

Campbell River Water Use Plan Monitoring Program and Physical Works

Annual Report: 2022

Implementation Period: October 2021 to September 2022

- **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 Assessment**
- **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, 2022

BC Hydro Campbell River Project Water Use Plan Monitoring Programs and Physical Works Annual Report: 2022

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, 2022, 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	Sep 26, 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 Assessment	Schedule E.3.c	Aug 24, 2020	Sep 04, 2020		
JHTMON-14 Lower Campbell River Load Factoring Fisheries Assessment	Schedule E.3.d	Combined with JHTMON-13 TOR			
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	Schedule C.1.a				
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, 2022.

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		✓	✓	✓	✓	✓	✓	x	x	✓	■	■
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						✓	✓	✓F				
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 Assessment ²								✓	✓	✓	■	■
JHTMON-14 Lower Campbell River Load Factoring Fisheries Assessment (implemented through JHTMON-13)	Combined with JHTMON-13 TOR											
JHTMON-15 Elk Canyon Smolt and Spawner Abundance Assessment		✓	✓	✓	✓	✓	✓	✓	✓	✓	■	
Physical Works												
JHTWORKS-1 Upper Campbell Lake Erosion Control ¹												
JHTWORKS-2 Upper and Lower Campbell Lake Recreation Facility Redevelopment				✓	✓	✓	✓	✓	✓F			
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 ³												
JHTWORKS-6 Salmon River Diversion Fish Screen Upgrade ³	✓	✓	✓									

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

² Study is combined with JHTMON-14.

³ Relief granted for this project as of December 2017

- Legend:
- = Program to be undertaken/initiated in identified year
 - ✓ = Program completed for the year
 - x = Program delayed/postponed
 - ✓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

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. Options for utilizing this information to support boater safety on the reservoirs are being explored with BC Parks, Forest Recreation and Trails BC and City of Campbell River.

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 2024. Field work in 2020 and again in 2021 was unable to be completed due to COVID-19. The project team agreed that the remaining years of field work would provide enough data to meet the project objectives, therefore, the project will not be extended for an additional two years.

The 2019 (Year 5) report dated January 2021 is attached. The 2022 (Year 6) report will be submitted with the 2023 Annual Report.

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 2020 (Year 7) report dated July 4, 2022 is attached. The 2021 (Year 8) report is in draft and will be submitted with the 2023 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.

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

Field work on the Component 2 commenced in 2020. The 2020 Component 2 (Year 1) report dated May 11, 2021 is attached. The 2021 Component 2 (Year 2) is in draft and will be submitted in the 2023 Annual Report.

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 complete. 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 was 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. A literature review and limiting factor analysis have been completed and were discussed at the Fish Technical Committee in October 2020. The Component 3 background review and detailed

study plan was finalized and approved by BC Hydro in June 2022. The Year 2 Component 3 annual report will be submitted along with the 2023 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 ten 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 2020 (Year 7) report dated December 16, 2021, and the 2021 (Year 8) report dated October 3, 2022, are attached.

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 commenced in late 2018 and the project is complete.

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 2014 (Year 1) 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 can predict vegetation community change on the Upper Campbell Reservoir.

With JHTWORKS-3 Upper Campbell Drawdown Zone Revegetation Program moving into Phase 3 of implementation in 2023, we are evaluating whether further improvements to the model may be warranted to enable it to predict vegetation change which will be valuable to inform potential future operational decisions.

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 being finalized which will provide a better understanding of the effect of Upper Campbell Reservoir operations on shoreline erosion. The report contains confidential information and will not be shared publicly.

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.

The TOR for JHTMON-13 was approved on September 4, 2020. This blended the objectives of JHTMON-13 with JHTMON-14, as was agreed to by the Fish Technical Committee. The JHTMON-13 will assess salmonid response to ramping rates. The Fish Technical Committee reviewed the current state of the new John Hart Generating Station, the Order, and the Consultative Committee report, and agreed that tripping was well mitigated due to the bypass valve. The literature review and limiting factor analysis completed in JHTMON-6 will be used to inform field methodology for this project.

Field work commenced in the summer of 2021, data collection is still underway, and the report will be submitted with the 2023 Annual Report.

