

2021/2022 Annual Summary Report

Water Monitoring of Small Watersheds Program Project Number: ER-Water-2019-01



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Background

The collection of streamflow data (i.e. hydrometric information) has been declining over the past 20 years by the Water Survey of Canada; historically in northeast BC (NEBC) there was over 50 active hydrometric stations compared to the ~20 active stations today. The active stations are primarily collecting streamflow data for the larger systems such as the Kiskatinaw River or Halfway River which leaves a data gap for the smaller, tributary systems. This data gap represents a challenge with water licence requests on many of these smaller watersheds which have little to no hydrologic data to support decisions.

The OGC, MFLNRORD and various other users, rely on the Northeast Water Tool (NEWT) to support water licence and short-term use approval application decisions. The hydrologic model underlying NEWT relies on empirical (statistical) hydrologic regionalization methods; this approach is affected by the scalability of available data, where the representativeness over short time periods of weak spatial transferability to watersheds without streamflow data can severely limit the accuracy of estimates. It is widely accepted and acknowledged that NEWT is not without limitations and one of its greatest includes a higher degree of uncertainty for smaller basins, as data for calibration at this scale is limited.

The First Nation (FN) communities within Treaty Eight each have expressed water as their highest priority and concern. A specific concern relates to water withdrawals from small watersheds, the lack of data, and the reliance on NEWT for water management decisions given its potential limitations.

This project was designed to help address the small watershed data gap and FN concerns by collecting streamflow data in three smaller watersheds in NEBC. Once the data is processed it will be integrated into the hydrometric network and be used to inform future water allocation and watershed management. The long-term objective is to build stronger relationships with FNs, gather streamflow information in smaller watersheds, and to update the hydrologic model supporting NEWT.

Funding for the Water Monitoring of Small Watersheds program is provided by the BC Oil and Gas Research and Innovation Society (BC OGRIS) until the end of 2022. The project is being led by Suzan Lapp and Ryan Rolick with the BC OGC, with support from Barry Ortman with Peace Country Technical Services Ltd. We would like to thank the Blueberry River First Nations, Doig River First Nation, Prophet River First Nation, and Saulteau First Nations land's staff and community members for participating in the program.

Summary of Activities

The location of the four stations and upstream watersheds are shown in Figure 1: Martin Creek for PRFN, Le Bleu Creek for SFN, Upper Aitken Creek for BRFN, and Osborn River for DRFN.

Prior to spring freshet, the equipment was installed in Le Bleu Creek (SFN) on April 1, Aitken Creek (BRFN) on April 6 and the Osborn River (DRFN) on April 15, to capture the first full season open water measurements since the original installation. We were able to visit each site a minimum of five times to collect instream flow measurements and download sensor data. Overall, there was excellent participation from each of the community's staff and members. SFN Guardians were also part of the monitoring program this year.

We discovered at the end of the 2020 field season that the Old Alaska Highway Road, which was used to access the Martin Creek station (PRFN) was no longer being maintained. In conversation with the PRFN Lands Manager, we agreed that the station should be relocated in the summer of 2021. The area around Trutch Creek was discussed as an option. Unfortunately, due to Covid and resource limitations we were unable to meet up with the PRFN Lands Manager or community members to confirm a new station location during the 2021 field season. As such, no data was collected at Martin Creek nor was another location identified. This will need to be addressed in 2022.

Over the past three years the Commission staff have been very successful at building positive relationships with the First Nation communities. Scheduling can often be a challenge as many of the participants are busy with other field programs in the summer, so it is essential that the field program is set out in advance to ensure successful participation.

Field pictures and streamflow at each site can be found in Figure 2 (Le Bleu Creek), Figure 3 (Osborn River) and Figure 4 (Aitken Creek). The streamflow in Le Bleu declined significantly upon spring melt, resulting in missing data. The sensor was relocated further into the water column in June to capture the remainder of the season's streamflow data (Figure 2). This new sensor depth and location will be used for the 2022 season.

As of February 2022, all of the information, data and photos collected during the previous field season has been shared with the communities and data from the stations is to be publicly available by April 2022 through the Water Portal (<u>http://waterportal.geoweb.bcogc.ca/</u>) and provincial database Aquarius.



Figure 1. Location of the four hydrometric stations.



a. Reinstall equipment for spring melt. April 1, 2021.



c. Equipment adjusting, June 22, 2021.





b. Le Bleu Creek flow measurement, June 22, 2021.



d. July 22, 2021. Le Bleu Creek flow measurement.



a. Reinstalling equipment for spring melt. April 15, 2021



b. High streamflow measurement, May 7, 2021.



c. Flow measurement, July 28, 2021.



d. Flow measurement, September 1, 2021.

Figure 3. Osborn River with BRFN members field season photos.



a. Reinstalling equipment for spring melt. April 6, 2021.



c. Measuring streamflow, June 29, 2021.



b. High streamflow measurement May 11, 2021.



d. Measuring streamflow, October 6, 2021.

Figure 4. Upper Aitken Creek at Mile 98 Road with BRFN field season photos.

Deliverables

Daily streamflow hydrographs were derived based on the information collected during the 2021 field season in Upper Aitken Creek, Osborn River and Le Bleu Creek. Figures 5 – 7 show stream discharge over the monitoring periods in Upper Aitken Creek, Osborn River, and Le Bleu Creek, respectively. Early season data from Le Bleu Creek was not sufficient for analysis, so the hydrograph begins after sensor relocation on June 22, 2021.



Figure 5. 2021 discharge in Upper Aitken Creek at Mile 98 Road.



Figure 6. 2021 discharge in Osborn River near Doig River First Nation



Figure 7. 2021 discharge in Le Bleu Creek north side of Moberly Lake.

Streamflow in Upper Aitken Creek from early April through to early October ranged from approximately 0.136 m³/s to 6.53 m³/s, in response snowmelt and rain events, with the peak event occurring on June 17. An ongoing challenge with this station is measuring water flows amongst an ongoing beaver activity.

Osborn River streamflow from mid June through to early October ranged from approximately 0.175 m³/s to 17.0 m³/s, in response snowmelt and rain events. Peak flows occurred on June 18, likely in response to the same weather system that caused the peak flow in Upper Aitken Creek.

Streamflow in Le Bleu Creek from mid April through to late September ranged from approximately 0.00157 m³/s to 0.191 m³/s, in response snowmelt and rain events, with the peak event occurring on August 23. An ongoing challenge with this station is extremely low flows during the open water season, making sensor location very important to ensure data capture.

Participant Comments

Appendix A is the 2021-22 Annual Report from BRFN. Mae Whyte provides some excellent recommendations and comments.

Conclusions

All the stations, other than at Martin Creek with PRFN, are ready for equipment re-installation pre-freshet in 2022 to capture the peak flows. Commission staff plan to meet with PRFN staff to confirm a new station location and re-install the equipment at this new site once the sites are accessible. Overall, the project is a success and the data/information being collected will continue to support water management decisions and the First Nation communities are excited to be part of the project.