BC Oil & Gas COMMISSION

# 2019/2020 Annual Summary Report

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

Suzan Lapp, Hydrologist, BC OGC
Ryan Rolick, Environmental Specialist, BC OGC

March 17, 2020

# 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 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.

## Summary of Activities

In the spring of 2019 BC OGC staff from the met with Saulteau First Nations (SFN), Doig River First Nation (DRFN) and Prophet River First Nation (PRFN) lands managers and staff, and community members. The intent of the meetings were to introduce the project and to collaboratively identify streams of interest to install the hydrometric equipment within. One stream per community was identified and a key community member, or staff member, was chosen to work alongside with the BC OGC staff to install the monitoring equipment and collect streamflow information during the open-water field season.

The location of the three streams are shown in Figure 1: Martin Creek for PRFN, Le Bleu Creek for SFN, and Osborn River for DRFN. Martin Creek does not have an official gazetted name according to the provincial database, however the community refers to it as “Martin Creek”. Photos captured at each site are shown in Figures 2-4.

The equipment at each of the streamflow monitoring stations consisted of a staff gauge, solinst barologger, solinst Levelogger, and trail camera.

To date, the data has been processed and QA/QC'd. We are in the process of making the data available to the public through the provincial database, Aquarius, and the BC Water Portal.

As of March 2020, follow up meetings have been conducted with PRFN and SFN (DRFN is scheduled for April 1) to discuss the 2019 field season program successes, and opportunities for improvement, and to share the data results. The stations will be re-installed in the spring of 2020 once the sites can be safely accessed.

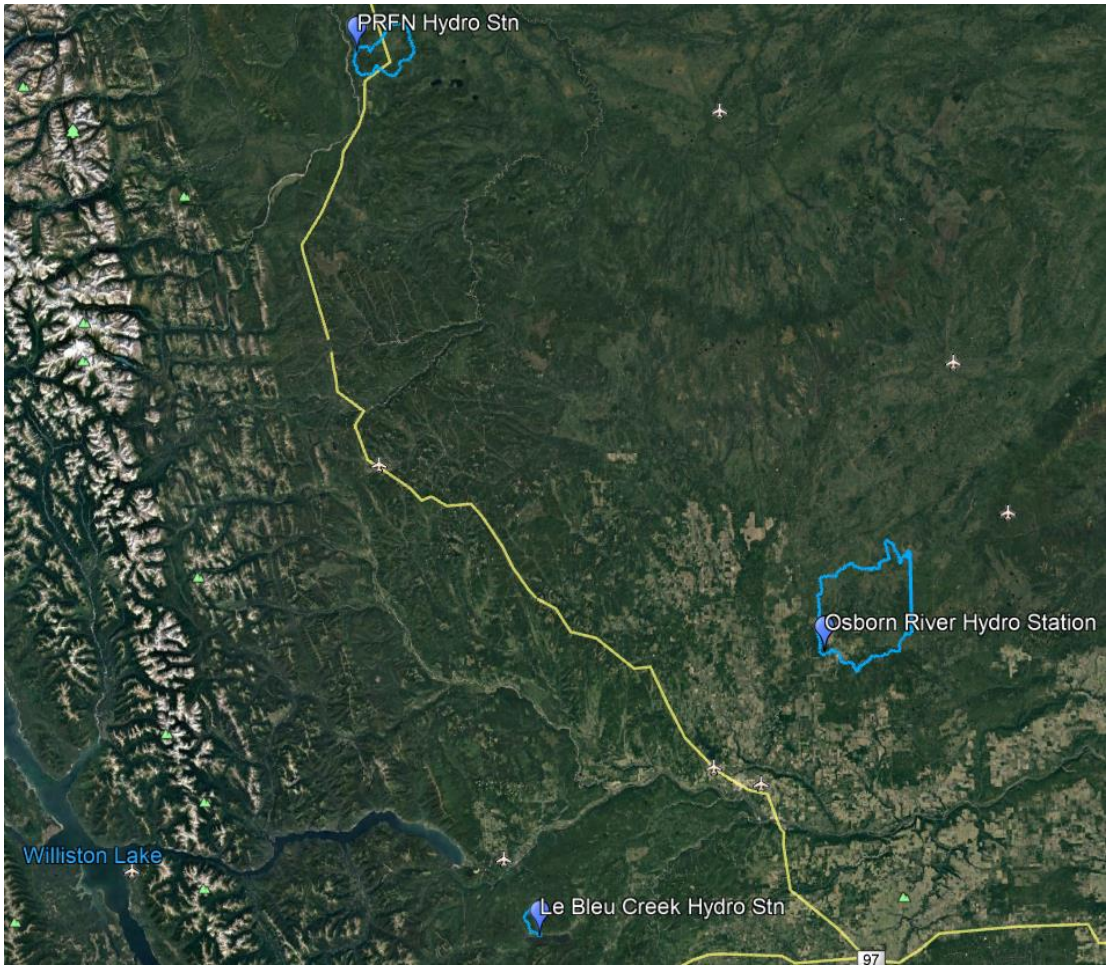


Figure 1. Location of the three hydrometric stations installed in 2019.

a. Drone photo


b. Piezometer and logger

c. Measuring streamflow

d. Survey of benchmarks

Figure 2. Le Bleu Creek with SFN, installed on June 27, 2019.

a. Drone photo

b. Logger and staff gauge

c. Explaining how the station operates

d. Image from trail camera

Figure 3. Martin Creek with PRFN, installed on June 25, 2019.

a. Drone photo looking upstream from station on right side

b. Taking streamflow measurements

Figure 4. Osborn Creek with DRFN, installed on August 15, 2019.

