

Site C Clean Energy Project

Temporary Upstream Fish Passage Facility Operations Report

Reporting Period: September 1 to 15, 2024

Prepared by BC Hydro

October 8, 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.

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 September 2024. Note that the facility operated daily from September 1 to 15 and was shutdown on September 15 prior to the diversion tunnel outlet closure cofferdam work commencing on September 16 (Photo 1).

This report has the following sections:

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

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 4.1 of the Fish Passage Management Plan².

Summary

Ten thousand four hundred and twenty fish – 8859 Redside Shiner, 764 Northern Pikeminnow, 566 Sucker Species (Not Identified to Species), 165 Largescale Sucker, 51 Longnose Sucker, 4 White Sucker, 3 Mountain Whitefish, 3 Peamouth, 2 Lake Chub, 1 Rainbow Trout, 1 Longnose Dace, 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).

Following a single crowd on September 15, the facility was permanently shutdown in advance of the diversion tunnel outlet closure cofferdam work commencing on September 16 (Photo 1).

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

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>

Biological operation

In total, 10420 fish were sorted in the temporary facility during the reporting period (Table 1; Figure 1). Two mortalities were observed during the reporting period (0.4% of all fish sorted in 2024), which is in-line with the anticipated levels of mortality during operations³.

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

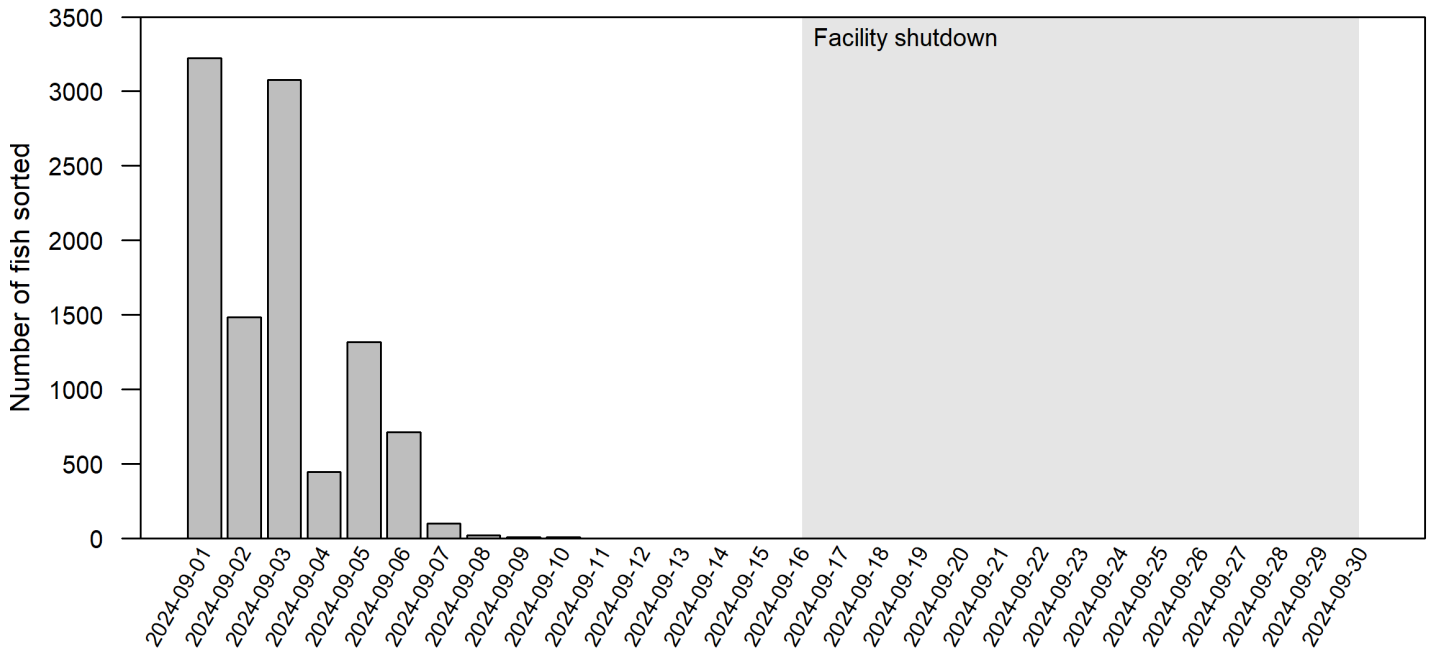
Species	Sorted	Transported and released	PIT tagged	Mortalities	Genetics	Microchemistry or ageing
Arctic Grayling						
Brook Stickleback						
Brook Trout						
Bull Trout						
Burbot						
Finescale Dace						
Flathead Chub						
Goldeye						
Kokanee						
Lake Chub	2	2				
Lake Trout						
Lake Whitefish						
Largescale Sucker	165	165	29			
Longnose Dace	1	1				
Longnose Sucker	51	51	5	2		
Mountain Whitefish	3	3				2
Northern Pike						
Northern Pikeminnow	764	764				
Northern Redbelly Dace						
Peamouth	3	3				
Pearl Dace						
Prickly Sculpin						
Pygmy Whitefish						
Rainbow Trout	1	1	1		1	1
Redside Shiner	8859	8859				
Slimy Sculpin	1	1				
Spoonhead Sculpin						
Sculpin Species						
Spottail Shiner						
Sucker Species	566	566				
Trout-perch						
Walleye						
White Sucker	4	4				
Yellow Perch						
Grand total	10420	10420	35	2	1	3

