

Bridge River Water Use Plan

Monitoring Program and Physical Works

Annual Report: 2013

Implementation Period: February 2012 to January 2013

- **BRGMON-1 Lower Bridge River Aquatic Monitoring**
- **BRGMON-2 Carpenter Reservoir Riparian Vegetation Monitoring**
- **BRGMON-3 Lower Bridge River Adult Salmon and Steelhead Enumeration**
- **BRGMON-4 Carpenter Reservoir and Middle Bridge Fish Habitat and Population Monitoring**
- **BRGMON-5 Downton Reservoir Riparian Vegetation Monitoring**
- **BRGMON-6 Seton Lake Aquatic Productivity Monitoring**
- **BRGMON-7 Downton Reservoir Fish Habitat and Population Monitoring**
- **BRGMON-8 Seton Lake Resident Fish Habitat and Population Monitoring**
- **BRGMON-9 Seton River Habitat and Fish Monitoring**
- **BRGMON-10 Carpenter Reservoir Productivity Model Validation and Refinement**
- **BRGMON-11 Lower Bridge River Riparian Vegetation Monitoring**
- **BRGMON-12 Bridge-Seton Metals and Contaminant Monitoring Program**
- **BRGMON-13 Seton Sockeye Salmon Smolts Monitoring Program**
- **BRGMON-14 Effectiveness of Cayoosh Flow Dilution, Dam Operation, and Fishway Passage on Delay and Survival of Upstream Migration of Salmon in the Seton-Anderson Watershed**
- **BRGMON-15 Seton Lake Erosion Mitigation Program**
- **BRGMON-16 Lower Bridge River Spiritual and Cultural Value Monitoring**
- **BRGWORKS-1 Carpenter Revegetation**
- **BRGWORKS-2 Seton Lake Erosion**

For Water Licences FWL 126279, 126278, 126280, 126281, 126286, 126287, 126288, 126282, 126283, 12680, 126250 and 126259.

February 28, 2013

BC Hydro Bridge River Project Water Use Plan Monitoring Programs and Physical Works Annual Report: 2013

1 Introduction

This document represents a summary of the status and the results of the Bridge River Water Use Plan (WUP) monitoring programs and physical works to January 31, 2013, as per the Bridge River Order under the *Water Act*, dated March 30, 2011. There are 16 monitoring programs and 2 physical works.

2 Status

The following table outlines the dates that TOR for the Bridge River WUP monitoring programs and physical works were submitted to and approved by the CWR.

**Table: 2-1: Dates of Bridge River 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 |
| BRGMON-1 Lower Bridge River Aquatic Monitoring | Schedule A.1 | Jan 30, 2012 | Apr 12, 2012 | | |
| BRGMON-2 Carpenter Reservoir Riparian Vegetation Monitoring | Schedule A.6 | Jan 30, 2012 | Jun 26, 2012 | | |
| BRGMON-3 Lower Bridge River Adult Salmon and Steelhead Enumeration | Schedule A.10 | Jan 30, 2012 | Feb 07, 2012 | | |
| BRGMON-4 Carpenter Reservoir and Middle Bridge Fish Habitat and Population Monitoring | Schedule A.7 | Jan 30, 2012 | Jun 06, 2012 | | |
| BRGMON-5 Downton Reservoir Riparian Vegetation Monitoring | Schedule A.2 | Mar 30, 2012 | Jul 11, 2012 | | |
| BRGMON-6 Seton Lake Aquatic Productivity Monitoring | Schedule A.14 | to be submitted by Jan 31, 2014 | | | |
| BRGMON-7 Downton Reservoir Fish Habitat and Population Monitoring | Schedule A.3 | Jan 30, 2012 | Jun 06, 2012 | | |
| BRGMON-8 Seton Lake Resident Fish Habitat and Population Monitoring | Schedule A.15 | Jan 30, 2012 | Jun 07, 2012 | | |
| BRGMON-9 Seton River Habitat and Fish Monitoring | Schedule A.16 | Jan 30, 2012 | Jun 07, 2012 | | |
| BRGMON-10 Carpenter Reservoir Productivity Model Validation and Refinement | Schedule A.5 | to be submitted by Jan 31, 2014 | | | |
| BRGMON-11 Lower Bridge River Riparian Vegetation Monitoring | Schedule A.8 | Mar 30, 2012 | Jun 27, 2012 | | |
| BRGMON-12 Bridge-Seton Metals and Contaminant Monitoring Program | Schedule A.1 | Mar 30, 2012 | Jul 24, 2012 | | |
| BRGMON-13 Seton Sockeye Salmon Smolts Monitoring Program | Schedule A.17 | Jan 30, 2012 | Apr 05, 2012 | | |
| BRGMON-14 Effectiveness of Cayoosh Flow Dilution, Dam Operation, and Fishway Passage on Delay and Survival of Upstream Migration of Salmon in the Seton-Anderson Watershed | Schedule A.18 | Jan 30, 2012 | Jun 26, 2012 | | |
| BRGMON-15 Seton Lake Erosion Mitigation Program | Schedule A.13 | Mar 30, 2012 | Jul 13, 2012 | | |
| BRGMON-16 Lower Bridge River Spiritual and Cultural Value Monitoring | Schedule A.11 | Mar 30, 2012 | Jul 26, 2012 | | |
| BRGWORKS-1 Carpenter Revegetation | Schedule A.4 | to be submitted by Jan 31, 2014 | | | |
| BRGWORKS-2 Seton Lake Erosion | Schedule A.12 | to be submitted by Apr. 30, 2014 | | | |

