

# **Campbell River Water Use Plan Monitoring Program and Physical Works**

**Annual Report: 2019**

**Implementation Period: October 2018 to September 2019**

- **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-7 Campbell River Watershed Riverine Fish Rearing**
- **JHTMON-8 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-12 Salmon River Diversion Erosion Monitoring**
- **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, 2019**

## **BC Hydro Campbell River 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 Campbell River Water Use Plan (WUP) monitoring programs and physical works to September 30, 2019, 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 Comptroller of Water Rights (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	Schedule C.1.c	Dec 21, 2016	Feb 10, 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	Jan 27, 2016	Apr 21, 2016
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	Jan 27, 2016	May 19, 2016
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	Sep 06, 2019	
JHTMON-6 Campbell Watershed Riverine Fish Production Assessment	Schedule E.3.a. and 3.b	Sep 26, 2013	Jan 30, 2014	Jun 26, 2019	Jul 10, 2019
JHTMON-8 Quinsam and Salmon Rivers Smolt and Spawner Abundance Assessment	Schedule F.5.a	Sep 26, 2013	Jan 30, 2014	Dec 22, 2017	Jan 26, 2018
JHTMON-9 Upper and Lower Campbell Lake Reservoir Amphibian Assessment	Schedule C.4.a, Schedule D.3.a	May 04, 2018	May 18, 2018		
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	Jun 28, 2016	Jul 26, 2016
JHTMON-11 Upper Campbell Lake Reservoir Erosion Assessment	Schedule C.1.a and 2.a	Jul 04, 2013	Jul 11, 2013	Jul 12, 2017	Aug 18, 2017
JHTMON-13 Lower Campbell River Ramping and Tripping Physical Model and Assmt	Schedule E.3.c	To be submitted spring 2020			
JHTMON-14 Lower Campbell River Load Factoring Fisheries Assessment	Schedule E.3.d	To be submitted spring 2020			
JHTMON-15 Elk Canyon Smolt and Spawner Abundance Assessment	Schedule E.3.e	Sep 26, 2013	Jan 20, 2014	Jan 27, 2016	May 19, 2016
JHTWORKS-1 Upper Campbell Lake Erosion Control					
JHTWORKS-2 Upper and Lower Campbell Lake Recreation Facility Redevelopment	Schedule C.1b, 1d Schedule D.1a, 1b	Jan 26, 2016	Mar 15, 2016	Nov 02, 2018	Dec 07, 2018
JHTWORKS-3 Upper Campbell Drawdown Zone Revegetation Program	Schedule C.1.c	Jun 28, 2016	Jul 26, 2016		
JHTWORKS-4 Sayward Canoe Route (Portage and Signage)	Schedule C.4.a	Jan 26, 2016	Mar 15, 2016		
JHTWORKS-5 Salmon River Diversion, Fry Creek Erosion Control	Schedule F.4.b & c	2016-01-20 Early ID Phase funding	Mar 15, 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

