

FortWhyte Alive Winnipeg Riverwatch Report

Prepared with Student Data: September 2017 – October 2018

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INTRODUCTION

Thank you to all the schools that participated in Winnipeg Riverwatch sessions this fall!

Our second fall session of Riverwatch is now complete, leaving us with some neat comparative results for some sites for fall 2017, spring 2018, and fall 2018 monitoring.

Results indicated fair to good water quality for the rivers, streams, and ponds we tested, relative to expected values. Read on for descriptions and graphs of our findings, as well as Activity suggestions to further your learning with the data we collected.

You can also view your findings at www.scecoinstitute.com under the Winnipeg Watershed section.

RESULTS

1. Transparency and Turbidity

Groups measured the transparency and turbidity of the water as two ways to understand how clear the water is. Water clarity is affected by the concentration of particulate, such as sediment or algae, as well as the presence or absence of dissolved substances in the water (e.g. dissolved organic carbon – think of tea-coloured water resulting from plant decomposition).

The transparency tube allows us to use our eyes to determine the water clarity, while the turbidity meter allows us to press a button and get a reading of how much light was scattered off particles in the water, giving us a result in “Nephelometric Turbidity Units” or NTU.

These values can help us to understand what is currently “normal” for the water body, and will enable us to notice changes in the future that may be “abnormal.” An increase or a decrease in clarity from the normal value can put stress on plants, fish and invertebrates.

The Red River is often very turbid, due to the clay-rich sediment that is carried downstream by the current. Smaller streams are less turbid, but show more dramatic increases with rainfall events or runoff. The Turbidity Summary also compares three sampling sessions at five sites.

ACTIVITY:

- Using the data summary table provided, compare the relationships of Transparency Tube (cm) with Turbidity (NTU). More information on the relationship between these two values can be found at: <https://extension.psu.edu/fish-understanding-your-transparency-tube-measurements>

2. Phosphorus (mg/L or ppm)

Groups completed phosphorus tests using a La Motte Low Range Phosphate test kit, which tests for the level of orthophosphate. Orthophosphate (PO_4^{3-}) is a reactive form of phosphorus dissolved in water that is readily available to plants and algae.

The kit results indicated that levels in five (5) Winnipeg sites tested fall 2017, spring 2018, and fall 2018 ranged from a detection of 0 mg/L up to 2 mg/L.

Comparing fall and spring results, the spring samples contained higher phosphorus concentrations than fall samples; this difference was more pronounced in smaller creeks (Sturgeon Creek, Seine River, and Bunn's Creek) and less so in the Red and Assiniboine Rivers. Our student data is supported by scientific research; according to Lake Winnipeg Health reports, the majority of dissolved phosphorus that enters Lake Winnipeg does so during the spring flood season as snow meltwater runs overland, picking up phosphorus from the landscape to deliver it quickly into rivers and streams.

In urban or agricultural areas, we expected a value between 0.7 mg/L and 1.2 mg/L, while forested areas with natural landscapes can produce values less than 0.1 mg/L, according to findings by the Lake Winnipeg Foundation

CBM Network. Our values were consistent with urban areas, though spring 2018 values in the Seine River and Bunn's Creek exceeded expected urban values.

Human activity on the landscape has increased the phosphorus concentrations in rivers and streams in Lake Winnipeg's watershed, a process known as "eutrophication". Phosphorus is the limiting nutrient for plants and algae in freshwater ecosystems, so even small increases in phosphorus concentration can cause increases in algae and plant growth.

ACTIVITY:

- To learn more about how Lake Winnipeg Foundation research is uncovering phosphorus hotspots in our watersheds, check out the story map at <https://arcg.is/0fCjvr>
- To find out about how researchers discovered the impacts of phosphorus on freshwater, read the IISD-Experimental Lakes Area's article on Algal Blooms: <https://www.iisd.org/ela/research/current-projects/harmful-algal-blooms/>
- Invite a classroom presenter from IISD-ELA OR Lake Winnipeg Foundation to discuss the impacts of phosphorus on water quality. Email education@iisd-ela.org OR info@lakewinnipegfoundation.org

3. Dissolved Oxygen (mg/L or ppm)

Groups completed dissolved oxygen tests using a La Motte Dissolved Oxygen test kit through a process called a "Winkler Titration".

