

Coquitlam-Buntzen Water Use Plan

Monitoring Programs and Physical Works Annual Report: 2018

Implementation Period: April 2017 to March 2018

- COQMON-1 Assessment of Fisheries Access to Streams Tributary to Coquitlam River
- COQMON-2 Coquitlam Dam Flow Release Interim Ramping Rate Monitoring
- COQMON-3 Lower Coquitlam River Fish Habitat Requirements Study
- COQMON-4 Assessment of Pink Salmon Passage in Lower Coquitlam River
- COQMON-5 Coquitlam River Periphyton and Benthic Invertebrate Monitoring
- COQMON-6 Lower Coquitlam River Temperature Monitoring
- COQMON-7 Lower Coquitlam River Fish Productivity Index
- COQMON-8 Lower Coquitlam River Substrate Quality Assessment
- COQWORKS-1 Modification of Coquitlam Dam Release Facilities (Flow Release Valve)

For Water Licences 119709, 119710 and 119711

April 30, 2018

BC Hydro Coquitlam-Buntzen Water Use Plan Monitoring Programs and Physical Works Annual Report: 2018

1 Introduction

This document represents a summary of the status and the results of the Coquitlam-Buntzen Water Use Plan (WUP) monitoring programs and physical works to March 31, 2018, as per the Coquitlam-Buntzen Order under the *Water Act*, dated April 21, 2005 and the amendment dated March 8, 2006. There are eight monitoring programs and one physical works.

2 Status

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

Table: 2-1: Dates of Coquitlam-Buntzen 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
COQMON-1 – Assessment of Fisheries Access to Streams Tributary to Coquitlam River	Schedule E.1	Oct 24, 2005	Jan 03, 2006		
COQMON-2 – Coquitlam Dam Flow Release Interim Ramping Rate Monitoring	Schedule E.2	Oct 24, 2005	Jan 03, 2006	Feb 16, 2018	Feb 28, 2018
COQMON-3 – Lower Coquitlam River Fish Habitat Requirements Study	Schedule E.2 portion for COQMON-3 rescinded Mar 13, 2005	Jan 10, 2007	Feb 01, 2007	Feb 09, 2009	Mar 23, 2009
COQMON-4 – Assessment of Pink Salmon Passage in Lower Coquitlam River	Schedule E.2	Oct 24, 2005	Jan 03, 2006	Feb 09, 2009	Mar 23, 2009
COQMON-5 – Coquitlam River Periphyton and Benthic Invertebrate Monitoring	Schedule E.2	Oct 24, 2005	Jan 03, 2006	Feb 09, 2009	Mar 23, 2009
COQMON-6 – Lower Coquitlam River Temperature Monitoring	Schedule E.2	Oct 24, 2005	Jan 03, 2006	Feb 09, 2009	Mar 23, 2009
COQMON-7 – Lower Coquitlam River Fish Productivity Index	Schedule E.2	Feb 08, 2006	Mar 08, 2006	Jan 25, 2018	Jan 26, 2018
COQMON-8 – Lower Coquitlam River Substrate Quality Assessment	Schedule E.2	Oct 24, 2005	Jan 03, 2006	Jun 16, 2016	Jul 26, 2016
COQWORKS-1 – Modification of Coquitlam Dam Release Facilities (Flow Release Valve)	Schedule B	Oct 24, 2005	Dec 02, 2005	Apr 29, 2009	App not required

3 Schedule

The following table outlines the current schedule for the monitoring programs and physical works being delivered for the Coquitlam-Buntzen WUP.

Table 3-1: Monitoring Programs and Physical Works Schedule as of March 31, 2018

Monitoring Programs	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
	WLR Yr1	WLR Yr2	WLR Yr3	WLR Yr4	WLR Yr5	WLR Yr6	WLR Yr7	WLR Yr8	WLR Yr9	WLR Yr10	WLR Yr11	WLR Yr12 ³	WLR Yr13	WLR Yr14	WLR Yr15
COQMON-1 – Assessment of Fisheries Access to Streams Tributary to Coquitlam River	✓	✓	✓F												
COQMON-2 – Coquitlam Dam Flow Release Interim Ramping Rate Monitoring	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	■	■	■
COQMON-3 – Lower Coquitlam River Fish Habitat Requirements Study	DEL ¹	DEL ¹	DEL ¹	✓	✓	✓	✓				✓F				
COQMON-4 – Assessment of Pink Salmon Passage in Lower Coquitlam River		✓		✓		✓		✓		✓F					
COQMON-5 – Coquitlam River Periphyton and Benthic Invertebrate Monitoring	✓	DEL ¹	DEL ¹	✓	✓	✓	✓F								
COQMON-6 – Lower Coquitlam River Temperature Monitoring	✓	✓	✓	✓	✓	✓	✓F								
COQMON-7 – Lower Coquitlam River Fish Productivity Index	Smolt and Fry Outmigration Assessment	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	■	■	■
	Fry and Juvenile Standing Stock Assessment	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	■	■	■
	Fall Adult Salmon Escapement Surveys	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	■	■	■
	Steelhead Redd Surveys	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	■	■	■
	Recruitment Analysis	✓	✓	✓									✓		■
COQMON-8 – Lower Coquitlam River Substrate Quality Assessment	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓F			
Physical Works															
COQWORKS-1 – Modification of Coquitlam Dam Release Facilities (Flow Release Valve)	DEL ²	DEL ²	✓	✓F											

