

Site C Clean Energy Project

Temporary Upstream Fish Passage Facility Operations Report

Reporting Period: June 1 to 30, 2024

Prepared by BC Hydro

July 10, 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, Rainbow Trout, and the Sucker species) 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 June 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

One thousand six hundred and eight fish – 1463 Redside Shiner, 103 Largescale Sucker, 13 Longnose Sucker, 11 Mountain Whitefish, 5 Rainbow Trout, 4 Spoonhead Sculpin, 2 Arctic Grayling, 2 Northern Pikeminnow, 2 Prickly Sculpin, 1 Bull Trout, 1 Lake Trout, and 1 Slimy Sculpin – 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 four sessions of contingent fish capture downstream of the diversion tunnel outlet and transported 245 Longnose Sucker, 140 Largescale Sucker, 106 White Sucker, 80 Bull Trout, 14 Rainbow Trout, and 6 Arctic Grayling upstream of the Project (Table 6, Photo 2). One hundred and forty four fish from other species were encountered during contingent fish capture and were released downstream of the Project (Table 6).

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, 1608 fish were sorted in the temporary facility during the reporting period (Table 1; Figure 1). Fifty four mortalities were observed during the reporting period (2.7% 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.

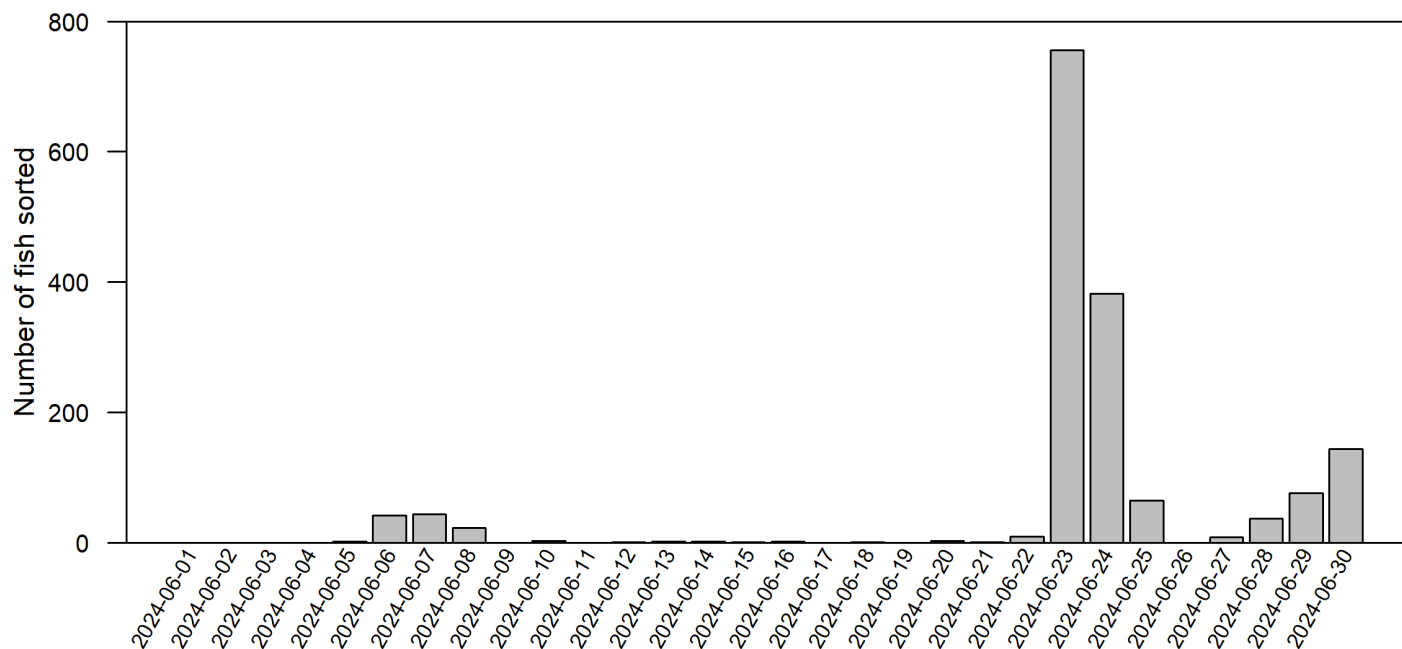
Species	Sorted	Transported and released	PIT tagged	Mortalities	Genetics	Microchemistry or ageing
Arctic Grayling	2	2	2		2	2
Brook Stickleback						
Brook Trout						
Bull Trout	1	1	1		1	1
Burbot						
Finescale Dace						
Flathead Chub						
Goldeye						
Kokanee						
Lake Chub						
Lake Trout	1	1				
Lake Whitefish						
Largescale Sucker	103	103	67			
Longnose Dace				14	6	
Longnose Sucker	13	13	10	1		
Mountain Whitefish	11	11	8	3		
Northern Pike						
Northern Pikeminnow	2	2				
Northern Redbelly Dace						
Peamouth						
Pearl Dace						
Prickly Sculpin	2	2		2		
Pygmy Whitefish						
Rainbow Trout	5	5	5	1	5	5
Redside Shiner	1463	1463		1	39	
Slimy Sculpin	1	1		4		
Spoonhead Sculpin	4	4		4		
Sculpin Species				23		
Spottail Shiner						
Trout-perch						
Walleye						
White Sucker				1		
Yellow Perch						
Grand total	1608	1608	83	54	53	8

