

## **Cheakamus Project Water Use Plan**

### **Monitoring Programs Annual Report: 2014**

**Implementation Period: November 2013 to October 2014**

- **CMSMON-1A Cheakamus River Juvenile Salmonid Outmigrant Enumeration Monitoring**
- **CMSMON-1B Cheakamus River Chum Salmon Escapement Monitoring and Mainstem Spawning Groundwater Survey**
- **CMSMON-2 Trout Abundance Monitor in Cheakamus River (Daisy Lake Dam to Cheakamus Canyon)**
- **CMSMON-3 Cheakamus River Steelhead Adult Abundance, Fry Emergence-timing, and Juvenile Habitat Use and Abundance Monitoring**
- **CMSMON-4 Monitoring Stranding Downstream of Cheakamus Generating Station**
- **CMSMON-5 Monitoring Stranding Downstream of Daisy Lake Dam**
- **CMSMON-6 Monitoring Groundwater in Side Channels of the Cheakamus River**
- **CMSMON-7 Cheakamus River Benthic Community Monitoring**
- **CMSMON-8 Monitoring Channel Morphology in Cheakamus River**
- **CMSMON-9 Cheakamus River Recreational Angling Access Monitoring**

**For Conditional Water Licences 110107 and 114268**

**November 30, 2014**

## **BC Hydro Cheakamus Project Water Use Plan Monitoring Programs Annual Report: 2014**

### **1 Introduction**

This document represents a summary of the status and the results of the Cheakamus Project Water Use Plan (WUP) monitoring programs to October 31, 2014, as per the Cheakamus Order under the *Water Act*, dated February 17, 2006. There are ten monitoring programs and no physical works.

### **2 Status**

The following table outlines the dates that TOR for the Cheakamus WUP monitoring programs were submitted to and approved by the Comptroller of Water Rights (CWR).

**Table 2-1: Dates of Cheakamus 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
CMSMON-1A Cheakamus River Juvenile Salmonid Outmigrant Enumeration Monitoring	Clause 4.i	Nov 20, 2006	Nov 26, 2006	Dec 13, 2012	Dec 18, 2012
CMSMON-1B Cheakamus River Chum Salmon Escapement Monitoring and Mainstem Spawning Groundwater Survey	Clause 4.i	Feb 23, 2007	Mar 22, 2007	Apr 15, 2013	May 06, 2013
CMSMON-2 Trout Abundance Monitor in Cheakamus River	Clause 4.ii	Feb 23, 2007	Mar 22, 2007	Sep 23, 2014	Oct 15, 2014
CMSMON-3 Cheakamus River Steelhead Adult Abundance, Fry Emergence-timing, and Juvenile Habitat Use and Abundance Monitoring	Clause 4.iii	Feb 23, 2007	Mar 22, 2007	Dec 13, 2012	Dec 18, 2012
CMSMON-4 Monitoring Stranding Downstream of Cheakamus Generating Station	Clause 4.v	Feb 23, 2007	Mar 22, 2007	-	-
CMSMON-5 Monitoring Stranding Downstream of Daisy Lake Dam	Clause 4.vi	Feb 23 2007	Mar 22, 2007	-	-
CMSMON-6 Monitoring Groundwater in Side Channels of the Cheakamus River	Clause 4.vii	Feb 23 2007	Mar 22, 2007	-	-
CMSMON-7 Cheakamus River Benthic Community Monitoring	Clause 4.viii	Feb 23 2007	Mar 22, 2007	-	-
CMSMON-8 Monitoring Channel Morphology in Cheakamus River	Clause 4.ix	Feb 23 2007	Mar 22, 2007	May 28, 2013	Jun 19, 2013
CMSMON-9 Cheakamus River Recreational Angling Access Monitoring	Clause 4.x	Feb 23 2007	Mar 22, 2007	-	-

### 3 Schedule

The following table (Table 3-1) outlines the current schedule for the monitoring programs being delivered for the Cheakamus WUP as of October 31, 2014.