The kit results indicated that levels in five (5) Winnipeg sites tested fall 2017, spring 2018, and fall 2018 ranged from 4 mg/L up to 11 mg/L.

The level of dissolved oxygen in water is important because oxygen supports fish and invertebrate life. Low oxygen concentrations happen when an excess of organic matter (such as dead algae or plants) is being broken

down by decomposition by oxygen-breathing bacteria in the water body. In this way, a low oxygen value can be a symptom of eutrophication (nutrient pollution) or other forms of pollution that increase the amount of decomposition in the water. Below 2 mg/L DO, fish will begin to suffocate. Rivers and streams with moving water are expected to have higher oxygen concentrations than standing or stagnant water. Excessively high concentrations of dissolved oxygen can indicate that an algae bloom is in progress.

Most sites visited had moderate to high levels of dissolved oxygen. The lowest concentrations of oxygen were detected in the fall 2018 sample at Bunn's Creek, and in the spring sample in the Seine River at Lagimodiere-Gaboury Park, but all were well above the lower limit of 2 mg/L.

ACTIVITY:

- The amount of dissolved oxygen (mg/L) that can be present in water is impacted by water temperature. Use our data to calculate percent oxygen saturation for your sites. Use the percent saturation chart at <http://www.mostreamteam.org/assets/dosaturation.pdf> and the Data Table at the end of this document.

4. pH

Groups completed Phenol Red pH tests on water samples. The pH scale, with values from 0 to 14, is a measurement of whether the water is acidic or basic (also called alkaline). Water from our sites was slightly basic at an average of 8. Other aspects of water chemistry that we were not able to measure, such as concentration of carbonates and bicarbonates from local soil, are factors that influence pH.

ACTIVITY:

- Use simple pH test kits or strips to test water mixed with a variety of different natural substances to determine pH. Try soaking pine needles, leaves, adding soil, sand or gravel, or other substances such as dish soap and vinegar.

5. *E. coli* Testing

Some groups tested for *Escherichia coli* (*E. coli*) bacteria levels in water samples taken at their locations, using a Coliscan Easygel kit. *E. coli* is a bacteria that can cause illness if ingested, but there are many strains that are not infective to humans. *E. coli* is present in the feces of water birds, such as ducks, geese, and gulls, and is also found in raw sewage.

Results showed that most sites tested below the advisory limit of 200 colonies per 100mL.