Legend:

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

Footnotes:

1. Program delayed due to postponement of required flow release structure modification and associated modified flow regime to October 23, 2008.
2. The installation of the release valve was delayed due to existing dam seismic upgrade repairs.
3. No field work, data results analysis only.

4 Monitoring Programs and Physical Works Terms of Reference

The monitoring programs and physical works being implemented under the Coquitlam-Buntzen 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/lower_mainland/coquitlam_buntzen.html

5 Status of Monitoring Programs

5.1 COQMON-1 Assessment of Fisheries Access to Streams Tributary to Coquitlam Reservoir

This program was initiated in 2006 and completed in 2008. The objective of the study was to assess three Coquitlam Reservoir tributaries for fish use, access, and habitat potential. A migration barrier was discovered in one of the tributaries (Meech Creek), which was subsequently removed in August 2009.

5.2 COQMON-2 Coquitlam Dam Flow Release Interim Ramping Rate Monitoring

The objective of this monitoring program is to report on the fish stranding impacts in the lower Coquitlam River associated with the implementation of the interim ramping rate protocol for the Coquitlam Dam. This monitoring program has been in place since 2006 and was expected to complete in 2017. However, in early 2018 BC Hydro received approval from the Comptroller of Water Rights to extend this monitoring program for an additional 3 years. BC Hydro requested this extension in order to collect additional fish stranding data, with a particular focus on the annual spring (June) rampdowns. Additional years of data collection will allow BC Hydro to better refine the rampdown protocols.

Due to extensive reviews of the Coquitlam Water Use Plan monitoring studies, the review of the Year 11 report has been delayed and will be included with next year's Annual Report. The Year 12 study results will also be provided in next year's Annual Report.

5.3 COQMON-3 Lower Coquitlam River Fish Habitat Requirements Study

This program was initiated in 2008. During the development of the Coquitlam WUP, generic provincial criteria was used to model habitat requirements for fish species of interest, which contributed to the flow targets developed for the river. The objective of the study is to identify any changes to the habitat suitability criteria used in the Coquitlam-Buntzen WUP calculations of weighted useable area of habitat, and refine the habitat-flow relationships and flow release targets developed in the WUP.

Fieldwork and data analysis for this study are complete. The final report for COQMON-03 (i.e., Year 4) is attached.

5.4 COQMON-4 Assessment of Pink Salmon Passage in Lower Coquitlam River

This monitoring program was initiated in August 2007 with the onset of pink salmon migration in the Coquitlam River, which continued through the low flow September period. The objective of this monitoring program is to monitor the migration of returning pink salmon in odd years to determine if there are any flow-related partial or complete migration barriers in the Lower Coquitlam River corridor.

This program is complete.

5.5 COQMON-5 Coquitlam River Periphyton and Benthic Invertebrate Monitoring

This program was initiated in 2006 and completed in 2012.

The objective of this monitoring program was to develop a predictive model for evaluating periphyton and invertebrate benefits associated with Lower Coquitlam River flow alternatives.

5.6 COQMON-6 Lower Coquitlam River Temperature Monitoring

This program was initiated in 2006 and completed in 2012.

The objective of this monitoring program was to identify if and how temperature in the lower Coquitlam River is influenced by reservoir operations.

5.7 COQMON-7 Lower Coquitlam River Fish Productivity Index

Under the Water Use Plan, COQMON-07 started in 2006 and was scheduled to conclude in 2017. However, in 2018 BC Hydro received approval from the Comptroller of Water Rights to extend this study for an additional 3 years.

The objective of this monitoring program is to measure the change in fish productivity that occurs between two test flow regimes for the Lower Coquitlam River (Treatments 1 & 2). Results from this work will inform the flow prescription for the Lower Coquitlam River upon completion of the study which is a key decision for this Water Use Plan.

The Year 10 report (data analysis from 2006 through 2015) is attached.

