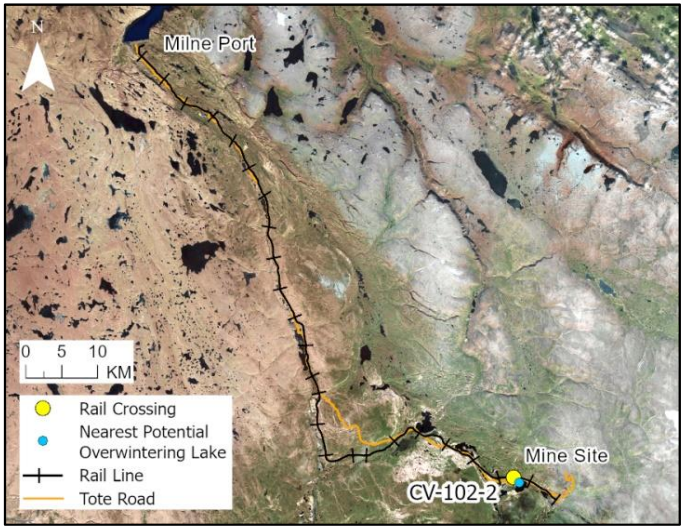
RAIL CV-102-2

LOCATION AND CROSSING DESCRIPTION

Site ID:	CV-102-2	**Dates Surveyed:**	28-Jun-19; 21-Aug-19	**Waterbody Type:**	Stream
Project Interaction:	Rail Culvert	**Centreline UTM Coordinates:**	17W 556012 E 7915438 N	**Culvert Length (m):**	24
Number of Barrels:	3	**Culvert Diameter/Span (mm):**	1200	**Slope (%):**	1

GENERAL PHYSICAL CHARACTERISTICS

Flow Regime: Seasonal **Stream Order:** 3 **Drainage Basin Area (km²):** 1.69



SUMMARY

The rail alignment crosses an unnamed seasonal stream at CV-102-2 that drains south to Camp Lake approximately 800 m downstream. The creek is crossed by the existing Tote Road (CV-224) approximately 570 m downstream of the rail centreline. The stream has low to moderate depths and velocities and wetted width is relatively narrow. Habitat is largely riffle/run/pool over cobble/gravel substrate with increasing proportions of cascades and larger substrates upstream from the centreline.

There is a permanent barrier 340 m upstream of the rail centreline at a large vertical drop. There are no downstream barriers to fish movement.

This stream provides open-water season rearing habitat for juvenile Arctic Char from Camp Lake upstream to the barrier. The stream does not provide overwintering or spawning habitat for char due to lack of flow and sufficient depth in winter.

Ninespine Stickleback were not captured near the rail crossing in 2018 or 2019 but have been captured downstream at the Tote Road and in a small tributary that enters approximately 80 m downstream of the crossing (see the assessment sheets for AR60 for more details on this tributary). Stickleback use of the stream is likely restricted to downstream of the centreline and only for movements to and from preferred habitats.