**Table 3-1: Table of WUP Schedule**

Monitoring Programs	2007	2008	2009	2010	2011	2012	2012 Interim Review					2016	2017
	WLR YR1	WLR YR2	WLR YR3	WLR YR4	WLR YR5	WLR YR6	WLR YR7	WLR YR8	WLR YR9	WLR YR10	WLR YR11		
CMSMON-1a Cheakamus River Juvenile Salmonid Outmigrant Enumeration Monitoring	✓	✓	✓	✓	✓	✓	✓	✓	■	■	■		
CMSMON-1b Cheakamus River Chum Salmon Escapement Monitoring and Mainstem Spawning Groundwater Survey	✓	✓	✓	✓	✓	✓	✓	✓	■	■	■		
CMSMON-2 Trout Abundance Monitor in Cheakamus River (Daisy Lake Dam to Cheakamus Canyon)	✓	✓	✓	✓	✓	✓		u/w	P	P	P		
CMSMON-3 Cheakamus River Steelhead Adult Abundance, Fry Emergence-timing, and Juvenile Habitat Use and Abundance Monitoring	✓	✓	✓	✓	✓	✓	✓	✓	■	■	■		
CMSMON-4 Monitoring Stranding Downstream of Cheakamus Generating Station		✓	✓	✓	✓								
CMSMON-5 Monitoring Stranding Downstream of Daisy Lake Dam	x	✓											
CMSMON-6 Monitoring Groundwater in Side Channels of the Cheakamus River	✓	✓	✓	✓	✓								
CMSMON-7 Cheakamus River Benthic Community Monitoring		✓	✓	✓	✓								
CMSMON-8 Monitoring Channel Morphology in Cheakamus River	✓	✓	✓	✓	✓	✓	✓	✓	■	■	■		
CMSMON-9 Cheakamus River Recreational Angling Access Monitoring			✓										

Legend:

- = Program to be undertaken/initiated in identified year
- P = Pending decision to proceed
- ✓ = Program completed for the year
- x = Program started, but encountered operational or hydrological delays
- u/w = Underway

### 4 Monitoring Programs Terms of Reference

The monitoring programs being implemented under the Cheakamus WUP are described in 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/cheakamus.html](http://www.bchydro.com/about/sustainability/conservation/water_use_planning/lower_mainland/cheakamus.html)

### 5 Summary of Monitoring Programs

#### 5.1 CMSMON-1a: Cheakamus River Juvenile Salmonid Outmigrant Enumeration Monitoring

##### 5.1.1 Status

Attached is the report for Years 2011, 2012 and 2013. The 2014 summary report is currently under review.

**5.2 CMSMON-1b: Cheakamus River Chum Salmon Escapement Monitoring and Mainstem Spawning Groundwater Survey**

**5.2.1 Status**

Attached is the report for Year 2012. The 2013 summary report is currently under review.

**5.3 CMSMON-2 Trout Abundance Monitor in Cheakamus River (Daisy Lake Dam to Cheakamus Canyon)**

**5.3.1 Status**

An analysis of the collected data is currently underway and the results will be available in early 2015 for review by the technical sub-committee. A TOR will be re-submitted in 2015 if further work on this project is recommended by the technical sub-committee.

**5.4 CMSMON-3: Cheakamus River Steelhead Adult Abundance, Fry Emergence-timing, and Juvenile Habitat Use and Abundance Monitoring**

**5.4.1 Status**

Attachment to this annual report brings all outstanding reports for CMSMON-3 up to date. Attached is the outstanding report for Year 2011. The 2013 summary report is currently under review.

**5.5 CMSMON-4: Monitoring Stranding Downstream of Cheakamus Generating Station**

**5.5.1 Status**

This project started in 2008 and was completed in 2011. Attached is the final outstanding report for Year 2011.

**5.6 CMSMON-5: Monitoring Stranding Downstream of Daisy Lake Dam**

**5.6.1 Status**

This program was initiated in the fall of 2008 and completed within the same year.