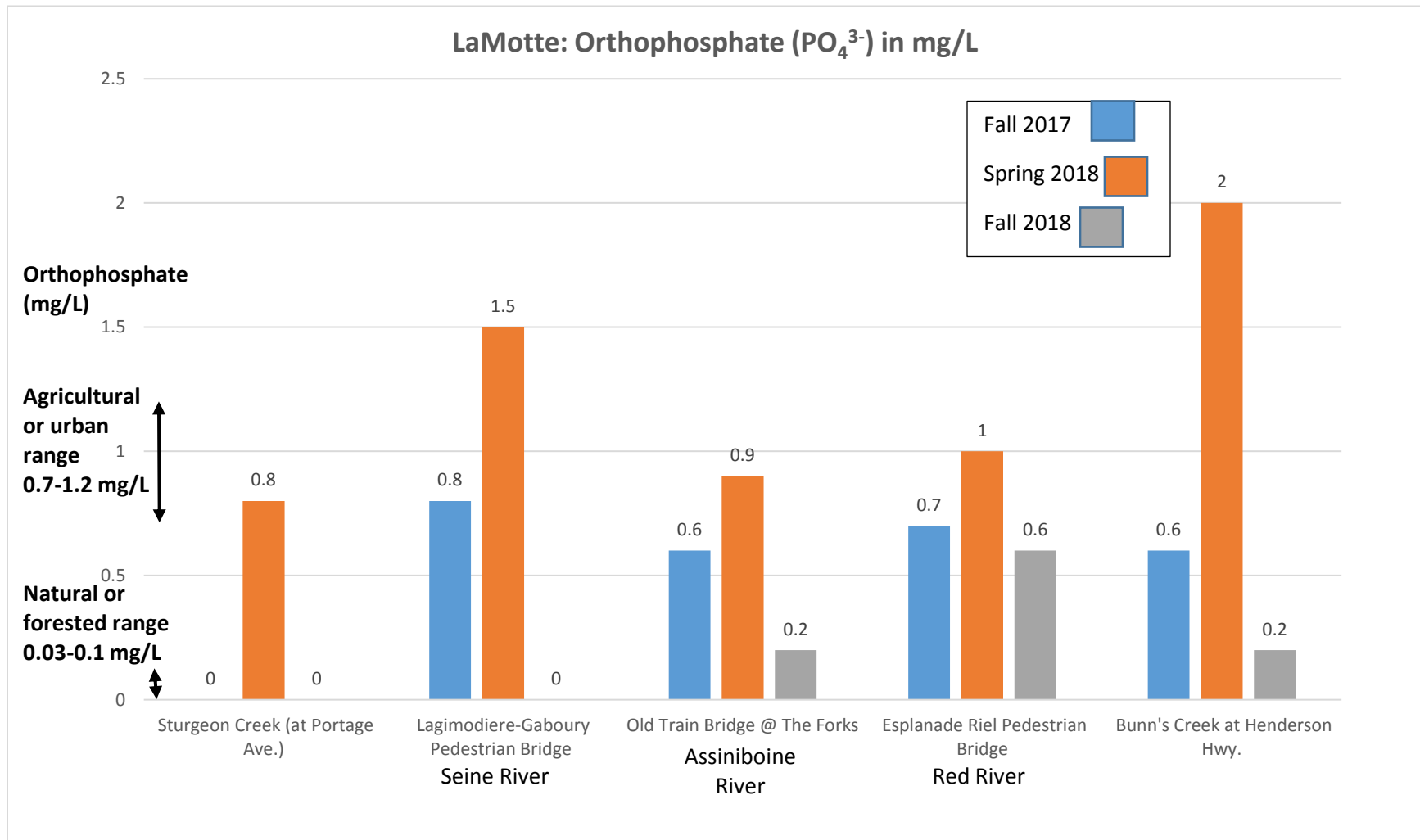
ACTIVITY:

