2022/2023 Annual Summary Report

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

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Contents

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 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). 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 2023. The project is being led by Ryan Rolick 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 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 5, Aitken Creek (BRFN) on April 6 and the Osborn River (DRFN) on April 8, 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.

Unfortunately, due to resource limitations we were unable to meet up with the PRFN Lands Manager or community members to confirm site accessibility to the Martin Creek until October 2022. As such, no data was

collected at Martin Creek, however it was confirmed that the site at Martin Creek is accessible and will be re-established for 2023.

Over the past four 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). The streamflow in Le Bleu declined significantly upon spring melt such that streamflow was below the sensor, resulting in missing data. The sensor was relocated further into the water column in May to capture the remainder of the season's streamflow data (Figure 2). An updated structure and logger combination will be used for the 2023 season to capture more of the season data.

As of February 2023, 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.

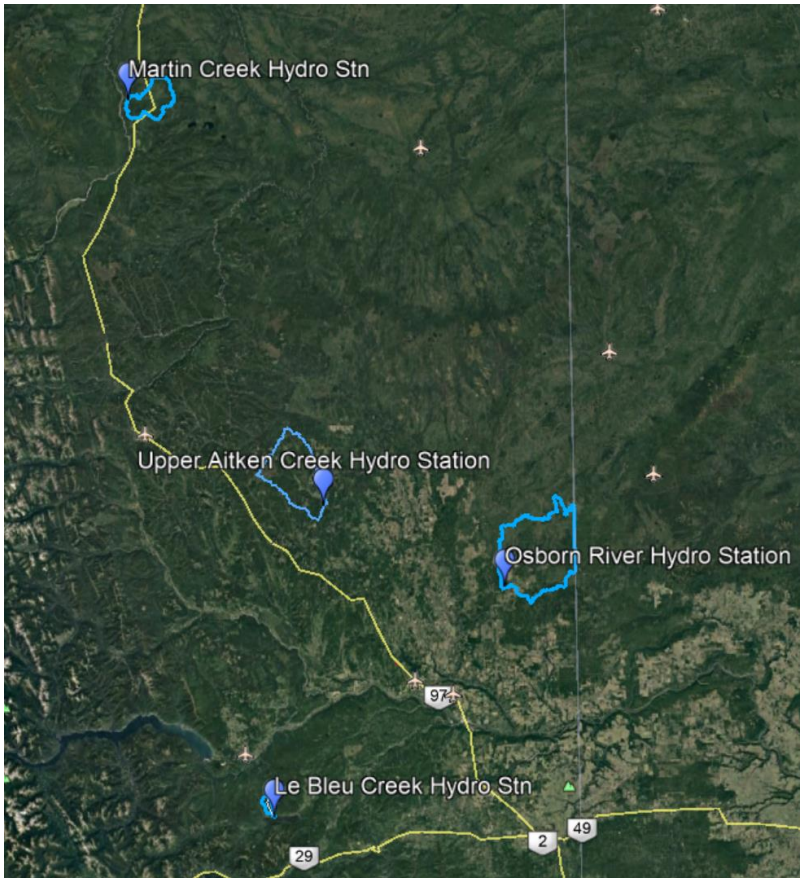
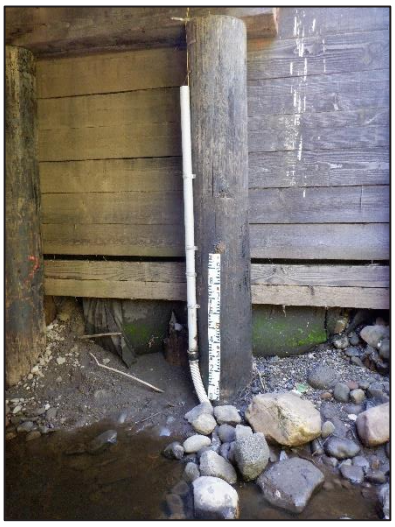


Figure 1. Location of the four hydrometric stations.

a. Reinstall equipment for spring melt. April 5, 2022.

b. Late season low flows, August 29, 2022.



c. Armoring installation during low flows, July 27, 2022.

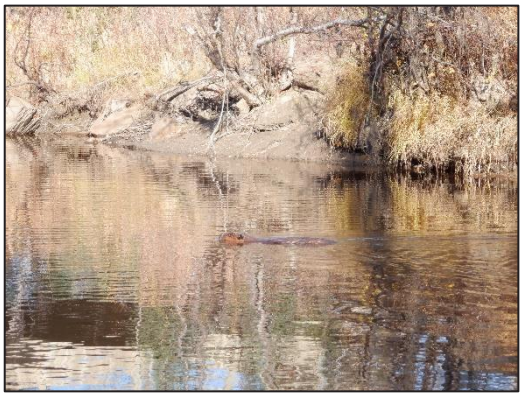
d. Early season high flows, May 19, 2022.

