

**PATH**

## Action Log Report

Page 1 of 54

Report Date: 2022/11/28

Title:  
PATH File No.:

Coastal GasLink Pipeline Site 532, unnamed tributary (Morice River), Houston  
Habitat File No:

Receive Date: 2020/08/21

Activity:

Correspondence - Do not go to Macro Access Screen

Action ID No.:  
Action Date:  
Document Date:

15  
October 19, 2022

To:

From:

Title: PATH File No.:	Coastal GasLink Pipeline Site 532, unnamed tributary (Morice River), Houston 20-HPAC-01360 Habitat File No:	Receive Date:	2020/08/21
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Description:

**From:** [REDACTED]  
**Sent:** Wednesday, October 19, 2022 9:36 AM  
**To:** Bergsma, Ian <Ian.Bergsma@dfo-mpo.gc.ca>  
**Cc:** [REDACTED]  
**Subject:** Notification of Project Start - 20-HPAC-01360 (CGL Site 532)

Hi Ian,

As per the Avoid and Mitigate letter provided by Fisheries and Oceans Canada (DFO File: **20-HPAC-01360** [Site 532]) Coastal GasLink is providing notification of Project Start.

If you would like to discuss this further, please do not hesitate to contact myself at [REDACTED] or [REDACTED]

Regards,

[REDACTED]  
**Technical Lead - Aquatics**  
Environment - Execution  
Contractor representing Coastal GasLink

mobile: [REDACTED]

Title: Coastal GasLink Pipeline Site 532, unnamed tributary (Morice River), Houston  
PATH File No.: 20-HPAC-01360

Receive Date: 2020/08/21

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Title: PATH File No.:	Coastal GasLink Pipeline Site 532, unnamed tributary (Morice River), Houston 20-HPAC-01360	Habitat File No:	Receive Date:	2020/08/21
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Action:	Information Received	Effective Date:
		Expiry Date - HADD/Serious Harm:
		Expiry Date - Other:
		Compensation/Offsetting:
Time Spent (Hrs):	0.00	Included in List of Records:
Authorization Rationale:		Species at Risk:



Title:	Coastal GasLink Pipeline Site 532, unnamed tributary (Morice River), Houston	Receive Date:	2020/08/21
PATH File No.:	20-HPAC-01360	Habitat File No.:	

Activity:	Correspondence - Do not go to Macro Access Screen	Action ID No.:	14
To:		Action Date:	October 11, 2022
From:		Document Date:	

Description: discussed with Section Head Vince Harper. Discussed with [redacted] at CGL. In principal ok with proposed variance, but requested that CGL advise DFO when sites are going to be done so that a final assessment can be done of the site to identify any concerns.

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**From:** [redacted]  
**Sent:** Tuesday, October 11, 2022 3:43 PM  
**To:** Bergsma, Ian <Ian.Bergsma@dfo-mpo.gc.ca>  
**Subject:** Suggested Update to QEP Timing Windows for Construction Section 7

Hi Ian,

As discussed last week, CGL is looking to provide flexibility to construction timing this fall by providing a variance to the QEP window (December 1 to March 31) for the CS7 sites listed below, based on:

No salmon spawning or migrations observed during any of the 2020, 2021 and 2022 surveys; no adult salmon observed

Only Dolly varden (DV) spawning observed  
DV spawning either complete or mostly complete by October 15

CGL would be looking to provide an updated QEP timing window of October 15 to March 31 (presently December 1 to March 31). This would allow some of the crossings listed below to be completed in late October and November.

See table below for an overview of what has been observed in CS7 during the spawning surveys to date.  
All sites listed below have spawning deterrents installed over suitable gravels 10m u/s to 10m d/s of the construction footprint, no spawning has been observed within the deterrent area.

Title:	Coastal GasLink Pipeline Site 532, unnamed tributary (Morice River), Houston	Receive Date:	2020/08/21
PATH File No.:	20-HPAC-01360	Habitat File No.:	

**Site ID**  
**Fall Spawning Activity**  
**Suggested Update to QEP timing window**  
**Comments**  
**2020**  
**2021**  
**2022**  
  
133C1  
No spawning activity  
No spawning activity  
No spawning activity  
October 15 to March 31  
Lamprey spawning observed in the spring

No salmon spawning activity or migrations observed

532  
DV observed

no spawning activity past Sept 27

DV observed

no spawning activity past Oct 1

DV observed

No spawning activity observed since Sept 22

October 15 to March 31

No salmon spawning activity or migrations observed

573B

No spawning activity

Title:	Coastal GasLink Pipeline Site 532, unnamed tributary (Morice River), Houston	Receive Date:	2020/08/21
PATH File No.:	20-HPAC-01360	Habitat File No.:	

No spawning activity DV observed	No spawning activity observed since October 1
October 15 to March 31 No salmon spawning activity or migrations observed 579B No Survey DV observed	
DV observed	no spawning activity past Sept 27
October 15 to March 31 No salmon spawning activity or migrations observed 583B No spawning activity DV observed	No spawning activity observed since October 4
DV observed	no spawning activity past Oct 6
October 15 to March 31 No salmon spawning activity or migrations observed 565 No spawning activity No survey	Staging fish still observed

Title:	Coastal GasLink Pipeline Site 532, unnamed tributary (Morice River), Houston	Receive Date: 2020/08/21
PATH File No.:	20-HPAC-01360	
	Habitat File No:	

No spawning activity  
October 15 to March 31  
No salmon spawning activity or migrations observed  
DV - Dolly Varden

If you would like to discuss further please do not hesitate to contact me.

Regards,

[Redacted]

**Technical Lead - Aquatics**  
Environment - Execution  
Contractor representing Coastal GasLink

mobile: [Redacted]

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Action:	Waiting/Pending Action by others	Effective Date:	Expiry Date - HADD/Serious Harm: Expiry Date - Other: Compensation/Offsetting: Included in List of Records: Species at Risk:
Time Spent (Hrs): Authorization Rationale:	0.00		

**From:** [Harper, Vince](#)  
**Sent:** Monday, October 31, 2022 1:20 PM  
**To:** [Bergsma, Ian](#)  
**Subject:** RE: Fish Salvage: Mortality reporting Coastal GasLink Project (Permit #: XHAB179 2022), October 29, 2022

**Follow Up Flag:** Follow up  
**Flag Status:** Flagged

Ok thanks. That's the problem with installing only block nets as anything that gets washed into it is unlikely to be able to swim away. Angling the nets is good but still may cause impingement at the d/s end of the net. I assume these are used at locations where there is continual flow through the site (i.e., no actual site isolation via bulk bags, etc.). If there is site isolation, then block nets should only be used on a temporary basis until the isolation is in place to prevent this from happening.

Vincent

**From:** Bergsma, Ian <[ian.Bergsma@dfo-mpo.gc.ca](mailto:ian.Bergsma@dfo-mpo.gc.ca)>  
**Sent:** Monday, October 31, 2022 10:16 AM  
**To:** Harper, Vince <[Vince.Harper@dfo-mpo.gc.ca](mailto:Vince.Harper@dfo-mpo.gc.ca)>  
**Subject:** FW: Fish Salvage: Mortality reporting Coastal GasLink Project (Permit #: XHAB179 2022), October 29, 2022

FYI. I did speak with FO Jason Davey about this and I will bring this up with [REDACTED] of CGL on Wednesday when we both will be in attendance for the site 714 pre-construction meeting.

Ian

**From:** Davey, Jason <[jason.Davey@dfo-mpo.gc.ca](mailto:jason.Davey@dfo-mpo.gc.ca)>  
**Sent:** Monday, October 31, 2022 9:01 AM  
**To:** Bergsma, Ian <[ian.Bergsma@dfo-mpo.gc.ca](mailto:ian.Bergsma@dfo-mpo.gc.ca)>  
**Cc:** [REDACTED]  
**Subject:** FW: Fish Salvage: Mortality reporting Coastal GasLink Project (Permit #: XHAB179 2022), October 29, 2022

Good morning Ian,

Not sure if you see these mortality reports from CGL or not? I have received 7 mortality notifications, such as the one below, in the last 11 days. The total number of mortalities reported is now at 31. This is an abnormal amount of mortality notifications for the CGL project. In your opinion, at what point should a field inspection be conducted to ensure proper methods are being utilized for salvage to minimize mortalities?

