

Site C Clean Energy Project

Temporary Upstream Fish Passage Facility Operations Report

Reporting Period: July 1 to 31, 2024

Prepared by BC Hydro

August 7, 2024

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 Q¹). 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 2024) on the left bank of the Peace River at the outlet of the diversion tunnels. 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 2024, the permanent upstream fish passage facility (hereafter permanent facility) will be operated at the outlet of the generating station to provide fish passage during the operation phase of the Project.

On April 15, 2024, the horizontal propeller pumps were removed from the pump station for detailed inspection. Both pumps had sustained extensive damage from operation in previous years and were shipped to the manufacturer for repair. Operating the temporary facility without attraction flows has the potential to reduce the biological effectiveness of the temporary facility. As a result, BC Hydro implemented the contingent measures listed in Section 4.8 of the Fish Passage Management Plan².

Contingent measures consisted of weekly boat electroshocking surveys (hereafter contingent fish capture and transport) to capture target species downstream of the diversion tunnel outlet and transport and release them upstream of the Project. Only those species trying to fulfill life history requirements upstream of the Project (Arctic Grayling, Bull Trout, and Rainbow Trout) were transported and released upstream of the Project during the reporting period (EIS, Volume 2, Appendix O³; BC Hydro 2015⁴). All other species were released at their capture location downstream of the Project.

Operation of the temporary facility and implementation of contingent fish capture collectively provided for upstream fish passage for target species during the reporting period.

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 July 2024.

This report has the following sections:

- Biological operation;
- Environmental conditions;
- Mechanical operation;
- Adjustments; and
- Contingent fish capture and transport.

Biological operation is defined as the sorting, sampling, tagging, transport and release of fish. Mechanical operation is defined as the operation of the pumps, gates, crowder, lock, sensors, loggers, and other mechanical equipment to ensure the temporary facility achieves the biological objectives described in Section

¹ Available at: https://www.ceaa-acee.gc.ca/050/documents_staticpost/63919/85328/Vol2_Appendix_Q.pdf

² Available at: <http://sitecproject.com/sites/default/files/Fish%20Passage%20Management%20Plan.pdf>

³ Available at: https://www.ceaa-acee.gc.ca/050/documents_staticpost/63919/85328/Vol2_Appendix_O.pdf

⁴ Available at: <http://sitecproject.com/sites/default/files/Fisheries-and-Aquatic-Habitat-Monitoring-and-Follow-up-Program.pdf>

Summary

Five thousand and nine fish – 4300 Redside Shiner, 381 Mountain Whitefish, 225 Longnose Sucker, 71 Largescale Sucker, 11 Bull Trout, 8 Rainbow Trout, 6 Northern Pikeminnow, 3 White Sucker, 2 Slimy Sculpin, 1 Arctic Grayling, and 1 Kokanee – were sorted and sampled at the temporary facility, and transported and released into the Peace River upstream of the Project (Table 1, Photo 1).

In addition to operating the temporary facility, BC Hydro conducted five sessions of contingent fish capture downstream of the diversion tunnel outlet and transported 102 Bull Trout, 5 Rainbow Trout, and 2 Arctic Grayling upstream of the Project (Table 6). Six hundred and ninety fish from other species were encountered during contingent fish capture and were released downstream of the Project (Table 6).

River otters were observed throughout the reporting period. As such, BC Hydro continued live trapping efforts by deploying a baited trap in the entrance pool (Photo 2). No river otters were trapped.

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

⁵ Available at: <http://sitecproject.com/sites/default/files/Fish%20Passage%20Management%20Plan.pdf>

Biological operation

In total, 5009 fish were sorted in the temporary facility during the reporting period (Table 1; Figure 1). Thirty six mortalities were observed during the reporting period (1.5% of all fish sorted in 2024), which is in-line with the anticipated levels of mortality during operations⁶.

