

Coquitlam-Buntzen Water Use Plan

Monitoring Program Terms of Reference

- **COQMON#1 – Assessment of Fisheries Access to Streams Tributary to Coquitlam Reservoir**

Initial submission: October 24, 2005
Revision 1: December 14, 2006

December 14, 2006

Terms of Reference for the Coquitlam-Buntzen Water Use Plan Monitoring Programs

Introduction

This document outlines the Coquitlam-Buntzen Water Use Plan (WUP) Terms of Reference for the monitoring programs as per the Coquitlam-Buntzen Order under the Water Act, dated 21 April 2005

This Revision 1 document contains the detailed Terms of Reference for the eight monitoring programs for the Coquitlam-Buntzen WUP approved based on the below schedule Table 1.

Monitoring Program	1 st Submission	Revision 1	Rescinded	Approval
COQMON#1	24 Oct 2005			3 Jan 2006
COQMON#2	24 Oct 2005			3 Jan 2006
COQMON#3	24 Oct 2005	8 Feb 2006	8 Mar 2006	
COQMON#4	24 Oct 2005			3 Jan 2006
COQMON#5	24 Oct 2005			3 Jan 2006
COQMON#6	24 Oct 2005			3 Jan 2006
COQMON#7	24 Oct 2005	8 Feb 2006		8 Mar 2006
COQMON#8	24 Oct 2005			3 Jan 2006

Table 1. Coquitlam-Buntzen monitoring program Terms of Reference submission and approval schedule.

The attached Terms of Reference includes the revised Lower Coquitlam River Habitat Suitability Criteria Development entitled Lower Coquitlam River Habitat Requirements Study (COQMON#3) and increased implementation costs for COQMON#5 – Coquitlam River Periphyton and Benthic Invertebrate Monitoring, COQMON#7 – Lower Coquitlam River Fish Productivity Index, and COQMON#8 – Lower Coquitlam River Substrate Quality Assessment based an extended WUP review period resulting from the delayed implementation of the Treatment 2 flow release.

- 1) COQMON#1: Assessment of Fisheries Access to Streams Tributary to Coquitlam Reservoir. The objective of this study is to identify fish use and/or fish habitat potential in each of the three streams identified with potential fish access issues (BC Hydro 2000) and to recommend physical works and/or operational constraints to restore fish access for all operations.
- 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.
- 3) COQMON#3: Lower Coquitlam River Fish Habitat Requirements Study. The objective of this study is to identify any changes to the habitat suitability criteria used

in the Coquitlam-Buntzen Water Use Plan calculations of weighted useable area of habitat, and refine the habitat-flow relationships and flow release targets developed in the WUP.

- 4) COQMON#4: Assessment of Pink Salmon Passage in Lower Coquitlam River. The objective of this study 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.
- 5) COQMON#5: Coquitlam River Periphyton and Benthic Invertebrate Monitoring. The objective of this study program is to develop a predictive model for evaluating periphyton and invertebrate benefits associated with Lower Coquitlam River flow alternatives.
- 6) COQMON#6: Lower Coquitlam River Temperature Monitoring. The objective of this monitoring program is to identify if and how temperature in the lower Coquitlam River is influenced by reservoir operations.
- 7) COQMON#7: Lower Coquitlam River Fish Productivity Index. The objective of this monitoring program is to determine the fisheries benefits of two test flows and to enable a better understanding of trade-offs between fisheries, domestic water and power generation for the benefit of future water planning processes.
- 8) COQMON#8: Lower Coquitlam River Substrate Quality Assessment. The objective of this monitoring program is to evaluate the effectiveness of the flushing flow provisions outlined in the LB1 WUP to increase fish productivity through improved substrate quality in the lower Coquitlam River.

Physical works terms of reference will be delivered in a separate package.

Coquitlam-Buntzen Water Use Plan

Monitoring Program Terms of Reference Summary

1.0 Background

In 2003, the Coquitlam-Buntzen Water Use Plan (LB1 WUP) consultative committee (CC) agreed on a set of operating conditions for the review period ending in 2016. The recommended operations include the release of two flow regimes from Coquitlam Dam (see Figure 1-1): Treatment #1 will continue the release schedule of two fish valves fully open (this flow agreement has been in place since 1999, releasing between 0.8-1.7m³s⁻¹). Upon dam seismic upgrade completion in 2007, Treatment #2 will take effect, releasing 1.1-5.9m³s⁻¹ depending on the time of year (see Table 1-1).