**5.7 CMSMON-6: Monitoring Groundwater in Side Channels of the Cheakamus River**

**5.7.1 Status**

This program was initiated in October 2007 and completed in 2011.

## **5.8 CMSMON-7: Cheakamus River Benthic Community Monitoring**

### **5.8.1 Status**

This program was initiated in 2008 and completed in 2011. Following the Interim Review in 2012, BC Hydro contemplated additional monitoring due to recent improvements in the Whistler wastewater treatment plant; instead Whistler Municipality is undertaking monitoring and agreed to share the data. No further monitoring is being considered by BC Hydro.

## **5.9 CMSMON-8: Monitoring Channel Morphology in Cheakamus River**

### **5.9.1 Status**

The 2013 summary report is currently under review. A review of the collected data has been undertaken and the results of the review will inform the study on the changes required for future years. A TOR resubmission may be required in 2015.

## **5.10 CMSMON-9: Cheakamus River Recreational Angling Access Monitoring**

### **5.10.1 Status**

This program was initiated in the spring of 2009 and completed over a three-month period within the same year. The program report has been completed.

## **6 Monitoring Programs Costs**

The following table summarizes the Cheakamus WUP monitoring programs costs approved by the Comptroller and the actual costs to October 31, 2014.

Table 6-1: Cheakamus WUP Monitoring Programs Costs

Monitoring Programs	Phase	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
Cheakamus WUP Annual Report		\$9,276	\$7,045	\$7,402	\$14,447	(\$5,171)	Annual report DM was not budgeted after 2012 due to uncertainties of Interim Review. TOR resubmission will be submitted	TOR Resubmission by Nov 30, 2014
CMSMON-1A Cheakamus River Juvenile Salmonid Outmigrant Enumeration Monitoring		\$3,807,777	\$2,419,404	\$992,587	\$3,411,991	\$395,786		
CMSMON-1A Cheakamus River Juvenile Salmonid Outmigrant Enumeration Monitoring	Phase 1	\$2,112,685	\$1,786,106		\$1,786,106	\$326,579	Phase 1 complete	
CMSM01A Juvenile Salmonid - ONR DM		\$91,450	\$94,108		\$94,108	(\$2,658)		
CMSM01A Juvenile Salmonid - ONR Imp		\$2,021,235	\$1,691,998		\$1,691,998	\$329,237		
CMSMON-1A Cheakamus River Juvenile Salmonid Outmigrant Enumeration Monitoring	Phase 2	\$1,695,092	\$633,298	\$992,587	\$1,625,885	\$69,207		
CMSM01A Juvenile Salmonid - ONR DM		\$32,735	\$10,751	\$23,049	\$33,800	(\$1,065)		
CMSM01A Juvenile Salmonid - ONR Imp		\$1,662,357	\$622,547	\$969,538	\$1,592,085	\$70,272		
CMSMON-1B Cheakamus River Chum Salmon Escapement Monitoring and Mainstem Spawning Groundwater Survey		\$1,996,391	\$1,334,126	\$652,274	\$1,986,400	\$9,991		
CMSM01B Chum Salmon Monitor - ONR DM		\$71,447	\$55,428	\$18,939	\$74,368	(\$2,921)		
CMSM01B Chum Salmon Monitor - ONR Imp		\$1,924,944	\$1,278,698	\$633,335	\$1,912,033	\$12,911		
CMSMON-2 Trout Abundance Monitor in Cheakamus River		\$239,943	\$219,692	\$220,551	\$239,943	\$0		
CMSM02A Trout Abundance Mon - ONR DM		\$45,421	\$40,950	\$4,471	\$45,421	\$0		
CMSM02A Trout Abundance Mon - ONR Imp		\$194,522	\$178,742	\$15,780	\$194,522	\$0		
