

Falls River Project Water Use Plan

Monitoring Programs Annual Report: 2008

- **Falls River Presence and Timing of Steelhead and Salmon Spawning Monitoring**
- **Falls River Fish Spawning Habitat Monitoring**
- **Big Falls Reservoir Tributary Access and Potential Stranding Monitoring**
- **Big Falls Reservoir Sedge Habitat Maintenance Monitoring**
- **Big Falls Reservoir Tributary Backwatering Monitoring**
- **Big Falls Reservoir Wildlife Shoreline Habitat Monitoring**

For Conditional Water Licences 120736 and 120739

BC Hydro Falls River Project Water Use Plan Monitoring Programs Annual Report: 2008

1 Introduction

This document represents a summary of the status and the results of the Falls River Water Use Plan (WUP) monitoring programs to 31 October 2008, as per the Falls River Order under the *Water Act*, dated 4 April 2006. There are five monitoring programs and no physical works:

- 1) Falls River Presence and Timing of Steelhead and Salmon Spawning Monitoring
- 2) Falls River Fish Spawning Habitat Monitoring
- 3) Big Falls Reservoir Tributary Access and Potential Stranding Monitoring
- 4) Big Falls Reservoir Sedge Habitat Maintenance Monitoring
- 5) Big Falls Reservoir Tributary Backwatering Monitoring
- 6) Big Falls Reservoir Wildlife Shoreline Habitat Monitoring

2 Background

The water use planning process for BC Hydro's Falls River project was initiated in May 2002 and completed in May 2003. The conditions proposed in the WUP for the operation of the project reflect the recommendations of the Falls River WUP Consultative Committee.

In November 2005, the Falls River WUP was submitted to the Comptroller.

On 4 April, 2006, BC Hydro was ordered to implement the conditions proposed in the Falls River WUP and prepare the monitoring programs terms of reference (TOR).

On 4 October 2006, the Falls River WUP monitoring programs TOR were submitted to the Comptroller for review and approval. On 28 November 2006, the TOR for all monitoring programs were accepted by the Comptroller.

On 2 May 2007, BC Hydro re-submitted the TOR for the Big Falls Reservoir Tributary Backwatering Monitoring due to a revision of methodology and resulting increased implementation cost. On 27 June 2007, this revised TOR was rejected by the Comptroller.

On 30 July 2007, BC Hydro submitted a letter to the Comptroller to provide clarity on the schedule for Falls River Fish Spawning Habitat Monitoring.

On 27 Sept 2007, BC Hydro requested a variance from the Water License at Falls River due to safety concerns.

On 27 February 2008, BC Hydro notified the Comptroller that monitoring programs #3, #4 and #5 will be delayed due to the spillway gate upgrade project at Falls River

Generating Station. On 3 March 2008, BCH received a response from the Comptroller in support of the recommended delays.

On April 29, 2008 BCH formally re-submitted the TOR for monitoring programs #3, #4 and #5. The re-submission was due to the delay from the spillway gate upgrade project at Falls River Generating Station.

Note that this delay in completion of the reservoir studies will impact the Falls 5 year review, originally slated for 2011/2012. There is the potential to carry out a partial review focusing on the tailrace portions of the facility after 5 years (2012), with a complete review in approximately 2017.

As outlined in the Falls River WUP, a review is recommended after five years. If a review is not recommended after five years then the next review of the Falls River Water use Plan will be conducted in ten years after the implementation of the plan.

3 Status

The following table outlines the status and schedule for the Falls River WUP monitoring programs and physical work.

Table 3-1: Status of Falls River WUP Monitoring Programs Implementation

Monitoring Programs	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
	WLR YR1	WLR YR2	WLR YR3	WLR YR4	WLR YR5 Interim Review	WLR YR6	WLR YR7	WLR YR8	WLR YR9	WLR YR10 Final Review
Falls River Presence and Timing of Steelhead and Salmon Spawning Monitoring	✓	u/w	■							
Falls River Fish Spawning Habitat Monitoring		u/w	■	■?	■?					
Big Falls Reservoir Tributary Access and Potential Stranding Monitoring					■?	■?	■?			
Big Falls Reservoir Sedge Habitat Maintenance Monitoring	✓				▲?	▲?	▲?			
Big Falls Reservoir Tributary Backwatering Monitoring					■?	■?	■?			
Big Falls Reservoir Wildlife Shoreline Habitat Monitoring	✓	u/w	■							

- Legend:
- = Program to be undertaken/initiated in identified year
 - u/w = Project is underway
 - ✓ = Program completed for the year
 - × = Program started, but encountered operational or hydrological delays
 - ? = YR3 will be either 2011 or 2012, depends on the timing of the spillway gate project at Falls River Generating Station.
 - ▲? = YR2 will be either 2001 or 2012, depends on the timing of spillway gate project at Falls River Generating Station.

