

Campbell River Water Use Plan

Monitoring Program and Physical Works

Annual Report: 2015

Implementation Period: October 2014 to September 2015

- JHTMON-1 Upper and Lower Campbell Lake Reservoir Digital Elevation Model
- JHTMON-2 Upper and Lower Campbell and John Hart Reservoirs Public Use and Perception Survey
- JHTMON-3 Upper and Lower Campbell Lake Fish Spawning Success Assessment
- JHTMON-4 Upper and Lower Campbell Lake Reservoirs Littoral Productivity Assessment
- JHTMON-5 Campbell Reservoirs Littoral vs. Pelagic Fish Production Assessment
- JHTMON-6 Campbell Watershed Riverine Fish Production Assessment
- JHTMON-8 Heber, Quinsam and Salmon Rivers Smolt and Spawner Abundance Assessment
- JHTMON-9 Upper and Lower Campbell Lake Reservoir Amphibian Assessment
- JHTMON-10 Upper and Lower Campbell Lake Reservoirs Shoreline Vegetation Model Validation
- JHTMON-11 Upper Campbell Lake Reservoir Erosion Assessment
- JHTMON-13 Lower Campbell River Ramping and Tripping Physical Model and Assmt
- JHTMON-14 Lower Campbell River Load Factoring Fisheries Assessment
- JHTMON-15 Elk Canyon Smolt and Spawner Abundance Assessment
- JHTWORKS-1 Upper Campbell Lake Erosion Control
- JHTWORKS-2 Upper and Lower Campbell Lake Recreation Facility Redevelopment
- JHTWORKS-3 Upper Campbell Drawdown Zone Revegetation program
- JHTWORKS-4 Sayward Canoe Route (Portage and Signage)
- JHTWORKS-5 Salmon River Diversion, Fry Creek Erosion Control
- JHTWORKS-6 Salmon River Diversion Fish Screen Upgrade

For Water Licences 126726, 126725, 126722, 126724, 126713, 126721, 126751, 126727, 126757, 126764, 126759, 126765, 126761 and Conditional Water Licence 23265

October 31, 2015

BC Hydro Campbell River Project Water Use Plan Monitoring Programs and Physical Works Annual Report: 2015

1 Introduction

This document represents a summary of the status and the results of the Campbell River Water Use Plan (WUP) monitoring programs and physical works to September 30, 2015, as per the Campbell River Order under the *Water Act*, dated November 21, 2012. There are thirteen monitoring programs and six physical works.

