

# 2023/2024 Annual Summary Report

---

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



Ryan Rolick, Hydrologist, BCER  
Mahesh Khadka, Environmental Management Specialist, BCER

February 2, 2024

# Contents

---

Background ..... 3

Summary of Activities ..... 3

Deliverables ..... 7

Participant Comments..... 9

Conclusions ..... 10

# 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 BCER, MFLNRORD and various other users, rely on the Northeast Water Tool (NEWT) to support water licence and short-term water 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, facilitate mutual knowledge transfer, 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). The program was initiated in 2019, monitoring three watersheds (Osborn River, Le Bleu Creek, and Martin Creek), with the addition of a fourth (Blueberry River) in 2020 and is currently funded until the end of 2024. The project is being led by Ryan Rolick and Mahesh Khadka with the BCER, 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 Sauteau First Nations land's staff and community members for participating in the program.

## Summary of Activities

Prior to spring freshet, the equipment was installed in the Osborn River (DRFN) on April 17, Le Bleu Creek (SFN) on April 20 and Aitken Creek (BRFN) on May 9, to capture the first full season open water measurements since the original installation. The team was able to visit each of these sites a minimum of five times to collect instream flow measurements and download sensor data.

The site at Martin Creek was re-established on June 20 after confirming that road to the site was passable. Unfortunately, upon return to this site on July 13, it was discovered that access was again restricted due to road decommissioning activities that were not communicated to the project team. As such, no data was collected at Martin Creek, however on October 18 a new site, Beaver Creek at Highway 97 was selected and prepped to begin monitoring in 2024 (Figure 1). This is a preferred site as being located at a major highway

crossing will ensure access for the team to collect early season data, contrary to the Martin Creek site. Overall, there was excellent participation from each of the community’s staff and members. SFN Guardians continued their participation in the monitoring program this year.

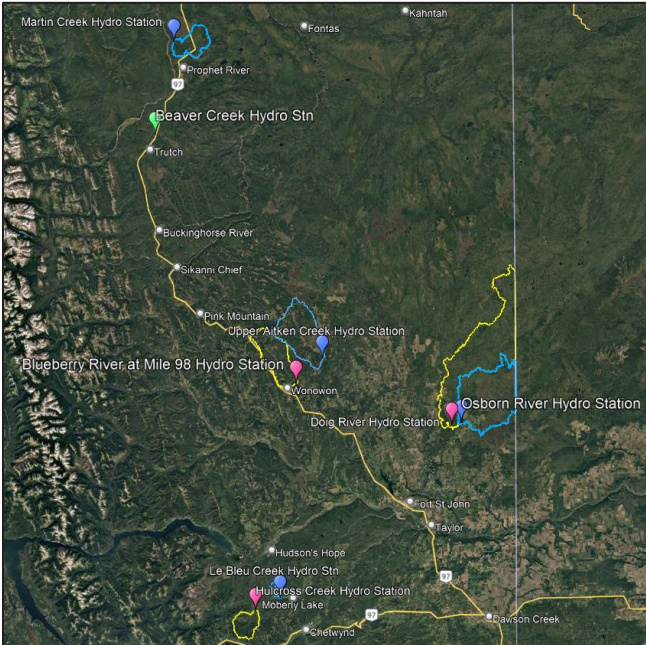
The program will see some changes for the 2024 monitoring season, with the removal of Le Bleu Creek from the program, the addition of three existing stations previously funded by Geoscience BC (Doig River, Blueberry River, and Hulcross Creek) and upgrading of the Osborn River station.

The location of the four original stations, three new stations and respective upstream watersheds, as well as the newly established Beaver Creek hydro station are shown in Figure 1: Martin Creek and Beaver Creek for PRFN, Le Bleu Creek and Hulcross Creek for SFN, Upper Aitken Creek and Blueberry River for BRFN, and Osborn River and Doig River for DRFN.

Over the past five years the Regulator 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).