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 756 fish were sorted daily during the reporting period (Figure 1).

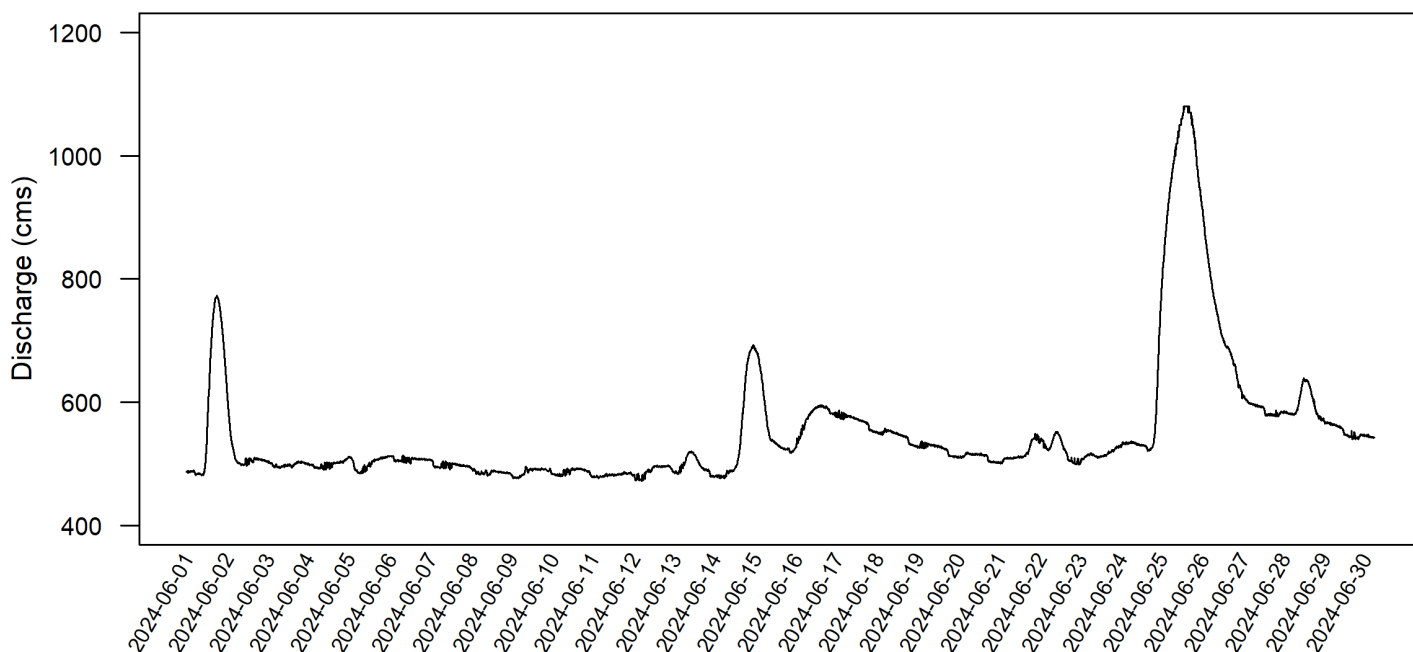
Figure 1. Daily number of fish sorted in the temporary facility during the reporting period.



