Bridge-Seton Water Use Plan

Monitoring Program Terms of Reference

BRGMON-14 Effectiveness of Cayoosh Flow Dilution, Dam Operation, and Fishway Passage on Delay and Survival of Upstream Migration of Salmon in the Seton-Anderson Watershed

Addendum 2

November 29, 2017

A2.0 Addendum 2 to BRGMON-14 – Effectiveness of Cayoosh Flow Dilution, Dam Operation, and Fishway Passage on Delay and Survival of Upstream Migration of Salmon in the Seton-Anderson Watershed

A2.1 Addendum Rationale

A key objective of BRGMON-14 is to assess how Seton Dam operations affect salmon migration upstream of the Seton Dam. On June 3, 2016, Addendum 1 to BRGMON-14 was approved to add an additional year of field data collection in 2016 to repeat a 2014 trial of an alternative flow release at Seton Dam that could benefit the upstream survival of Gates Creek sockeye salmon (GCSK). Upstream-migrating adult GCSK must navigate highly turbulent flows in the Seton Dam tailrace, provided by the combined discharge of Siphon #1 (SSV1) and the fish water release gate (FWRG), to locate the Seton Dam fishway entrance. For the 2016 trial, water releases from Seton Dam were alternated weekly between releasing water directly adjacent to the fishway entrance from the FWRG and SSV1, to releasing water away from the fishway entrance using Siphon #4 (SSV4). The goal of changing siphon use was to maintain Seton Dam discharge while reducing turbulent flows downstream of the fishway to improve GCSK migration success.

Tagging study results from 2016 found that GCSK had equal success entering the fishway regardless of siphon use; however, the time GCSK delayed in the Seton Dam tailrace prior to entering the fishway was significantly greater with use of SSV4. While increased delay downstream of dams can reduce upstream survival of salmon, the 2016 results also found the post-passage survival of GCSK to spawning grounds was 15-20% greater for fish that passed Seton Dam during the use of SSV4 than those fish passed during the use of the FWRG and SSV1. These results indicate that, under the migration conditions present in 2016, the benefits to GCSK migration associated with reducing turbulent flows downstream of the fishway entrance outweighed the costs associated with increased delay downstream of Seton Dam.

The improved survival observed during use of SSV4 supports operating SSV4 at Seton Dam for the six-week duration of the GCSK migration period. However, some uncertainties remain around the benefits to GCSK of using SSV4. Specifically, it is unknown if the survival benefits observed during SSV4 trials in 2016 will be observed at the population level as the condition and survival of GCSK varies over the migration period and SSV4 was only tested for two weeks near the peak of migration. In addition, it is unknown if the increased post-passage survival observed with SSV4 use would still occur under warmer migration temperatures. Energetic costs of delay increase with water temperature and could exceed the energetic savings of reduced turbulent flows, thereby reducing the survival benefit to GCSK from using SSV4. Resolving these uncertainties requires ongoing monitoring of GCSK post-passage survival to determine if using SSV4 throughout the migration period is beneficial to GCSK over the entire migration period and under a range of migration temperatures.

A2.2 Objective and Scope

Addendum 2 extends BRGMON-14 TOR Task 7 (Seton Dam Fish Counter and Fishway Infrastructure) to continue enumerating GCSK at Seton Dam. No other field program tasks will be extended and the comprehensive synthesis report deadline for completed BRGMON-14 monitoring tasks, including Task 7 up to 2016, will remain as May 2018 as outlined in Addendum 1.

A2.3 Approach

Seton Dam fish counter operations will enumerate GCSK passage at Seton Dam from 2017 to 2020. Annual post-passage survival estimates will be determined using the difference between GCSK abundance at Seton Dam and GCSK abundance at spawning grounds (data to be obtained from Fisheries and Oceans Canada). A fisheries monitor will be used to estimate fisheries-take between the two locations. To determine the difference in the post-passage survival of GCSK between the use of SSV1/FWRG and SSV4, two years of control data will be collected under SSV1/FWRG and two years of trial data collected under the use of SSV4. Within a single year, only one flow scenario will be operated during the GCSK migration period. Temperature data will be supplied by BC Hydro.

A2.4 Key Water Use Decision Affected

Results of the studies in Addendum 2 will be used to inform operational guidelines for water release configurations at Seton Dam during the GCSK migration period.

A2.5 Schedule and Reporting

Addendum 2 will extend BRGMON-14 from the Addendum 1 end date of May 31, 2018 to May 31, 2020. GCSK post-passage survival will be determined each year from 2017 to 2020 and an annual report submitted to BC Hydro by March 31 of each year. Data reports will include an assessment of monitoring effectiveness to determine if the post-passage survival estimates are of sufficient resolution to detect survival differences between the two flow scenarios. If data are insufficient, the monitoring program will either be reassessed and adjusted or discontinued. A final report is due May 31, 2020. The program schedule for Addendum 2 is presented in Table 1.

Table 1: Schedule of Seton Dam flow configurations and tasks for BRGMON-14 Addendum 2.

Task	Task Description	2017	2018	2019	2020
		Routine	Routine	Alt	Alt
7	Counter Operations	X	X	X	X
	Annual Data Report	X	X	X	
	Final Report				X

A2.6 Budget

Total revised program cost: $2,497,957.