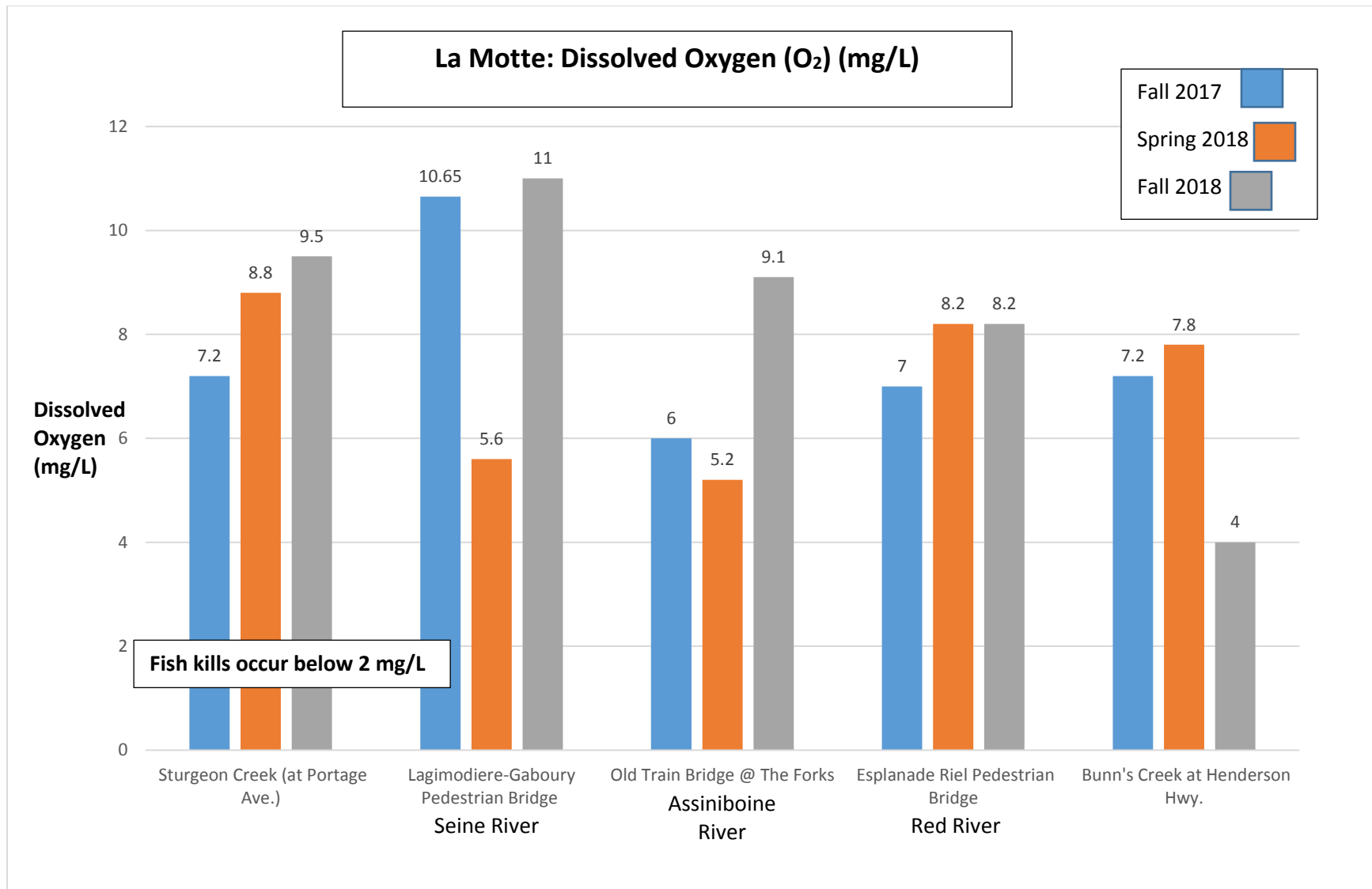
- Visit the Manitoba Sustainable Development Beach Monitoring Program website to investigate *E. coli* reports for popular swimming beaches this past summer. Learn what advice is offered to reduce bacterial contamination and contact. Online: <https://www.gov.mb.ca/sd/waterstewardship/quality/beaches.html>
- Learn how Combined Sewers work in some areas of Winnipeg, and learn about ways to reduce overflows. There are resources in your Riverwatch binder or visit <https://winnipeg.ca/waterandwaste/sewage/combinedSewerOverflow.stm>

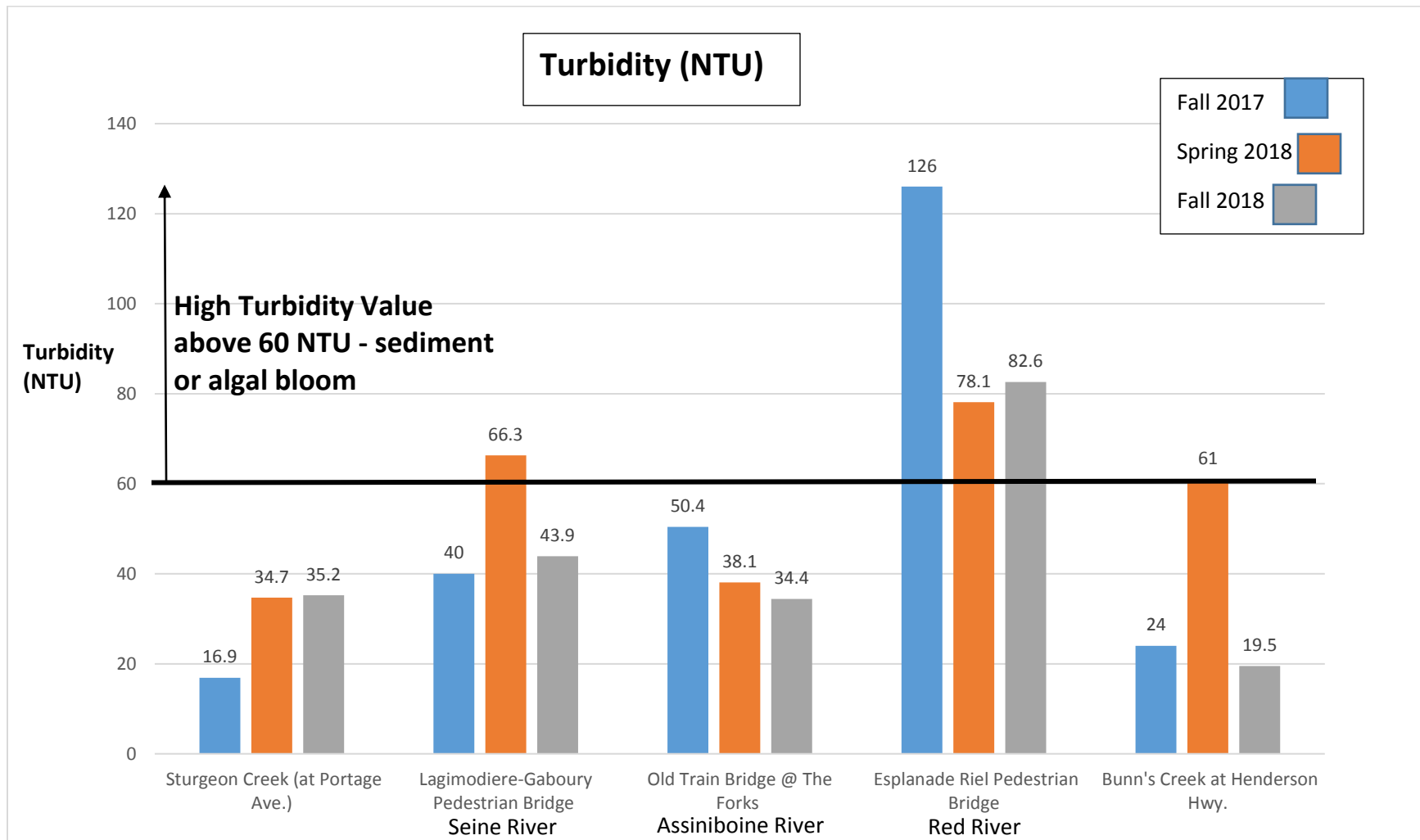
Thank you to 2018-19 project funder!



