

Stave River Water Use Plan

Monitoring Programs

Annual Report: 2015

Implementation Period: July 2014 to June 2015

- **SFLMON-1 Pelagic Monitor (Nutrient Load/Total Carbon Levels)**
- **SFLMON-2 Littoral Productivity Assessment**
- **SFLMON-3 Fish Biomass Assessment**
- **SFLMON-4 Limited Block Load as Deterrent to Spawning**
- **SFLMON-5 Risk of Adult Stranding**
- **SFLMON-6 Risk of Fry Stranding**
- **SFLMON-7 Diel Pattern of Fry Out-migration**
- **SFLMON-8 Seasonal Timing and Assemblage of Resident Fish**
- **SFLMON-9 Turbidity Levels in Hayward Reservoir**
- **SFLMON-10 Archaeological Management**

For Conditional Water Licences 117530, 117531, 117532, 117533, 117535, 117536, and 117537

July 31, 2015

BC Hydro Stave River Project Water Use Plan Monitoring Programs Annual Report: 2015

1 Introduction

This document represents a summary of the status and the results of the Stave River Water Use Plan (WUP) monitoring programs to June 30, 2015, as per the Stave River Order under the *Water Act*, dated May 6, 2004. There are ten monitoring programs.

2 Status

The following table outlines the dates that Terms of Reference (TOR) for the Stave River WUP monitoring programs were submitted to and approved by the CWR.

Table: 2-1: Dates of Stave 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
SFLMON-1 Pelagic Monitor (Nutrient Load/Total Carbon Levels)	Schedule B.1.1.1, Schedule B.1.1.2	Jun 10, 2005	Jun 30, 2005	Oct 27, 2014	Nov 04, 2014
SFLMON-2 Littoral Productivity Assessment	Schedule B.1.1.2	Jun 10, 2005	Jun 30, 2005		
SFLMON-3 Fish Biomass Assessment	Schedule B.1.1.1	Jun 10, 2005	Jun 30, 2005	Aug 13, 2013	Sep 30, 2013
SFLMON-4 Limited Block Load as Deterrent to Spawning	Schedule B.1.1.2	Jun 10, 2005	Jun 30, 2005	Sep 13, 2007	Oct 17, 2007
SFLMON-5 Risk of Adult Stranding	Schedule B.1.1.2	Jun 10, 2005	Jun 30, 2005		
SFLMON-6 Risk of Fry Stranding	Schedule B.1.1.2	Jun 10, 2005	Jun 30, 2005		
SFLMON-7 Diel Pattern of Fry Out-migration	Schedule B.1.1.2	Jun 10, 2005	Jun 30, 2005		
SFLMON-8 Seasonal Timing and Assemblage of Resident Fish	Schedule B.1.1.2	Jun 10, 2005	Jun 30, 2005	Sep 08, 2014	Sep 24, 2014
SFLMON-9 Turbidity Levels in Hayward Reservoir	Schedule B.1.1.3	Jun 10, 2005	Jun 30, 2005	Jul 29, 2010	Dec 15, 2010
SFLMON-10 Archaeological Management	Schedule B.4.0	Jun 10, 2005	Jun 30, 2005		

3 Schedule

The following table outlines the current schedule for the monitoring programs being delivered for the Stave River WUP.

Table 3-1: Table of WUP Schedule

Monitoring Programs	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
	WLR YR1	WLR YR2	WLR YR3	WLR YR4	WLR YR5	WLR YR6	WLR YR7	WLR YR8	WLR YR9	WLR YR10	WLR YR11
SFLMON-1 Pelagic Monitor (Nutrient Load/Total Carbon Levels)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
SFLMON-2 Littoral Productivity Assessment	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
SFLMON-3 Fish Biomass Assessment	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
SFLMON-4 Limited Block Load as Deterrent to Spawning	x	✓	✓	✓	✓	✓	✓	✓	✓	✓	
SFLMON-5 Risk of Adult Stranding		✓									
SFLMON-6 Risk of Fry Stranding		x	x	x	✓						
SFLMON-7 Diel Pattern of Fry Out-migration				✓	✓						
SFLMON-8 Seasonal Timing and Assemblage of Resident Fish						✓			✓	x	■
SFLMON-9 Turbidity Levels in Hayward Reservoir	✓	✓	✓	✓	✓						
SFLMON-10 Archaeological Management	✓	✓	✓								