3 Schedule

The following table (Table 3-1) outlines the current schedule for the monitoring programs and physical works being delivered for the Bridge River WUP.

Table 3-1: Table of WUP Schedule

| Monitoring Programs | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
|--|---------|---------|---|---------|---------|---------|---------|---------|---------|----------|
| | WLR YR1 | WLR YR2 | WLR YR3 | WLR YR4 | WLR YR5 | WLR YR6 | WLR YR7 | WLR YR8 | WLR YR9 | WLR YR10 |
| BRGMON-1 Lower Bridge River Aquatic Monitoring | u/w | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| BRGMON-2 Carpenter Reservoir Riparian Vegetation Monitoring | | ■ | | ■ | ■ | ■ | ■ | ■ | | ■ |
| BRGMON-3 Lower Bridge River Adult Salmon and Steelhead Enumeration | u/w | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| BRGMON-4 Carpenter Reservoir and Middle Bridge Fish Habitat and Population Monitoring | u/w | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| BRGMON-5 Downton Reservoir Riparian Vegetation Monitoring | u/w | ■ | | | | | | | | ■ |
| BRGMON-6 Seton Lake Aquatic Productivity Monitoring | | | ■ | ■ | ■ | | | | | |
| BRGMON-7 Downton Reservoir Fish Habitat and Population Monitoring | u/w | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| BRGMON-8 Seton Lake Resident Fish Habitat and Population Monitoring | u/w | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| BRGMON-9 Seton River Habitat and Fish Monitoring | u/w | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| BRGMON-10 Carpenter Reservoir Productivity Model Validation and Refinement | | | ■ | ■ | ■ | | | | | |
| BRGMON-11 Lower Bridge River Riparian Vegetation Monitoring | u/w | ■ | ■ | ■ | | ■ | | ■ | | ■ |
| BRGMON-12 Bridge-Seton Metals and Contaminant Monitoring Program | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| BRGMON-13 Seton Sockeye Salmon Smolts Monitoring Program | u/w | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| BRGMON-14 Effectiveness of Cayoosh Flow Dilution, Dam Operation, and Fishway Passage on Delay and Survival of Upstream Migration of Salmon in the Seton-Anderson Watershed | u/w | ■ | ■ | ■ | ■ | ■ | ■ | | | |
| BRGMON-15 Seton Lake Erosion Mitigation Program | | ■ | | | | ■ | | ■ | | ■ |
| BRGMON-16 Lower Bridge River Spiritual and Cultural Value Monitoring | | ■ | ■ | ■ | ■ | ■ | | | | |
| Physical Works | | | | | | | | | | |
| BRGWORKS-1 Carpenter Revegetation | | | ■ | ■ | ■ | ■ | ■ | | | |
| BRGWORKS-2 Seton Lake Erosion | | | ■ | ■ | ■ | | | | | |
| 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 | | | | | | | |

4 Monitoring Programs and Physical Works Terms of Reference

The Monitoring Programs and Physical Works being implemented under the Bridge River 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/lower_mainland/bridge_river.html

5 Summary of Monitoring Programs

5.1 BRGMON-1 Lower Bridge River Aquatic Monitoring

5.1.1 Status

This monitoring program was initiated in August 2012 and will be carried out over 10 years. Reporting on this project is due August 2013 and will be included in the next annual report. Note that this project continues from the interim order work completed under BRGMON-30 and the reporting for BRGMON-30 was completed in September 2012.

5.2 BRGMON-2 Carpenter Reservoir Riparian Vegetation Monitoring

5.2.1 Status

This monitoring program will be initiated in March 2013 and will be carried out over 7 years of the 10 year review period. Reporting on this project is due January 2014 and will be included in the subsequent annual report.

