Your Environmental Trust Fund at Work

pH Monitoring Ice & Snow

Miramichi River Environmental Assessment Committee (MREAC)

Report 2020

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1.0 Introduction & Background

Miramichi River Environmental Assessment Committee (MREAC) staff and volunteers have been engaged in a project of sampling snow and river water for pH levels since 2018. This project is sponsored in part by the New Brunswick Environmental Trust Fund. The motivation for this project was a concern about fish habitat, especially in the spring when the phenomenon of acid shock can be problematic. Snow samples are taken throughout MREAC's entire wintering monitoring schedule (Figure 1). Water sampling is often delayed as samples are not available until the rivers begin to break up and open water becomes accessible. Sampling occurs in concert with the snow course monitoring and ice observations that the MREAC performs on the Miramichi River watershed on behalf of the province each winter/spring to assess the flood risk in the provincial River Watch program.

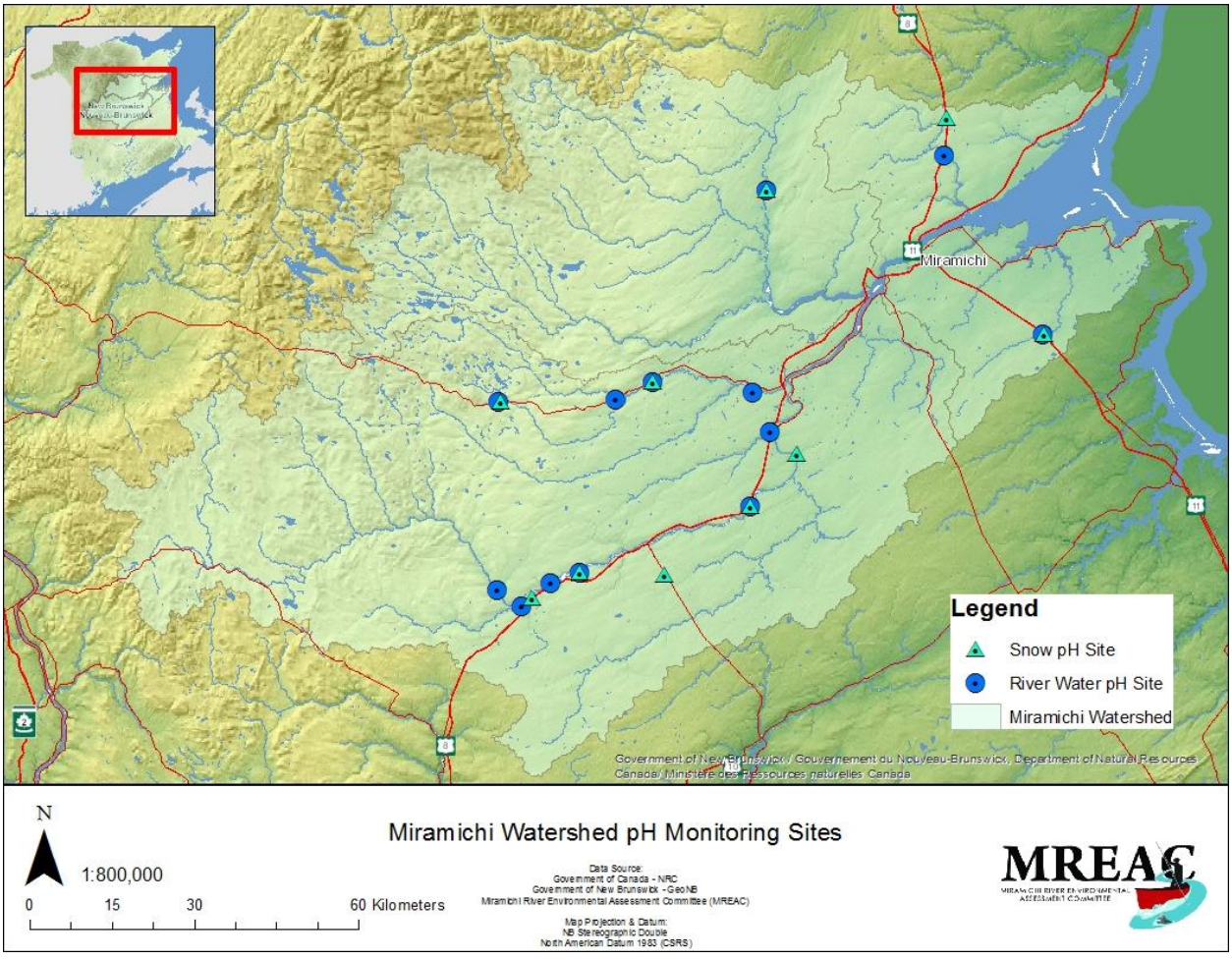

Figure 1: Miramichi Watershed pH Monitoring Sites 2020

2.0 Project Description

Snow and water sample sites are shown in Figure 1. All of the snow samples are collected using the snow sampling tube and weight scales that provides both snow depth and snow density. This core sample allows a sample throughout the snowpack. The sample does not include the snow-ground interface to avoid any influence from local soils. Snow samples are bagged and sealed. The pH readings are later taken from the snow meltwater, usually back at the MREAC office.

