

Columbia River Project Water Use Plan

Heritage Management Plan

Annual Report: 2016

Implementation Period: April 2015 to March 2016

- **CLBMON-50 Arrow Lakes Reservoir Heritage Monitoring Wind and Wave Erosion**
- **CLBMON-51 Kinbasket and Revelstoke Archaeological Overview Assessment**
- **CLBMON-52 Arrow Archaeological Site Overview Assessment**

Conditional Water Licences for Kinbasket storage (27068 and 39432), Mica diversion (39431), Revelstoke diversion and storage (47215), and Arrow storage (27066)

April 30, 2016

BC Hydro Columbia River Project Water Use Plan Heritage Management Plan Monitoring Programs Annual Report: 2016

1 Introduction

This document represents a summary of the status and the results of the Columbia River Heritage Management Plan Water Use Plan (WUP) monitoring programs and physical works to March 31, 2016, as per the Columbia River Order under the *Water Act*, dated January 26, 2007, and the letter from the Comptroller of Water Rights (CWR) dated December 12, 2012. There are three monitoring programs.

2 Status

The following table outlines the dates that Terms of Reference (TOR) for the Heritage Management Plan WUP monitoring programs were submitted to and approved by the CWR.

Table 2-1: Dates of Heritage Management Plan 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
CLBMON-50 Arrow Lakes Reservoir Heritage Monitoring Wind and Wave Erosion	Section 3.b	Oct 26, 2007	Dec 03, 2007		
CLBMON-51 Kinbasket and Revelstoke Archaeological Overview Assessment	Section 3.a	Apr 04, 2007	Apr 19, 2007		
CLBMON-52 Arrow Archaeological Site Overview Assessment	Section 3.a	Apr 04, 2007	Apr 19, 2007		

3 Schedule

The following table outlines the current schedule for the monitoring programs being delivered under the Heritage Management Plan WUP.

Table 3-1: Monitoring Programs Schedule as of March 31, 2016.

Monitoring Programs	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
	WLR YR1	WLR YR2	WLR YR3	WLR YR4	WLR YR5	WLR YR6	WLR YR7	WLR YR8	WLR YR9	WLR YR10	WLR YR11	WLR YR12	WLR YR13 Final Review
CLBMON -50 Arrow Lakes Reservoir Heritage Monitoring Wind and Wave Erosion			✓	*	✓	✓	✓	✓					
CLBMON-51 Kinbasket and Revelstoke Archaeological Overview Assessment	✓												
CLBMON-52 Arrow Archaeological Site Overview Assessment	✓	✓											
Legend: <ul style="list-style-type: none"> ■ = Program to be undertaken/initiated in identified year u/w = Program is underway ✓ = Program completed for the year * = Program not undertaken as planned due to operational or hydrological delays 													

4 Monitoring Program Terms of Reference

The monitoring programs being implemented under the Heritage Information Plan 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/southern_interior/columbia_river/heritage-plan.html

5 Status of Monitoring Programs

5.1 CLBMON-50 Arrow Lakes Reservoir Heritage Monitoring Wind and Wave Erosion

This monitoring program was initiated in 2009, and was originally planned for five consecutive years. In 2010 field work was not implemented due to high water levels and as a result, the program was extended by one year.

The objective of the erosion monitoring study was to collect quantitative measures of the magnitude, severity, rate of change and estimated duration of erosion effects caused by reservoir operations on selected portions of escarpment and other significant landforms situated within the drawdown zone of the Arrow Lakes Reservoir.

Attached is the Year 6 (2014) report which summarizes the 2014 fieldwork and provides a comprehensive analysis of the results over the course of the project.

The patterns and causes of erosion and accretion are complex and remain poorly understood at the study area scale. Although the causes of erosion were mostly attributed to wave action and wind-controlled shore-parallel currents, there is evidence of some degree of erosion impact from reservoir operations. Information from this monitoring program will be used in future WUP discussions.

5.2 CLBMON-51 Kinbasket and Revelstoke Archaeological Overview Assessment

This monitoring program was initiated and completed in 2007. The 2012 Annual Report provided details of the project that is summarized below for completeness of this Annual Report.

This monitoring program involved documentary research and analysis, as well as a non-intrusive field survey.

Beyond providing inventory information, the survey of Kinbasket Reservoir was focused on areas where there was the potential for physical works (such as re-vegetation and debris management) to affect archaeological sites within the reservoir. The survey in Revelstoke Reservoir was focused on specific shoreline locations selected on the basis of previously identified archaeological potential.

Physical works related to re-vegetation and debris management programs have avoided the archaeological sites identified in this program and the Reservoir Archaeology Program in implementation to date.

5.3 CLBMON-52 Arrow Archaeological Site Overview Assessment

This monitoring program was initiated in 2007 and was completed in 2008. The 2012 Annual Report provided details of the project that is summarized below for completeness of this Annual Report.

This monitoring program involved documentary research and analysis, as well as a non-intrusive field survey.

Beyond providing inventory information, the survey of Arrow Reservoir was focused on areas where there was the potential for physical works (such as re-vegetation and debris management) to affect archaeological sites within the reservoir.

Physical works related to re-vegetation and debris management programs have avoided the archaeological sites identified in this program and the Reservoir Archaeology Program in implementation to date.

6 Monitoring Programs Costs

The following table summarizes the Heritage Management Plan WUP monitoring programs costs approved by the Comptroller and the Actual Costs to March 31, 2016.

Table 6-1: Heritage Management Plan WUP Monitoring Program 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
C09 Prepare Annual Report	\$1,421	\$523	\$898	\$1,421	\$0		
C09M50A ARR HER MON WIND	\$415,617	\$415,351	\$266	\$415,617	\$1	Project Complete. Final reporting outstanding.	
C09M50A ARR HER MON WIND - OR DM	\$59,068	\$55,562	\$266	\$55,828	\$3,240		
C09M50A ARR HER MON WIND - OR Imp	\$356,549	\$359,788		\$359,788	(\$3,239)		
C09M51A KIN & REV Arch Site	\$59,446	\$56,688	\$1,921	\$58,609	\$837	Project Complete. Final reporting outstanding.	
C09M51A KIN & REV Arch Site - OR DM	\$10,100	\$6,570	\$1,921	\$8,491	\$1,609		
C09M51A KIN & REV Arch Site - OR Imp	\$49,346	\$50,119		\$50,119	(\$773)		
C09M52A ARROW Arch Site	\$112,494	\$104,702	\$1,921	\$106,623	\$5,871	Project Complete. Final reporting outstanding.	
C09M52A ARROW Arch Site - OR DM	\$15,936	\$15,837	\$1,921	\$17,758	(\$1,822)		
C09M52A ARROW Arch Site - OR Imp	\$96,558	\$88,865		\$88,865	\$7,693		
OR - Ordered Remissible ONR - Ordered Non-Remissible							

* Red values in parentheses denote overage.