

Duncan Dam Project Water Use Plan

Monitoring Programs and Physical Works Annual Report: 2019

Implementation Period: April 2018 to March 2019

- DDMMON-1 Lower Duncan River Ramping Rate Monitoring
- DDMMON-2 Lower Duncan River Habitat Use Monitoring
- DDMMON-3 Lower Duncan River Hydraulic Model Development
- DDMMON-4 Lower Duncan River Kokanee Spawning Monitoring
- DDMMON-5 Upper Duncan River Bull Trout Migration Monitoring
- DDMMON-6 Lower Duncan Dam Bull Trout Passage Monitoring
- DDMMON-7 Lower Duncan River Water Quality Monitoring
- DDMMON-8 Duncan Watershed Riparian and Cottonwood Monitoring
- DDMMON-9 Lower Duncan River Mosquito Monitoring and Management Plan Development
- DDMMON-10 Duncan Reservoir Fish Habitat Use Monitoring
- DDMMON-11 Duncan Reservoir Burbot Monitoring
- DDMMON-12 Duncan Reservoir Archaeological Overview Assessment
- DDMMON-13 Duncan Reservoir Archaeological Site Erosion Monitoring
- DDMMON-14 Duncan Wildlife Use Monitoring
- DDMMON-15 Lower Duncan River Stranding Protocol Development and Finalization
- DDMMON-16 Lower Duncan River Fish Stranding Impact Monitoring
- DDMMON-17 Duncan Reservoir Kokanee Stock Assessment
- DDMWORKS-1 Lower Duncan River Argenta Slough Erosion Protection
- DDMWORKS-2 Duncan Reservoir Glacier Creek Boat Ramp Extension
- DDMWORKS-3 Plan to Address Nutrient Retention Caused by Duncan Dam Operations
- DDMWORKS-4 Action Plan to Minimize Stranding of Kokanee Spawning in Lower Duncan River Sidechannels

For Conditional Water Licence for Duncan Dam and Reservoir 27027

April 30, 2019

BC Hydro Duncan Dam Project Water Use Plan Monitoring Programs and Physical Works Annual Report: 2019

1 Introduction

This document represents a summary of the status and the results of the Duncan Dam Water Use Plan (WUP) monitoring programs and physical works to March 31, 2019, as per the Duncan Dam Order under the *Water Act*, dated December 21, 2007, and Clause 1 Amendment dated June 20, 2016. There are seventeen monitoring programs and four physical works.

2 Status

The following table outlines the dates that Terms of Reference (TOR) for the Duncan Dam WUP monitoring programs and physical works were submitted to and approved by the Comptroller of Water Rights (CWR).