4 Falls River WUP Monitoring Programs

This section outlines the status of the Falls River WUP monitoring programs as per the Order under the *Water Act*, dated 4 April 2006.

4.1 Falls River Presence and Timing of Steelhead and Salmon Spawning Monitoring

4.1.1 Overview

The primary objective of the monitoring study is to assess the timing of salmon presence and spawning in the Falls River tailpond (Figure 1-1). The geographic scope of the monitoring will be limited to the Falls River tailpond, which is defined as the 180 m long reach from the base of the larger falls (spillway) to top of smaller cascade at the end of the tailpond.

All species observed during the monitoring will be documented. Monitoring will focus on the presence of chinook, chum, and coho salmon because these species were used to calculate the “spawning habitat” performance measure. Chinook salmon spawning was of particular interest to the Fish and Wildlife Technical Committee. Chinook, pink and chum salmon have been documented to spawn in the tailpond. Monitoring will also examine adult steelhead presence and spawning. Steelhead spawning has not been documented in the tailpond.

Monitoring Indicator: (a) Presence of chinook, coho and chum salmon adults or redds in the tailpond.

This monitoring program involves three main components; background data review, snorkel surveys, and environmental data collection. In addition, there will a data analysis and reporting component.

4.1.2 Status

This program was initiated in April 2007 and will be carried out during in 2008 and 2009 for a total of three years of monitoring. The first program report was received in January 2008 and the second year report is expected in January 2009.

4.1.3 Interpretation of Data

All surveys and data collection were successfully carried out for Year 1. As outlined in the Terms of Reference, interpretation of data is to be performed after the completion of data collection in Year 3.

4.2 Falls River Fish Spawning Habitat Monitoring

4.2.1 Overview

The primary objective of the monitoring program is to reduce uncertainty related to the benefits of the minimum flows to the incubation of chinook salmon eggs in the Falls River. The study area will include the Falls River from the falls just downstream of the dam to the confluence with the Ecstall River, with a focus on spawning areas in the tailpond. The tailpond is where most fish habitat is located downstream of the dam. Monitoring will occur annually over three years.

The Consultative Committee (CC) for the Falls River Water Use Plan (WUP) expressed concern that flow conditions in the Falls River may affect available spawning habitat and egg incubation success for salmon. To address these concerns, the CC recommended a minimum flow to help ensure incubation success. However, the estimated influence of WUP flows on spawning and egg incubation were highly uncertain as they were estimated from models with uncertain parameter estimates. As a result of these uncertainties, the CC recommended a monitoring plan to determine the effects of these flows on incubation success.

Monitoring Indicator: (a) Chinook salmon egg-to-fry incubation success.

This monitoring program will include four components: habitat survey and monitoring, egg incubator installation and monitoring; field spot measurements and incubation assessments; and data summary, analysis and reporting.

4.2.2 Status

This program was initiated in March 2008 and will be carried out in 2009 and 2010 for a total of three years of monitoring. The first program report is expected in July 2009.

4.2.3 Interpretation of Data

At this time there is no data to interpret for this monitoring program.

4.3 Big Falls Reservoir Tributary Access and Potential Stranding Monitoring

4.3.1 Overview

The primary objective of the monitoring study is to reduce uncertainty related to the presence of migration barriers for adult cutthroat and Dolly Varden, and areas of potential fish stranding in the Big Falls Reservoir. The geographic scope of the monitoring will include the drawdown zone of the Big Falls Reservoir (elevations <92.4 m).

The Consultative Committee (CC) for the Falls River Water Use Plan (WUP) expressed concern that the operation of the Big Falls Reservoir and associated seasonal reservoir elevations could affect access to tributaries by cutthroat trout and Dolly Varden because migration barriers may be present in the drawdown zone of the reservoir. The CC was also concerned that rapid drawdowns of the reservoir could strand fish along the reservoir shoreline throughout the drawdown zone.