SUMMARY GRAPHS







SUMMARY DATA TABLES:

Transparency Tubes and Turbidity

Water Body Name	Sampling Date (dd/mm/yyyy)	Season	Transparency Tube (cm)	Turbidity (NTU)
Adsum Dr. @ Santa Fe Dr. Pond	11/10/2017	Fall	57	7.42
Ambergate Park Retention Pond	13/10/2017	Fall	23	12.8
Woodsworth Park Retention Pond	02/10/2018	Fall	32	
Assiniboine River - Old Train Bridge @ The Forks	29/05/2018	Spring	19	38.1
Assiniboine River - Old Train Bridge @ The Forks	25/09/2018	Fall	16.2	34.4
Bunn's Creek at Henderson Hwy.	29/05/2018	Spring	13.3	61
Bunn's Creek at Henderson Hwy.	11/10/2018	Fall	26.4	19.5
Bunn's Creek Centennial Park	16/05/2018	Spring	53.6	22
Red River - Esplanade Riel Pedestrian Bridge	17/10/2017	Fall	8.55	126
Red River - Esplanade Riel Pedestrian Bridge	29/05/2018	Spring	12.5	78.1
Red River - Disraeli Pedestrian Bridge	10/10/2018	Fall	35.4	67.8
Red River - Chief Peguis Bridge	15/10/2018	Fall		54.7
Seine River - Lagimodiere-Gaboury Pedestrian Bridge	17/10/2017	Fall	18	
Seine River - Lagimodiere-Gaboury Pedestrian Bridge	11/10/2018	Fall	19.8	43.9
Seine River - Lagimodiere-Gaboury Pedestrian Bridge	25/09/2018	Fall	14.6	43.9
Seine River - Lagimodiere-Gaboury Pedestrian Bridge	29/05/2018	Spring	15.4	66.3

Red River - Esplanade Riel Pedestrian Bridge	25/09/2018	Fall	10.2	82.6
Seine River - Tremblay Pedestrian Bridge	25/10/2017	Fall	40	30.7
Sturgeon Creek (at Portage Ave)	27/09/2017	Fall	25	16.9
Sturgeon Creek (at Portage Ave.)	24/04/2018	Spring		34.7
Sturgeon Creek (at Portage Ave.)	04/10/2018	Fall	20	35.2