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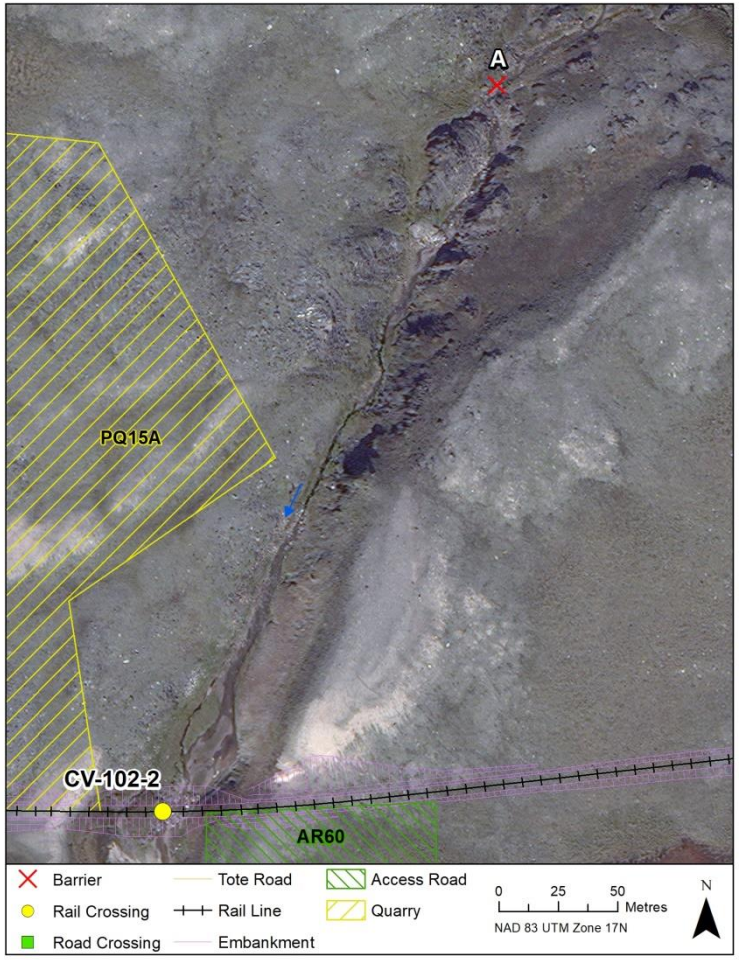
BARRIERS

Upstream/ Downstream	UTM		Barrier Type			Height (m)	Gradient (°)	Description	Site Label
	Easting	Northing	1	2	3				
Downstream	NO BARRIERS								
Upstream	556153	7915744	VD			0.6		Permanent Barrier: Hundreds of fish up to base of vertical drop, none observed above	A



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RAIL CV-102-2

FISH HABITAT POTENTIAL

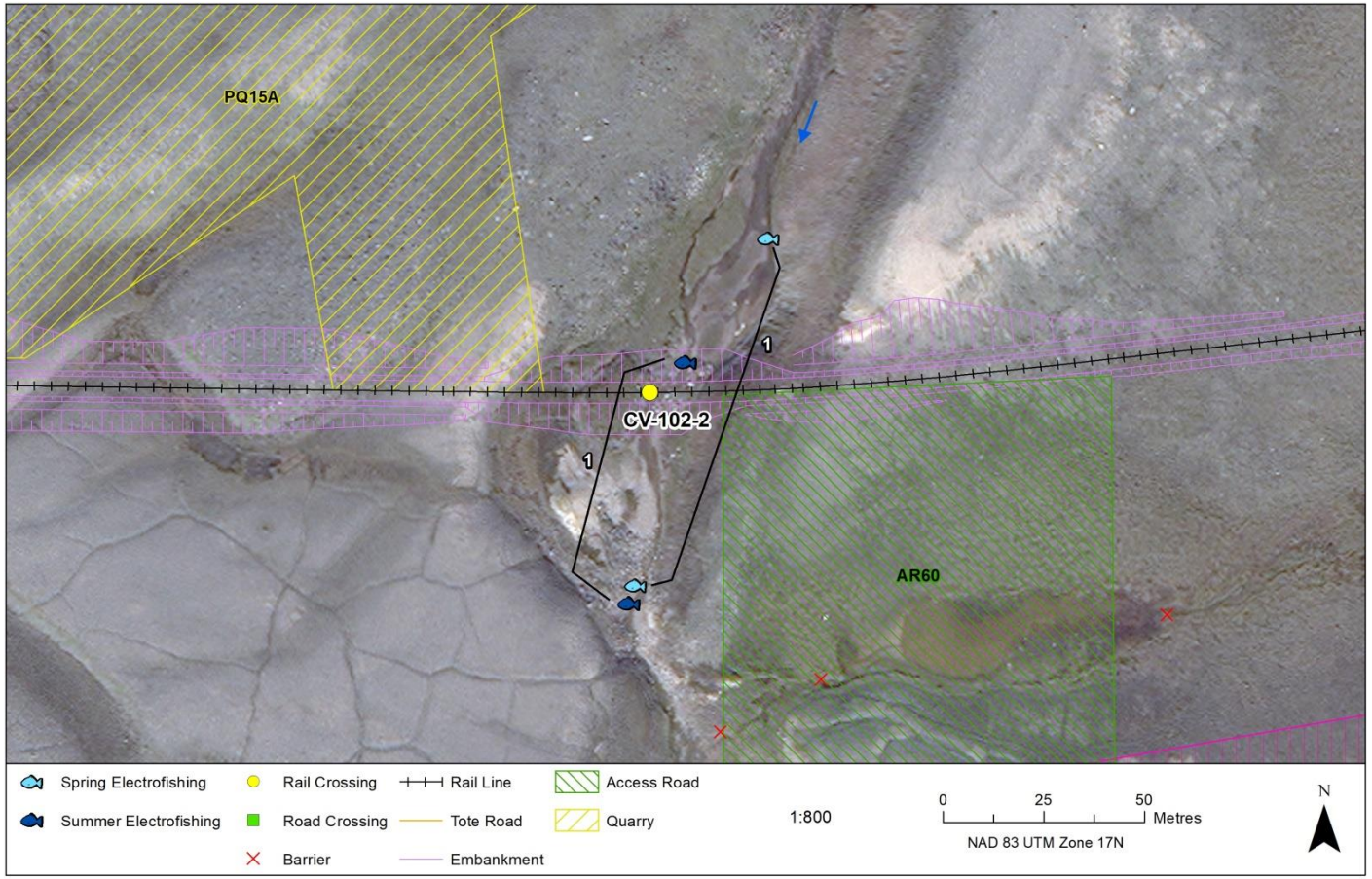
Nearest Potential Overwintering Habitat - ARCH: Camp Lake