Table 2-1: Dates of Duncan Dam 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
DDMMON-1 Lower Duncan River Ramping Rate Monitoring	Clause 5(e)	Apr 03, 2008	Apr 30, 2008		
DDMMON-2 Lower Duncan River Habitat Use Monitoring	Clause 5(e)	Aug 07, 2008	Sep 9,2008		
DDMMON-3 Lower Duncan River Hydraulic Model Development	Clause 5(e)	Apr 03, 2008	Apr 30, 2008	Mar 31, 2014	Jul 28, 2014
DDMMON-4 Lower Duncan River Kokanee Spawning Monitoring	Clause 6(a)	Apr 03, 2008	Apr 30, 2008	Dec 19, 2008	Mar 17, 2009
DDMMON-5 Upper Duncan River Bull Trout Migration Monitoring	Clause 6(b)	Jan 23, 2008	Mar 05, 2008	Feb 22, 2010	Mar 18, 2010
DDMMON-6 Lower Duncan Dam Bull Trout Passage Monitoring	Clause 6(b)	Jan 23, 2008	Mar 05, 2008		
DDMMON-7 Lower Duncan River Water Quality Monitoring	Clause 6(c)	Dec 16, 2008	Mar 11, 2009		
DDMMON-8 Duncan Riparian Monitoring	Clause 6(d)	Aug 07, 2008	Sep 09, 2008	Nov 01, 2012	Nov 15, 2012
DDMMON-9 Lower Duncan River Mosquito Monitoring and Management Plan Development	Clause 6(e)	Aug 07, 2008	Sep 09, 2008	May 13, 2013	Jun 13, 2013
DDMMON-10 Duncan Reservoir Fish Habitat Use Monitoring	Clause 6(f)	Dec 16, 2008	Mar 11, 2009		
DDMMON-11 Duncan Reservoir Burbot Monitoring	Clause 6(g)	Apr 03, 2008	Apr 30, 2008	May 01, 2013	May 29, 2013
DDMMON-12 Duncan Reservoir Archaeological Overview Assessment	Clause 5(f)	Dec 04, 2009	Feb 05, 2010		
DDMMON-13 Duncan Reservoir Archaeological Site Erosion Monitoring	Clause 5(g)	Dec 04, 2009	Apr 07, 2010		
DDMMON-14 Duncan Wildlife Use Monitoring	Clause 6(h)	Aug 07, 2008	Sep 09, 2008	Jun 09, 2017	Jun 07, 2017
DDMMON-15 Lower Duncan River Stranding Protocol Development and Finalization	Clause 5(e)	Dec 16, 2008	Mar 11, 2009	Jul 30, 2009	Aug 31, 2009
DDMMON-16 Lower Duncan River Fish stranding impact monitoring	Clause 5(e)	Jul 23, 2008	Sep 08, 2008	Jul 04, 2018	Jul 20, 2018
DDMMON-17 Duncan Reservoir Kokanee Stock Assessment	Clause 6(f)	Dec 04, 2009	Apr 08, 2010		
DDMWORKS-1 Argenta Slough Erosion Protection	Clause 5(a)	Jan 23, 2008	Mar 18, 2008	Dec 31, 2018	Jan 25, 2019
DDMWORKS-2 Glacier Creek Boat Ramp	Clause 5(b)	Jan 23, 2008	Mar 18, 2008		
DDMWORKS-3 Plan to Address Nutrient Retention Caused by Duncan Dam Operations	Clause 5(d)	Jan 23, 2008	Mar 18, 2008		
DDMWORKS-4 Action Plan to Minimize Stranding of Kokanee Spawning in Lower Duncan River Sidechannels	Clause 5(c)	Dec 04, 2009	Apr 08, 2010	Dec 03, 2013	Jan 15, 2014

3 Schedule

The following table outlines the current schedule for the monitoring programs and physical works being delivered for the Duncan Dam WUP.

Table 3-1: Monitoring Programs and Physical Works Schedule as of March 31, 2019

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 Final Review	WLR YR12	WLR YR13
DDMMON-1 Lower Duncan River Ramping Rate Monitoring	✓	✓											
DDMMON-2 Lower Duncan River Habitat Use Monitoring	✓	✓	✓	✓	✓F								
DDMMON-3 Lower Duncan River Hydraulic Model Development		✓	✓		✓					✓	x	u/w	
DDMMON-4 Lower Duncan River Kokanee Spawning Monitoring	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓F			
DDMMON-5 Upper Duncan River Bull Trout Migration Monitoring	✓	✓			✓	✓		✓		✓	✓F		
DDMMON-6 Lower Duncan Dam Bull Trout Passage Monitoring	✓	✓	✓	x									
DDMMON-7 Lower Duncan River Water Quality Monitoring			✓	✓	✓F								
DDMMON-8 Duncan Riparian Monitoring		✓	✓		✓	✓	✓	✓	✓	✓	✓F		
DDMMON-9 Lower Duncan River Mosquito Monitoring and Management Plan Development		✓	✓	✓	✓		✓		✓	✓F			
DDMMON-10 Duncan Reservoir Fish Habitat Use Monitoring		✓	✓	✓	✓		✓		✓F				
DDMMON-11 Duncan Reservoir Burbot Monitoring		✓	✓	✓			✓	✓	✓F				
DDMMON-12 Duncan Reservoir Archeological Overview Assessment			✓F										
DDMMON-13 Duncan Reservoir Archeological Site Erosion Monitoring				✓	✓	✓	✓	✓F					
DDMMON-14 Duncan Wildlife Use Monitoring		✓		✓			x			x	✓		
DDMMON-15 Lower Duncan River Stranding Protocol Development and Finalization		✓	✓	✓	✓	✓	✓	✓	✓	✓		■	
DDMMON-16 Lower Duncan River Fish stranding impact monitoring	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	■	■
DDMMON-17 Duncan Reservoir Kokanee Stock Assessment									✓	✓	✓F		
Physical Works													
DDMWORKS-1 Argenta Slough Erosion Protection	✓	✓	x					x					■
DDMWORKS-2 Glacier Creek Boat Ramp	x	✓											
DDMWORKS-3 Kootenay Lake Nutrient Loading Funding	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
DDMWORKS-4 Action Plan to minimize stranding of kokanee stranding in Lower Duncan River Sidechannels						✓	x	x	✓	✓		■	