2 Status

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

Table: 2-1: Dates of Campbell River 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
JHTMON-1 Upper and Lower Campbell Lake Reservoir Digital Elevation Model		To be submitted Mar 31, 2017			
JHTMON-2 Upper and Lower Campbell and John Hart Reservoirs Public Use and Perception Survey	Schedule C.2.b, Schedule D.1.c, Schedule E.2	Sep 26, 2013	Oct 08, 2013		
JHTMON-3 Upper and Lower Campbell Lake Reservoirs Fish Spawning Success Assessment	Schedule C.3.a, Schedule D.2.a	Jul 04, 2013	Jul 11, 2013	Jul 09, 2014	Aug 08, 2014
JHTMON-4 Upper and Lower Campbell Lake Reservoirs Littoral Productivity Assessment	Schedule C.3.b, Schedule E.1.a	Jul 04, 2013	Jul 11, 2013		
JHTMON-5 Campbell Reservoirs Littoral vs. Pelagic Fish Production Assessment	Schedule C.3.c, Schedule D.2.b, Schedule E.1.b, Schedule F.5.b	Sep 26, 2013	Nov 12, 2013		
JHTMON-6 Campbell Watershed Riverine Fish Production Assessment	Schedule E.3.a. and 3.b	Sep 26, 2013	Jan 30, 2014		
JHTMON-8 Heber, Quinsam and Salmon Rivers Smolt and Spawner Abundance Assessment	Schedule F.5.a	Sep 26, 2013	Jan 30, 2014		
JHTMON-9 Upper and Lower Campbell Lake Reservoir Amphibian Assessment		To be submitted Jan 31, 2017			
JHTMON-10 Upper and Lower Campbell Lake Reservoirs Shoreline Vegetation Model Validation	Schedule C.4.b, Schedule D.3.b	Sep 26, 2013	Jan 14, 2014		
JHTMON-11 Upper Campbell Lake Reservoir Erosion Assessment	Schedule C.1.a and 2.a	Jul 04, 2013	Jul 11, 2013		
JHTMON-13 Lower Campbell River Ramping and Tripping Physical Model and Assmt		TBD*			
JHTMON-14 Lower Campbell River Load Factoring Fisheries Assessment	Schedule E.3.d	To be submitted Jan 31, 2020			
JHTMON-15 Elk Canyon Smolt and Spawner Abundance Assessment	Schedule E.3.e	Sep 26, 2013	Jan 20, 2014		
JHTWORKS-1 Upper Campbell Lake Erosion Control		To be submitted Jan 31, 2016			
JHTWORKS-2 Upper and Lower Campbell Lake Recreation Facility Redevelopment		To be submitted Jan 31, 2016			
JHTWORKS-3 Upper Campbell Drawdown Zone Revegetation Program		To be submitted Jan 31, 2016			
JHTWORKS-4 Sayward Canoe Route (Portage and Signage)		To be submitted Jan 31, 2016			
JHTWORKS-5 Salmon River Diversion, Fry Creek Erosion Control		To be submitted Jan 31, 2016			
JHTWORKS-6 Salmon River Diversion Fish Screen Upgrade	Schedule F.4.d	Jan 28, 2014	Apr 10, 2014	Aug 27, 2015	Oct 13, 2015
* JHTMON-13 will likely be negated by the John Hart Upgrade Project					

3 Schedule

The following table outlines the current schedule for the monitoring programs and physical works being delivered for the Campbell River WUP

Table 3-1: Monitoring Programs and Physical Works Schedule as of September 30, 2015.

Monitoring Programs	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
	WLR YR1	WLR YR2	WLR YR3	WLR YR4	WLR YR5	WLR YR6	WLR YR7	WLR YR8	WLR YR9	WLR YR10	WLR YR11	WLR YR12
JHTMON-1 Upper and Lower Campbell Lake Reservoir Digital Elevation Model					■							
JHTMON-2 Upper and Lower Campbell and John Hart Reservoirs Public Use and Perception Survey		✓	u/w	■	■	■	■	■	■	■	■	
JHTMON-3 Upper and Lower Campbell Lake Reservoirs Fish Spawning Success Assessment		✓	u/w	■	■	■	■	■	■	■	■	
JHTMON-4 Upper and Lower Campbell Lake Reservoirs Littoral Productivity Assessment			u/w	■	■	■	■	■	■	■	■	■
JHTMON-5 Campbell Reservoirs Littoral vs. Pelagic Fish Production Assessment		✓	u/w			■		■	■	■	■	
JHTMON-6 Campbell Watershed Riverine Fish Production Assessment			u/w	■	■	■	■	■	■	■	■	
JHTMON-8 Heber, Quinsam and Salmon Rivers Smolt and Spawner Abundance Assessment		✓	u/w	■	■	■	■	■	■	■	■	
JHTMON-9 Upper and Lower Campbell Lake Reservoir Amphibian Assessment					■	■	■					
JHTMON-10 Upper and Lower Campbell Lake Reservoirs Shoreline Vegetation Model Validation		✓	u/w	■	■	■	■	■	■	■	■	
JHTMON-11 Upper Campbell Lake Reservoir Erosion Assessment			u/w	■	■	■	■	■	■	■	■	
JHTMON-13 Lower Campbell River Ramping and Tripping Physical Model and Assmt								■	■			
JHTMON-14 Lower Campbell River Load Factoring Fisheries Assessment								■	■	■	■	■
JHTMON-15 Elk Canyon Smolt and Spawner Abundance Assessment		✓	u/w	■	■	■	■	■	■	■	■	
Physical Works												
JHTWORKS-1 Upper Campbell Lake Erosion Control ¹												
JHTWORKS-2 Upper and Lower Campbell Lake Recreation Facility Redevelopment ¹												
JHTWORKS-3 Upper Campbell Drawdown Zone Revegetation Program ¹												
JHTWORKS-4 Sayward Canoe Route (Portage and Signage) ¹												
JHTWORKS-5 Salmon River Diversion, Fry Creek Erosion Control ¹												
JHTWORKS-6 Salmon River Diversion Fish Screen Upgrade	✓	✓	u/w	■								