Distance to Nearest Potential Overwintering Habitat - ARCH (km): ~0.80

Overwintering Habitat Upstream of Site - ARCH (Y/N): No

Species	Spawning	Overwintering	Rearing	Adults Present
ARCH	N	N	Y	N
NNST	N	N	P	P

FISHING SITES



RAIL CV-102-2

FISHERIES DATA

Date:	28-Jun-19	**Temperature (°C):**	15.0	**Gear Used:**	Backpack Electrofisher/Visual
Distance Fished (m):	100	**Duration Fished (seconds):**	151		

Species	Season	Pass	Effort (Seconds)	Fish Captured	Fish Observed	CPUE (No. Fish/60 Seconds)	Length Range (mm)
ARCH	Spring	1	151	75	many	29.80	50 – 100 (estimated)
NNST	Spring	1	151	0	0	-	-

Date:	21-Aug-19	**Temperature (°C):**	8.0	**Gear Used:**	Backpack Electrofisher/Visual
Distance Fished (m):	60	**Duration Fished (seconds):**	236		

Species	Season	Pass	Effort (Seconds)	Fish Captured	Fish Observed	CPUE (No. Fish/60 Seconds)	Length Range (mm)
ARCH	Summer/Fall	1	236	21	>50	5.34	55 – 120 (measured)
NNST	Summer/Fall	1	236	0	0	-	-

COMMENTS

In both seasons, char were abundant throughout the fished reach and upstream to the barrier. Similar results have been noted for surveys conducted downstream at the Tote Road crossing since 2008. One stickleback was captured downstream of the Tote Road, but the steeper cascade habitat near the rail centreline may prevent access to the area for this species.