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

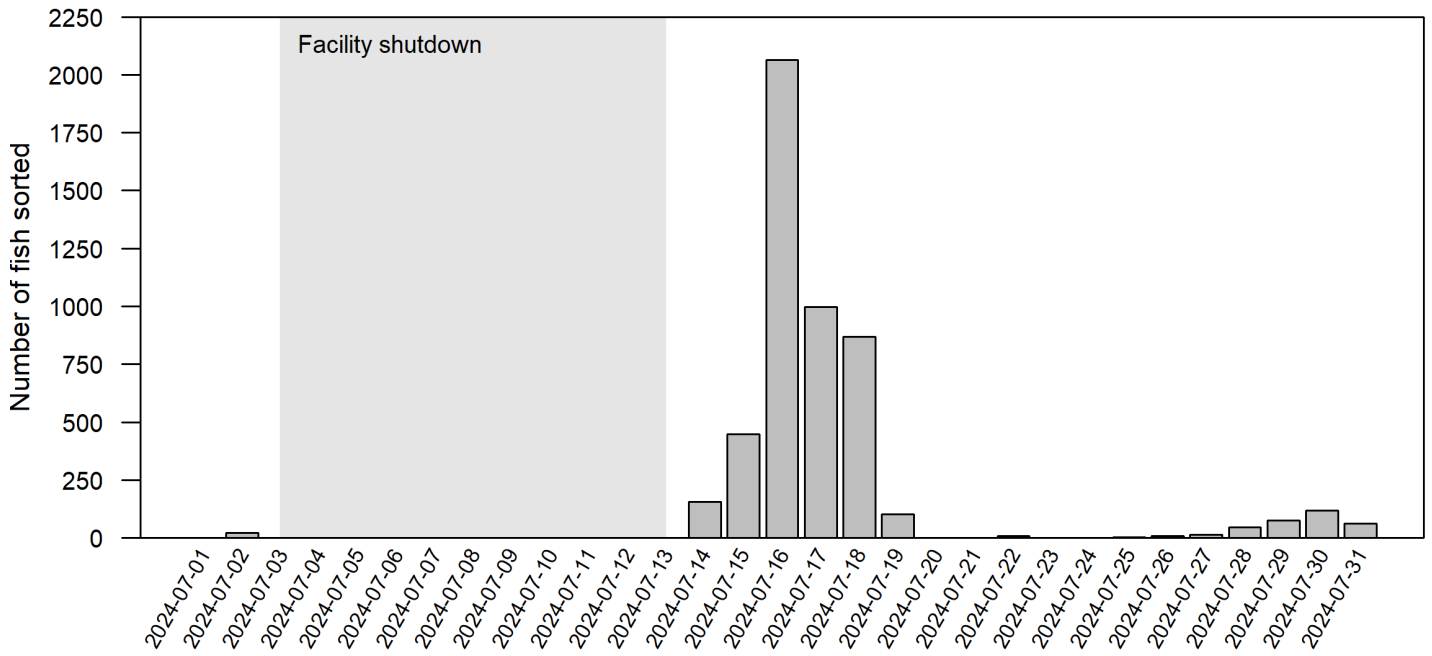
Species	Sorted	Transported and released	PIT tagged	Mortalities	Genetics	Microchemistry or ageing
Arctic Grayling	1	1	1		1	1
Brook Stickleback						
Brook Trout						
Bull Trout	11	11	8		7	6
Burbot						
Finescale Dace						
Flathead Chub						
Goldeye						
Kokanee	1	1	1			
Lake Chub						
Lake Trout						
Lake Whitefish						
Largescale Sucker	71	71	38			
Longnose Dace						
Longnose Sucker	225	225	67			
Mountain Whitefish	381	381	339	3		5
Northern Pike						
Northern Pikeminnow	6	6				
Northern Redbelly Dace						
Peamouth						
Pearl Dace						
Prickly Sculpin						
Pygmy Whitefish						
Rainbow Trout	8	8	8		7	8
Redside Shiner	4300	4300		33		
Slimy Sculpin	2	2				
Spoonhead Sculpin						
Sculpin Species						
Spottail Shiner						
Trout-perch						
Walleye						
White Sucker	3	3	2			
Yellow Perch						
Grand total	5009	5009	464	36	15	20

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

⁶ 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.

Between zero and 2063 fish were sorted daily during the reporting period (Figure 1).

