BC Hydro
Power smart

Fisheries and Aquatic Habitat Management Plan Annual Report: Jan 1, 2020 to Dec 31, 2020

Site C Clean Energy Project

March 31, 2021

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1.0 Introduction

1.1 Background

The Fisheries and Aquatic Habitat Management Plan (FAHMP, or the Plan) describes the measures that will be used to mitigate the adverse effects of the Site C Clean Energy Project (the Project) on fish and fish habitat during the construction and operation of the Project. The Plan has been developed in accordance with the conditions of the Project's provincial Environmental Assessment Certificate (EAC #E14-02, or the EAC), including the EAC's Schedule B, and Federal Decision Statement issued for the Project, dated October 14, 2014 and reissued November 25, 2014 (the FDS). FDS conditions 8.3 to 8.7 refer to "a fish and fish habitat management plan", while EAC condition 4 refers to "a Fisheries and Aquatic Habitat Management Plan". Each refers to similar requirements for fish and fish habitat. For simplicity, BC Hydro developed one plan, entitled "Fisheries and Aquatic Habitat Management Plan" (FAHMP, or the Plan) that satisfies the conditions of both the EAC and the FDS. Revision 1 of the FAHMP was submitted on June 1, 2015, and is available on the Project's website[1].

As described in the FAHMP Section 7 and per the reporting requirement in condition 8.7 of the FDS – Implementation and Reporting, BC Hydro will provide annual reports on the implementation of the Plan to the Canadian Environmental Assessment Agency, now named the Impact Assessment Agency of Canada (the Agency). Condition 8.7 states:

> The Proponent shall implement the plan and provide to the Agency an analysis and summary of the implementation of the plan, as well as any amendments made to the plan in response to the results, on an annual basis during construction and for the first ten years of operation and once every five years for the next 20 years.

This report is submitted to satisfy Condition 8.7. BC Hydro previously submitted to the Agency annual reports for earlier reporting periods of Project construction. The reporting period for this report covers January 1, 2020 through December 31, 2020.

This report is part of a broader set of information that BC Hydro reports to the Agency, per the FDS, on the Project's construction and environmental management. For example, BC Hydro provides to the Agency 'Monthly Environmental Monitoring Summary Reports' (the Monthly Reports) as follows:

> "Under Section 2.1 of the Construction Environmental Management Plan (CEMP), BC Hydro must submit monthly reports on construction and environmental monitoring activities for the Site C Clean Energy Project to the Independent Environmental Monitor (IEM), the BC Environmental Assessment Office (BCEAO), and the Canadian Environmental Assessment Agency (CEA Agency). The reports must summarize:
>
> - Weekly information provided by contractor environmental monitors to BC Hydro;
> - Results of BC Hydro field inspections;
> - Environmental incidents and applicable corrective actions; and
> - Compliance of construction activities with the Environmental Requirements for the Project."

[1] Available at: https://www.sitec project.com/document-library/environmental-management-plans-and-reports

The Monthly Reports include information on many aspects of the Project's construction and environmental management. This report is specific to the implementation of mitigation measures for fisheries and aquatic habitat that are required under FDS conditions 8.3 to 8.7.

1.2 Status of Project Construction

Construction activities during the reporting period included components described in the Project's Environmental Impact Statement (Volume 1 Section 4 Project Description, sub-section 4.4 Construction).

Construction began at the Site C Project on July 27, 2015 and has been ongoing since. River diversion occurred in October 2020.

In 2020, substantive progress was made across the project. On the dam site, the main civil works contractor continued:

- Peace River diversion through two 750-metre-long tunnels into the north bank of the river
- earthfill dam construction continued with two cofferdams, which seal off the main channel of the river,
- excavation on the south bank,
- work on the spillway's roller-compacted concrete buttress,
- completion of the temporary fish passage facility

The generating station and spillways civil work contractor continued the placement of concrete in the powerhouse and continued the assembly and installation of the penstocks and intakes. Two of the six turbine runners were transported to site.

The first of two debris booms was installed across the Peace River, about three kilometres upstream of the Site C dam site. Work was completed on the debris management structure across the Moberly River. These piles are in addition to debris booms that are now in place on the Moberly and Peace Rivers and will protect the dam site from debris until the reservoir is filled.

The first of two new 500kV, 75-km transmission lines was completed and energized in fall 2020. The second transmission line is more than half finished. The Site C substation was completed in October 2020 and is now energized

Clearing of the 87 kilometre-long reservoir area continued the north and south banks of the Peace River. Clearing has been completed up to the middle reservoir area, west of Halfway River to Farrell Creek and up the Moberly River valley. Merchantable timber is being hauled to local mills, while non-merchantable timber is being disposed of or removed from site.

Construction continued on six segments of the Highway 29 realignment, between Hudson's Hope to Fort St. John. Construction is underway for all 30 kilometres of the highway that need to be realigned to accommodate the future reservoir.

Additional information on construction progress has been submitted to the Agency previously as part of BC Hydro's Monthly Reports. The Project's website[2] also provides information and

[2] 2 Information on construction activities available at the: https://www.sitecproject.com/construction-

regular updates on construction activities.

Construction of mitigation measures for fish and fish habitat continued in 2020. Construction of phase 1 of the fish habitat enhancement sites in side channels on the south bank of the Peace River downstream of the dam is complete (described in Section 3.5 of this report) and contouring of a mainstream bar continued (described in Section 3.4 of this report). Habitat enhancement at this site is described in the FAHMP Section 6.2.1.1, Peace River Channel Contouring and Side Channel Enhancement. Construction of the temporary upstream fish passage facility was completed in 2020 (section 3.8 of this report). The construction and operation of the upstream fish passage facilities is described in the FAHMP Section 6.2.2.2, Upstream Fish Passage.

1.3 Summary

Per FDS Condition 8.7, this report documents the measures to mitigate the adverse effects of the Project on fish and fish habitat during the reporting period (Tables 1 and 2). Standard mitigation measures and Project-specific mitigation measures were implemented to mitigate potential effects on fish and fish habitat in accordance with the implementation schedules in the FAHMP. BC Hydro audits compliance with these requirements by reviewing contractor Environmental Protection Plans (EPPs) and conducting audits and inspections during construction to verify implementation of the mitigation measures outlined in EPPs. The effective implementation of these measures was documented during most inspections. Corrective actions, where required, were identified and implemented.

Annual reporting will continue to document the implementation of the FAHMP. In addition, monitoring of physical habitat, lower trophic levels, fish abundance, and community composition under the Fisheries and Aquatic Habitat Monitoring and Follow-up Program (FAHMFP) will provide information to evaluate the effectiveness of these measures to mitigate potential effects on fish and fish habitat over the longer term.

activities/construction-bulletins

2.0 Fisheries and Aquatic Habitat Management Plan

The objective of this report (the Report) is to describe the mitigation measures implemented during this period to meet the reporting requirements of FDS condition 8.7. The Report follows the information in Section 7.0 Implementation and Reporting of the FAHMP.

Tables 1 and 2 outline the structure of the Report. These tables list the Conditions (and components of the Conditions), as well as the corresponding sections of the FAHMP that pertain to the Conditions. These tables also list whether components within the Conditions occurred or were implemented during the reporting period, and if so, the corresponding section in the Report that summarizes the implementation. Section 7 of the Report is an analysis of implementation of the Plan.

Table 1. Environmental Assessment Certificate Conditions and Relevant Plan Sections**.**

EAC Condition	Condition	Occurred During Construction Period for Report	Section in this Report	Plan Reference
FISH AND FISH HABITAT				
4	The EAC Holder must manage harmful Project effects on fish and fish habitats during the construction and operation phases by implementing mitigation measures detailed in a Fisheries and Aquatic Habitat Management Plan.	Described in rows below.	Described in rows below	Not Applicable
	The Fisheries and Aquatic Habitat Management Plan must be developed by a QEP	No. Occurred prior to the reporting period.	Not Applicable	This condition is addressed in FAHMP Section 8.0 Qualified Professionals
	The Fisheries and Aquatic Habitat Management Plan must include at least the following:	Described in rows below.	Described in rows below	Described in rows below

EAC Condition	Condition	Occurred During Construction Period for Report	Section in this Report	Plan Reference
	• Remove temporary structures as soon as they are no longer required.	Yes	Section 3.1	These conditions are addressed in Construction Environmental Management Plan (CEMP) Section 4.5, Fisheries and Aquatic Habitat Management.
	• Maintain a 15 m machine free zone adjacent to watercourses during reservoir clearing (as measured from the Ordinary High Water Mark).	Yes	Section 3.2	
	• Place material relocation sites (R5a, R5b, and R6) 15 m back from the mainstem to avoid affecting Peace River fish habitat.	Yes	Section 3.3	
	• Contour mainstream bars to reduce potential for fish stranding, as advised by FLNR.	Yes	Section 3.4	This condition is addressed in FAHMP Section 6.2.1.1, Peace River Channel Contouring and Side Channel Enhancement.
	• Incorporate fish habitat features into the final capping of material relocation sites upstream of the dam.	No, planned for implementation during subsequent stage of construction.	Not Applicable	This condition is addressed in FAHMP Section 6.2.3.4, Dam Site Material Relocation Site Enhancement.

EAC Condition	Condition	Occurred During Construction Period for Report	Section in this Report	Plan Reference
	• Contour and cap with gravels and cobble substrate the spoil area between elevations 455 m and 461 m to provide a productive fish habitat that will be available to fish during the operation phase.	No, planned for implementation during subsequent stage of construction.	Not Applicable	This condition is addressed in FAHMP Section 6.2.3.4, Dam Site Material Relocation Site Enhancement.
	• Include fish habitat features (e.g., shears, large riprap point bars, etc.) in the final design of the north bank haul road bed material that would be placed in the Peace River.	No, constructed and reported during previous reporting period.	Not Applicable	This condition is addressed in FAHMP Section 6.2.1.2, River Road Habitat Enhancement.
	• Incorporate fish habitat features into the final design of the Highway 29 roadway that would border the reservoir, east of Lynx Creek.	No, planned for implementation during subsequent stage of construction.	Not Applicable	This condition is addressed in FAHMP Section 6.2.3.2, Highway 29 Realignment Fish Habitat.
	• Construct the Hudson‘s Hope shoreline protection with large material that will provide	Yes	Section 3.5	This condition is addressed in FAHMP Section 6.2.3.3, Hudson’s Hope Shoreline

EAC Condition	Condition	Occurred During Construction Period for Report	Section in this Report	Plan Reference
	replacement fish habitat.	stage of construction.		Protection Fish Habitat.
	• Incorporate additional fish habitat features (e.g., shear zones and point bars) into the final design of the Hudson's Hope shoreline protection.	No, planned for implementation during subsequent stage of construction.	Not Applicable	This condition is addressed in FAHMP Section 6.2.3.3, Hudson's Hope Shoreline Protection Fish Habitat.
	• Contour Highway 29 borrow sites prior to decommissioning to provide littoral fish habitat in the reservoir.	Yes	Section 3.6	This condition is addressed in FAHMP Section 6.2.3.1, Site C Reservoir Shoreline Enhancement.
	• Cap material repositioning areas with gravel and cobble, and contour to enhance fish habitat conditions.	No, planned for implementation during subsequent stage of construction.	Not Applicable	This condition is addressed in FAHMP Section 6.2.3.4, Dam Site Material Relocation Site Enhancement.
	• Plant a 15 m wide riparian area along the reservoir shoreline adjacent to BC Hydro-owned farmland where necessary to provide riparian habitat and bank stabilization except as	No, planned for implementation during subsequent stage of construction.	Not Applicable	This condition is addressed in FAHMP Section 6.2.3.5, Reservoir Shoreline Riparian Planting.