### 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, 2019.**

Monitoring Program	2013 WLR YR1	2014 WLR YR2	2015 WLR YR3	2016 WLR YR4	2017 WLR YR5	2018 WLR YR6	2019 WLR YR7	2020 WLR YR8	2021 WLR YR9	2022 WLR YR10	2023 WLR YR11	2024 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		✓	✓	✓	✓	✓	■	■	■	■	■	
JHTMON-3 Upper and Lower Campbell Lake Reservoirs Fish Spawning Success Assessment		✓	✓	✓	✓	✓	■	■	■	■	■	
JHTMON-4 Upper and Lower Campbell Lake Reservoirs Littoral Productivity Assessment			✓	✓	✓F							
JHTMON-5 Campbell Reservoirs Littoral vs. Pelagic Fish Production Assessment		✓	✓	✓	✓	✓	■	■	■	■	■	
JHTMON-6 Campbell Watershed Riverine Fish Production Assessment			✓	✓	✓	✓	■	■	■	■	■	
JHTMON-7 Campbell River Watershed Riverine Fish Rearing (not ordered)												
JHTMON-8 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-12 Salmon River Diversion Erosion Monitoring (merged with WORKS-5)												
JHTMON-13 Lower Campbell River Ramping and Tripping Physical Model and Assmt <sup>2</sup>								■	■	■	■	■
JHTMON-14 Lower Campbell River Load Factoring Fisheries Assessment								■	■	■	■	■
JHTMON-15 Elk Canyon Smolt and Spawner Abundance Assessment		✓	✓	✓	✓	✓	■	■	■	■	■	
<b>Physical Works</b>												
JHTWORKS-1 Upper Campbell Lake Erosion Control <sup>1</sup>												
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)				✓	✓F							
JHTWORKS-5 Salmon River Diversion, Fry Creek Erosion Control <sup>3</sup>												
JHTWORKS-6 Salmon River Diversion Fish Screen Upgrade <sup>3</sup>	✓	✓	✓									

Footnote <sup>1</sup> Terms of Reference pending results of JHTMON-11. Implementation date and duration of program not set.

<sup>2</sup> Study is intended to be combined with JHTMON-14. TOR submission planned for spring 2020.

<sup>3</sup> Relief granted for this project as of December 2017

- Legend: ■ = Program to be undertaken/initiated in identified year  
 ✓ = Program completed for the year  
 ✓F = All field work for this project is complete. No further field work is planned.

#### **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 Status of Monitoring Programs**

##### **5.1 JHTMON-1 Upper and Lower Campbell Lake Reservoir Digital Elevation Model**

On February 10, 2017 we received approval for the Terms of Reference for this project.

The intent of this project is to review boating hazards related to operating levels on the Upper Campbell Lake Reservoir/Buttle Lake Reservoir, and Campbell Lake Reservoir. On both reservoirs, spatial data will be collected and boating hazard zones will be mapped for different reservoir levels. The scope includes the collation of both existing and new aerial photography, bathymetry, mapping analysis and digital elevation models.

The spatial information collected by this project will also support spatial data needs associated with other projects including JHTWORKS-2 (recreation facility redevelopment), JHTWORKS-3 (revegetation program), as well as JHTMON-3, 4, and 5 (fish spawning and productivity studies).

All spatial information has been collected. Several options for hazard mapping have been drafted for review and concepts were presented to the Monitoring Committee in November 2018. Over the coming year, BC Hydro intends work with BC Parks, and Recreation Sites and Trails BC to determine the best option for utilizing this information to support boater safety on the reservoirs.

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

The intent of this project is to develop and implement a systematic approach to evaluate public use and perception of the operation and flow management in the Campbell River hydroelectric system, as well as of any works constructed as part of the WUP. The information gathered from this study is anticipated to provide a better understanding of the relationship between system operations and the overall recreation benefit expected from implementing WUP operations. The information will be used to inform future decisions that would necessitate trade-offs between recreation and other values such as fish and power benefits.

The monitoring program was initiated in 2014 and field work began in 2015. Work continues annually until 2023.

Attached is the Year 4 (2018) report dated February 12, 2019.

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

The intent of this project is to assess the impact of the WUP operating regime on effective spawning habitat for cutthroat trout and rainbow trout in the Upper Campbell Reservoir and Campbell Lake Reservoir.

This monitoring program was initiated in June 2014 and is being carried out over 10 years. The Year 5 (2018) report is in draft and will be submitted with the 2020 Annual Report.

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

The intent of this study was to assess the extent to which the management of reservoir levels affect littoral productivity. The results of this study will be used with the results of JHTMON-5 to determine how littoral productivity influences fish production. This project is complete.

### **5.5 JHTMON-5 Campbell Reservoirs Littoral vs. Pelagic Fish Production Assessment**

The intent of this study is to assess the extent to which fish production is driven by littoral or pelagic production and how this relates to BC Hydro operations. The results of this study will be used with the results of JHTMON-4 to determine how littoral or pelagic productivity influences fish production.