Cheers, Jason

**From:** [REDACTED]  
**Sent:** Sunday, October 30, 2022 10:44 AM  
**To:** Ma, Carey <[Carey.Ma@dfo-mpo.gc.ca](mailto:Carey.Ma@dfo-mpo.gc.ca)>; Davey, Jason <[jason.Davey@dfo-mpo.gc.ca](mailto:jason.Davey@dfo-mpo.gc.ca)>  
**Cc:** [REDACTED]  
**Subject:** Fish Salvage: Mortality reporting Coastal GasLink Project (Permit #: XHAB179 2022), October 29, 2022

Good afternoon Jason and Carey,

Please consider this notification for a total of twelve fish mortalities at site 133C1 (KP 521+706; UTM: 641170E, 6005231N, 9U) on the Coastal GasLink Project (Permit #: XHAB179 2022). Eight Longnose Dace mortalities were salvaged on site. For mitigation, we directed the crews to:

- Continue to monitor block nets daily for fish impingement.
- Salvage any fish observed upstream of the block net and release them downstream.
- Install the block nets at a greater angle relative to the direction of flow to create areas of refuge for fish

The table below outlines our effort to salvage at site 133C1 on October 29, 2022.

Date	Watercourse ID	Access/ Ancillary Surveyed	Equipment Used	Species	Total Fish Salvaged	Fish Mortalities	Notes
October 29, 2022	54C2A	609+556	DN	LCN	15	8	Seven Longnose Dace were salvaged and released downstream. Eight mortalities occurred, attributed to impingement on the block net. Fish Salvage is ongoing.

Fish Mortality Table:

Date	Watercourse ID	Species	Life stage	Presumed cause of death	Length (mm)	Weight (g)	Number of individuals	Comments	Mitigations
October 29, 2022	133C1	LCN	A	Net impingement.	50	±0.5	1	A precipitation event causing high flows resulted in fish impingement at the block net.	In consultation with the CGL Aquatics QR, the Crew will reinstall the block nets at a greater angle relative to the direction of flow to create areas of refuge for fish. The Crew added some boulder and large woody debris to create eddies for smaller fish to find rest.
					45		1		
					42		1		
					45		1		
					42		1		
					42		1		
					52		1		
					45		1		

Please let us know if you have any further questions or require additional information.

[REDACTED] Jacobs | Aquatic Biologist

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**From:** [REDACTED]  
**Sent:** Thursday, November 17, 2022 4:48 PM  
**To:** [Bergsma, Ian](#)  
**Cc:** [Harper, Vince](#)  
**Subject:** RE: [EXTERNAL] Questions regarding Morice River trenchless crossing  
**Attachments:** Site 558\_2020 Spawning\_Summary\_Memo.pdf

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Hi Ian,

Thanks for the email.

Please see below for information to support responses to the IR's.

Things to note – all responses are in reference to tunnelling operations; No blasting is taking place at the Morice River; water temps at the Morice were very warm this year.

CGL is looking at installing vibration monitors to determine the magnitude of ground vibrations and relate them back to the guidelines in Wright and Hopky. We have the spawning areas mapped so we can place the monitors in the best sampling location and avoid disturbing any redds.

Note – the cutting head is now at the east bank of the Morice River. All redds near the crossing were identified on the west bank and in the side channel. No observations during active spawning of fish avoidance or stress related activities have been observed during water quality monitoring.

Regards,

[REDACTED]  
**Technical Lead – Aquatics**  
Environment - Execution  
Contractor representing Coastal GasLink

mobile: [REDACTED]

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**From:** Bergsma, Ian <Ian.Bergsma@dfo-mpo.gc.ca>  
**Sent:** Wednesday, November 16, 2022 10:23 AM  
**To:** [REDACTED]  
**Cc:** Harper, Vince <Vince.Harper@dfo-mpo.gc.ca>  
**Subject:** [EXTERNAL] Questions regarding Morice River trenchless crossing

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Hi [REDACTED]

Follow up from my message for CGL responses to the following questions originating from the Skeena Watershed Conservation Coalition. I will be in the field for part of today so feel free to contact Vince (cc'd) to discuss further.

Ian

Hello,

I have concerns about the drilling happening on the Morice River right now being conducted as part of the Coastal GasLink Pipeline construction.

The salmon and their eggs in the gravel that our rafting team saw in the Morice River (at the drill site as well as above and below) really raised concerns. Has any a salmon biologist or appropriate person been sent out investigate? Local biologists that we (SWCC staff and others) have talked with told us the drilling and blasting will most certainly have an impact. DFO has made public assertions that this is Provincial project when asked about salmon, steelhead and lamprey mitigation and/or investigation into impacts of the drilling under the Morice River by CGL.

I followed up with a number of civil servants out of the Smithers and Prince George offices and they have sent me to the OGC, EAO & DFO. Rose out of your Ft St John office was lovely to chat with and she gave me your email. Well, she gave me the incorrect email address but the typo was corrected so had to send this twice.

Can you help me understand what Ministry, agency or what person we can direct our concerns or ask questions to about the drilling? Who is actually responsible to oversee this work and ensure it's being done safely as it relates to anadromous fish?

It's really disturbing that there isn't clarity about who is responsible and where we can direct concerns. Hoping you can help.

Specifically, I am hoping to understand:

Why is this drilling permitted to happen during the time of most impact to most species (some of which are blue listed, others have recovery programs in place in this very river to try and deal with declining populations). The impact assessment of timing on instream work is attached below from CGL's EA submission.

<b>Coastal GasLink Pipeline Project</b>	
Appendix B: Environmental Assessment Certificate Condition 1	Section 8.0
Fish and Fish Habitat Technical Data Report #2	Results

**Table 8-6: Least-Risk Window by Species for Instream Construction in the Skeena Region – Morice TSA**

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Least Risk Window
bull trout													Jun 15 – Aug 31
chinook salmon													Jun 1 – Jul 15
chum salmon													May 15 – Aug 1
coho salmon													Jul 1 – Aug 31
cuthroat trout													Sep 1 – May 15
Dolly Varden													Jun 15 – Aug 31
kokanee													Jun 15 – Jul 15
pink salmon													May 15 – Aug 1
rainbow trout													Sep 1 – May 15
sockeye salmon													Jun 15 – Jul 15
steelhead													Sep 1 – Apr 30
whitefish													Jun 1 – Sep 15

**NOTES:**

Shaded cells bars indicate restricted work periods within the Morice TSA; non-shaded cells indicate instream work period. cells Notwithstanding the above, if any one of the following conditions are met, work may occur within the restricted work period as the timing window is considered not applicable:

- the watercourse channel is naturally dry (no flow) or frozen to the bottom at the worksite and the instream activity will not adversely affect fish habitat (e.g., result in the introduction of sediment into fish habitat); or
- construction of a winter crossing is planned and such work does not adversely affect the watercourse channel (including watercourse banks), fish habitat or fish passage

SOURCE: (BC MOE 2005)



We know that the noise from drilling and blasting have impacts to salmon and their eggs. Here's a short list of what we would like to understand:

- No blasting is taking place at the Morice River.
  - How many salmon eggs are currently alive in that gravel on and immediately downstream of the Right of Way?
- Oodles...., but following DFOs blasting guidelines we will assume only redds within 150 m of the tunnel path have the potential to be impacted by vibrations. Therefore, inferences can be made from applicable 2020 spawning survey data, which are summarized below:
  - 14 fall spawning surveys were conducted between August 6 and November 12, 2020
  - Fall spawning within 150 m of the ditchline occurred in spawning habitat areas 6 and 8 in 2020
  - A conservative estimate of redds in SHA 6 and 8 is up to 39 redds of unknown species (presumed Coho)
  - McPhail (2007) suggests the number of eggs per female Coho can range from 1700 to almost 7000 (depending on female size as well as egg size – the larger the eggs, the fewer are produced) – 159-167 days at 2C to 50% hatch
    - Chum 2000-4000 eggs – synchronous emergence by drainage
    - SK 2000 – 4000 eggs – 80 – 119 days (temps 5-8) to 50% hatch
    - CH 2000 - > 17000 eggs – 69 to 132 days (temps 4-8C) to 50% hatch
  - A conservative estimate of Coho eggs in the gravels within 150 m of the tunnel path = 273, 000.
  - Why is this work happening during a time of most impact to most species?
- The objective of least risk windows is to reduce the risk of impacts to fish and fish habitat from instream works and vegetation clearing. There is no instream works associated with tunnelling activities and an undisturbed vegetation buffer (minimum of 130 m) has been left between on-land activities and the high water mark. A tunneling method was selected to avoid instream activities and avoid adverse effects to fish and fish habitat, as it does not involve disturbance to the stream bed or banks. Based on data collected in 2020 and observations and water temperatures collected during water quality monitoring in 2022, spawning was considered complete by mid-November. The tunneling tool is currently approaching the east bank of the river, therefore tunnelling under the river will occur post-spawning migrations.
  - What is their current life stage... eyed or not eyed? (This would now need to include info from when the drilling and blasting began).
- Eggs will be in various stages of development based on timing of spawning and species, but based on water temperatures, most should be eyed. Eyed stage begins roughly at 270 TU – water temps were warm this year, and adding up the daily average water temps to-date to

determine TUs –we get approximately 800 TU, so in theory they are eyed – this value seems high though, and almost suggests these fish are fully developed.

