

## **Cheakamus Project Water Use Plan**

### **Monitoring Programs Annual Report: 2013**

**Implementation Period: November 2012 to October 2013**

- **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, 2013**

## **BC Hydro Cheakamus Project Water Use Plan Monitoring Programs Annual Report: 2013**

### **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, 2013, 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 TOR for the Cheakamus WUP monitoring programs that were submitted to and approved by the CWR.

**Table 2-1: Status of Cheakamus WUP Monitoring Programs Implementation**

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	-	-
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.

**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	2013 WLR YR7	2014 WLR YR8	2015 WLR YR9	2016 WLR YR10	2017 WLR YR11		
CMAMON-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)	✓	✓	✓	✓	✓	✓		P	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		✓	✓	✓	✓			P	P	P	P		
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

#### 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

A TOR revision for an additional 5 years (2013-2017) was accepted and approved December 2012. The 2012 summary report is currently under review. The 2013 draft report is expected November 2013. Both reports are anticipated to be submitted with next year's annual report.

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

### **5.2.1 Status**

A TOR revision for an additional 5 years (2013-2017) was accepted and approved May 2013. The 2012 summary report is currently under review. The 2013 draft report is expected November 2013. Both reports will be submitted with next year's annual report.

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

### **5.3.1 Status**

Attached is the report for 2012 dated September 1, 2013. No report is expected for 2013. Due to technical issues regarding the results to date a technical sub-committee including the Ministry of Environment has been formed to review the methods and results of this study to determine the value continuing this study. Results of the review will be communicated early 2014 and the TOR will be re-submitted in 2014 if 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**

A TOR revision for an additional 5 years (2013-2017) was accepted and approved in December 2012. The 2012 summary report is currently under review. Attached are the reports for 2011 dated December 1, 2011 and for 2013 dated November 11, 2013. The 2012 report will be submitted with next year's annual report.

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

### **5.5.1 Status**

The field work for Year 3 was completed in November 2011. All field work is now completed. The final reporting is still outstanding from the contractor but is due to be received by December 2013. The final report will be submitted with next year's annual report.

## **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 over a one year period. The program has been completed.

## **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 over a three year period. The program has been completed.

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

### **5.8.1 Status**

This program was initiated in the summer of 2008 and completed over a three year period. The monitor is completed but we are considering the need for additional monitoring due to recent improvements to the Whistler Wastewater Treatment Plant which may have an impact on the productivity of the benthic community in the Cheakamus River as discussed at the 2012 Interim Review. A definitive recommendation will be provided in 2014.

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

### **5.9.1 Status**

A TOR revision for an additional 5 years (2013-2017) was accepted and approved by the CWR in June 2013. Work on this project has now resumed. No report is expected in 2013.