Treatment Schedule 3 - 3 Yrs Base (2FVC); 9 Years STP6																		
Activity	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Treatment #1 - 2FVC baseline smolt monitoring	1	2	3	4	5	6												
Dam Modifications				1	2	3												
Treatment #2 - STP6							1	2	3	4	5	6	7	8	9			

Figure 1-1: Treatment schedule recommended by the Consultative Committee for LB1 WUP review period to 2015¹.

¹ Note that recommendations from the Monitoring Committee in 2006 will result in extending Treatment 1 to September 2007, and Treatment 2 to September 2016.

Table 1-1: Annual schedule for release amounts as agreed by the Consultative Committee. Note that 2FV dam release amounts are average and affected by reservoir elevations, resulting in variation similar to, but not equal to those summarized.

	<i>Reservoir Diversion Schedules (cms)</i>					Species Driver and Priority for Coquitlam River Releases
	Domestic Water		Coquitlam Dam Releases			
	Target	Min	2 Fish Valves (Current)	"Share the Pain 6"		
				Target	Min	
<i>01-Jan</i>	11.9	10.7	1.0	5.9	3.6	Chinook Spawning
<i>15-Jan</i>	11.9	10.7	1.0	2.9	2.9	Chinook Incubation
<i>Feb</i>	11.9	10.7	1.0	2.9	1.8	Chinook Incubation
<i>Mar</i>	11.9	10.7	0.8	4.3	1.1	Steelhead Spawning
<i>Apr</i>	12.0	10.8	0.8	3.5	1.1	Steelhead Spawning
<i>May</i>	12.0	11.0	1.1	2.9	1.1	Steelhead Spawning
<i>Jun</i>	12.0	10.9	1.4	1.1	1.1	Steelhead Parr
<i>Jul</i>	18.0	15.8	1.4	1.2	1.1	Steelhead Parr
<i>Aug</i>	23.0	20.2	1.1	2.7	1.1	Steelhead Parr
<i>Sep</i>	23.0	20.9	0.8	2.2	1.1	Steelhead Parr
<i>Oct</i>	12.0	10.8	0.8	6.1	3.6	Chinook Spawning
<i>Nov</i>	12.0	10.8	1.1	4.0	1.5	Chinook Spawning
<i>Dec</i>	11.9	10.7	1.1	5.0	2.5	Chinook Spawning

In addition to Coquitlam Dam flow releases for fish interests, the CC also agreed to increased water diversion from Coquitlam Reservoir for Greater Vancouver Regional District (GVRD) for drinking water.

The CC also made provisions in the LB1 WUP to address uncertainties through long-term monitoring, and to facilitate Treatment #2 flow releases through Coquitlam Dam gate improvements.