- How dependent are these specific redds locations and species on ground water given current/projected water levels and what impacts does the drilling have on groundwater movement?

- Tunneling operations are not expected to have any adverse effects on water levels or ground water movement.

- Are there any specific currently occupied redd locations which present significant harm to eggs due to the maximum 40 foot buffer between the eggs and the bore hole?

- No adverse effects to eggs are expected to result from tunnelling operations. It should be noted there is no "40 foot buffer" associated with redds and the tunneling operation.

- When was the last time a qualified biologist or inspector was on site to complete this research and what is the work plan in response to these findings that will protect the habitat necessary for salmon egg survival this year? (This would also need backdated info to include the entire time of drilling and blasting)

- No blasting is taking place at the Morice River. Not clear what 'research' they are referring to, but Qualified professionals (i.e. qualified biologists) and/or Environmental Inspectors are onsite daily. Water quality monitoring has been ongoing 24/7 since the start of tunnelling works and is being conducted by qualified professionals (e.g. qualified biologists). Environmental inspectors visit the location daily to inspect for compliance with permitting conditions and project environmental management plans.

- What about the disturbance to spawners trying to move upstream?

- Spawning migrations and activity have now concluded with no disturbance to spawning fish or migrations documented. Fish were observed moving through, and spawning at, the site.

- Can you help me understand if the OGC permitted and supports the current timing window for in-stream and drilling work on/under the Morice River? Or - did you get a letter of advice or some other DFO decision that permitted this activity at this time? (In stream work was conducted for gravel removal but not sure when that work was completed)

- There are no instream works associated with drilling activities. OGC requires crossing of fish bearing streams to be constructed in accordance with the timing, methods and any mitigation specified in the supplemental stream crossing submission. As per the Coastal GasLink Pipeline Project Environmental Management Plan trenchless crossing techniques can occur during least risk windows.

It is a minimum of tens, and likely hundreds, of thousands of eggs based on what we saw during our rafting trip that are currently on and immediately downstream of the ROW being exposed to drilling.

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## **2020 Spawning Survey Summary – Morice River (Site 558), Construction Section 7**

### **Work Package 3**

CGL4703-JEG3-ENV-MEM-0027

May 26, 2021

Revision 0

Issued for Information

# **Jacobs**



## Revision Log

Rev	Section	Revision Description
0	All	Issued for Information

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<b>Subject</b>	<b>2020 Spawning Survey Summary – Morice River (Site 558), Construction Section 7</b>
<b>Project Name</b>	Coastal GasLink Project (the Project)
<b>Attention</b>	[REDACTED] Coastal GasLink Pipeline Ltd. (Coastal GasLink)
<b>From</b>	[REDACTED] Jacobs
<b>Date</b>	May 26, 2021
<b>Copies to</b>	[REDACTED]
<b>Document Control Number</b>	CGL4703-JEG3-ENV-MEM-0027

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## 1. Introduction

Coastal GasLink retained Jacobs to complete spring and fall spawning surveys in 2020 where potential spawning habitat was identified within the construction footprint during fish habitat assessments. The objective for the spawning surveys was to inform construction planning, and provide additional fish and fish habitat information in support of Fisheries and Oceans Canada Request for Review submissions. This memorandum summarizes the results of the spring and fall spawning surveys for Site 558 on the Morice River.

## 2. Methods

Spawning surveys were conducted by snorkelling, or from the banks where stream conditions were unsuitable for snorkelling. Spawning surveys were conducted by crews of two or three, led by an Aquatic Biologist. Survey reaches typically extended from 200 metres (m) upstream (u/s) to 200 m downstream (d/s) from the construction footprint, but varied and were largely based on spawning habitat potential, expected zone of influence, and the British Columbia (BC) Oil and Gas Commission corridor boundaries. Areas that were identified as potential spawning habitat during previous and ongoing assessments for the Project were surveyed. In some cases, observations were limited by high water velocity or turbidity, particularly during the spring spawning season. Observations of staging and spawning fish were recorded, as well as redd counts (that is, confirmed, potential, and test redds). General fish observations were also recorded, including non-spawning fish counts and activity (for example, holding or feeding).

## 3. Site Location and Potential Spawning Habitat Summary

Site 558 is located at Kilometre Post 558+337 of the Project on the Morice River (watershed code 460-600600). Based on historic fish presence (Government of BC 2021a,b) and fish presence surveys conducted for the Project, the fish species of management concern that may occur in the Morice River near Site 558 are Bull Trout (BT) (*Salvelinus confluentus*), Chinook Salmon (CH) (*Oncorhynchus tshawytscha*), Chum Salmon (*Oncorhynchus keta*), Coho Salmon (CO) (*Oncorhynchus kisutch*), Cutthroat Trout (*Oncorhynchus clarkii*), Dolly Varden (DV) (*Salvelinus malma*), Lake Trout (*Salvelinus namaycush*), Lamprey (*Lampetra* sp.), Mountain Whitefish (MW) (*Prosopium williamsoni*), Pink Salmon (PK) (*Oncorhynchus gorbuscha*), Rainbow Trout (RB) (*Oncorhynchus mykiss*), Sockeye Salmon (SK) (*Oncorhynchus nerka*), and Steelhead (ST) (*Oncorhynchus mykiss*).

There were 10 potential Spawning Habitat Areas identified during the detailed habitat assessment at Site 558 on November 2, 2019 and the 2020 spawning surveys; of these, three potential Spawning Habitat Areas were identified within the construction footprint, one was identified u/s of the construction footprint, and six were identified d/s of the construction footprint (see Table 1 and Figure 1). Deep run habitat and small and large gravel substrate provide potential spawning habitat for both redd-building and broadcast spawning species, such as MW.

Table 1. Summary of Potential Spawning Habitat Areas for Site 558 (November 2, 2019 and October 31, 2020)

Parameter	Spawning Habitat Area 1	Spawning Habitat Area 2	Spawning Habitat Area 3	Spawning Habitat Area 4	Spawning Habitat Area 5	Spawning Habitat Area 6	Spawning Habitat Area 7	Spawning Habitat Area 8	Spawning Habitat Area 9	Spawning Habitat Area 10
Spawning Habitat Type	Redd and broadcast spawning	Redd and broadcast spawning	Redd and broadcast spawning	Redd and broadcast spawning	Redd and broadcast spawning	Redd and broadcast spawning	Redd and broadcast spawning	Redd and broadcast spawning	Redd and broadcast spawning	Redd and broadcast spawning
Spawning Habitat Location	Outside of the construction footprint (extending from 660 m to 770 m d/s from ditchline)	Within and outside of the construction footprint (extending from 30 m to 760 m d/s from ditchline)	Outside of the construction footprint (extending from 325 m to 560 m d/s from ditchline)	Outside of the construction footprint (320 m d/s from ditchline)	Outside of the construction footprint (280 m d/s from ditchline)	Outside of the construction footprint (155 m d/s from ditchline)	Outside of the construction footprint (140 m d/s from ditchline)	Within the construction footprint (10 m d/s from ditchline)	Within the construction footprint (20 m u/s from ditchline)	Outside of the construction footprint (80 m u/s from ditchline)
Spawning Habitat Area (square metres)	1,041.0	17,978.5	2,731.4	3.0	1.0	9.0	3.0	235.0	1.0	2.0
Average Water Depth (metres)	0.72	0.93	0.70	0.5 to 1.0	0.5 to 1.0	0.5 to 1.0	0.5 to 1.0	0.5 to 1.0	Not recorded	Greater than 1.0
Substrate (Dominant/ Subdominant)	LG/C	Not recorded	C/SG	Gravel	Gravel	Gravel	SG/LG	LG/C and SG	C/LG	C/LG
Cover (Dominant/ Subdominant)	DP/OHV	Not recorded	OHV/WD	WD/DP	Not recorded	DP/WD	DP/WD	WD/DP	DPWD	DP/OHV
Velocity (metres per second)	0.20	0.40	0.30	Not recorded	Not recorded	Not recorded	Not recorded	Not recorded	Not recorded	Not recorded