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

³ 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 2 and 3222 fish were sorted daily during the reporting period (Figure 1).

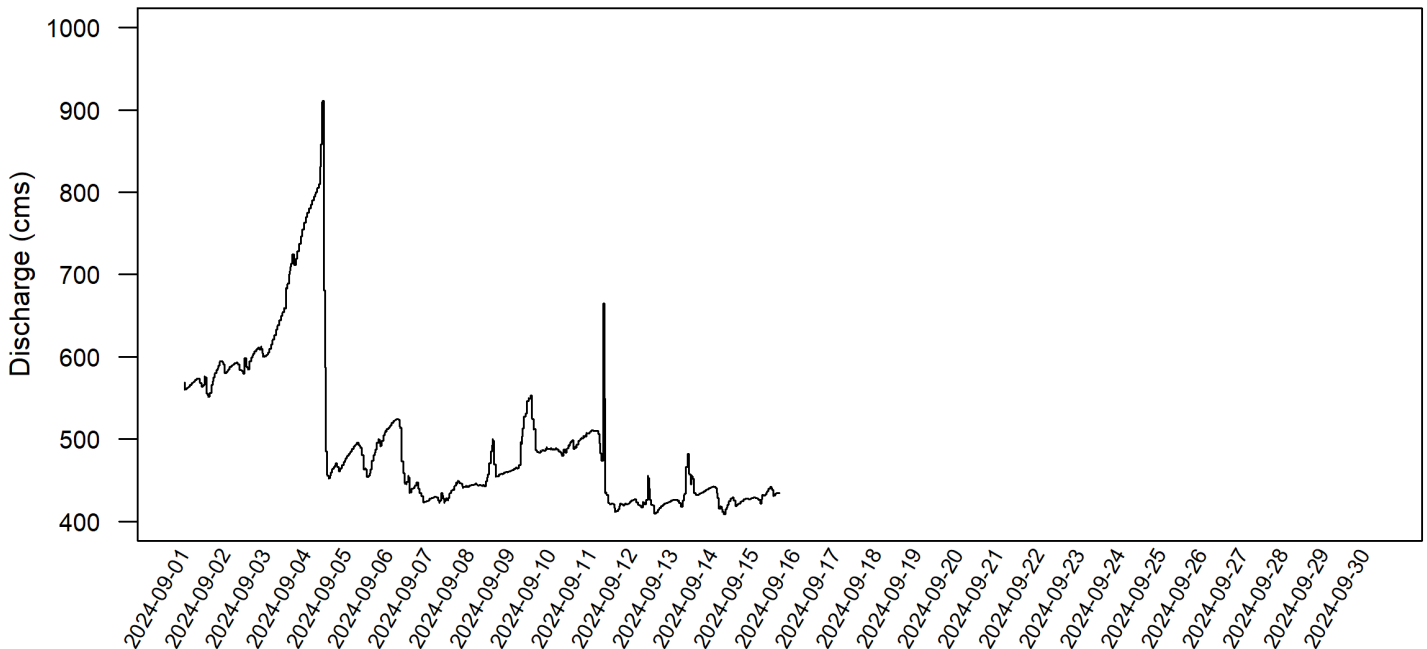
Figure 1. Daily number of fish sorted in the temporary facility during the reporting period.