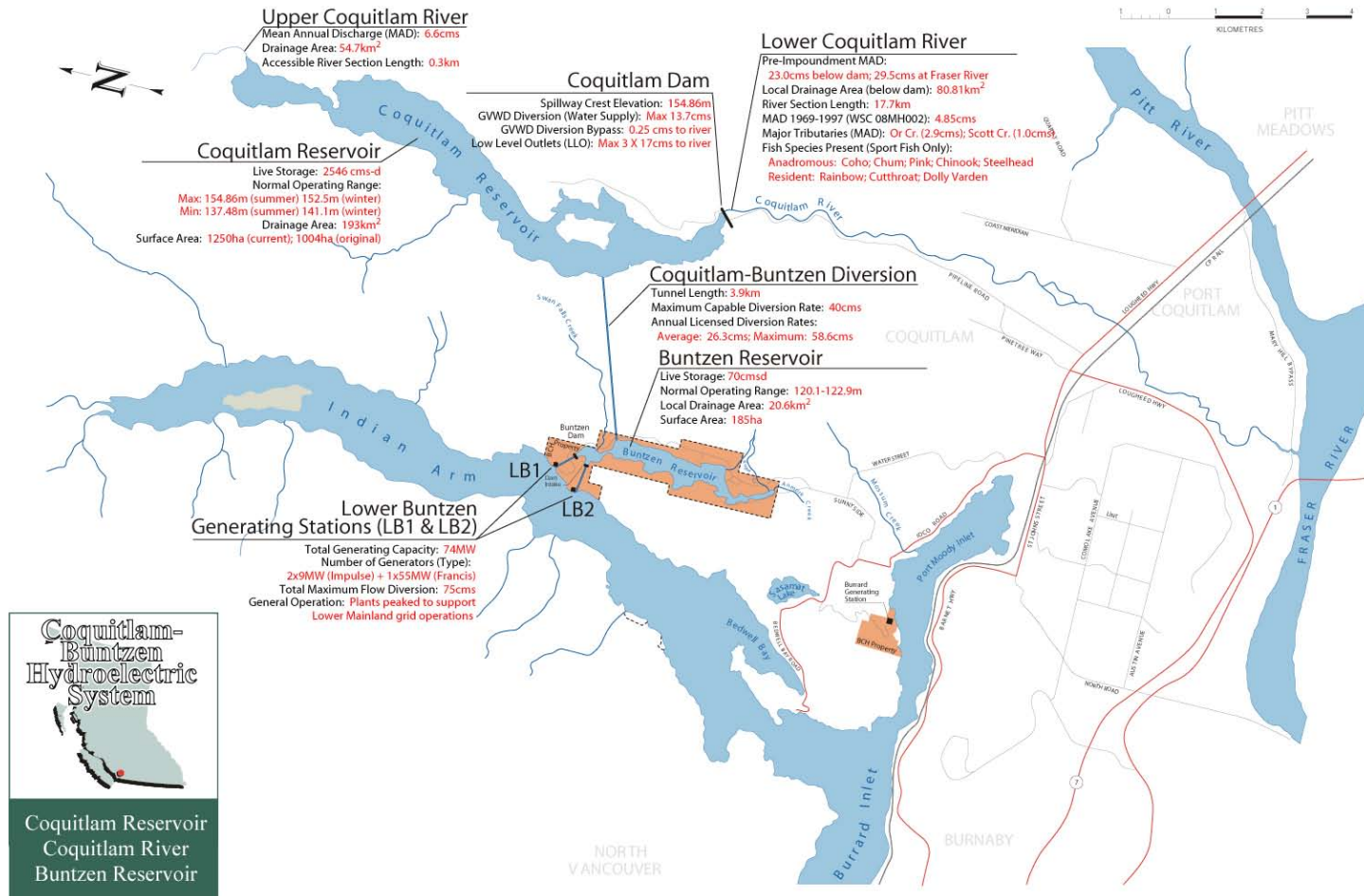


Figure 1-2: Coquitlam-Buntzen System components and attributes

1.1 Monitoring Program Summary

1.1.1 Program Objective

To address uncertainties related to the effectiveness of the LB1 WUP operating constraints, the CC recommended that a monitoring program be implemented for the duration of the review period. The overall objective of the monitoring program is to provide the level of information required for future water planning processes on the Coquitlam-Buntzen system to recommend a Coquitlam Dam release regime that fits within the parameters of the LB1 WUP agreement: between the annual water budgets of Treatment #1 and Treatment #2 (or STP5² whichever is more desirable to fish).

1.1.2 Program Approach

Although the approach varies between study programs, the program in general attempts to address key uncertainties and evaluate the effectiveness of the Water Use Plan operations. The most important indicator of effectiveness will be the productive response of fish species in the Lower Coquitlam River. In lieu of unknown productivity relationships, predictions of habitat response in Reaches 2 and 3 (see BC Hydro 2003a for reach summaries) to flow alternatives were reviewed in WUP deliberations. The validity of these predictions as proxies for fish production will be evaluated at the end of the WUP review period.