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. As noted above, objectives for JHTMON-14 will be combined under JHTMON-13. This includes assessment of load factoring opportunities at the new John Hart Generating Station.

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 2020 (Year 6) dated August 19, 2021 and 2021 (Year 7) dated July 25, 2022 are attached.

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 including 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	<p>Completed repairs to the existing dock and installed a new dock extension to the end of the existing dock.</p> <p>This project is complete including 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 was completed in 2020/21.</p>	<p>Dock upgrade complete - in-service date: May 14, 2018</p> <p>Campsite #18 work completed by BC Parks in 2020/21</p>

Project	Scope	Status
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.

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 which has continued in spring and fall annually. Phase 2 work will be completed in fall 2022.

BC Hydro will be evaluating program results in early 2023 and planning Phase 3. The plan for Phase 3 will be based on the results of the 2018-2022 effectiveness monitoring of trial vegetation treatments. Phase 3 will involve applying the most successful of the trial treatments on a broader scale and provide recommendations for potential future applications.

The 2021 (Year 5) report will be submitted with the 2023 Annual Report.

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 six 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, 2022.

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
Campbell River WUP Annual Report	\$21,194	\$12,091	\$5,402	\$17,493	\$3,701		
JHTM01A Digital Elevation Mod	\$164,335	\$78,088		\$78,088	\$86,247	Project Complete	
JHTM01A Digital Elevation Mod - OR DM	\$22,630	\$23,689		\$23,689	(\$1,059)		
JHTM01A Digital Elevation Mod - OR Imp	\$141,705	\$54,399		\$54,399	\$87,306		
JHTM02A Public Use Perception	\$1,345,982	\$710,141	\$206,176	\$916,317	\$429,665	Efficiencies found during project implementation	
JHTM02A Public Use Perception - OR DM	\$117,321	\$54,775	\$17,569	\$72,343	\$44,978		
JHTM02A Public Use Perception - OR Imp	\$1,228,661	\$655,367	\$188,607	\$843,974	\$384,687		
JHTM03A Fish Spawn Success As	\$1,657,581	\$1,505,356	\$121,311	\$1,626,667	\$30,914	Efficiencies found during project implementation	
JHTM03A Fish Spawn Success As - OR DM	\$149,098	\$74,503	\$14,633	\$89,136	\$59,962		
JHTM03A Fish Spawn Success As - OR Imp	\$1,508,483	\$1,430,853	\$106,678	\$1,537,531	(\$29,048)		
JHTM04A Littoral Productivity	\$632,771	\$530,678		\$530,678	\$102,093	Project Complete	
JHTM04A Littoral Productivity - OR DM	\$104,696	\$36,464		\$36,464	\$68,232		
JHTM04A Littoral Productivity - OR Imp	\$528,075	\$494,214		\$494,214	\$33,861		
JHTM05A Littoral vs Pelagic	\$985,111	\$753,440	\$139,736	\$893,176	\$91,935	Efficiencies found during project implementation	
JHTM05A Littoral vs Pelagic - OR DM	\$116,246	\$52,984	\$7,047	\$60,031	\$56,215		
JHTM05A Littoral vs Pelagic - OR Imp	\$868,865	\$700,456	\$132,688	\$833,145	\$35,720		
JHTM06A River Fish Flow-Habitat	\$839,068	\$720,026	\$118,885	\$838,911	\$157		
JHTM06A River Fish Flow-Habitat - OR DM	\$110,518	\$76,165	\$9,253	\$85,418	\$25,100		