Environmental conditions

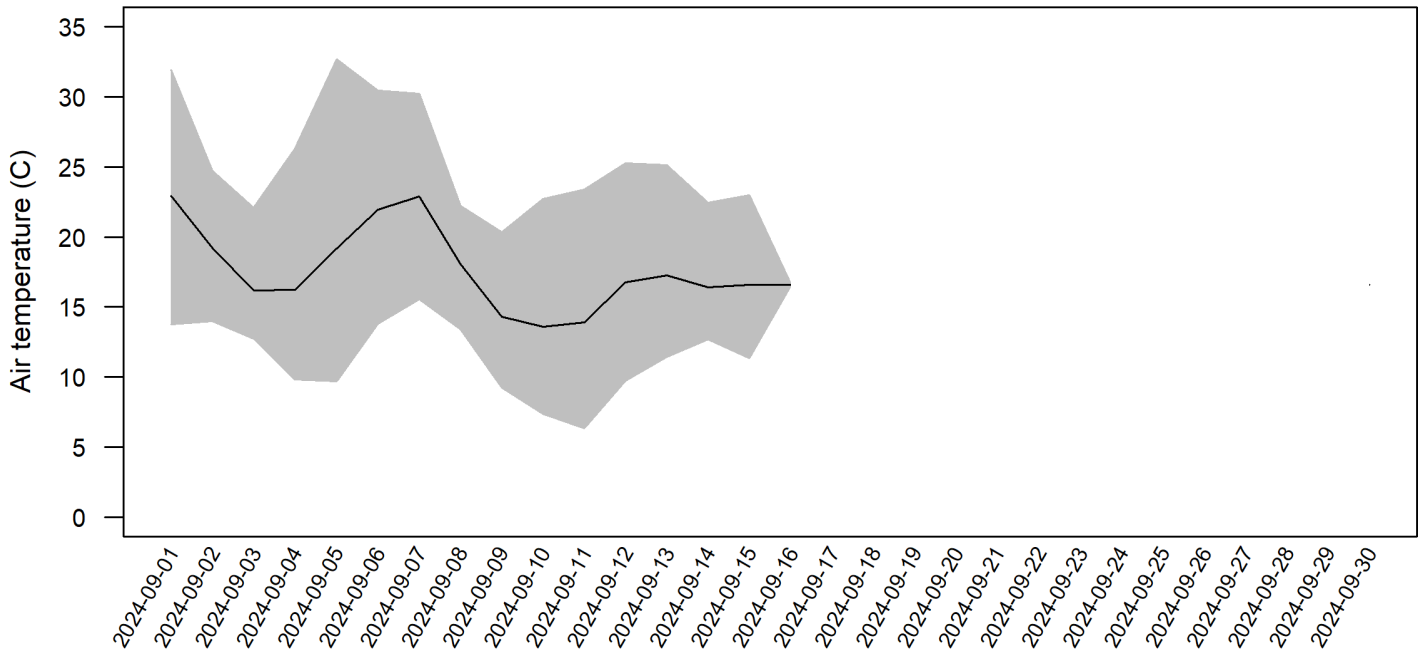
Discharge in the Peace River fluctuated during the reporting period from a low of 409 cms on September 14 to a high of 911 cms on September 4 (Figure 2). Flows were reduced on September 4 to allow the closure of Diversion Tunnel #2 and to facilitate filling the Site C Reservoir.

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 October 3; the downloaded data were provided at 5-minute intervals and were listed as provisional by the WSC.