4 Monitoring Programs and Physical Works Terms of Reference

The monitoring programs and physical works being implemented under the Duncan Dam WUP are described in Terms of Reference. These TOR and the reports for work completed to date can be found here:

http://www.bchydro.com/about/sustainability/conservation/water_use_planning/southern_interior/duncan_dam.html

5 Status of Monitoring Programs

5.1 DDMMON-1 Lower Duncan River Ramping Rate Monitoring

The 2012 Annual Report provided a detailed summary of the work that is summarized below for completeness of this Annual Report.

Several ramping experiments were conducted in 2009 to support Clause 5e of the Order which requires the development of an adaptive protocol to minimize stranding of fish in the Lower Duncan River. In a subsequent stakeholder meeting, stakeholders agreed that ramping experiments were not the most effective way of answering the management questions. In lieu of ramping experiments, the stranding assessments in DDMMON-16 were modified as follows: day time flow reductions (to minimize night time stranding), a flow reduction rate of 10 cm/hr or less, and multiple smaller increment flow reductions.

A review completed in 2017 confirmed that the management questions from DDMMON-1 are being sufficiently addressed through DDMMON-16. The outstanding questions from DDMMON-1 will be addressed in the DDMMON-16 extension.

5.2 DDMMON-2 Lower Duncan River Habitat Use Monitoring

This monitoring project was initiated in 2008 and completed in 2012. The objective of this monitoring project was to assess fish habitat use and life histories of Rainbow trout, Mountain whitefish, and Burbot within the Lower Duncan River mainstem and sidechannels.

5.3 DDMMON-3 Lower Duncan River Hydraulic Development

This monitoring program was initiated in 2009. The objective of this monitoring program is to provide a comprehensive model of hydraulic and fish habitat values for the Lower Duncan River floodplain for the normal range of flow conditions affected by Duncan Dam operations.

This program includes a two-year development stage at the start of the review period, with model updates scheduled for Years 5 and 10 of the review period. The 2012 Annual Report provides an accurate summary of the project for the first two years of implementation.

The Year 5 (October 2013) model update captured changing conditions in the river; incorporated advancements in the hydraulic model; and reinforced the potential links between other monitoring programs in the Duncan Dam Project WUP.

In Year 10 (June 2017), the model was updated to adjust for technical differences between the 2010 and 2013 models, eliminating any bias when comparing the two years.

Channel morphology has changed significantly in sections of the river between modelling years. A further extension to December 2019 is required to update the model to reflect the most up to date and relevant morphological conditions. No additional funds are required.

5.4 DDMMON-4 Lower Duncan River Kokanee Spawning Monitoring

This monitoring program was initiated in 2008 and completed in 2018. The objective of this monitoring program is to assess annual kokanee escapement in the Lower Duncan River, Kokanee spawning as it relates to any operational constraints and defining Kokanee habitat preferences.

Three of the four management questions will be addressed in the final report. The fourth management question will be answered through DDMWORKS-4.

Attached is the Year 10 report (2017) dated May 2018.

5.5 DDMMON-5 Upper Duncan River Bull Trout Migration Monitoring

This monitoring program was initiated in 2008 and will be carried out periodically over ten years. The objective of the monitoring program is to determine the effectiveness of the adult Bull trout transfer program at Duncan Dam for contributing to Kootenay Reservoir and/or Duncan Reservoir Bull trout recruitment.