This monitoring program was initiated in July 2014 and is being carried out over a 10-year period.

There are two components to this study: the Component 1 uses stable isotope analysis to assess the source of food for fish (littoral or pelagic) as it relates to reservoir operation, and Component 2 assesses pelagic bacteria as an indicator of biological production related to water residence time in the reservoir.

The Component 1 is complete. The final report for Component 1 was submitted with the 2017 Annual Report.

Planning for the Component 2 of this study required revisions to the Terms of Reference (TOR) to reflect recommended changes in methodology coming from review of the results from the Component 1. The TOR revision was approved by the CWR on September 26, 2019. Field work on the Component 2 is scheduled to begin in 2020.

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

The intent of this study is to address uncertainty around the relationship between habitat and flow in rivers within the Campbell River hydroelectric system and to determine the range of flows migrating fish need to successfully navigate barriers within the rivers. The study also examines the effectiveness of flow versus habitat modelling techniques.

This three-component monitoring program was initiated in April 2015 and is being carried out over nine years. This study is intended to assess rivers within the Campbell River hydroelectric system, which initially included Salmon River. BC Hydro decommissioned the Salmon River Diversion; therefore a Terms of

Reference (TOR) revision was submitted to the CWR and approved in January 2018. The TOR revision removed all study components related to the Salmon River.

Components 1 and 2 are ongoing. Knowledge gained since this study began informed a new study plan for Component 3 requiring a TOR revision. The TOR revision was submitted to the CWR and approved in July 2019.

A technical workshop will be held in January 2020 to help inform the development of a model that best summarizes the habitat availability across a range of operations in the lower Campbell River. Field work to support the model will begin in 2020.

The report for Component 1 Years 2 to 3 dated November 29, 2018 is attached. The draft report for Component 2 Year 3 is currently under review and will be submitted along with the 2020 Annual Report.

#### **5.7 JHTMON-7 Campbell River Watershed Riverine Fish Rearing**

Not ordered.

#### **5.8 JHTMON-8 Quinsam and Salmon Rivers Smolt and Spawner Abundance Assessment**

The intent of this study is to identify the primary factors that limit fish abundance in the Campbell River system and how these factors are influenced by BC Hydro operations, as well as to evaluate the effectiveness of WUP-based operations on fish abundance.

This monitoring program was initiated in March 2014 and is being carried out over 10 years. This study is intended to assess rivers within the Campbell River hydroelectric system, which initially included Salmon River. BC Hydro decommissioned the Salmon River Diversion; therefore, a Terms of Reference (TOR) revision was submitted to the CWR and approved in January 2018. The TOR revision removed all components related to the Salmon River.

The Year 5 (2018) report is in draft and will be submitted with the 2020 Annual Report.

#### **5.9 JHTMON-9 Upper and Lower Campbell Lake Reservoir Amphibian Assessment**

The intent of this study is to assess the response of amphibians to the operation of the Campbell River system largely through gaining a better understanding of the linkage between reservoir elevation and its influence on amphibian habitat quantity and quality.

The Terms of Reference were approved by the CWR in May 2018. This study is commenced in late 2018 and continues for 2 to 3 years.

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

The intent of this study is to determine if the shoreline vegetation model used during the development of the WUP to quantify operational impacts of reservoir

operations could accurately predict how the plant communities respond to reservoir operational change over time.

The Year 1 (2014) field work identified that for the Upper Campbell Reservoir, the shoreline vegetation model did not correlate well with field observations. To address the Year 1 findings, fieldwork originally planned for Year 10 was completed mid-way through the project in Year 5 (2018). This allowed improvements to the model to be made and confirmation that the model is able to predict vegetation community change on the Upper Campbell Reservoir.