As of February 2, 2024, 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 publicly through the Water Portal (<http://waterportal.geoweb.bcogc.ca/>) and provincial database Aquarius.



**Figure 1.** Location of the four original hydrometric stations and new stations to be included for 2024. Blue outlines and markers are the original watersheds and stations, yellow outlines and pink markers are watersheds and stations previously funded by Geoscience BC.





a. Reinstall equipment for spring melt. April 20, 2023.



b. Late season low flows, July 12, 2023.



c. Training of summer students and SFN Guardians, June 19, 2023.



d. Early season high flows, June 1, 2023.

**Figure 2.** Le Bleu Creek with SFN field season photos.



a. Reinstalling equipment for spring melt. April 17, 2023



b. Early season measurement, May 30, 2023.



c. Downstream beaver dam causing high water, June 23, 2023.



d. Smoky flow measurement, July 10, 2023.

**Figure 3.** Osborn River with DRFN field season photos.





a. Early season flow conditions during equipment installation. May 9, 2023.



b. High streamflow measurement May 31, 2023.



c. The beaver dam downstream of the sensor persists, July 11, 2023.

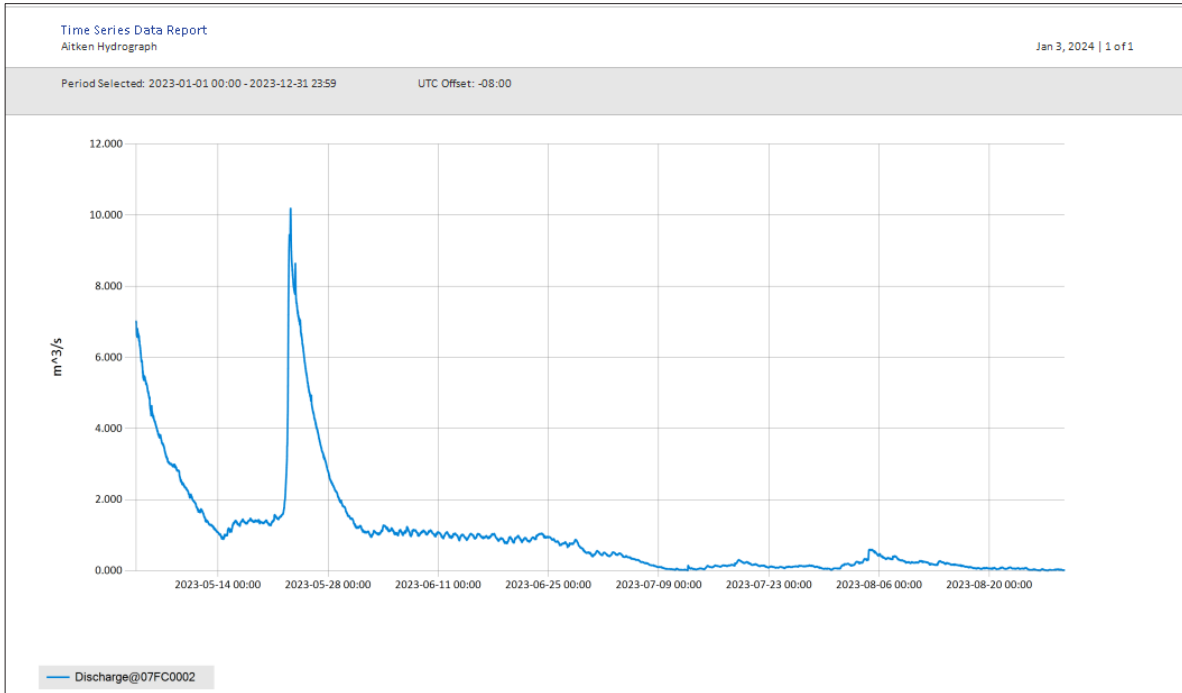


d. Measuring streamflow, August 29, 2023.