5.3 BRGMON-3 Lower Bridge River Adult Salmon and Steelhead Enumeration

5.3.1 Status

This monitoring program was initiated in August 2012 and will be carried out over 10 years. Reporting on this project is due April 2013 and will be included in the next annual report.

5.4 BRGMON-4 Carpenter Reservoir and Middle Bridge Fish Habitat and Population Monitoring

5.4.1 Status

This monitoring program was initiated in October 2012 and will be carried out over 10 years. Initial progress reporting on this project is due April 2013 and will be included in the next annual report.

5.5 BRGMON-5 Downton Reservoir Riparian Vegetation Monitoring

5.5.1 Status

This monitoring program was initiated in November 2012 and will be carried out over 2 years during the 10 year review period. Reporting on this project is due November 2013 and will be included in the subsequent annual report.

5.6 BRGMON-6 Seton Lake Aquatic Productivity Monitoring

5.6.1 Status

This monitoring program will be initiated in April 2014 and will be carried out over 3 years of the 10 year review period. Reporting on this project is due April 2015 and will be included in the subsequent annual report.

5.7 BRGMON-7 Downton Reservoir Fish Habitat and Population Monitoring

5.7.1 Status

This monitoring program was initiated in October 2012 and will be carried out over 10 years. Initial progress reporting on this project is due April 2013 and will be included in the next annual report.

5.8 BRGMON-8 Seton Lake Resident Fish Habitat and Population Monitoring

5.8.1 Status

This monitoring program was initiated in October 2012 and will be carried out over 10 years. Initial progress reporting on this project is due April 2013 and will be included in the next annual report.

5.9 BRGMON-9 Seton River Habitat and Fish Monitoring

5.9.1 Status

This monitoring program was initiated in November 2012 and will be carried out over 10 years. Initial progress reporting on this project is due April 2013 and will be included in the next annual report.

5.10 BRGMON-10 Carpenter Reservoir Productivity Model Validation and Refinement

5.10.1 Status

This monitoring program will be initiated in April 2014 and will be carried out over 3 years of the 10 year review period. Reporting on this project is due April 2015 and will be included in the subsequent annual report.

5.11 BRGMON-11 Lower Bridge River Riparian Vegetation Monitoring

5.11.1 Status

This monitoring program was initiated in November 2012 and will be carried out over 10 years. Initial progress reporting on this project is due April 2013 and will be included in the next annual report.

5.12 BRGMON-12 Bridge-Seton Metals and Contaminant Monitoring Program

5.12.1 Status

This monitoring program will be initiated in May of 2013 and will be carried out over 10 years. Data collection for this project is tied to the Fish and Fish Habitat Projects

(BRGMON-3, -4, -7 and -8) and could not be initiated until those projects were started. Reporting on this project is due May 2014 and will be included in the subsequent annual report. Note that this project continues from the interim order work completed under BRGMON-32 and the reporting for BRGMON-32 was completed in September 2012.

5.13 BRGMON-13 Seton Sockeye Salmon Smolts Monitoring Program

5.13.1 Status

This monitoring program was initiated in April 2012 and will be carried out over 10 years. Reporting on this project is due May 2013 and will be included in the next annual report.

5.14 BRGMON-14 Effectiveness of Cayoosh Flow Dilution, Dam Operation, and Fishway Passage on Delay and Survival of Upstream Migration of Salmon in the Seton-Anderson Watershed

5.14.1 Status

This monitoring program was initiated in August 2012 and will be carried out over 10 years. Reporting on this project is due June 2013 and will be included in the next annual report.

5.14.2 BRGMON-15 Seton Lake Erosion Mitigation Program Status

This monitoring program will be initiated in spring of 2013 and will be carried out over 4 to 5 years of the 10 year review period. Reporting on this project is due May 2014 and will be included in the subsequent annual report.

5.15 BRGMON-16 Lower Bridge River Spiritual and Cultural Value Monitoring

5.15.1 Status

This monitoring program will be initiated in spring of 2013 and will be carried out over 4 to 5 years of the 10 year review period. Reporting on this project is due April 2014 and will be included in the subsequent annual report.

A TOR addendum will be prepared to address necessary changes in the management questions and methodology to address the fact that the 3 cms and 0 cms flow regimes noted in the TOR are no longer testable.

6 Summary of Physical Works

6.1 BRGWORKS-1 Carpenter Revegetation

6.1.1 Status

This physical works will be initiated in 2014 and will be carried out over 5 years.