Further lab analyses of the otolith chemistry will be conducted to increase the confidence in the results from the final year of implementation that occurred in 2017.

Attached is the Year 10 report (2017) dated May 23, 2018.

5.6 DDMMON-6 Lower Duncan Dam Bull Trout Passage Monitoring

This monitoring program was initiated in 2008 for three years.

The operation of the Bull trout transfer program at Duncan Dam May to September each year allows the migration of Bull trout from the Lower Duncan River to spawning locations in the Upper Duncan River system (upstream of Duncan Dam). Fish passage at Duncan Dam is facilitated through the installation of a weir immediately downstream of the flip bucket of the Low Level Operating Gate. In 2012, it was concluded that the existing weir was an effective system for ensuring Bull trout passage through the dam.

The second objective of this study was to evaluate alternative passage methods. In 2011, redesign and automation of the weir was proposed primarily for operational flexibility and safety reasons. After 2011, the weir was damaged and has not been used since. As implementation of the improvements to update the weir is outside of the scope of the Duncan Dam Project WUP, BC Hydro commenced with design phases of the project under the regular capital planning process.

5.7 DDMMON-7 Lower Duncan River Water Quality Monitoring

This monitoring program was initiated in 2010 and was completed in 2012.

The objective of this monitoring program is to determine if a relationship exists between water quality parameters (TGP levels and water temperature) and Duncan Dam operations and decide how each of the water quality parameters affect fish

species downstream of Duncan Dam using the total gas pressure as a performance measure (there is no performance measure for water temperature).

5.8 DDMMON-8 Duncan Watershed Riparian and Cottonwood Monitoring

This project has been divided into two discrete monitoring components based on their locations in the Duncan River watershed.

5.8.1 DDMMON-8-1 Lower Duncan River Riparian Cottonwood Monitoring

This monitoring program was initiated in 2009 and, with the exception of 2011, will be carried out every year over a ten year period.

The aim of the study is to provide site-specific data to guide the flow management regime and to improve the understanding of the relationships between flow regime, physical environmental conditions, and riparian vegetation.

The Year 9 (2018) report will be submitted with the 2020 annual report.

5.8.2 DDMMON-8-2 Duncan Reservoir Riparian Monitoring

This monitoring program was initiated in 2009, implemented in 2012 and 2015, and will next be carried out in 2018.

This long-term monitoring program is being implemented to assess the effects of Alternative S73 through observation of riparian distribution and abundance and testing of hypotheses underlying the approach taken in the WUP.

The Year 4 (2018) report will be submitted with the 2020 annual report.

5.9 DDMMON-9 Lower Duncan River Mosquito Monitoring and Management Plan Development

This monitoring program was initiated in 2009 and completed in 2017. All management questions have been addressed.

Initial Lower Duncan flooding during the spring (largely driven by unregulated inflows) represents the largest opportunity for nuisance mosquito production, and re-flooding later in the summer (largely driven by regulated discharges from Duncan Dam) can increase production, depending on the difference between summer and spring peak river flows (regulated + unregulated).

Different vegetation support different levels of nuisance mosquito breeding; regulation of summer flows can influence the flooding of key vegetation types like grasslands. Other factors outside of BC Hydro control, such as precipitation and warmer temperatures, will increase the productivity of nuisance mosquito populations in any given period of the spring and summer.

5.10 DDMMON-10 Duncan Reservoir Fish Habitat Use Monitoring

This monitoring program was initiated in 2009 and completed in 2016. A review of the monitoring program indicates that the management questions have been addressed.

The objective of the monitoring program is to monitor habitat use of reservoir fish species of interest (Rainbow trout, Kokanee, Bull trout and Burbot), reservoir water quality variables, and spawning timing data on a seasonal basis.