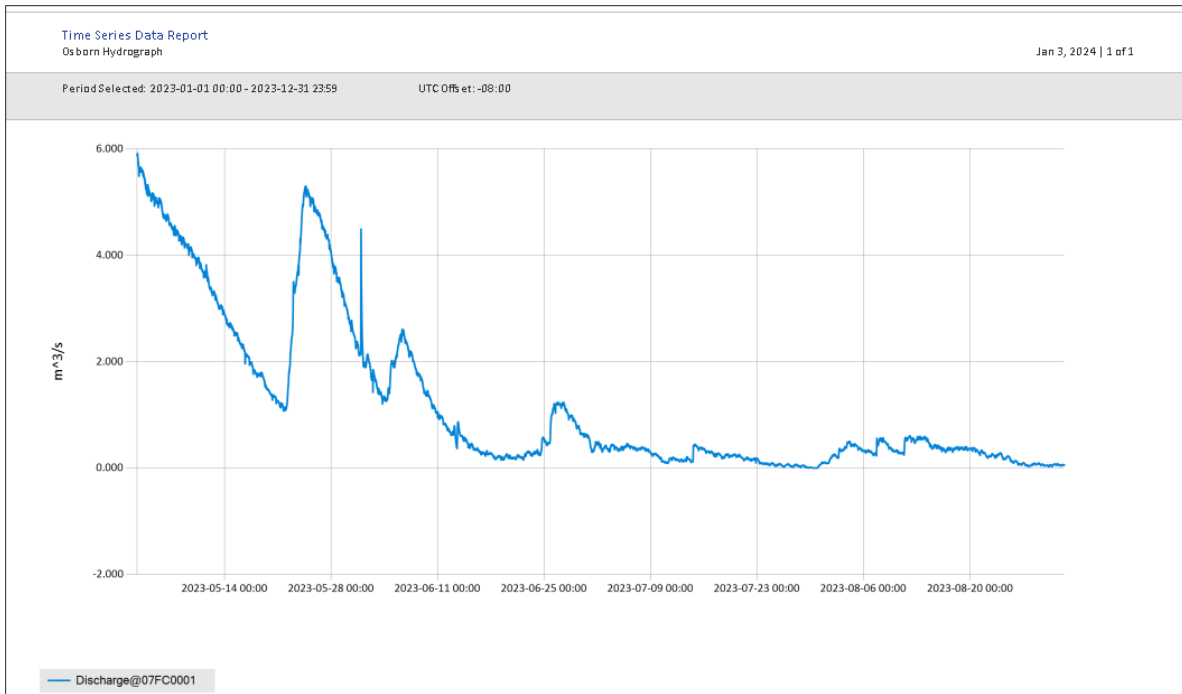
**Figure 4.** Upper Aitken Creek at Mile 98 Road with BRFN field season photos.

## Deliverables

Daily streamflow hydrographs were derived based on the information collected during the 2023 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.