Water Chemistry Summary

Organization Name	Sampling Date (dd/mm/yyyy)	Site Name	Water Temperature (Celsius)	LaMotte: Dissolved Oxygen (mg/L)	LaMotte: pH (phenol red)	LaMotte: Phosphate – Orthophosphate (mg/L)	LaMotte: Nitrite – N (mg/L)
Maples Met School	11/10/2017	Adsum Dr. @ Santa Fe Dr. Pond	11.6	5.3	8	1	
Maples Met School	13/10/2017	Ambergate Park Retention Pond	11.5	16	8.2	0.2	1.1
Sisler High School	02/10/2018	Woodsworth Park Retention Pond	8	11	8.2	0.2	
Miles Macdonell Collegiate	17/10/2017	Assiniboine River - Old Train Bridge @ The Forks		6	8.2	0.6	
Miles Macdonell Collegiate	25/09/2018	Assiniboine River - Old Train Bridge @ The Forks	11.1	9.1	8.2	0.2	0
Miles Macdonell Collegiate	29/05/2018	Assiniboine River - Old Train Bridge @ The Forks		5.2	8.2	0.9	
Elmwood High	11/10/2018	Bunn's Creek at Henderson Hwy.	2.8	4	8	0.2	<0.25
Miles Macdonell Collegiate	17/10/2017	Bunn's Creek at Henderson Hwy.	5.8	7.2	8	0.6	

Miles Macdonell Collegiate	29/05/2018	Bunn's Creek at Henderson Hwy.	21.7	3.9	7.8	2	
River East Collegiate	16/05/2018	Bunn's Creek Centennial Park		7.2	8.1	0.8	
Seven Oaks Met School	15/05/2017	Kildonan Park Creek - Pedestrian Bridge		1.8	7.8	1	
Seven Oaks Met School	18/10/2017	Kildonan Park Creek - Pedestrian Bridge	6.9	3.19	7.8	0.7	0
Seven Oaks Met School	18/10/2017	Kildonan Park Duck Pond	7.9	9.1	8.2	0.2	
River East Collegiate	15/10/2018	Red River - Chief Peguis Bridge		11	8.2	0.2	
Miles Macdonell Collegiate	17/10/2017	Red River - Esplanade Riel Pedestrian Bridge	12.1	7	8.2	0.7	
Miles Macdonell Collegiate	25/09/2018	Red River - Esplanade Riel Pedestrian Bridge		8.2	8.2	0.6	1
Miles Macdonell Collegiate	29/05/2018	Red River - Esplanade Riel Pedestrian Bridge		7	8.2	1	
Elmwood High	10/10/2018	Red River - Disraeli Pedestrian Bridge	5.1	13	8	0.3	<0.25
Elmwood High	12/10/2017	Red River - Louise Bridge	12.3	7.4	8.2	0.8	
Miles Macdonell Collegiate	17/10/2017	Seine River - Lagimodiere-Gaboury Pedestrian Bridge	6.8	10.65	8	0.8	
Elmwood High	11/10/2018	Seine River - Lagimodiere-Gaboury Pedestrian Bridge	3	11	8	0	<0.25
Miles Macdonell Collegiate	25/09/2018	Seine River - Lagimodiere-Gaboury Pedestrian Bridge	9.5	15.2	7.8	0.4	0.5
Miles Macdonell Collegiate	29/05/2018	Seine River - Lagimodiere-Gaboury Pedestrian Bridge		2.8	7.8	1.5	

Nelson McIntyre Collegiate	25/10/2017	Seine River - Tremblay Pedestrian Bridge	7.1	13	8.2	0.4	0
Nelson McIntyre Collegiate	26/10/2017	Seine River - Tremblay Pedestrian Bridge	5.6	11	8	0	0.5
Nelson McIntyre Collegiate	27/10/2017	Seine River - Tremblay Pedestrian Bridge	4	6.6		0	1.1
Westwood Collegiate	27/09/2017	Sturgeon Creek (at Portage Ave)	11.9	7.2	7.6	0	
Westwood Collegiate	04/10/2018	Sturgeon Creek (at Portage Ave.)	3.2	9.5	7.9	0	0
Westwood Collegiate	24/04/2018	Sturgeon Creek (at Portage Ave.)	6	8.8	7.7	0.8	2.2