## **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. 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, 2013.

Table 6-1: Cheakamus WUP Monitoring Programs Costs

Monitoring Programs - Post 2012 Interim Review (Phase II)	Costs approved by CWR	Life to Date Actuals (LTD) Phase II	Estimated to Complete (Forecast)	Total Forecast (LTD and Forecast)	Variance Total to Approved	Explanation	Corrective Action
<b>Cheakamus WUP Annual Report</b>	\$9,276	\$6,513	\$9,134	\$15,647	(\$6,371)	Annual report costs to be re-submitted as part of overall WLR Program	
<b>CMSMON-1A Cheakamus River Juvenile Salmonid Outmigrant Enumeration Monitoring</b>	\$1,695,092	\$314,789	\$1,377,024	\$1,691,813	\$3,279	Phase II approval	
CMSM01A Juvenile Salmonid - ONR DM	\$32,735	\$4,846	\$26,756	\$31,601	\$1,134		
CMSM01A Juvenile Salmonid - ONR Imp	\$1,662,357	\$309,943	\$1,350,268	\$1,660,212	\$2,145		
<b>CMSMON-1B Cheakamus River Chum Salmon Escapement Monitoring and Mainstem Spawning Groundwater Survey</b>	\$917,354	\$107,193	\$808,973	\$916,166	\$1,188	Phase II approval	
CMSM01B Chum Salmon Monitor - ONR DM	\$24,776	\$7,869	\$16,615	\$24,484	\$293		
CMSM01B Chum Salmon Monitor - ONR Imp	\$892,578	\$99,325	\$792,358	\$891,683	\$895		
<b>CMSMON-2 Trout Abundance Monitor in Cheakamus River</b>						Monitor under review; recommendation will be provided in 2014	
CMSM02A Trout Abundance Mon - ONR DM							
CMSM02A Trout Abundance Mon - ONR Imp							
<b>CMSMON-3 Cheakamus River Steelhead Adult Abundance, Fry Emergence-timing, and Juvenile Habitat Use and Abundance Monitoring</b>	\$1,142,226	\$165,060	\$974,896	\$1,139,956	\$2,270	Phase II approval	
CMSM03A Steelhead Spawner - ONR DM	\$32,735	\$7,795	\$22,671	\$30,465	\$2,270		
CMSM03A Steelhead Spawner - ONR Imp	\$1,109,491	\$157,265	\$952,225	\$1,109,491	\$0		
<b>CMSMON-7 Cheakamus River Benthic Community Monitoring</b>						Monitor under review; recommendation will be provided in 2014	
CMSM07A River Benthic monitor - ONR DM							
CMSM07A River Benthic monitor - ONR Imp							
<b>CMSMON-8 Monitoring Channel Morphology in Cheakamus River</b>	\$244,662	\$8,751	\$248,393	\$257,144	(\$12,482)	Phase II approval; Implementation costs are forecast higher than anticipated.	Scope change and/or TOR resubmission may be required.
CMSM08A Channel Morphology - ONR DM	\$40,234	\$5,051	\$18,788	\$23,839	\$16,396		
CMSM08A Channel Morphology - ONR Imp	\$204,428	\$3,700	\$229,605	\$233,305	(\$28,877)		
Monitoring Programs - Pre 2012 Interim Review (Phase I)	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
<b>CMSMON-1A Cheakamus River Juvenile Salmonid Outmigrant Enumeration Monitoring</b>	\$2,112,685	\$1,786,106	Phase II	\$1,786,106	\$326,579	Phase I variance. Monitor will continue in years 2013-2017 under new approval	
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		
<b>CMSMON-1B Cheakamus River Chum Salmon Escapement Monitoring and Mainstem Spawning Groundwater Survey</b>	\$1,233,333	\$1,036,462	Phase II	\$1,036,462	\$196,871	Phase I variance. Monitor will continue in years 2013-2017 under new approval	
CMSM01B Chum Salmon Monitor - ONR DM	\$84,586	\$45,026		\$45,026	\$39,560		
CMSM01B Chum Salmon Monitor - ONR Imp	\$1,148,747	\$991,436		\$991,436	\$157,311		
<b>CMSMON-2 Trout Abundance Monitor in Cheakamus River</b>	\$212,102	\$214,246	under review	\$214,246	(\$2,144)	Phase I variance. Monitor under review for additional years.	
CMSM02A Trout Abundance Mon - ONR DM	\$40,396	\$35,504	\$0	\$35,504	\$4,892		
CMSM02A Trout Abundance Mon - ONR Imp	\$171,706	\$178,742	\$0	\$178,742	(\$7,036)		
<b>CMSMON-3 Cheakamus River Steelhead Adult Abundance, Fry Emergence-timing, and Juvenile Habitat Use and Abundance Monitoring</b>	\$1,080,660	\$1,104,037	Phase II	\$1,104,037	(\$23,377)		
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)		
<b>CMSMON-4 Monitoring Stranding Downstream of Cheakamus Generating Station</b>	\$238,374	\$218,966	completed	\$218,966	\$19,408	Project complete in 2012 as per CMS Interim Review	Monitor not to continue as per Interim Review Outcomes
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		
<b>CMSMON-5 Monitoring Stranding Downstream of Daisy Lake Dam</b>	\$29,066	\$31,853	completed	\$31,853	(\$2,787)	Project complete in 2009 as per CMS Interim Review	Monitor not to continue as per Interim Review Outcomes
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)		
<b>CMSMON-6 Monitoring Groundwater in Side Channels of the Cheakamus River</b>	\$307,297	\$286,425	completed	\$286,425	\$20,872	Project complete in 2011 as per CMS Interim Review	Monitor not to continue as per Interim Review Outcomes
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)		
<b>CMSMON-7 Cheakamus River Benthic Community Monitoring</b>	\$304,371	\$296,835	under review	\$296,835	\$7,536	Monitor under review	
CMSM07A River Benthic monitor - ONR DM	\$38,153	\$27,542		\$27,542	\$10,611		
CMSM07A River Benthic monitor - ONR Imp	\$266,218	\$269,293		\$269,293	(\$3,075)		
<b>CMSMON-8 Monitoring Channel Morphology in Cheakamus River</b>	\$269,664	\$211,993	Phase II	\$211,993	\$57,671	Phase I variance. Monitor will continue in years 2013-2017 under new approval	
CMSM08A Channel Morphology - ONR DM	\$73,102	\$26,577		\$26,577	\$46,525		
CMSM08A Channel Morphology - ONR Imp	\$196,562	\$185,416		\$185,416	\$11,146		
<b>CMSMON-9 Cheakamus River Recreational Angling Access Monitoring</b>	\$28,228	\$20,410	completed	\$20,410	\$7,818	Project complete in 2009 as per CMS Interim Review	Monitor not to continue as per Interim Review Outcomes
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.