We are currently evaluating whether further improvements to the model enable it to predict vegetation change on the (lower) Campbell Lake Reservoir which will be valuable to inform potential future operational decisions. If so, approval of a Terms of Reference resubmission will be required in order to proceed with model improvements. We intend to complete this evaluation over the coming year.

The Year 5 report dated July 29, 2019, is attached.

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

The original approved TOR assumed that enough information was known to conclude that private properties (i.e., Cedar Creek, Strathcona Park and Strathcona Park Lodge subdivisions) were being affected by shoreline impacts related to reservoir operations. However, upon further review, it has been determined that a better understanding of shoreline impact and erosion processes relative to private property boundaries is necessary to determine the best approach to address issues associated with shoreline impacts.

To inform our understanding of impacts to shoreline and erosion processes, LiDAR, and wind and wave data was collected. Following that, a geotechnical field survey was conducted in September 2018. The draft report is currently under review and will be submitted in the next annual report. The report will provide a better understanding of the effect of Upper Campbell Reservoir operations on shoreline erosion.

#### **5.12 JHTMON-12 Salmon River Diversion Erosion Monitoring**

Not ordered.

#### **5.13 JHTMON-13 Lower Campbell River Ramping and Tripping Physical Model and Assessment**

This study was intended to correlate the quantity and quality of spawning and rearing habitat with John Hart Generating Station ramp rates and tripping events.

The new John Hart Generating Station facility incorporates an automatic flow bypass that maintains flows during tripping events (forced flow outages). Commissioning of the new powerhouse was completed in 2018 and the new flow bypass system is operational. The bypass reduces the risk to downstream habitat from tripping events. As a result, BC Hydro is currently re-assessing the scope of this project as it relates to other flow change and ramping risks on the lower Campbell River, such as the load factoring fisheries objectives for JHTMON-14. Objectives for this study will be consolidated with the objectives for JHTMON-14 in order to come up with an overall study design that will help to inform future operational decisions related to flow changes and ramping in the

lower Campbell River with an emphasis on load factoring. The TOR will be submitted to the CWR in spring 2020.

#### **5.14 JHTMON-14 Lower Campbell River Load Factoring Fisheries Assessment**

The intent of this project is to develop a correlation between load factoring (ramping according to peak power demand) at John Hart Generating Station and spawning/rearing behaviour and success. The new John Hart Generating Station was commissioned in 2018, and load factoring operations for the new facility are proposed. The TOR is intended to also look at the impact of other potential flow change scenarios in the lower Campbell River to better align with the original objectives of JHTMON-13 (flow ramping due to generating station forced outages – tripping), recognizing the reduced risk of tripping events with the new generating station. The intent of the study will be to inform future operational decisions related to flow changes and ramping in the lower Campbell River with an emphasis on load factoring. The TOR for this two-year project will be submitted to the CWR in spring 2020.

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

The intent of this study is to track the success or failure of the flow prescription in Elk Canyon to meet the intended WUP objectives around optimizing the flow versus habitat relationship in the canyon.

This monitoring program was initiated in September 2014 and is being carried out over 10 years.

The Year 4 report (2017) is in draft and will be submitted with the 2020 Annual Report.

### **6 Status of Physical Works**

#### **6.1 JHTWORKS-1 Upper Campbell Lake Erosion Control**

This physical works project was intended to develop an engineered solution using “soft techniques” (e.g., vegetation and natural materials) to mitigate shoreline erosion adjacent to private properties at Cedar Creek, Strathcona Park and Strathcona Park Lodge subdivisions. The outcomes of JHTMON-11 will be considered in order to support a decision on the need for an erosion control physical works strategy, or other feasible solutions if warranted.

If a decision is made to proceed with a physical works strategy, a TOR will be prepared and submitted to the CWR.

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

The focus of this work is to improve recreational access and to remove safety hazards in the Upper Campbell Lake and Buttle Lake Reservoir and Campbell Lake Reservoir.