JHTM06A River Fish Flow-Habitat - OR Imp	\$728,550	\$643,861	\$109,632	\$753,493	(\$24,943)		
JHTM08A Quinsam & Salmon	\$2,246,345	\$1,457,038	\$216,956	\$1,673,994	\$572,351	Efficiencies found during project implementation	
JHTM08A Quinsam & Salmon - OR DM	\$137,667	\$69,253	\$8,617	\$77,871	\$59,796		
JHTM08A Quinsam & Salmon - OR Imp	\$2,108,678	\$1,387,784	\$208,339	\$1,596,123	\$512,555		
JHTM09A Lake Res Amphibian As	\$301,430	\$284,114		\$284,114	\$17,316	Project Complete	
JHTM09A Lake Res Amphibian As - OR DM	\$55,656	\$54,203		\$54,203	\$1,453		
JHTM09A Lake Res Amphibian As - OR Imp	\$245,774	\$229,911		\$229,911	\$15,863		
JHTM10A Shoreline Veg Model	\$268,799	\$261,463	\$5,979	\$267,441	\$1,358	Project Complete	
JHTM10A Shoreline Veg Model - OR DM	\$65,412	\$57,677	\$5,979	\$63,656	\$1,756		
JHTM10A Shoreline Veg Model - OR Imp	\$203,387	\$203,786		\$203,786	(\$399)		
JHTM11A Erosion Assessment	\$344,874	\$305,765	\$11,700	\$317,465	\$27,409	Efficiencies found during project implementation	
JHTM11A Erosion Assessment - OR DM	\$76,403	\$132,081	\$1,700	\$133,781	(\$57,378)		
JHTM11A Erosion Assessment - OR Imp	\$268,471	\$173,684	\$10,000	\$183,684	\$84,787		
JHTM13A Ramp / Trip Physical	\$545,482	\$207,226	\$322,277	\$529,503	\$15,979	Efficiencies found during project implementation	
JHTM13A Ramp / Trip Physical - OR DM	\$44,547	\$35,863	\$12,442	\$48,305	(\$3,758)		
JHTM13A Ramp / Trip Physical - OR Imp	\$500,935	\$171,363	\$309,835	\$481,198	\$19,737		
JHTM15A Elk Canyon Smolt	\$2,180,378	\$1,869,646	\$286,012	\$2,155,658	\$24,720	Efficiencies found during project implementation	
JHTM15A Elk Canyon Smolt - OR DM	\$141,441	\$95,626	\$21,787	\$117,413	\$24,028		
JHTM15A Elk Canyon Smolt - OR Imp	\$2,038,937	\$1,774,020	\$264,226	\$2,038,246	\$691		
JHTW01A Up Campbell Erosion		\$18,364		\$18,364	(\$18,364)	Project dependant on outcome of JHTMON-11	Complete JHTMON-11
JHTW01A Up Campbell Erosion - OR DM		\$18,364		\$18,364	(\$18,364)		
JHTW01A Up Campbell Erosion - OR Imp							
JHTW02A Rec Facility Upgrad	\$2,500,359	\$2,257,941		\$2,257,941	\$242,418	Project Complete	
JHTW02A Rec Facility Upgrad - OR DM	\$461,115	\$472,182		\$472,182	(\$11,067)		
JHTW02A Rec Facility Upgrad - OR Imp	\$2,039,244	\$1,785,759		\$1,785,759	\$253,485		
JHTW03A Up Campbell Re-Vege	\$888,313	\$784,112	\$104,022	\$888,134	\$179	Recent TOR approved	
JHTW03A Up Campbell Re-Vege - OR DM	\$142,545	\$129,694	\$12,765	\$142,460	\$85		
JHTW03A Up Campbell Re-Vege - OR Imp	\$745,768	\$654,417	\$91,257	\$745,674	\$94		
JHTW04A Sayward Canoe Route	\$45,788	\$21,362		\$21,362	\$24,426	Efficiencies found during project implementation	
JHTW04A Sayward Canoe Route - OR DM	\$20,488	\$11,702		\$11,702	\$8,786		
JHTW04A Sayward Canoe Route - OR Imp	\$25,300	\$9,660		\$9,660	\$15,640		
JHTW05A Salmon Erosion Cont	\$54,462	\$17,106		\$17,106	\$37,357	Project Cancelled	
JHTW05A Salmon Erosion Cont - OR DM	\$54,462	\$17,106		\$17,106	\$37,357		
JHTW05A Salmon Erosion Cont - OR Imp							
JHTW06A Salmon Screen Upgrd	\$842,742	\$480,598		\$480,598	\$362,144	Project Cancelled	
JHTW06A Salmon Screen Upgrd - OR DM	\$46,881	\$41,526		\$41,526	\$5,355		
JHTW06A Salmon Screen Upgrd - OR Imp	\$795,861	\$439,071		\$439,071	\$356,790		

OR - Ordered Remissible
ONR - Ordered Non-Remissible

* Red values in parentheses denote overage.