Water Survey of Canada (WSC). By tracking flow online using the WSC's real-time data, the network can notify partners and citizen scientists across the watershed to ensure frequent sampling during peak flows.

Sites with flow data can be coupled with LWCBMN data to calculate **phosphorus loads**. We need several samples throughout the season, corresponding to changes in flow, to accurately calculate these loads. Phosphorus loads can subsequently be used to calculate **phosphorus export**, 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, expressed as tonnes per year.

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

Sample Collection & Site Map

Water samples are collected using a weighted sampling device that collects source water directly into a 500 mL Nalgene polyethylene bottle. The sampling device is lowered into the water just before it hits the bottom, the bottle is filled, then brought back to the surface. It is rinsed three times prior to sample collection. Next, a 60 mL Nalgene polyethylene bottle containing 1 mL 4N H_2SO_4 is filled with whole water from the collection bottle.

In 2021, 919 unfiltered water samples were collected and analyzed from 93 sites. Of these 93 LWCBMN sampling sites, 73 are located near flow-metered WSC stations, four are located near non-flow-metered WSC stations, one is located near a USGS station, and fifteen are not located near any stations.

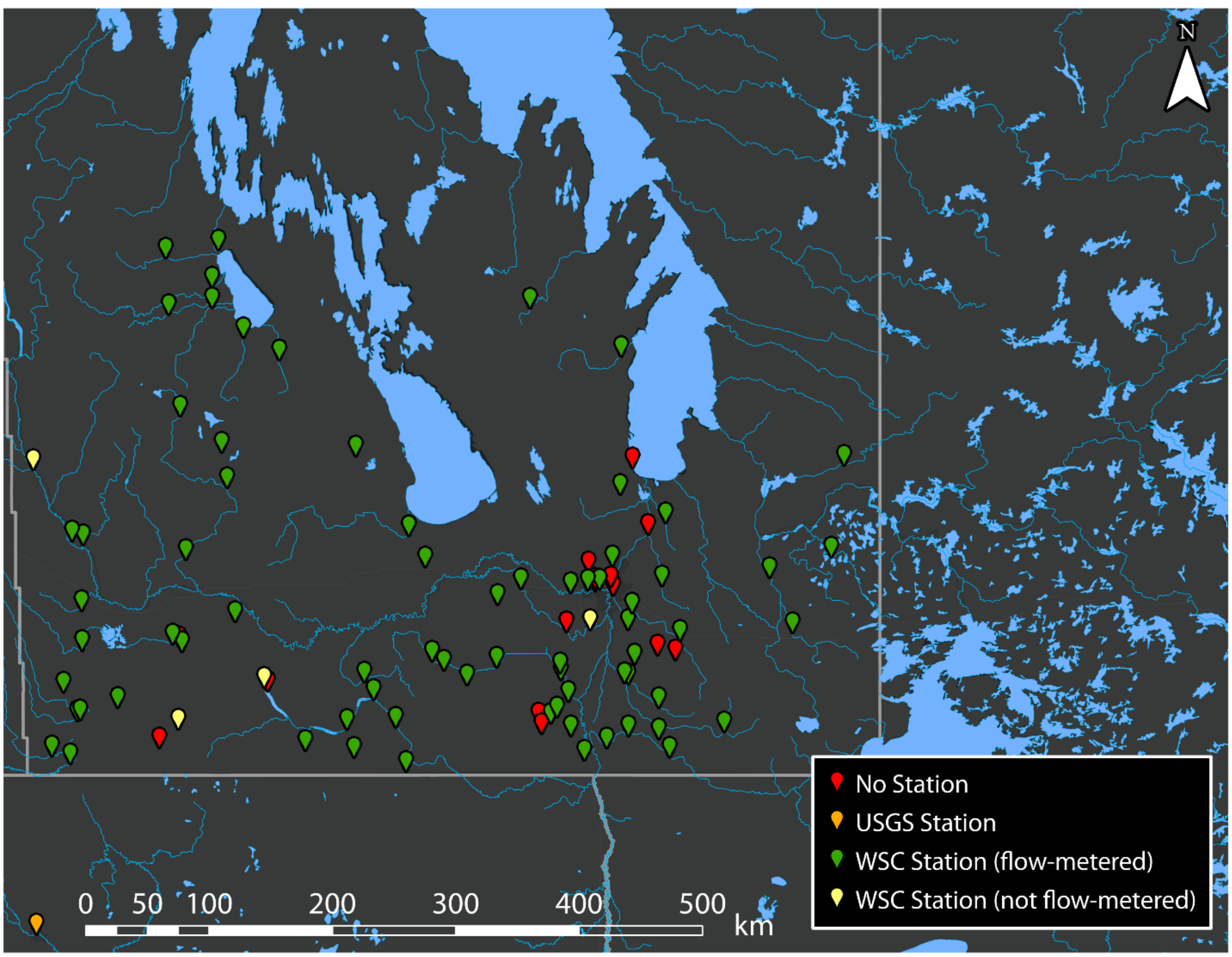


Figure 1: Map of LWCBMN sampling sites in 2021. Locations shown provided at least one sample. Colours indicate nearby station type.

Laboratory & Data Analysis

LWCBMN water samples are analysed for total phosphorus concentration. The analysis of a sample for total phosphorus (TP) is a two-step procedure involving first the chemical digestion/conversion of all P forms to orthophosphate (PO_4^{3-}) followed by the analysis of the concentration of PO_4^{3-}. The digestion procedure is patterned after USGS Water-Resources Investigations Report 03-4174. The concentration of PO_4^{3-} in the sample was determined following Murphy & Riley (1962). The result of this analytical method is determination of unfiltered total phosphorus in mg/L.

Laboratory analysis on LWCBMN water samples was conducted in partnership with Dr. Nora Casson at her laboratory at the University of Winnipeg. Quality assurance of laboratory methods for the determination of total phosphorus was completed on samples sent from Proficiency Testing Canada. Proficiency testing allows us to assess the quality of our results as compared to the results of other laboratories across the country. We received excellent passing grades of 92/100 in November 2023 and 94/100 in May 2024, further highlighting the consistency and accuracy of our laboratory methods.

Our laboratory results provide a record of the phosphorus concentrations for every day that water samples were collected, but we are equally interested in reporting the actual load of phosphorus each year in each watershed that we sample. To create this record, we multiply concentrations by the volume of water that flowed past the station every day, using flow data from Water Survey of Canada (WSC) stations.

WSC's real-time flow data subsequently undergoes additional quality assurance and quality control processes and is later published as historical flow data. Historical data is released by WSC as the official version of the data, with additional notes about unique site characteristics or considerations affecting data quality (e.g., the COVID-19 pandemic reduced field visits in 2020). Our 2020 data analysis used historical flow data.

For each station, gaps between concentration observations are filled by linear interpolation to create a continuous daily record. For the WSC flow record before or after the first or last water sample collected, we estimate the missing daily mean concentrations to be equal to the first or last measured concentration, respectively. These measured and estimated daily concentrations are then multiplied by daily flow to create a record of daily phosphorus loads.

Larger watersheds generate greater river flow and typically larger phosphorus loads. Comparing the intensity of phosphorus sources, especially among watersheds of varying sizes, is possible through the calculation of average load exported from each unit area of the watershed. Hence, we also report phosphorus export, which is simply the annual load divided by the watershed area that contributed to this load.

The export per unit area is indicative of the relative intensity of the sources generating phosphorus export, even among watersheds of different sizes. This is why we display maps of phosphorus export (and not load) in this report. Hotspots identified in these reports export several times more phosphorus per hectare than non-hotspot watersheds. Identifying hotspots can help government agencies to focus phosphorus reduction programs efficiently throughout the province.

LWCBMN By the Numbers - 2021

Table 1: Summary of 2021 LWCBMN sampling activity by region.

Region	Number of sites	Number of samples	Site with highest regional total phosphorus (TP) export (kg/ha/y)	Mean % of spring* water load	Mean % of spring* TP load
Assiniboine West	8	89	Little Saskatchewan River near Minnedosa - 0.037	40.81	42.41
Central Assiniboine	2	29	Cypress River near Bruxelles - 0.020	47.43	27.94
City of Winnipeg	6	35	Omand's Creek near Empress Street - 0.017	67.14	60.82
East Interlake	5	46	Grassmere Creek Drain near Middlechurch - 0.0073	77.41	79.81
Inter-Mountain	7	95	Ochre River near Ochre River - 0.062	47.06	37.13
Northeast Red	1	12	Devils Creek near Libau – 0.027	85.59	90.23
Pembina Valley	12	111	Kronsgart Drain near Sewell - 0.055	43.30	39.49
Redboine	11	150	La Salle River at Elie - 0.035	58.92	62.39
Souris	10	62	Pipestone Creek near Pipestone - 0.0046	43.07	40.61
Seine Rat Roseau	14	179	Manning Canal near Île-des-Chênes- 0.063	64.33	64.51
Whitemud	3	37	Whitemud River near Westbourne - 0.0072	66.49	58.92
Winnipeg River	4	66	Whiteshell River at outlet of Jessica Lake - 0.026	38.71	39.89

*LWCBMN defines "Spring" as March 1 to May 31, inclusive.

Raw data (phosphorus concentration and water flow) from LWCBMN's 2020 field season is available online at LakeWinnipegDataStream.ca, an open access hub for sharing water data.

Inter-Mountain Watershed District

The Inter-Mountain Watershed District (IMWD) was formed in 2020 from the amalgamation of the Turtle River Watershed Conservation District and the Intermountain Conservation District. The new IMWD is now one of the largest watershed districts in Manitoba, located in western Manitoba. The district has diverse topography, reaching from north of Duck Mountain Provincial Park, south to Riding Mountain National Park, and including portions of both these protected areas. In addition to agricultural activities, wastewater treatment plants and lagoons in municipalities throughout IMWD contribute phosphorus to local waterways, the largest being the city of Dauphin.

In partnership with LWCBMN, IMWD staff and volunteers sampled seven sites in the IMWD region, of which all were at actively monitored WSC flow meters.

IMWD Website (imwd.ca)

IMWD Watershed Plans (imwd.ca/iwmps.html)

IMWD Website

IMWD Watershed Plans

Characteristics of the 2021 Field Season

2021 was a very dry year in southern Manitoba[1]. As well, from March to May 2021, a historically important season for phosphorus export, most of southern Manitoba experienced severely to extremely dry conditions[2].