The feasibility of upgrades at nine potential sites was completed and summarized in the Recommendations Report dated October 11, 2017. On October 31, 2017, the CWR approved the detailed design and construction of recreational upgrades

at seven sites, including improvements to the Buttle Lake boat launch and the Karst Creek boat launch.

Project is complete with the exception of a funding contribution to BC Parks for Loveland Bay Provincial Park.

Below is summary of the completion of the work at the seven sites.

Project	Scope	Status
Loveland Bay	Completed repairs to the existing dock and installed a new dock extension to the end of the existing dock.  This project is complete with the exception of a funding contribution to BC Parks for Campsite #18 as per Memorandum of Understanding between BC Hydro and BC Parks. BC Parks originally was planning to implement Campsite #18 improvements in 2019; however, due to a delay in the design implementation the work is now planned for 2020/21. As per the MOU BC Hydro will retain these funds until work at Loveland Bay Campsite #18 is complete.	Dock upgrade complete - in-service date: May 14, 2018  Campsite #18 funding contribution expected in 2021
Dogwood Beach Dredge	BC Hydro, Recreation Sites and Trails BC (RSTBC), and First Nations agreed that the work would not benefit park users and that this money would be better allocated toward further work at the Karst Creek Boat Launch Project.	NA – Funds Reallocated to Karst Creek Boat Launch
Miller Creek Dock	Removed the existing jetty and dock and replace with engineered jetty, aluminum gangway and new dock.	Complete  In-service date: May 18, 2018
Campbell Recreation Site	Installed rock barriers in 7 locations along the bank between campsites and the beach. Installed Rock stairs at 8 locations along the bank providing safe public access to the beach.	Complete  In-service date: March 8, 2018
Buttle Lake Boat Launch	Replaced all existing concrete ribs with pre-cast heavier grid units, extended the ramp by 2.2 m, installed a ramp toe trench at elevation of 215.5 m for an overall slope of 13.1% and armoured the sides of the ramp to minimize undermining.	Complete  In-service date: November 3, 2018
Buttle Lake Campground Day Use Area	Completed tree clearing, grubbing, trail construction, stone stair placement and placement of picnic area concrete. Completed clearing, grubbing and construction of replacement campsite. Campsite #2 was removed during the installation of the trail and relocated to another area of the campground. Picnic tables and trail retention curbs were installed post in-service date due to material supply.	Complete  In-service date: March 15, 2019.
Karst Creek Boat Launch	Removed of existing grid units, added fill to the site, installed new grid units and added rip rap along the sides of the ramp to minimize undermining. Added a gravel only portion of material between the designed toe and existing water elevation at time of construction to improve accessibility at lower water levels experienced in 2019.	Complete  In-service date: May 17, 2019.

### **6.3 JHTWORKS-3 Upper Campbell Drawdown Zone Revegetation Program**

The intent of this project is to identify, prioritize, and revegetate highly visible reservoir perimeter sites within the drawdown zone in the Upper Campbell Reservoir.

The project is being delivered in three phases with Phases 1 and 2 covered under the current approved Terms of Reference (TOR). The methods and the budget for Phase 3 will be submitted to the CWR for approval at the end of Year 6 (2022). Phase 3 is the implementation of the final Revegetation Treatment Plan, incorporating the learnings from the operational trials in Phase 2 and an assessment to determine if goals and objectives of the program are being met. A final report will detail the program results and state if maintenance of revegetation works will be required.

Following the identification and prioritization of selected revegetation sites around Upper Campbell Reservoir (Phase 1), Phase 2 started in October 2018, including trial treatments (i.e., active planting and substrate treatments) at selected high priority sites. Further work within the Revegetation Treatment Plan scope defined in Phase 1 will start in October 2019 and will continue in spring 2020.

The Year 2 report dated October 22, 2019 is attached.