6.2 BRGWORKS-2 Seton Lake Erosion

6.2.1 Status

This physical works will be initiated in 2014 and will be carried out over 3 years.

7 Monitoring Programs and Physical Works Costs

The following table summarizes the Bridge River WUP monitoring programs and physical works costs approved by the Comptroller and the Actual Costs to January 31, 2013.

Table 7-1: Bridge River WUP Monitoring Programs and Physical Works Costs

| Monitoring Programs | Activity | 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 |
|---|----------|-----------------------|----------------------------|----------------------------------|-----------------------------------|----------------------------|--|--|
| Bridge Annual Report | OR | \$0 | \$0 | \$15,866 | \$15,866 | (\$15,866) | Annual Reporting costs to be approved by CWR. | Submit annual reporting costs for approval. |
| BRGMON#1 OR LOWER BRIDGE R AQUATIC | OR | \$2,126,171 | \$127,408 | \$1,896,348 | \$2,023,756 | \$102,415 | Delays in project implementation. | Budget to be re-assessed after reforecast in Fiscal 2014 |
| BRGMON#1 OR Direct Management 001 | OR | \$92,854 | \$11,995 | \$52,023 | \$64,018 | \$28,836 | | |
| BRGMON#1 OR Implementation 002 | OR | \$2,033,317 | \$115,413 | \$1,844,325 | \$1,959,738 | \$73,579 | | |
| BRGMON#2 CARPENTER RSE RIPARIAN VEGETATION | OR | \$412,706 | \$3,265 | \$389,396 | \$392,661 | \$20,045 | Guide to explanations below | Budget to be re-assessed after reforecast in Fiscal 2014 |
| BRGMON#2 Direct Management 001 | OR | \$65,857 | \$3,080 | \$42,548 | \$45,628 | \$20,229 | | |
| BRGMON#2 Implementation 002 | OR | \$346,849 | \$185 | \$346,848 | \$347,033 | (\$184) | | |
| BRGMON#3 LOWER BRIDGE R ADULT SALMON & STEELHEAD ENUMERATION | OR | \$1,975,352 | \$256,696 | \$1,681,782 | \$1,938,478 | \$36,874 | Delays in project implementation. | Budget to be re-assessed after reforecast in Fiscal 2014 |
| BRGMON#3 Direct Management 001 | OR | \$92,722 | \$11,872 | \$50,550 | \$62,422 | \$30,300 | | |
| BRGMON#3 Implementation 002 | OR | \$1,882,630 | \$244,824 | \$1,631,232 | \$1,876,056 | \$6,574 | | |
| BRGMON#4 CARPENTER RSE & MIDDLE BRIDGE R FISH HABITAT & POPULATION | OR | \$1,392,191 | \$47,350 | \$1,234,433 | \$1,281,783 | \$110,408 | Delays in project implementation. | Budget to be re-assessed after reforecast in Fiscal 2014 |
| BRGMON#4 Direct Management 001 | OR | \$98,053 | \$3,617 | \$53,925 | \$57,542 | \$40,511 | | |
| BRGMON#4 Implementation 002 | OR | \$1,294,138 | \$43,733 | \$1,180,508 | \$1,224,241 | \$69,897 | | |
| BRGMON#5 DOWNTON RSE RIPARIAN VEGETATION | OR | \$355,756 | \$3,524 | \$343,424 | \$346,948 | \$8,808 | Delays in project implementation. | Budget to be re-assessed after reforecast in Fiscal 2014 |
| BRGMON#5 Direct Management 001 | OR | \$26,922 | \$3,252 | \$14,587 | \$17,839 | \$9,083 | | |
| BRGMON#5 Implementation 002 | OR | \$328,834 | \$272 | \$328,837 | \$329,109 | (\$275) | | |
| BRGMON#7 DOWNTON RSE FISH HABITAT & POPULATION | OR | \$922,490 | \$2,036 | \$886,139 | \$888,175 | \$34,315 | Delays in project implementation. | Budget to be re-assessed after reforecast in Fiscal 2014 |
| BRGMON#7 Direct Management 001 | OR | \$87,909 | \$1,967 | \$51,558 | \$53,525 | \$34,384 | | |
| BRGMON#7 Implementation 002 | OR | \$834,581 | \$69 | \$834,581 | \$834,650 | (\$69) | | |