The mean peak discharge data across all LWCBMN sites with analyzed water samples was June 27, 2021 (with a standard deviation of 70.40 days). In 2021, an average of 54.60% of stream discharge occurred in spring (March 1 - May 31) across LWCBMN sites (with a standard deviation of 24.53%).

As a result of the extreme drought in 2021, there are no phosphorus exports above 0.5 (kg / ha / year) in any site in any region monitoring by LWCBMN in 2021[KF1].

[1] https://www.gov.mb.ca/sd/pubs/water/drought/2021/drought-conditions-report-october-2021.pdf
[2] https://www.gov.mb.ca/sd/pubs/water/drought/2021/drought_conditions_report_may_2021.pdf

Manitoba Watershed District Map

Manitoba's watershed districts are crucial partners contributing to the success of LWCBMN. In addition to assisting with sample collection, each district brings valuable community connections and a wealth of regional expertise to the network, helping us contextualize and better understand the data.

In 2021, 10 watershed districts participated in LWCBMN activities: Assiniboine West, Central Assiniboine, East Interlake; Inter-Mountain; Northeast Red, Pembina Valley, Redboine, Souris River, Seine Rat Roseau, and Whitemud.

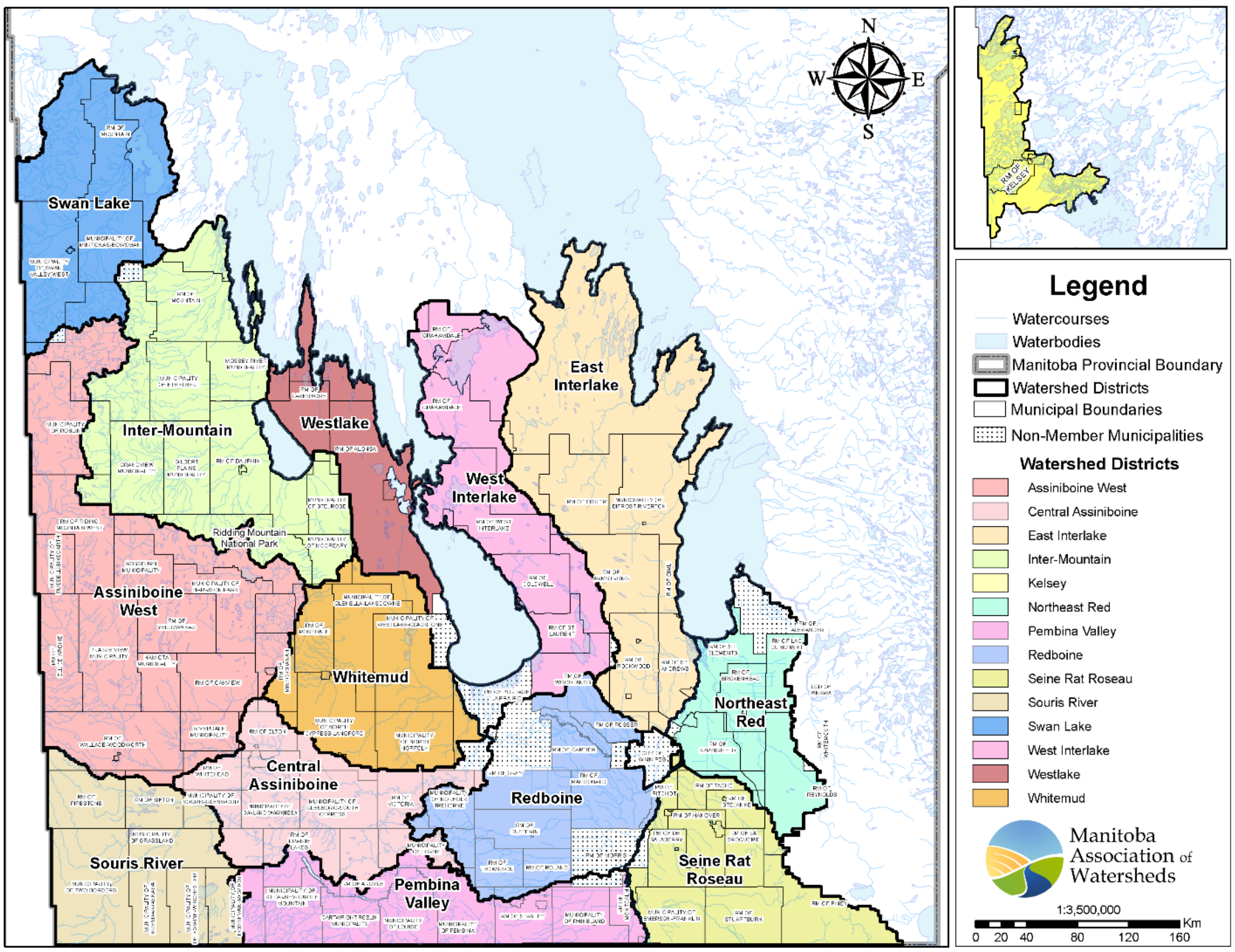


Figure 2: Manitoba Watershed District Boundaries. There are 14 total watershed districts. Map provided by Manitoba Association of Watersheds (updated July 2022).

2021 Results – Inter-Mountain Summary

Table 2: Summary of 2021 LWCBMN results in Inter-Mountain. Letters correspond to drainage areas in Figure 3. Data shown represents sites with sampling efforts adequate enough to calculate loads/exports. [1]See footnote for explanation of acronyms/abbreviations.

	Site Name	WSC Station	GDA (km^2)	IDA (km^2)	Gross/ Incr.	TP load (tonnes/y)	TP export (kg/ha/y)
A	Mink Creek near Ethelbert	05LJ019	135.80	NA	gross	0.13	0.0096
B	Mossy River Below Outlet of Dauphin Lake	05LJ025	8806.82	3013.02	incr.	-5.32	-0.018
C	Ochre River near Ochre River	05LJ005	359.88	NA	gross	2.25	0.062
D	Turtle River near Laurier	05LJ007	1027.92	NA	gross	1.14	0.011
E	Valley River near Dauphin	05LJ010	2936.51	NA	gross	0.77	0.0026
F	Vermillion River near Dauphin	05LJ012	665.34	NA	gross	1.01	0.015
G	Wilson River near Ashville	05LJ045	667.88	NA	gross	0.94	0.014

To compare 2021 results to other years of data, please see LWCBMN regional reports online at https://lakewinnipegfoundation.org/lwcbmn-regional-reports

[1] WSC = Water Survey of Canada.
GDA = gross drainage area (i.e., the total watershed area).
IDA = incremental drainage area (i.e., the total watershed area minus the total watershed area of any contained upstream sites with data adequate for load/export calculation).
Gross/Incr. = whether or not the adjacent TP load/export listed is from the gross or incremental ("Incr.") drainage area of a site.

2021 Results – Hotspot Map

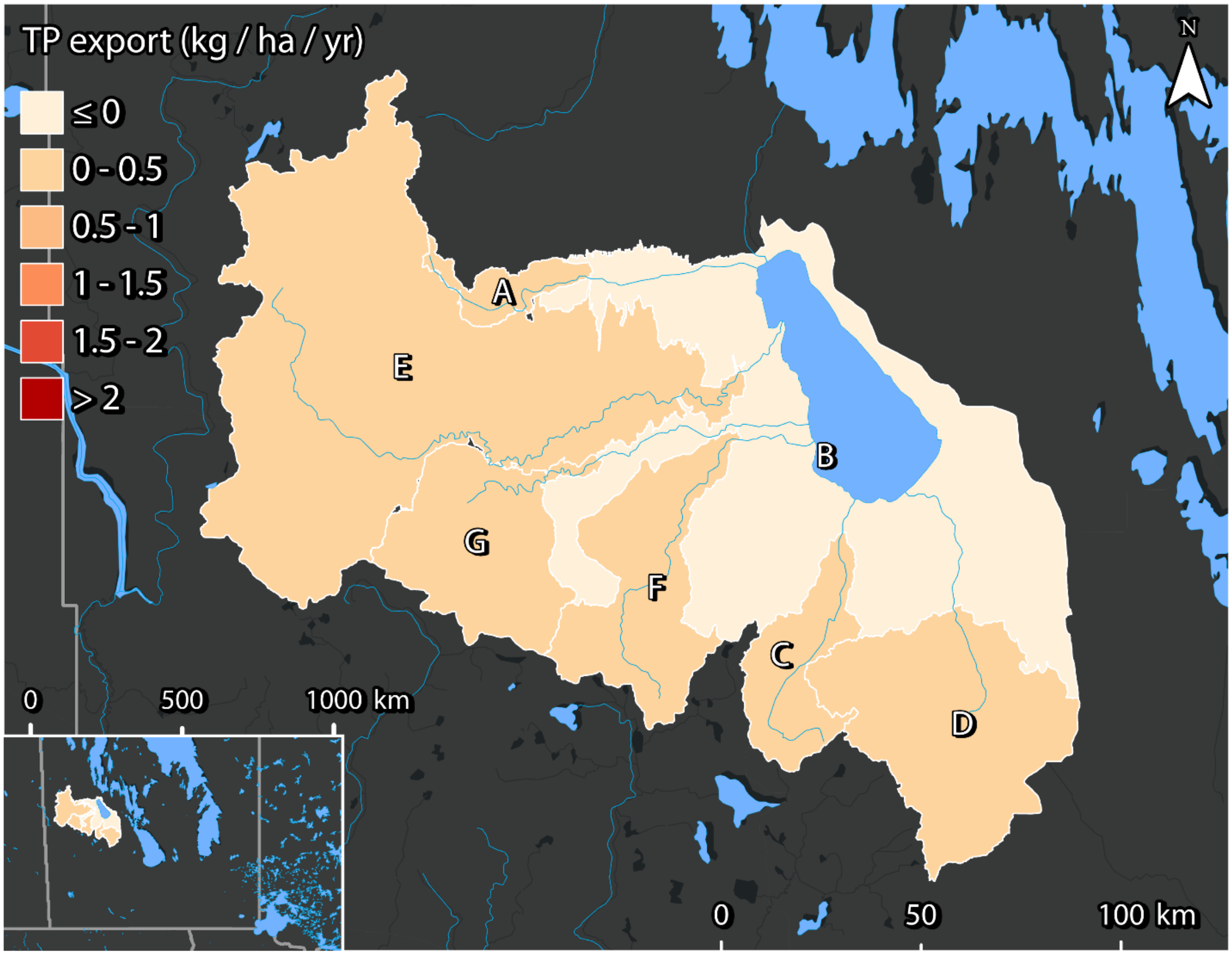


Figure 3: 2021 LWCBMN TP Export Hotspots in Inter-Mountain. Letters correspond to sites listed in Table 2.