EAC Condition	Condition	Occurred During Construction Period for Report	Section in this Report	Plan Reference
	approved by the onsite environmental monitor.			
	• Increase wetted habitat by creating new wetted channels and restoring back channels on the south bank island downstream of the dam.	Yes	Section 3.5	This condition is addressed in FAHMP Section 6.2.1.1, Peace River Channel Contouring and Side Channel Enhancement.
	• Enhance side channel complexes between the dam site and the confluence of the Peace and Pine rivers during low flows.	Yes	Section 3.5	This condition is addressed in FAHMP Section 6.2.1.1, Peace River Channel Contouring and Side Channel Enhancement.
	• Manage reservoir fluctuation within a 1.8 m maximum normal operating range from the maximum operating level of 461.8 m.	No. Will occur during Project operations.	Not Applicable	
	• If the reservoir deviates from the normal operating range, the EAC Holder must report the event in accordance	No. Condition applies to Project operations.	Not Applicable	

EAC Condition	Condition	Occurred During Construction Period for Report	Section in this Report	Plan Reference
	with water licence requirements.			
	The EAC Holder must manage construction footprints to reduce the harmful Project effects on fish and fish habitat, in accordance with the conditions of the applicable *Fisheries Act* authorization(s) and direction provided by FLNR.	Yes. Construction footprints were managed in accordance with the conditions of the applicable *Fisheries Act* authorizations.		
	This draft Fisheries and Aquatic Habitat Management Plan must be provided to FLNR, MOE and Aboriginal Groups for review a minimum of 90 days prior to commencement of construction.	No. Occurred prior to the reporting period.	Not Applicable	This condition is addressed in FAHMP Section 2.3 Consultation
	The EAC Holder must file the Final Fisheries and Aquatic Habitat Management Plan with EAO, FLNR, MOE and Aboriginal Groups a minimum of 30 days prior to commencement of construction.	No. Occurred prior to the reporting period.	Not Applicable	
	The EAC Holder must develop, implement			

EAC Condition	Condition	Occurred During Construction Period for Report	Section in this Report	Plan Reference
	and adhere to the Final Fisheries and Aquatic Habitat Management Plan, and any amendments, to the satisfaction of EAO.			

Table 2. Federal Decision Statement Conditions and Relevant Plan Sections.

FDS Condition	Condition	Occurred During Construction Period for Report	Section in this Report	Plan Reference
8.	**Fish and Fish Habitat**			
8.1	The Proponent shall undertake efforts to avoid or minimize adverse impacts to fish and fish habitat to ensure the continued availability of fisheries resources in the Local Assessment Area.	Yes, see rows below.	See rows below.	
8.2	The Proponent shall prepare and submit to the Agency an annual schedule identifying the location and timing of construction activities that may impact fish or fish habitat 90 days prior to such activities	Yes	Not applicable	Submitted under separate cover.

FDS Condition	Condition	Occurred During Construction Period for Report	Section in this Report	Plan Reference
	occurring.			
8.3.	The Proponent shall prepare, in consultation with Fisheries and Oceans Canada, Reservoir Area Aboriginal groups and Immediate Downstream Aboriginal groups, a fish and fish habitat management plan.	No. Occurred prior to the reporting period.	Not applicable	These conditions are addressed in the Fisheries and Aquatic Habitat Management Plan (FAHMP).
8.4	The Plan shall include:			
8.4.1.	Identification of baseline conditions for fish and fish habitat in the Local Assessment Area;	No. Occurred prior to the reporting period	Not applicable	This condition is addressed in FAHMP Section 4.0, Fish and Fish Habitat Baseline Conditions.
8.4.2.	Measures to mitigate potential effects on fish and fish habitat during construction and operation of the Designated Project including:	Yes, see rows below.	See rows below.	This condition is addressed in FAHMP Section 6.0, Fish and Fish Habitat Mitigation.
8.4.2.1.	Erosion and sediment control measures, riparian zone avoidance measures, best practices for watercourse crossings, in-stream work guidelines, and in-stream work timing windows;	Yes	Section 3.6	These conditions are addressed in CEMP Section 4.5, Fisheries and Aquatic Habitat Management.

FDS Condition	Condition	Occurred During Construction Period for Report	Section in this Report	Plan Reference
8.4.2.2.	Measures to avoid or reduce fish stranding;	Yes	Section 3.7	This condition is addressed in CEMP Section 4.5, Fisheries and Aquatic Habitat Management. See also FAHMP 6.2.1.1, Peace River Channel Contouring and Side Channel Enhancement.
8.4.2.3.	Operational practices, technologies and design features that minimize downstream fish entrainment past the dam site;	No, planned for implementation during subsequent stage of construction.	Not Applicable	This condition is addressed in FAHMP Section 6.2.2.1, Fish Entrainment.
8.4.2.4.	Measures to mitigate the effects of Total Dissolved Gas concentrations in tailwater on fish; and	No, planned for implementation during subsequent stage of construction.	Not Applicable	This condition is addressed in FAHMP Section 6.2.2.3, Mitigation of Total Dissolved Gas.
8.4.2.5.	Measures to mitigate obstructed upstream fish passage for bull trout and, as appropriate and feasible, other migrating fish species;	Yes	Section 3.8	This condition is addressed in FAHMP Section 6.2.2.2, Upstream Fish Passage.
8.4.3.	An approach to monitor changes to fish and fish habitat baseline	Yes	Section 3.9	The approach is summarized in FAHMP Section 2.2, Scope as well

FDS Condition	Condition	Occurred During Construction Period for Report	Section in this Report	Plan Reference
	conditions in the Local Assessment Area;			in the monitoring programs listed in Appendix D. Further information on monitoring is provided in the Fisheries and Aquatic Habitat Monitoring and Follow-up Program.
8.4.4.	An approach to monitor and evaluate the effectiveness of mitigation or offsetting measures and to verify the accuracy of the predictions made during the environmental assessment on fish and fish habitat; and	Yes, monitoring and evaluation occurred per the approach in the Project's Fisheries and Aquatic Habitat Monitoring and Follow-up Program.	Section 3.9	The approach is summarized in FAHMP Section 2.2, Scope as well in the monitoring programs listed in Appendix D. Further information on monitoring is provided in the Fisheries and Aquatic Habitat Monitoring and Follow-up Program.
8.4.5.	Any other requirements identified by Fisheries and Oceans Canada in support of its application for an authorization under the *Fisheries Act*.	Not applicable	Section 3.10	To date, Fisheries and Oceans Canada has not identified other requirements in support of an application for an authorization under the *Fisheries Act*. Should DFO identify other requirements, these will be taken into account in

FDS Condition	Condition	Occurred During Construction Period for Report	Section in this Report	Plan Reference
				amendments to the plan, as described in condition 8.7
8.5.	The Proponent shall submit a draft copy of the plan to the Agency, Fisheries and Oceans Canada, Reservoir Area Aboriginal groups and Immediate Downstream Aboriginal groups 90 days prior to submitting its application for authorization under the *Fisheries Act*.	No. Occurred prior to the reporting period.	Not Applicable	This condition is addressed in FAHMP Section 2.3 Consultation
8.6.	The Proponent shall submit to the Agency the final plan a minimum of 30 days prior to submitting its application for authorization under the Fisheries Act. When submitting the final plan, the Proponent shall provide to the Agency an analysis that demonstrates how it has appropriately considered the input, views or information received from Fisheries and Oceans Canada, Reservoir Area Aboriginal groups and Immediate Downstream Aboriginal groups and shall describe how it has taken the plan into consideration as part of its application for an	No. Occurred prior to the reporting period.	Not Applicable	This condition is addressed in FAHMP Section 2.3 Consultation

FDS Condition	Condition	Occurred During Construction Period for Report	Section in this Report	Plan Reference
	authorization under the Fisheries Act.			
8.7.	The Proponent shall implement the plan and provide to the Agency an analysis and summary of the implementation of the plan, as well as any amendments made to the plan in response to the results, on an annual basis during construction and for the first ten years of operation and once every five years for the next 20 years.	Yes	This report addressed Condition 8.7	This condition is addressed in FAHMP Section 7 Reporting
8.8	The Proponent shall develop an offsetting plan, in consultation with Fisheries and Oceans Canada, to offset residual serious harm to fish and monitor the effectiveness of offsets.	No, plan developed during a previous reporting period.	Section 3.11	Offsetting plans were submitted as a component of the applications for authorization under the Fisheries Act. Information from offsetting plans was submitted to CEAA as described under FDS Condition 8.9.
8.9	The Proponent shall conduct an analysis for any physical fish habitat offsets proposed in the offsetting plan, in consultation with Transport Canada, Environment Canada, Reservoir Area Aboriginal groups and Immediate Downstream	No, occurred during a previous reporting period.	Section 3.12	These conditions were met in a separate analysis.

FDS Condition	Condition	Occurred During Construction Period for Report	Section in this Report	Plan Reference
	Aboriginal groups, that includes:			
8.9.1	the effects on migratory birds and their habitats;			
8.9.2	the effects on terrestrial species and their habitats;			
8.9.3	the effects on species at risk and species at risk habitat;			
8.9.4	the effects on current use of lands and resources for traditional purposes by Aboriginal peoples;			
8.9.5	identification of navigation impacts; and			
8.9.6	identification of potential sources of contamination (e.g. mercury).			

FDS Condition	Condition	Occurred During Construction Period for Report	Section in this Report	Plan Reference
8.10	The Proponent shall submit to the Agency the results of the analysis in condition 8.9, including a description of how the input, views or information received have been taken into account in finalizing its fish habitat offsetting plan.	No, occurred during a previous reporting period.	Section 3.12	This condition was met in a stand-alone document that was submitted to CEAA on June 24, 2016 prior to implementing the offsetting plan.

3.0 Summary of Plan Implementation

Section 3.1 "Remove temporary structures as soon as they are no longer required."

Temporary bridges used to access areas for reservoir clearing were removed once clearing activities were completed. In some circumstances, components of temporary instream structures are retained. This occurs when retaining the structure is assessed to provide a potential benefit to fish and fish habitat, and/or removing the structure would cause additional disturbance to fish habitat.