Environmental conditions

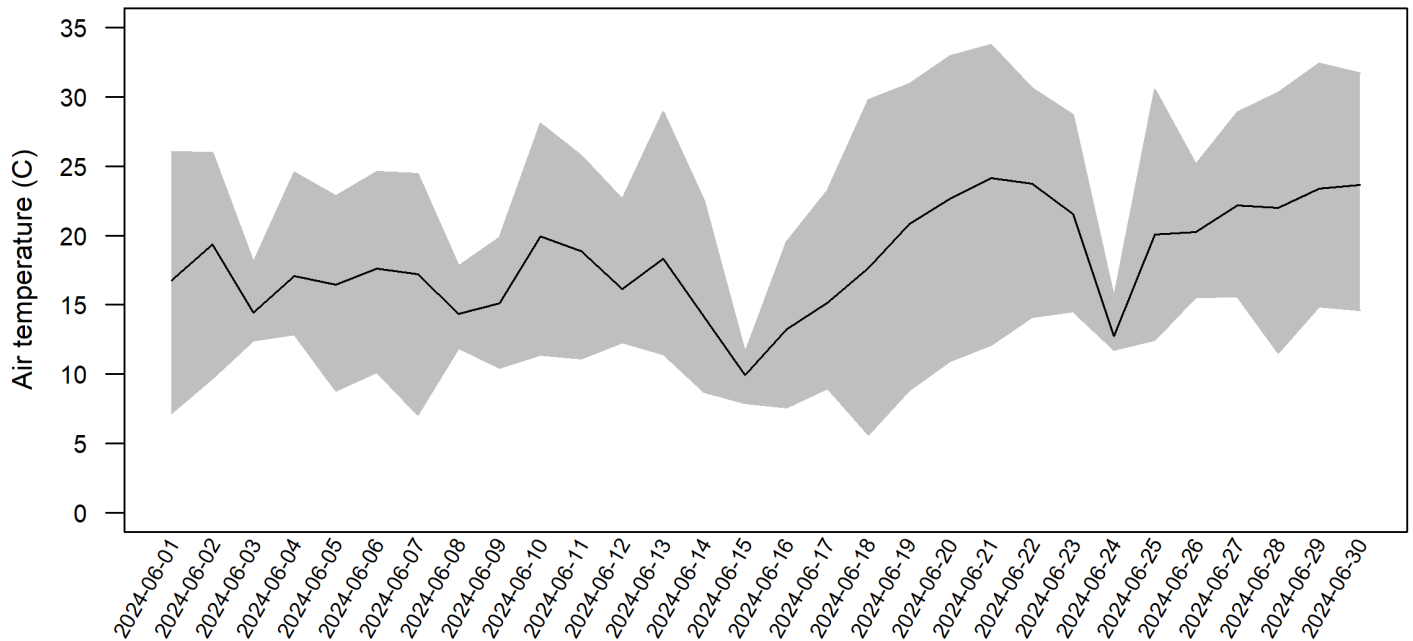
Discharge in the Peace River fluctuated during the reporting period from a low of 472 cms on June 12 to a high of 1080 cms on June 26 (Figure 2).

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 July 2; the downloaded data were provided at 5-minute intervals and were listed as provisional by the WSC.