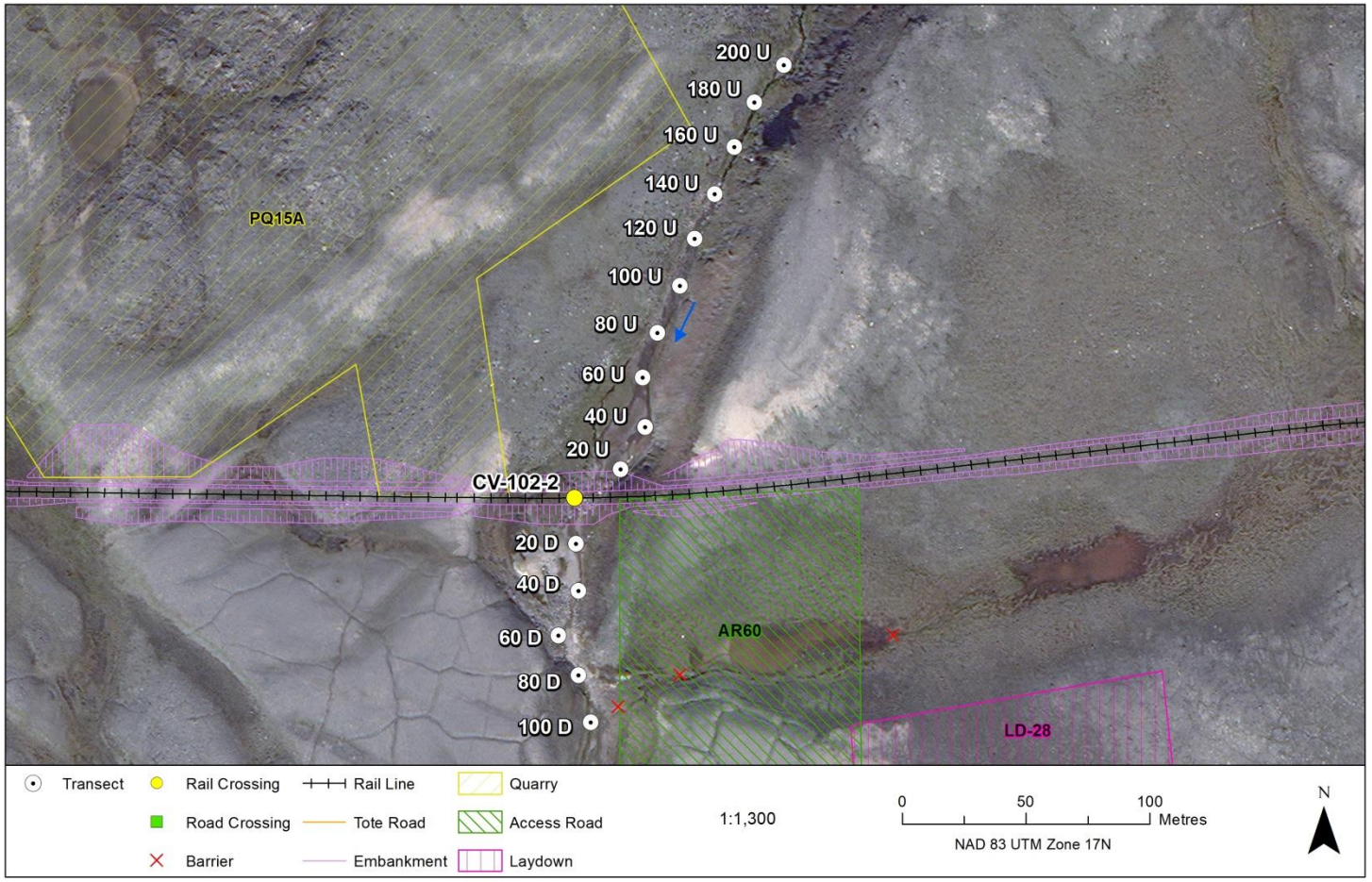
RAIL CV-102-2

GENERAL HABITAT CHARACTERISTICS

Channel Confinement: PC **Stream Morphology:** Sinuous **Riparian Vegetation Type (%):** Grass 90, Other 10

Centreline	Height (m)	Stability	Materials (%)	Shape
LHB	0.27	Moderate	Boulder 50, CGS 40, Organic 10	Sloping
RHB	0.20	Moderate	Boulder 10, CGS 85, Organic 5	Sloping