Section 3.2 "Maintain a 15 m machine free zone adjacent to watercourses during reservoir clearing (as measured from the Ordinary High Water Mark)."

Reservoir clearing occurred during the reporting period. In February 2019, BC Hydro received an EAC amendment (EAC Amendment #4) allowing for the use of machines adjacent to watercourses during reservoir clearing when worker safety prohibits manual tree falling and vegetation removal methods. Works must be addressed in a site-specific prescription prepared and endorsed by a QEP. The rationale for the safety exemption must be documented in the prescription.

Section 3.3 "Place material relocation sites (R5a, R5b, and R6) 15 m back from the mainstem to avoid affecting Peace River fish habitat."

Development of Relocated Surplus Excavated Material (RSEM) areas R5a, R5b and R6 commenced greater than 15 m back from the mainstem to avoid affecting Peace River fish habitat.

Section 3.4 "Contour mainstream bars to reduce potential for fish stranding, as advised by FLNR."

Peace River Channel Contouring and Side Channel Enhancement (described in FAHMP Section 6.2.1.1) are scheduled to occur over many years, per the schedule in the FAHMP. Contouring of some bar areas occurred during previous reporting periods. Construction works to contour a mainstream bar in the Peace River occurred during the reporting period. As well, physical and biological monitoring of the previously contoured bar occurred during the reporting period, in accordance with the FAHMFP.

Section 3.5 " Construct the Hudson's Hope shoreline protection with large material that will provide replacement fish habitat."

Construction of the Hudson's Hope shoreline protection, including riprap placement in the Peace River, began in September 2020. Riprap will provide cover habitat for fish species such as rainbow trout, and a diversity of habitat relative to the predominantly sandy shoreline in these areas of the Site C reservoir.

Section 3.6 " Contour Highway 29 borrow sites prior to decommissioning to provide littoral fish habitat in the reservoir."

The "Peaceview" Highway 29 borrow area near Cache Creek will be contoured to provide reservoir littoral zone habitat between elevation 456 m and 459.75 m. Works at this borrow area occurred during 2020 and are ongoing. Reservoir littoral habitat development is described in the FAHMP Section 6.2.3.1, Site C Reservoir Shoreline Enhancement.

Section 3.7 "Increase wetted habitat by creating new wetted channels and restoring back channels on the south bank island downstream of the dam. Enhance side channel complexes between the dam site and the confluence of the Peace and Pine rivers during low flows."

Construction of the fish habitat enhancement sites in side channels on the south bank of the Peace River downstream of the dam site began in 2018. Habitat enhancement at this site is described in the FAHMP Section 6.2.1.1, Peace River Channel Contouring and Side Channel Enhancement. Construction of phase 1 was complete in December 2019.

Section 3.8 "The Plan shall include: Erosion and sediment control measures, riparian zone avoidance measures, best practices for watercourse crossings, in-stream work guidelines, and in-stream work timing windows."

These measures are listed in the CEMP Section 4.5, Fisheries and Aquatic Habitat Management. The CEMP specifies the requirements for site-specific EPPs that are developed for specific components of work. BC Hydro audits compliance with this requirement by reviewing contractor EPPs and conducting environmental audits during construction to verify implementation of the EPPs. In addition, BC Hydro has implemented an enhanced site-wide erosion and sediment control program that requires assessment of sites and preparation of detailed prescriptions by Qualified Erosion and Sediment Control Professionals and overseeing installation of measures by these professionals and ongoing re-inspections. Environmental issues and associated corrective actions reported during environmental monitoring and compliance auditing are described in the BC Hydro Monthly Environmental Monitoring Summary Reports. Monthly reports for 2020 have been submitted to the Agency.

Suspended sediment levels in the Peace River, as well as inputs to the Peace River as a result of construction, were monitored during the reporting period and indicated that construction inputs were low relative to the background suspended sediment levels. These results are consistent with past years and predictions in the Project's Environmental Impact Statement (EIS). Baseline suspended sediment load in the Peace River at the dam site is estimated at 1,136,000 tonnes / year, and increases to 3,540,000 tonnes / year downstream of the Pine River confluence (Table 5.3 and Fig 5.3a of the EIS, Vol 2 Appendix I Fluvial Geomorphology and Sediment Transport Technical Data Report). Over the ten-year construction phase, fine sediment inputs related to instream construction activities would represent an estimated increase of 0.2% to 0.3% above mean annual baseline sediment load immediately downstream of the Site C dam site (EIS Volume 2 Appendix I).

During the reporting period there were environmental incidents and near misses related to fish and fish habitat (summarized in Table 4). No adverse effects on fish and fish habitat resulted from these incidents.

Table 4: Environmental incidents and near misses related to fish and fish habitat in 2020.

Incident Date	Description of Events/Corrective Actions
January 22, 2020	A dozer operator pushed snow into the riparian area along the top of the river adjacent to a Highway 29 realignment laydown area. Clearing was stopped and the boundaries for clearing/stripping were discussed with crew. The snow was removed from boundary.
January 28, 2020	During reservoir clearing, a fish bearing watercourse was crossed by machinery without the completion and implementation of a mitigation plan from the QEP, which is a hold point requirement in the site-specific EPP.
January 31, 2020	Fording at a reservoir clearing location had been planned to occur as part of a scheduled decrease in water flow in the Peace River, however, the machines crossed the channel prior to the environmental monitor being on site. The following Peace River Middle Reservoir Clearing Crossing mitigation plan measures were not followed during the crossing:1) corduroy was not placed on the banks of the channel, 2) machine tracks were not cleaned prior to crossing, and 3) Side by Side was not equipped with biofluids. No remediation was necessary after two weeks of site monitoring.
March 20, 2020	During Highway 29 realignment activities a site on the Halfway River was used to withdraw approximately 9000 L of water prior to the start date of the Permit. The pump was immediately removed, and the contractor was made aware of permit conditions.
March 26, 2020	During the evening of March 25 (approximately 7pm) until the morning of March 26 (approximately 7am), upstream flows from the Peace Canyon Dam reduced from 1,800 m^3s to approximately 400 m^3s. This allowed for the causeway to be connected from the mainland to the adjacent Gates Island. This connection lowered the channel depth downstream of the causeway. At 12pm on March 26, following the protocols in the Causeway Construction Fish Salvage Plan, the environmental monitor was searching pools and the shoreline for stranded fish. The environmental monitor came across an area of river bed that had dried up directly downstream of the causeway. Approximately 40 sculpin casualties were observed on the dry riverbed, however, the environmental monitor was unable to immediately enter the area as the causeway was not sufficiently stable to ensure worker safety. Fish salvage efforts in accordance with the fish salvage plan began the following morning (March 27) when the causeway was deemed stable.

April 14, 2020	Intermittent overwhelming of a sump within the dam site construction area resulted in varying quantities of sediment laden water reaching the L3 Creek channel. Crew responded immediately and established the appropriate measures to prevent further sump over-topping during melt or heavy rain events. Increased communication between involved parties was discussed to prevent future occurrences.
April 13, 2020	The environmental monitor discovered fifteen fish mortalities associated with the dam site right bank cofferdam work. The mortalities were likely due to a poor cofferdam seal caused by the channel bottom substrate. Minor flow was observed between two sandbags, allowing the fish to enter the coffer dam area or be trapped on the exterior side of the coffer dam. The environmental monitor advised the crew to place clean drain rock against the inside of the cofferdam on both ends in attempts to seal it. This was completed and monitoring for fish mortalities continued; no additional mortalities were identified.
June 15, 2020	The environmental monitor was notified of the release of construction contact water to the Peace River from within the dam site area on the left bank of the Peace River Debris Boom. High flows within the Peace River encroached into the construction area and inundated the temporary erosion and sediment control measures (e.g. silt fence and check dams) and storm water from areas within the left bank flowed into the Peace River. Improvements to erosion and sediment control measures were made commencing June 19, 2020 once the left bank was safe to access.
June 20, 2020	Within the dam site area approximately 5 L of bio-hydraulic oil was spilled to the Peace River and up to 50 L spilled to ground due to mechanical failure on an excavator. Work was immediately shut down and spill kits deployed to contain the spill. Contaminated water and soil was removed.
June 30, 2020	A spill to the Peace River occurred at the Diversion Inlet Portal river excavation within the dam site area. Approx. 5 L of bio-hydraulic oil was released due to mechanical failure on a boom. Approx. 70 L was released with the majority being confined to the work pad. Work was immediately shut down and emergency response procedures put in place. Contaminated soil was recovered.
July 18, 2020	During significant rainfall, perimeter controls within the transmission line replacement area were overwhelmed and sediment laden water was deposited into the adjacent riparian area and watercourse. Remediation of the site commenced immediately with perimeter topsoil and mulch placed back onto the work area to minimize further erosion and sedimentation. Surface runoff from the laydown area was redirected away from the structure area to limit the volume of water infiltrating the site. Surface seeding was conducted to promote stabilization.

September 30, 2020	Installed culverts in a reservoir clearing approach causeway which was not identified in the crossing mitigation plan. The contractor removed the culverts and installed a short bridge as per the mitigation plan. The contractor will also initiate a pre-work meeting with BC Hydro for all bridge crossing construction.
November 14, 2020	Equipment forded a reservoir clearing crossing without a mitigation plan in place. The contractor was notified of the absence of appropriate documentation and a mitigation plan was developed.
December 20, 2020	During dredging of a Peace River mainstem bar fish habitat enhancement directly downstream of the dam site an excavator entered the Peace River after the bank sloughed away during dredging operations. Environmental and safety personnel responded with spill mitigation materials but they were not required as no leaks have been detected to date.

Section 3.9 "The Plan shall include: Measures to avoid or reduce fish stranding."

The contouring of mainstem bars (described in the Section 3.4) has reduced the risk of fish stranding by reducing the area of the bars that dewaters when discharge in the Peace River fluctuates.

Section 3.10 "Measures to mitigate obstructed upstream fish passage for bull trout and, as appropriate and feasible, other migrating fish species."

A combined approach of water velocity monitoring and radio telemetry confirmed that fish passage conditions were maintained in the Peace River during the installation of the rockfill berm and upstream and downstream cofferdams prior to Peace River Diversion.

Fish passage management was implemented as described in the Fish Passage Management Plan and FAHMP Section 6.2.2.2, Upstream Fish Passage. River diversion represented the first activity in the construction of the Project to affect upstream fish movement in the Peace River. As such, the temporary upstream fish passage facility was operated in October 2020 to pass fish upstream and allow them to fulfill portions of their lifecycles upstream of the Project. In general the operation of the temporary upstream fish passage facility was effective at providing for the upstream passage of fish. Seventy-one fish were sorted and sampled at the temporary facility – 70 of the 71 fish were transported and released due to a single mortality identified at release. Specifically, the facility operator sorted 63 Mountain Whitefish, 6 Longnose Sucker, 1 Arctic Grayling, and 1 Slimy Sculpin. More details can be found in the operations report for October 2020 (Attachment 1).