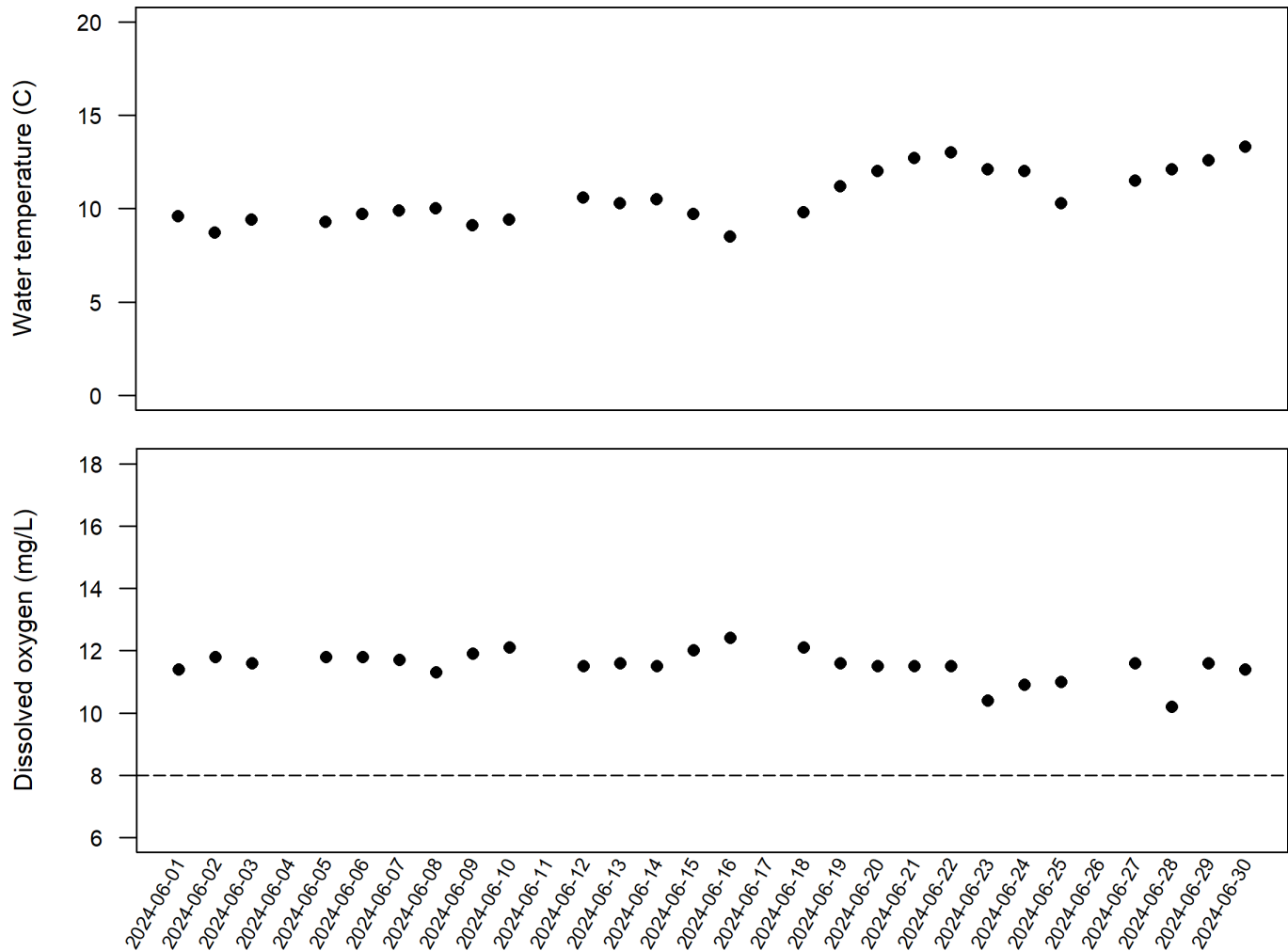
Air temperature fluctuated during the reporting period from a low of 5.6°C on June 18 to a high of 33.7°C on June 21 (Figure 3).

