

## **Coquitlam-Buntzen Water Use Plan**

### **Monitoring Programs and Physical Works Annual Report: 2022**

#### **Implementation Period: April 2021 to March 2022**

- 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 29, 2022**

## **BC Hydro Coquitlam-Buntzen 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 Coquitlam-Buntzen Water Use Plan (WUP) monitoring programs and physical works to March 31, 2022, 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COQMON-3 – Lower Coquitlam River Fish Habitat Requirements Study	Schedule E.2 portion for COQMON-3 rescinded Mar 13, 2005	Jan 10, 2007	Feb 01, 2007	Feb 09, 2009	Mar 23, 2009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	Feb 09, 2021	Pending
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, 2022**

Monitoring Programs	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
	WLR Yr1	WLR Yr2	WLR Yr3	WLR Yr4	WLR Yr5	WLR Yr6	WLR Yr7	WLR Yr8	WLR Yr9	WLR Yr10	WLR Yr11	WLR Yr12 <sup>2</sup>	WLR Yr13	WLR Yr14	WLR Yr15	WLR Yr16	WLR Yr17	WLR Yr18
COQMON-1 – Assessment of Fisheries Access to Streams Tributary to Coquitlam River	✓	✓	✓F															
COQMON-2 – Coquitlam Dam Flow Release Interim Ramping Rate Monitoring	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓F			
COQMON-3 – Lower Coquitlam River Fish Habitat Requirements Study	DEL <sup>1</sup>	DEL <sup>1</sup>	DEL <sup>1</sup>	✓	✓	✓	✓				✓F							
COQMON-4 – Assessment of Pink Salmon Passage in Lower Coquitlam River		✓		✓		✓		✓		✓F								
COQMON-5 – Coquitlam River Periphyton and Benthic Invertebrate Monitoring	✓	DEL <sup>1</sup>	DEL <sup>1</sup>	✓	✓	✓	✓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						
<b>Physical Works</b>																		
COQWORKS-1 – Modification of Coquitlam Dam Release Facilities (Flow Release Valve)	DEL <sup>2</sup>	DEL <sup>2</sup>	✓	✓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 TOR. These TOR 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](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 this 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 CWR to extend this monitoring program for an additional three years, 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 rampdown protocols.

The Year 16 report (2020-2021) marks the last year of the study and will be included in next year's annual report after final revisions are made.

## **5.3 COQMON-3 Lower Coquitlam River Fish Habitat Requirements Study**

This program was initiated in 2008 and completed in 2016.

During the development of the Coquitlam WUP, generic provincial criteria were used to model habitat requirements for fish species of interest, which contributed to the flow targets developed for the river. The objectives of the study were 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.

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

This monitoring program was initiated in August 2007 and completed in 2015.

The objective of this monitoring program was 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.

## **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**

This program was initiated in 2006 and was scheduled to conclude in 2017. However, in 2018 BC Hydro received approval from the CWR to extend this study for an additional three 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). Program results will inform the flow regime for the Lower Coquitlam River. Data collection during the first test flow regime was completed between 2000 and 2008. Data collection during the second test flow regime began in 2009 and was scheduled to be complete after the 2020 field season. Analysis of the long-term data set suggests that not all of the management questions have been answered, so the program will continue for another three years until 2023.

The Year 16 (2021) will be submitted with the following annual report.

## **5.8 COQMON-8 Lower Coquitlam River Substrate Quality Assessment**

Field work for this monitoring program was initiated in 2006 and was completed in 2017. All reporting was completed in 2020. The objective of this study was to understand the relationship between high flows and substrate quality suitable for spawning habitat.

## **6 Summary of Physical Works**

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

The low-level outlet gate at the Coquitlam Dam was replaced to facilitate flow releases to the Coquitlam River as required by the WUP Order.

This physical works project was complete 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, 2022.

**Table 7-1: Coquitlam - Buntzen 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>Coquitlam WUP Annual Report</b>	\$32,353	\$20,179	\$0	\$20,179	\$12,174		
<b>COQM01A Access to Streams</b>	\$26,582	\$20,615		\$20,615	\$5,967	Project Complete	
COQM01A Access to Streams - OR DM	\$16,322	\$8,434		\$8,434	\$7,888		
COQM01A Access to Streams - OR Imp	\$10,260	\$12,181		\$12,181	(\$1,921)		
<b>COQM02A Dam Flow Release R</b>	\$233,913	\$210,989		\$210,989	\$22,924	Project Complete	
COQM02A Dam Flow Release R - OR DM	\$46,009	\$77,171		\$77,171	(\$31,162)		
COQM02A Dam Flow Release R - OR Imp	\$187,904	\$133,819		\$133,819	\$54,085		
<b>COQM03A Fish Habitat Suitabil</b>	\$115,374	\$107,160		\$107,160	\$8,214	Project Complete	
COQM03A Fish Habitat Suitabil - OR DM	\$31,018	\$31,052		\$31,052	(\$34)		
COQM03A Fish Habitat Suitabil - OR Imp	\$84,356	\$76,109		\$76,109	\$8,247		
<b>COQM04A Pink Salmon Passage</b>	\$70,698	\$53,106		\$53,106	\$17,592	Project Complete	
COQM04A Pink Salmon Passage - OR DM	\$32,947	\$15,355		\$15,355	\$17,592		
COQM04A Pink Salmon Passage - OR Imp	\$37,751	\$37,751		\$37,751			
<b>COQM05A Periphyton &amp; Benthic</b>	\$268,770	\$239,911		\$239,911	\$28,859	Project Complete	
COQM05A Periphyton & Benthic - OR DM	\$29,883	\$15,437		\$15,437	\$14,446		
COQM05A Periphyton & Benthic - OR Imp	\$238,887	\$224,473		\$224,473	\$14,414		
<b>COQM06A Lower COQ River Temp</b>	\$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)		
<b>COQM07A Fish Productivity Ind</b>	\$4,888,122	\$4,229,791	\$448,003	\$4,677,794	\$210,328	Efficiencies found during project implementation	
COQM07A Fish Productivity Ind - OR DM	\$205,140	\$193,938	\$24,645	\$218,583	(\$13,443)		
COQM07A Fish Productivity Ind - OR Imp	\$4,682,982	\$4,035,853	\$423,357	\$4,459,210	\$223,772		
<b>COQM08A Substrate Quality Ass</b>	\$416,664	\$416,664		\$416,664	\$0	Project Complete	
COQM08A Substrate Quality Ass - OR DM	\$80,392	\$49,619		\$49,619	\$30,774		
COQM08A Substrate Quality Ass - OR Imp	\$336,272	\$367,045		\$367,045	(\$30,773)		
<b>COQW01A Mod COQ Dam Release</b>	\$867,977	\$868,191		\$868,191	(\$214)	Project Complete	
COQW01A Mod COQ Dam Release - OR DM	\$9,279	\$57,185		\$57,185	(\$47,906)		
COQW01A Mod COQ Dam Release - OR Imp	\$858,698	\$810,794		\$810,794	\$47,904		
<b>OR - Ordered Remissible</b>							
<b>ONR - Ordered Non-Remissible</b>							

\* Red values in parentheses denote overage.