Footnote ¹ Terms of Reference under development. Implementation date and duration of program not set.

- Legend:
- = Program to be undertaken/initiated in identified year
 - ✓ = Program completed for the year
 - u/w = Program is under way

4 Monitoring Programs and Physical Works Terms of Reference

The Monitoring Programs and Physical Works being implemented under the Campbell River WUP are described in Terms of Reference. These Terms of Reference and the reports for work completed to date can be found here:

http://www.bchydro.com/about/sustainability/conservation/water_use_planning/vancouver_island/campbell_river.html

5 Status of Monitoring Programs

5.1 JHTMON-2 Upper and Lower Campbell and John Hart Reservoirs Public Use and Perception Survey

This monitoring program was initiated in April 2014 and will be carried out over 10 years. Reporting on this project is expected in December 2015 and will be included in the subsequent annual report.

5.2 JHTMON-3 Upper and Lower Campbell Lake Reservoirs Fish Spawning Success

This monitoring program was initiated in June 2014 and will be carried out over 10 years. Attached is the report for Year 2014.

A number of changes have been piloted throughout 2015 based on recommendations from Year 1 data collection. Due to the timing of these changes the TOR resubmission deadline of January 15, 2016 will not be met. Once the effectiveness of the pilot has been verified a TOR will be submitted by June 2016.

5.3 JHTMON-4 Upper and Lower Campbell Lake Reservoirs Littoral Productivity Assessment

This monitoring program was initiated in August 2015 and will be carried out over 10 years. Reporting on this project is expected to start in 2016 and will be included in the subsequent annual report.

5.4 JHTMON-5 Campbell Reservoirs Littoral vs. Pelagic Fish Production Assessment

This monitoring program was initiated in July 2014 and will be carried out over 10 years. Attached is the report for Year 2014.

Based on the results of Year 1 monitoring, updates to the program have been implemented. A TOR resubmission outlining these changes will be submitted by June 2016.

5.5 JHTMON-6 Campbell Watershed Riverine Fish Production Assessment

This monitoring program was initiated in April 2015 and will be carried out over nine years. Reporting on this project is expected to start in 2016 and will be included in the subsequent annual report.

5.6 JHTMON-8 Heber, Quinsam and Salmon Rivers Smolt and Spawner Abundance Assessment

This monitoring program was initiated in March 2014 and will be carried out over 10 years. Attached is the report for Year 2014.

Costs of the first two years were higher than anticipated. We are expecting to recover the initial overspend costs over the life of the project.

5.7 JHTMON-10 Upper and Lower Campbell Lake Reservoirs Shoreline Vegetation Model Validation

This monitoring program was initiated in July 2014 and will be carried out over 10 years. The 2015 report is currently under review and will be included in the subsequent annual report.

A technical meeting is planned for November 2015 to discuss improvements to the monitor in order to better answer the management questions. Due to the timing of the meeting the November 2015 TOR resubmission deadline will not be met. The TOR resubmission will be submitted by June 2016.

5.8 JHTMON-11 Upper Campbell Lake Reservoir Erosion Assessment

Currently plans are in place to deploy a wind and wave monitoring buoy. We are on schedule to have the buoy deployed and operational by early 2016. Reporting on this project is expected to start in 2016 and will be included in the subsequent annual report.

