



Bridge-Seton Water Use Plan

Monitoring Program Terms of Reference

BRGMON-13 Seton Sockeye Salmon Smolts Monitoring Program

**Addendum 1
February 6, 2020**

A1.0 Addendum to BRGMON-13 Seton Sockeye Salmon Smolts Monitoring Program

A1.1 Context

This monitoring is required under the Water Use Plan (WUP) Order dated March 30, 2011, Schedule A, Clause 17 (a-c) as follows:

- a) Monitor variation in diel and seasonal timing of the annual out migration of sockeye salmon smolts from Seton-Anderson watershed.*
- b) Monitor if the operation of Seton Generating Station and Seton Dam affect the relative distribution of fish migrating past the facility in the Seton watershed.*
- c) Monitor if the implementation of planned partial or blanket shutdowns of the Seton generating station meet sockeye salmon smolt population protection targets. The frequency and duration of the shutdowns along with the expected benefits in reducing mortality will be reported to the Comptroller of Water Rights annually.*

A1.2 Addendum Background and Rationale

The BRGMON-13 Terms of Reference (TOR) (January 23, 2012) specified methods to determine the effectiveness of Seton Generating Station (SON) shutdowns for reducing the proportion of outmigrating sockeye smolts entrained through SON. The program's intent was to assess the effectiveness of shutdowns occurring 20:00-02:00 nightly from April 20 to May 20 by enumerating smolts and estimating the annual proportion of smolts that the shutdowns diverted through Seton Dam. Enumeration would occur via an annual smolt trapping program supported by five to ten mark-recapture experiments. Additional data to be collected was the seasonal and diel timing of the outmigration and how total Seton Dam releases and water conveyance structures use affected the diverted proportion of smolts. Data will support operational refinements to maximize the shutdown effectiveness for smolt entrainment protection.

Review of results to date has found that enumeration and mark-recapture alone will not address the management questions (Harrower et al. 2019; Lingard and Ledoux 2019). Mark-recapture experiments in the Seton Dam forebay to estimate the diversion proportion of smolts have been complicated by long forebay residency times (Sneep et al. 2012) and uncertainty in the fate of smolts (Lingard and Ledoux 2019). Radio telemetry is therefore needed to determine how discharge and water conveyance structure use affects the diversion proportion. Catch data also indicates that smolt migration extends beyond the April 15 to May 25 trapping period specified in the TOR.

This TOR Addendum 1 adds:

- Monitoring time for smolt capture beyond May 25 each year; and
- Two years of radio telemetry to determine smolt diversion proportions at different Seton Dam discharges.

These updates will allow the management questions to be addressed.

A1.3 Management Questions

There are no changes to the BRGMON-13 management questions.

A1.4 Methods

A1.4.1 Task 3A Smolt Sampling – Abundance and Outmigration Timing

Smolt collection will employ the same trapping methods as previous years, but trapping may be extended up to or past May 30 if required to fully estimate the proportion of the smolt population migrating in the Seton Generating Station shutdown period. Trapping timing and effort will be adjusted in season based on the apparent size and timing of the outmigrating smolt population, increasing effort during the peak run timing period (~April 20 to May 30) and reducing effort during the early migration period (~April 10-20).

A1.4.2 Task 3B Smolt Sampling - Diversion Rates

Two years of radio telemetry will be carried out to characterize how the proportion of fish diverted through Seton Dam varies with discharge and the configuration of the dam discharge facilities used (Management Question #2). Each year up to 200 smolts will be tagged with radio or acoustic transmitters and released upstream of Seton Dam. Releases will be timed to coincide with different Seton Dam discharges and operations across the migration period. Receivers will be installed in the Seton Dam forebay and tailrace, power canal, Seton Generating Station forebay and tailrace, and Seton River to detect the proportion of smolts diverted through Seton Dam or into the power canal and through Seton Generating Station. Forebay behaviour in relation to conveyance structure use will also be characterized. Telemetry will also provide data on the migration timing and survival of outmigrating smolts through SON.

A1.5 Schedule

Field studies will be carried out in project Years 9 and 10 (2020-2021) of the program. We expect to answer the management questions with nine years of data collection following the addition of radio telemetry and extended monitoring time outlined in this Addendum. Summary reporting will occur in the final field season.

A1.6 Budget

The total revised Program Cost is \$2,127,578.

A2.0 References

Harrower, W.L., B, Adolph, and R. Ledoux. 2019. Seton Sockeye Salmon Smolts Monitoring Program 2018 Report. Prepared for BC Hydro by St'át'imc Eco-Resources Ltd.

Lingard, S. and R. Ledoux. 2019. Seton Sockeye Salmon Smolts Monitoring Program 2019 Report. Prepared for BC Hydro by St'át'imc Eco-Resources Ltd.

Sneep, J., B, Adolph, and D. Levy. 2013. Seton Sockeye Salmon Smolts Monitoring Program 2012 Report. Prepared for BC Hydro by St'át'imc Eco-Resources Ltd.

BC Hydro, 2012, BRGMON-13 Seton Sockeye Salmon Smolts Monitoring Program Terms of Reference, Burnaby, BC.