Legend: ■ = Program to be undertaken/initiated in identified year
 ✓ = Program completed for the year
 x = Program started, but encountered operational or hydrological delays

4 Monitoring Programs Terms of Reference

The monitoring programs being implemented under the Stave 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/lower_mainland/stave_river.html

5 Status of Monitoring Programs

5.1 SFLMON-1 Pelagic Monitor (Nutrient Load/Total Carbon Levels)

This monitoring program was initiated in 2005 and was carried out over ten years. All field work was completed in fall 2014. The final comprehensive report will be included in next year's annual report.

5.2 SFLMON-2 Littoral Productivity Assessment

This monitoring program was initiated in 2005 and was carried out over ten years. All field work was completed in fall 2014. The final report for 2014 will be included in next year's annual report.

5.3 SFLMON-3 Fish Biomass Assessment

This monitoring program was initiated in 2005 and was carried out over ten years. All field work was completed in fall 2014. The final report for 2013 and 2014 will be included in next year's annual report.

5.4 SFLMON-4 Limited Block Load as Deterrent to Spawning

This monitoring program was initiated in 2005 and was carried out over ten years. Field data collection was performed in 2005 and 2007. In the intervening and subsequent years, chum spawner data was obtained from DFO. This monitoring program is now complete. The 2014 report will be included in next year's annual report.

5.5 SFLMON-5 Risk of Adult Stranding

This monitoring program was completed in 2006.

5.6 SFLMON-6 Risk of Fry Stranding

This monitoring program was completed in 2009..

5.7 SFLMON-7 Diel Pattern of Fry Out-migration

This monitoring program was completed in 2009.

5.8 SFLMON-8 Seasonal Timing and Assemblage of Resident Fish

This proposed one-year monitoring program was initiated in March 2010 and extended through March 2011; however, during the 2012 Stave Monitoring Advisory Committee meeting it was discussed that the management questions have not been answered for this monitor. The committee agreed that more monitoring is required and two more years of monitoring was approved in the letter from CWR dated May 27, 2013. During the 2013 Stave Monitoring Advisory Committee Meeting, it was discussed that there was a considerably lower catch success relative to previous years so remaining effort will now be focused to a more qualitative approach to the study. The approach will now focus on collecting physical habitat data at specific flows to assess change in available habitat.

A TOR resubmission regarding the change in scope and budget noted above was approved by the Comptroller's office in September 2014. Due to safety issues, monitoring did not proceed as planned in 2014. The final year of monitoring is scheduled to be completed in fall 2015.

5.9 SFLMON-9 Turbidity Levels in Hayward Reservoir

This monitoring program was completed in 2009.

5.10 SFLMON-10 Archaeological Management

This monitoring program was complete in 2008.

6 Monitoring Programs

The following table summarizes the Stave River WUP monitoring program costs approved by the Comptroller and the Actual Costs to June 30, 2015.

