

Wahleach Project Water Use Plan

Monitoring Program and Physical Works

Annual Report: 2017

Implementation Period: February 2016 to January 2017

- **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, 2017

BC Hydro Wahleach Project Water Use Plan Monitoring Programs and Physical Works Annual Report: 2017

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, 2017, 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	Mar 25, 2015	Apr 27, 2015
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, 2017

Study/Physical Work	Component	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
		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
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

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 monitoring program was initiated in 2005 and all field work is complete. The final project report dated December 2014, for the 2013-2014 year is attached.

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 monitoring program was initiated in 2005, field work was completed in 2013, and reporting was completed in 2014. A final synthesis report dated December 31, 2015, summarizing all work completed between 2005-2014, is attached.

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.

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. A resubmission to extend the fertilization program may be required at a later date if the WUP Order Review is not completed by the end of 2017.

Attached is the report dated December 1, 2015 for the 2013/2014 field season.

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, 2017.

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	\$14,108	\$0	\$14,108	\$251		
WAHM01A Fish Productivity Ind	\$1,335,486	\$537,055	\$3,127	\$540,182	\$795,304	Efficiencies found as outcome of interim review.	
WAHM01A Fish Productivity Ind - ONR DM	\$147,986	\$56,760	\$1,507	\$58,267	\$89,719		
WAHM01A Fish Productivity Ind - ONR Imp	\$1,187,500	\$480,294	\$1,620	\$481,914	\$705,586		
WAHM02A Channel Stability Ass	\$227,278	\$173,284	\$903	\$174,187	\$53,091	Efficiencies found as outcome of interim review.	
WAHM02A Channel Stability Ass - ONR DM	\$74,678	\$29,389	\$903	\$30,292	\$44,386		
WAHM02A Channel Stability Ass - ONR Imp	\$152,600	\$143,895		\$143,895	\$8,705		
WAHM03A Herring Island Side	\$479,514	\$329,328	\$903	\$330,230	\$149,284	Efficiencies found as outcome of interim review.	
WAHM03A Herring Island Side - ONR DM	\$141,814	\$46,226	\$903	\$47,128	\$94,686		
WAHM03A Herring Island Side - ONR Imp	\$337,700	\$283,102		\$283,102	\$54,598		
WAHW01A Boulder Cr Flow Byp	\$1,330,034	\$296,032	\$858	\$296,890	\$1,033,144	Efficiencies found as outcome of interim review.	
WAHW01A Boulder Cr Flow Byp - ONR DM	\$265,918	\$47,612	\$858	\$48,470	\$217,448		
WAHW01A Boulder Cr Flow Byp - ONR Imp	\$283,116	\$179,728	\$0	\$179,728	\$103,388		
WAHW01A Boulder Cr Flow Byp - CAP Imp	\$781,000	\$68,692		\$68,692	\$712,308		
WAHW02A Fertilization Progr	\$1,489,562	\$1,314,199	\$156,095	\$1,470,294	\$19,268	Efficiencies found as outcome of interim review.	
WAHW02A Fertilization Progr - ONR DM	\$54,058	\$43,857	\$11,577	\$55,434	(\$1,376)		
WAHW02A Fertilization Progr - ONR Imp	\$1,435,504	\$1,270,342	\$144,518	\$1,414,860	\$20,644		
WAHW03A Lower WAH Channel	\$241,609	\$110,022	\$1,891	\$111,913	\$129,696	Efficiencies found as outcome of interim review.	
WAHW03A Lower WAH Channel - ONR DM	\$67,659	\$29,994	\$1,891	\$31,885	\$35,774		
WAHW03A Lower WAH Channel - ONR Imp	\$173,950	\$80,028	\$0	\$80,028	\$93,922		

OR - Ordered Remissible

ONR - Ordered Non-Remissible

* Red values in parentheses denote overage.