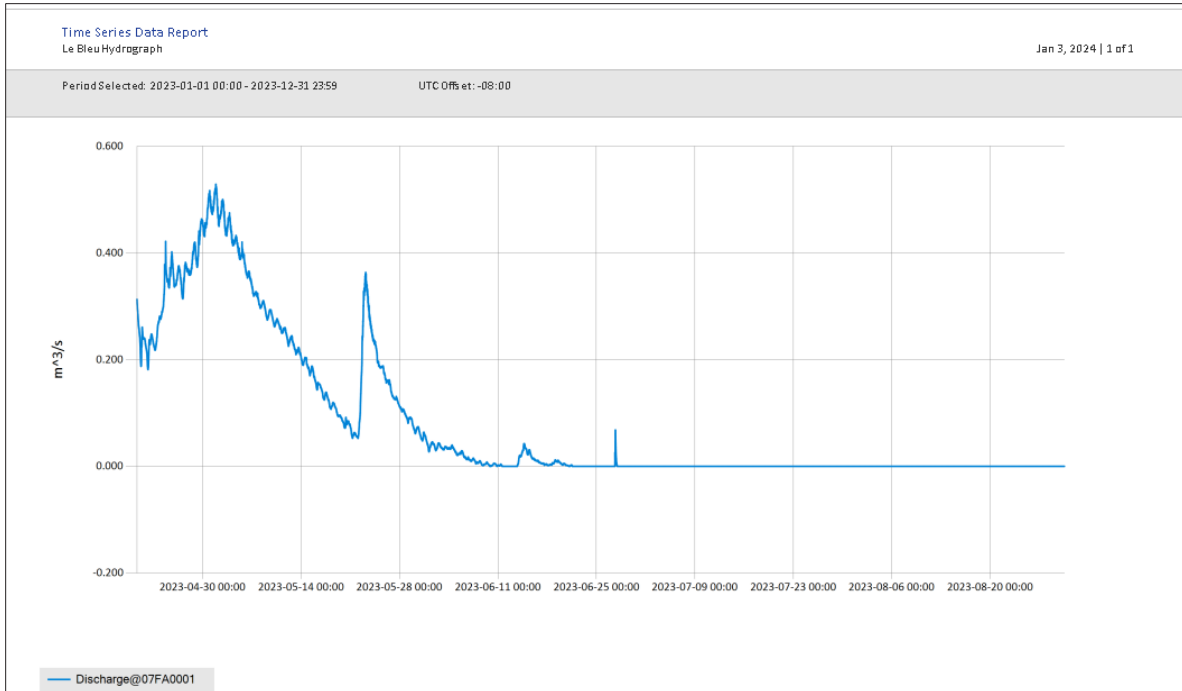


**Figure 5.** 2023 discharge in Upper Aitken Creek at Mile 98 Road.



**Figure 6.** 2023 discharge in Osborn River near Doig River First Nation.





**Figure 7.** 2023 discharge in Le Bleu Creek north side of Moberly Lake.

Streamflow in Upper Aitken Creek from early May through to late August ranged from approximately 0.02  $m^3/s$  to 10.1  $m^3/s$ , in response to snowmelt and rain events, with the peak event occurring on May 23. The ongoing drought in northeast BC resulted in very low flows persisting for the majority of the monitoring season. An ongoing challenge with this station is measuring water flows amongst ongoing beaver activity and poor road conditions restricting site access at times. Timing of visits to this site is crucial moving forward, if heavy precipitation is expected, scheduling of visits may change to ensure site access. Currently, the impacts of beavers at this site have been noted and will be addressed accordingly as needed.

Osborn River streamflow from early May through to early September ranged from approximately 0.02  $m^3/s$  to 5.92  $m^3/s$ , in response to snowmelt and rain events. Peak flows occurred on May 2, with a secondary peak on May 24 in response to heavy rains and rapid snowmelt. Similar to Aitken Creek, low flows persisted for the majority of the monitoring season due to the ongoing drought.

Streamflow in Le Bleu Creek from mid April through to late August ranged from approximately 0.000  $m^3/s$  to 0.529  $m^3/s$ , in response to snowmelt and rain events. Peak flows occurred on May 1, with a secondary peak on May 23 in response to heavy rains and rapid snowmelt. An ongoing challenge with this station is severe ice effects in the early season, and extremely low flows during the open water season making sensor location very important to ensure data capture. This was especially apparent this season, with zero flow being measured from late June onward. It is these complications that have been taken into consideration with decommissioning this station moving forward, which will allow the team to focus efforts on collecting flow data at other locations.

## Participant Comments

Appendix A is the 2023-24 Annual Report from BRFN. Ian Ruttenberg provides some excellent recommendations and comments, pointing out the importance of this station to their overall environmental monitoring program.

## Conclusions

All the stations, including the newly established Beaver Creek (replacing Martin Creek) with PRFN and the stations grandfathered in from Geoscience BC, are ready for equipment re-installation pre-freshet in 2024 to capture the peak flows. Regulator staff will upgrade the Osborn River station with updated equipment in the spring of 2024 with plans to turn this station into a more permanent installation and facilitate more streamlined data collection. 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.