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 steadily increased 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
2024-06-01	5	08:59, 09:57, 10:59, 12:01, 13:02
2024-06-02	5	09:15, 10:17, 11:18, 12:22, 13:22
2024-06-03	1	08:48
2024-06-04	-	Facility shutdown
2024-06-05	5	08:55, 09:58, 11:01, 12:04, 13:05
2024-06-06	5	09:32, 10:44, 11:40, 12:31, 14:30
2024-06-07	5	09:02, 10:11, 11:31, 12:31, 13:35
2024-06-08	5	09:02, 10:42, 11:34, 12:32, 13:29
2024-06-09	2	09:51, 10:59
2024-06-10	5	08:55, 10:13, 11:21, 12:31, 13:23
2024-06-11	0	-
2024-06-12	5	09:00, 09:57, 10:56, 11:55, 13:01
2024-06-13	5	09:05, 10:00, 10:55, 12:01, 13:01
2024-06-14	1	10:30
2024-06-15	5	09:18, 10:14, 10:57, 11:54, 12:56
2024-06-16	1	08:51
2024-06-17	-	Facility shutdown
2024-06-18	5	09:19, 10:39, 11:32, 12:25, 13:28
2024-06-19	5	08:48, 09:57, 10:58, 11:53, 12:57
2024-06-20	5	08:50, 09:59, 10:59, 12:12, 13:16
2024-06-21	5	08:50, 09:50, 10:45, 11:53, 12:58
2024-06-22	4	10:19, 11:04, 12:39, 13:54
2024-06-23	2	10:46, 13:41
2024-06-24	1	11:27
2024-06-25	1	10:10
2024-06-26	-	Facility shutdown
2024-06-27	4	09:20, 10:38, 12:02, 14:09
2024-06-28	3	09:51, 11:32, 13:03
2024-06-29	5	09:02, 10:18, 11:26, 12:10, 13:29
2024-06-30	3	09:14, 10:15, 11:38

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

Date	Standby or shutdown	Rationale
2024-06-03 09:12 to 2024-06-05 05:50	Shutdown	Facility shutdown for 45 hours to re-establish water levels in the wet well.
2024-06-09 11:23 to 2024-06-09 17:42	Shutdown	Facility shutdown for 6 hours to re-establish water levels in the wet well.
2024-06-14 10:24 to 2024-06-14 17:18	Shutdown	Facility shutdown for 7 hours to re-establish water levels in the wet well.
2024-06-16 09:29 to 2024-06-17 16:25	Shutdown	Facility shutdown for 31 hours to re-establish water levels in the wet well.
2024-06-20 13:37 to 2024-06-20 22:04	Shutdown	Facility shutdown for 8 hours to re-establish water levels in the wet well.
2024-06-25 10:50 to 2024-06-26 19:26	Shutdown	Facility shutdown for 30 hours to re-establish water levels in the wet well.

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
N/A	N/A	N/A	N/A	N/A

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	Crews batch processed Redside Shiners to speed up fish processing; this adjustment helped to ensure fish health and survival on high abundance days (June 23 and 24, 2024; Figure 1).

Contingent fish capture and transport

In total, 591 fish were transported upstream through contingent fish capture during the reporting period (Table 6). Specifically, 245 Longnose Sucker, 140 Largescale Sucker, 106 White Sucker, 80 Bull Trout, 14 Rainbow Trout, and 6 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 5		Session 6		Session 7		Session 8		Total
	June 4		June 11		June 17		June 26		
	U	D	U	D	U	D	U	D	
Arctic Grayling	3		3						6
Brook Stickleback									
Brook Trout									
Bull Trout	26		16		17		21		80
Burbot		1				3		2	6
Finescale Dace									
Flathead Chub									
Goldeye									
Kokanee								1	1
Lake Chub									
Lake Trout		1		1					2
Lake Whitefish									
Largescale Sucker	32	1	78	2	14	4	16	1	148
Longnose Dace									
Longnose Sucker	61	4	62	1	62	1	60	1	252
Mountain Whitefish		15		6		7		11	39
Northern Pike		2		1		4		1	8
Northern Pikeminnow		18		8		8		19	53
Northern Redbelly Dace									
Peamouth				1					1
Pearl Dace									
Prickly Sculpin						2			2
Pygmy Whitefish									
Rainbow Trout	3		1		5		5		14
Redside Shiner				9		1			10
Slimy Sculpin									
Spoonhead Sculpin									
Spottail Shiner									
Trout-perch									
Walleye								2	2
White Sucker	27	2	33	1	16	1	30	1	111
Yellow Perch									
Total	152	44	193	30	114	31	132	39	735
Grand total	196		223		145		171		

Photos

Photo 1. Biologists sample a Lake Trout in the sorting facility during the reporting period (June 22, 2024).



