

Cheakamus Project Water Use Plan

Monitoring Programs Annual Report: 2012

Implementation Period: November 2011 to October 2012

- **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, 2012

BC Hydro Cheakamus Project Water Use Plan Monitoring Programs Annual Report: 2012

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

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

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 Program & Physical Works TOR	Original ToR Submission		Most Recent ToR Resubmission	
	Date Submitted	Date Approved	Date Submitted	Date Approved
CMSMON#1A Cheakamus River Juvenile Outmigrant Enumeration Monitoring	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	Feb 23, 2007	Mar 22, 2007	-	-
CMSMON#2 Trout Abundance Monitor in Cheakamus River	Feb 23, 2007	Mar 22, 2007	-	-
CMSMON#3 Cheakamus River Steelhead Adult Abundance, Fry Emergence-timing, and Juvenile Habitat Use and Abundance Monitoring	Feb 23, 2007	Mar 22, 2007	Dec 13, 2012	Dec 18, 2012
CMSMON#4 Monitoring Stranding Downstream of Cheakamus Generating Station	Feb 23, 2007	Mar 22, 2007	-	-
CMSMON#5 Monitoring Stranding Downstream of Daisy Lake Dam	Feb 23 2007	Mar 22, 2007	-	-
CMSMON#6 Monitoring Groundwater in Side Channels of the Cheakamus River	Feb 23 2007	Mar 22, 2007	-	-
CMSMON#7 Cheakamus River Benthic Community Monitoring	Feb 23 2007	Mar 22, 2007	-	-
CMSMON#8 Monitoring Channel Morphology in Cheakamus River	Feb 23 2007	Mar 22, 2007	-	-
CMSMON#9 Cheakamus River Recreational Angling Access Monitoring	Feb 23 2007	Mar 22, 2007	-	-

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

5 Summary of Monitoring Programs

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

5.1.1 Status

A 2001-2011 summary report is currently under review. No report is attached. Expected report due February 2013 to be submitted in next year's report.

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

5.2.1 Status

A 2001-2011 summary report is currently under review. No report is attached. Expected report due February 2013 to be submitted in next year's report.

5.3 Program #2: Trout Abundance Monitor in Cheakamus River (Daisy Lake Dam to Cheakamus Canyon)

5.3.1 Status

The fifth program report is currently under review. No report is attached. Expected report due April 2013 to be submitted in next year's report.

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

5.4.1 Status

The fifth year program report is currently under review. No report is attached. Expected report due March 2013 to be submitted in next year's 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. No report is attached. Expected report due April 2013 to be submitted in next year's 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. Attached is the report for year 3 dated January 2012.

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. Attached are the reports for year 2 as well year 2 Appendix to final dated December 31, 2010 and December 17, 2011 respectively.

5.9 CMSMON-8: Monitoring Channel Morphology in Cheakamus River

5.9.1 Status

The fifth year program report is currently under review. No report is attached. Expected report due February 2013 to be submitted in next year's report.

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 on March 22, 2007 and the actual costs to October 31, 2012.