2021 Results – Individual Sites

Mink Creek near Ethelbert

Mink Creek is the smallest of seven major tributaries flowing into Dauphin Lake. Mink Creek originates in the Duck Mountains and flows east towards Dauphin Lake. The drainage area is primarily comprised of grasslands and pastures. This site is located at Water Survey of Canada flow meter 05LJ019, near Ethelbert, MB. The sampling effort provided adequate coverage to calculate TP loads and exports.

Table 3: Indices of discharge and phosphorus from the gross drainage area of Mink Creek near Ethelbert (05LJ019) in 2021.

Gross drainage area:	135.8 km^2
Peak discharge:	2.44 $m^3 s^{-1}$ (2021-06-12)
Peak TP concentration:	0.096 mg/L (2021-08-24)
% of water load in spring:	57.11%
% of TP load in spring:	56.69%
Water load:	0.0032 $km^3 y^{-1}$
TP load:	0.13 tonnes P y^{-1}
Water export:	23.34 mm y^{-1}
TP export:	0.0096 kg P $ha^{-1} y^{-1}$

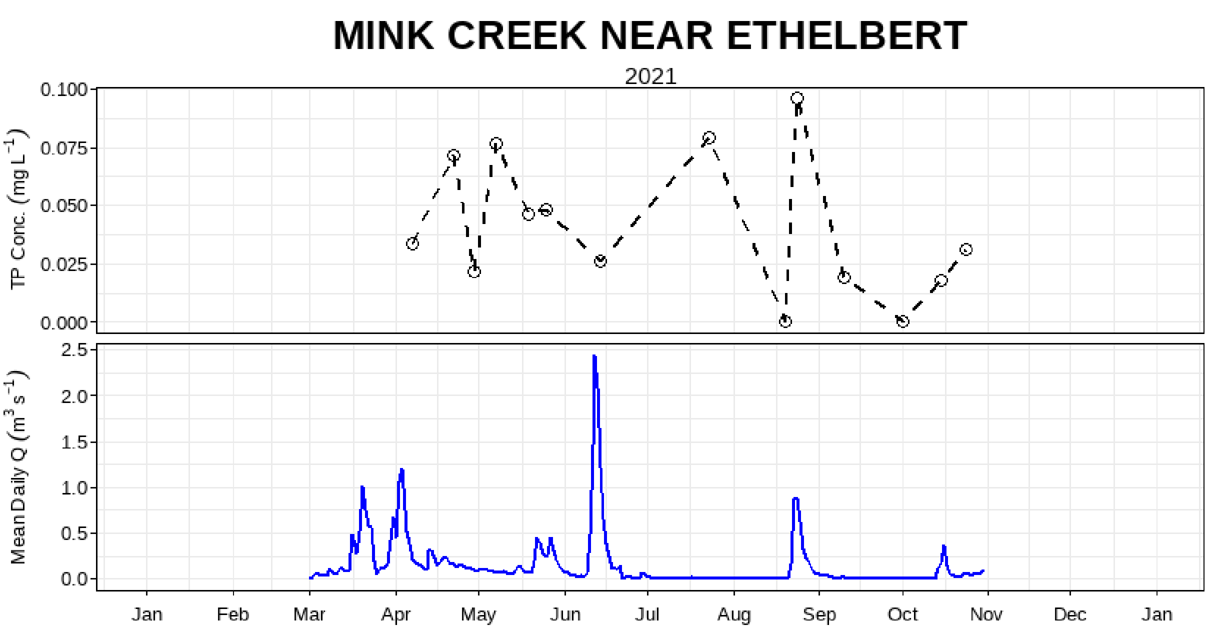


Figure 4: Mean daily discharge ($m^3 s^{-1}$) and total phosphorus concentration (mg L^{-1}) over the 2021 sampling season at Mink Creek near Ethelbert (05LJ019).

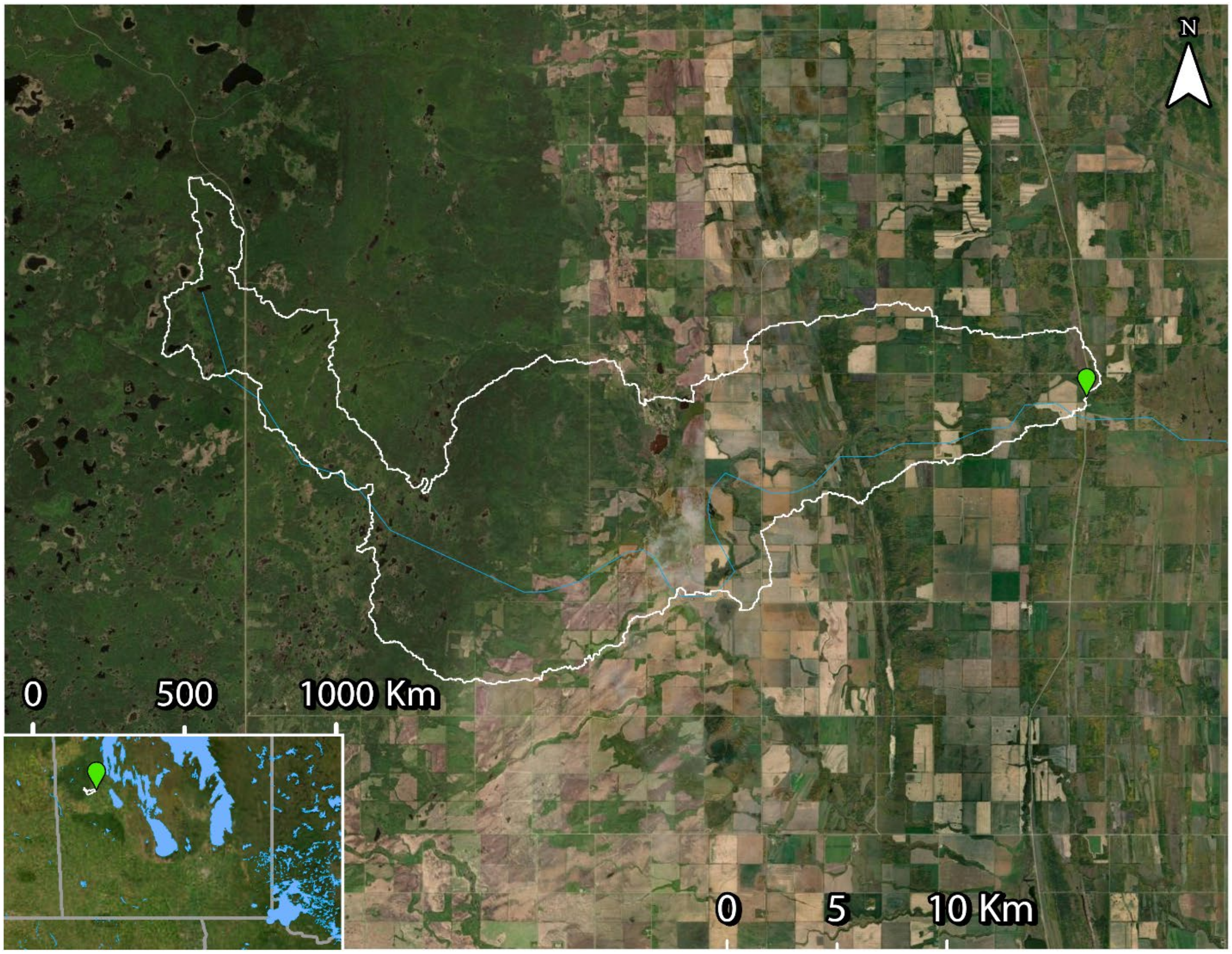


Figure 5: WSC station 05LJ019 (green) and drainage area polygon (white - source: WSC). LWCBMN samples directly at the WSC station.

Ochre River near Ochre River

Ochre River, one of seven major tributaries of Dauphin Lake, flows north from the Riding Mountains. The Ochre River sub-watershed is prone to flooding events which cause erosion. Primary land uses in surrounding areas include pastures and forested. This sampling site is located at Water Survey of Canada flow meter 05LJ005, at Ochre River. The sampling effort provided excellent coverage to calculate TP loads and exports.

Table 4: Indices of discharge and phosphorus from the gross drainage area of Ochre River near Ochre River (05LJ005) in 2021.

Gross drainage area:	359.88 km^2
Peak discharge:	21.4 $m^3 s^{-1}$ (2021-06-12)
Peak TP concentration:	0.26 mg/L (2021-06-13)
% of water load in spring:	41.20%
% of TP load in spring:	15.98%
Water load:	0.022 $km^3 y^{-1}$
TP load:	2.25 tonnes P y^{-1}
Water export:	60.52 mm y^{-1}
TP export:	0.062 kg P $ha^{-1} y^{-1}$

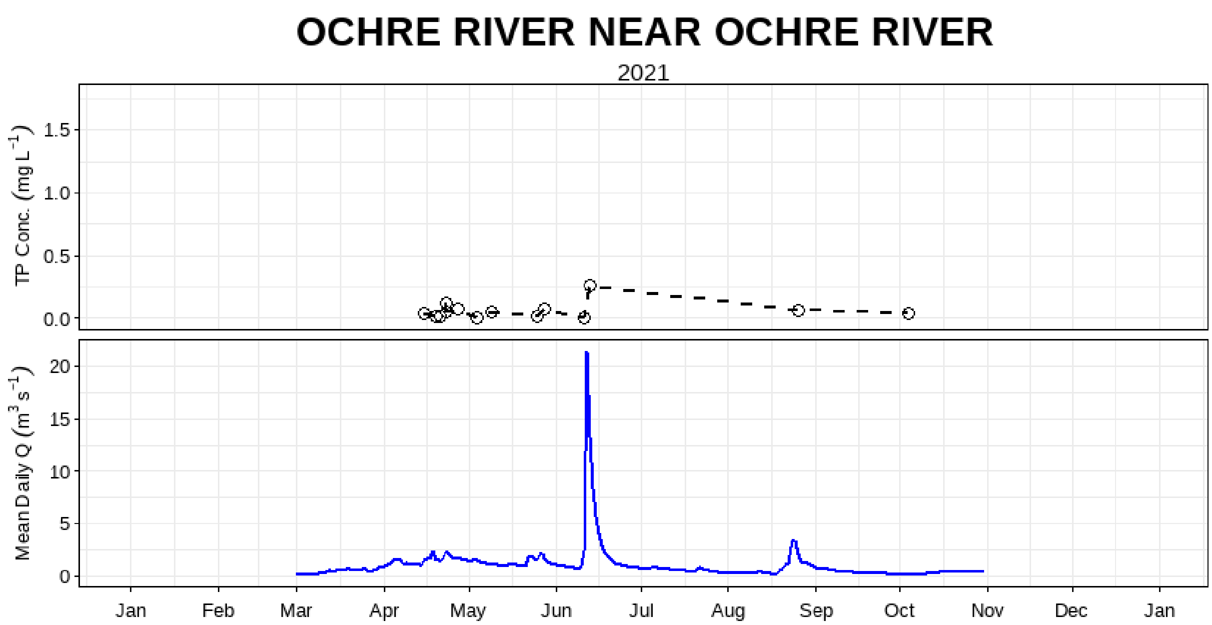


Figure 6: Mean daily discharge ($m^3 s^{-1}$) and total phosphorus concentration (mg L^{-1}) over the 2021 sampling season at Ochre River near Ochre River (05LJ005).