Section 3.11 "The Plan shall include: An approach to monitor changes to fish and fish habitat baseline conditions in the Local Assessment Area.

An approach to monitor and evaluate the effectiveness of mitigation or offsetting measures and to verify the accuracy of the predictions made during the environmental assessment on fish and fish habitat."

BC Hydro developed and implemented the FAHMFP[3] to monitor changes in habitat conditions in the Local Assessment Area and the effectiveness of mitigation and offsetting measures, and to verify the predictions made during the environmental assessment. The general monitoring approach in the FAHMFP is to monitor changes in baseline conditions in the Local Assessment Area for physical habitat, lower trophic levels, fish abundance, and community composition. This information will be used to evaluate the effectiveness of Project mitigation or offsetting measures and verify the accuracy of predictions made during the Environmental Assessment. Monitoring under the FAHMFP in 2020 will be summarized in BC Hydro's report: Fisheries and Aquatic Habitat Monitoring and Follow-up Program Annual Report: Jan 1, 2020 to Dec 31, 2020. Previous reports under the FAHMFP are available on the Project website[4].

[3] Available at: https://www.sitecproject.com/document-library/environmental-management
[4] Available at: https://www.sitecproject.com/sites/default/files/Fisheries%20and%20Aquatic%20Habitat%20Monitoring%20and%20Follow-up%20Program%202020%20Annual%20Report.pdf

Section 3.12 "The Plan shall include: Any other requirements identified by Fisheries and Oceans Canada in support of its application for an authorization under the Fisheries Act."

Fisheries and Oceans Canada has not identified other requirements in support of an application for an authorization under the *Fisheries Act* in addition to those in the FAHMP.

Section 3.13 "The Proponent shall develop an offsetting plan, in consultation with Fisheries and Oceans Canada, to offset residual serious harm to fish and monitor the effectiveness of offsets."

Offsetting plans were developed in consultation with Fisheries and Oceans Canada, and are described in:

1. "Section 9.0 Offsetting Plan" of the document titled "DFO – Application for Authorization Site Preparation – Site C Clean Energy Project British Columbia Hydro and Power Authority"
2. "Section 9.0 Offsetting Plan" of the document titled "DFO – Application for Authorization Dam Construction, Reservoir Preparation, and Filling – Site C Clean Energy Project British Columbia Hydro and Power Authority"

Section 3.14 Conditions 8.9 and 8.10 refer to "an analysis for any physical fish habitat offsets proposed in the offsetting plan."

The analysis of physical fish habitat offsets[5] was completed and submitted to the Agency during a previous reporting period.

[5] "Site C Clean Energy Project, Site Preparation: Environmental Analysis of Physical Fish Habitat Offsets" dated Aug 5, 2015 and "Site C Clean Energy Project, Dam Construction, Reservoir Preparation and Filling: Environmental Analysis of Physical Fish Habitat Offsets" dated June 24, 2016.

4.0 Analysis of Plan Implementation

The FAHMP describes the following categories of measures:

- Standard mitigation measures during construction activities described in the CEMP (e.g., erosion and sediment control measures); and
- Project-specific mitigation measures described in the FAHMP (e.g., habitat enhancements for reservoir shoreline habitat enhancement works, capping of dam site material relocation site with fish habitat features).

During the reporting period, both standard mitigation measures and Project-specific mitigation measures were implemented to mitigate potential effects on fish and fish habitat.

Monitoring of physical habitat, lower trophic levels, fish abundance, and community composition under the FAHMFP will provide information to evaluate the effectiveness of these measures to mitigate potential effects on fish and fish habitat over the longer term.

5.0 Revisions to the Plan

No revisions to the Fisheries and Aquatic Habitat Management Plan have been required since Revision 1 dated June 1, 2015.

6.0 Qualified Professionals

This report was prepared by the following Qualified Individuals:

Qualified Individual	Expertise
Brent Mossop, MRM, RPBio	Fisheries
Dave Hunter, RPBio	Fisheries

Figure 1. Temporary Peace River side channel crossings within middle reservoir clearing area. On site Qualified Environmental Professionals in place and site specific mitigation plans (September 26, 2020).

Figure 2. Within the dam site construction area all in-river machines are regularly checked for any signs of over greasing (August 11, 2020).

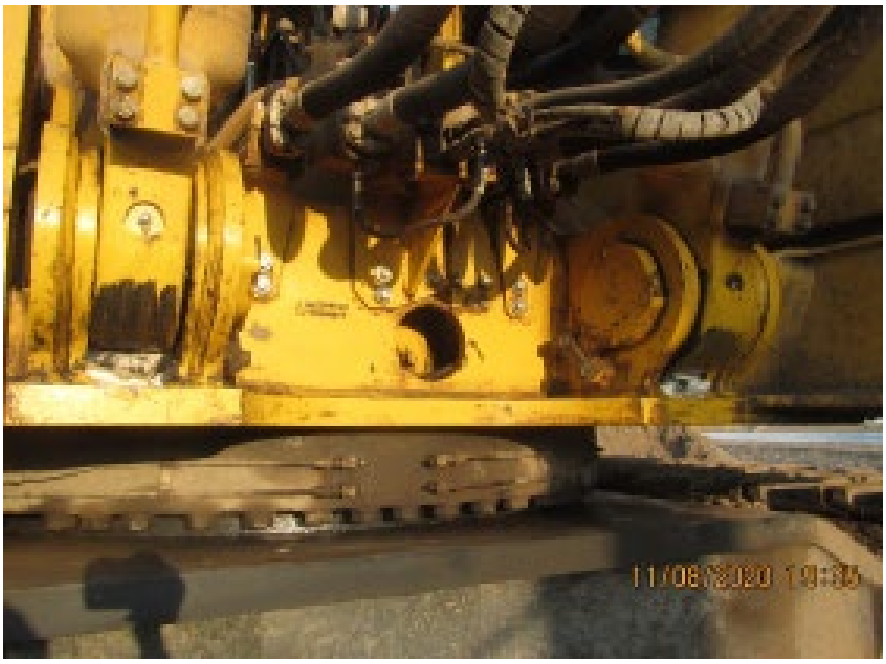


Figure 3. Spill prevention measures, including floating boom, within the dam site construction area adjacent to the Peace River (May 31, 2020).

Figure 4. BC Hydro operated the temporary upstream fish passage facility during the month of October (October 2, 2020).

Figure 5. Diversion inlet pumps and containment. Water was pumped from the Peace River into the diversion inlet cofferdam area to balance water levels in preparation for removal of the inlet cofferdam (August 29, 2020).

Figure 5. Rockfill berm extends from each bank of the Peace River to support river diversion. On site Qualified Environmental Professionals in place to ensure measures, including slow starts, controlled pace, and continuous of advancement, were being following to deter fish from active work areas (September 30, 2020; from south bank looking west).

Figure 6. Contouring of Peace River mainstem bar downstream of the dam site (October 5, 2020; from south bank looking west).

Attachment #1

Temporary Upstream Fish Passage Facility
Operations Report

Reporting Period: October 1 to 31, 2020

BC Hydro
Power smart

Site C Clean Energy Project

Temporary Upstream Fish Passage Facility Operations Report

Reporting Period: October 1 to 31, 2020

Prepared by BC Hydro

Submitted January 21, 2021

Introduction

BC Hydro diverted the Peace River through two diversion tunnels on the left bank of the dam site during the fall of 2020. River diversion represented the first activity in the construction of the Site C Clean Energy Project (the Project) to affect upstream fish movement in the Peace River (EIS, Volume 2, Appendix Q[3]). As such, the temporary upstream fish passage facility (hereafter temporary facility) was operated to pass fish upstream and allow them to fulfill portions of their lifecycles upstream of the Project.

Note that the temporary facility will operate during the river diversion phase of construction (2020 to 2023) on the left bank of the Peace River at the outlet of the diversion tunnels (Map 1). BC Hydro intends to operate the temporary facility from April 1 to October 31 each year based on the timing of fish movements in the Peace River and to avoid damaging mechanical equipment during cold weather conditions from November to March. Following the closure of the diversion tunnels and reservoir filling in the fall of 2023, the permanent upstream fish passage facility will be operated at the outlet of the generating station to provide fish passage during the operation phase of the Project.

The following sequence of construction activities related to upstream fish passage milestones occurred in 2020:

- Diversion outlet cofferdam was breached on September 11 (Photo 1), providing a connection between the Peace River and the diversion tunnel outlet (Photo 2);
- Commissioning of the temporary facility from September 23 to 30 (Photo 3). Facility operator opened the trap at the top of the fishway (referred to as a 'vee-trap'), which allowed fish to swim into the pre-sort holding pool and be available for crowding into the sorting facility;
- Diversion tunnel gates were opened on September 30 (Photo 4), which started to divert the Peace River through the diversion tunnels;
- River closure occurred on October 3 (Photo 5) with the final rip rap placement of the rockfill berm across the Peace River; and
- Operation of the temporary facility from October 1 to 31.

Fish were able to continue to naturally swim past the dam site in the Peace River until October 3.

Structure of the report

This report summarizes the data and information presented in weekly reports prepared by the facility operator, as described in the Manual of Operational Parameters and Procedures (OPP), and covers the full extent of operations in 2020. Operations in 2020 were limited to the month of October, as pre-commisioning and commissioning occurred in September and the facility was shutdown following the last day of operation on October 31.

This report has the following sections:

- Biological operation;
- Environmental conditions;
- Mechanical operation;
- Adjustments; and
- Photos.

Biological operation is defined as the sorting, sampling, tagging, transport and release of fish (Photos 6 to 10). Mechanical operation is defined as the operation of the pumps, gates, crowder, lock, sensors, loggers, and other mechanical equipment (Photos 11 to 13) to ensure the temporary facility achieves the biological

[3] Available at: https://www.ceaa-acee.gc.ca/050/documents_staticpost/63919/85328/Vol2_Appendix_Q.pdf

objectives described in Section 4.1 of the Fish Passage Management Plan[4].

Summary

In general the operation of the temporary facility during the first month of operations was effective at providing for the upstream passage of fish. Seventy-one fish were sorted and sampled at the temporary facility – 70 of the 71 fish were transported and released due to a single mortality identified at release (Table 1). Specifically, the facility operator sorted 63 Mountain Whitefish, 6 Longnose Sucker, 1 Arctic Grayling, and 1 Slimy Sculpin. Following the sampling and tagging procedures of the OPP, sixty-three fish were PIT tagged and 23 fish were sampled for genetics, microchemistry and/or ageing (Table 1).

No fish were sorted during commissioning despite the vee-trap being open and the operation of the temporary facility mimicking normal operations. Fish may not have been attracted to the temporary facility and the diversion tunnel outlet until the river was closed and the Peace River flowed solely through the diversion tunnels.

Several adjustments were made to improve the biological and mechanical operation of the temporary facility. Adjustments will be reflected in an updated revision of the OPP for operations in 2021.