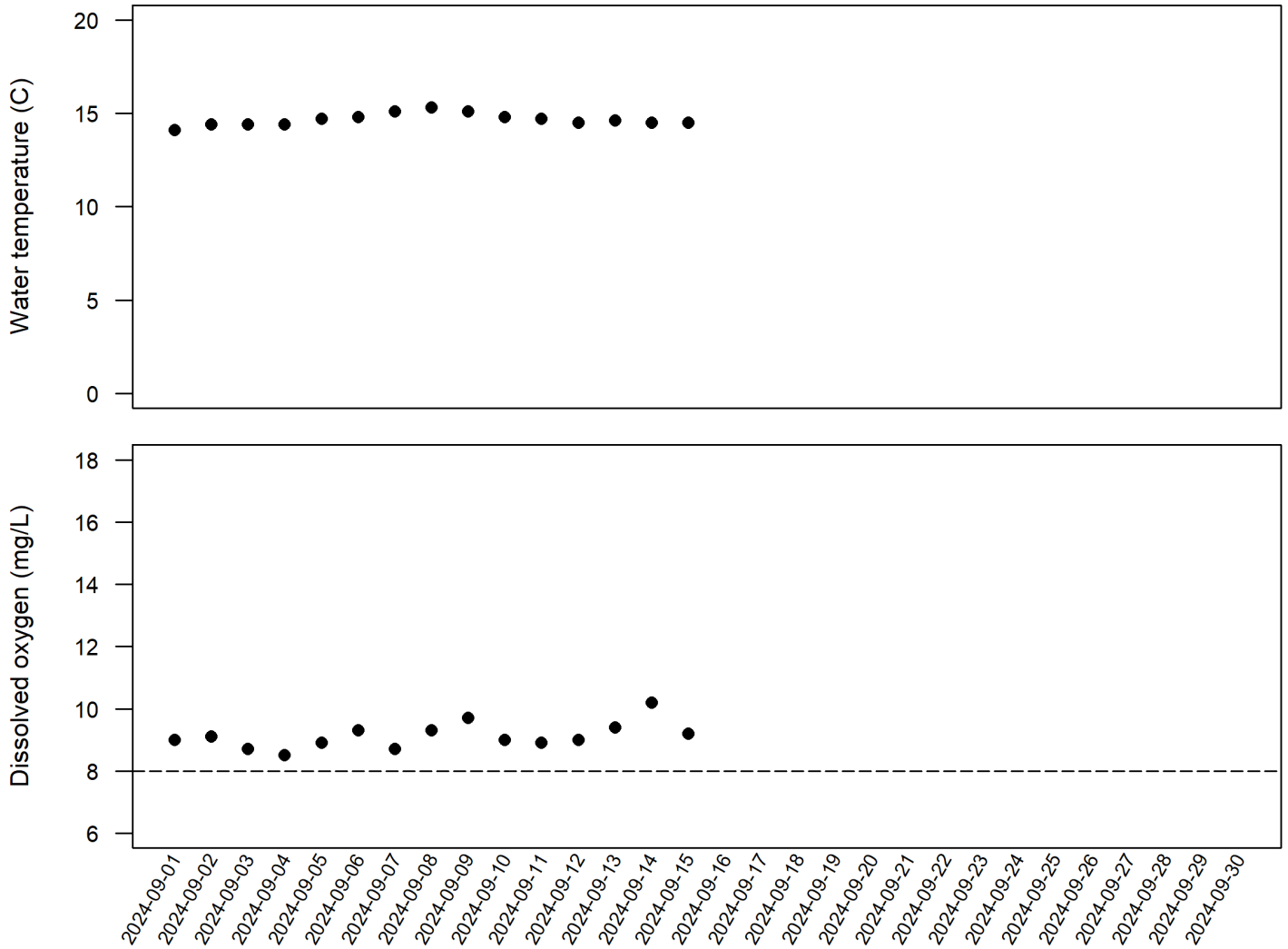
Air temperature fluctuated during the reporting period from a low of 6.4°C on September 11 to a high of 32.7°C on September 5 (Figure 3).

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 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.

