

Stave River Water Use Plan

Monitoring Programs

Annual Report: 2014

Implementation Period: July 2013 to June 2014

- **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, 2014

BC Hydro Stave River Project Water Use Plan Monitoring Programs Annual Report: 2014

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, 2014, 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 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	Jul 29, 2010	Nov 12, 2010
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	May 06, 2013	May 27, 2013
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 (Table 3-1) 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
	WLR YR1	WLR YR2	WLR YR3	WLR YR4	WLR YR5	WLR YR6	WLR YR7	WLR YR8	WLR YR9	WLR YR10
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						✓			✓	■
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 Summary of Monitoring Programs

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

5.1.1 Status

This monitoring program was initiated in 2005 and was carried out over 10 years. The project is currently in the final year of data collection. Attached is the report for 2012 (Year 8) and 2013 (Year 9) dated August 2013 and April 2014 respectively. A comprehensive report is required after Year 10 of the project to evaluate all data. The effort required for this report was underestimated in the TOR. A TOR resubmission will be submitted to the Comptroller's office in September 2014.

5.2 SFLMON-2 Littoral Productivity Assessment

5.2.1 Status

This monitoring program was initiated in 2005 and was carried out over 10 years. The project is currently in the final year of data collection. Attached is the report for 2012 (Year 8) and 2013 (Year 9) dated August 2013 and April 2014 respectively.

5.3 SFLMON-3 Fish Biomass Assessment

5.3.1 Status

This monitoring program was initiated in 2005 and was carried out over 10 years. The project is currently in the final year of data collection. Attached is the report for 2012 (Year 8) dated February 2014. The 2013 report (Year 9) will be submitted with the next year's annual report.

5.4 SFLMON-4 Limited Block Load as Deterrent to Spawning

5.4.1 Status

This monitoring program was initiated in 2005 with data collection performed in 2005 and 2007. Subsequently, data for the remaining years of the project were provided by DFO's Stave River chum salmon spawner escapement estimates. Reports have been prepared every two years for the duration of the project. Attached is the report for 2011 (Year 7). The next and final report is expected March 2015 which will include all data up through 2014.

5.5 SFLMON-5 Risk of Adult Stranding

5.5.1 Status

This monitoring program was initiated in 2006 and was carried out over one year. This monitor is complete.

5.6 SFLMON-6 Risk of Fry Stranding

5.6.1 Status

This monitoring program was scheduled for implementation in April 2006, however, based on insufficient inflows was postponed until April 2007. April 2007 initiation was further postponed until April 2008 based on potential impacts to fry downstream of Ruskin Dam due to a high total gas pressure incident. Year 1 monitoring initiation occurred in April 2008, however, was stopped prematurely after 2 surveys due to insufficient inflows. The final Year 2 stranding surveys were completed as scheduled in April 2009 with a final report submitted in December 2009. This monitor is complete.

5.7 SFLMON-7 Diel Pattern of Fry Out-migration

5.7.1 Status

This monitoring program was initiated in 2008 and was carried out over two years. This monitor is complete.

5.8 SFLMON-8 Seasonal Timing and Assemblage of Resident Fish

5.8.1 Status

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. The 2013 and 2014 final report will be submitted with next year's annual report. A TOR Resubmission regarding the change in scope and budget noted above will be submitted to the Comptroller's office in September 2014.

5.9 SFLMON-9 Turbidity Levels in Hayward Reservoir

5.9.1 Status

This monitoring program was initiated in 2005 and was carried out over five years. This monitor is complete.

5.10 SFLMON-10 Archaeological Management

5.10.1 Status

As an additional component of Stave River WUP and the Order under the *Water Act*, dated May 6, 2004, a final summary report of Stave Archaeological Management Plan (SAMP) was to be submitted to the Comptroller of Water Rights (CWR). The March 15, 2008 SAMP summary report was included as a separate submission accompanying the 2008 monitoring program's annual report. This monitor is complete.

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, 2014.

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	\$10,621	\$9,948	\$1,164	\$11,113	(\$492)		
SFLM01A Pelagic Monitor	\$428,440	\$405,494	\$94,792	\$500,287	(\$71,847)	Final comprehensive report required after Year 10 requires more effort than estimated in TOR	TOR Resubmission to be submitted to CWR September 2014.
SFLM01A Pelagic Monitor - ONR DM	\$24,315	\$16,294	\$4,792	\$21,086	\$3,229		
SFLM01A Pelagic Monitor - ONR Imp	\$404,125	\$389,200	\$90,000	\$479,200	(\$75,075)		
SFLM02A Littoral Productivity	\$659,139	\$515,373	\$30,186	\$545,559	\$113,580	Efficiencies found during project implementation	
SFLM02A Littoral Productivity - ONR DM	\$140,339	\$25,017	\$4,186	\$29,203	\$111,136		
SFLM02A Littoral Productivity - ONR Imp	\$518,800	\$490,356	\$26,000	\$516,356	\$2,444		
SFLM03A Fish Biomass Assessme	\$532,156	\$417,588	\$107,131	\$524,719	\$7,437	Efficiencies found during project implementation	
SFLM03A Fish Biomass Assessme - ONR DM	\$40,877	\$22,605	\$4,093	\$26,698	\$14,179		
SFLM03A Fish Biomass Assessme - ONR Imp	\$491,279	\$394,983	\$103,038	\$498,021	(\$6,742)		
SFLM04A Ltd Block Load Monit	\$164,206	\$88,950	\$11,875	\$100,826	\$63,380	Efficiencies found during project implementation	
SFLM04A Ltd Block Load Monit - ONR DM	\$71,991	\$7,455	\$2,075	\$9,530	\$62,461		
SFLM04A Ltd Block Load Monit - ONR Imp	\$92,215	\$81,495	\$9,800	\$91,295	\$920		
SFLM05A Adult Stranding Moni	\$38,185	\$23,099	\$0	\$23,099	\$15,086	Study Complete	
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	Study Complete	
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	Study Complete	
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	\$135,663	\$97,409	\$40,818	\$138,228	(\$2,565)	Scope for 2014 data collection has been modified and requires additional work.	TOR Resubmission for scope change and increase budget to be submitted to CWR September 2014.
SFLM08A Resident Fish Monito - ONR DM	\$27,152	\$15,906	\$3,841	\$19,747	\$7,405		
SFLM08A Resident Fish Monito - ONR Imp	\$108,511	\$81,504	\$36,977	\$118,481	(\$9,970)		
SFLM09A Turbidity Levels Hayw	\$182,462	\$39,050	\$0	\$39,050	\$143,412	Study Complete	
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)	Study Complete	
SFLM10A Archaeological Mgmt - ONR DM	\$23,803	\$14,191	\$0	\$14,192	\$9,611		
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.