

Columbia River Project Water Use Plan Kinbasket Fish and Wildlife Information Plan

Monitoring Programs Annual Report: 2016

Implementation Period: January 2015 to December 2015

- **CLBMON-1 – Mica Dam Total Gas Pressure Monitoring and Abatement Program**
- **CLBMON-2 – Kinbasket and Revelstoke Reservoirs Kokanee Population Monitoring**
- **CLBMON-3 – Kinbasket and Revelstoke Reservoirs Ecological Productivity Monitoring Program**
- **CLBMON-4 – Kinbasket Reservoir Fish Stranding Assessment**
- **CLBMON-5 – Kinbasket Reservoir Burbot Life History and Habitat Use Assessment**
- **CLBMON-6 – Kinbasket Reservoir Bull Trout Life History and Habitat Use Assessment**
- **CLBMON-7 – Kinbasket Reservoir Rainbow Trout Life History and Habitat Use Assessment**
- **CLBMON-8 – Kinbasket Reservoir Monitoring of the Valemount Peatland**
- **CLBMON-55 – Revelstoke Reservoir Macrophyte Overview**
- **CLBMON 56 – Ecological Productivity**
- **CLBMON 59 – Nagle Creek**
- **CLBMON 60 – Fish Indexing**
- **CLBMON 61 – Wetland Vegetation**
- **CLBMON 62 – TGP Monitoring**

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

January 31, 2016

BC Hydro Columbia River Project Water Use Plan Kinbasket Reservoir Fish and Wildlife Information Plan Monitoring Programs Annual Report: 2016

1 Introduction

This document represents a summary of the status and the results of the Kinbasket Reservoir Fish and Wildlife Information Plan Water Use Plan (WUP) monitoring programs to December 2015, as per the Columbia River WUP Order under the *Water Act*, dated January 26, 2007 and the Amended Order dated August 23, 2007. There are fourteen monitoring programs.

2 Status

The following table outlines the dates that Terms of Reference (TOR) for the Kinbasket Reservoir Fish and Wildlife Information Plan WUP monitoring programs were submitted to and approved by the CWR.

Table 2-1: Dates of Kinbasket Reservoir Fish and Wildlife Information 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-1 Mica Dam Total Gas Pressure Monitoring and Abatement Program	Schedule A 5(a)	Oct 24, 2007	Dec 03, 2007	Jun 27, 2014	Sep 23, 2014
CLBMON-2 Kinbasket and Revelstoke Reservoirs Kokanee Population Monitoring	Schedule A 5(b) & Schedule B 1(a)	Oct 24, 2007	Dec 03, 2007	Jun 27, 2012	Jul 11, 2012
CLBMON-3 Kinbasket and Revelstoke Reservoirs Ecological Productivity Monitoring Program	Schedule A 5(c) & Schedule B 1(b)	Oct 24, 2007	Dec 03, 2007	-	-
CLBMON-4 Kinbasket Reservoir Fish Stranding Assessment	Schedule A 5(d)	Oct 24, 2007	Dec 03, 2007	Feb 02, 2009	Mar 26, 2009
		Oct 22, 2008	Dec 10, 2008		
CLBMON-5 Kinbasket Reservoir Burbot Life History and Habitat Use Assessment	Schedule A 5(e)	Oct 24, 2007	Dec 03, 2007	Oct 22, 2008	Dec 10, 2008
CLBMON-6 Kinbasket Reservoir Bull Trout Life History and Habitat Use Assessment	Schedule A 5(f)	Oct 24, 2007	Dec 03, 2007	-	-
CLBMON-7 Kinbasket Reservoir Rainbow Trout Life History and Habitat Use Assessment	Schedule A 5(g)	Oct 24, 2007	Dec 03, 2007	Feb 02, 2009	Mar 26, 2009
CLBMON-8 Kinbasket Reservoir Monitoring of the Valemout Peatland	Schedule A 5(h)	Oct 24, 2007	Dec 03, 2007	-	-
CLBMON-55 Revelstoke Reservoir Macrophyte Overview	Clause 2(f) Amended Order	Jan 07, 2009	Mar 19, 2009	-	-
CLBMON-56 Ecological Productivity	Clause 2(c) Amended Order	Aug 12, 2011	Nov 07, 2011		
CLBMON-59 Nagle Creek	Clause 1(d) Amended Order	Dec 15, 2011	Jan 20, 2012	Oct 01, 2012	Oct 16, 2012
CLBMON-60 Fish Indexing	Clause 1(b) Amended Order	Aug 12, 2011	Nov 07, 2011		
CLBMON-61 Wetland Vegetation	Clause 1(a) Amended Order	Jan 16, 2012	Apr 19, 2012	Jun 02, 2014	Aug 08, 2014
CLBMON-62 TGP Monitoring	Clause 1.c Mica 5/6 Addendum	Jun 27, 2014	Sep 23, 2014		

3 Schedule

The following table outlines the current schedule for the monitoring programs and physical works being delivered for the Kinbasket Reservoir Fish and Wildlife Information Plan WUP.