To inform the monitoring approach, a power analysis (Higgins et. al. 2002) was conducted that described the ability of a monitoring program to measure a response to a flow change. It concluded that 15 years of monitoring in reaches 2 and 3 would be required to obtain a reliable result. Although lower reaches (i.e. reaches 0 or 1) are extremely productive for fish in the Coquitlam River, the effect size used in the analysis showed that lower sites would not be a reliable indicator of response to dam releases upstream. Therefore, the Consultative Committee agreed that the focus of the monitoring program would be on the upper reaches of the Lower Coquitlam River. There are several other components of the monitoring program (e.g. Interim Ramping Rate Monitoring, Pink Salmon Passage and the Substrate Quality Assessment) that conduct at least some aspects of their monitoring in the lower reaches in recognition that impacts of operations affect the entire Lower Coquitlam River.

The flow treatments were developed to address habitat requirements for various key species life histories throughout the year, predominantly steelhead and chinook salmon. However, because chinook are in low abundance, coho, chum and pink salmon will be used as indicators in the monitoring program and chinook will be monitored where possible.

² STP5 or "Share the Pain" 5 was an alternative tentatively approved for implementation by the Consultative Committee in 2002 (BC Hydro 2002), and the agreement by the CC at the time was not amended when the CC refined the alternative to STP6 (Treatment #2).

1.1.3 Program Summary

This package outlines eight monitoring programs being implemented during the review period. The objectives and monitoring indicators to be reported to BC's Comptroller of Water Rights are listed below:

- COQMON#1 – Assessment of Fisheries Access to Streams Tributary to Coquitlam Reservoir: The objective of this study is to identify fish use and/or fish habitat potential in each of the three streams identified with potential fish access issues (BC Hydro 2000) and to recommend physical works and/or operational constraints to restore fish access for all operations.
Monitoring Indicator: Barrier to fish passage identified (yes/no)
- 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.
Monitoring Indicator: Stranding risk (number of fish stranded per area of dewatered habitat measured).
- COQMON#3 – Lower Coquitlam River Fish Habitat Requirements Study: The objective of this study is to identify any changes to the habitat suitability criteria used in the Coquitlam-Buntzen Water Use Plan calculations of weighted useable area of habitat, and refine the habitat-flow relationships and flow release targets developed in the WUP.
Monitoring Indicator (a): Habitat suitability for species of interest
Monitoring Indicator (b): Flow target (Coquitlam Dam releases) for LB1 WUP
- COQMON#4 – Assessment of Pink Salmon Passage in Lower Coquitlam River: The objective of this study 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.
Monitoring Indicator: Number of days of unimpeded access
- COQMON#5 – Coquitlam River Periphyton and Benthic Invertebrate Monitoring: The objective of this study program is to develop a predictive model for evaluating periphyton and invertebrate benefits associated with Lower Coquitlam River flow alternatives.
Monitoring Indicators (short term): seasonal results of benthos monitoring;
Monitoring Indicators (long term): modeled results of benthos abundance and diversity indicators.
- COQMON#6 – Lower Coquitlam River Temperature Monitoring: The objective of this monitoring program is to identify if and how temperature in the lower Coquitlam River is influenced by reservoir operations.
Monitoring Indicator (a): Deviation of temperature regime from natural examples.
Monitoring Indicator (b): Correlation between temperature and reservoir operations
- COQMON#7 – Lower Coquitlam River Fish Productivity Index: The objective of this monitoring program is to determine the fisheries benefits of two test flows and to enable a better understanding of trade-offs between fisheries, domestic water and power generation for the benefit of future water planning processes.

Monitoring Indicator (a): Smolt per spawner (stock productivity) for coho salmon and steelhead.

Monitoring Indicator (b): Fry per spawner for chum and pink salmon.

- COQMON#8 – Lower Coquitlam River Substrate Quality Assessment: The objective of this monitoring program is to evaluate the effectiveness of the flushing flow provisions outlined in the LB1 WUP to increase fish productivity through improved substrate quality in the lower Coquitlam River.

Monitoring Indicator: Substrate quality (areal fraction of fine sand)

Physical works terms of reference will be delivered in a separate package.