Notes:  
Substrate types: C (Cobble), LG (Large Gravel), SG (Small Gravel)  
Cover types: DP (Depth), OHV (Overhanging Vegetation), WD (Woody Debris)





## 4. Spring and Fall Spawning Survey Results

Spring and fall spawning surveys were conducted at Site 558 from May to November 2020. BT, BT/DV, CH, CO, DV, Largescale Sucker (CSU) (*Catostomus macrocheilus*), MW, PK, RB, Sculpin (CC) (*Cottus* sp.) SK, ST, Sucker (SU) (*Catostomus* sp.), unidentified fish (SP), unidentified Salmon species (SA) (*Oncorhynchus* sp.), and White Sucker (WSU) (*Catostomus commersonii*) were observed. Juvenile fish identified as either BT or DV were recorded as BT/DV, based on the lack of defining traits between these species at this life stage. Survey effectiveness was limited in the main channel due to high flow, instream hazards (such as large woody debris) and large channel size, so crews' efforts were focused on the slower-moving side channels and channel margins. The results of the spring and fall spawning surveys are included in Sections 4.1 and 4.2.

### 4.1 Site 558 Spring Spawning Surveys

There were six spring spawning surveys conducted between May 14 and July 4, 2020 at Site 558. During these surveys, visibility was generally high with low turbidity. Water temperature ranged from 4.1 degrees Celsius (°C) to 8.6°C, pH from 7.3 to 8.5, and dissolved oxygen (DO) from 8.0 milligrams per litre (mg/L) to 10.0 mg/L. No spawning behaviour was observed, however, 21 potential redds were observed (see Table 2 and Figure 2). Since no adult spring spawning fish were observed with these redds, they were recorded as potential redds. The potential redds ranged in size from 0.1 m by 0.2 m, to 0.5 m by 1.5 m. Based on the size range, the smaller potential redds may have been created by RB and the larger redds by ST, since these were the only spring spawning redd-building species observed during the spring survey period. General fish observations included BT, BT/DV, CC, CH, CO, MW, RB, SA, SP, and ST (see Table 2 and Figure 5). The SP observed were unidentified salmonids.

### 4.2 Site 558 Fall Spawning Surveys

There were 14 fall spawning surveys conducted between August 6 and November 12, 2020 at Site 558. During these surveys, visibility ranged from low to high, with low to moderate turbidity. Water temperature ranged from 13.6°C to 3.1°C, pH from 7.0 to 8.0, and DO from 8.0 mg/L to 11.0 mg/L. There were 7 spawning SK, 6 staging SK, 50 staging CH, and 3 staging CO observed, as well as 8 CH redds, 1 SK redd, 22 SP redds, and 1 potential redd (see Table 2 and Figure 3). Some SP redds were likely CO redds based on the smaller size, but were not observed in association with spawning adult fish, so this was not confirmed. The potential redd had fine algae on the upper layer of gravel, indicating that it may not have been used by fish recently. General fish observations included BT, BT/DV, CH, CO, CSU, DV, MW, PK, RB, SA, SK, ST, SU, and WSU (see Table 2 and Figure 6).

During the 2020 fall spawning surveys, MW were regularly observed throughout the study reach and groups of MW were frequently observed feeding and holding u/s and d/s of the construction footprint. Although congregations of adult MW (that is, 10 or more fish grouped together tightly and behaving in a way that suggests they are maintaining that grouping) were not observed during the surveys, a large number of the adult MW observed were consistently in a deep run/pool section approximately 260 m upstream from the construction footprint, and in a deep pool approximately 110 m downstream from the construction footprint (see Figure 1). Adult MW observations generally increased from the spring into fall and peaked on September 19, 2020, when water temperature was 8.0°C (see Table 2 and Figure 4). MW are broadcast spawners that release eggs over the substrate without site preparation, often spawning at dusk or during the night. These factors make it difficult to observe and confirm MW spawning. Spawning typically begins when water temperature drops below 10°C and peak activity occurs at temperatures less than 6°C (McPhail 2007).

Table 2. Fish Observation Summary for Site 558 Spring and Fall Spawning Surveys

Survey Date (2020)	Spawning Observations	General Fish Observations Species (Life Stage)	Activity	Habitat
<i>Spring Spawning</i>				
May 14	There were 6 potential SP redds observed within and u/s of the construction footprint in Spawning Habitat Areas 8, 9, and 10 (see Figure 1 and Table 1).	Not applicable	Not applicable	Habitat was characterized as backwater areas and runs deeper than 1.0 m.
May 19	There was no spawning activity or new redds observed.	2 SP (young-of-the-year [YOY])	Feeding	Habitat was characterized as backwater areas. Cover was provided by log debris.
May 28	There was no spawning activity or new redds observed.	2 SP (YOY)	Holding	Habitat was characterized as backwater pools. Cover was provided by log debris.
June 13	There were 15 potential SP redds observed d/s of the construction footprint in Spawning Habitat Area 6 (see Figure 1 and Table 1).	3 CC (adult) 1 BT/DV (juvenile) 6 MW (adult) 40 SA (YOY)	Holding Feeding Holding Holding	Habitat was characterized as backwater pools, with some runs deeper than 1.0 m. Cover was provided by boulders, log debris, and water depth.
June 26	There was no spawning activity or new redds observed.	Not applicable	Not applicable	Habitat was characterized as backwater areas.
July 4	There was no spawning activity or new redds observed.	35 CO (YOY) 2 MW (adult)	Holding Holding	Habitat was characterized as backwater areas and pools deeper than 1.0 m. Cover was provided by log debris and undercut banks.
		2 BT (adult) 20 CH (YOY) 136 CO (YOY) 3 MW (adult) 1 RB (adult)	Holding Feeding Feeding Feeding Feeding	Habitat was characterized as backwater pools, with some runs deeper than 1.0 m. Cover was provided by water depth and log debris.
		3 BT (adult) 122 CO (YOY) 13 MW (adult) 2 RB (unknown) 2 ST (adult)	Feeding Feeding Feeding Holding Holding	Habitat was characterized as backwater pools, with some runs deeper than 1.0 m. Cover was provided by water depth and log debris.



Table 2. Fish Observation Summary for Site 558 Spring and Fall Spawning Surveys

Survey Date (2020)	Spawning Observations	General Fish Observations Species (Life Stage)	Activity	Habitat
<b>Fall Spawning</b>				
August 6	There was no spawning activity or redds observed.	1 BT (adult) 100 CH (YOY) 200 CO (YOY) 11 MW (adult) 6 MW (juvenile) 3 RB (adult) 7 RB (juvenile) 5 ST (adult)	Holding Not recorded Feeding Feeding Feeding Feeding Feeding Holding	Habitat was characterized as pools and runs deeper than 1.0 m. Cover was provided by water depth and log debris.
August 13	There was no spawning activity or redds observed.	1 BT (adult) 1 CH (adult) 100 CH (YOY) 50 CO (YOY) 17 MW (adult) 2 RB (adult) 5 RB (juvenile) 30 SK (adult) 11 ST (adult)	Feeding Holding Feeding Feeding Feeding Feeding Feeding Holding Holding	Habitat was characterized as pools and runs deeper than 1.0 m. Cover was provided by water depth.
August 20	There was no spawning activity or redds observed.	30 CO (YOY) 2 MW (adult) 4 RB (juvenile) 100 RB (YOY) 2 SK (adult) 3 ST (adult)	Feeding Holding Holding Holding Holding Holding	Habitat was primarily characterized as runs deeper than 1.0 m. Cover was provided by log debris.