## Deliverables

Daily streamflow hydrographs were derived for the three stations, based on the information collected during the 2019 field season. Figure 5 shows the daily hydrograph of Martin Creek compared to the daily precipitation events as measured at the Fort Nelson Airport climate station.

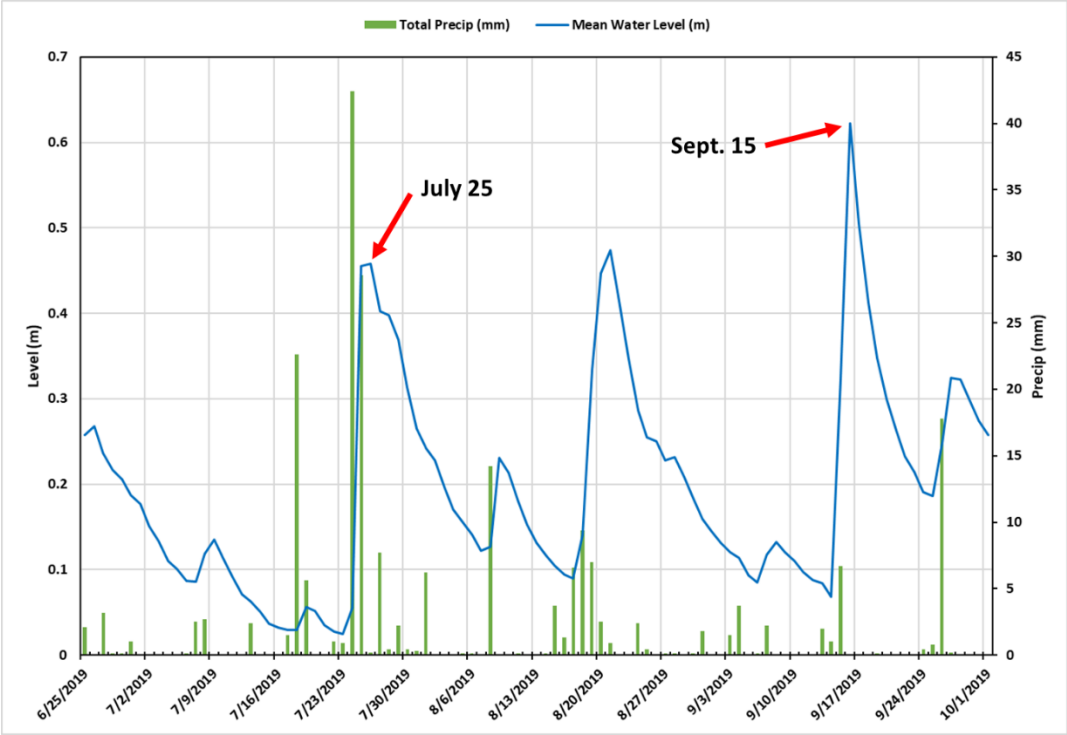


Figure 5. Daily water level relative in Martin Creek relative to daily precipitation at the Fort Nelson Airport climate station.

The trail camera captures hourly photos at each site and allows for a visual comparison to the numerical data collected. Figure 6 shows a photo of Martin Creek on August 22, 2019 at 1:35 pm along with the staff gauge height of 0.43 m and discharge (Q) of 5.534 m3/s.


Figure 6. Photo of Martin Creek on August 22, 2019 at 1:35 pm.

## Participant Comments

Below are comments from each of the FN participants based on the 2019 field season:

Comment #1:

"*What I have learned about hydrology water management is how to measure stream flow and water management and how interesting it is to learn how water measurement is done. I have enjoyed the field days and look forward to future work to be done in 2020. I have a lot to learn about how to calculate water and flows, very interested in learning more.*

*Opportunity for improvement: How to calculate water in Cubic meters and streamflow?"*

Comment #2:

"*We went out with Ryan and Suzan on October 10 and measured the pressure and speed of the river. We wore hip waders and it was cold but a great learning experience. We went out a second time and the water had gone down about 30 cm from the last time we visited. I took notes on the IPad. It is very new to me, but I am very interested in anything to do with water because it is a big part of the*

*land. We sat there after all was done, had lunch and watched Ryan fly the drone. Thank you for the time and great learning experience*."

Comment #3:

"*OGC has invited SFN to participate in water metering monitoring in Moberly Water shed with Suzan Lapp -OGC Hydrologist and Ryan Rolick - OGC Environmental Specialist.*

*We chose Lebleau Creek as it has limited industrial impacts from the headwaters to Hwy 29.*

*We learned the techniques in measuring water flows as we participated on measuring the stream and reading the instruments with OGC.*

*This was a monthly activity and we finished our annual measuring and removed the equipment before freeze up.*

*I am eager to begin next year's water flow measuring of Lebleau Ck and learn how to read the information we have gather so far.*

*Both Ryan and Suzan were great help in helping us measuring and reading the equipment*."

Comment #4:

"*I think this is a great project because we can monitor water levels of surround water sources near our community, and deal with droughts and such events, and see how the water levels are changing. This program benefits our community in the long run and give us a heads up about droughts and low water*."

Comment #5:

"*I think this water monitoring station is beneficial to the community, because it is good for us to know what is happening around our community. It would also be good to know about water quantity during all the different seasons, even in the winter to drill a hole and do tests so that we can see the difference against the baseline."*

## Conclusions

Overall, the stations are capturing excellent quality data and there is knowledge sharing between the OGC staff and FN community members engaged in the project. The stations will be adjusted, as necessary, and re-installed in the spring of 2020, with data collected over the summer/fall field season in collaboration with the FN communities.