

Stave River Water Use Plan

Monitoring Programs

Annual Report: 2013

Implementation Period: July 2012 to June 2013

- **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, 2013

BC Hydro Stave River Project Water Use Plan Monitoring Programs Annual Report: 2013

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, 2013, as per the Stave River Order under the *Water Act*, dated May 6, 2004. There are nine 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 (optional)	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	Sep 13, 2007	Oct 17, 2007
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	×	✓	✓	✓	✓	✓	✓	✓	■	■	
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	Complete										
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									

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 will be carried out over 10 years. Attached is the report for 2011 (Year 7) dated July 2012. The 2012 report (Year 8) will be submitted with the next year's annual report.

5.2 SFLMON-2 Littoral Productivity Assessment

5.2.1 Status

This monitoring program was initiated in 2005 and will be carried out over 10 years. Attached is the report for 2011 (Year 7) dated July 2012. The 2012 final report (Year 8) will be submitted with the next year's annual report.

5.3 SFLMON-3 Fish Biomass Assessment

5.3.1 Status

This monitoring program was initiated in 2005 and will be carried out over 10 years. Attached is the report for Year 7 dated February 2012. The 2012 report (Year 8) 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 and will be carried out over 10 years. The 2011 report (Year 7) will be submitted with the next year's annual report. There is no report expected for 2012.

5.5 SFLMON-5 Risk of Adult Stranding

5.5.1 Status

This monitoring program was initiated in 2006 and was carried out over two years. This monitor is completed.

5.6 SFLMON-6 Risk of Fry Stranding

5.6.1 Status

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

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 completed.

5.8 SFLMON-8 Seasonal Timing and Assemblage of Resident Fish

5.8.1 Status

This monitoring program was initiated in 2010 and was to be carried out over one year; 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.

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 completed.

5.10 SFLMON-10 Archaeological Management

5.10.1 Status

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

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, 2013.

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	\$9,487	\$4,993	\$14,480	(\$3,859)	Forecast to be updated pending WUP Review in 2015	
SFLMON-1 Pelagic Monitor (Nutrient Load/Total Carbon Levels)	\$428,440	\$330,063	\$98,377	\$428,440	(\$0)		
SFLM01A Pelagic Monitor - ONR DM	\$24,315	\$13,880	\$6,752	\$20,633	\$3,682		
SFLM01A Pelagic Monitor - ONR Imp	\$404,125	\$316,183	\$94,450	\$410,633	(\$6,508)		
SFLMON-2 Littoral Productivity Assessment	\$659,139	\$406,066	\$64,198	\$470,264	\$188,875	Efficiencies found during project implementation	
SFLM02A Littoral Productivity - ONR DM	\$140,339	\$18,303	\$762	\$19,065	\$121,274		
SFLM02A Littoral Productivity - ONR Imp	\$518,800	\$387,762	\$63,436	\$451,198	\$67,602		
SFLMON-3 Fish Biomass Assessment	\$473,885	\$350,927	\$111,515	\$462,441	\$11,444		
SFLM03A Fish Biomass Assessme - ONR DM	\$62,586	\$17,681	\$6,528	\$24,208	\$38,378		
SFLM03A Fish Biomass Assessme - ONR Imp	\$411,299	\$333,246	\$104,987	\$438,233	(\$26,934)		
SFLMON-4 Limited Block Load as Deterrent to Spawning	\$164,206	\$82,844	\$11,819	\$94,663	\$69,543		
SFLM04A Ltd Block Load Monit - ONR DM	\$71,991	\$6,599	\$2,019	\$8,617	\$63,374		
SFLM04A Ltd Block Load Monit - ONR Imp	\$92,215	\$76,245	\$9,800	\$86,045	\$6,170		
SFLMON-5 Risk of Adult Stranding	\$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)		
SFLMON-6 Risk of Fry Stranding	\$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)		
SFLMON-7 Diel Pattern of Fry Out-migration	\$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)		
SFLMON-8 Seasonal Timing and Assemblage of Resident Fish	\$135,663	\$64,970	\$46,618	\$111,588	\$24,075	Monitor has been approved for two more years.	
SFLM08A Resident Fish Monito - ONR DM	\$27,152	\$9,803	\$4,618	\$14,421	\$12,731		
SFLM08A Resident Fish Monito - ONR Imp	\$108,511	\$55,167	\$42,000	\$97,167	\$11,344		
SFLMON-9 Turbidity Levels in Hayward Reservoir	\$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		
SFLMON-10 Archaeological Management	\$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.