HABITAT SURVEY SITES



RAIL CV-102-2

HYDROLOGY & HABITAT CHARACTERISTICS: 28-JUN-19

Wetted/Dry/Shallow (<0.02 m)/Unconnected Pools: Wetted **Stage:** Low

Site	Channel Width (m)		Water Depth (m)				Water Velocity (m/s)			
	Bankfull	Wetted	25%	50%	75%	Max	25%	50%	75%	Max
100D	12.2	4.1	0.08	0.03	0.05	0.10	0.23	0.15	0.25	0.31
80D	6.1	2.1	0.05	0.04	0.07	0.11	0.17	0.37	0.23	0.60
60D	9.1	2.2	0.09	0.10	0.08	0.16	0.00	0.04	0.13	0.39
40D	6.2	3.5	0.09	0.05	0.05	0.26	0.27	0.47	0.05	0.56
20D	7.2	2.6	0.04	0.09	0.06	0.15	0.08	0.00	0.30	0.29
0 (Centreline)	8.2	3.1	0.07	0.22	0.17	0.31	0.11	0.00	0.00	0.21
20U	20.0	6.9	0.04	0.02	0.20	0.26	0.31	0.20	0.00	0.45
40U	11.6	4.5	0.10	0.05	0.01	0.51	0.09	0.00	0.00	0.27
60U	10.1	3.7	0.05	0.06	0.03	0.09	0.05	0.09	0.00	0.36
80U	8.0	4.0	0.03	0.03	0.09	0.14	0.03	0.01	0.22	0.22
100U	7.9	5.1	0.04	0.05	0.04	0.10	0.00	0.23	0.04	0.24

Site	Stream Morphology Composition (%)							Substrate Composition (%)				
	Riffle	Pool (<0.2 m)	Pool (>0.2 m)	Run	Cascade	Flat	Rapids	Fines	Gravel	Small Cobble	Large Cobble	Boulders
100D	-	-	-	80	20	-	-	-	40	30	30	-
80D	30	-	-	40	30	-	-	-	30	40	25	5
60D	30	30	-	10	30	-	-	20	30	20	20	10
40D	25	-	25	-	50	-	-	10	20	40	15	15
20D	-	85	-	5	10	-	-	40	30	20	5	5
0 (Centreline)	50	-	50	-	-	-	-	50	30	5	5	10
20U	-	65	10	25	-	-	-	70	25	-	-	5
40U	-	-	75	-	25	-	-	30	40	30	-	-
60U	100	-	-	-	-	-	-	-	40	40	20	-
80U	85	15	-	-	-	-	-	-	10	40	40	10
100U	100	-	-	-	-	-	-	-	10	20	60	10

OTHER NOTES / OBSERVATIONS

The stream has moderate overall depths and velocities and displays a variety of morphologies and substrates.

RAIL CV-102-2

HYDROLOGY & HABITAT CHARACTERISTICS: 21-AUG-19

Wetted/Dry/Shallow (<0.02 m)/Unconnected Pools: Wetted **Stage:** Low

Site	Channel Width (m)		Water Depth (m)				Water Velocity (m/s)			
	Bankfull	Wetted	25%	50%	75%	Max	25%	50%	75%	Max
100D	15.9	7.4	0.03	0.05	0.02	0.15	0.21	0.17	0.00	0.56
80D	6.4	2.2	0.15	0.09	0.08	0.27	0.19	0.18	0.18	0.48
60D	7.3	1.3	0.15	0.11	0.08	0.15	0.14	0.13	0.13	0.81
40D	5.9	2.1	0.03	0.09	0.07	0.18	0.13	0.55	0.42	0.88
20D	6.1	3.3	0.15	0.26	0.10	0.29	0.00	0.01	0.04	0.34
0 (Centreline)	12.0	2.2	0.29	0.14	0.11	0.31	0.07	0.02	0.03	0.66
20U	5.1	1.7	0.03	0.03	0.05	0.20	0.18	0.24	0.42	0.48
40U	15.0	11.1	0.48	0.30	0.18	0.48	0.00	0.00	<0.01	0.27
60U	7.5	5.1	0.06	0.02	0.03	0.17	0.27	0.14	0.14	0.32
80U	6.7	3.8	0.04	0.08	0.04	0.15	0.08	0.20	0.11	0.51
100U	7.6	6.1	0.13	0.07	0.08	0.13	0.04	0.05	0.10	0.40