Table 3-1: Monitoring Programs Schedule as of December 31, 2015

Monitoring Programs	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
	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-1 Mica Dam Total Gas Pressure Monitoring and Abatement Program			✓	×	×	×	×	✓	■				
CLBMON-2 Kinbasket and Revelstoke Reservoirs Koknaee Population Monitoring	✓	✓	✓	✓	✓	✓	✓	✓	■	■	■	■	
CLBMON-3 Kinbasket and Revelstoke Reservoirs Ecological Productivity Monitoring Program	✓	✓	✓	✓	✓	✓	✓	✓	■	■	■	■	
CLBMON-4 Kinbasket Reservoir Fish Stranding Assessment			✓						■	■			
CLBMON-5 Kinbasket Reservoir Burbot Life History and Habitat Use Assessment							✓	✓	■				
CLBMON-6 Kinbasket Reservoir Bull Trout Life History and Habitat Use Assessment								✓	■	■			
CLBMON-7 Kinbasket Reservoir Rainbow Trout Life History and Habitat Use Assessment							✓	✓	■				
CLBMON-8 Kinbasket Reservoir Monitoring of the Valemount Peatland	✓	✓							■				
CLBMON-55 Revelstoke Reservoir Macrophyte Overview		✓	✓				✓						
CLBMON-56 Addendum to CLBMON-3 Kinbasket and Revelstoke Reservoirs Ecological Productivity Monitoring					✓	✓	✓	✓	■	■	■	■	
CLBMON-59 Monitoring of Impacts on Nagle Creek Wetland from Mica Units 5 and 6					✓								
CLBMON-60 Mica Tailrace Fish Indexing Study					×	✓	✓			■	■		
CLBMON-61 Wetland Vegetation					✓	✓	✓	✓	■	■			
CLBMON-62 TGP Monitoring										■	■	■	

Legend:

- = Program to be undertaken/initiated in identified year
- = Project is opportunistic depending on reservoir elevations
- ✓ = Program completed for the year
- ×

× = Program started, but encountered operational or hydrological delays

4 Monitoring Programs Terms of Reference

The monitoring programs and Physical Works being implemented under the Kinbasket Reservoir Fish and Wildlife 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/kinbasket-fish-wildlife.html

5 Status of Monitoring Programs

5.1 CLBMON-1 Mica Dam Total Gas Pressure Monitoring and Abatement Program

The monitoring program underwent a TOR revision in 2014; work under this new TOR was initiated in 2015 and will be carried out over two years. The Year 1 (2015) report is in draft format and will be submitted with the next Annual Report.

5.2 CLBMON-2 Kinbasket and Revelstoke Reservoirs Kokanee Population Monitoring

This monitoring program was initiated in 2008 and will be carried out over 12 years. Attached is the Year 7 (2014) report dated November 2015.

5.3 CLBMON-3 Kinbasket and Revelstoke Reservoirs Ecological Productivity Monitoring Program

This monitoring program was initiated in 2008 and will be carried out over 12 years. Attached is the Year 6 (2013) report dated January 2016 that also includes CLBMON-56 Year 2 (2013) as Appendix 8. Year 7 (2014) report is in draft format and will be submitted with the next Annual Report.

5.4 CLBMON-4 Kinbasket Reservoir Fish Stranding Assessment

This monitoring program was initiated in 2010. Implementation is opportunistic and requires low reservoir elevations (less than 725 m) in Kinbasket through the winter and spring. We will implement for up to two years when stranding conditions arise. This program was not implemented in 2015.

A contract was established for this work to be implemented when the opportunity arises. The procurement of the contract was complex and required more resources than originally forecast. Due to this, BC Hydro will monitor the forecast once the study commences and may submit a request for additional budget prior to exceeding the approved budget.

5.5 CLBMON-5 Kinbasket Reservoir Burbot Life History and Habitat Use Assessment

This monitoring program was initiated in 2014 and will be carried out over three years from 2014-2016, inclusive. The Year 2 (2015) report is in draft format and will be submitted with the next Annual Report.