Water samples can be assessed for pH almost immediately in the field, using a hand-held meter during the field trip. All samples from 2020 were measured for pH using a Myron L. Company "Ultrapen" that provides both pH and water temperature. Regular calibration of the Ultrapen is completed at the start of the field trip. Water samples are normally collected from bridges by using a line, sample jar and weight (Figures 2 and 3).

Figure 2: Water Sampling at Priceville Swing Bridge site

3.0 Results

Sample results from 2020 for both snow and ice showed some contrast with the previous two years of monitoring. Figures 4 and 5, for water and snow respectively, show that all the samples fall within a normal range, one that freshwater fishes are comfortable with. This was not always the case with the 2018 and 2019 results (see www.mreac.org). Collecting these samples in the spring when the potential risk of acidic conditions is the highest promotes a higher level of confidence that acidic waters may, or may not, be a limiting factor for fish survival or reproduction. Despite the somewhat supressed pH levels in 2018 and 2019 these were not deemed to be a significant concern to salmonid fish habitat (pers comm. Dr. Cindy Breau, DFO, Gulf Region).

The actual readings taken throughout the sampling period in 2020 are shown in Appendix 1.

Figure 3: Water Sample Collection at Broomfield Ridge Site

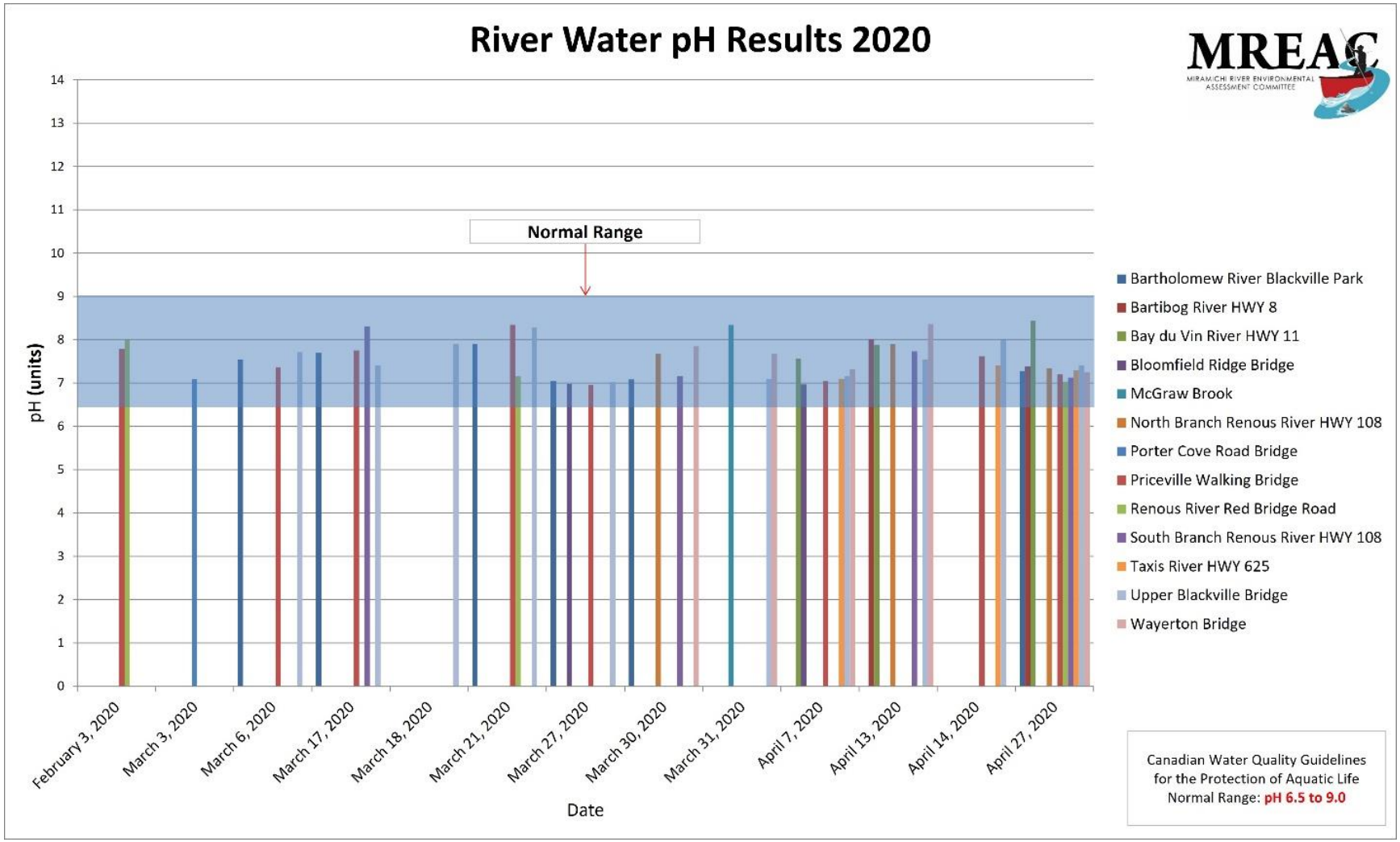

Figure 4:River Water pH Results 2020

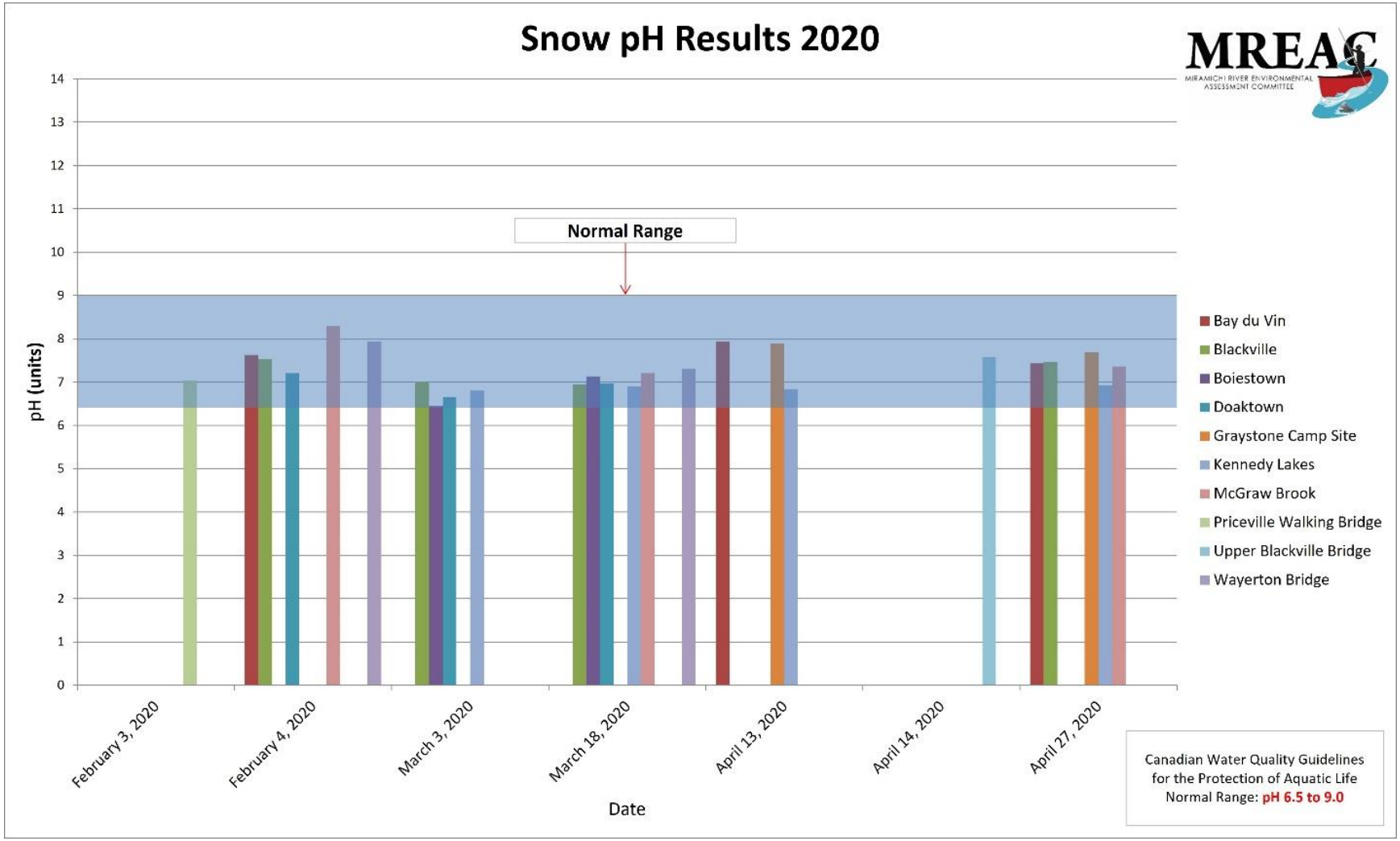

Figure 5: Snow pH Results 2020

4.0 Conclusion

The results from pH monitoring in 2020 fell within the normal range in all the waterways sampled in the Miramichi River watershed. This was not the case in 2018 or 2019 when several of the snow and water samples were found to be marginally more acidic. Why conditions differed in 2020 is unknown. MREAC monitoring results of pH sampling in summer and fall related to other projects all show results within the acceptable range. Other MREAC monitoring of macroinvertebrates, dissolved oxygen and specific conductivity over many years show good habitat conditions widespread throughout the Miramichi River watershed.

