

# Campbell River Water Use Plan

## Monitoring Program and Physical Works

Annual Report: 2014

Implementation Period: October 2013 to September 2014

- 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, 2014

## **BC Hydro Campbell River Project Water Use Plan Monitoring Programs and Physical Works Annual Report: 2014**

### **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, 2014, 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 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		
* JHTMON-13 will likely be negated by the John Hart Upgrade Project					

### 3 Schedule

The following table (Table 3-1) outlines the current schedule for the monitoring programs and physical works being delivered for the Campbell River WUP

**Table 3-1: WUP Schedule as of September 30, 2014.**

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-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			■	■	■	■	■	■	■	■	■	■
JHTMON-5 Campbell Reservoirs Littoral vs. Pelagic Fish Production Assessment		u/w	■			■		■	■	■	■	
JHTMON-6 Campbell Watershed Riverine Fish Production Assessment			■	■	■	■	■	■	■	■	■	
JHTMON-8 Heber, Quinsam and Salmon Rivers Smolt and Spawner Abundance Assessment		u/w	■	■	■	■	■	■	■	■	■	
JHTMON-10 Upper and Lower Campbell Lake Reservoirs Shoreline Vegetation Model Validation		u/w	■	■	■	■	■	■	■	■	■	
JHTMON-11 Upper Campbell Lake Reservoir Erosion Assessment		x	■	■	■	■	■	■	■	■	■	
JHTMON-15 Elk Canyon Smolt and Spawner Abundance Assessment		u/w	■	■	■	■	■	■	■	■	■	
<b>Physical Works</b>												
JHTWORKS-6 Salmon River Diversion Fish Screen Upgrade	✓	u/w	■	■								
Legend:												
■	=	Program to be undertaken/initiated in identified year										
u/w	=	Project is underway										
✓	=	Program completed for the year										
x	=	Program started, but encountered operational or hydrological delays										

### 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](http://www.bchydro.com/about/sustainability/conservation/water_use_planning/vancouver_island/campbell_river.html)

### 5 Summary of Monitoring Programs

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

##### 5.1.1 Status

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

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

### **5.2.1 Status**

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

Costs for Year 1 were higher than anticipated due to the time and effort associated with reporting and analysis, as well as the high cost for hydroacoustics. These additional costs may be absorbed in future years; however, a change in scope may be required based on the findings in Year 1. We are planning a resubmission for this project in May 2015.

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

### **5.3.1 Status**

This monitoring program will be initiated in early 2015 and will be carried out over 10 years. The project requires a winter start up (between January and March). It has not started because of contract implementation delays that were not resolved in time for the start of field work. 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**

### **5.4.1 Status**

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

Costs for Year 1 were higher than anticipated due to additional effort required in the first year. At this time, we are expecting that the additional Year 1 costs will be absorbed in future years but we will need to review the results and re-assess the budget in 2015.

## **5.5 JHTMON-6 Campbell Watershed Riverine Fish Production Assessment**

### **5.5.1 Status**

This monitoring program will be initiated in the spring of 2015 and will be carried out over nine years. The project requires an early spring start up (between March and May). This project is considered a lower priority compared to other projects that needed to start in 2014 and therefore has been delayed. 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**

### **5.6.1 Status**

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

Costs for Year 1 were higher than anticipated due to additional effort required in the first year. At this time, we are expecting that the additional Year 1 costs will be absorbed in future years but we will need to review the results and re-assess the budget in 2015.

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

### **5.7.1 Status**

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

Costs for Year 1 were higher than anticipated due to additional time required by the study team for information gathering, as well as additional upfront costs for installation of a remote access technology hydrometric station. These upfront installation costs of the hydrometric station will reduce field work labour costs over the life of the project. The TOR also underestimates the effort required to verify hydrometric data. A TOR resubmission will be prepared by November 2015.

## **5.8 JHTMON-11 Upper Campbell Lake Reservoir Erosion Assessment**

### **5.8.1 Status**

Implementation of this project has been delayed until BC Hydro has received confirmation of property boundaries and land ownership within the area of erosion. Once this has been completed, the monitoring program will be reassessed.

## **5.9 JHTMON-15 Elk Canyon Smolt and Spawner Abundance Assessment**

### **5.9.1 Status**

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

Safety and logistical challenges anticipated with implementing various aspects of this project in the Elk Canyon are being reviewed by the study team. A resubmission may be considered in 2015 to cover potential scope and budget changes if required.

## **6 Summary of Physical Works**

### **6.1 JHTWORKS-6 Salmon River Diversion Fish Screen Upgrade**

#### **6.1.1 Status**

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 the project will be carried out over four years.