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

a. Reinstalling equipment for spring melt. April 8, 2022

b. High streamflow measurement, May 20, 2022.

c. High flow survey, June 23, 2022.



d. Flow measurement, October 14, 2022.

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

a. Early season flow measurement during equipment installation. April 6, 2022.

b. High streamflow measurement May 18, 2022.

c. A large beaver dam has developed downstream of the sensor, August 17, 2022.

d. Measuring streamflow, September 22, 202.

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.

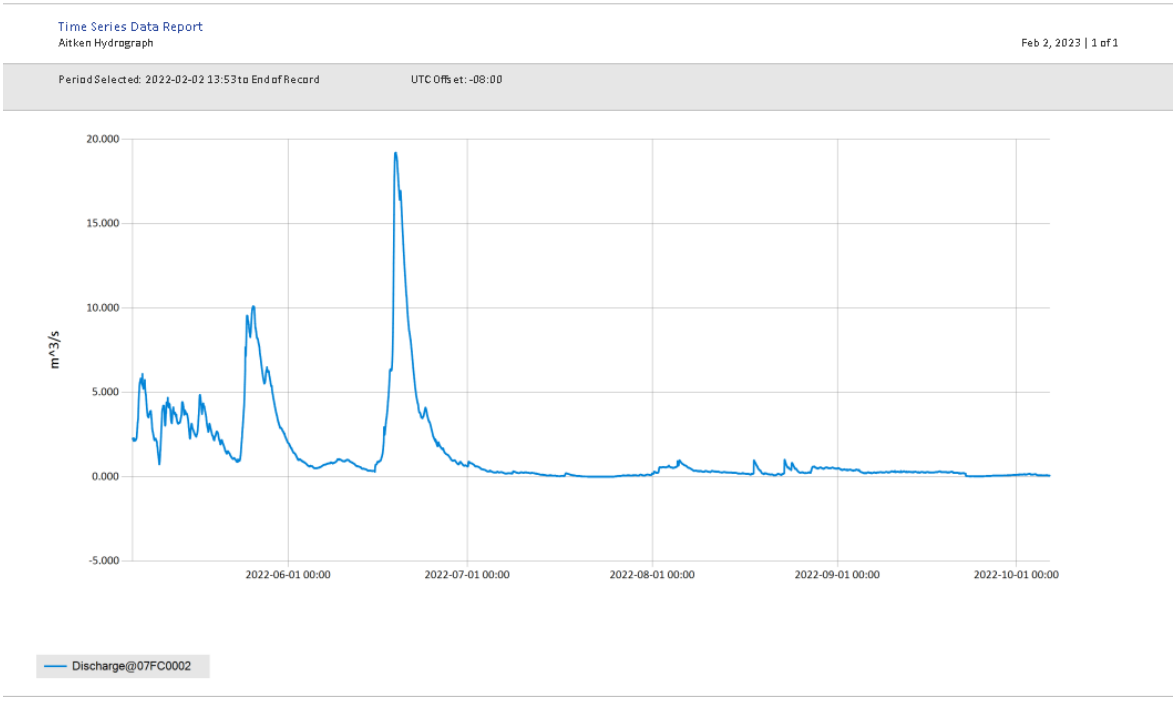


Figure 5. 2022 discharge in Upper Aitken Creek at Mile 98 Road.

