



Bridge-Seton Water Use Plan

Monitoring Program Terms of Reference

BRGMON-9 Seton River Habitat and Fish Monitoring

**Addendum 1
November 30, 2018**

A1.0 Addendum to BRGMON-9 Seton River Habitat and Fish Monitoring

A1.1 Context

This monitoring is required under the Water Use Plan (WUP) Order dated March 11, 2011, Schedule A, Clause 16 (e) as follows:

e) Monitor if discharge from Seton Generating Station significantly affects fish habitat in the Fraser River above and beyond its natural variation.

A1.2 Addendum Background and Rationale

The BRGMON-9 Terms of Reference (TOR) (January 23, 2012) identified concerns and specified methods to investigate the effects of Seton Generating Station (SON) shutdowns on fish habitat in the Fraser River during periods of low Fraser River discharge in the winter (December to March). The goal was to reduce uncertainty around fish stranding on the Fraser River, previously estimated in Higgins (2010).

To date, BRGMON-9 has assessed stranding risk during winter shutdowns at two bar sites in the upper Fraser River relatively close to SON (~1 km downstream). Assessments carried out from 2014-2017 found that despite high ramp rates and stage change, stranding risk in the upper Fraser River is low (Ramos-Espinoza et al. 2015, 2016, 2018a, 2018b) and further assessments are not required. However, this approach did not address stranding risk in the lower Fraser River, ~300 km downstream of SON between Hope and Mission (the “gravel reach”), that was assessed in Higgins (2010) and identified by Fisheries and Oceans Canada (DFO) in 2013 as a key area of concern for stranding.

This TOR Addendum expands the Fraser River stranding risk assessment to include the lower Fraser River gravel reach. Significant pink and chum salmon spawning occurs in the gravel reach and egg, alevin and fry stranding in spawning grounds can occur if SON shutdowns decrease Fraser River flows below normal winter low flows. Outside of WUP monitoring, preliminary gravel reach stranding assessments and habitat modeling have been completed (Ramos-Espinoza 2016; Putt and Wilson 2017; Ecofish 2018). This Addendum will build on these assessments to determine whether SON operations affect Fraser River fish habitat beyond natural variation.

A1.3 Management Questions

There are no changes to the BRGMON-9 management questions.

A1.4 Approach and Methods

The stranding assessment for the lower Fraser River gravel reach will build on previous studies (Ramos-Espinoza 2016; Putt and Wilson 2017; Ecofish 2018) to develop a model to estimate stranding risk and the potential effects of SON shutdowns. Model development will be a desktop exercise supported with two years of limited annual field studies to collect data on salmon spawning habitat preferences and stage changes to refine a stage-discharge relationship for the gravel reach and validate model predictions. One additional year of field studies may be required depending on the variability in spawning habitat use and

discharges observed. Opportunistic field studies will also occur in the event of a winter SON shutdown.

A1.5 **Schedule**

Desktop studies will be carried out in Year 7 to 10 (2019-2022) and at least two years of field studies will be completed (2019-2020) to assess annual variability in spawning habitat preferences. Up to one additional year of field studies may be required in Year 10 (2022) depending on variation in spawning habitat use observed in Year 8 and 9. A refined model would be completed by Year 10.

A1.6 **Budget**

Total revised program cost: \$1,365,841.

A2.0 References

Ramos-Espinoza, D., C. Melville, and A. Putt. 2016. Analysis of the effect of Seton Generating Station shutdowns on the Lower Fraser River at Ferry Island. Unpublished report prepared for BC Hydro by Instream Fisheries Research.

Putt, A. and L.J. Wilson. 2017. Seton Generating Station shutdown March 7, 2017: Ferry Island Stranding. Unpublished report prepared for BC Hydro by Instream Fisheries Research.

Faulkner, S., M. Sparling, A. Yeomans-Routledge, and A. Lewis. 2018. BC Hydro Seton Generating Station Fraser River Egg Dewatering Risk Assessment. Draft V1. Consultant's report prepared for BC Hydro by Ecofish Research Ltd. May 7, 2018.

Ramos-Espinoza, D., D.C. Braun, and D. McCubbing. 2015. BRGMON-9 Implementation Years 1 and 2 (2013 and 2014). Seton River Habitat and Fish Monitor. Report prepared for BC Hydro by Instream Fisheries Research. January 2015.

Ramos-Espinoza, D., D.C. Braun, N. Burnett and C. Melville. 2016. BRGMON-9 Implementation Year 3 (2015). Seton River Habitat and Fish Monitor. Report prepared for BC Hydro by Instream Fisheries Research. December 23, 2016.

Ramos-Espinoza, D., D.C. Braun, N. Burnett, and J. Buchanan. 2018a. BRGMON-9 Implementation Year 4 (2016). Seton River Habitat and Fish Monitor. Report prepared for BC Hydro by Instream Fisheries Research. February 26, 2018.

Ramos-Espinoza, D., A. Putt, J. Buchanan and S. Lingard. 2018b. BRGMON-9 Implementation Year 5 (2017). Seton River Habitat and Fish Monitor. Report prepared for BC Hydro by Instream Fisheries Research. February 26, 2018.