1.2 Monitoring Cost Summary

The following table describes the costs associated with the monitoring program proposals in this document. It is assumed that the funding for this program will be initiated in 2006. Note that resources not spent in 2005 will be carried forward to the next year where warranted. Based on revised terms of references (COQMON#3) and revised implementation schedules resulting from physical works delays, the budgets and the review period have increased for this program beyond those originally approved. The revised average annual cost is \$212K, with an expected inflated total program cost of \$2,542K over the 12-year (2005-2016 inclusive) review period. This is 43% higher than what was approved in the LB1 WUP (total inflated approved costs were \$1,781K), although only 12% of this is due to the recent program changes. The remainder of the cost variance is due in-part to an unanticipated shortfall in partnership funding associated with the smolt enumeration program, a sub-component of the Lower Coquitlam River Fish Productivity Index study program. In addition to the shortfall, several items identified during the Terms of Reference review were added to the program to improve the power and consistency of monitoring the effectiveness of the operational changes. These included an annual standing stock assessment, an expansion of the periphyton and benthic invertebrate monitoring program, and an annual survey of substrate quality, as requested by agency representatives.

Table 1-2: Summary of LB1 WUP monitoring program costs and variance from budgets approved during the WUP (inflated values)

Study Ref#	Terms of Reference Proposals	Program Costs
1	Assessment of Fisheries Access to Streams Tributary to Coquitlam Reservoir	\$10,260
2	Coquitlam Dam Flow Release Interim Ramping Rate Monitoring	\$87,235
3	Lower Coquitlam River Fish Habitat Requirements Monitoring Program	\$82,992
4	Assessment of Pink Salmon Passage in Lower Coquitlam River	\$37,241
5	Coquitlam River Periphyton and Benthic Invertebrate Monitoring	\$168,739
6	Lower Coquitlam River Temperature Monitoring	\$22,791
7	Lower Coquitlam River Fish Productivity Index	\$1,925,301
8	Lower Coquitlam River Substrate Quality Assessment	\$208,346
Total – All Components		\$2,542,905
WUP Approved Budget		\$1,772,666
% Variance from Approved		43%

1.3 Monitoring Program Delivery

The LB1 WUP was ratified in 2003 and was ordered by the BC Comptroller of Water Rights (CWR) in April 2005. Current implementation of Treatment 1 flows are in effect until 2007 when gate modifications and dam seismic upgrades will be complete and Treatment 2 flows will be instated and monitored.

After 9 years of Treatment 2 monitoring, the review period will conclude and the results of the monitoring program will be deliberated. A recommendation on the basis of the monitoring results pertaining to the flow release regime needed to meet the objectives laid out in the LB1 WUP will be provided to the CWR by BC Hydro on behalf of the monitoring committee. The recommendation will be constrained between the annual water budgets of Treatment 1 and Treatment 2 per the agreement made by the Consultative Committee as outlined in the consultative committee report (BC Hydro 2003).

2.0 COQMON#1 – Assessment of Fisheries Access to Streams Tributary to Coquitlam Reservoir

2.1 Monitoring Program Rationale

2.1.1 Background

Consultative committee (CC) members at the onset of the Coquitlam-Buntzen Water Use Plan (LB1 WUP) raised issues relating to possible fisheries impacts on Coquitlam Reservoir caused by Coquitlam Dam operations. Several studies were initiated; in particular, a study was undertaken to evaluate fish access to streams tributary to the Coquitlam Reservoir (BC Hydro 2001). The study focussed on the access corridor in each stream within the drawdown zone as this is the only portion of the stream influenced by operations. The study assessed all eleven streams considered fish-bearing (according to a study commissioned by GVRD in 1998 (Acres, 1999), and concluded all but three creeks retained fisheries access throughout the possible range of reservoir access. The study did not verify fish use in the streams; nor did it identify opportunities for mitigation. The LB1 WUP fisheries technical committee agreed to waive tributary access in Coquitlam Reservoir as an operational issue based on the commitment from BC Hydro that these streams will be studied and mitigative actions will be taken. This study will identify fish use and/or fish habitat potential in each of the three streams and provide recommendations for physical works and/or operational constraints to restore fish access for all reservoir operations.

2.1.2 Management Questions

The following management question relating to Coquitlam Reservoir fish populations needs to be addressed in this study program:

What are the impacts of Coquitlam Dam operations on fish access to Coquitlam Reservoir tributaries and how can they be addressed?

Reservoir operations are currently unimpeded by fisheries constraints under the assumption that this study will identify and address any fish access issues in Coquitlam Reservoir tributaries.

