

Wahleach Project Water Use Plan

Monitoring Program and Physical Works

Annual Report: 2019

Implementation Period: February 2017 to January 2019

- **WAHMON-1 Lower Jones Creek Fish Productivity Indices**
- **WAHMON-2 Channel Stability Assessment**
- **WAHMON-3 Herrling Island Sidechannel Chum Spawning Success Monitoring**
- **WAHWORKS-1 Boulder Creek Diversion Bypass**
- **WAHWORKS-2 Wahleach Reservoir Fertilization Program**
- **WAHWORKS-3 Lower Wahleach (Jones) Creek Channel Enhancement Project**

For Water Licences 119711, 119709 and 119710

February 28, 2019

BC Hydro Wahleach Project Water Use Plan Monitoring Programs and Physical Works Annual Report: 2019

1 Introduction

This document represents a summary of the status and the results of the Wahleach Project Water Use Plan (WUP) monitoring programs and physical works to January 31, 2019, as per the Wahleach Order under the *Water Act*, dated January 25, 2005. There are three monitoring programs and three physical works.

2 Status

The following table outlines the dates that Terms of Reference (TOR) for the Wahleach Project WUP monitoring programs and physical works were submitted to and approved by the CWR.

Table: 2-1: Dates of Wahleach Project WUP TOR Submissions and Approvals by the Comptroller of Water Rights

| Monitoring Program & Physical Works TOR | Order Clause | Original ToR Submission | | Most Recent ToR Resubmission | |
|---|-------------------|-------------------------|---------------|------------------------------|---------------|
| | | Date Submitted | Date Approved | Date Submitted | Date Approved |
| WAHMON-1 Lower Jones Creek Fish Productivity Indices | Schedule B.1.a | Aug 24, 2005 | Sep 27, 2005 | Feb 24, 2011 | Oct 01, 2012 |
| WAHMON-2 Channel Stability Assessment | Schedule B.1.a | Aug 24, 2005 | Sep 27, 2005 | Feb 24, 2011 | Oct 01, 2012 |
| WAHMON-3 Herrling Island Sidechannel Chum Spawning Success Monitoring | Schedule B.1.b | Aug 24, 2005 | Sep 27, 2005 | Feb 24, 2011 | Oct 01, 2012 |
| WAHWORKS-1 Boulder Creek Diversion Bypass | Schedule A.2.a.ii | Aug 24, 2005 | Oct 28, 2005 | Feb 24, 2011 | Oct 01, 2012 |
| | | Jul 16, 2007 | Jul 26, 2007 | | |
| WAHWORKS-2 Wahleach Reservoir Fertilization Program | Schedule C | Aug 24, 2005 | Oct 28, 2005 | Jun 18, 2018 | Jun 21, 2018 |
| WAHWORKS-3 Lower Wahleach (Jones) Creek Channel Enhancement Project | Schedule D | Jun 15, 2006 | Aug 02, 2006 | Nov 03, 2014 | Nov 26, 2014 |

3 Schedule

The following table outlines the current schedule for the monitoring programs and physical works being delivered for the Wahleach Project WUP.

Table 3-1: Monitoring Programs Schedule as of January 31, 2019

| Study/Physical Work | Component | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|--|------------------------------------|---------|---------|---------|---------|---------|------------------------|---------|---------|---------|----------|----------|----------|----------|----------|----------|----------|
| | | WLR YR1 | WLR YR2 | WLR YR3 | WLR YR4 | WLR YR5 | WLR YR6 Interim Review | WLR YR7 | WLR YR8 | WLR YR9 | WLR YR10 | WLR YR11 | WLR YR12 | WLR YR13 | WLR YR14 | WLR YR15 | WLR YR16 |
| WAHMON-1 Lower Jones Creek Fish Productivity Indices | Fry Outmigration Assessment | ✓ | ✓ | ✓ | ✓ | ✓ | x | ✓ | x | ✓F | x | | | | | | |
| | Smolt Outmigration Assessment | ✓ | ✓ | ✓ | ✓ | ✓F | x | x | x | x | x | | | | | | |
| | Adult Salmon Escapement | ✓ | ✓ | ✓ | ✓ | ✓ | x | ✓ | x | ✓F | x | | | | | | |
| | Adult Steelhead Escapement | ✓ | ✓ | ✓ | ✓ | ✓F | x | x | x | x | x | | | | | | |
| WAHMON-2 Channel Stability Assessment | ✓ | | ✓ | | ✓ | | ✓ | | | ✓F | | | | | | | |
| WAHMON-3 Herring Island Sidechannel Chum Spawning Success Monitoring | Behaviour Assessments | ✓ | ✓ | ✓ | ✓ | ✓F | x | x | x | x | x | | | | | | |
| | Stranding Assessments | ✓ | ✓ | ✓ | ✓ | ✓F | x | x | x | x | x | | | | | | |
| | Water level fluctuation monitoring | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓F | | | | | | |
| WAHWORKS-1 Boulder Creek Diversion Upgrade | Temporary Upgrade | ✓ | ✓ | ✓F | □ | □ | x | x | x | x | x | | | | | | |
| | Final Upgrade | | | | | | x | | | | | | | | | | |
| WAHWORKS-2 Wahleach Reservoir Fertilization Program | Fertilization and Basic Monitoring | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ■ | ■ |
| | Hydroacoustic Monitoring | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ■ | ■ |
| WAHWORKS-3 Lower Wahleach Creek Channel Enhancement Project | | DEL | ✓ | ✓ | ✓ | □ | □ | □ | □ | □ | ✓F | | | | | | |