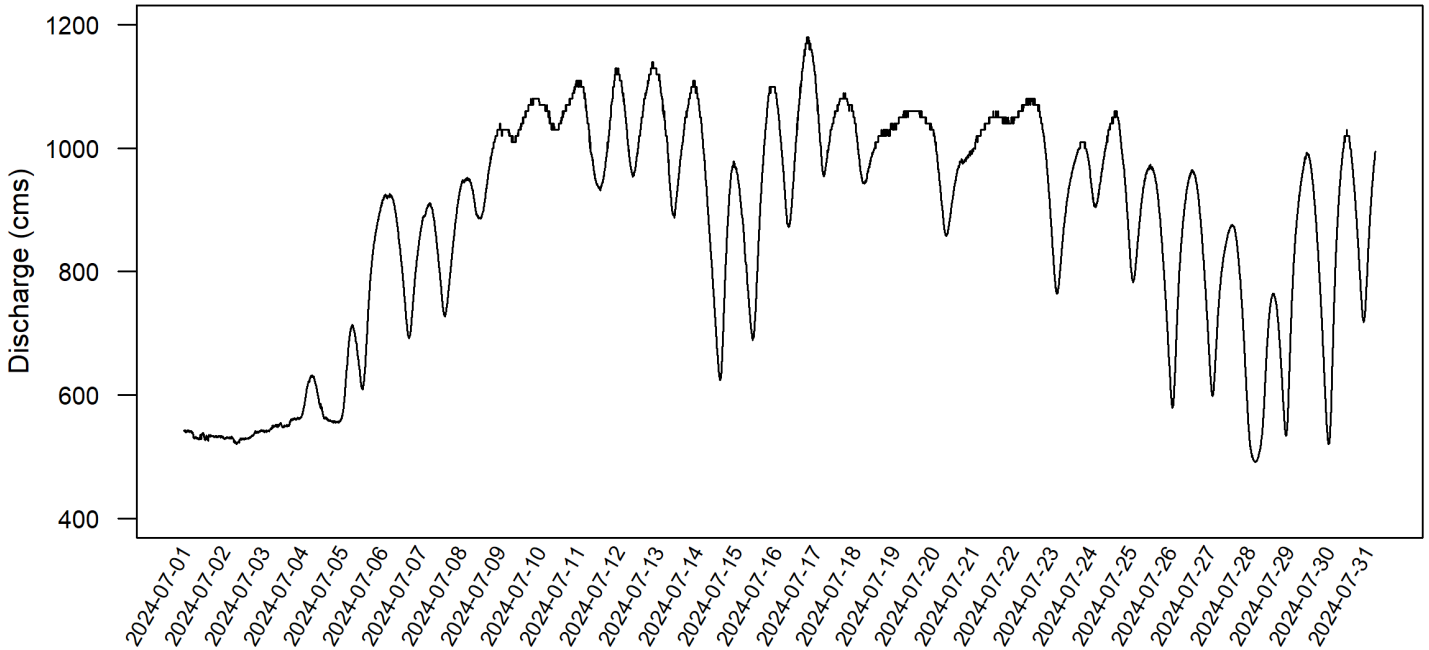
Figure 1. Daily number of fish sorted in the temporary facility during the reporting period.