In 2010, Rainbow trout were considered to have been adequately addressed and were dropped from the monitoring program. This was based on the lack of available habitat, low water temperatures, and limited Rainbow trout presence. It was determined that it was unlikely that Duncan Lake and its tributaries supported large numbers of Rainbow trout prior to dam construction, and therefore Rainbow trout are no longer considered a key species with respect to reservoir management.

Attached is the final Year 9 report (2016) dated April 2018.

5.11 DDMMON-11 Duncan Reservoir Burbot Monitoring

This monitoring program was initiated in 2009 and completed in 2016. In 2013, after three years of attempting to monitor adult Burbot spawning with little success and to capture juvenile Burbot with no success, this program changed its methods from direct biological monitoring to a physical modelling approach.

This program mapped potential Burbot habitat and monitored temperature in the upper Duncan Reservoir drawdown zone. The Burbot habitat mapping and modelling occurred in August 2015 and associated temperature monitoring was completed in 2016.

5.12 DDMMON-12 Duncan Reservoir Archaeological Overview Assessment

The key objective addressed by this monitoring program was to collect information on cultural resource potential or sensitivity within portions of the drawdown zone of the Duncan reservoir and, based on this research, identify cultural site locations suitable for long-term erosion monitoring under DDMMON-13.

This study was initiated in 2010 and was completed in 2011.

5.13 DDMMON-13 Duncan Reservoir Archaeological Site Erosion Monitoring

The purpose of this study was to monitor the rate of erosion at two archaeological sites on Duncan Reservoir. This study was initiated in 2011 and was completed in 2015.

Based on the data collected over five years, it appears that the two archaeological sites are subject to both erosion and deposition, with erosion being the dominant process. Deposition appears to occur during years with relatively quiet or calm weather, while erosion appears to occur under stormy weather. The ground surfaces at both sites have, over the five years of monitoring, lowered in average elevation by

approximately 1 cm. Artifacts observed within the monitoring areas have generally lowered, in keeping with this drop in the ground surface elevation, and shifted away laterally, from their original recorded location by typically less than 10 cm.

The information from this study will be used by BC Hydro's Reservoir Archaeology Program to assess the impacts of normal reservoir operations on these two archaeological sites and to better understand erosion within the Duncan drawdown zone as a whole. The study information is also expected to assist future decision makers and the development of an Archaeological Management Plan.

5.14 DDMMON-14 Duncan Wildlife Use Monitoring

This monitoring program was initiated in 2009 and implemented in 2011. The objective of this monitoring program is to identify the impacts of the Duncan operating regime (Alternative S 73) on the riparian wildlife community.

The 2014 field season was cancelled because, based on an external review of this study, the TOR required significant revision. Reservoir wildlife monitoring has been refocused on the identification of wildlife habitat values within the wetland at the northern reach of the reservoir.

The TOR was approved July 2017 and fieldwork was completed in 2018. The final report (2018) will be submitted with the 2020 Annual Report.

5.15 DDMMON-15 Lower Duncan River Stranding Protocol Development and Finalization

This monitoring program was initiated in 2009 and will be carried out every year for ten years.

The regulatory agencies (Fisheries and Oceans Canada and the Ministry of Forests, Lands and Natural Resource Operations) will be updated in 2017 on any recommended changes to the Adaptive Stranding Protocol (ASP). No comments were received back from the agencies.

The Year 10 report is in progress and will be submitted in the 2020 annual report. The project schedule is extended to the end of 2019 in order to integrate findings from DDMMON-1, DDMMON-3, DDMMON-4 and DDMMON-16 into the report.

5.16 DDMMON-16 Lower Duncan River Fish Stranding Impact Monitoring

The objective of this monitoring program is to finalize a flow reduction protocol, including stranding response procedures (e.g., fish salvaging), flow reduction procedures at Duncan Dam, internal and external correspondence procedures, stranding assessment methodology, and reporting requirements.

This monitoring program was initiated in 2008. A TOR resubmission for a program extension until the WUP Order Review was approved on July 20, 2018. Attached is the report for Year 9 (2016-2017), dated December 5, 2018.

5.17 DDMMON-17 Duncan Reservoir Kokanee Stock Assessment

The program will improve understanding of the effects of reservoir operation on Kokanee populations, and will lead to a better understanding of the implications of entrainment on Kokanee populations to assist in future decisions regarding the operation of Duncan Reservoir.