Site	Stream Morphology Composition (%)							Substrate Composition (%)				
	Riffle	Pool (<0.2 m)	Pool (>0.2 m)	Run	Cascade	Flat	Rapids	Fines	Gravel	Small Cobble	Large Cobble	Boulders
100D	70	20	-	10	-	-	-	10	10	65	10	5
80D	50	30	5	5	10	-	-	-	10	70	10	10
60D	35	40	-	5	20	-	-	5	25	50	10	10
40D	70	20	-	-	10	-	-	-	45	30	10	15
20D	30	10	-	50	10	-	-	55	14	30	1	-
0 (Centreline)	60	15	5	10	10	-	-	10	20	40	10	20
20U	65	30	5	-	-	-	-	55	30	5	-	10
40U	5	30	10	20	-	35	-	80	15	5	-	-
60U	30	30	-	20	-	20	-	11	64	25	-	-
80U	30	50	-	10	10	-	-	5	40	50	4	1
100U	30	30	-	10	30	-	-	1	14	65	15	5

OTHER NOTES / OBSERVATIONS

Water levels and velocities were slightly higher in summer/fall than spring. The stream had abundant habitat for juvenile char in summer/fall.

RAIL CV-102-2

28-JUN-19

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Photos 1. Photos taken at the crossing centreline (top) and 20 m downstream (bottom) in spring: (A,D) facing upstream; (B,E) facing downstream; and (C,F) across (left bank looking at right bank).

RAIL CV-102-2

28-JUN-19

A

B

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D

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Photos 2. Photos taken 40 m downstream (top) and 60 m downstream (bottom) in spring: (A,D) facing upstream; (B,E) facing downstream; and (C,F) across (left bank looking at right bank).

RAIL CV-102-2

28-JUN-19

A

B

C

D

E

F

Photos 3. Photos taken 80 m downstream (top) and 100 m downstream (bottom) in spring: (A,D) facing upstream; (B,E) facing downstream; and (C,F) across (left bank looking at right bank).

RAIL CV-102-2

28-JUN-19

A

B

C

D

E

F

Photos 4. Photos taken 20 m upstream (top) and 40 m upstream (bottom) in spring: (A,D) facing upstream; (B,E) facing downstream; and (C,F) across (left bank looking at right bank).

RAIL CV-102-2

28-JUN-19

A

B

C

D

E

F

Photos 5. Photos taken 60 m upstream (top) and 80 m upstream (bottom) in spring: (A,D) facing upstream; (B,E) facing downstream; and (C,F) across (left bank looking at right bank).

RAIL CV-102-2

28-JUN-19

A

B

C

Photos 6. Photos taken 100 m upstream in spring: (A) facing upstream; (B) facing downstream; and (C) across (left bank looking at right bank).

RAIL CV-102-2

21-AUG-19

A

B

C

D

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F

Photos 7. Photos taken at the crossing centreline (top) and 20 m downstream (bottom) in summer/fall: (A,D) facing upstream; (B,E) facing downstream; and (C,F) across (left bank looking at right bank).

RAIL CV-102-2

21-AUG-19

A

B

C

D

E

F

Photos 8. Photos taken 40 m downstream (top) and 60 downstream (bottom) in summer/fall: (A,D) facing upstream; (B,E) facing downstream; and (C,F) across (left bank looking at right bank).

RAIL CV-102-2

21-AUG-19

A

B

C

D

E

F

Photos 9. Photos taken 80 m downstream (top) and 100 m downstream (bottom) in summer/fall: (A,D) facing upstream; (B,E) facing downstream; and (C,F) across (left bank looking at right bank).

RAIL CV-102-2

21-AUG-19

A

B

C

D

E

F

Photos 10. Photos taken 20 m upstream (top) and 40 m upstream (bottom) in summer/fall: (A,D) facing upstream; (B,E) facing downstream; and (C,F) across left bank looking at right bank).