| BRGMON#8 SETON LAKE RESIDENT FISH HABITAT & POPULATION | OR | \$947,702 | \$3,108 | \$914,107 | \$917,215 | \$30,487 | Delays in project implementation. | Budget to be re-assessed after reforecast in Fiscal 2014 |
| BRGMON#8 Direct Management 001 | OR | \$85,780 | \$3,039 | \$52,185 | \$55,224 | \$30,556 | | |
| BRGMON#8 Implementation 002 | OR | \$861,922 | \$69 | \$861,922 | \$861,991 | (\$69) | | |
| BRGMON#9 SETON R HABITAT & FISH | OR | \$1,185,918 | \$2,647 | \$1,151,344 | \$1,153,991 | \$31,927 | Delays in project implementation. | Budget to be re-assessed after reforecast in Fiscal 2014 |
| BRGMON#9 Direct Management 001 | OR | \$85,924 | \$2,578 | \$51,350 | \$53,928 | \$31,996 | | |
| BRGMON#9 Implementation 002 | OR | \$1,099,994 | \$69 | \$1,099,994 | \$1,100,063 | (\$69) | | |
| BRGMON#11 LOWER BRIDGE R RIPARIAN VEGETATION | OR | \$567,076 | \$2,946 | \$561,316 | \$564,262 | \$2,814 | Delays in project implementation. | Budget to be re-assessed after reforecast in Fiscal 2014 |
| BRGMON#11 Direct Management 001 | OR | \$33,052 | \$2,537 | \$27,292 | \$29,829 | \$3,223 | | |
| BRGMON#11 Implementation 002 | OR | \$534,024 | \$409 | \$534,024 | \$534,433 | (\$409) | | |
| BRGMON#12 BRIDGE-SETON METALS & CONTAMINANT PROGRAM | OR | \$481,257 | \$5,409 | \$471,626 | \$477,036 | \$4,221 | Delays in project implementation. | Budget to be re-assessed after reforecast in Fiscal 2014 |
| BRGMON#12 Direct Management 001 | OR | \$65,889 | \$5,285 | \$50,498 | \$55,783 | \$10,106 | | |
| BRGMON#12 Implementation 002 | OR | \$415,368 | \$124 | \$415,368 | \$415,492 | (\$124) | | |
| BRGMON#13 EFFECTIVENESS OF SETON POWERHOUSE SHUTDOWN FOR REDUCING ENTRAINMENT MORTALITY OF SOCKEYE SALMON SMOLTS | OR | \$1,958,221 | \$168,529 | \$1,757,888 | \$1,926,418 | \$31,803 | Delays in project implementation. | Budget to be re-assessed after reforecast in Fiscal 2014 |
| BRGMON#13 Direct Management 001 | OR | \$89,289 | \$5,725 | \$51,599 | \$57,325 | \$31,964 | | |
| BRGMON#13 Implementation 002 | OR | \$1,868,932 | \$162,804 | \$1,706,289 | \$1,869,093 | (\$161) | | |
| BRGMON#14 SETON LAKE ADULT FISH PASSAGE RESEARCH PROGRAM | OR | \$2,234,341 | \$62,573 | \$1,821,898 | \$1,884,471 | \$349,870 | Delays in project implementation. | Budget to be re-assessed after reforecast in Fiscal 2014 |
| BRGMON#14 Direct Management 001 | OR | \$46,517 | \$4,494 | \$25,418 | \$29,912 | \$16,605 | | |
| BRGMON#14 Implementation 002 | OR | \$2,187,824 | \$58,079 | \$1,796,480 | \$1,854,559 | \$333,265 | | |
| BRGMON#15 SETON LAKE EROSION MITIGATION PROGRAM - PHASE 1 | OR | \$184,648 | \$4,328 | \$478,615 | \$482,943 | (\$298,295) | Only first phase of monitoring approved by CWR | Resubmit for next phase in calendar 2014. |
| BRGMON#15 Direct Management 001 | OR | \$17,403 | \$4,204 | \$25,905 | \$30,110 | (\$12,707) | | |
| BRGMON#15 Implementation 002 | OR | \$167,245 | \$124 | \$452,709 | \$452,833 | (\$285,588) | | |
| BRGMON#16 LOWER BRIDGE RIVER SPIRITUAL AND CULTURAL VALUE MONITORING | OR | \$495,211 | \$1,953 | \$476,796 | \$478,750 | \$16,461 | Delays in project implementation. | Budget to be re-assessed after reforecast in Fiscal 2014 |
| BRGMON#16 Direct Management 001 | OR | \$44,246 | \$1,568 | \$25,831 | \$27,399 | \$16,847 | | |
| BRGMON#16 Implementation 002 | OR | \$450,965 | \$385 | \$450,969 | \$451,354 | (\$389) | | |
| OR - Ordered Remissible | | | | | | | | |
| ONR - Ordered Non-Remissible | | | | | | | | |