CMSMON-3 Cheakamus River Steelhead Adult Abundance, Fry Emergence-timing, and Juvenile Habitat Use and Abundance Monitoring		\$2,222,886	\$1,487,239	\$673,195	\$2,160,434	\$62,452		
CMSMON-3 Cheakamus River Steelhead Adult Abundance, Fry Emergence-timing, and Juvenile Habitat Use and Abundance Monitoring	Phase 1	\$1,080,660	\$1,104,037		\$1,104,037	(\$23,377)	Phase1 complete	
CMSM03A Steelhead Spawner - ONR DM		\$100,814	\$58,308		\$58,308	\$42,506		
CMSM03A Steelhead Spawner - ONR Imp		\$979,846	\$1,045,729		\$1,045,729	(\$65,883)		
CMSMON-3 Cheakamus River Steelhead Adult Abundance, Fry Emergence-timing, and Juvenile Habitat Use and Abundance Monitoring	Phase 2	\$1,142,226	\$383,202	\$673,195	\$1,056,397	\$85,829		
CMSM03A Steelhead Spawner - ONR DM		\$32,735	\$11,419	\$17,155	\$28,575	\$4,160		
CMSM03A Steelhead Spawner - ONR Imp		\$1,109,491	\$371,782	\$656,040	\$1,027,822	\$81,669		
CMSMON-4 Monitoring Stranding Downstream of Cheakamus Generating Station		\$238,374	\$218,966	\$0	\$218,966	\$19,408	Project complete in 2012 as per CMS Interim Review	
CMSM04A Stranding RiskMonitor - ONR DM		\$42,414	\$42,391	\$0	\$42,391	\$23		
CMSM04A Stranding RiskMonitor - ONR Imp		\$195,960	\$176,574	\$0	\$176,574	\$19,386		
CMSMON-5 Monitoring Stranding Downstream of Daisy Lake Dam		\$29,066	\$31,853	\$0	\$31,853	(\$2,787)	Project complete in 2009 as per CMS Interim Review	
CMSM05A Dam downstrm strand - ONR DM		\$12,992	\$14,523	\$0	\$14,523	(\$1,531)		
CMSM05A Dam downstrm strand - ONR Imp		\$16,074	\$17,330	\$0	\$17,330	(\$1,256)		
CMSMON-6 Monitoring Groundwater in Side Channels of the Cheakamus River		\$307,297	\$286,425	\$0	\$286,425	\$20,872	Project complete in 2011 as per CMS Interim Review	
CMSM06A Groundwater Linkage - ONR DM		\$62,279	\$32,039	\$0	\$32,039	\$30,240		
CMSM06A Groundwater Linkage - ONR Imp		\$245,018	\$254,387	\$0	\$254,387	(\$9,369)		
CMSMON-7 Cheakamus River Benthic Community Monitoring		\$304,371	\$297,615	\$7,806	\$305,422	(\$1,051)	Project complete	
CMSM07A River Benthic monitor - ONR DM		\$38,153	\$28,322	\$7,806	\$36,129	\$2,024		
CMSM07A River Benthic monitor - ONR Imp		\$266,218	\$269,293		\$269,293	(\$3,075)		
CMSMON-8 Monitoring Channel Morphology in Cheakamus River		\$457,576	\$264,134	\$218,271	\$482,405	(\$24,829)	Additional analysis requirements and higher than expected implementation costs	Budget is under review and TOR Resubmission planned for April 30, 2015.
CMSM08A Channel Morphology - ONR DM		\$67,733	\$36,151	\$18,610	\$54,761	\$12,972		
CMSM08A Channel Morphology - ONR Imp		\$389,843	\$227,983	\$199,661	\$427,644	(\$37,801)		
CMSMON-9 Cheakamus River Recreational Angling Access Monitoring		\$28,228	\$20,410	\$0	\$20,410	\$7,818	Project complete in 2009 as per CMS Interim Review	
CMSM09A Recreation Angling - ONR DM		\$14,426	\$8,906	\$0	\$8,906	\$5,520		
CMSM09A Recreation Angling - ONR Imp		\$13,802	\$11,504	\$0	\$11,504	\$2,298		
OR - Ordered Remissible								
ONR - Ordered Non-Remissible								

\* Red values in parentheses denote overage.