MREAC staff hope to continue this project of pH monitoring of both snow and ice in 2021.

Appendix 1

pH Monitoring Results - 2020					
	Site	**River Water pH**	**Snow pH**	**Temperature (°C)**	
February 3, 2020	Renous River (bailey bridge)	7.99		4.9	
	Priceville Footbridge	7.78	7.04	1.2	
February 4, 2020					
	Bay du Vin		7.63	4.8	
	Blackville		7.53	3.5	
	McGraw Brook		8.29	3.6	
	Wayerton Bridge		7.93	3.1	
	Doaktown		7.20	6.9	
March 3, 2020					
	Kennedy Lakes		6.80	4.9	
	Porter Cove Rd.	7.09		2.3	
	Doaktown		6.65	10.9	
	Boiestown		6.45	5.6	
	Blackville		7.01	5.9	
			6.8	4.9	
March 6, 2019					
	Upper Blackville Bridge	7.71		1.4	
	Priceville Footbridge	7.36		2.4	
	Bartholomew River	7.54		2.4	
March 17, 2020					
	South Branch Renous	8.31		1.6	
	Upper Blackville Bridge	7.41		0.7	
	Priceville Footbridge	7.75		1.4	
	Bartholomew River	7.7		1.6	
March 18, 2020					
	Blackville		6.94	19.9	
	Doaktown		6.97	19.9	
	Boiestown		7.13	20.5	
	Upper Blackville Bridge	7.89		1.8	
	McGraw Brook		7.2	18.0	

	Kennedy Lakes		6.89	11.5	
	Wayerton Bridge		7.3	3.6	
March 21, 2020		River Water pH	Snow pH	Temperature (°C)	
	Upper Blackville Bridge	8.29		2.4	
	Priceville Footbridge	8.34		2.4	
	Renous Bailey Bridge	7.15		2.1	
	Bartholomew River		7.15	2.1	
March 27, 2020					
	Upper Blackville Bridge	7.02		3.3	
	Priceville Footbridge	6.95		3.3	
	Bloomfield Ridge Bridge	6.98		2.4	
	Bartholomew River	7.04		2.7	
March 30, 2020					
	Wayerton Bridge	7.84		1.0	
	Bartholomew River	7.08		2.4	
	North Renous	7.68		1.6	
	South Renous	7.15		2.2	
March 31, 2020					
	Upper Blackville Bridge	7.09		2.0	
	McGraw Brook	8.34		4.7	
	Wayerton Bridge	7.67		3.9	
April 7, 2020					
	Bloomfield Ridge Bridge	6.97		9.1	
	Wayerton Bridge	7.31		3.8	
	Taxis River	7.09		3.5	
	Priceville Swingbridge	7.04		4.6	
	Upper Blackville Bridge	7.16		3.2	
	Bay du Vin	7.56		2.3	
April 13, 2020					
	North Branch Renous	7.89		3.5	
	South Branch Renous	7.73		1.9	
	Upper Blackville Bridge	7.53		5.3	
	Wayerton Bridge	8.36		2.1	
	Bartibog River	8.01		3.0	
	Bay du Vin Bridge	7.88	7.93	0.5	
	Greystone Park		7.89	2.1	

	Kennedy Lake		6.83	5.7	
April 14, 2020					
	Upper Blackville Bridge	7.99	7.58	4.8	
	Priceville Footbridge	7.62		4.6	
	Taxis River @ HWY 25	7.41		4	
April 27, 2020					
	Bay du Vin River	8.43	7.43	4.3	
	Upper Blackville Bridge	7.41		6.8	
	Blackville		7.46	5.7	
	Priceville Swingbridge	7.19		6.1	
	McGraw Brook		7.36	6.7	
	Kennedy Lake		6.93	7.2	
	Taxis River	7.29		4.9	
	Bartholomew River	7.28		7.5	
	Renous Bailey Bridge	7.03		6.7	
	North Branch Renous	7.34		6.2	
	South Branch Renous	7.12		4.9	
	Greystone Park		7.68	5.1	
	Wayerton	7.25		7.4	
	Bartibog	7.38		4.1	