Table 6-1: Stave River WUP Monitoring Programs 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
Stave River WUP Annual Report	\$11,795	\$10,531	\$1,264	\$11,795	(\$0)		
SFLM01A Pelagic Monitor	\$536,926	\$500,869	\$24,210	\$525,079	\$11,847	Final expenses outstanding	
SFLM01A Pelagic Monitor - ONR DM	\$22,110	\$18,412	\$1,962	\$20,375	\$1,735		
SFLM01A Pelagic Monitor - ONR Imp	\$514,816	\$482,456	\$22,248	\$504,704	\$10,112		
SFLM02A Littoral Productivity	\$659,139	\$540,120	\$40,661	\$580,781	\$78,358	Analysis originally to be completed by BC Hydro now completed by consultant. Final expenses outstanding	
SFLM02A Littoral Productivity - ONR DM	\$140,339	\$26,434	\$1,143	\$27,577	\$112,762		
SFLM02A Littoral Productivity - ONR Imp	\$518,800	\$513,686	\$39,518	\$553,204	(\$34,404)		
SFLM03A Fish Biomass Assessme	\$532,156	\$515,296	\$1,296	\$516,592	\$15,564	Final report development	
SFLM03A Fish Biomass Assessme - ONR DM	\$40,877	\$23,735	\$1,296	\$25,030	\$15,847		
SFLM03A Fish Biomass Assessme - ONR Imp	\$491,279	\$491,561	\$0	\$491,562	(\$283)		
SFLM04A Ltd Block Load Monit	\$164,206	\$101,588	\$1,177	\$102,765	\$61,441	Final report development	
SFLM04A Ltd Block Load Monit - ONR DM	\$71,991	\$7,601	\$1,372	\$8,972	\$63,019		
SFLM04A Ltd Block Load Monit - ONR Imp	\$92,215	\$93,987	(\$194)	\$93,792	(\$1,577)		
SFLM05A Adult Stranding Moni	\$38,185	\$23,099	\$0	\$23,099	\$15,086	Project completed	
SFLM05A Adult Stranding Moni - ONR DM	\$17,985	\$2,404	\$0	\$2,404	\$15,581		
SFLM05A Adult Stranding Moni - ONR Imp	\$20,200	\$20,695	\$0	\$20,695	(\$495)		
SFLM06A Fry Stranding Monito	\$93,529	\$70,716	\$0	\$70,716	\$22,813	Project completed	
SFLM06A Fry Stranding Monito - ONR DM	\$34,129	\$4,635	\$0	\$4,635	\$29,494		
SFLM06A Fry Stranding Monito - ONR Imp	\$59,400	\$66,081	\$0	\$66,081	(\$6,681)		
SFLM07A Fry Out-Migrat Diel P	\$114,654	\$103,707	\$0	\$103,707	\$10,947	Project completed	
SFLM07A Fry Out-Migrat Diel P - ONR DM	\$36,254	\$11,366	\$0	\$11,366	\$24,888		
SFLM07A Fry Out-Migrat Diel P - ONR Imp	\$78,400	\$92,341	\$0	\$92,341	(\$13,941)		
SFLM08A Resident Fish Monito	\$170,649	\$107,066	\$62,857	\$169,923	\$726		
SFLM08A Resident Fish Monito - ONR DM	\$27,152	\$20,686	\$4,420	\$25,106	\$2,046		
SFLM08A Resident Fish Monito - ONR Imp	\$143,497	\$86,380	\$58,437	\$144,817	(\$1,320)		
SFLM09A Turbidity Levels Hayw	\$182,462	\$39,050	\$0	\$39,050	\$143,412	Project completed	
SFLM09A Turbidity Levels Hayw - ONR DM	\$106,662	\$6,757	\$0	\$6,757	\$99,905		
SFLM09A Turbidity Levels Hayw - ONR Imp	\$75,800	\$32,293	\$0	\$32,293	\$43,507		
SFLM10A Archaeological Mgmt	\$143,803	\$147,850	\$0	\$147,850	(\$4,047)	Project completed	
SFLM10A Archaeological Mgmt - ONR DM	\$23,803	\$14,191	\$0	\$14,191	\$9,612		
SFLM10A Archaeological Mgmt - ONR Imp	\$120,000	\$133,658	\$0	\$133,658	(\$13,658)		

OR - Ordered Remissible

ONR - Ordered Non-Remissible

* Red values in parentheses denote overage.