5.6 CLBMON-6 Kinbasket Reservoir Bull Trout Life History and Habitat Use Assessment

This monitoring program was initiated in 2015 and will be carried out over the next three years from 2015-2017, inclusive. The Year 1 (2015) report is draft format and will be submitted with the next Annual Report.

5.7 CLBMON-7 Kinbasket Reservoir Rainbow Trout Life History and Habitat Use Assessment

This monitoring program was initiated in 2014 and will be carried out over three years. The Year 1 (2014) and Year 2 (2015) reports are in draft format and will be submitted with the next Annual Report.

5.8 CLBMON-8 Kinbasket Reservoir Monitoring of the Valemount Peatland

This monitoring program was initiated in 2008, and two of the three years of study are complete. The final year of the monitoring program is scheduled for 2016.

The final program report is expected in December 2016.

5.9 CLBMON-55 Revelstoke Reservoir Macrophyte Overview

This monitoring program was initiated in 2009 (Phase 1) and was carried out over two years. The second phase and final year of the program was implemented in 2014. Attached is the Year 2 (Phase 2-2014) report dated September 2015.

5.10 CLBMON-56 Ecological Productivity

This monitoring program was initiated in 2012 and will be carried out over eight years. Year 2 (2013) is included within the Year 6 (2013) report for CLBMON-3 dated January 2016 as Appendix 8.

5.11 CLBMON-59 Monitoring of Impacts on Nagle Creek Wetland from Mica Units 5 and 6

This one-year monitoring program was initiated in 2012 and completed in 2013.

5.12 CLBMON-60 Mica Tailrace Fish Indexing Study

This monitoring program was initiated in the fall of 2012 and is to include two years of pre-Mica 5/6 monitoring and two years of post-Mica 5/6 monitoring. The 2013/2014 field monitoring is complete. The summer 2014 data will be incorporated into the first report for the post- Mica 5/6 in-service monitoring which is scheduled for 2017 and 2018.

5.13 CLBMON-61 Wetland Vegetation

This monitoring program was initiated in 2012 and will be carried out over six years.

The first two years of baseline collection occurred under conditions of surcharge on Kinbasket Reservoir; the sample size collected in the two years was too small to adequately characterize pre-Mica 5 conditions. A Terms of Reference addendum was approved on August 8, 2014 to add another year of pre-Mica 5 data collection from 2014.

The Year 3 (2014) data will be incorporated into the Year 4 (2015) report which is the first year of post-Mica 5 monitoring. The remainder of the post-Mica 5 monitoring is currently scheduled for Year 5 (2016) and Year 6(2017). The Year 4 (2015) report is currently being drafted and will be submitted with the next Annual Report.

5.14 CLBMON-62 TGP Monitoring

The first year of implementation is scheduled for 2017 and will be carried out over three years.

6 Monitoring Programs Costs

The following table summarizes the Kinbasket Reservoir Fish and Wildlife Information Plan WUP monitoring programs costs approved by the Comptroller and the Actual Costs to November 30, 2015.