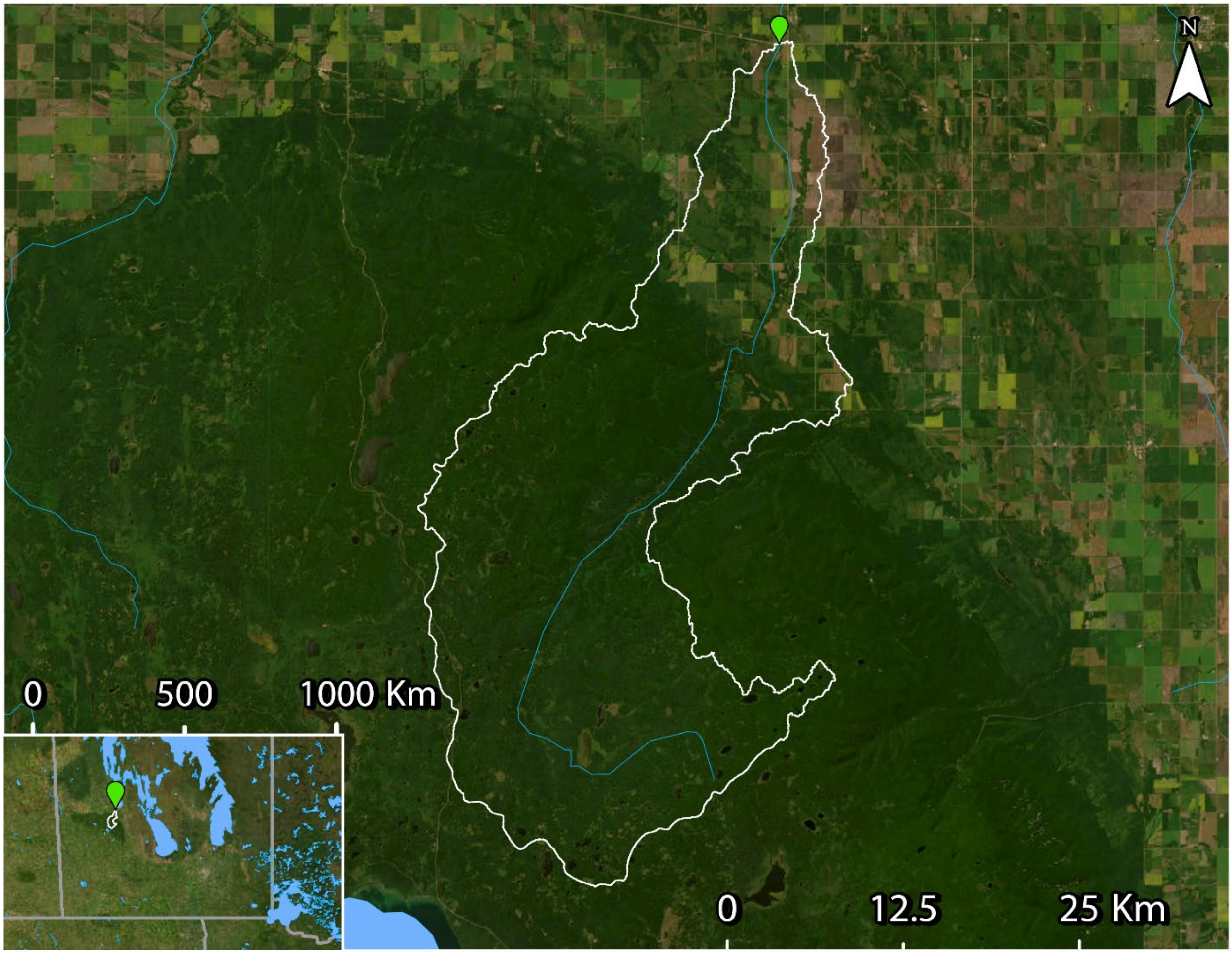


Figure 7: WSC station 05LJ005 (green) and drainage area polygon (white - source: WSC). LWCBMN samples directly at the WSC station.

Turtle River near Laurier

Turtle River originates from the Riding Mountains and flows north into Dauphin Lake. Turtle River is one of seven major tributaries that flows into Dauphin Lake. The Turtle River is located in the low-lying region west of Dauphin Lake and drains a largely agricultural area, consisting mainly of cropland and forested land. This sampling site is located at Water Survey of Canada flow meter 05LJ007, near Laurier, MB. The sampling effort provided excellent coverage to calculate TP loads and exports.

Table 5: Indices of discharge and phosphorus from the gross drainage area of Turtle River near Laurier (05LJ007) in 2021.

Gross drainage area:	1027.92 km^2
Peak discharge:	30.3 $m^3 s^{-1}$ (2021-06-12)
Peak TP concentration:	0.11 mg/L (2021-06-14)
% of water load in spring:	53.08%
% of TP load in spring:	35.96%
Water load:	0.021 $km^3 y^{-1}$
TP load:	1.14 tonnes P y^{-1}
Water export:	20.06 mm y^{-1}
TP export:	0.011 P $ha^{-1} y^{-1}$

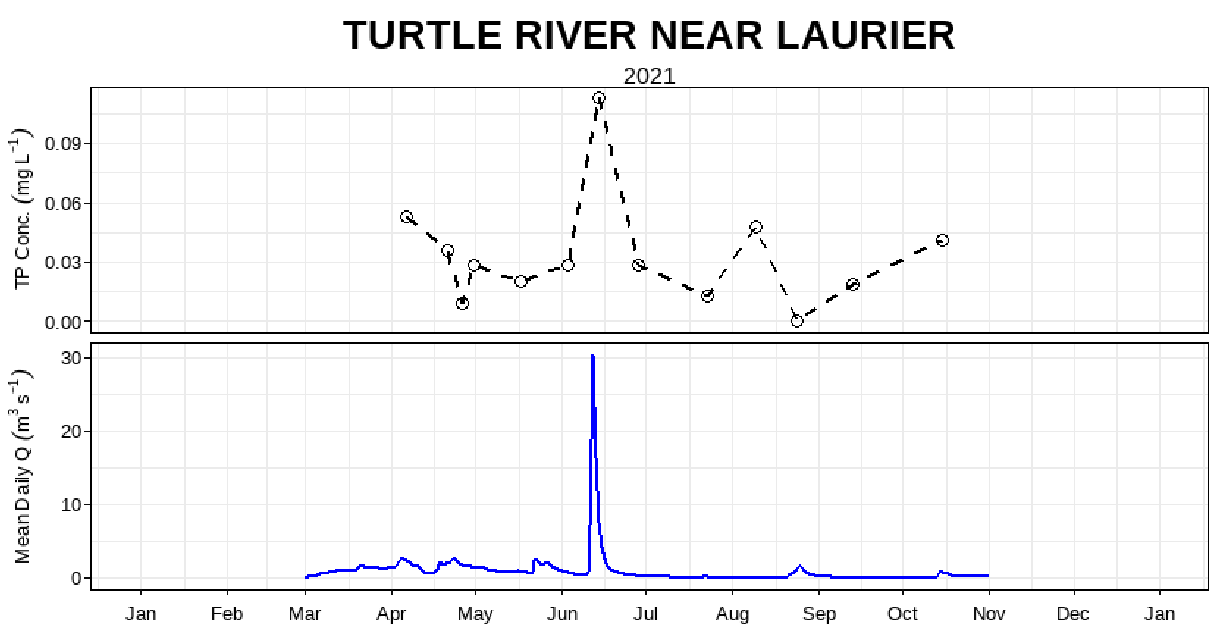


Figure 8: Mean daily discharge ($m^3 s^{-1}$) and total phosphorus concentration (mg L^{-1}) over the 2021 sampling season at Turtle River near Laurier (05LJ007).

