

Stave River Water Use Plan

Monitoring Programs

Annual Report: 2016

Implementation Period: July 2015 to June 2016

- 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, 2016

BC Hydro Stave River Project Water Use Plan Monitoring Programs Annual Report: 2016

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, 2016, 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	Feb 05, 2016	May 19, 2016
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.

The Stave Water Use Plan completed its last year of monitoring in 2015 and this report will represent the final annual report. The Stave Monitoring Committee met in

June 2015 to discuss the results of the final year of monitoring. This will be the last meeting until the WUP Order Review scheduled to be held in 2017.

Table 3-1: Monitoring Programs Schedule as of June 30, 2016

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 is complete. Due to the complexity of the analysis, extensive work has been put into the final report and has resulted in delays in the submission. The final report will be submitted once it is finalized.

5.2 SFLMON-2 Littoral Productivity Assessment

This monitoring program was initiated in 2005 and was carried out over ten years. All field work is complete. Due to the complexity of the analysis, extensive work has been put into the final report and has resulted in delays in the submission. The final report will be submitted once it is finalized.

5.3 SFLMON-3 Fish Biomass Assessment

This monitoring program was initiated in 2005 and was carried out over ten years. This monitoring program is now complete. Attached are the final reports for Year 2013 and 2014.

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. Attached is the final report for 2014.

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 three year monitoring program was initiated in March 2010 and was carried out over five years.

Since the original Terms of Reference, there have been three subsequent addendums. The first addendum (approved May 5, 2011) was to include night fish sampling session in addition to the required day sampling. The second addendum (approved May 27, 2013) followed the 2012 Stave Monitoring Advisory Committee meeting where it was discussed that the management questions were not yet answered and recommended adding two years of monitoring. The third addendum (approved September 24, 2014) requested the addition of habitat assessment to the existing data collection.

The final year of field work was completed in 2015. The 2015 report is currently under review and will be submitted once it is finalized.

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, 2016.

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	\$12,873	\$12,542	\$331	\$12,873	\$0		
SFLM01A Pelagic Monitor	\$536,926	\$517,235	\$2,660	\$519,895	\$17,031	Project completed. Completion Report outstanding.	
SFLM01A Pelagic Monitor - ONR DM	\$22,110	\$19,746	\$2,660	\$22,406	(\$296)		
SFLM01A Pelagic Monitor - ONR Imp	\$514,816	\$497,488	\$0	\$497,488	\$17,328		
SFLM02A Littoral Productivity	\$659,139	\$584,112	\$8,647	\$592,759	\$66,380	Final reporting and expenses outstanding.	
SFLM02A Littoral Productivity - ONR DM	\$140,339	\$27,767	\$3,017	\$30,785	\$109,554		
SFLM02A Littoral Productivity - ONR Imp	\$518,800	\$556,345	\$5,630	\$561,975	(\$43,175)		
SFLM03A Fish Biomass Assessme	\$532,156	\$517,925	\$3,017	\$520,943	\$11,213	Project completed. Completion Report outstanding.	
SFLM03A Fish Biomass Assessme - ONR DM	\$40,877	\$26,364	\$3,017	\$29,381	\$11,496		
SFLM03A Fish Biomass Assessme - ONR Imp	\$491,279	\$491,561	\$0	\$491,562	(\$283)		
SFLM04A Ltd Block Load Monit	\$164,206	\$105,847	\$3,017	\$108,864	\$55,342	Project completed. Completion Report outstanding.	
SFLM04A Ltd Block Load Monit - ONR DM	\$71,991	\$9,468	\$3,017	\$12,485	\$59,506		
SFLM04A Ltd Block Load Monit - ONR Imp	\$92,215	\$96,379	\$0	\$96,379	(\$4,164)		
SFLM05A Adult Stranding Moni	\$38,185	\$23,099	\$3,017	\$26,116	\$12,069	Project completed. Completion Report outstanding.	
SFLM05A Adult Stranding Moni - ONR DM	\$17,985	\$2,404	\$3,017	\$5,421	\$12,564		
SFLM05A Adult Stranding Moni - ONR Imp	\$20,200	\$20,695	\$0	\$20,695	(\$495)		
SFLM06A Fry Stranding Monito	\$93,529	\$70,716	\$3,017	\$73,733	\$19,796	Project completed. Completion Report outstanding.	
SFLM06A Fry Stranding Monito - ONR DM	\$34,129	\$4,635	\$3,017	\$7,652	\$26,477		
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	\$3,017	\$106,724	\$7,930	Project completed. Completion Report outstanding.	
SFLM07A Fry Out-Migrat Diel P - ONR DM	\$36,254	\$11,366	\$3,017	\$14,383	\$21,871		
SFLM07A Fry Out-Migrat Diel P - ONR Imp	\$78,400	\$92,341	\$0	\$92,341	(\$13,941)		
SFLM08A Resident Fish Monito	\$182,853	\$162,402	\$11,917	\$174,319	\$8,534	Final reporting and expenses outstanding.	
SFLM08A Resident Fish Monito - ONR DM	\$28,326	\$26,487	\$3,017	\$29,504	(\$1,178)		
SFLM08A Resident Fish Monito - ONR Imp	\$154,527	\$135,915	\$8,900	\$144,815	\$9,712		
SFLM09A Turbidity Levels Hayw	\$182,462	\$39,050	\$3,017	\$42,067	\$140,395	Project completed. Completion Report outstanding.	
SFLM09A Turbidity Levels Hayw - ONR DM	\$106,662	\$6,757	\$3,017	\$9,774	\$96,888		
SFLM09A Turbidity Levels Hayw - ONR Imp	\$75,800	\$32,293	\$0	\$32,293	\$43,507		
SFLM10A Archaeological Mgmt	\$143,803	\$147,850	\$3,017	\$150,867	(\$7,064)	Project completed. Completion Report outstanding.	
SFLM10A Archaeological Mgmt - ONR DM	\$23,803	\$14,191	\$3,017	\$17,209	\$6,594		
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.