Table 6-1: Cheakamus WUP Monitoring Programs Costs

Monitoring Programs (Phase I - Pre Interim Review ending October 2012)	Activity	Costs approved by CWR	Life to Date Actuals (Up to and including Oct 2012)	Variance Total to Approved	Explanation	Corrective Action
Cheakamus Annual Report	ONR	\$9,276	\$6,404	\$2,872		
CMSMON#1A CHEAKAMUS RIVER JUVENILE OUTMIGRANT ENUMERATION MONITORING	ONR	\$2,112,685	\$1,786,106	\$326,579	TOR resubmitted on December 13, 2012	
CMSMON#1A Direct Management 001	ONR	\$91,450	\$94,108	(\$2,658)		
CMSMON#1A Implementation 002	ONR	\$2,021,235	\$1,691,998	\$329,237		
CMSMON#1B CHEAKAMUS RIVER CHUM SALMON ESCAPEMENT MONITORING AND MAINSTEM SPAWNING GROUNDWATER SURVEY	ONR	\$1,233,386	\$1,036,461	\$196,925	Resubmit TOR in Jan 2013	
CMSMON#1B Direct Management 001	ONR	\$84,586	\$45,026	\$39,560		
CMSMON#1B Implementation 002	ONR	\$1,148,747	\$991,436	\$157,311		
CMSMON#2 TROUT ABUNDANCE MONITOR IN CHEAKAMUS RIVER	ONR	\$212,102	\$199,057	\$13,045	Resubmit TOR in May 2013	
CMSMON#2 Direct Management 001	ONR	\$40,396	\$32,592	\$7,804		
CMSMON#2 Implementation 002	ONR	\$171,706	\$166,465	\$5,241		
CMSMON#3 CHEAKAMUS RIVER STEELHEAD ADULT ABUNDANCE, FRY EMERGENCE-TIMING, AND JUVENILE HABITAT USE ABUNDANCE MONITORING	ONR	\$1,080,660	\$1,104,037	(\$23,377)	TOR resubmitted on December 13, 2012	
CMSMON#3 Direct Management 001	ONR	\$100,814	\$58,308	\$42,506		
CMSMON#3 Implementation 002	ONR	\$979,846	\$1,045,729	(\$65,883)		
CMSMON#4 MONITORING STRANDING DOWNSTREAM OF CHEAKAMUS GENERATING STATION	ONR	\$238,374	\$218,872	\$19,502	Project completed in 2012 as per CMS Interim Review	Monitor not to continue as per Interim Review Outcomes
CMSMON#4 Direct Management 001	ONR	\$42,414	\$42,298	\$116		
CMSMON#4 Implementation 002	ONR	\$195,960	\$176,574	\$19,386		
CMSMON#5 MONITORING STRANDING DOWNSTREAM OF DAISY LAKE DAM	ONR	\$29,066	\$31,760	(\$2,694)	Project completed in 2009 as per CMS Interim Review	Monitor not to continue as per Interim Review Outcomes
CMSMON#5 Direct Management 001	ONR	\$12,992	\$14,429	(\$1,437)		
CMSMON#5 Implementation 002	ONR	\$16,074	\$17,330	(\$1,256)		
CMSMON#6 MONITORING GROUNDWATER IN SIDECHANNELS OF THE CHEAKAMUS RIVER	ONR	\$307,297	\$286,425	\$20,872	Project completed in 2011 as per CMS Interim Review	Monitor not to continue as per Interim Review Outcomes
CMSMON#6 Direct Management 001	ONR	\$62,279	\$32,039	\$30,240		
CMSMON#6 Implementation 002	ONR	\$245,018	\$254,387	(\$9,369)		
CMSMON#7 CHEAKAMUS RIVER BENTHIC COMMUNITY MONITORING	ONR	\$304,371	\$294,813	\$9,558	Resubmit TOR in April 2013	
CMSMON#7 Direct Management 001	ONR	\$38,153	\$25,520	\$12,633		
CMSMON#7 Implementation 002	ONR	\$266,218	\$269,293	(\$3,075)		
CMSMON#8 MONITORING CHANNEL MORPHOLOGY IN CHEAKAMUS RIVER	ONR	\$269,664	\$200,429	\$69,235	Resubmit TOR in May 2013	
CMSMON#8 Direct Management 001	ONR	\$73,102	\$26,577	\$46,525		
CMSMON#8 Implementation 002	ONR	\$196,562	\$173,852	\$22,710		
CMSMON#9 CHEAKAMUS RIVER RECREATIONAL ANGLING ACCESS MONITORING	ONR	\$28,228	\$20,410	\$7,818	Project completed in 2009 as per CMS Interim Review	Monitor not to continue as per Interim Review Outcomes
CMSMON#9 Direct Management 001	ONR	\$14,426	\$8,906	\$5,520		
CMSMON#9 Implementation 002	ONR	\$13,802	\$11,504	\$2,298		

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Monitoring Programs (Phase II - Post Interim Review commencing November 2012)	Activity	Costs approved by CWR	Total Forecast (Forecast November 2012 to 2018)	Variance Total to Approved	Explanation	Corrective Action
Cheakamus Annual Report	ONR	\$9,276	\$18,405	(\$9,129)		Variance will be adjusted once Annual Report budget is projected
CMSMON#1A CHEAKAMUS RIVER JUVENILE OUTMIGRANT ENUMERATION MONITORING	*ONR	\$988,288	\$988,288	\$0	Continuing as per CMS Interim Review	
CMSMON#1A Direct Management 001	ONR	\$21,224	\$21,224	\$0		
CMSMON#1A Implementation 002	ONR	\$967,064	\$967,064	\$0		
CMSMON#1B CHEAKAMUS RIVER CHUM SALMON ESCAPEMENT MONITORING AND MAINSTEM SPAWNING GROUNDWATER SURVEY	ONR			\$0	Resubmit TOR in January 2013	
CMSMON#1B Direct Management 001	ONR			\$0		
CMSMON#1B Implementation 002	ONR			\$0		
CMSMON#2 TROUT ABUNDANCE MONITOR IN CHEAKAMUS RIVER	ONR			\$0	Resubmit TOR in May 2013	
CMSMON#2 Direct Management 001	ONR			\$0		
CMSMON#2 Implementation 002	ONR			\$0		
CMSMON#3 CHEAKAMUS RIVER STEELHEAD ADULT ABUNDANCE, FRY EMERGENCE-TIMING, AND JUVENILE HABITAT USE ABUNDANCE MONITORING	*ONR	\$1,142,226	\$1,142,226	\$0	Continuing as per CMS Interim Review	
CMSMON#3 Direct Management 001	ONR	\$32,735	\$32,735	\$0		
CMSMON#3 Implementation 002	ONR	\$1,109,491	\$1,109,491	\$0		
CMSMON#7 CHEAKAMUS RIVER BENTHIC COMMUNITY MONITORING	ONR			\$0	Resubmit TOR in April 2013	
CMSMON#7 Direct Management 001	ONR			\$0		
CMSMON#7 Implementation 002	ONR			\$0		
CMSMON#8 MONITORING CHANNEL MORPHOLOGY IN CHEAKAMUS RIVER	ONR			\$0	Resubmit TOR in May 2013	
CMSMON#8 Direct Management 001	ONR			\$0		
CMSMON#8 Implementation 002	ONR			\$0		
OR - Ordered Remissible						
ONR - Ordered Non-Remissible						
* Approved December 18, 2012						

* Red values in parentheses denote overage.