This monitoring program was carried out for three years from 2016 to 2018. Attached is the report for Year 2 (2017) dated April 2019.

6 Status of Physical Works

6.1 DDMWORKS-1 Argenta Slough Erosion Protection

The regulatory agencies (Fisheries and Oceans Canada and Ministry of Forests, Lands and Natural Resources) do not support proceeding with any proposed physical works to armour the eroding bend in Lower Duncan River. Regulators agreed to continue erosion monitoring and the creation of an ecological inventory of the areas of the slough that are threatened by a breach.

The Ecological Inventory was presented to regulators in May 2017. One of the outcomes of the presentation was for BC Hydro to recommend options in lieu of physical works. BC Hydro reviewed the options with the regulators in the fall of 2018 and agreed to provide a contribution to the acquisition of conservation property in lieu of physical works. The TOR resubmission was approved January 2019 and implementation is in progress.

6.2 DDMWORKS-2 Glacier Creek Boat Ramp Extension

The ramp was completed in May 2009. The Regional District of Central Kootenay (RDCK) is maintaining the ramp. BC Hydro conducted an inspection of the ramp in 2016.

6.3 DDMWORKS-3 Plan to Address Nutrient Retention Caused by Duncan Dam Operations

Payments are made annually to the amount of 17.5% of the previous year's fertilization cost as per the letter of agreement between BC Hydro and the Fish and Wildlife Compensation Program (FWCP). In 2017, the payment was \$165,589. A TOR revision to extend the program to the WUPOR will be submitted in 2019 contingent on program evaluation undertaken within the updated action plan for FWCP.

6.4 DDMWORKS-4 Action Plan to Minimize Stranding of Kokanee Spawning in Lower Duncan River Sidechannels

The regulatory agencies (Fisheries and Oceans Canada and Ministry of Forests, Lands and Natural Resources) rejected physical works given issues with logistics, annual maintenance and potential secondary effects on other resources in the area.

As an alternate method to mitigate Kokanee stranding, an opportunistic alteration to the flow regime was realized from September 2013 to February 2014. The results from the 2013 DDMMON-4 report were inconclusive about the benefits from the experimental flows because of changes in methodology and difficulties in conducting field studies during the brief peak spawning period.

BC Hydro undertook another opportunistic alteration to the flow regime which occurred from September to October 2016. Observations and data were collected under DDMMON-4 and shared with DDMWORKS-4. The results of this modified operation were shared with regulatory agencies and First Nations.

The flow variance was repeated again in 2017 with the endorsement of the regulatory agencies. The study was extended to compare data from the 2017 Kokanee spawning flow variance. No additional funds are required.

7 Monitoring Programs and Physical Works Costs

The following table summarizes the Duncan Dam WUP monitoring programs and physical works costs approved by the CWR and the Actual Costs to March 31, 2019.