Table 6-1: Kinbasket Reservoir Fish and Wildlife Information Plan 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
CLB MP1 Kin Fish & WL Annual Report	\$12,744	\$8,085	\$6,000	\$14,085	(\$1,342)	Original forecast was conservative for annual report costs.	Letter to CWR for increase in budget will be resubmitted prior to exceeding approved budget.
C01M01A MCA DAM TGP MON	\$164,616	\$69,851	\$80,724	\$150,575	\$14,041	Efficiencies found during project	
C01M01A MCA DAM TGP MON - OR DM	\$53,517	\$24,467	\$15,009	\$39,476	\$14,041		
C01M01A MCA DAM TGP MON - OR Imp	\$111,099	\$45,384	\$65,715	\$111,099			
C01M02A KIN & REV Kokanee Pop	\$1,362,811	\$757,824	\$604,115	\$1,361,939	\$872		
C01M02A KIN & REV Kokanee Pop - OR DM	\$28,502	\$14,541	\$13,089	\$27,631	\$871		
C01M02A KIN & REV Kokanee Pop - OR Imp	\$1,334,309	\$743,283	\$591,026	\$1,334,309	0		
C01M03A KIN & REV Ecological	\$4,313,829	\$2,301,318	\$2,012,511	\$4,313,829	0		
C01M03A KIN & REV Ecological - OR DM	\$157,106	\$109,943	\$47,163	\$157,106	0		
C01M03A KIN & REV Ecological - OR Imp	\$4,156,723	\$2,191,375	\$1,965,348	\$4,156,723	0		
C01M04A KIN: Stranding	\$253,427	\$29,789	\$223,638	\$253,427	0		
C01M04A KIN: Stranding - OR DM	\$29,033	\$22,229	\$18,638	\$40,867	(\$11,834)		
C01M04A KIN: Stranding - OR Imp	\$224,394	\$7,560	\$205,000	\$212,560	\$11,834		
C01M05A KIN: Burbot Life	\$573,070	\$432,320	\$133,266	\$565,587	\$7,484	Efficiencies found during project	
C01M05A KIN: Burbot Life - OR DM	\$42,658	\$25,296	\$10,865	\$36,160	\$6,498		
C01M05A KIN: Burbot Life - OR Imp	\$530,412	\$407,025	\$122,402	\$529,426	\$986		
C01M06A KIN: Bull Trout	\$512,596	\$73,165	\$433,948	\$507,113	\$5,483	Efficiencies found during project	No corrective action required
C01M06A KIN: Bull Trout - OR DM	\$38,207	\$10,895	\$21,830	\$32,726	\$5,481		
C01M06A KIN: Bull Trout - OR Imp	\$474,389	\$62,270	\$412,117	\$474,387	\$2		
C01M07A KIN: Rainbow	\$519,961	\$219,769	\$278,109	\$497,878	\$22,083	Efficiencies found during project	No corrective action required
C01M07A KIN: Rainbow - OR DM	\$39,617	\$21,150	\$18,579	\$39,729	(\$112)		
C01M07A KIN: Rainbow - OR Imp	\$480,344	\$198,619	\$259,530	\$458,150	\$22,195		
C01M08A KIN:Valemont Peatland	\$143,546	\$116,934	\$26,612	\$143,546	0		
C01M08A KIN:Valemont Peatland - OR DM	\$34,593	\$27,683	\$6,910	\$34,593	0		
C01M08A KIN:Valemont Peatland - OR Imp	\$108,953	\$89,251	\$19,702	\$108,953	0		
C01M55A REV Res Macrophyte	\$147,184	\$136,620	\$1,983	\$138,603	\$8,581	Project Completed. Final completion report outstanding.	
C01M55A REV Res Macrophyte - ONR DM	\$28,017	\$35,492	\$1,725	\$37,217	(\$9,200)		
C01M55A REV Res Macrophyte - ONR Imp	\$119,167	\$101,128	\$258	\$101,386	\$17,781		
C01M56A KIN & REV Eco Pro	\$816,901	\$378,478	\$438,423	\$816,901	0		
C01M56A KIN & REV Eco Pro - ONR DM	\$31,371	\$15,405	\$15,966	\$31,371	0		
C01M56A KIN & REV Eco Pro - ONR Imp	\$785,530	\$363,073	\$422,457	\$785,530	0		

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
C01M59A Nagle Creek	\$69,185	\$64,080	\$1,725	\$65,805	\$3,380	Project Completed. Final completion report outstanding.	
C01M59A Nagle Creek - ONR DM	\$17,426	\$14,948	\$1,725	\$16,673	\$753		
C01M59A Nagle Creek - ONR Imp	\$51,759	\$49,133		\$49,133	\$2,626		
C01M60A Fish Indexing	\$553,666	\$307,897	\$243,176	\$551,073	\$2,593	Efficiencies found during project	No corrective action required
C01M60A Fish Indexing - ONR DM	\$39,620	\$34,444	\$27,061	\$61,505	(\$21,885)		
C01M60A Fish Indexing - ONR Imp	\$514,046	\$273,453	\$216,115	\$489,568	\$24,478		
C01M61A Wetland Veg	\$934,862	\$599,729	\$272,616	\$872,345	\$62,517	Efficiencies found during project	
C01M61A Wetland Veg - ONR DM	\$72,200	\$28,396	\$22,121	\$50,517	\$21,683		
C01M61A Wetland Veg - ONR Imp	\$862,662	\$571,333	\$250,495	\$821,828	\$40,834		
C01M62A TGP Monitoring	\$222,556	\$4,295	\$196,120	\$200,416	\$22,140	Efficiencies found during project	
C01M62A TGP Monitoring - ONR DM	\$48,306	\$4,295	\$21,870	\$26,166	\$22,140		
C01M62A TGP Monitoring - ONR Imp	\$174,250		\$174,250	\$174,250	0		

OR - Ordered Remissible
 ONR - Ordered Non-Remissible

* Red values in parentheses denote overage.