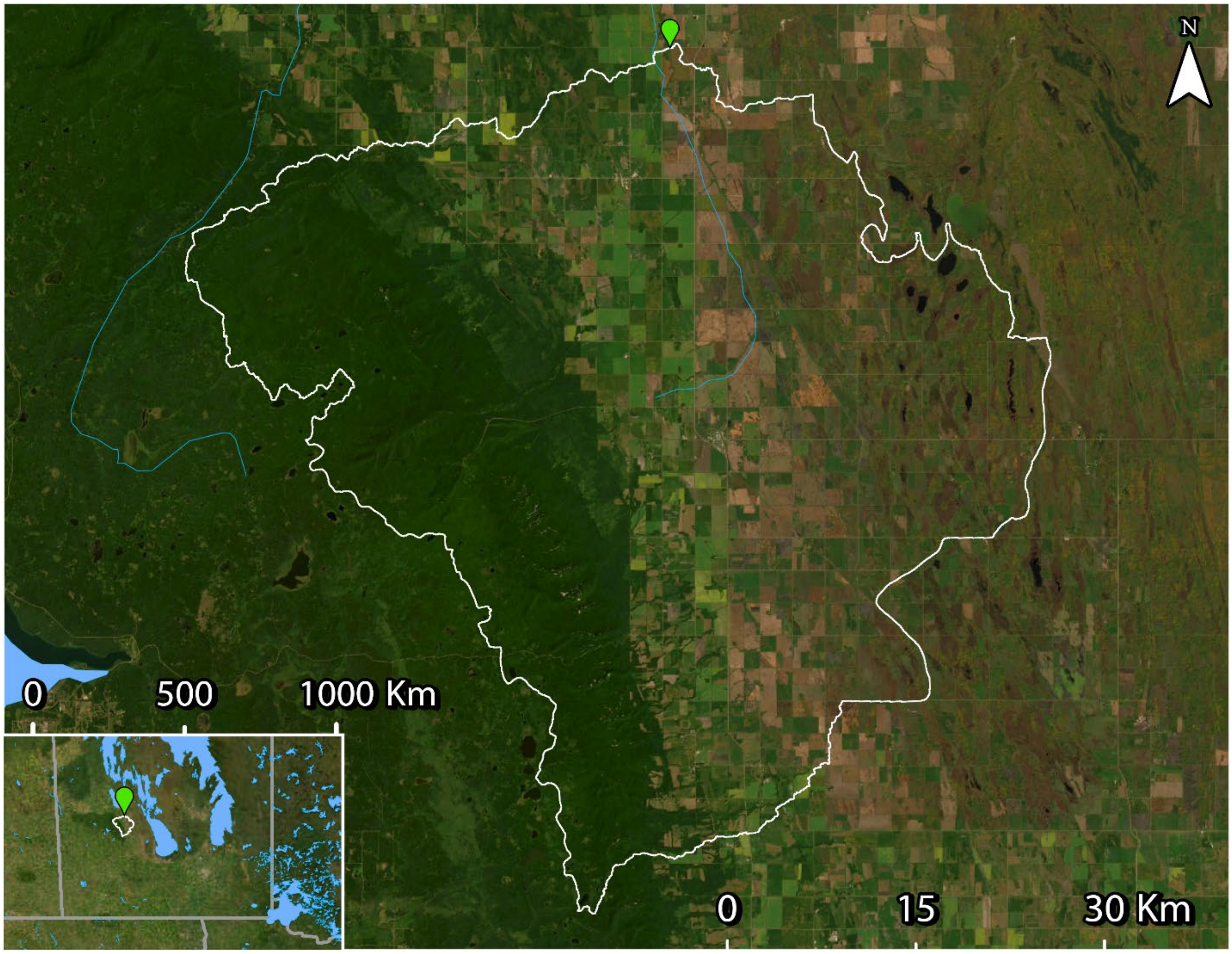


Figure 9: WSC station 05LJ007 (green) and drainage area polygon (white – source: WSC). LWCBMN samples directly at the WSC station.

Valley River near Dauphin

Valley River originates in the Duck Mountains before flowing northeast into Dauphin Lake. Valley River is one of seven major tributaries flowing into Dauphin Lake. Valley River has a drainage area consisting primarily of marsh wetlands and pasture land. This sampling site is located at Water Survey of Canada flow meter 05LJ010, near Dauphin, MB. The sampling effort provided excellent coverage to calculate TP loads and exports.

Table 6: Indices of discharge and phosphorus from the gross drainage area of Valley River near Dauphin (05LJ010) in 2021.

Gross drainage area:	2936.51 km^2
Peak discharge:	16.4 $m^3 s^{-1}$ (2021-06-13)
Peak TP concentration:	0.069 mg/L (2021-09-03)
% of water load in spring:	39.92%
% of TP load in spring:	28.84%
Water load:	0.026 $km^3 y^{-1}$
TP load:	0.77 tonnes P y^{-1}
Water export:	9.02 mm y^{-1}
TP export:	0.0026 kg P $ha^{-1} y^{-1}$

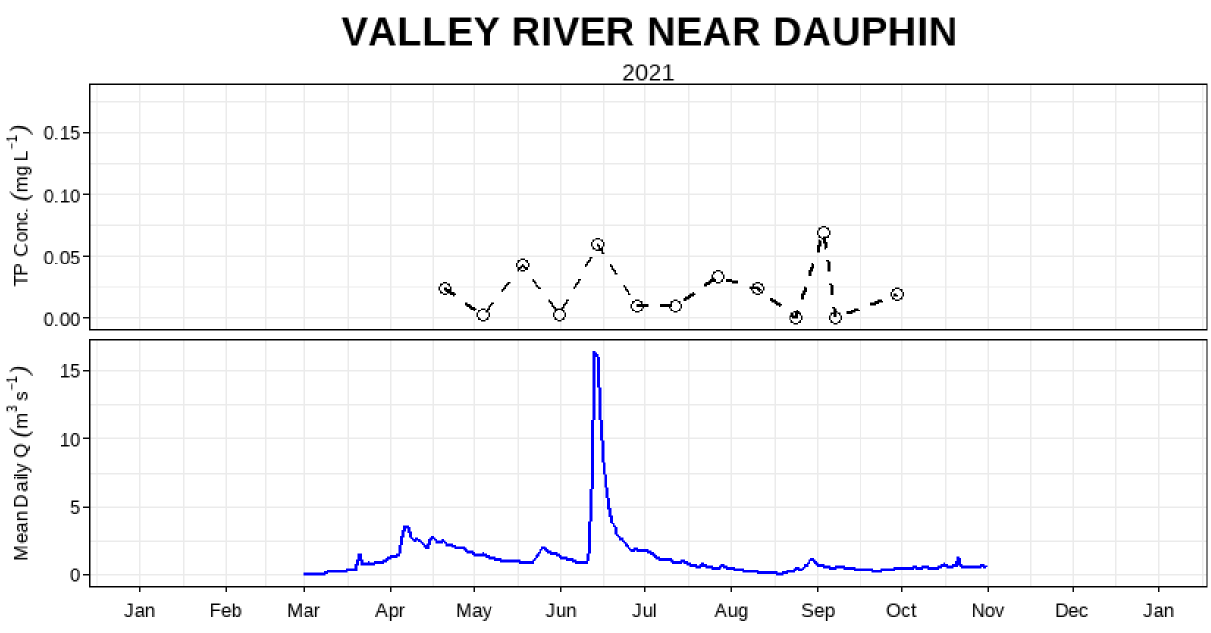


Figure 10: Mean daily discharge ($m^3 s^{-1}$) and total phosphorus concentration (mg L^{-1}) over the 2021 sampling season at Valley River near Dauphin (05LJ010).

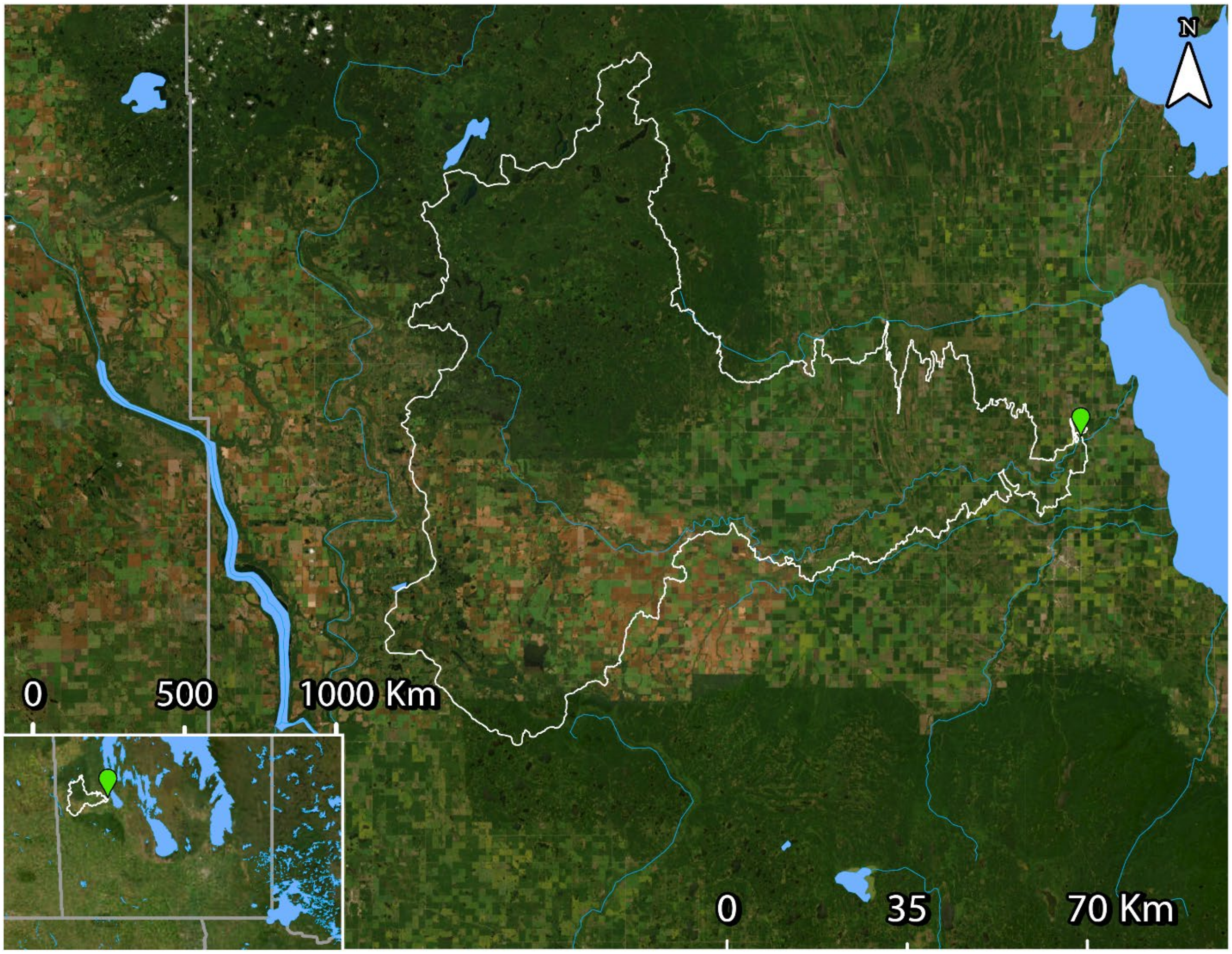


Figure 11: WSC station 05LJ010 (green) and drainage area polygon (white – source: WSC). LWCBMN samples directly at the WSC station.