Table 2. Fish Observation Summary for Site 558 Spring and Fall Spawning Surveys

Survey Date (2020)	Spawning Observations	General Fish Observations Species (Life Stage)	Activity	Habitat
August 27	There were 6 staging SK observed d/s of the construction footprint in Spawning Habitat Area 1 (see Figure 1 and Table 1).	Not applicable	Staging	Habitat was characterized as a pool deeper than 1.0 m. Cover was provided by log debris.
		100 CO (YOY) 14 MW (adult) 30 RB (juvenile) 100 RB (YOY) 17 ST (adult)	Feeding Holding Feeding Feeding Holding	Habitat was characterized as runs 0.5 m to 1.0 m deep, and pools deeper than 1.0 m. Cover was provided by water depth and log debris.
September 3	There was no spawning activity or redds observed.	4 BT (adult) 1 BT/DV (juvenile) 3 CH (adult) 29 CH (YOY) 36 CO (YOY) 40 MW (adult) 3 MW (juvenile) 21 PK (adult) 19 RB (adult) 8 RB (juvenile) 3 SK (adult) 1 ST (adult)	Holding Feeding Holding Feeding Feeding Feeding Feeding Holding Holding Feeding Holding Holding	Habitat was characterized as pools deeper than 1.0 m and runs 0.5 m to 1.0 m deep. Cover was provided by water depth.



Table 2. Fish Observation Summary for Site 558 Spring and Fall Spawning Surveys

Survey Date (2020)	Spawning Observations	General Fish Observations Species (Life Stage)	Activity	Habitat
September 10	There were 2 adult staging CH and 1 CH redd observed d/s of the construction footprint in Spawning Habitat Area 2 (see Figure 1 and Table 1).	Not applicable	Staging	Habitat was characterized as a 0.5 m to 1.0 m deep run. Cover was provided by water depth.
		4 BT (adult) 8 CH (adult) 68 CH (YOY) 54 CO (adult) 87 CO (YOY) 54 MW (adult) 44 PK (adult) 13 RB (adult) 14 RB (juvenile) 13 SK (adult) 4 ST (adult) 3 WSU (adult)	Holding Holding Feeding Holding Feeding Feeding Holding Feeding or holding Feeding Holding Holding Holding	Habitat was characterized as backwater pools and runs 0.5 m to 1.0 m deep, with some deeper than 1.0 m. Cover was provided by water depth and log debris.
September 19	There were 48 adult staging CH and 2 CH mortalities observed within and d/s of the construction footprint in Spawning Habitat Area 1 and near Spawning Habitat Areas 4 and 7.	Not applicable	Staging and mortality	Habitat was characterized as runs 0.5 m to 1.0 m deep. Cover was provided by log debris.
		60 CH (juvenile) 40 CO (juvenile) 3 CSU (adult) 1 BT/DV (juvenile) 100 MW (adult) 20 RB (juvenile) 4 SK (adult) 6 ST (adult)	Feeding Feeding Holding Feeding Holding Feeding Holding Feeding	Habitat was characterized as runs 0.5 m to 1.0 m deep. Cover was provided by log debris, water depth, and stream turbulence.

**Table 2. Fish Observation Summary for Site 558 Spring and Fall Spawning Surveys**

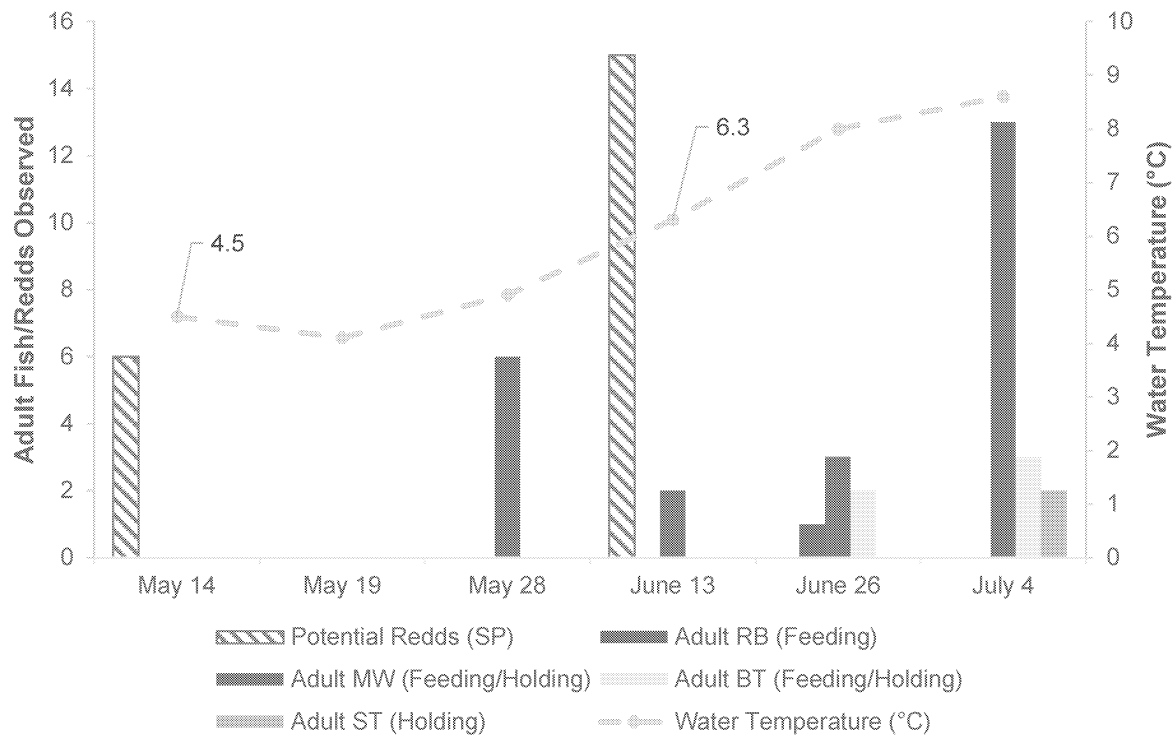
Survey Date (2020)	Spawning Observations	General Fish Observations Species (Life Stage)	Activity	Habitat
September 24	There were 7 spawning SK and 1 SK redd observed within and d/s of the construction footprint in Spawning Habitat Area 2 (see Figure 1 and Table 1).	Not applicable	Spawning	Habitat was characterized as a 0.5 m to 1.0 m deep run.
	There were 2 CH redds observed d/s of the construction footprint in Spawning Habitat Area 4 (see Figure 1 and Table 1).	Not applicable	Not applicable	Habitat was characterized as a 0.5 m to 1.0 m deep run.
October 1	There was no spawning activity or new redds observed.	90 CH (adult) 110 CH (juvenile) 90 CO (YOY) 8 CSU (adult) 1 DV (adult) 1 RB (adult) 50 RB (YOY) 1 ST (adult)	Holding Feeding Feeding Feeding Holding Holding Feeding Holding	Habitat was characterized as runs 0.5 m to 1.0 m deep, with some deeper than 1.0 m. Cover was provided by water depth, log debris, and shade.
		6 CO (YOY) 1 MW (adult) 3 RB (juvenile) 11 RB (YOY)	Feeding Holding Feeding Feeding	Habitat was characterized as runs. Cover was provided by log debris and shade.
October 8	There was no spawning activity or new redds observed.	1 BT (adult) 30 CH (YOY) 30 CO (YOY) 48 MW (adult) 1 RB (adult) 8 SU (adult)	Holding Feeding Feeding Holding Holding Holding	Habitat was characterized as runs deeper than 1.5 m. Cover was provided by water depth.
October 15	There was no spawning activity or new redds observed.	3 BT (adult) 15 CH (YOY) 15 CO (YOY) 57 MW (adult) 5 MW (juvenile) 11 RB (juvenile) 3 SU (adult)	Holding Feeding Feeding Holding Feeding Feeding Holding	Habitat was characterized as runs with some pools. Cover was provided by water depth and log debris.