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

The intent of this project was to improve access and signage along portage routes on the Salmon River Diversion to reduce public safety risks. Since Recreation Sites and Trails BC (FLNRORD) had already upgraded the portage trail along the 6 km portion of the Sayward Canoe Route along the Salmon River Diversion, the Terms of Reference (TOR) (approved by the CWR on May 15, 2016) did not include improvements to access. The project was limited to providing signage and safety advisories to enhance public safety along the already improved portage route.

As a result of the decommissioning of the Salmon River Diversion Dam, the safety signs were modified and installed in September 2017 to accurately reflect the type of hazard that exists along this part of the route. Recreation Sites and Trails BC are responsible for the ongoing maintenance of the signage. There are no further commitments anticipated for this project.

This project is complete.

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

Due to BC Hydro's decommissioning of the Salmon River Diversion facility, BC Hydro was granted relief from this project on December 13, 2017.

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

Due to BC Hydro's decommissioning of the Salmon River Diversion facility, BC Hydro was granted relief from this project on December 13, 2017.

## **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, 2019.

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

Monitoring Programs and 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
<b>Campbell River WUP Annual Report</b>	\$21,194	\$8,875	\$9,564	\$18,439	\$2,755		
<b>JHTM01A Digital Elevation Mod</b>	\$164,335	\$77,028	\$32,448	\$109,476	\$54,859		
JHTM01A Digital Elevation Mod - OR DM	\$22,630	\$23,413	\$4,725	\$28,138	(\$5,508)		
JHTM01A Digital Elevation Mod - OR Imp	\$141,705	\$53,615	\$27,722	\$81,338	\$60,367		
<b>JHTM02A Public Use Perception - ONR</b>	\$261,211	\$17,315	\$181,084	\$198,399	\$62,812		
JHTM02A Public Use Perception - ONR DM	\$22,918	\$0	\$8,131	\$8,131	\$14,788		
JHTM02A Public Use Perception - ONR Imp	\$238,293	\$17,315	\$172,953	\$190,269	\$48,024		
<b>JHTM02A Public Use Perception - OR</b>	\$1,084,771	\$507,256	\$425,675	\$932,930	\$151,841		
JHTM02A Public Use Perception - OR DM	\$94,403	\$44,309	\$22,117	\$66,426	\$27,977		
JHTM02A Public Use Perception - OR Imp	\$990,368	\$462,947	\$403,558	\$866,504	\$123,864		
<b>JHTM03A Fish Spawn Success As</b>	\$1,657,581	\$1,266,453	\$384,629	\$1,651,082	\$6,499		
JHTM03A Fish Spawn Success As - OR DM	\$149,098	\$65,321	\$39,832	\$105,152	\$43,946		
JHTM03A Fish Spawn Success As - OR Imp	\$1,508,483	\$1,201,132	\$344,798	\$1,545,929	(\$37,446)		