BC Hydro shared information related to the operation of the temporary facility through a number of venues:

- Presentation to the Peace Williston Advisory Committee on September 18;
- Tour representatives from Fisheries and Oceans Canada and the Ministry of Forests, Lands and Natural Resource Operations and Rural Development on September 25 and November 3;
- Presentation to Indigenous groups at Environmental Forum #13 on October 14; and
- Tour representatives from the Halfway River First Nation, Blueberry River First Nation, Saulteau First Nation, Doig River First Nation, Prophet River First Nation, McLeod Lake Indian Band, and Métis Nation British Columbia on September 23 and November 4 (Photo 14).

Appendix I provides a high-level summary of operation of the temporary facility during the reporting period.

Appendix II summarizes the total flow diverted from the Peace River to operate the temporary facility during the reporting period.

[4] Available at: http://sitecproject.com/sites/default/files/Fish%20Passage%20Management%20Plan.pdf

Biological operation

In total, 71 fish were sorted in the temporary facility during the reporting period (Table 1). Two mortalities – both Mountain Whitefish – were observed during the reporting period (3% of all fish sorted in 2020), which is in-line with the anticipated levels of mortality during operations[5]. One mortality was identified at release while the other occurred in the sorting facility during sampling.

Table 1. Total number of fish sorted, sampled, transported and released during the reporting period.

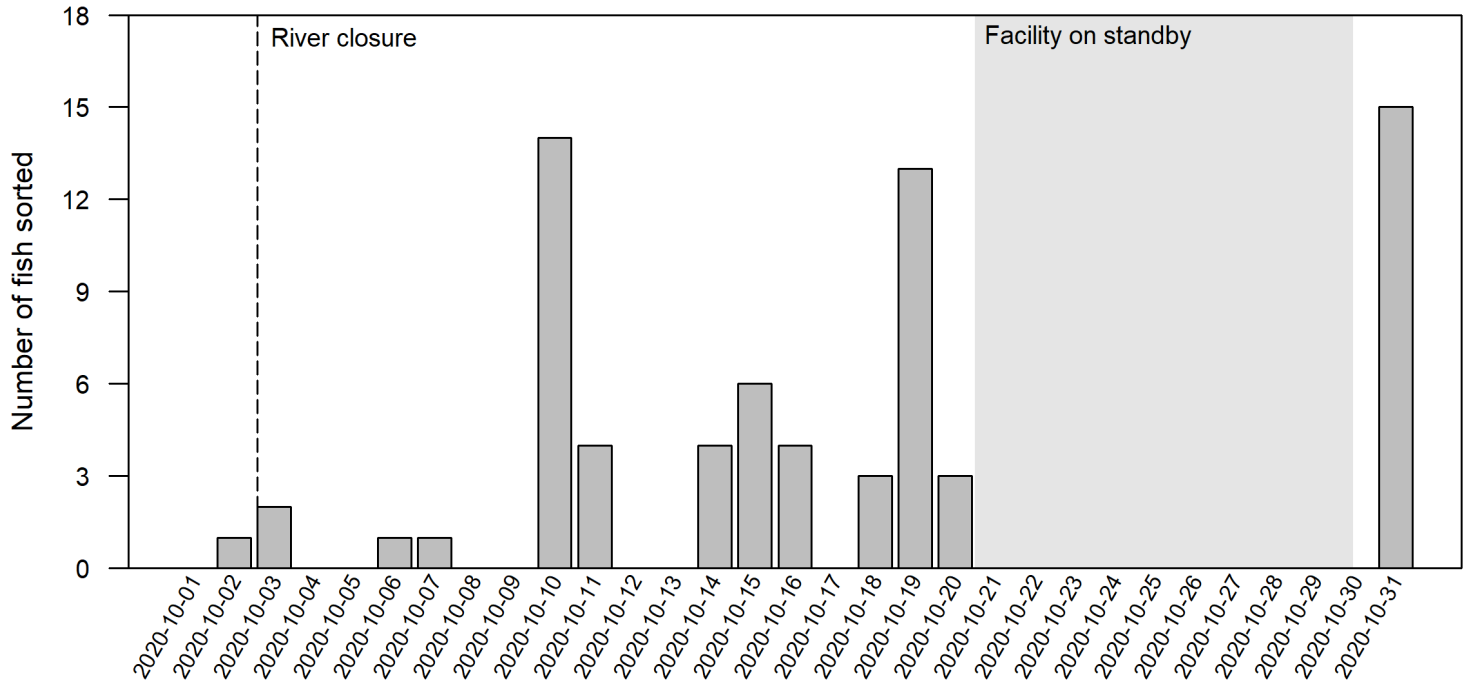
Species	Sorted	Transported and released	PIT tagged	Mortalities	Genetics	Microchemistry or ageing
Arctic Grayling	1	1	1		1	1
Brook Stickleback						
Brook Trout						
Bull Trout						
Burbot						
Finescale Dace						
Flathead Chub						
Goldeye						
Kokanee						
Lake Chub						
Lake Trout						
Lake Whitefish						
Largescale Sucker						
Longnose Dace						
Longnose Sucker	6	6	6		N/A	N/A
Mountain Whitefish	63	62	58	2	N/A	20
Northern Pike						
Northern Pikeminnow						
Northern Redbelly Dace						
Peamouth						
Pearl Dace						
Prickly Sculpin						
Pygmy Whitefish						
Rainbow Trout						
Redside Shiner						
Slimy Sculpin	1	1	N/A		1	N/A
Spoonhead Sculpin						
Spottail Shiner						
Trout-perch						
Walleye						
White Sucker						
Yellow Perch						
Grand total	71	70	65	2	2	21

Not all fish species were PIT tagged or sampled for genetics, microchemistry, or ageing, as described in the OPP.

[5] The FAA for Main Civil Works and Facility Operations (15-HPAC-01160) describes an acceptable level of incidental mortality to be no more than 5% of the total number of fish sorted in the temporary facility on an annual basis.

The facility operator sorted the first fish – a Longnose Sucker – in the temporary facility on October 2 (Photo 7). Between zero and 15 fish were sorted daily during the reporting period (Figure 1). Note that the facility was on standby from October 20 to 30 due to cold weather conditions[6], as shown in Figure 3 and described in Table 3.

Figure 1. Daily number of fish sorted in the temporary facility during the reporting period.

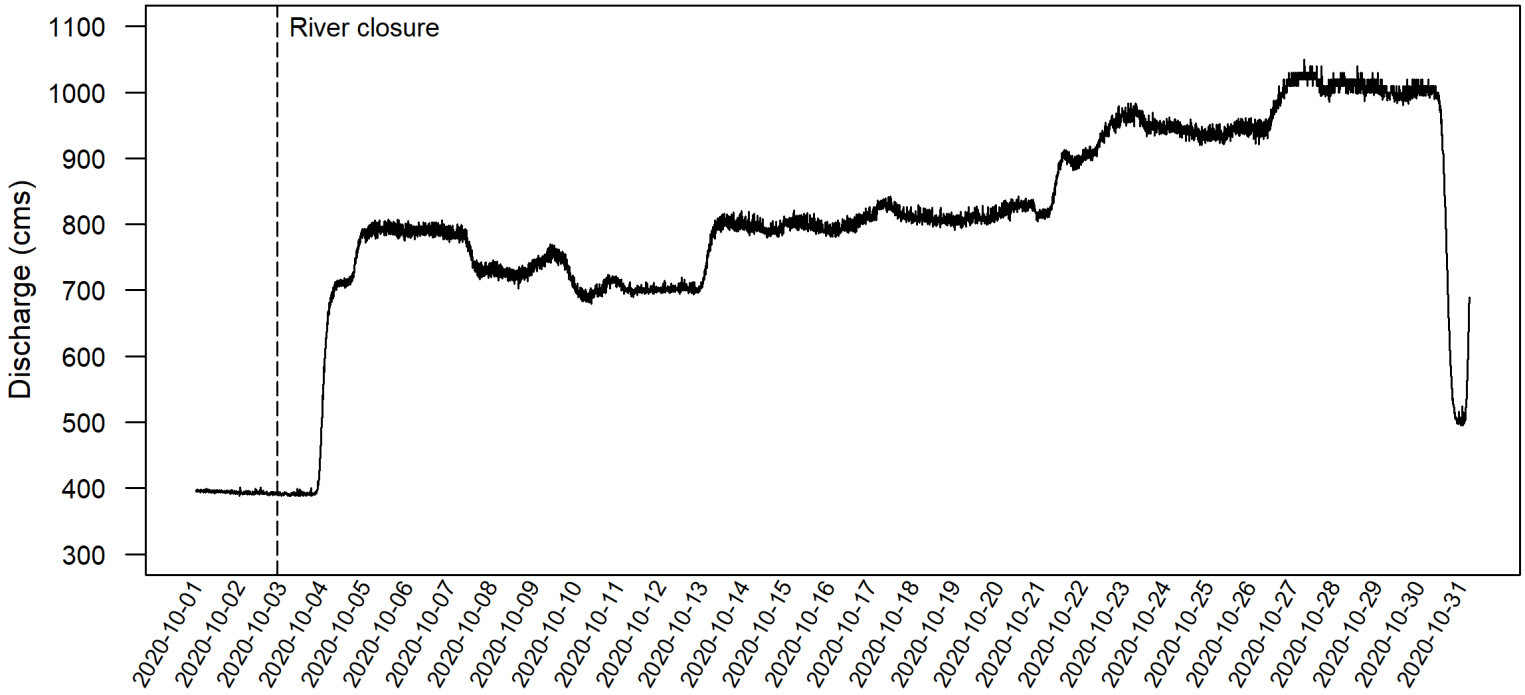


[6] Cold weather conditions were described in Section 3.1.3.3 of the OPP.