Table 2. Fish Observation Summary for Site 558 Spring and Fall Spawning Surveys

Survey Date (2020)	Spawning Observations	General Fish Observations Species (Life Stage)	Activity	Habitat
October 25	There were 9 SP redds observed d/s of the construction footprint in Spawning Habitat Areas 2, 3, and 5 (see Figure 1 and Table 1).	Not applicable	Not applicable	Habitat was characterized as runs 0.5 m to 1.0 m deep.
		1 CH (adult) 1 RB (YOY) 3 SA (YOY)	Holding Holding Holding	Habitat was characterized as runs. Cover was provided by log debris.
	There were 3 adult staging CO observed d/s of the construction footprint.	Not applicable	Staging	Habitat was characterized as runs. Cover was provided by log debris.
October 31	There were 13 SP redds and 1 potential SP redd observed within and d/s of the construction footprint in Spawning Habitat Areas 2, 7, and 8 (see Figure 1 and Table 1).	Not applicable	Not applicable	Habitat was characterized as runs 0.5 m to 1.0 m deep.
	There were 5 CH redds observed within and d/s of the construction footprint in Spawning Habitat Areas 2 and 8 (see Figure 1 and Table 1).	Not applicable	Not applicable	Habitat was characterized as runs 0.5 m to 1.0 m deep.
		2 CO (adult) 32 CO (juvenile) 2 MW (adult) 3 RB (adult) 5 RB (juvenile) 1 WSU (adult)	Holding Feeding or holding Feeding Feeding Feeding Feeding	Habitat was characterized as runs 0.5 m to 1.0 m deep, with some deeper than 1.5 m. Cover was provided by water depth, log debris, and shade.
November 12	There was no spawning activity or new redds observed.	9 CH (YOY) 30 MW (adult)	Holding Holding	Habitat was characterized as runs. Cover was provided by log debris and water depth.





**Figure 2. Adult Sportfish Activity and Redd Observation Summary for the Site 558 2020 Spring Spawning Surveys**

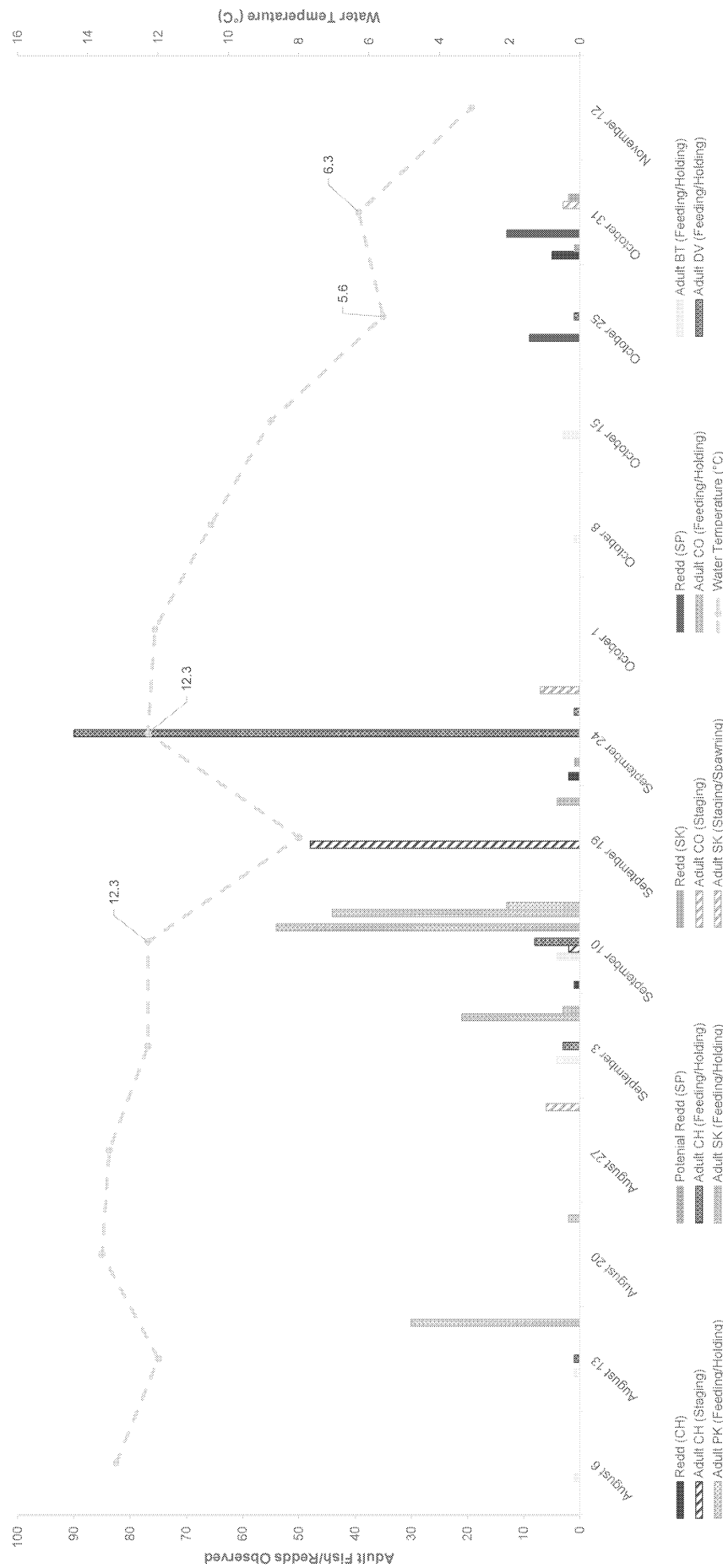


Figure 3. Adult Fall Redd-building Sportfish Activity and Redd Observation Summary for the Site 558 2020 Fall Spawning Surveys

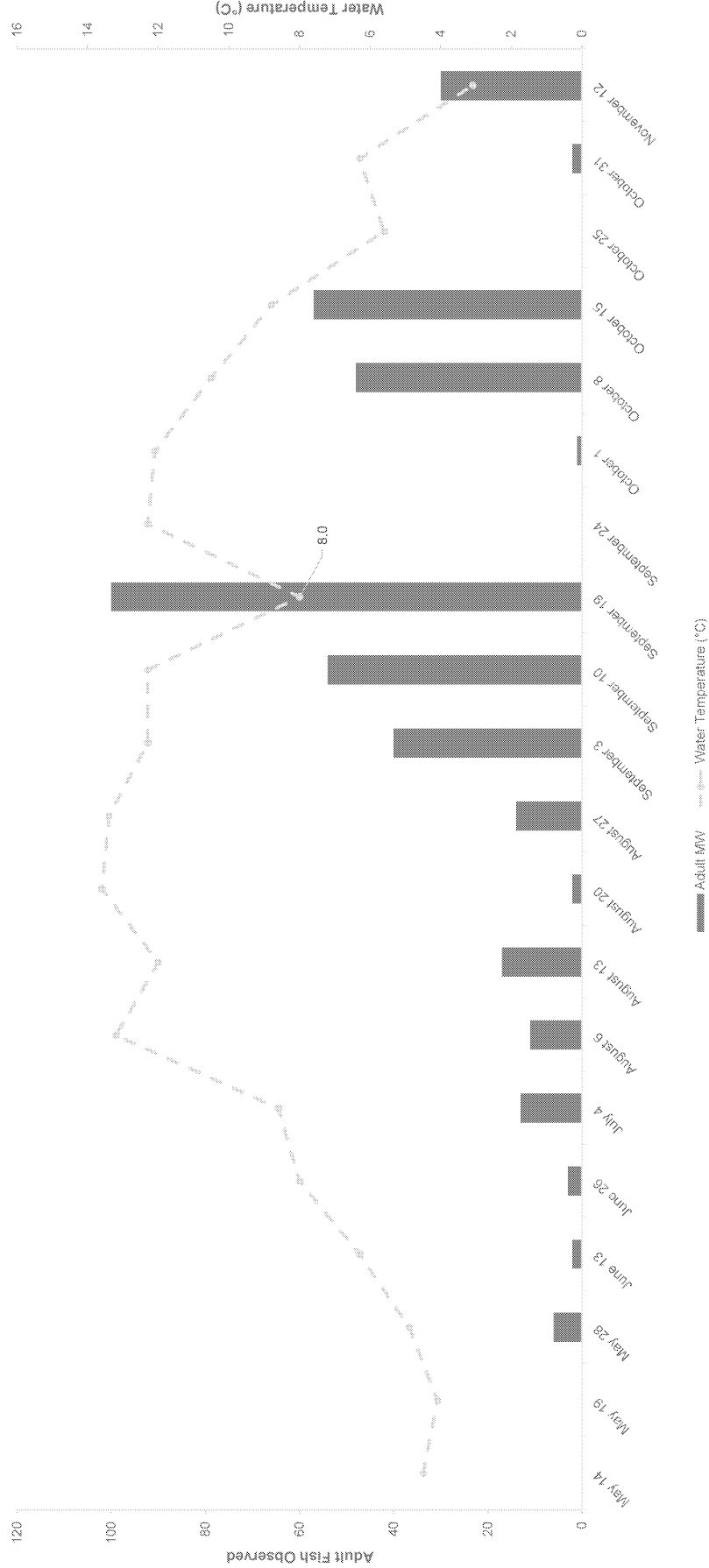


Figure 4. Adult Mountain Whitefish Observations During the Site 558 2020 Spawning Surveys