Photo 2. Crews encountered both Arctic Grayling and Rainbow Trout through contingent fish capture and transport during the reporting period (June 11, 2024).

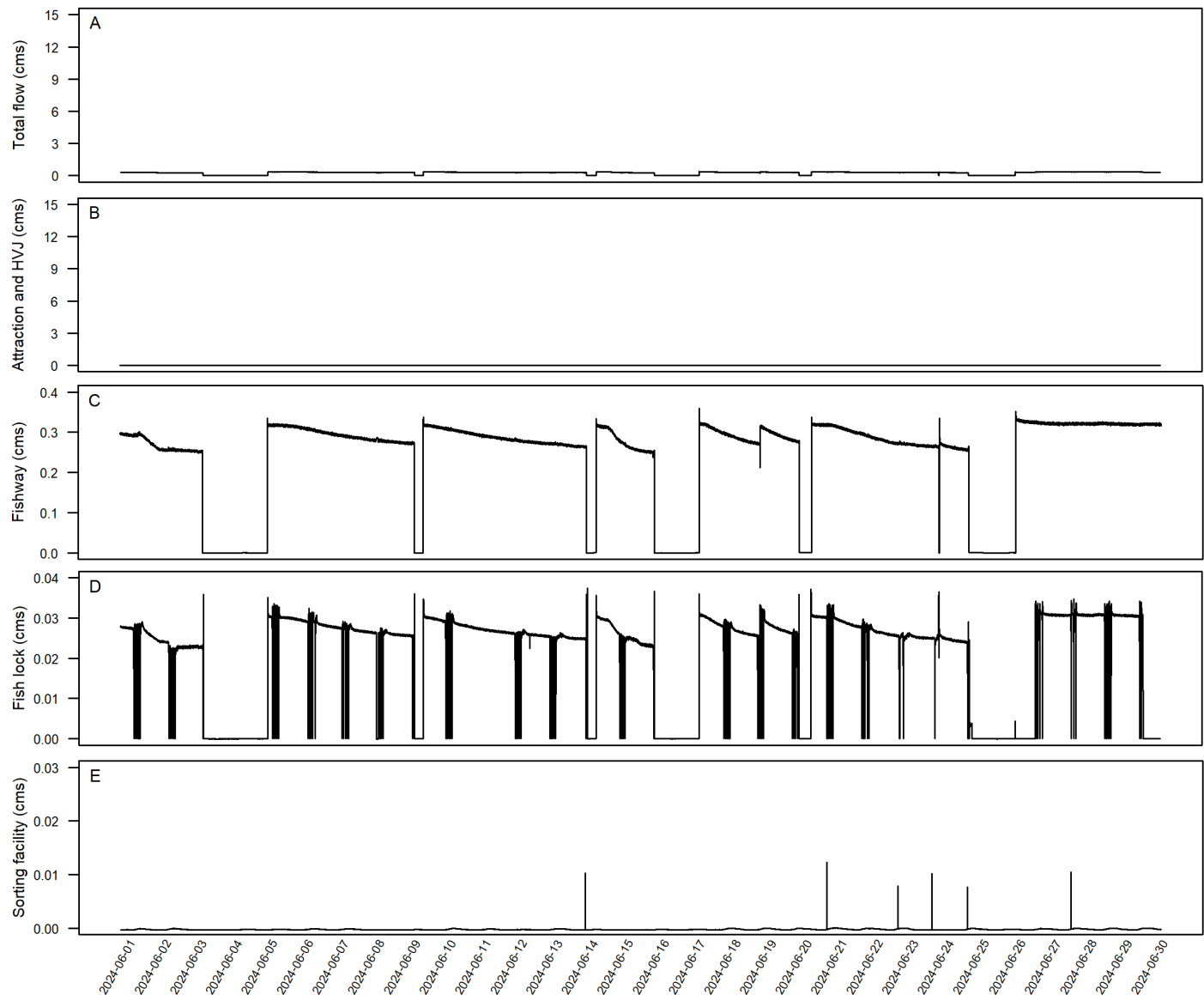


Prepared by

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://sitecproject.com/sites/default/files/fish-passage-facility-water-licences-133986-133987.pdf>