Environmental conditions

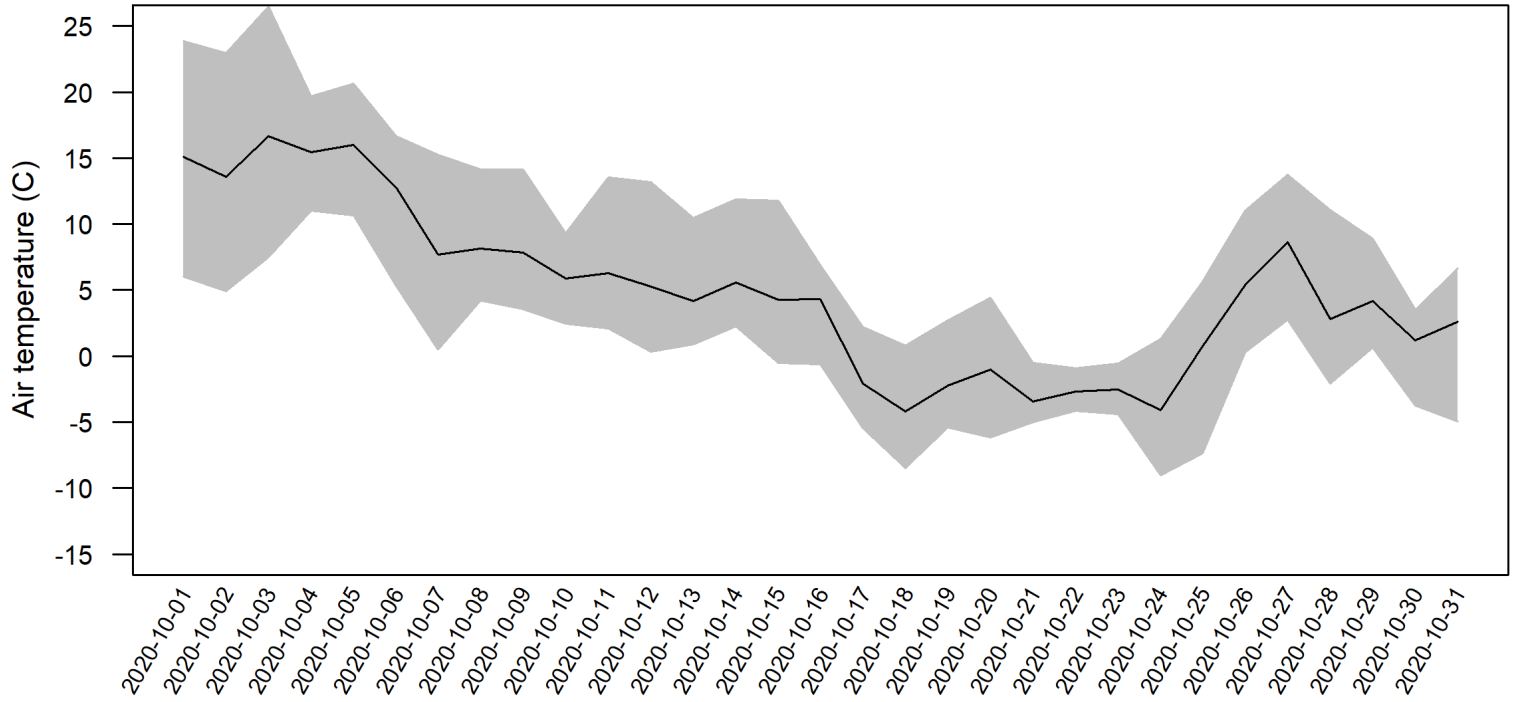
Discharge in the Peace River was held low (approximately 400 cms) from September 29 to October 3 to support placement of the final rip rap at the rockfill berm (Photo 5). Following river closure on October 3, flows increased to approximately 800 cms and remained above this level until a planned ramp down event at Peace Canyon Dam on October 31 to support Highway 29 construction activities at the Halfway River (Figure 2).

Figure 2. Discharge in the Peace River during the reporting period as measured at the Peace River above Pine River (07FA004) Water Survey of Canada (WSC) hydrometric station. Data were downloaded from the WSC on November 9 at 5-minute intervals and were listed as provisional by the WSC.



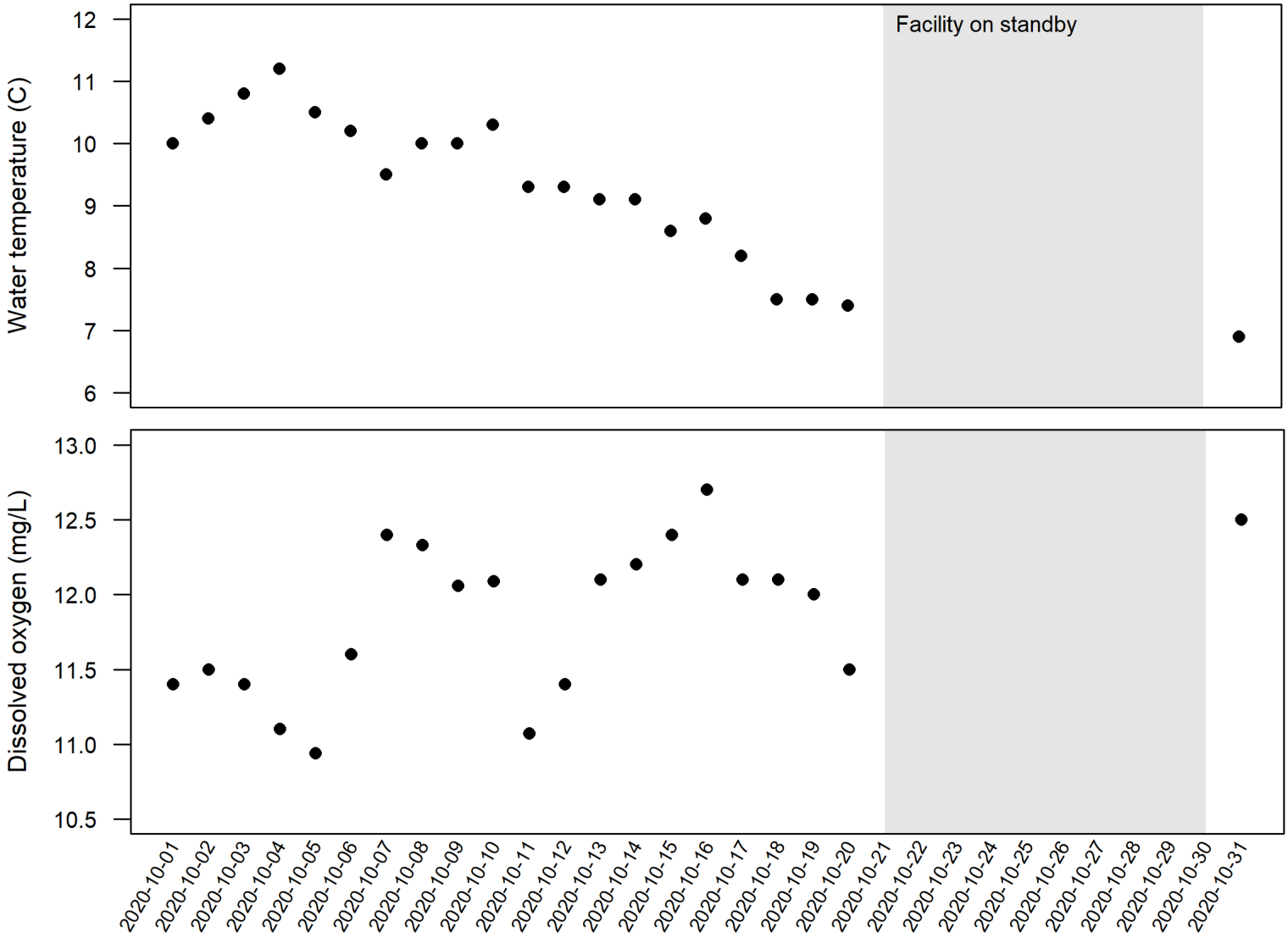
Air temperatures steadily decreased during the reporting period, reaching a low of -9°C on October 24 (Figure 3). As a result, the facility operator put the temporary facility on standby from October 20 to 30 due to the potential risk to fish health and damaging mechanical equipment (Table 3).

Figure 3. Mean daily air temperature (black line; °C) during the reporting period as measured at the temporary facility (Sensor No. TT-602). Shaded area represents the minimum and maximum daily air temperatures.



Water temperatures steadily decreased during the reporting period from a high of 11.2°C on October 4 to a low of 6.9°C on October 31 (Figure 4). Dissolved oxygen remained above the minimum dissolved oxygen level (8.0 mg/L) described in the design report of the temporary facility.

Figure 4. Daily water temperature (°C) and dissolved oxygen (mg/L) during the reporting period as measured in the pre-sort holding pool of the temporary facility.

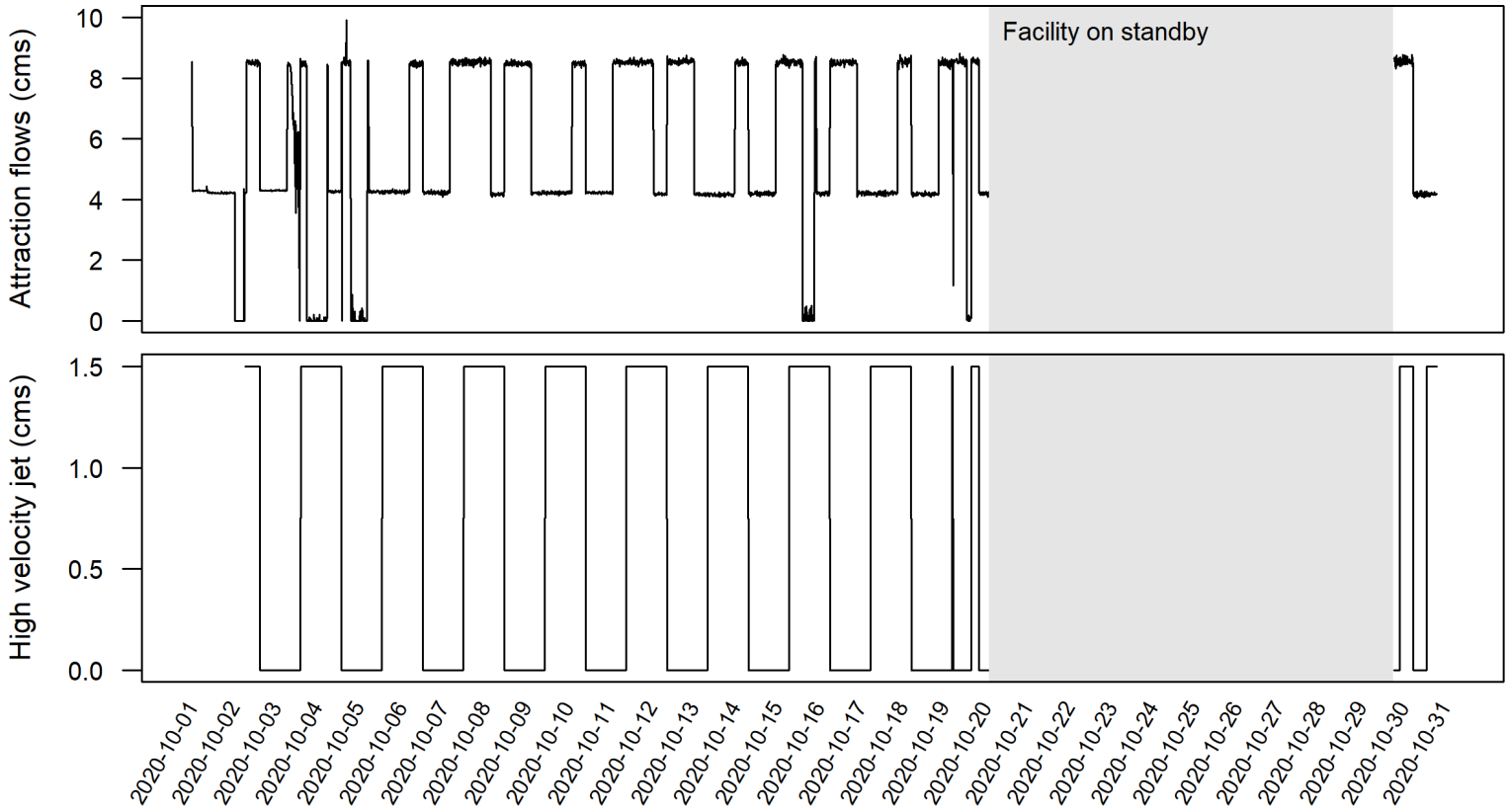


Mechanical operation

Operation of the attraction flows and high velocity jet intends to attract fish towards the fishway entrance. Once fish have entered the temporary facility, flows within the fishway intend to provide a flow signal for fish to detect and swim up each pool to the sorting facility.