Table 7-1: Duncan Dam WUP Monitoring Programs and Physical Works 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
Duncan Dam WUP Annual Report	\$25,300	\$15,428	\$1,762	\$17,190	\$8,110		
DDMM01A Ramping Rate	\$247,883	\$127,173	\$6,101	\$133,274	\$114,609	Project complete - completion report outstanding	
DDMM01A Ramping Rate - ONR DM	\$34,639	\$18,849	\$6,101	\$24,950	\$9,689		
DDMM01A Ramping Rate - ONR Imp	\$213,244	\$108,324		\$108,324	\$104,920		
DDMM02A Low Duncan HabitatUse	\$566,815	\$502,057	\$6,101	\$508,158	\$58,657	Project complete - completion report outstanding	
DDMM02A Low Duncan HabitatUse - ONR DM	\$84,707	\$40,585	\$6,101	\$46,686	\$38,021		
DDMM02A Low Duncan HabitatUse - ONR Imp	\$482,108	\$461,472		\$461,472	\$20,636		
DDMM03A Low Duncan Hydraulic	\$674,088	\$591,098	\$82,990	\$674,088	\$0		
DDMM03A Low Duncan Hydraulic - ONR DM	\$88,037	\$93,306	\$6,101	\$99,407	(\$11,370)		
DDMM03A Low Duncan Hydraulic - ONR Imp	\$586,051	\$497,792	\$76,889	\$574,681	\$11,370		
DDMM04A Low Duncan Kokanee Sp	\$1,462,700	\$1,029,437	\$6,101	\$1,035,538	\$427,162	Project complete - completion report outstanding	
DDMM04A Low Duncan Kokanee Sp - ONR DM	\$148,850	\$78,412	\$6,101	\$84,513	\$64,337		
DDMM04A Low Duncan Kokanee Sp - ONR Imp	\$1,313,850	\$951,025		\$951,025	\$362,825		
DDMM05A Up Duncan Bull Study	\$436,738	\$370,408	\$6,101	\$376,509	\$60,229	Project complete - completion report outstanding	
DDMM05A Up Duncan Bull Study - ONR DM	\$88,738	\$58,843	\$6,101	\$64,944	\$23,794		
DDMM05A Up Duncan Bull Study - ONR Imp	\$348,000	\$311,564		\$311,564	\$36,436		
DDMM06A Low Duncan Bull Pass	\$280,970	\$93,135	\$6,101	\$99,236	\$181,734	Project complete - completion report outstanding	
DDMM06A Low Duncan Bull Pass - ONR DM	\$78,970	\$27,205	\$6,101	\$33,306	\$45,664		
DDMM06A Low Duncan Bull Pass - ONR Imp	\$202,000	\$65,930		\$65,930	\$136,070		
DDMM07A Low Duncan Water Qual	\$154,827	\$106,203	\$6,101	\$112,304	\$42,523	Project complete - completion report outstanding	
DDMM07A Low Duncan Water Qual - ONR DM	\$43,003	\$22,166	\$6,101	\$28,267	\$14,736		
DDMM07A Low Duncan Water Qual - ONR Imp	\$111,824	\$84,037		\$84,037	\$27,787		
DDMM08A Low Duncan Riparian	\$1,457,738	\$1,225,794	\$187,586	\$1,413,380	\$44,358	Efficiencies found during project implementation	
DDMM08A Low Duncan Riparian - ONR DM	\$192,758	\$132,133	\$17,271	\$149,404	\$43,354		
DDMM08A Low Duncan Riparian - ONR Imp	\$1,264,980	\$1,093,661	\$170,315	\$1,263,976	\$1,004		
DDMM09A LDR Mosquito Mon	\$730,574	\$571,509	\$6,101	\$577,610	\$152,964	Project complete - completion report outstanding	
DDMM09A LDR Mosquito Mon - ONR DM	\$122,310	\$114,938	\$6,101	\$121,039	\$1,271		
DDMM09A LDR Mosquito Mon - ONR Imp	\$608,264	\$456,571		\$456,571	\$151,693		
DDMM10A Res Seasonal Habitat	\$791,362	\$678,832	\$6,101	\$684,933	\$106,429	Project complete - completion report outstanding	
DDMM10A Res Seasonal Habitat - ONR DM	\$117,205	\$81,025	\$6,101	\$87,126	\$30,079		
DDMM10A Res Seasonal Habitat - ONR Imp	\$674,157	\$597,807		\$597,807	\$76,350		
DDMM11A Duncan Burbot	\$829,768	\$649,329	\$6,101	\$655,430	\$174,338	Project complete - completion report outstanding	