Legend:
 □ = Project timing subject to change according to maintenance schedule
 ■ = Project to be undertaken/initiated in identified year
 X = Project field work/data collection discontinued based on outcome of interim review
 ✓F = All field work for this project is complete. No further field work is planned.
 PCR = Project Completion Report submitted
 DEL = Delayed

4 Monitoring Programs and Physical Works Terms of Reference

The monitoring programs and physical works being implemented under the Wahleach Project WUP are described in TOR. These TOR and the reports for work completed to date can be found here:

http://www.bchydro.com/about/sustainability/conservation/water_use_planning/lower_mainland/wahleach.html

5 Status of Monitoring Programs

5.1 WAHMON-1 Lower Jones Creek Fish Productivity Indices

The objective of this program was to determine the fisheries benefits associated with the flow provisions outlined in the Wahleach WUP, as indicated by egg to fry survival for Chum and Pink salmon (%), and smolt production for Steelhead (number of smolts).

After the five-year interim review of the program in 2010, scope was reduced to monitoring only in odd Pink spawning years due to the low numbers of Chum and Steelhead returns during non-Pink years. An additional outcome of the five-year review was the expansion of the monitoring program to include egg incubation monitoring, to assess the impacts of impaired substrate quality, since substrate quality is believed to be the major cause of poor egg-to-fry survival for Chum and Pink in Jones Creek.

This project is complete.

5.2 WAHMON-2 Channel Stability Assessment

The objective of this program was to assess channel change and infer its effects on fish productivity in the anadromous reach of Lower Jones Creek, in consideration of results from the Lower Jones Creek Fish Productivity Indices program.

This project is complete.

5.3 WAHMON-3 Herrling Island Sidechannel Chum Spawning Success Monitoring

The objective of this program was to assess the effectiveness of the Wahleach Generating Station operations at preventing stranding of Chum and Pink spawners.

This monitoring program was initiated in 2005 and was completed in 2010 based on the outcome of the interim review. Following the interim review Herrling Island Sidechannel hydrometric data was collected annually until 2015. In efforts to mitigate any incidences of adult and redd stranding within the Herrling sidechannel BC Hydro continues to install exclusion fences at all confirmed high risk stranding sites on an annual basis (Living Resources Environmental, 2008-2015).

6 Status of Physical Works

6.1 WAHWORKS-1 Boulder Creek Diversion Bypass

The objective of this project was to upgrade the Boulder Creek diversion bypass to provide supplemental flows to meet Lower Jones Creek flow provisions. The bypass has been critical in assuring compliance with the minimum flow provisions since its installation in 2007. BC Hydro Engineering condition assessments in 2010 and again in 2015 confirmed the bypass structure continues to be operationally and structurally sound.

This physical works was initiated in 2005 and was completed in 2007 based on the outcome of the interim review.

This project is complete.

6.2 WAHWORKS-2 Wahleach Reservoir Fertilization Program

The objective of this program was to restore kokanee abundance in Wahleach Reservoir through annual application of nutrient fertilizer from June through October. The project also includes a monitoring program designed to ensure program effectiveness, evaluate in-season progress, and enable fine-tuning supplements the fertilizer application program.

This physical works was initiated in 2005 and is still underway. BC Hydro, in consultation with MOE, recommended that the fertilization program continue until completion of the WUP Order Review when a long-term decision can be made on the reservoir fertilization. On April 27, 2015, the CWR approved a TOR addendum to continue fertilization until December 31, 2017, when the WUP Order Review was scheduled for completion.

The WUP Order Review schedule was revised and is currently proposed for 2020. On February 14, 2018, the CWR approved a TOR addendum to extend the fertilization program until 2020 with a budget adjustment approved on June 21, 2018.

There have been some delays in reporting. Report 6 (2009-2015 field seasons), Report 7 (2016 field season) and Report 8 (2017 field season) will be submitted when finalized.