2.1.3 Summary of Alternate Hypotheses

The following hypothesis was already evaluated during the LB1 WUP process:

H₁: Streams tributary to the Coquitlam Reservoir are inaccessible due to Coquitlam Dam operations.

The study (BC Hydro 2001) concluded that three streams were considered inaccessible at certain reservoir elevations. The following hypothesis will be evaluated in this study towards identifying fish use below the barrier and/or assessing fish habitat potential:

H₂: Inaccessible streams do not have fisheries value in that they are not fish bearing and/or do not have fish habitat potential.

In addition to testing the hypothesis above, mitigation options for restoring access using physical works will be identified for streams with confirmed fish value. Where no practical means for employing physical works can be identified, operational controls will be recommended.

2.1.4 Key Water Use Decision Affected

Reservoir operations currently are constrained to meet flood control, power generation and drinking water storage objectives only. Where fish values are affected by Coquitlam Dam operations, and no physical works can be employed to offset identified impacts, operational controls recommended from this study may be considered in future water planning processes that will constrain reservoir operations. Such constraints would have to be evaluated in consideration of the other uses on this reservoir. Given the work conducted to date, it is highly probable that this study will either identify no impact or identify mitigative physical works measures that would restore access without affecting Coquitlam Dam operations.

2.2 Monitoring Program Proposal

2.2.1 Objective and Scope

The objective of this study is to identify fish use and/or fish habitat potential in each of the three streams identified with potential fish access issues (BC Hydro 2000) and to recommend physical works and/or operational constraints to restore fish access for all operations.

The study area is restricted to streams tributary to Coquitlam Reservoir with access issues that were identified in previous study. The three streams of interest are described in the table below. The study will focus on these tributaries only. Only those areas with access issues that fall within the reservoir drawdown zone (137.5m to 154.9m) will be considered. The study will assess fish use over three seasons, and will conclude after one year with final recommendations to BC Hydro and the LB1 WUP monitoring committee.

Habitat characteristics will be considered for those reservoir species that are most likely to access the tributaries of interest. The following species of interest will be the main focus of this study:

- Rainbow trout: rearing, spawning, incubation, and overwintering (year round);
- Cutthroat trout: rearing, spawning, incubation, and overwintering (year round); and
- Kokanee: spawning and incubation (fall-spring)

Periodicity for these species is not known in the Coquitlam Reservoir, although lake-spawning kokanee have been observed in November (Bocking and Gaboury 2003).

Table 2-1: Streams with access issues identified during a field assessment in 1999 (BC Hydro 2000)

Creek Name	Reference ID (Acres 1999)	Critical El. (m)	Stream slope (%)	Comments
Meech Creek	CO-37	149.96	16-26	3 cfs flow observed during survey with limited spawning habitat
Unnamed Cr.	CO-43	149.96	20	Tributary to Meech creek; No spawning habitat potential
Unnamed Cr.	CO-35	149.96	>20	Tributary to Meech creek; No spawning habitat potential

2.2.2 Approach

There are two steps involved in this assessment:

- *Fish Use and Fish Habitat Assessment:* confirmation of fish presence/absence in each of the tributaries of interest will be conducted during spring, summer and fall seasons of one year of study only. Assessment of fish habitat potential above the migration barrier will be conducted; and
- *Access Barrier Removal Prescriptions:* where fish use/habitat potential exists above the barrier, prescriptions for barrier removal/mitigation will be developed. Prescriptions will employ physical works where possible; if not feasible, operational controls will be recommended.

Both pieces of information will be integrated and a qualitative assessment (unless quantitative data are available) of the hypothesis provided to the Monitoring Committee.

2.2.3 Methods

2.2.3.1 Fish Use and Fish Habitat Assessment

Field methods and data requirements for this task are referenced to Resource Inventory Standards Committee (RISC 2001) and Watershed Restoration Program (Johnston and Slaney 1996) guidelines. It is up to the lead biologist to ensure that the data collected fit the scope of the project requirements: only data relevant to assessing the degree of fish use/fish habitat isolated in reaches adjacent to the barriers being assessed are required for this study.