Environmental conditions

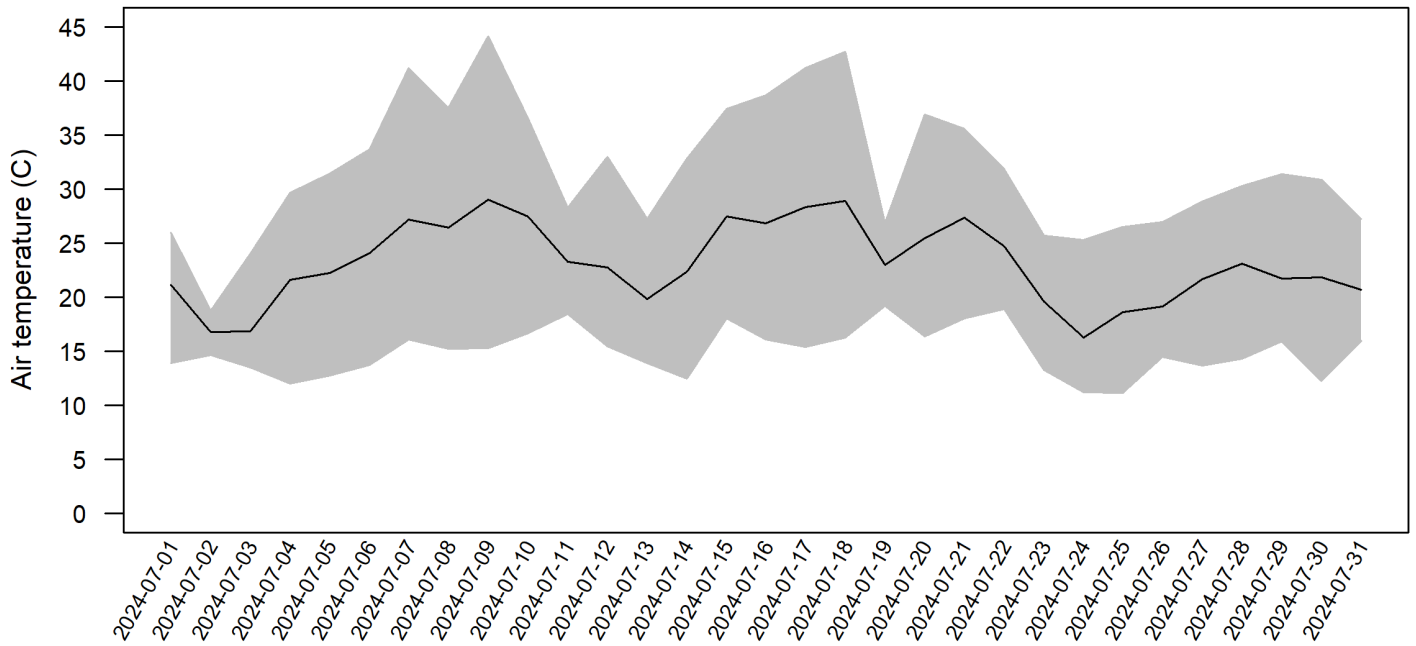
Discharge in the Peace River fluctuated during the reporting period from a low of 491 cms on July 28 to a high of 1180 cms on July 17 (Figure 2).

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 August 1; the downloaded data were provided at 5-minute intervals and were listed as provisional by the WSC.