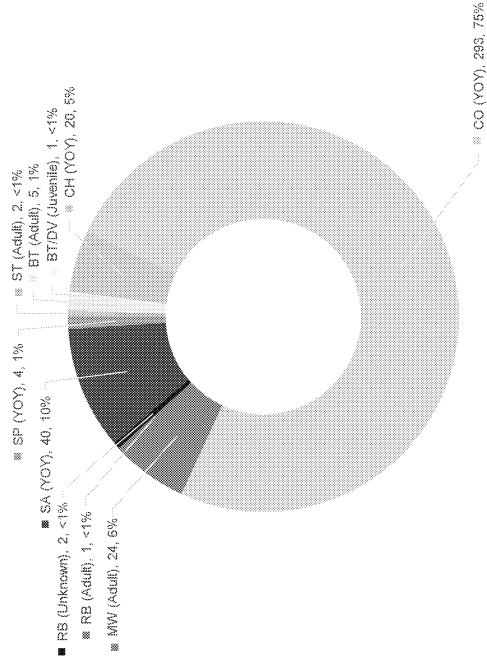


Figure 5. Sportfish Observation Summary for Site 558 2020 Spring Spawning Surveys (May 14 to July 4)  
(Species [Age Class], Count, Percentage)

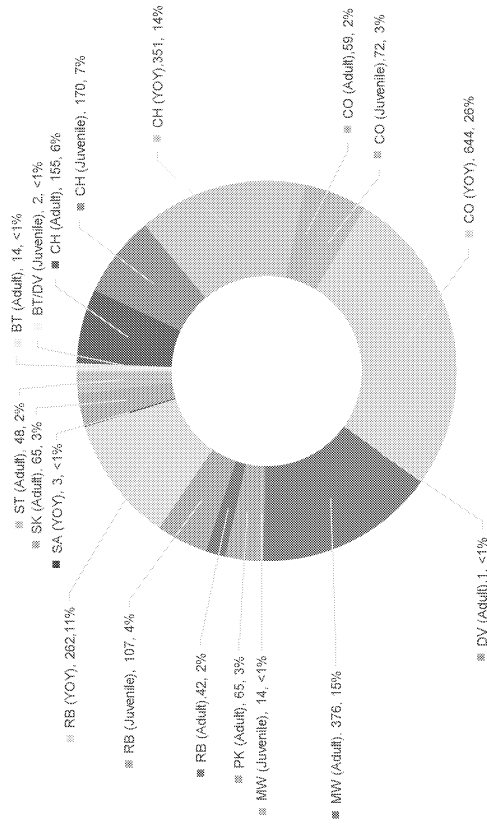


Figure 6. Sportfish Observation Summary for Site 558 2020 Fall Spawning Surveys (August 6 to November 12)  
(Species [Age Class], Count, Percentage)

## 5. Closing

Spawning habitat was identified both within and outside of the construction footprint at the Morice River near Site 558. Spring and fall survey effectiveness was limited in the main channel due to high flow, instream hazards, and large channel size, so survey efforts were focused on the slower-moving side channels and channel margins. No spawning behaviour was observed during the spring spawning surveys, however, potential redds were observed within, u/s, and d/s of the construction footprint (see Figures 1 and 2, and Table 2). RB and ST were the only adult spring spawning redd-building species observed during the surveys (see Figure 5).

During the fall spawning surveys, SK, CH, and CO staging or spawning behaviour was observed within and d/s from the construction footprint, as well as redds (see Figures 1 and 3, and Table 2). Groups of adult MW were observed feeding and holding during the fall surveys with peak MW observations on September 19, 2020 (see Figures 1 and 4 and Table 2). Please contact [REDACTED] via email at [REDACTED] if you would like additional information.

## 6. References

Government of British Columbia. 2021a. "Fish Inventories Data Queries (FIDQ)." gov.bc.ca. Accessed March 2021. <http://a100.gov.bc.ca/pub/fidq/welcome.do>.

Government of British Columbia. 2021b. "HabitatWizard." gov.bc.ca. Accessed February 2021. <https://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/ecosystems/habitatwizard>.

McPhail, J.D. 2007. *The Freshwater Fishes of British Columbia*. Edmonton, Alberta: The University of Alberta Press, Ring House 2. pp. 392-397.

s.19(1)

**From:** [Harper, Vince](#)  
**Sent:** Thursday, November 17, 2022 6:24 PM  
**To:** [REDACTED]  
**Subject:** RE: [EXTERNAL] Questions regarding Morice River trenchless crossing

---

Excellent thanks for the prompt reply.

---

**From:** [REDACTED]  
**Sent:** Thursday, November 17, 2022 3:23 PM  
**To:** Harper, Vince <[Vince.Harper@dfo-mpo.gc.ca](mailto:Vince.Harper@dfo-mpo.gc.ca)>  
**Subject:** RE: [EXTERNAL] Questions regarding Morice River trenchless crossing

Hi Vince,

The minimum distance is approximately 13 meters (approximately 42 feet) and is on the east bank of the Morice River, where no redds or spawning activity have been observed.

Regards,

[REDACTED]  
**Technical Lead – Aquatics**  
Environment - Execution  
Contractor representing Coastal GasLink

mobile: [REDACTED]

---

**From:** Harper, Vince <[Vince.Harper@dfo-mpo.gc.ca](mailto:Vince.Harper@dfo-mpo.gc.ca)>  
**Sent:** Thursday, November 17, 2022 4:00 PM  
**To:** [REDACTED]  
**Subject:** RE: [EXTERNAL] Questions regarding Morice River trenchless crossing  
**Importance:** High

Hi [REDACTED] I have a quick question regarding the question and answer below:

*Are there any specific currently occupied redd locations which present significant harm to eggs due to the maximum 40 foot buffer between the eggs and the bore hole?*

*No adverse effects to eggs are expected to result from tunnelling operations. It should be noted there is no "40 foot buffer" associated with redds and the tunneling operation.*

I'm wondering if they are referring to the distance below the streambed that the drill is taking as the "buffer". That being said, can you confirm what the minimum distance between the drill and the streambed is so I can just mention that distance in our correspondence back?

Thanks,

Vincent

s.19(1)

---

**From:** [REDACTED]  
**Sent:** Thursday, November 17, 2022 1:48 PM  
**To:** Bergsma, Ian <[Ian.Bergsma@dfo-mpo.gc.ca](mailto:Ian.Bergsma@dfo-mpo.gc.ca)>  
**Cc:** Harper, Vince <[Vince.Harper@dfo-mpo.gc.ca](mailto:Vince.Harper@dfo-mpo.gc.ca)>  
**Subject:** RE: [EXTERNAL] Questions regarding Morice River trenchless crossing

Hi Ian,

Thanks for the email.

Please see below for information to support responses to the IR's.

Things to note – all responses are in reference to tunnelling operations; No blasting is taking place at the Morice River; water temps at the Morice were very warm this year.

CGL is looking at installing vibration monitors to determine the magnitude of ground vibrations and relate them back to the guidelines in Wright and Hopky. We have the spawning areas mapped so we can place the monitors in the best sampling location and avoid disturbing any redds.

Note – the cutting head is now at the east bank of the Morice River. All redds near the crossing were identified on the west bank and in the side channel. No observations during active spawning of fish avoidance or stress related activities have been observed during water quality monitoring.