Vermillion River near Dauphin

Vermillion River originates in the Riding Mountains and flows northeast into Dauphin Lake. Vermillion River is one of seven major tributaries that flows into Dauphin Lake. The adjacent land is comprised of pasture land, forages and forested land. The river is characterized by rapid silt runoff which is due to the steep slopes of the Riding Mountains. The rapid runoff causes bank erosion. This sampling site is located at Water Survey of Canada flow meter 05LJ012, near Dauphin, MB. The sampling effort provided excellent coverage to calculate TP loads and exports.

Table 7: Indices of discharge and phosphorus from the gross drainage area of Vermillion River near Dauphin (05LJ012) in 2021.

Gross drainage area:	665.34 km^2
Peak discharge:	15.7 $m^3\ s^{-1}$ (2021-06-13)
Peak TP concentration:	0.11 mg/L (2021-10-08)
% of water load in spring:	56.25%
% of TP load in spring:	52.39%
Water load:	0.019 $km^3\ y^{-1}$
TP load:	1.01 tonnes P y^{-1}
Water export:	28.31 mm y^{-1}
TP export:	0.015 kg P $ha^{-1}\ y^{-1}$

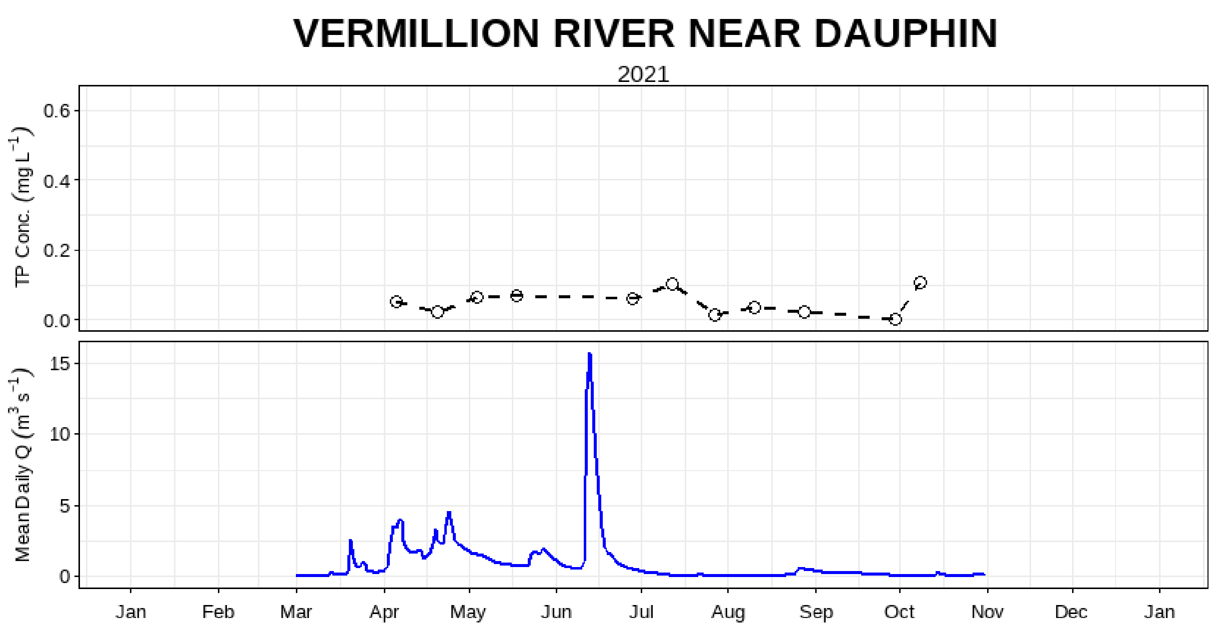


Figure 12: Mean daily discharge ($m^3\ s^{-1}$) and total phosphorus concentration (mg L^{-1}) over the 2021 sampling season at Vermillion River near Dauphin (05LJ012).

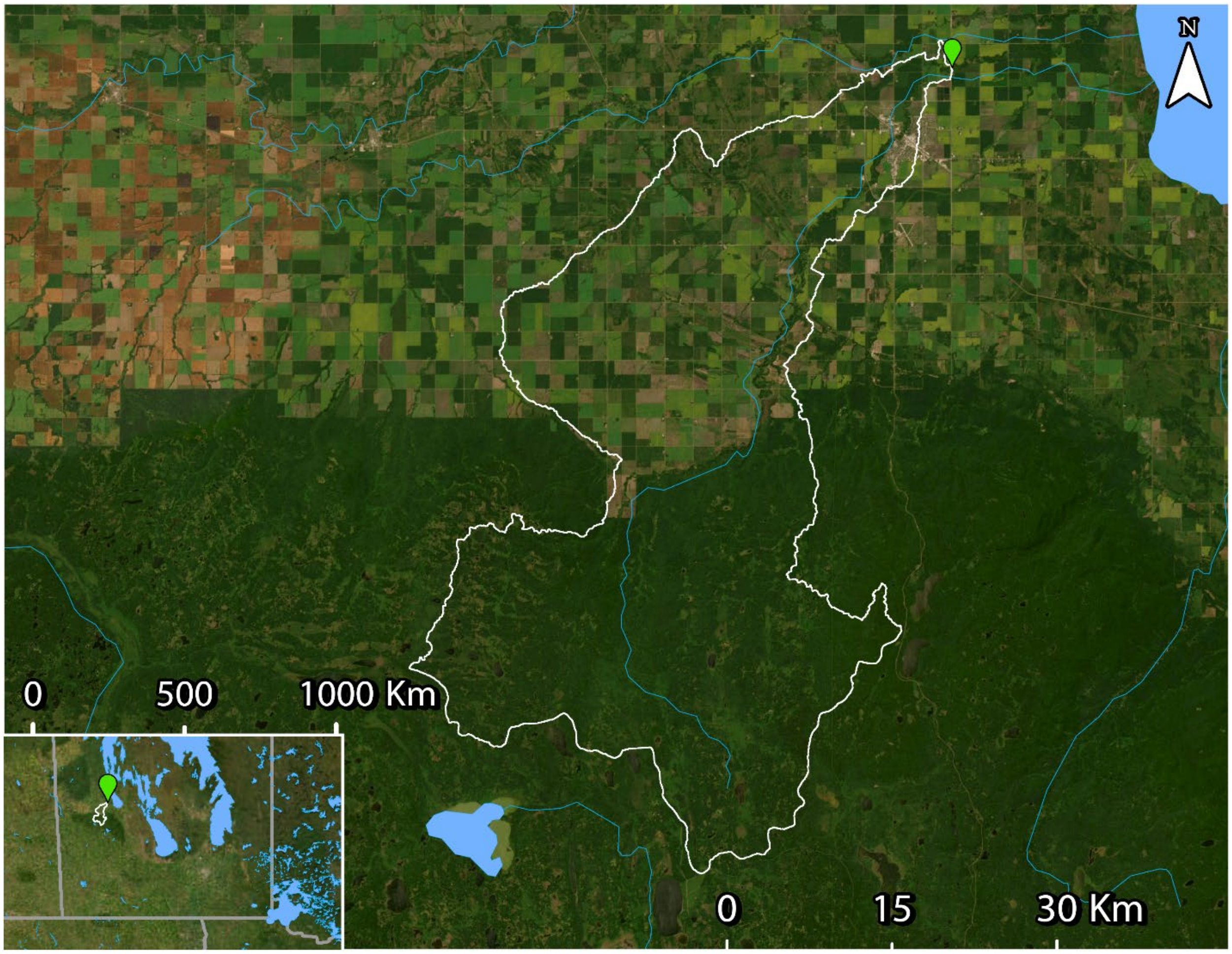


Figure 13: WSC station 05LJ012 (green) and drainage area polygon (white – source: WSC). LWCBMN samples directly at the WSC station.

Wilson River near Ashville

Wilson River originates in the Riding Mountains and flows east into Dauphin Lake. Wilson River is one of seven major tributaries that flows into Dauphin Lake. The Wilson River drains an area consisting of primarily cropland and pastures. The Wilson River is located in the low-lying region west of Dauphin Lake. This sampling site is located at Water Survey of Canada flow meter 05LJ045, near Ashville, MB. The sampling effort provided excellent coverage to calculate TP loads and exports.

Table 8: Indices of discharge and phosphorus from the gross drainage area of Wilson River near Ashville (05LJ045) in 2021.

Gross drainage area:	667.88 km^2
Peak discharge:	12.5 $m^3 s^{-1}$ (2021-06-12)
Peak TP concentration:	0.19 mg/L (2021-06-14)
% of water load in spring:	47.89%
% of TP load in spring:	29.15%
Water load:	0.0072 $km^3 y^{-1}$
TP load:	0.94 tonnes P y^{-1}
Water export:	10.79 mm y^{-1}
TP export:	0.014 kg P $ha^{-1} y^{-1}$

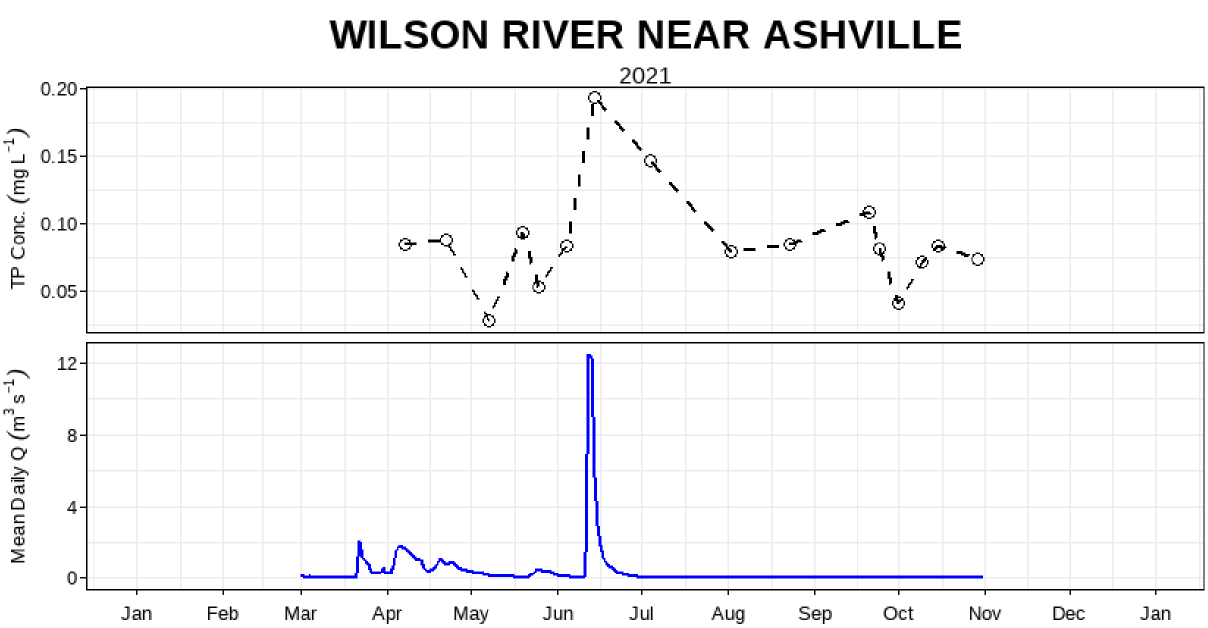


Figure 14: Mean daily discharge ($m^3 s^{-1}$) and total phosphorus concentration (mg L^{-1}) over the 2021 sampling season at Wilson River near Ashville (05LJ045).