RAIL CV-102-2

21-AUG-19

A

B

C

D

E

F

Photos 11. Photos taken 60 m upstream (top) and 80 m upstream (bottom) in summer/fall: (A,D) facing upstream; (B,E) facing downstream; and (C,F) across (left bank looking at right bank).

RAIL CV-102-2

21-AUG-19

A

B

C

Photos 12. Photos taken 100 m upstream in summer/fall: (A) facing upstream; (B) facing downstream; and (C) across (left bank looking at right bank).

RAIL CV-102-2

HYDROLOGY & HABITAT CHARACTERISTICS: UPSTREAM SURVEY

Date: 21-Aug-19

Site	Channel Width (m)		Water Depth (m)				Water Velocity (m/s)			
	Bankfull	Wetted	25%	50%	75%	Max	25%	50%	75%	Max
120U	6.7	5.1	0.05	0.04	0.06	0.15	0.14	0.24	0.22	0.64
140U	4.6	1.9	0.05	0.08	0.02	0.20	0.21	0.34	0.10	0.72
160U	1.7	0.8	0.09	0.08	0.10	0.13	0.36	0.65	0.40	0.62
180U	1.7	1.6	0.09	0.10	0.08	0.26	0.18	0.21	0.21	0.90
200U	7.4	4.8	0.04	0.10	0.12	0.37	0.14	0.27	0.15	0.67

Site	Stream Morphology Composition (%)							Substrate Composition (%)				
	Riffle	Pool (<0.2 m)	Pool (>0.2 m)	Run	Cascade	Flat	Rapids	Fines	Gravel	Small Cobble	Large Cobble	Boulders
120U	40	35	-	-	25	-	-	1	19	70	5	5
140U	15	25	15	10	35	-	-	1	9	60	15	15
160U	40	35	-	-	25	-	-	1	-	89	5	5
180U	20	35	10	15	20	-	-	1	-	69	20	10
200U	25	50	10	15	-	-	-	1	20	64	5	10

OTHER NOTES / OBSERVATIONS

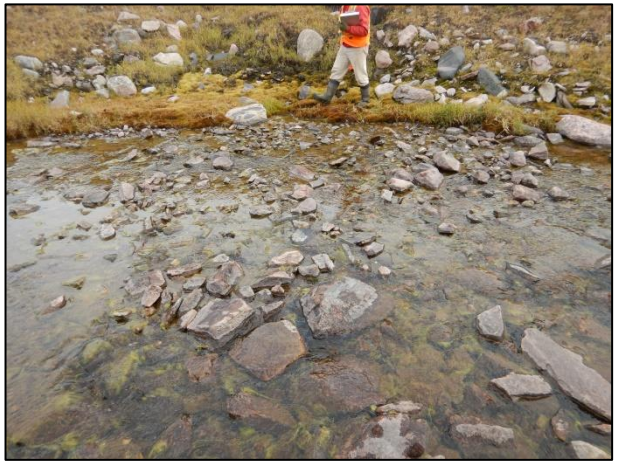
A detailed habitat survey was conducted 100-200 m upstream in summer/fall. Velocities increased upstream as the stream became steeper. Gradient increases to near 10° downstream of the barrier.

RAIL CV-102-2

21-AUG-19: UPSTREAM SURVEY

A

B



C

D

E

F

Photos 13. Photos taken 120 m upstream (top) and 140 m upstream (bottom) in summer/fall: (A,D) facing upstream; (B,E) facing downstream; and (C,F) across (left bank looking at right bank).

RAIL CV-102-2

21-AUG-19: UPSTREAM SURVEY

A

B

C

D

E

F

Photos 14. Photos taken 160 m upstream (top) and 180 m upstream (bottom) in summer/fall: (A,D) facing upstream; (B,E) facing downstream; and (C,F) across (left bank looking at right bank).

RAIL CV-102-2

21-AUG-19: UPSTREAM SURVEY

A

B

C

Photos 15. Photos taken 200 m upstream in summer/fall: (A) facing upstream; (B) facing downstream; and (C) across (left bank looking at right bank).