5.8 COQMON-8 Lower Coquitlam River Substrate Quality Assessment

This monitoring program was initiated in 2006 and field work was completed in 2017.

Due to extensive reviews of the entire Coquitlam Water Use Plan monitoring studies, the review of the Year 9 report has been delayed and will be included with next year's Annual Report, along with the Year 10-11 report.

6 Summary of Physical Works

6.1 COQWORKS-1 Modification of Coquitlam Dam Release Facilities (Flow Release Valve)

The replacement of the existing low level outlet gate was required to facilitate the releases to the Coquitlam River ordered by the CWR and recommended in the Coquitlam-Buntzen WUP. The new gate assembly was installed in October 2008.

This physical works project was completed in 2009.

7 Monitoring Programs and Physical Works Costs

The following table summarizes the Coquitlam-Buntzen WUP monitoring programs and physical works costs approved by the CWR and the Actual Costs to March 31, 2018.

Table 7-1: Coquitlam - Buntzen 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
Coquitlam WUP Annual Report	\$32,353	\$18,110	\$8,494	\$26,603	\$5,750		
COQM01A Access to Streams	\$26,582	\$20,615	\$5,967	\$26,582	\$0	Project complete	
COQM01A Access to Streams - OR DM	\$16,322	\$8,434	\$5,967	\$14,401	\$1,921		
COQM01A Access to Streams - OR Imp	\$10,260	\$12,181		\$12,181	(\$1,921)		
COQM02A Dam Flow Release R	\$233,913	\$133,437	\$55,569	\$189,006	\$44,907	Project efficiencies found	
COQM02A Dam Flow Release R - OR DM	\$46,009	\$33,678	\$14,319	\$47,997	(\$1,988)		
COQM02A Dam Flow Release R - OR Imp	\$187,904	\$99,759	\$41,250	\$141,009	\$46,895		
COQM03A Fish Habitat Suitabil	\$115,374	\$94,034	\$6,654	\$100,688	\$14,686	Project complete	
COQM03A Fish Habitat Suitabil - OR DM	\$31,018	\$17,925	\$6,654	\$24,579	\$6,439		
COQM03A Fish Habitat Suitabil - OR Imp	\$84,356	\$76,109		\$76,109	\$8,247		
COQM04A Pink Salmon Passage	\$70,698	\$53,106	\$3,112	\$56,218	\$14,480	Project complete	
COQM04A Pink Salmon Passage - OR DM	\$32,947	\$15,355	\$3,112	\$18,467	\$14,480		
COQM04A Pink Salmon Passage - OR Imp	\$37,751	\$37,751		\$37,751			
COQM05A Periphyton & Benthic	\$268,770	\$238,560	\$3,112	\$241,673	\$27,097	Project complete	
COQM05A Periphyton & Benthic - OR DM	\$29,883	\$14,087	\$3,112	\$17,199	\$12,684		
COQM05A Periphyton & Benthic - OR Imp	\$238,887	\$224,473		\$224,473	\$14,414		
COQM06A Lower COQ River Temp	\$62,539	\$62,128		\$62,128	\$411	Project complete	
COQM06A Lower COQ River Temp - OR DM	\$12,969	\$12,547		\$12,547	\$422		
COQM06A Lower COQ River Temp - OR Imp	\$49,570	\$49,580		\$49,580	(\$10)		
COQM07A Fish Productivity Ind	\$3,984,118	\$2,891,886	\$927,347	\$3,819,233	\$164,885	Project efficiencies found	
COQM07A Fish Productivity Ind - OR DM	\$135,332	\$127,599	\$14,001	\$141,600	(\$6,268)		
COQM07A Fish Productivity Ind - OR Imp	\$3,848,786	\$2,764,287	\$913,346	\$3,677,633	\$171,153		
COQM08A Substrate Quality Ass	\$416,664	\$395,746	\$18,612	\$414,358	\$2,306	Project complete	
COQM08A Substrate Quality Ass - OR DM	\$80,392	\$51,735	\$8,112	\$59,847	\$20,545		
COQM08A Substrate Quality Ass - OR Imp	\$336,272	\$344,011	\$10,500	\$354,511	(\$18,239)		
COQW01A Mod COQ Dam Release - OR	\$867,977	\$867,977		\$867,977	\$0	Project complete	
COQW01A Mod COQ Dam Release - OR DM	\$9,279	\$57,183		\$57,183	(\$47,904)		
COQW01A Mod COQ Dam Release - OR Imp	\$858,698	\$810,794		\$810,794	\$47,904		

OR - Ordered Remissible
ONR - Ordered Non-Remissible

* Red values in parentheses denote overage.