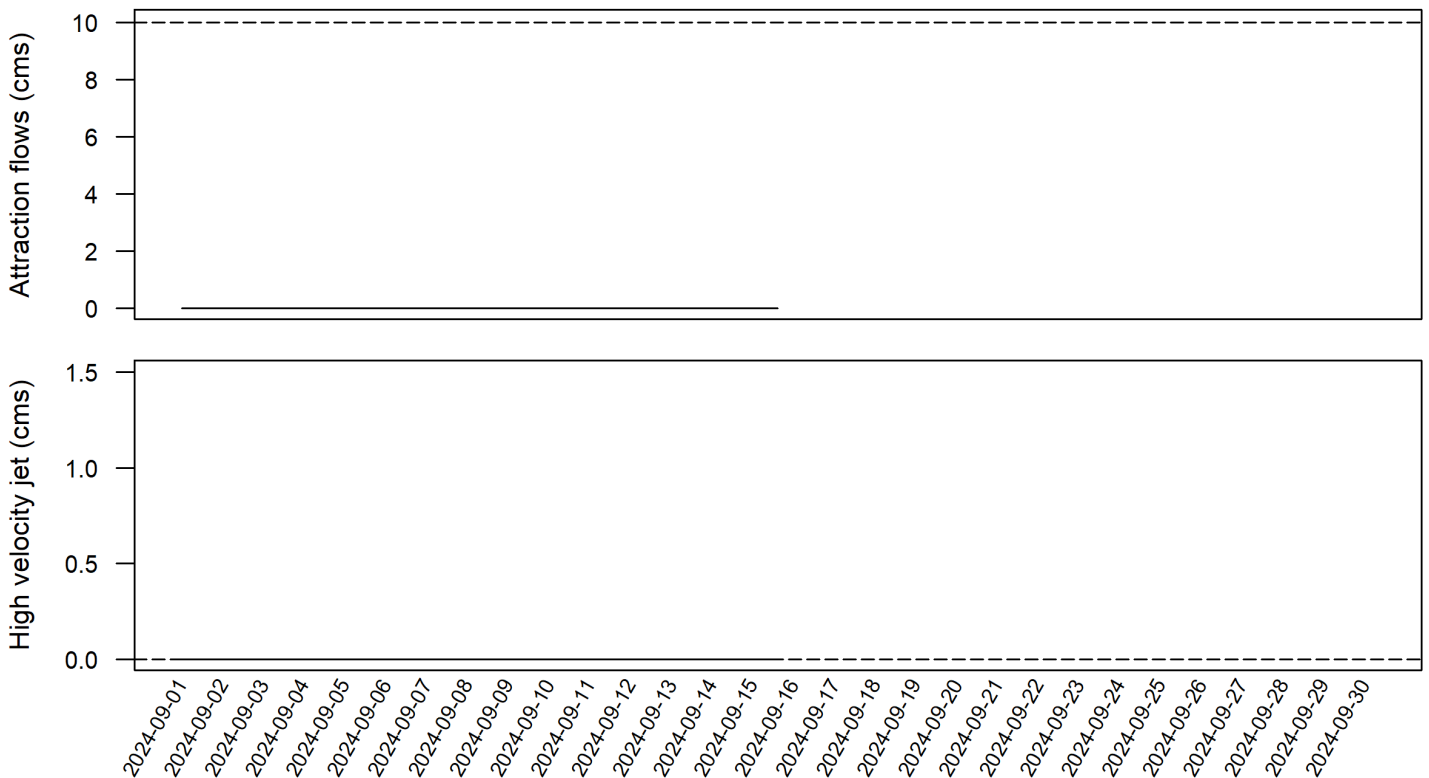


Mechanical operation

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 seven 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
2024-09-01	6	09:08, 10:33, 11:36, 12:32, 14:23, 15:21
2024-09-02	5	09:04, 10:25, 11:35, 12:59, 14:06
2024-09-03	5	08:56, 10:23, 12:32, 13:38, 14:44
2024-09-04	5	08:54, 10:03, 11:20, 12:34, 14:34
2024-09-05	7	08:58, 10:02, 11:06, 12:07, 12:40, 12:58, 13:52
2024-09-06	6	08:46, 11:14, 12:03, 13:12, 13:44, 14:52,
2024-09-07	5	09:09, 10:40, 11:33, 13:01, 14:06
2024-09-08	5	09:02, 10:08, 11:39, 13:07, 14:04
2024-09-09	4	09:10, 09:58, 10:47, 12:37
2024-09-10	5	09:30, 10:23, 12:01, 12:55, 13:55
2024-09-11	5	09:02, 09:57, 10:58, 12:39, 13:28
2024-09-12	5	09:19, 10:14, 11:24, 12:53, 14:12
2024-09-13	5	10:21, 11:35, 12:46, 13:42, 14:14
2024-09-14	5	09:04, 09:45, 11:13, 12:11, 13:09
2024-09-15	1	09:01
2024-09-16	-	Facility shutdown
2024-09-17	-	Facility shutdown
2024-09-18	-	Facility shutdown
2024-09-19	-	Facility shutdown
2024-09-20	-	Facility shutdown
2024-09-21	-	Facility shutdown
2024-09-22	-	Facility shutdown
2024-09-23	-	Facility shutdown
2024-09-24	-	Facility shutdown
2024-09-25	-	Facility shutdown
2024-09-26	-	Facility shutdown
2024-09-27	-	Facility shutdown
2024-09-28	-	Facility shutdown
2024-09-29	-	Facility shutdown
2024-09-30	-	Facility shutdown

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

Date	Standby or shutdown	Rationale
2024-09-15 09:12	Shutdown	BC Hydro operated the temporary facility from September 1 to 15 and then shutdown the facility on September 15 at 09:12 (Photo 1).

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
2024-09-09	Malfunction	Water levels in the fishway started to drop after completing a crowd and draining the fish lock.	Likely operator error or glitch in programming.	Reviewed pump and valve manuals with the operator.