BC Hydro intended to operate the attraction flows and high velocity jet as described in Section 3.3.1 of the OPP, whereby conditions were changed every 8 hours during the reporting period. In general the attraction flows and high velocity jet were operated in a manner consistent with the OPP (Figure 5). Exceptions include early and mid-October when Pumps 1 and 2, which provide the attraction flows, briefly shutdown due to high water elevations in the diversion tunnel outlet triggering alarms in the programming of the temporary facility (Figure 5).

Figure 5. Operation of the attraction flows and high velocity jet during the reporting period.



Fish were crowded daily from the pre-sort holding pool into the fish lock. Operators then proceeded to raise crowded fish to the elevation of the sorting facility. Note that this process is referred to as a "sorting cycle".

Operators initially set the number of sorting cycles to two per day to allow enough time to transport any sorted Bull Trout to the Halfway River after the second sorting cycle in the early afternoon (Table 2). Three sorting cycles were eventually selected as being the optimal number because Bull Trout were not present during the reporting period[7]. Operators conducted a fourth sorting cycle on October 31 to sort remaining fish in the pre-sort holding pool prior to shutting the temporary facility down for the year.

Table 2. Daily total number of sorting cycles.

Date	Number of sorting cycles	Start time
2020-10-01	2	09:00, 13:30
2020-10-02	2	09:00, 13:30
2020-10-03	2	09:00, 13:30
2020-10-04	2	09:00, 13:30
2020-10-05	2	09:00, 14:30
2020-10-06	2	09:00, 13:00
2020-10-07	2	09:00, 13:00
2020-10-08	2	09:00, 13:00
2020-10-09	2	09:00, 13:00
2020-10-10	5	08:30, 11:00, 11:40, 13:00, 14:20
2020-10-11	3	08:30, 11:00, 13:00
2020-10-12	3	08:30, 11:00, 13:00
2020-10-13	3	08:30, 11:00, 13:00
2020-10-14	3	08:30, 11:00, 13:00
2020-10-15	3	08:30, 11:00, 13:00
2020-10-16	3	08:30, 11:00, 13:00
2020-10-17	3	08:30, 11:00, 13:00
2020-10-18	3	08:30, 11:00, 13:00
2020-10-19	3	08:30, 11:00, 13:00
2020-10-20	3	08:30, 11:00, 13:00
2020-10-21	-	Facility on standby
2020-10-22	-	Facility on standby
2020-10-23	-	Facility on standby
2020-10-24	-	Facility on standby
2020-10-25	-	Facility on standby
2020-10-26	-	Facility on standby
2020-10-27	-	Facility on standby
2020-10-28	-	Facility on standby
2020-10-29	-	Facility on standby
2020-10-30	-	Facility on standby
2020-10-31	4	08:30, 11:00, 13:00, 13:30

[7] BC Hydro did not expect to sort Bull Trout during the reporting period as this species does not undergo upstream movements past the dam site in October.

Table 3. Summary of standby or shutdown periods during the reporting period.

Date	Standby or shutdown	Rationale
2020-10-20 14:00 to 2020-10-30 12:30	Standby	Crews started to encounter problems on October 17 when overnight air temperatures dropped below -6°C (Figure 3). Pumps started to freeze and required regular manual spinning to avoid ice build up and damage (described in Table 4). Crews kept the facility running until October 20, when the decision was made to put the facility on standby due to the potential risk to fish health and damaging mechanical equipment, as described in Section 3.1.3.3 of the OPP. The facility operator re-started the facility on October 30 after air temperatures had increased and mechanical equipment had been inspected and considered fit to operate.

Table 4. Root causes and corrective actions as a result of equipment malfunctions, breakdowns, or damage during the reporting period.

Date	Malfunction, breakdown or damage	Description	Root cause	Corrective action
2020-10-04	Malfunction	Pumps 1 and 2, which provide the attraction flows, shut down automatically overnight for approximately 4 hours. Both pumps were operational for the first crowd at 09:00 on October 4.	Flow increase in the Peace River the night of October 3 (Figure 2) caused shutdown alarms to be triggered due to water elevations exceeding the 5% exceedance design criteria of 410.5 m at the fishway entrance.	Shutdown alarms re-programmed with a higher water elevation (410.8 m).
2020-10-16	Breakdown	Pumps 4 and 8 (water supply to the sorting facility), and Pump 9 (water supply to fish lock) were inoperative due to freezing temperatures on October 16 (Pump 9 only) and October 17 (Pump 4, 8, and 9).	Cold air temperatures caused water to freeze in Pumps 4, 8 and 9.	All pump shafts were manually spinned to allow operation and crowding events proceeded as normal. Flow to the fishway was maintained at all times and there were no fish stranding concerns.
2020-10-19	Breakdown	Pump 9 froze overnight and there were mechanical issues with manipulating the brail gate (i.e., did not respond correctly to raising controls).	Cold air temperatures caused water to freeze in Pump 9.	Pump 9 was left on overnight, with a small volume of water flowing, in an attempt to prevent the pump from freezing.
2020-10-30	Breakdown	Ice accumulated on the fishway water supply pump valves after the temporary facility was on standby.	Cold air temperatures caused water to freeze in the fishway water supply pump valves.	Manual opening and closing of the fishway water supply pump valves.

Adjustments

Several adjustments were made during the reporting period to improve the biological and mechanical operation of the temporary facility (Table 5). BC Hydro described the potential for adjustments to the day-to-day biological and mechanical operation of the temporary facility in Section 7 of the Fish Passage Management Plan[2]. In general the temporary facility was operated as planned and described in the OPP. Adjustments outlined below will be reflected in an updated revision of the OPP for operations in 2021.

Table 5. Summary of adjustments made to the biological and mechanical operation of the temporary facility during the reporting period.

Component	Adjustment
Mechanical operation	Operator increased the height differential between the fish lock brail gate and the water level from 0.2 to 0.4 m to allow for sufficient water volume to maintain fish health while in fish lock.
	Pump 4, which supplies water to the sorting facility, was manually shut off prior to leaving the temporary facility at the end of each shift to avoid heating up facility water used for fish processing.
	Additional sorting cycles were conducted on October 10 (5 crowds) and October 11 (3 crowds) in an attempt to crowd fish that passed through the vee-trap into the pre-sort holding pool and were not crowded, either because they escaped back through the vee-trap or remained downstream of the crowder. When fish catches were low (i.e., less than 20), three daily sorting cycles at approximately 08:30, 11:00, and 13:00 were conducted.
	Following the observation of two suckers in the vee-trap wings during two crowding cycles, the facility operator adjusted the pre-crowd procedure. The previously-used method of striking the outside of the vee-trap with a long-handled dip net was discontinued. The new method involved clearing the vee-trap wings by lowering a long-handled net into the wings from above to herd fish out before lowering the wing gates. This required partially advancing the crowding platform with the crowding screen raised to allow access to the vee-trap wings from above. Following herding and gate closure, the crowding platform was returned to the starting position and a crowding cycle initiated as usual.
	Three crowds (08:30; 11:00; and 13:00) were conducted daily beginning October 11.
	Beginning on October 17, Pumps 4 and 8, both of which supply water to the sorting facility, were left on overnight to provide a small volume of water to the fish pods in an effort to prevent pumps from freezing.
	Beginning October 17, the Pump 9 valve was manually spinned during the night shift in an effort to prevent the pump from freezing.
	Attempts to encourage fish to move out of the vee-trap wing areas using a dipnet were discontinued, because it was not effective at displacing fish.
	Pump 9, which supplies water to the fish lock, was left on overnight, with a small volume of water flowing, in an attempt to prevent the pump from freezing.
	On October 31, a fourth sorting cycle was conducted to crowd all remaining fish in the pre-sort holding pool prior to shutting the temporary facility down for the year.
Biological operation	On October 11, the primary release site at the right bank boat launch upstream of the debris boom was not accessible due to slippery road surface conditions. Fish were instead released at an alternate site in the Peace River upstream of the Project. The facility operator decided that releasing fish at an alternate site was required to ensure fish health and minimize further holding time. Fish were released at the newly-created emergency response boat launch on the right bank downstream of the debris boom, approximately 550 m downstream of the primary release site.
	On October 31, the single Arctic Grayling was released in the Peace River instead of the Moberly River, as discussed with representatives from Fisheries and Oceans Canada, Ministry of Environment, and Ministry of Forests, Lands and Natural Resource Operations and Rural Development on September 23, 2020. Arctic Grayling do not undergo movements related to spawning in October, so this adjustment was not considered to have affected their ability to fulfill portions of their lifecycle upstream of the Project.

Photos

Photo 1. Excavators breach the Stage 1 Downstream Cofferdam to connect the diversion tunnel outlet with the Peace River (September 11, 2020).

Photo 2. Overview of the temporary facility located at the outlet of the diversion tunnels (October 2, 2020).

Photo 3. Worker opens the vee-trap on the first day of commissioning (September 23, 2020).

Photo 4. Diversion began on September 30, 2020, when the diversion tunnel gates were opened.

Photo 5. Final rip rap is placed on the rockfill berm (center) to close the Peace River on October 3, 2020 (looking downstream).

Photo 6. Workers conduct a crowding cycle during the first day of commissioning the temporary facility (September 23, 2020).