6.3 WAHWORKS-3 Lower Wahleach Creek Enhancement Channel

The objective of the physical works was to improve the productivity of juvenile salmon in lower Jones Creek, by enhancing habitat quality for spawning, rearing, and incubation of anadromous salmon. Due to the severe and on-going natural high inflow and sediment loading events in Jones Creek, the enhancement work focused on Lorenzetta Creek because it is less susceptible to damage.

In 2006, two enhancement channels and two gravel spawning platforms were constructed. In October 2014, a site visit and assessment by BC Hydro and DFO confirmed that further maintenance of the enhancement channels was not warranted or cost effective due to the repeated and substantial infilling of the channels from the significant sediment loading of Jones Creek. The gravel spawning platforms constructed further upstream in Lorenzetta Creek have continued to be stable and function as effective spawning habitat.

In 2014, formal approval to discontinue monitoring of the enhancement channels was received from the CWR.

7 Monitoring Programs and Physical Works Costs

The following table summarizes the Wahleach Project WUP monitoring programs and physical works costs approved by the Comptroller and the Actual Costs to January 31, 2019.

Table 7-1: Wahleach Project WUP Monitoring Programs and Physical Works Costs

| Monitoring Programs | Costs approved by CWR | Life to Date Actuals (LTD) | Estimated to Complete (Forecast) | Total Forecast (LTD and Forecast) | Variance Total to Approved | Explanation | Corrective Action |
|---|-----------------------|----------------------------|----------------------------------|-----------------------------------|----------------------------|--|-------------------|
| Wahleach WUP Annual Report | \$14,359 | \$14,260 | \$0 | \$14,260 | \$99 | | |
| WAHM01A Fish Productivity Ind | \$1,335,486 | \$537,055 | \$1,547 | \$538,602 | \$796,884 | Efficiencies found as outcome of interim review. | |
| WAHM01A Fish Productivity Ind - ONR DM | \$147,986 | \$56,760 | \$1,547 | \$58,308 | \$89,678 | | |
| WAHM01A Fish Productivity Ind - ONR Imp | \$1,187,500 | \$480,294 | | \$480,294 | \$707,206 | | |
| WAHM02A Channel Stability Ass | \$227,278 | \$173,825 | \$2,612 | \$176,438 | \$50,840 | Efficiencies found as outcome of interim review. | |
| WAHM02A Channel Stability Ass - ONR DM | \$74,678 | \$29,931 | \$2,612 | \$32,543 | \$42,135 | | |
| WAHM02A Channel Stability Ass - ONR Imp | \$152,600 | \$143,895 | | \$143,895 | \$8,705 | | |
| WAHM03A Herrling Island Side | \$479,514 | \$330,230 | | \$330,230 | \$149,284 | Efficiencies found as outcome of interim review. | |
| WAHM03A Herrling Island Side - ONR DM | \$141,814 | \$47,128 | | \$47,128 | \$94,686 | | |
| WAHM03A Herrling Island Side - ONR Imp | \$337,700 | \$283,102 | | \$283,102 | \$54,598 | | |
| WAHW01A Boulder Cr Flow Byp | \$1,330,034 | \$296,890 | \$5,068 | \$301,958 | \$1,028,076 | Efficiencies found as outcome of interim review. | |
| WAHW01A Boulder Cr Flow Byp - ONR DM | \$265,918 | \$48,470 | \$5,068 | \$53,539 | \$212,379 | | |
| WAHW01A Boulder Cr Flow Byp - ONR Imp | \$283,116 | \$179,728 | | \$179,728 | \$103,388 | | |
| WAHW01A Boulder Cr Flow Byp - CAP Imp | \$781,000 | \$68,692 | | \$68,692 | \$712,308 | | |
| WAHW02A Fertilization Progr | \$1,865,963 | \$1,547,459 | \$274,106 | \$1,821,566 | \$44,397 | | |
| WAHW02A Fertilization Progr - ONR DM | \$55,193 | \$45,534 | \$9,698 | \$55,232 | (\$39) | | |
| WAHW02A Fertilization Progr - ONR Imp | \$1,810,770 | \$1,501,925 | \$264,408 | \$1,766,333 | \$44,437 | | |
| WAHW03A Lower WAH Channel | \$241,609 | \$111,913 | \$5,068 | \$116,981 | \$124,628 | | |
| WAHW03A Lower WAH Channel - ONR DM | \$67,659 | \$31,885 | \$5,068 | \$36,953 | \$30,706 | | |
| WAHW03A Lower WAH Channel - ONR Imp | \$173,950 | \$80,028 | | \$80,028 | \$93,922 | | |

OR - Ordered Remissible
ONR - Ordered Non-Remissible

* Red values in parentheses denote overage.