Due to challenges encountered during the initial feasibility review for the Salmon River Canal Refurbishment and Fish Passage Improvements project, some changes are being made to better focus the project and prepare for the Definition Phase (design). A notification letter is being prepared for submission later this fall outlining our approach to the Salmon Diversion Downstream Fish Screen over the coming months. A resubmission is planned for March 2015 once the Identification Phase estimates are complete.

## **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, 2014.

**Table 7-1: Campbell River 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
<b>Campbell River WUP Annual Report</b>	21,194	65	20,648	20,712	482		
<b>JHTM02A Public Use Perception</b>	1,345,982	9,395	1,255,343	1,264,738	81,244		
JHTM02A Public Use Perception - OR DM	117,321	8,226	96,273	104,499	12,822		
JHTM02A Public Use Perception - OR Imp	1,228,661	1,169	1,159,070	1,160,239	68,422		
<b>JHTM03A Fish Spawn Success As</b>	1,657,581	140,125	1,631,397	1,771,523	(113,942)	Year 1 costs higher than anticipated due to additional effort required in the first year as well as high cost for hydroacoustics equipment.	Initial additional cost may be absorbed in future years. Budget to be re-assessed in 2015. TOR re-submission expected by May 29, 2015.
JHTM03A Fish Spawn Success As - OR DM	149,098	25,524	115,733	141,258	7,840		
JHTM03A Fish Spawn Success As - OR Imp	1,508,483	114,601	1,515,664	1,630,265	(121,782)		
<b>JHTM04A Littoral Productivity</b>	632,771	11,129	621,642	632,771	0		
JHTM04A Littoral Productivity - OR DM	104,696	11,129	93,567	104,696	0		
JHTM04A Littoral Productivity - OR Imp	528,075	0	528,075	528,075	0		
<b>JHTM05A Littoral vs Pelagic</b>	985,111	77,500	914,844	992,344	(7,233)	Year 1 costs higher than anticipated due to additional effort required in the first year.	Initial additional cost may be absorbed in future years. Budget to be re-assessed in 2015.
JHTM05A Littoral vs Pelagic - OR DM	116,246	11,783	98,199	109,982	6,264		
JHTM05A Littoral vs Pelagic - OR Imp	868,865	65,717	816,646	882,362	(13,497)		
<b>JHTM06A Fish Production Asses</b>	839,068	14,816	824,252	839,068	0		
JHTM06A Fish Production Asses - OR DM	110,518	14,816	95,702	110,518	0		
JHTM06A Fish Production Asses - OR Imp	728,550	0	728,550	728,550	0		
<b>JHTM08A Heber Quinsam &amp; Salmon</b>	2,246,345	139,280	2,113,382	2,252,663	(6,318)	Year 1 costs higher than anticipated due to additional effort required in the first year.	Initial additional cost may be absorbed in future years. Budget to be re-assessed in 2015.
JHTM08A Heber Quinsam & Salmon - OR DM	137,667	20,494	112,545	133,039	4,628		
JHTM08A Heber Quinsam & Salmon - OR Imp	2,108,678	118,786	2,000,837	2,119,623	(10,945)		
<b>JHTM10A Shoreline Veg Model</b>	241,161	72,695	172,189	244,884	(3,723)	Year 1 costs higher than anticipated due to upfront costs for installation of remote access technology hydrometric station.	Budget to be re-assessed in 2015. TOR re-submission expected by November 30, 2015..
JHTM10A Shoreline Veg Model - OR DM	76,093	13,627	46,943	60,570	15,523		
JHTM10A Shoreline Veg Model - OR Imp	165,068	59,068	125,247	184,315	(19,247)		
<b>JHTM11A Erosion Assessment</b>	344,874	6,044	333,054	339,098	5,776		
JHTM11A Erosion Assessment - OR DM	76,403	6,044	64,583	70,627	5,776		
JHTM11A Erosion Assessment - OR Imp	268,471	0	268,471	268,471	0		
<b>JHTM15A Elk Canyon Smolt</b>	2,180,378	44,312	2,136,055	2,180,367	11		
JHTM15A Elk Canyon Smolt - OR DM	141,441	20,318	121,111	141,429	12		
JHTM15A Elk Canyon Smolt - OR Imp	2,038,937	23,994	2,014,944	2,038,938	(1)		
<b>JHTW06A Salmon Screen Upgrd</b>	392,631	200,255	3,152,808	3,353,063	(2,960,432)	Identification phase costs approved and on track.	TOR re-submission expected by March 31, 2015 for Definition Phase costs.
JHTW06A Salmon Screen Upgrd - OR DM	46,631	33,107	14,010	47,117	(486)		
JHTW06A Salmon Screen Upgrd - OR Imp	346,000	167,148	3,138,797	3,305,945	(2,959,945)		
<b>OR - Ordered Remissible</b>							
<b>ONR - Ordered Non-Remissible</b>							

\* Red values in parentheses denote overage.