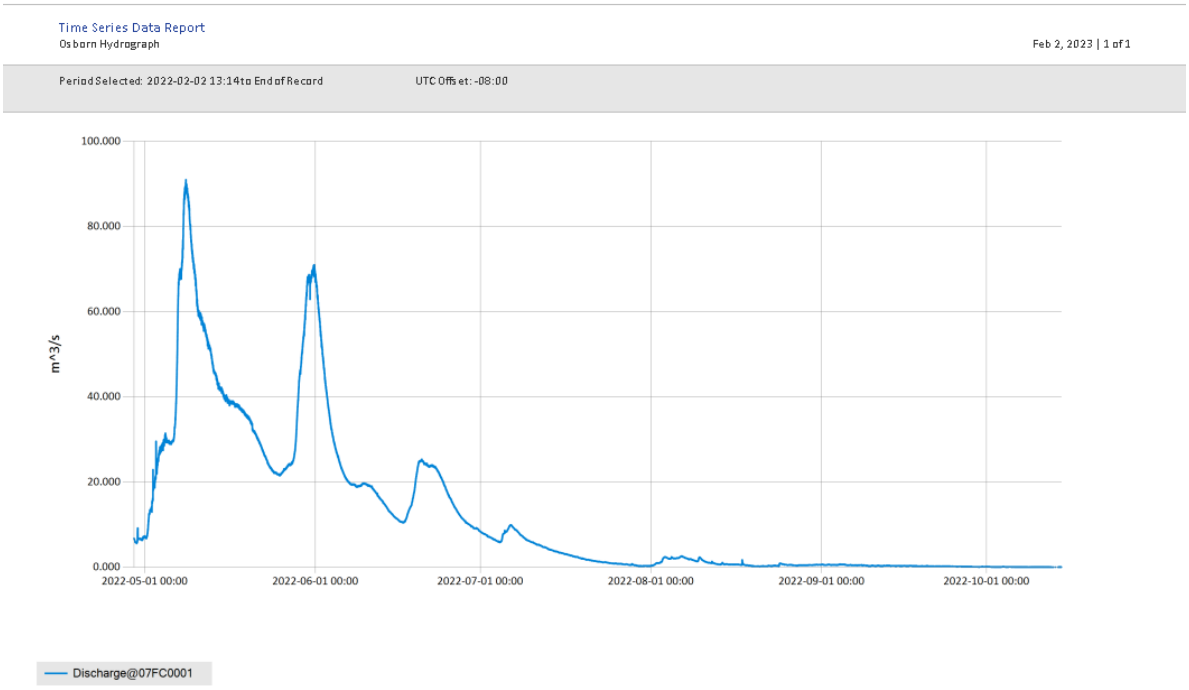


Figure 6. 2022 discharge in Osborn River near Doig River First Nation

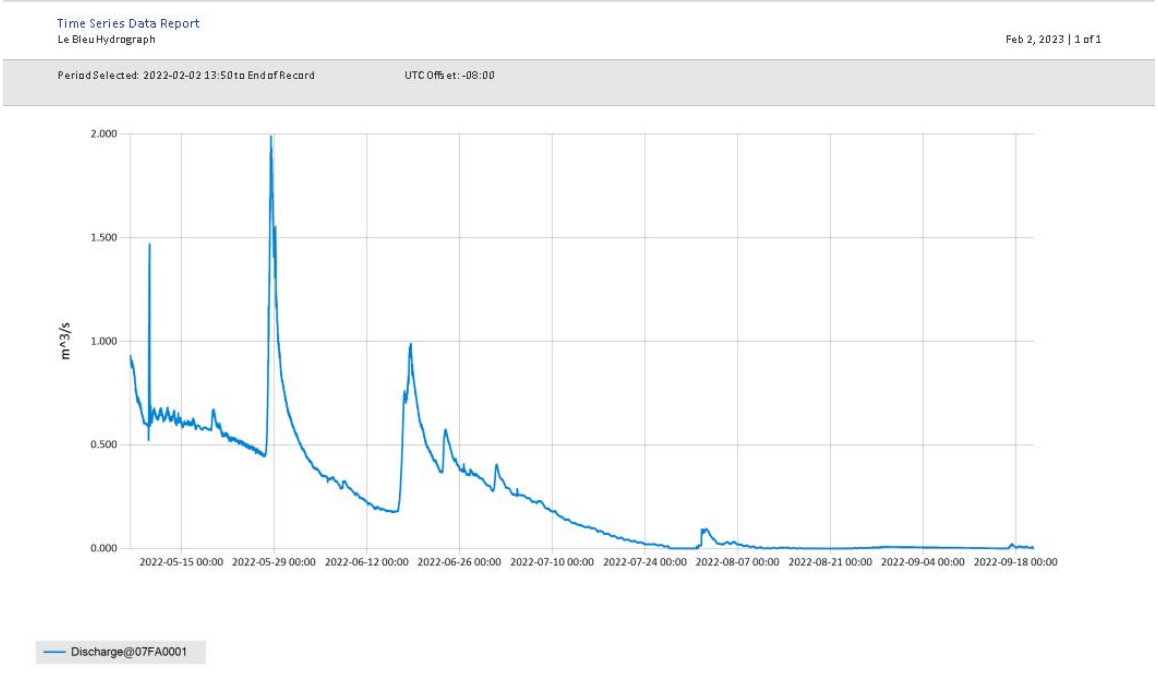


Figure 7. 2022 discharge in Le Bleu Creek north side of Moberly Lake.

Streamflow in Upper Aitken Creek from early May through to early October ranged from approximately 0.002 m^3/s to 19.2 m^3/s, in response to snowmelt and rain events, with the peak event occurring on June 19. 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 late April through to mid October ranged from approximately 0.02 m^3/s to 91.0 m^3/s, in response to snowmelt and rain events. Peak flows occurred on May 8, with a secondary peak on May 31 in response to heavy rains and rapid snowmelt. Doig River members shared that these events were some of the highest they have seen in recent memory.

Streamflow in Le Bleu Creek from early May through to late September ranged from approximately 0.004 m^3/s to 1.99 m^3/s, in response to snowmelt and rain events, with the peak event occurring on May 28. 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.

Participant Comments

Appendix A is the 2022-23 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 2023 to capture the peak flows. Regulator staff plan to meet with PRFN staff to upgrade the station and re-

install equipment at Martin Creek once the site is accessible, likely June – July 2023. 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.