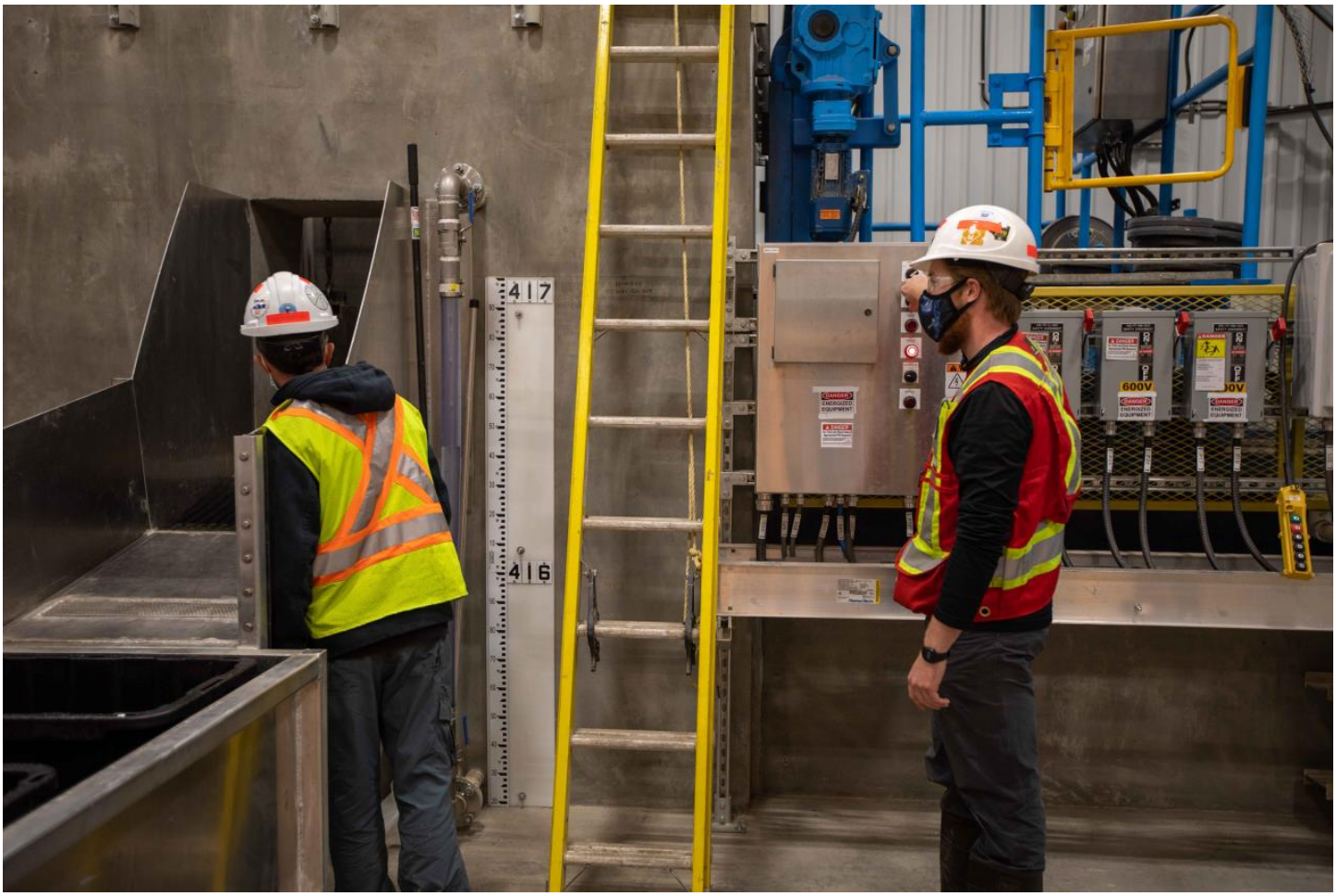


Photo 7. Weighing the first fish – a Longnose Sucker – on the second day of operations (October 2, 2020).

Photo 8. Workers load a transport pod onto the transport truck using the monorail crain hoist inside the sorting facility (October 2, 2020).

Photo 9. Transport truck is backed up to the release site 2 kilometers upstream of the dam site in the Peace River (October 2, 2020).

Photo 10. Workers sample a mortality (Mountain Whitefish) to confirm sex and collect otoliths for microchemistry and ageing analysis (October 10, 2020).

Photo 11. Ten pumps are located on site to provide flows to the fishway and the sorting facility (September 14, 2020).

Photo 12. Two entrance gates provide the attraction flows at the fishway entrance. Gates are programmed to automatically adjust their position to maintain the same head differential between the entrance pool and the diversion tunnel outlet (September 14, 2020).

Photo 13. Fish enter the pre-sort holding pool (center) where they are crowded and raised to the elevation of the sorting facility through the use of the lock (left) (September 14, 2020).

Photo 14. BC Hydro toured representatives from the Halfway River First Nation, Blueberry River First Nation, Saulteau First Nation, Doig River First Nation, Prophet River First Nation, McLeod Lake Indian Band, and Métis Nation British Columbia around the temporary facility as part of broader site tours (September 23 and November 4, 2020).

Prepared by

This report was prepared by the following individuals:

Qualified Individual	Expertise
Brent Mossop, MRM, RPBio	Fisheries
Nich Burnett, MSc, RPBio	Fisheries

Distribution List:

MFLNRORD: Ted White, Richard Penner, Connie Chapman, Dave Heikkila

BC Hydro: Karen von Muehldorfer, Greg Scarborough

Appendix I. High-level summary of operation of the temporary facility during the reporting period.

From: Brent Mossop and Nich Burnett, Fish and Aquatic – Site C Clean Energy Project

Reporting Period: October 1 to 31, 2020

Subject: Monthly Update on the Temporary Upstream Fish Passage Facility

71 fish sorted

Operated for 21 days

350+ tagged fish detected in and around the facility

Category	Performance	Commentary
Safety		• Verification: two minor hazards, two good safety practices • Lots of interfaces among contractors
Fish Passage[1]		• Fish approached, entered and passed the fishway • Observed an increase in fish activity after river closure
Sorting & Transport		• Sorted 71 fish from four species • Transport pod and transport truck system deemed effective
Fish Mortality		• Two mortalities – both Mountain Whitefish – representing 3% mortality out of all fish processed in 2020
Operation Within Criteria		• Operated within most engineering and design criteria • Put on standby for 10 days due to cold snap
External Communication		• Produced an informational video to share on social media • Presented to the Peace Williston Advisory Committee
Indigenous Relations		• Presented at Environmental Forum and toured representatives from the HRFN, BRFN, SFN, DRFN, PRFN, MCIB, and MNBC
Regulatory		• Received approvals on time to commission and operate • Toured DFO, FLNRORD, IE and IEM around the facility
Effectiveness Monitoring		• Monitoring data, including detection of 350+ tagged fish in and around the facility, informed operations and adjustments
Learning & Adjustment		• Minor, process-based adjustments made to operations and others identified for operations starting in spring 2021

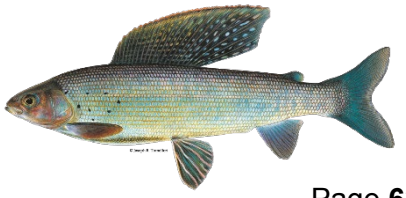
Meets or Exceeds Expectations	Nearing Expectations	Far Below Expectations

[1] Infographic available here: https://www.sitecproject.com/sites/default/files/fish-passage-facility.pdf

Target Species

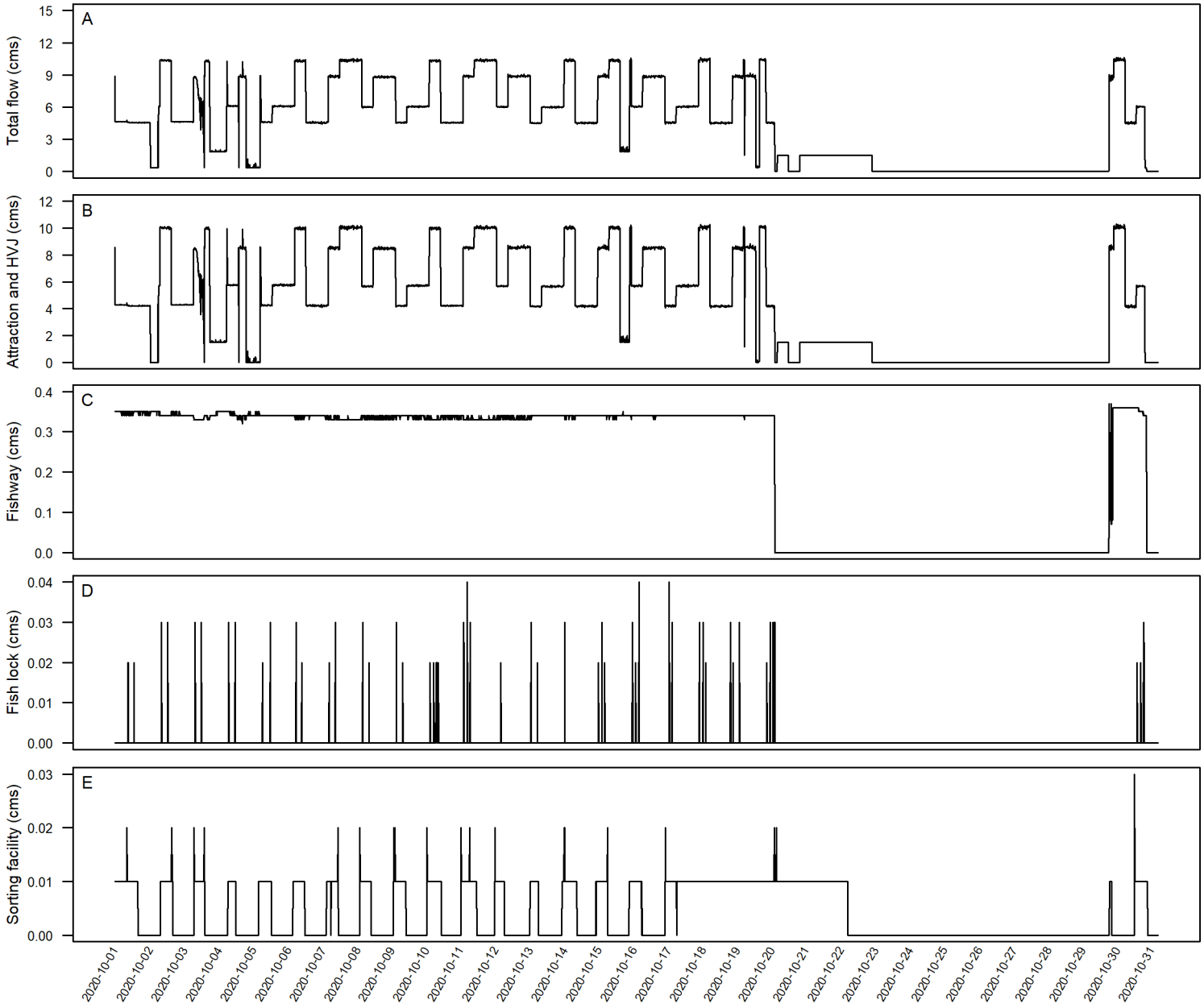
Bull Trout

Rainbow Trout



Arctic Grayling

Appendix II. (A) Total flow (cms) diverted from the Peace River to operate the temporary facility during the reporting period. Total flow is a combination of flows used for the attraction flows and high velocity jet (B), fishway (C), fish lock (D), and sorting facility (E), as described in T023 Plan for Measurement of Flow. Under Conditional Water Licence 133987[8], BC Hydro is authorized to divert up to 15 cms of flow from the Peace River to operate the temporary facility; this authorized quantity was not exceeded during the reporting period (A).



[8] Available at: http://sitecproject.com/sites/default/files/fish-passage-facility-water-licences-133986-133987.pdf