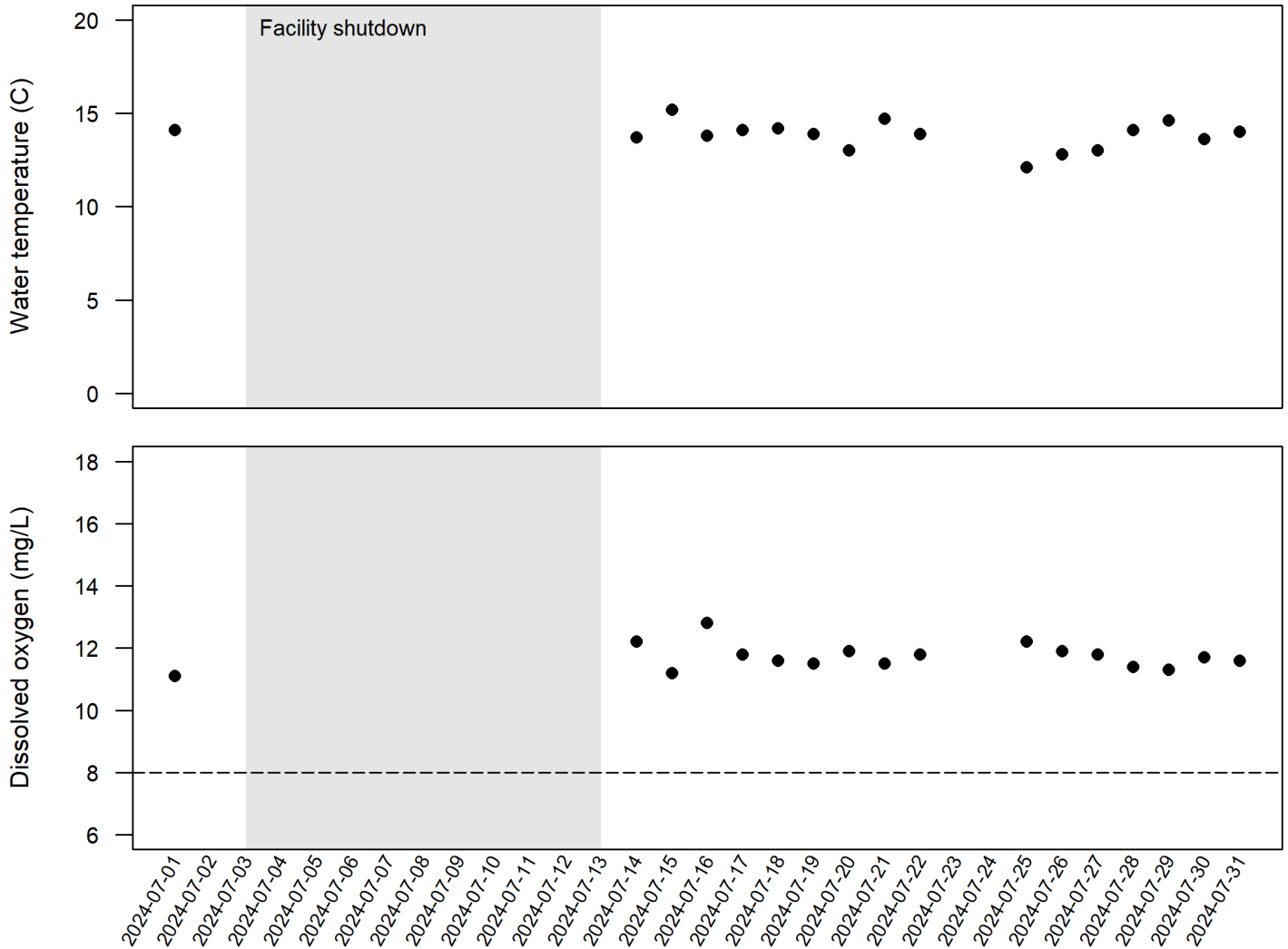
Air temperature fluctuated during the reporting period from a low of 11.2°C on July 25 to a high of 44.1°C on July 9 (Figure 3); this high is likely in response to direct sunlight on the temperature sensor.

Figure 3. Mean daily air temperature (black line; °C) during the reporting period as measured by a temperature sensor at the temporary facility (TT-602). Shaded area represents the minimum and maximum daily air temperatures.



Water temperature remained stable during the reporting period (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 Pool 25 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.

In 2024, BC Hydro intended to operate the attraction flows and high velocity jet at 10 cms and 0 cms, respectively (horizontal dashed lines in Figure 5). However, within the first week of operations, the attraction flows steadily declined and system alarms indicated electrical faults with the horizontal propeller pumps. BC Hydro 'turned off' the horizontal propeller pumps on April 5, 2024 and removed them from the pump station for a detailed inspection on April 15, 2024. As such, there were no attraction flows during the reporting period. BC Hydro turned off the high velocity jet on May 23 as water levels were not being maintained in the pump station to reliably operate the pump.

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”. Between one and five sorting cycles were conducted each day during the reporting period (Table 2).

Table 2. Daily total number of sorting cycles.