<b>JHTM04A Littoral Productivity</b>	\$632,771	\$530,678	\$0	\$530,678	\$102,093	Project Complete	
JHTM04A Littoral Productivity - OR DM	\$104,696	\$36,464	\$0	\$36,464	\$68,232		
JHTM04A Littoral Productivity - OR Imp	\$528,075	\$494,214	\$0	\$494,214	\$33,861		
<b>JHTM05A Littoral vs Pelagic</b>	\$985,111	\$503,927	\$407,208	\$911,135	\$73,976		
JHTM05A Littoral vs Pelagic - OR DM	\$116,246	\$44,890	\$9,208	\$54,098	\$62,148		
JHTM05A Littoral vs Pelagic - OR Imp	\$868,865	\$459,037	\$398,000	\$857,037	\$11,828		
<b>JHTM06A River Fish Flow-Habitat - ONR</b>	\$316,690	\$54,892	\$239,778	\$294,670	\$22,021		
JHTM06A River Fish Flow-Habitat - ONR DM	\$62,779	\$5,678	\$12,375	\$18,053	\$44,726		
JHTM06A River Fish Flow-Habitat - ONR Imp	\$253,911	\$49,214	\$227,403	\$276,617	(\$22,706)		
<b>JHTM06A River Fish Flow-Habitat - OR</b>	\$522,378	\$498,021	\$0	\$498,021	\$24,357		
JHTM06A River Fish Flow-Habitat - OR DM	\$47,739	\$47,739	\$0	\$47,739			
JHTM06A River Fish Flow-Habitat - OR Imp	\$474,639	\$450,282	\$0	\$450,282	\$24,357		
<b>JHTM08A Quinsam &amp; Salmon</b>	\$2,246,345	\$1,084,141	\$583,130	\$1,667,271	\$579,074	Salmon River study area removed from project	
JHTM08A Quinsam & Salmon - OR DM	\$137,667	\$51,088	\$43,578	\$94,666	\$43,001		
JHTM08A Quinsam & Salmon - OR Imp	\$2,108,678	\$1,033,053	\$539,553	\$1,572,605	\$536,073		
<b>JHTM09A Lake Res Amphibian As</b>	\$301,430	\$175,894	\$124,678	\$300,572	\$858		
JHTM09A Lake Res Amphibian As - OR DM	\$55,656	\$47,686	\$8,480	\$56,165	(\$509)		
JHTM09A Lake Res Amphibian As - OR Imp	\$245,774	\$128,208	\$116,198	\$244,407	\$1,367		
<b>JHTM10A Shoreline Veg Model</b>	\$268,799	\$260,884	\$3,322	\$264,207	\$4,592		
JHTM10A Shoreline Veg Model - OR DM	\$65,412	\$57,098	\$2,722	\$59,821	\$5,591		
JHTM10A Shoreline Veg Model - OR Imp	\$203,387	\$203,786	\$600	\$204,386	(\$999)		
<b>JHTM11A Erosion Assessment</b>	\$344,874	\$254,387	\$28,962	\$283,349	\$61,525		
JHTM11A Erosion Assessment - OR DM	\$76,403	\$85,380	\$3,721	\$89,100	(\$12,697)		
JHTM11A Erosion Assessment - OR Imp	\$268,471	\$169,008	\$25,242	\$194,249	\$74,222		
<b>JHTM12A Salmon Div Erosion</b>	\$0	\$0	\$0	\$0	\$0	Study merged with JHTWORKS-5	
JHTM12A Salmon Div Erosion - OR DM	\$0	\$0	\$0				
JHTM12A Salmon Div Erosion - OR Imp	\$0	\$0	\$0				
<b>JHTM13A Ramp / Trip Physical - ONR</b>	\$0	\$0	\$20,471	\$20,471	(\$20,471)	Project not yet implemented	TOR to be submitted by spring 2020
JHTM13A Ramp / Trip Physical - ONR DM	\$0	\$0	\$20,471	\$20,471	(\$20,471)		
JHTM13A Ramp / Trip Physical - ONR Imp	\$0	\$0	\$0				
<b>JHTM13A Ramp / Trip Physical - OR</b>	\$0	\$7,160	\$0	\$7,160	(\$7,160)		
JHTM13A Ramp / Trip Physical - OR DM	\$0	\$7,160	\$0	\$7,160	(\$7,160)		
JHTM13A Ramp / Trip Physical - OR Imp	\$0	\$0	\$0				