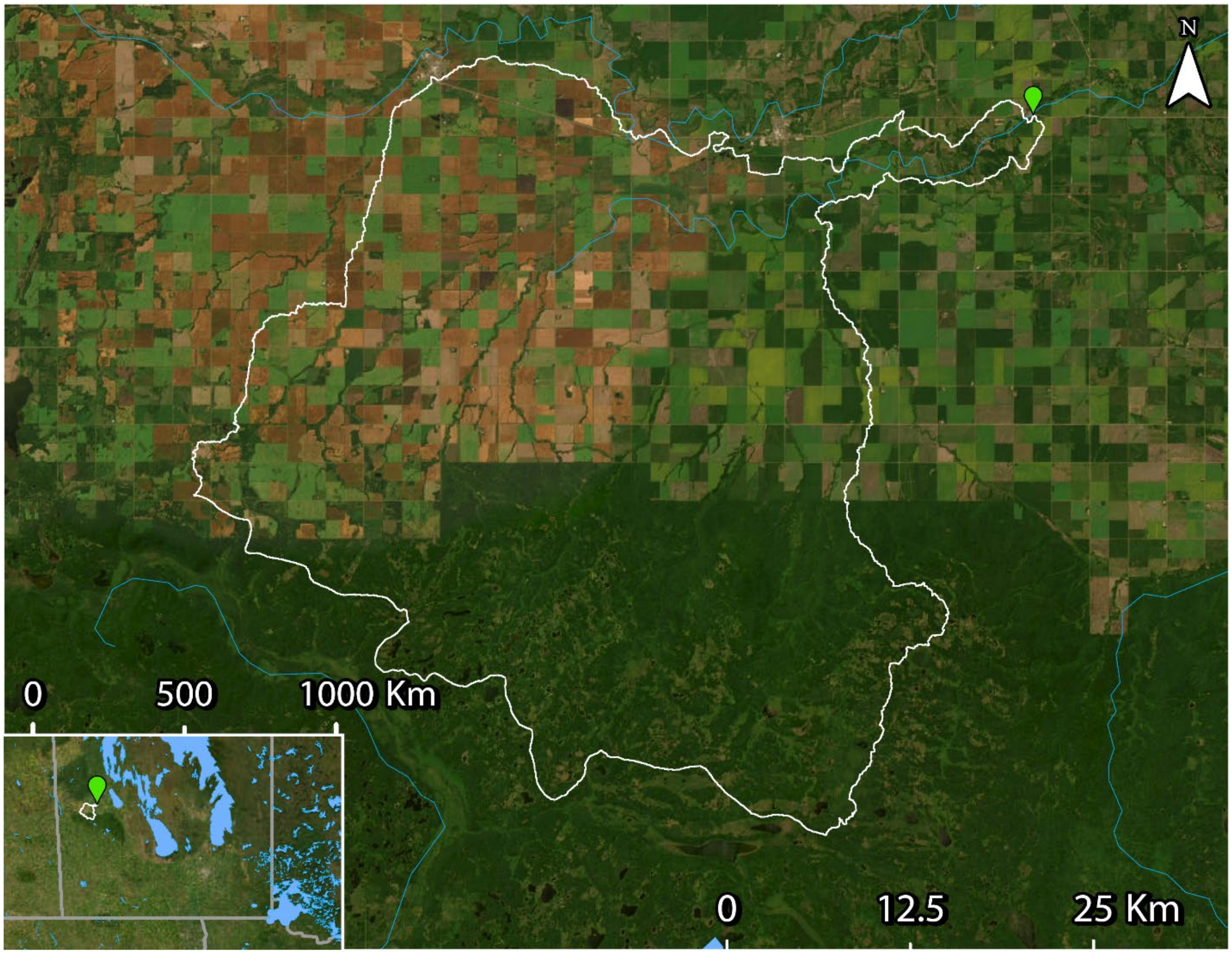


Figure 15: WSC station 05LJ045 (green) and drainage area polygon (white – source: WSC). LWCBMN samples directly at the WSC station.

Mossy River below outlet of Dauphin Lake

The Mossy River flows for 35 km from Dauphin Lake north into Lake Winnipegosis. Mossy River is the only outlet of Dauphin Lake. This site is located at WSC station 05LJ025, below the outlet of Dauphin Lake. The sampling effort provided adequate coverage to calculate TP loads and exports.

Table 9: Indices of discharge and phosphorus from the incremental drainage area of Mossy River below outlet of Dauphin Lake (05LJ025). See Supplemental Table 1 for gross calculations.

Incremental drainage area:	3013.02 km^2
Peak discharge:	4.37 m^3 s^{-1} (2021-06-16)
Peak TP concentration:	0.094 mg/L (2021-04-07)
% of water load in spring:	36.26%
% of TP load in spring:	37.84%
[1]Incremental water load:	-0.080 km^3 y^{-1}
[1]Incremental TP load:	-5.32 tonnes P y^{-1}
[2]Incremental water export:	26.67 mm y^{-1}
[2]Incremental TP export:	-0.018 kg P ha^{-1} y^{-1}

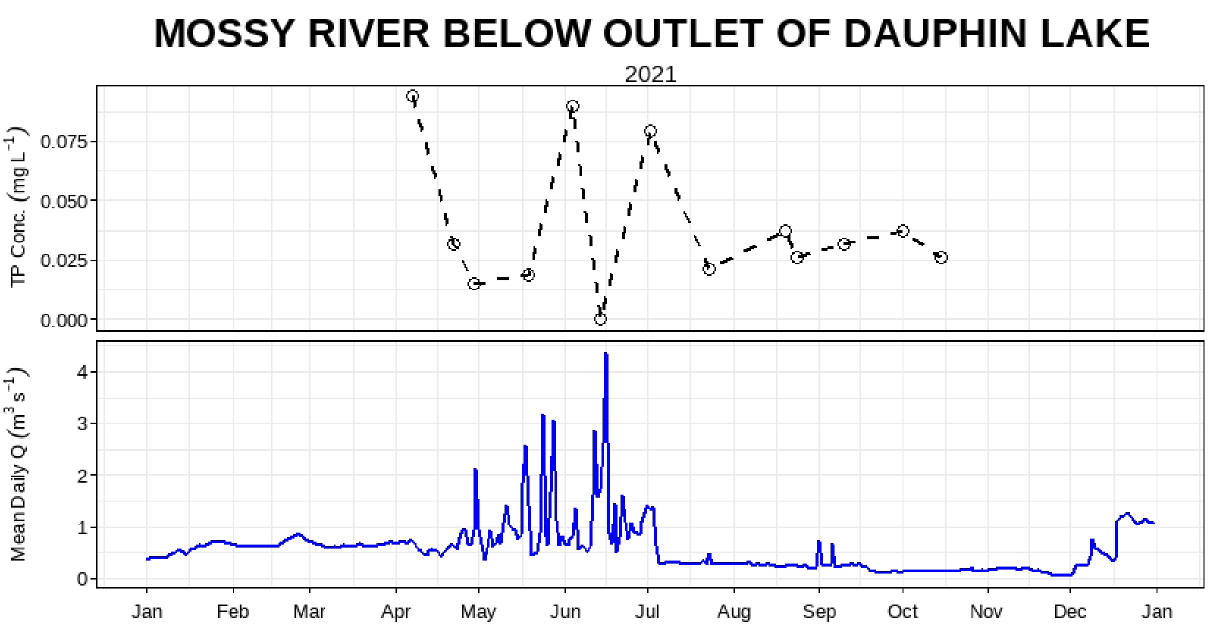


Figure 16: Mean daily discharge (m^3 s^{-1}) and total phosphorus concentration (mg L^{-1}) over the 2021 sampling season at Mossy River below outlet of Dauphin Lake (05LJ025).

[1] Incremental values are calculated by subtracting "Mink Creek near Ethelbert", "Ochre River near Ochre River", "Turtle River near Laurier", Valley River near Dauphin", "Vermillion River near Dauphin", and "Wilson River near Ashville" values from "Mossy River below outlet of Dauphin Lake" values.

[2] Incremental exports are calculated by dividing incremental loads by incremental drainage areas.