5.9 JHTMON-15 Elk Canyon Smolt and Spawner Abundance Assessment

This monitoring program was initiated in September 2014 and will be carried out over 10 years. Years 1 and 2 were underspent due to the focus put on determining a safe location and methodology for field work in Elk Canyon. Full field work has started in 2015 using trial methodologies which, once verified, will be included in a TOR resubmission. The 2015 summary report is currently under review and will be included in the subsequent annual report.

6 Status of Physical Works

6.1 JHTWORKS-1 Upper Campbell Lake Erosion Control

Terms of Reference are under development. Implementation date and duration of program not set. Plans to start wind and wave monitoring under JHTMON-11 that will support determining the feasibility of the project have commenced in 2015. Due to complexities with determining the scope of work for implementation, the TOR submission deadline of January 2016 will not be met. A TOR will be submitted following further assessment of erosion to be completed under JHTMON-11. Status of this project will be updated in the subsequent annual report.

6.2 JHTWORKS-2 Upper and Lower Campbell Lake Recreation Facility Redevelopment

Preliminary meetings and site visits have been held with BC Parks and FLNRO regarding scope and site selection. A TOR for feasibility is currently under development and will be submitted by January 2016.

6.3 JHTWORKS-3 Upper Campbell Drawdown Zone Revegetation Program

Terms of Reference are under development and plans are in place to present re-vegetation options to the Campbell River Monitoring Committee in early 2016. Due to the timing of the Campbell River Monitoring Committee meeting, the TOR submission deadline of November 2015 will not be met. The TOR resubmission will be submitted by June 2016.

6.4 JHTWORKS-4 Sayward Canoe Route (Portage and Signage)

A preliminary site visit has been held with FLNRO and local stakeholders regarding site selection. A TOR is currently under development and will be submitted by January 2016.

6.5 JHTWORKS-5 Salmon River Diversion, Fry Creek Erosion Control

Preliminary meetings and site visits have been held with BC Parks and FLNRO regarding scope of work. A TOR is currently under development and will be submitted by January 2016.

6.6 JHTWORKS-6 Salmon River Diversion Fish Screen Upgrade

The Salmon Diversion Downstream Fish Screen (JHTWORKS-6) is one of three initiatives being planned for the Salmon River Diversion (the other two are (1) the Salmon Diversion upstream fish passage; (2) the Salmon Diversion dam and canal refurbishment). In order to gain efficiencies and to ensure an effective overall solution, these three initiatives are being managed as a single project referred to as the Salmon River Canal Refurbishment and Fish Passage Improvements. The scope of the project related to JHTWORKS-6 Salmon River Diversion Juvenile Fish Screen Upgrade will be funded and covered under the WLR program. Funding for the other two components will come from other sources.

The Identification Phase (feasibility) of this physical works project was initiated in the fall of 2013 and was completed by the summer of 2015.

Definition phase funding was approved by the Comptroller in October 2015 and the work is currently underway and will be completed by June 2016. Once the definition phase is complete a TOR for the Implementation phase will be submitted by October 2016. The in-service date for the fish screen is expected in 2018.

7 Monitoring Programs and Physical Works Costs

The following table summarizes the Campbell River WUP monitoring programs and physical works costs approved by the Comptroller and the Actual Costs to September 30, 2015.