<b>JHTM14A Factoring Fisheries - ONR</b>	\$0	\$0	\$22,432	\$22,432	(\$22,432)	Project not yet implemented	TOR to be submitted by spring 2020
JHTM14A Factoring Fisheries - ONR DM	\$0	\$0	\$22,432	\$22,432	(\$22,432)		
JHTM14A Factoring Fisheries - ONR Imp	\$0	\$0	\$0				
<b>JHTM14A Factoring Fisheries - OR</b>	\$0	\$9,048	\$0	\$9,048	(\$9,048)		
JHTM14A Factoring Fisheries - OR DM	\$0	\$9,048	\$0	\$9,048	(\$9,048)		
JHTM14A Factoring Fisheries - OR Imp	\$0	\$0	\$0				
<b>JHTM15A Elk Canyon Smolt - ONR</b>	\$877,168	\$191,802	\$502,844	\$694,646	\$182,522		
JHTM15A Elk Canyon Smolt - ONR DM	\$67,970	\$2,150	\$43,613	\$45,762	\$22,208		
JHTM15A Elk Canyon Smolt - ONR Imp	\$809,197	\$189,653	\$459,231	\$648,884	\$160,314		
<b>JHTM15A Elk Canyon Smolt - OR</b>	\$1,303,210	\$1,275,485	\$0	\$1,275,485	\$27,726		
JHTM15A Elk Canyon Smolt - OR DM	\$73,471	\$74,366	\$0	\$74,366	(\$895)		
JHTM15A Elk Canyon Smolt - OR Imp	\$1,229,740	\$1,201,119	\$0	\$1,201,119	\$28,621		
<b>JHTW01A Up Campbell Erosion</b>	\$0	\$18,364	\$0	\$18,364	(\$18,364)		
JHTW01A Up Campbell Erosion - OR DM	\$0	\$18,364	\$0	\$18,364	(\$18,364)		
JHTW01A Up Campbell Erosion - OR Imp	\$0	\$0	\$0				
<b>JHTW02A Rec Facility Upgrad</b>	\$2,500,359	\$2,145,714	\$68,725	\$2,214,439	\$285,920	Efficiencies found in the project	
JHTW02A Rec Facility Upgrad - OR DM	\$461,115	\$463,441	\$2,042	\$465,483	(\$4,368)		
JHTW02A Rec Facility Upgrad - OR Imp	\$2,039,244	\$1,682,273	\$34,300	\$1,716,573	\$322,671		
<b>JHTW03A Up Campbell Re-Vege</b>	\$774,380	\$446,503	\$571,328	\$1,017,831	(\$243,451)	Forecast includes preliminary estimates for phase 3 (not yet approved)	Submit TOR by end of Year 6 (2022). Phase 3 is the implementation of the final Revegetation Treatment Plan, incorporating the learnings from the operational trials in Phase 2 and an assessment to determine if goals and objectives of the program are being met.
JHTW03A Up Campbell Re-Vege - OR DM	\$92,833	\$98,851	\$45,311	\$144,162	(\$51,329)		
JHTW03A Up Campbell Re-Vege - OR Imp	\$681,547	\$347,652	\$526,017	\$873,669	(\$192,122)		
<b>JHTW04A Sayward Canoe Route</b>	\$45,788	\$21,362	\$0	\$21,362	\$24,426		
JHTW04A Sayward Canoe Route - OR DM	\$20,488	\$11,702	\$0	\$11,702	\$8,786		
JHTW04A Sayward Canoe Route - OR Imp	\$25,300	\$9,660	\$0	\$9,660	\$15,640		
<b>JHTW05A Salmon Erosion Cont</b>	\$54,462	\$17,106	\$0	\$17,106	\$37,357		
JHTW05A Salmon Erosion Cont - OR DM	\$54,462	\$17,106	\$0	\$17,106	\$37,357		
JHTW05A Salmon Erosion Cont - OR Imp	\$0	\$0	\$0				
<b>JHTW06A Salmon Screen Upgrad</b>	\$842,742	\$480,598	\$0	\$480,598	\$362,144		
JHTW06A Salmon Screen Upgrad - OR DM	\$46,881	\$41,526	\$0	\$41,526	\$5,355		
JHTW06A Salmon Screen Upgrad - OR Imp	\$795,861	\$439,071.26	\$0	\$439,071	\$356,790		

OR - Ordered Remissible  
ONR - Ordered Non-Remissible  
\* Red values in parentheses denote overage.