Regards,

[REDACTED]  
**Technical Lead – Aquatics**  
Environment - Execution  
Contractor representing Coastal GasLink

mobile: [REDACTED]

---

**From:** Bergsma, Ian <[Ian.Bergsma@dfo-mpo.gc.ca](mailto:Ian.Bergsma@dfo-mpo.gc.ca)>  
**Sent:** Wednesday, November 16, 2022 10:23 AM  
**To:** [REDACTED]  
**Cc:** Harper, Vince <[Vince.Harper@dfo-mpo.gc.ca](mailto:Vince.Harper@dfo-mpo.gc.ca)>  
**Subject:** [EXTERNAL] Questions regarding Morice River trenchless crossing

**EXTERNAL EMAIL: PROCEED WITH CAUTION.**

This e-mail has originated from outside of the organization. Do not respond, click on links or open attachments unless you recognize the sender or know the content is safe. If this email looks suspicious, report it.

Hi [REDACTED]

Follow up from my message for CGL responses to the following questions originating from the Skeena Watershed Conservation Coalition. I will be in the field for part of today so feel free to contact Vince (cc'd) to discuss further.

Ian

Hello,

I have concerns about the drilling happening on the Morice River right now being conducted as part of the Coastal GasLink Pipeline construction.

The salmon and their eggs in the gravel that our rafting team saw in the Morice River (at the drill site as well as above and below) really raised concerns. Has any a salmon biologist or appropriate person been sent out investigate? Local biologists that we (SWCC staff and others) have talked with told us the drilling and blasting will most certainly have an impact. DFO has made public assertions that this is Provincial project when asked about salmon, steelhead and lamprey mitigation and/or investigation into impacts of the drilling under the Morice River by CGL.

I followed up with a number of civil servants out of the Smithers and Prince George offices and they have sent me to the OGC, EAO & DFO. Rose out of your Ft St John office was lovely to chat with and she gave me your email. Well, she gave me the incorrect email address but the typo was corrected so had to send this twice.

Can you help me understand what Ministry, agency or what person we can direct our concerns or ask questions to about the drilling? Who is actually responsible to oversee this work and ensure it's being done safely as it relates to anadromous fish?

It's really disturbing that there isn't clarity about who is responsible and where we can direct concerns. Hoping you can help.

Specifically, I am hoping to understand:

Why is this drilling permitted to happen during the time of most impact to most species (some of which are blue listed, others have recovery programs in place in this very river to try and deal with declining populations). The impact assessment of timing on instream work is attached below from CGL's EA submission.

**Coastal GasLink Pipeline Project**

Appendix B: Environmental Assessment Certificate Condition 1

Fish and Fish Habitat Technical Data Report #2

Section 8.0

Results

**Table 8-6: Least-Risk Window by Species for Instream Construction in the Skeena Region – Morice TSA**

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Least Risk Window
bull trout													Jun 15 – Aug 31
chinook salmon													Jun 1 – Jul 15
chum salmon													May 15 – Aug 1
coho salmon													Jul 1 – Aug 31
cutthroat trout													Sep 1 – May 15
Dolly Varden													Jun 15 – Aug 31
kokanee													Jun 15 – Jul 15
pink salmon													May 15 – Aug 1
rainbow trout													Sep 1 – May 15
sockeye salmon													Jun 15 – Jul 15
steelhead													Sep 1 – Apr 30
whitefish													Jun 1 – Sep 15

**NOTES:**

Shaded cells bars indicate restricted work periods within the Morice TSA; non-shaded cells indicate instream work period. cells

Notwithstanding the above, if any one of the following conditions are met, work may occur within the restricted work period as the timing window is considered not applicable:

- the watercourse channel is naturally dry (no flow) or frozen to the bottom at the worksite and the instream activity will not adversely affect fish habitat (e.g., result in the introduction of sediment into fish habitat); or
- construction of a winter crossing is planned and such work does not adversely affect the watercourse channel (including watercourse banks), fish habitat or fish passage

SOURCE: (BC MOE 2005)



We know that the noise from drilling and blasting have impacts to salmon and their eggs. Here's a short list of what we would like to understand:

- No blasting is taking place at the Morice River.
  - How many salmon eggs are currently alive in that gravel on and immediately downstream of the Right of Way?
- Oodles...., but following DFOs blasting guidelines we will assume only redds within 150 m of the tunnel path have the potential to be impacted by vibrations. Therefore, inferences can be made from applicable 2020 spawning survey data, which are summarized below:
  - 14 fall spawning surveys were conducted between August 6 and November 12, 2020
  - Fall spawning within 150 m of the ditchline occurred in spawning habitat areas 6 and 8 in 2020
  - A conservative estimate of redds in SHA 6 and 8 is up to 39 redds of unknown species (presumed Coho)
  - McPhail (2007) suggests the number of eggs per female Coho can range from 1700 to almost 7000 (depending on female size as well as egg size – the larger the eggs, the fewer are produced) – 159-167 days at 2C to 50% hatch
    - Chum 2000-4000 eggs – synchronous emergence by drainage
    - SK 2000 – 4000 eggs – 80 – 119 days (temps 5-8) to 50% hatch
    - CH 2000 - > 17000 eggs – 69 to 132 days (temps 4-8C) to 50% hatch
  - A conservative estimate of Coho eggs in the gravels within 150 m of the tunnel path = 273, 000.
  - Why is this work happening during a time of most impact to most species?
- The objective of least risk windows is to reduce the risk of impacts to fish and fish habitat from instream works and vegetation clearing. There is no instream works associated with tunnelling activities and an undisturbed vegetation buffer (minimum of 130 m) has been left between on-land activities and the high water mark. A tunneling method was selected to avoid instream activities and avoid adverse effects to fish and fish habitat, as it does not involve disturbance to the stream bed or banks. Based on data collected in 2020 and observations and water temperatures collected during water quality monitoring in 2022, spawning was considered complete by mid-November. The tunneling tool is currently approaching the east bank of the river, therefore tunnelling under the river will occur post-spawning migrations.
  - What is their current life stage... eyed or not eyed? (This would now need to include info from when the drilling and blasting began).
- Eggs will be in various stages of development based on timing of spawning and species, but based on water temperatures, most should be eyed. Eyed stage begins roughly at 270 TU – water temps were warm this year, and adding up the daily average water temps to-date to determine TUs –we get approximately 800 TU, so in theory they are eyed – this value seems high though, and almost suggests these fish are fully developed.

- How dependent are these specific redds locations and species on ground water given current/projected water levels and what impacts does the drilling have on groundwater movement?

- Tunneling operations are not expected to have any adverse effects on water levels or ground water movement.

- Are there any specific currently occupied redd locations which present significant harm to eggs due to the maximum 40 foot buffer between the eggs and the bore hole?

- No adverse effects to eggs are expected to result from tunnelling operations. It should be noted there is no "40 foot buffer" associated with redds and the tunneling operation.

- When was the last time a qualified biologist or inspector was on site to complete this research and what is the work plan in response to these findings that will protect the habitat necessary for salmon egg survival this year? (This would also need backdated info to include the entire time of drilling and blasting)

- No blasting is taking place at the Morice River. Not clear what 'research' they are referring to, but Qualified professionals (i.e. qualified biologists) and/or Environmental Inspectors are onsite daily. Water quality monitoring has been ongoing 24/7 since the start of tunnelling works and is being conducted by qualified professionals (e.g. qualified biologists). Environmental inspectors visit the location daily to inspect for compliance with permitting conditions and project environmental management plans.

- What about the disturbance to spawners trying to move upstream?

- Spawning migrations and activity have now concluded with no disturbance to spawning fish or migrations documented. Fish were observed moving through, and spawning at, the site.

- Can you help me understand if the OGC permitted and supports the current timing window for in-stream and drilling work on/under the Morice River? Or - did you get a letter of advice or some other DFO decision that permitted this activity at this time? (In stream work was conducted for gravel removal but not sure when that work was completed)

- There are no instream works associated with drilling activities. OGC requires crossing of fish bearing streams to be constructed in accordance with the timing, methods and any mitigation specified in the supplemental stream crossing submission. As per the Coastal GasLink Pipeline Project Environmental Management Plan trenchless crossing techniques can occur during least risk windows.

It is a minimum of tens, and likely hundreds, of thousands of eggs based on what we saw during our rafting trip that are currently on and immediately downstream of the ROW being exposed to drilling.

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