Date	Number of sorting cycles	Start time
2024-07-01	-	Facility shutdown
2024-07-02	1	17:29
2024-07-03	-	Facility shutdown
2024-07-04	-	Facility shutdown
2024-07-05	-	Facility shutdown
2024-07-06	-	Facility shutdown
2024-07-07	-	Facility shutdown
2024-07-08	-	Facility shutdown
2024-07-09	-	Facility shutdown
2024-07-10	-	Facility shutdown
2024-07-11	-	Facility shutdown
2024-07-12	-	Facility shutdown
2024-07-13	-	Facility shutdown
2024-07-14	1	07:47
2024-07-15	1	16:50
2024-07-16	2	08:52, 13:44
2024-07-17	1	16:18
2024-07-18	5	08:57, 10:16, 11:48, 13:01, 14:02
2024-07-19	3	08:46, 10:39, 11:49
2024-07-20	2	08:51, 10:59
2024-07-21	5	09:04, 10:01, 11:13, 12:10, 13:24
2024-07-22	5	09:29, 10:28, 12:04, 12:30, 13:41
2024-07-23	1	13:23
2024-07-24	1	14:41
2024-07-25	5	09:16, 10:36, 11:38, 12:27, 13:27
2024-07-26	5	08:50, 10:29, 11:35, 12:32, 13:47
2024-07-27	5	08:47, 10:28, 11:35, 12:38, 13:32
2024-07-28	5	08:51, 10:36, 11:31, 12:32, 13:32
2024-07-29	5	09:00, 10:18, 11:38, 12:55, 14:00
2024-07-30	5	08:59, 10:29, 11:30, 12:30, 13:35
2024-07-31	2	08:54, 09:58

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

Date	Standby or shutdown	Rationale
2024-07-02 17:46 to 2024-07-14 07:47	Shutdown	Gear on the fish lock gate valve was stripped and had to be replaced.
2024-07-23 00:44 to 2024-07-23 09:11	Shutdown	Brown out to the facility power supply.
2024-07-23 09:38 to 2024-07-23 13:17	Shutdown	Brown out to the facility power supply.
2024-07-24 15:40 to 2024-07-25 09:00	Shutdown	Brown out to the facility power supply.

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
2024-07-02	Damage	Gear on the fish lock gate valve was stripped.	Wear and tear from normal use.	New gear was machined and installed.

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 Plan². In general the temporary facility was operated as planned and described in the OPP.

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

Component	Adjustment
Biological	Fish were observed passing through the overflow drain of the anaesthetic tank on July 16, which lead to 28 mortalities (all Redside Shiner). Crews attached netting to block the overflow drain.

Contingent fish capture and transport

In total, 109 fish were transported upstream through contingent fish capture during the reporting period (Table 6). Specifically, 102 Bull Trout, 5 Rainbow Trout, and 2 Arctic Grayling were transported upstream of the Project.

Table 6. Number of fish captured by boat electroshocking and transported and released upstream (U) and downstream (D) of the Project.

Species	Session 9		Session 10		Session 11		Session 12		Session 13		Total
	July 2		July 9		July 17		July 24		July 31		
	U	D	U	D	U	D	U	D	U	D	
Arctic Grayling			1						1		2
Brook Stickleback											
Brook Trout											
Bull Trout	31		20		22		15		14		102
Burbot		1						1			2
Finescale Dace											
Flathead Chub											
Goldeye											
Kokanee											
Lake Chub											
Lake Trout		1		1		1				1	4
Lake Whitefish											
Largescale Sucker		18		35		9		10		7	79
Longnose Dace				1							1
Longnose Sucker		71		76		63		27		25	262
Mountain Whitefish		41		38		13		37		22	151
Northern Pike		4								1	5
Northern Pikeminnow		27		27		18		2		5	79
Northern Redbelly Dace											
Peamouth											
Pearl Dace											
Prickly Sculpin										1	1
Pygmy Whitefish											
Rainbow Trout	1		2				1		1		5
Redside Shiner		1						6			7
Slimy Sculpin											
Spoonhead Sculpin											
Spottail Shiner											
Trout-perch											
Walleye		1		1				1			3
White Sucker		21		23		16		15		21	96
Yellow Perch											
Total	32	186	23	202	22	120	16	99	16	83	799
Grand total	218		225		142		115		99		

Photos

Photo 1. More than 2000 fish were sampled on July 16, 2024, which is the most number of fish captured on a single day since operations began in October 2020.



Photo 2. Baited trap deployed on a floating platform in the entrance pool in an attempt to trap and relocate river otters away from the facility (July 14, 2024).



Prepared by

This report was prepared by the following individuals:

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

Appendix I. (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 133987⁷, 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).



⁷ Available at: <http://siteproject.com/sites/default/files/fish-passage-facility-water-licences-133986-133987.pdf>