Table 7-1: Campbell River WUP Monitoring Programs and Physical Works Costs

Monitoring Programs & Physical Works	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
Campbell River WUP Annual Report	\$21,194	\$2,322	\$17,430	\$19,752	\$1,442	Efficiencies found during implementation	
JHTM02A Public Use Perception	\$1,345,982	\$87,237	\$1,099,247	\$1,186,484	\$159,498	TOR approved amount includes contingency. Efficiencies found during implementation	
JHTM02A Public Use Perception - OR DM	\$117,321	\$16,715	\$49,928	\$66,642	\$50,679		
JHTM02A Public Use Perception - OR Imp	\$1,228,661	\$70,523	\$1,049,319	\$1,119,842	\$108,819		
JHTM03A Fish Spawn Success As	\$1,657,581	\$324,517	\$1,400,825	\$1,725,342	(\$67,761)	Year 1 costs were higher than anticipated. Year 2 has incorporated "trial" methodologies currently being tested for their effectiveness.	Once methodology verified as effective a TOR will be resubmitted
JHTM03A Fish Spawn Success As - OR DM	\$149,098	\$36,328	\$76,530	\$112,858	\$36,240		
JHTM03A Fish Spawn Success As - OR Imp	\$1,508,483	\$288,189	\$1,324,295	\$1,612,484	(\$104,001)		
JHTM04A Littoral Productivity	\$632,771	\$93,119	\$529,957	\$623,077	\$9,694	Efficiencies found during implementation	
JHTM04A Littoral Productivity - OR DM	\$104,696	\$19,155	\$75,848	\$95,003	\$9,693		
JHTM04A Littoral Productivity - OR Imp	\$528,075	\$73,965	\$454,109	\$528,074	\$1		
JHTM05A Littoral vs Pelagic	\$985,111	\$197,690	\$765,198	\$962,889	\$22,222	Efficiencies found during implementation	
JHTM05A Littoral vs Pelagic - OR DM	\$116,246	\$22,517	\$38,171	\$60,688	\$55,558		
JHTM05A Littoral vs Pelagic - OR Imp	\$868,865	\$175,173	\$727,028	\$902,201	(\$33,336)		
JHTM06A Fish Production Asses	\$839,068	\$51,644	\$787,424	\$839,068	(\$0)		
JHTM06A Fish Production Asses - OR DM	\$110,518	\$21,309	\$62,731	\$84,040	\$26,478		
JHTM06A Fish Production Asses - OR Imp	\$728,550	\$30,335	\$724,693	\$755,028	(\$26,478)		
JHTM08A Heber Quinsam & Salmon	\$2,246,345	\$374,946	\$1,837,907	\$2,212,853	\$33,492	Efficiencies found during implementation	
JHTM08A Heber Quinsam & Salmon - OR DM	\$137,667	\$33,568	\$71,088	\$104,657	\$33,010		
JHTM08A Heber Quinsam & Salmon - OR Imp	\$2,108,678	\$341,378	\$1,766,818	\$2,108,196	\$482		
JHTM10A Shoreline Veg Model	\$241,161	\$139,493	\$101,668	\$241,161	(\$0)		
JHTM10A Shoreline Veg Model - OR DM	\$76,093	\$21,256	\$27,897	\$49,153	\$26,940		
JHTM10A Shoreline Veg Model - OR Imp	\$165,068	\$118,237	\$73,770	\$192,007	(\$26,939)		
JHTM11A Erosion Assessment	\$344,874	\$9,537	\$331,456	\$340,994	\$3,880		
JHTM11A Erosion Assessment - OR DM	\$76,403	\$9,537	\$78,822	\$88,360	(\$11,957)		
JHTM11A Erosion Assessment - OR Imp	\$268,471		\$252,634	\$252,634	\$15,837		
JHTM15A Elk Canyon Smolt	\$2,180,378	\$332,812	\$1,728,375	\$2,061,187	\$119,191	Underspend in Years 1 & 2 which are expected to be spent in future years	Reforecasting required to future years once methodology is confirmed as effective
JHTM15A Elk Canyon Smolt - OR DM	\$141,441	\$41,520	\$80,853	\$122,373	\$19,068		
JHTM15A Elk Canyon Smolt - OR Imp	\$2,038,937	\$291,292	\$1,647,522	\$1,938,814	\$100,123		
JHTW06A Salmon Screen Upgrd	\$842,742	\$323,471	\$461,744	\$785,215	\$57,527	Efficiencies found during implementation	
JHTW06A Salmon Screen Upgrd - OR DM	\$46,881	\$38,209	\$34,537	\$72,745	(\$25,864)		
JHTW06A Salmon Screen Upgrd - OR Imp	\$795,861	\$285,262	\$427,208	\$712,470	\$83,391		

OR - Ordered Remissible

ONR - Ordered Non-Remissible

* Red values in parentheses denote overage.