Monitoring Indicators: (a) The presences of barriers to fish within the drawdown zone
(b) The presence of stranded fish within the drawdown zone

This program is comprised of two main components: a one-time barrier survey and a one-time stranding survey. In addition, there will a data analysis and reporting component.

4.3.2 Status

This program is scheduled to start in 2008; however, due to the spillway upgrade project required at Falls River Generating Station, the program can not commence until the upgrade is complete. The spillway project is anticipated to occur in 3 to 5 years.

4.3.3 Interpretation of Data

At this time there is no data to interpret for this monitoring program.

4.4 Big Falls Reservoir Sedge Habitat Maintenance Monitoring

4.4.1 Overview

The primary objective of the monitoring study is to reduce uncertainty related to the effects of reservoir operations on reservoir vegetation in the Big Falls Reservoir. The geographic scope of the monitoring will include the drawdown zone of the Big Falls Reservoir. The existing sedge community is between 90.3 and 92.4 m (Appendix E of BC Hydro 2003). The reservoir generally has steep rocky slopes. However, the eastern portion of the reservoir where Big Falls and Carthew creeks enter the reservoir has a more gentle topography and has extensive sedge habitat. While all areas of the drawdown zone will be examined, monitoring will focus on these areas where vegetation is present.

The Consultative Committee (CC) for the Falls River Water Use Plan (WUP) expressed some concern that changes to the operation of the Big Falls Reservoir would affect vegetation in the drawdown zone (hereafter "reservoir vegetation") of the Big Falls Reservoir. In particular, high ecological value was placed on maintaining the sedge grass community to benefit birds, wildlife and aquatic species. The Fish and Wildlife Technical Committee estimated that in order to maintain the sedge community, it should be inundated for a period long enough to prevent the succession of non-wetland species (i.e., shrubs and trees) into the sedge community, but exposed long enough to allow the sedge to grow. Based on a literature review, the Fish and Wildlife Technical Committee estimated that a minimum of 28-days inundation from February to May was needed to prevent succession. However, the exact elevation, timing, duration and frequency of inundation needed to maintain the sedge community is unknown.

Monitoring Indicator: (a) Change in the area of sedge grass community.

This program is comprised of two main components: mapping the distribution of reservoir vegetation within the drawdown zone of the Big Falls Reservoir and monitoring changes over time in the areal coverage and plant species composition of vegetated communities within the drawdown zone. In addition, there will a data analysis and reporting component.

4.4.2 Status

This program was initiated in August 2007 and will be carried out over 2 years. Year 2 was scheduled to be carried out in 2011; however, due to the spillway upgrade project required at Falls River Generating Station, the program can not commence

until the upgrade is complete. The spillway project is anticipated to occur in 3 to 5 years.

4.4.3 Interpretation of Results

All surveys and data collection were successfully carried out for Year 1. As outlined in the Terms of Reference, interpretation of data is to be performed after the completion of data collection, the timing of which is uncertain as discussed above.

4.5 Big Falls Reservoir Tributary Backwatering Monitoring

4.5.1 Overview

The primary objective of the monitoring study is to determine whether Dolly Varden and cutthroat trout spawn in tributaries within the drawdown zone of the Big Falls Reservoir. The geographic scope of the monitoring will cover three reservoir tributaries where spawning may occur¹: Big Falls Creek, Carthew Creek, and the unnamed tributary that drains Hayward Lake. The effective drawdown considered to be elevations <92.4 m and monitoring will focus on these elevations. To ensure that sampling in the drawdown zone is effective at identifying spawning areas, limited sampling will also occur at elevations >92.4 m.

The Consultative Committee (CC) for the Falls River Water Use Plan (WUP) expressed concern that the operation of the Big Falls Reservoir may affect spawning and incubation habitat conditions for Dolly Varden char (*Salvelinus malma*) and cutthroat trout (*Oncorhynchus clarki*) in sections of tributaries that flow through the reservoir drawdown zone. Backwatering or inundation of the connecting tributaries occurs when reservoir levels rise. If Dolly Varden² or cutthroat trout spawn in sections of tributaries within the drawdown zone, the redds are then susceptible to inundation from rising reservoir levels. Redd inundation after spawning and before fry emergence will potentially reduce egg-to-fry survival.