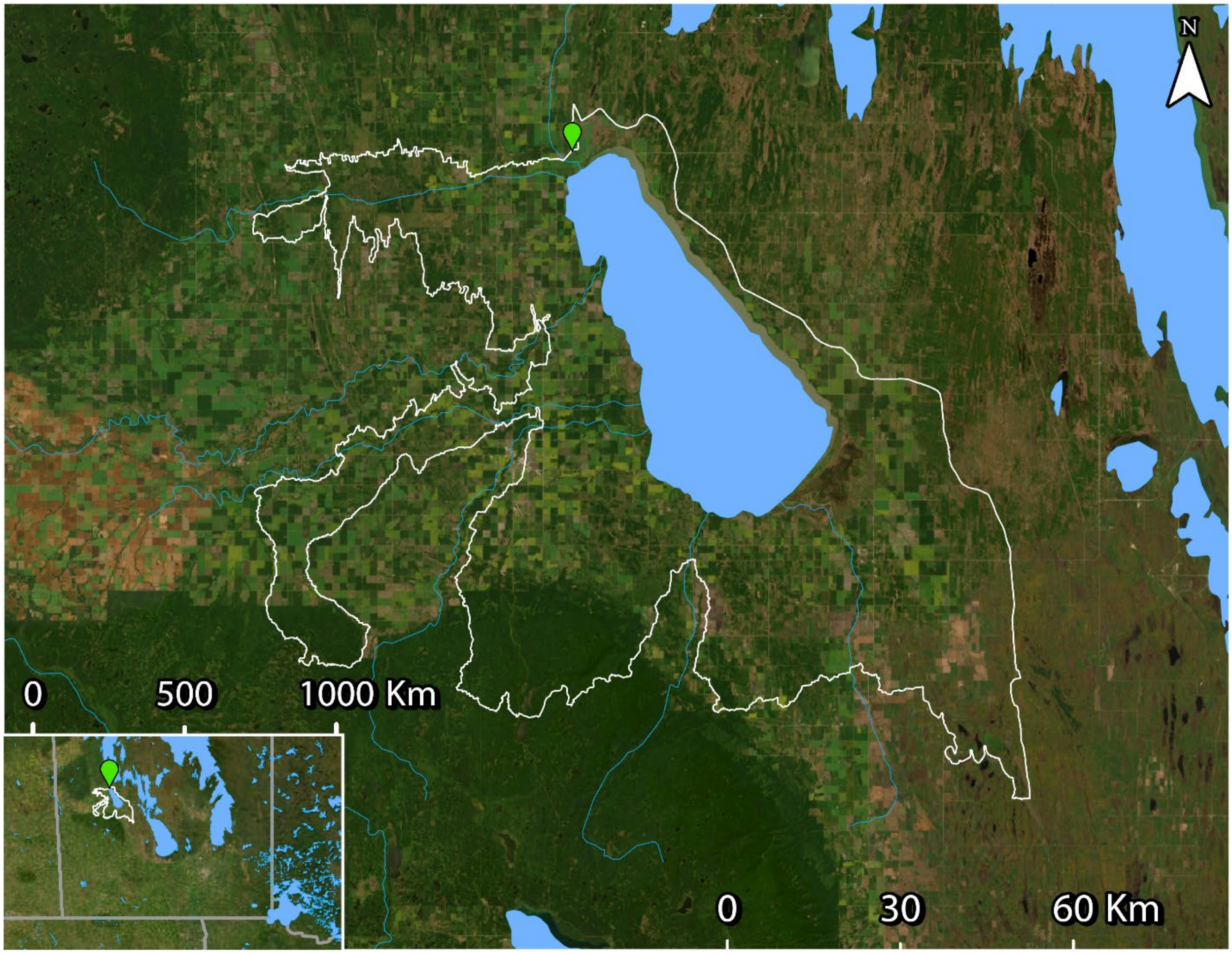


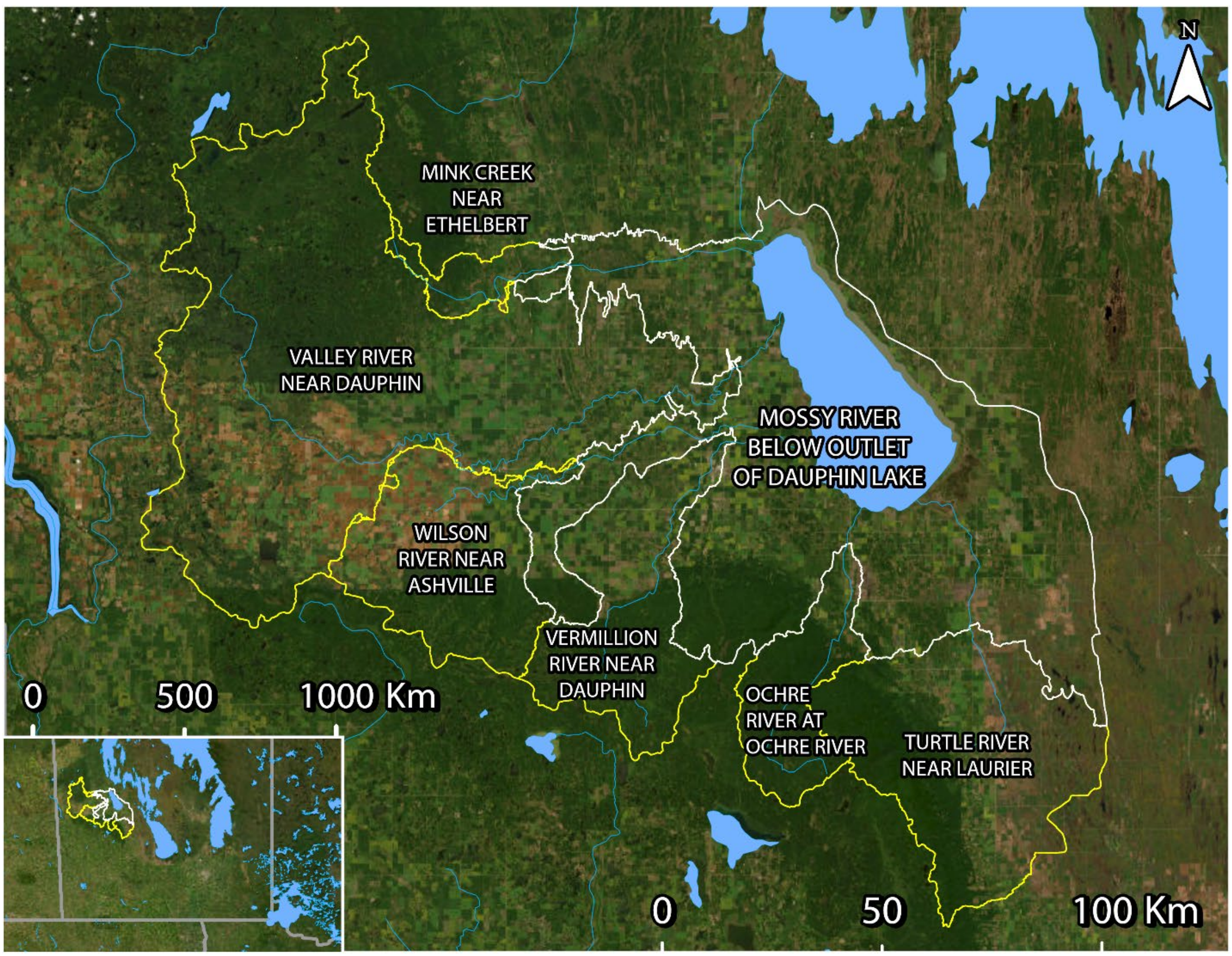
Figure 17: WSC station 05LJ025 (green), and incremental drainage area polygon (white - source: WSC). See Supplemental Figure 1**Error! Reference source not found.** for upstream drainage areas used to calculate incremental area. LWCBMN samples directly at the WSC station.

Incremental Calculations

Mossy River below outlet of Dauphin Lake

Supplemental Table 1: Indices of discharge and phosphorus from the combined gross drainage area and stream discharge of Mossy River below outlet of Dauphin Lake (05LJ025).

Gross drainage area:	8806.82 km^2
Water load:	0.018 $km^3\ y^{-1}$
TP load:	0.92 tonnes P y^{-1}
Water export:	2.01 mm y^{-1}
TP export:	0.0010 kg P $ha^{-1}\ y^{-1}$



Supplemental Figure 1: Incremental drainage area in white and upstream drainage areas in yellow. Incremental values are calculated by subtracting “Mink Creek near Ethelbert”, “Ochre River near Ochre River”, “Turtle River near Laurier”, Valley River near Dauphin”, “Vermillion River near Dauphin”, and “Wilson River near Ashville” values from “Mossy River below outlet of Dauphin Lake” values.

Map Sources

Drainage area polygons

Primarily, and whenever possible, drainage area polygons were taken from the Water Survey of Canada's (WSC) National Hydrometric Network Basin Polygons. Released on July 15, 2022, this prerelease version of the dataset contains drainage area polygons for over 7300 of the 7896 active and discontinued WSC stations. According to WSC, this dataset will continue to be updated as new polygons are added. For our analysis, we used drainage areas from this dataset.

Link: https://catalogue.ec.gc.ca/geonetwork/srv/eng/catalog.search#/metadata/0c121878-ac23-46f5-95df-eb9960753375

Secondarily, when no WSC drainage area polygons were available, or when it was necessary to enable accurate incremental calculations, we used drainage area polygons from the Total Gross Drainage Areas of the Agriculture and Agri-Food Canada (AAFC)'s Watersheds Project – 2013

Link: https://open.canada.ca/data/en/dataset/67c8352d-d362-43dc-9255-21e2b0cf466c

Due to the required use of drainage area polygons from two different datasets, some polygons may slightly overlap. Hotspot maps, as a result, have a few instances where a drainage area is visually cut off. However, most of these instances are very minor, and we display all watersheds in their full extent on each sampling site's individual section.

Map layers

Satellite imagery used in all maps is from the World Imagery map layer (Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community). World Imagery provides one meter or better satellite and aerial imagery in many parts of the world and lower resolution satellite imagery worldwide.

Lake and river map data used in all maps is from North America Environmental Atlas (Lakes, Rivers). The North American Environmental Atlas – Lakes & Rivers datasets display area hydrographic features (Lakes: major lakes and reservoirs; Rivers: major rivers, streams, and canals) of North America at a reference spatial scale of 1:1,000,000. Credits: Commission for Environmental Cooperation (CEC). 2023. "North American Atlas – Lakes and Rivers". Natural Resources Canada (NRCan), Instituto Nacional de Estadística y Geografía (INEGI), Comisión Nacional del Agua (CONAGUA), U.S. Geological Survey (USGS). Ed. 3.0, Vector digital data [1:1,000,000].

The **Lake Winnipeg Community-Based Monitoring Network** (LWCBMN) is a collaborative, long-term phosphorus monitoring program designed to identify localized phosphorus hotspots where action is required to improve Lake Winnipeg water quality. LWCBMN mobilizes citizen volunteers and watershed partners to collect water samples across Manitoba, generating robust water-quality data that is useful to community practitioners, academic researchers, government scientists and policy-makers alike. Focusing research, resources and action in phosphorus hotspots is necessary to reduce phosphorus loading to Lake Winnipeg.

LWCBMN is delivered in partnership with Manitoba's watershed districts, LWF's science advisors, volunteer citizen scientists and Dr. Nora Casson's laboratory at the University of Winnipeg. Thank you to all who make this network possible!

The **Lake Winnipeg Foundation** (LWF) advocates for change and coordinates action to improve the health of Lake Winnipeg. Combining the commitment of our grassroots membership and the expertise of our science advisors, LWF is nationally recognized for our unique capacity to link science and action. Our goal is to ensure policy and practices informed by evidence are implemented and enforced.

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