- *Field Preparation:* Prior to field assessment, the GVRD watershed fisheries assessment (Acres 1999) will be reviewed to confirm the location and fish/habitat information available for the streams of interest. Field data forms will be prepared in advance to capture all relevant information (please review the fish habitat assessment procedures [Johnston and Slaney 1996] for more information). A map of the area will be prepared to summarize key information including the locations of access issues, sampling locations, results, areas of habitat potential and types, and photopoints. Based on the 1:20,000 reconnaissance of fish habitat (RISC, 2001), the map will delineate reach boundaries adjacent to the barrier of interest for each stream/

- *Fish barrier/habitat inventory:* following RISC standards (2001), habitat characteristics in reaches adjacent to the fish barrier (upstream and downstream) will be documented in data collection forms during an inventory carried out during critical period stream flow between August and October. Inventories will focus on identifying habitat for those species of interest that would require access to/from the Coquitlam Reservoir. The habitat barriers identified in the inventory will be evaluated and all information in Table 2-1 will be verified. In addition, specific information required for the planning of instream rehabilitation works as outlined in Watershed Technical Circular #1 (Johnston and Moore 1995) will be collected regarding the barrier(s) of interest.
- *Fish Inventory:* following sampling methodologies outlined in Johnston and Slaney (1996) and RISC (2001), low-level seasonal sampling of fish use in reaches adjacent to the barrier (upstream and downstream) will be conducted during the CPSF habitat inventory in late summer, and again in the fall and spring. Inventory methods may include electroshocking and/or minnow (gee) trapping in the late summer, and visual observations of spawning kokanee and rainbow/cutthroat trout during the fall and spring surveys respectively. All fish collected will be enumerated – species, age, fork length and weight will be collected where possible/applicable. The fish barrier assessment will be re-visited each survey to incorporate any flow-related data for the site.

2.2.3.2 Barrier Mitigation Prescriptions

The Watershed Restoration Technical Circulars #1 (Johnston and Moore 1995) #8 (Johnston and Slaney 1996) and #9 (Slaney and Zaldokas 1997) will be useful for providing information for planning, assessing, and designing physical works for barrier removal/mitigation. Where possible, two prescriptions for physical works will be described in terms of cost, design and implementation requirements. Where no physical works are required pursuant to fish/habitat inventories indicating a lack of fisheries value upstream of the barriers, the rationale for this outcome will be summarized in the final report. Where no physical works are feasible given site conditions or extent of barriers observed, operational constraints should be recommended to address life history requirements as dictated by fish use/habitat potential observed during the field inventories. For example, if kokanee spawning potential exists in the stream above the barrier, a recommendation may include reservoir provisions for fall access to the stream.

2.2.3.3 Reporting

A draft report describing the results of the test of H_1 and H_2 will be submitted to BC Hydro and the LB1 WUP monitoring committee for review and comment. Final reports will be submitted with an executive summary and brief discussion of field methods and barrier removal (if applicable) and recommendation.

Reports will be in Word and Adobe Acrobat (*.pdf) formats. All data including spreadsheets, programming, mapping and photographs will be provided in electronic formats. Final reports will be submitted in hardcopy.

2.2.4 Interpretation of Monitoring Results

A plan for the removal of physical barriers for fish access will be recommended for impacted streams if:

- a) the point of interest is a confirmed barrier to fish access as dictated by criteria outlined in existing guidelines; AND
- b) the stream has fisheries value as confirmed by either presence of species of interest in the stream reach below the barrier or the identification of habitat of value for species of interest above the barrier.

The recommendation and plan will then provide the basis for physical works implementation to be carried forward by BC Hydro or through the Bridge-Coastal Fish and Wildlife Restoration Program (BCRP).

2.2.5 Schedule

The study steps are expected to take just over a year to complete. It is anticipated that this work will be performed in 2006 subject to leave to commence from the BC Comptroller of Water Rights office. The steps will be carried out according to the following schedule:

July: Contract award, report review and field preparation

August/September: First fish sampling survey, Fish habitat assessment and Barrier assessment

October/November: Second fish sampling survey and Barrier assessment

April/May: Third fish sampling survey and Barrier assessment

June: Draft recommendations and plans

July: Final report and plans

2.2.6 Budget

This is a one-time, one-year study for \$10K.