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
N/A	N/A

Photos

Photo 1. BC Hydro operated the temporary facility until the diversion tunnel outlet closure cofferdam work began on September 16 (top: September 27, 2024). Low level outlet gates and spillway operating gates were used to maintain flows in the Peace River downstream of the Project during the reporting period (bottom: September 29, 2024).

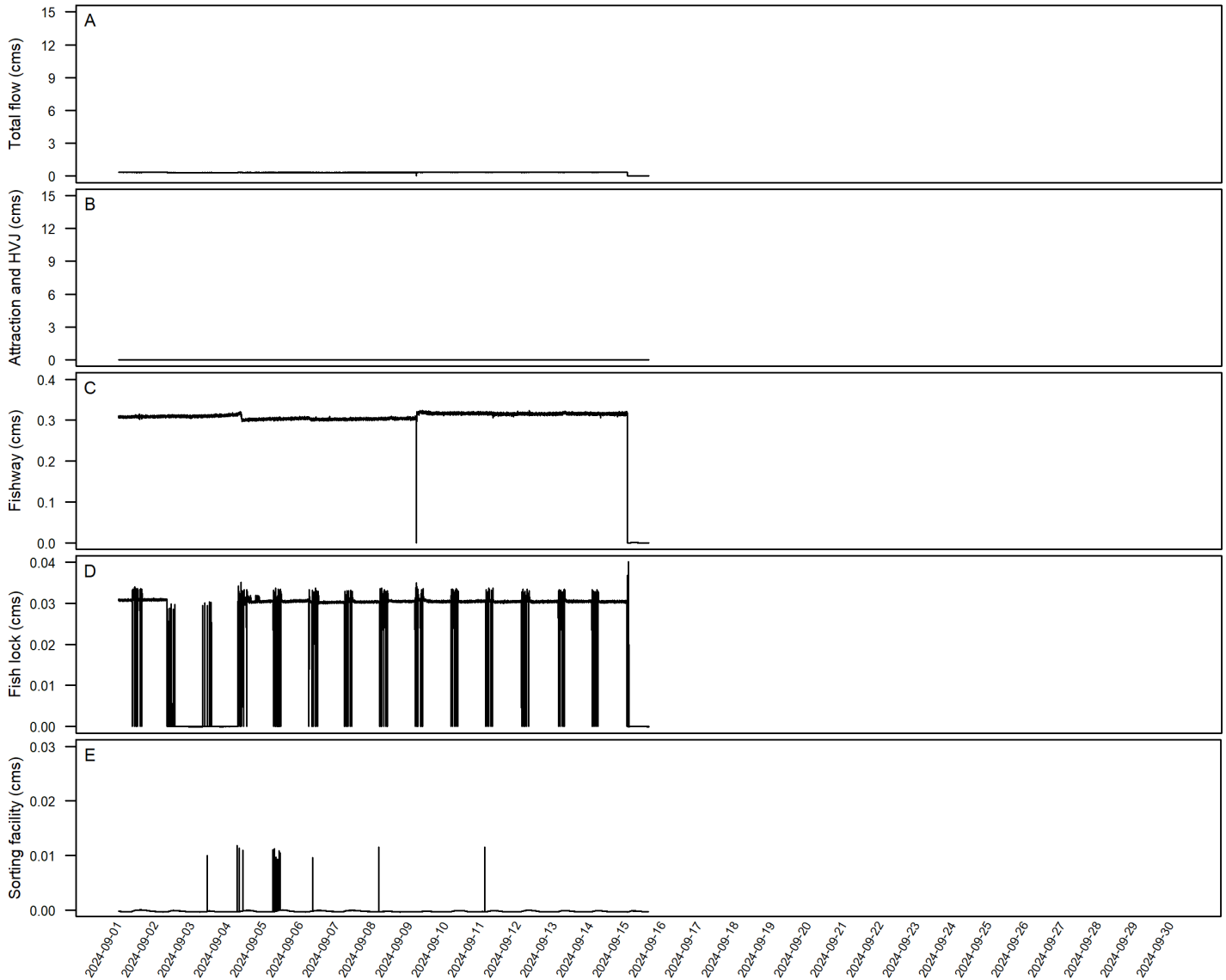


Prepared by

This report was prepared by the following individuals:

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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 133987⁴, 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).



⁴ Available at: <http://siteproject.com/sites/default/files/fish-passage-facility-water-licences-133986-133987.pdf>