Monitoring Indicator: (a) The presence of suitable spawning habitat in the drawdown zone.
(b) The presence of spawning Dolly Varden in the drawdown zone.

This monitoring program has two main components; a spawning habitat assessment and a spawner survey. In addition, there will a data analysis and reporting component.

4.5.2 Status

This program was scheduled to start in 2008. Due to the spillway upgrade project required at Falls River Generating Station, the program can not commence until the upgrade is complete. The spillway project is anticipated to occur in 3 to 5 years. Once the program starts it will be carried out over one year.

Dolly Varden were captured in Big Falls Creek upstream of the reservoir during the 1990s, and were observed spawning in the upper reaches of Big Falls Creek (summarized in Lewis 2002).

² Past observations of Dolly Varden may have been bull trout (*S. confluentus*) (Lewis 2002).

4.5.3 Interpretation of Results

At this time there is no data to interpret for this monitoring program.

4.6 Big Falls Reservoir Wildlife Shoreline Habitat Monitoring

4.6.1 Overview

The primary objective of the monitoring study is to reduce uncertainty related to the effects of reservoir operations on wildlife in the drawdown zone of the Big Falls Reservoir. Surveys will estimate the number of nests and dens that are present in the drawdown zone. The geographic scope of the monitoring will include the drawdown zone of the Big Falls Reservoir from 90.3 to 92.4 m.

The Consultative Committee (CC) for the Falls River Water Use Plan (WUP) expressed concern that changes to the seasonal operation of the Big Falls Reservoir would flood wildlife nesting and denning sites. Specifically, the CC was concerned that wildlife species may establish nests or dens around the reservoir at elevations below 92.4 m (local datum) during the period prior to flashboard installation, which can occur from 15 February to 15 March each year. Installation of the flashboards can raise the reservoir elevation from 90.3 to 92.4 m and should benefit reservoir vegetation, cutthroat spawning, and power generation. However, nests and dens at these elevations could be at risk of flooding when the flashboards are installed.

Monitoring Indicator: (a) The presence of wildlife nests and dens are present below 92.4 m in the drawdown zone of the Big Falls Reservoir

This monitoring program has three main components; the collection of local and traditional knowledge, interpretation of air photos, and a field survey. In addition, there will a data analysis and reporting component.

4.6.2 Status

This program was initiated in September 2007 and will be carried out over three years. The first program report was received in March 2008 and the second year report is expected in March 2009.

4.6.3 Interpretation of Results

All surveys and data collection were successfully carried out for Year 1. As outlined in the Terms of Reference, interpretation of data is to be performed after the completion of data collection in Year 3.

5 Falls River WUP Monitoring Programs Costs

The following table summarizes the Falls River WUP monitoring programs costs approved by the Comptroller on 28 November 2006 and the actual costs to 31 October 2008.

Table 5-1: Falls River WUP Monitoring Programs Costs

Description		Costs Approved by Comptroller of Water Rights	Actual Costs to 31 October 2008
Monitoring Programs			
FLSMON#1: Falls River Presence And Timing Of Steelhead And Salmon Spawning Monitoring	Direct Management	\$32,020	\$ 10,589.00
	Implementation	\$112,532	\$ 64,770.00
FLSMON#2: Falls River Fish Spawning Habitat Monitoring	Direct Management	\$34,460	\$ 13,834.00
	Implementation	\$188,421	\$ 22,351.00
FLSMON#3: Big Falls Reservoir Tributary Access and Potential Stranding Monitoring	Direct Management	\$14,716	\$ 5,768.00
	Implementation	\$19,500	\$ -
FLSMON#4: Big Falls Reservoir Sedge Habitat Maintenance Monitoring	Direct Management	\$28,734.26	\$ 11,807.00
	Implementation	\$105,139	\$ 37,408.00
FLSMON#5: Big Falls Reservoir Tributary Backwatering Monitoring	Direct Management	\$21,049	\$ 10,347.00
	Implementation	\$29,500	\$ -
FLSMON#6: Big Falls Reservoir Wildlife Shoreline Habitat Monitoring	Direct Management	\$22,477	\$ 5,240.00
	Implementation	\$40,703	\$ 18,308.00