DDMM11A Duncan Burbot - ONR DM	\$173,632	\$61,190	\$6,101	\$67,291	\$106,341		
DDMM11A Duncan Burbot - ONR Imp	\$656,136	\$588,140		\$588,140	\$67,996		
DDMM12A Duncan Arch Assess	\$68,632	\$71,633	\$6,534	\$78,167	(\$9,535)	Project complete - completion report outstanding	
DDMM12A Duncan Arch Assess - ONR DM	\$21,870	\$27,104	\$6,534	\$33,638	(\$11,768)		
DDMM12A Duncan Arch Assess - ONR Imp	\$46,762	\$44,529		\$44,529	\$2,233		
DDMM13A Duncan Arch Monitor	\$306,185	\$245,646	\$6,534	\$252,180	\$54,005	Project complete - completion report outstanding	
DDMM13A Duncan Arch Monitor - ONR DM	\$79,579	\$66,740	\$6,534	\$73,274	\$6,305		
DDMM13A Duncan Arch Monitor - ONR Imp	\$226,606	\$178,906		\$178,906	\$47,700		
DDMM14A DuncanResRiparianWLD	\$578,836	\$405,500	\$11,784	\$417,284	\$161,552	Efficiencies found during project implementation	
DDMM14A DuncanResRiparianWLD - ONR DM	\$119,625	\$110,142	\$6,534	\$116,677	\$2,948		
DDMM14A DuncanResRiparianWLD - ONR Imp	\$459,211	\$295,357	\$5,250	\$300,607	\$158,604		
DDMM15A LDR Stranding Protocol	\$257,049	\$155,490	\$54,217	\$209,708	\$47,341	Efficiencies found during project implementation	
DDMM15A LDR Stranding Protocol - ONR DM	\$71,421	\$45,048	\$10,575	\$55,623	\$15,798		
DDMM15A LDR Stranding Protocol - ONR Imp	\$185,628	\$110,443	\$43,642	\$154,085	\$31,543		
DDMM16A LDR Stranding Assess	\$1,166,464	\$934,210	\$232,254	\$1,166,464	(\$0)		
DDMM16A LDR Stranding Assess - ONR DM	\$100,166	\$72,599	\$22,373	\$94,972	\$5,194		
DDMM16A LDR Stranding Assess - ONR Imp	\$1,066,298	\$861,611	\$209,881	\$1,071,492	(\$5,194)		
DDMM17A Duncan Res KoK Mon	\$248,583	\$110,638	\$50,251	\$160,889	\$87,694	Efficiencies found during project implementation	
DDMM17A Duncan Res KoK Mon - ONR DM	\$49,281	\$12,271	\$6,101	\$18,372	\$30,909		
DDMM17A Duncan Res KoK Mon - ONR Imp	\$199,302	\$98,367	\$44,150	\$142,517	\$56,785		
DDMW01A Argenta Slough Eros	\$735,777	\$220,085	\$506,534	\$726,619	\$9,158		
DDMW01A Argenta Slough Eros - ONR DM	\$69,080	\$63,388	\$6,534	\$69,922	(\$842)		
DDMW01A Argenta Slough Eros - ONR Imp	\$666,697	\$156,697	\$500,000	\$656,697	\$10,000		
DDMW02A Glacier Creek Boat	\$197,339	\$124,363	\$15,067	\$139,430	\$57,909	Efficiencies found during project implementation	
DDMW02A Glacier Creek Boat - ONR DM	\$71,139	\$37,787	\$5,067	\$42,854	\$28,285		
DDMW02A Glacier Creek Boat - ONR Imp	\$126,200	\$86,576	\$10,000	\$96,576	\$29,624		
DDMW03A Plan Nutrient Reten	\$1,496,979	\$1,397,422	\$99,556	\$1,496,979	\$0	Plan to extend program to WUPOR contingent on program evaluation within FWCP.	TOR revision to be submitted by September 2019.
DDMW03A Plan Nutrient Reten - ONR DM	\$40,979	\$11,775	\$6,078	\$17,853	\$23,126		
DDMW03A Plan Nutrient Reten - ONR Imp	\$1,456,000	\$1,385,648	\$93,478	\$1,479,126	(\$23,126)		
DDMW04A Action Plan Kokanee	\$241,650	\$64,479	\$42,151	\$106,630	\$135,020	Efficiencies found during project implementation	
DDMW04A Action Plan Kokanee - ONR DM	\$90,342	\$32,122	\$6,101	\$38,223	\$52,119		
DDMW04A Action Plan Kokanee - ONR Imp	\$151,308	\$32,357	\$36,050	\$68,407	\$82,901		

* Red values in parentheses denote overage.