Appendix 3.1-3. Detailed Fish Habitat Assessment Protocol (FHAP) Data Sheets and Site Photographs, Hope Bay Belt Project, 2009

Station ID:	P.O. I/F2	Survey Date (d/m/y):	30-Jun-09	Coordinates:		Coordinates:	
Survey Distance (m):	200	Survey Crew:	KE/TR	Start		End	
		Time:	15:10	437821	7547195	437774	7547418
				Comments:			
Temperature (°C):	11.6	Transparency:	Turbid	Muddy after the lake			
Channel Velocity (m/s):	-	Conductivity (µS/cm):	131.6				
Current Flow Conditions:	Fast	pH:	7.5	Weather:			
Discharge estimate (m^3/s):	-			High cloud, sunny, SE wind			

Hab		Dist. fr			Depth (m)		Width (m)		Bed Material						Pool Info			Fish Passage	
Unit	Hab	start	Length	Slope		Bank-		Bank-	Fines	Sand	Gravel	Cobble	Boulder	Bedrock		Depth (m)		Barriers	
No.	Type	(m)	(m)	(%)	Mean	full	Mean	full	(%)	(%)	(%)	(%)	(%)	(%)	Type	Max	Crest	Type	T/P
1	G	0	7	1-2	0.31	0.43	10	10	100						-	-	-	-	-
2	P	7	20	1	~2.00	~2.15	15	15	100						S	~2	0.19	-	-
3	G	27	70	1-2	0.33	0.43	12	15	100						-	-	-	-	-
4	P	97	18	1	~2.00	~2.14	14	14	100						S	~2	0.37	-	-
5	G	115	10	1-2	0.45	0.55	7	9	100						-	-	-	-	-
6	P	125	20	1	~2.00	2.17	16	18	100						S	~2	0.45	-	-
7	G	145	55	1-2	0.34	0.44	5	7	100						-	-	-	-	-
8																			
9																			
10																			
11																			
12																			
13																			
14																			
15																			
16																			
17																			
18																			
19																			
20																			

Flow Conditions: H = High flow, M = Medium flow, L = Low flow

Habitat Unit: Under bankfull conditions: 0 - 2.5 m = > 1 m^2, 2.5 - 5 m = > 2 m^2, 5 - 10 m = > 4 m^2, 10 -15 m = > 6 m^2, 15 -20 = > 8 m^2, > 20 m = > 10 m^2

Hab Type: P = pool, G = glide, R = riffle, C = cascade, O = other

Dist. fr start: distance from beginning of the survey to the beginning of the habitat unit being surveyed

Pool Type: S = scour, D = dammed, U = unknown

Substrate: Sand (silt, clay, fine organic< 2 mm), Gravel (2 - 64 mm), Cobble (64 - 256 mm), Boulders (256 - 4000 mm), Bedrock (>4000 mm)

Fish Passage Barriers: IF = Impassible waterfall

BF = Boulder Field, passage through the boulder arrangement is not possible for fish

D = dry channel, no stream flow

NC = no distinct channel, water drains over land

N = no barrier to fish passage through the habitat unit

T/P: T = temporary, portion of open water season

P = Permanent, all year round

Overall Rating

Spawning: Poor to None
- No rock substrates
- Completely organic/vegetation bottom

Rearing: Good
- Excellent depth in pools with extensive cover/vegetation

Adult Feeding: Good

Over-wintering: N/A

Migration: Good
- Well connected

Appendix 3.1-3. Detailed Fish Habitat Assessment Protocol (FHAP) Data Sheets and Site Photographs, Hope Bay Belt Project, 2009

Station ID:	P.O. I/F2
Survey Date:	30-Jun-09
Survey Crew:	KE/TR
Survey Distance (m):	200

Hab Unit No.	Banks of Channel				Instream Cover							Riparian Cover (%)			Photos (Role #) (Photo #)
	L Bank Height (m)	R Bank Height (m)	L Bank Stab	R Bank Stab	Pool %	Boulder %	Instream Veg %	Overhang Veg %	Undercut Bank %	LWD %	SWD %	Canopy	LB	RB	
1	0.43	0.43	H	H			100					-	-	-	
2	~2.15	~2.15	H	H			100					-	-	-	
3	0.43	0.43	H	H			100					-	-	-	
4	~2.14	~2.14	H	H			100					-	-	-	
5	0.55	0.55	H	H			100					-	-	-	
6	~2.17	~2.17	H	H			100					-	-	-	
7	0.44	0.44	H	H			100					-	-	-	
8															
9															
10															
11															
12															
13															
14															
15															
16															
17															
18															
19															
20															

Comments:
Photos: 441-445
Overall habitat quality = Important
Abundance of wildlife observed in area, including Peregrine falcons, swans, geese, ducks
Site and remainder of stream displays rare pool - glide complexes
Stream flows over sediment/fines enabling pools to be scoured
Stream gradient is very low gradient/profile
Potential for fish habitat compensation. Stream has appropriate profile and flow but lacking appropriate substrate
Potential barrier located near inflow at PO Lake
Re-evaluate in summer for fish presence/community

Banks of Channel (Stability): H = highly stable, S = stable, U = unstable

Appendix 3.1-3. Detailed Fish Habitat Assessment Protocol (FHAP) Data Sheets and Site Photographs, Hope Bay Belt Project, 2009

Station ID:	Koignuk D/S	Survey Date (d/m/y):	28-Jun-09	Coordinates:	Coordinates:
Survey Distance (m):		Survey Crew:	TR/KE	Start	
		Time:	9:09	429569 7554988	
			Comments:		
Temperature (°C):	4.3	Transparency:	Medium	Big, fast flowing river	
Channel Velocity (m/s):		Conductivity (µS/cm):	53.5		
Current Flow Conditions:	Freshet - Fast	pH:	8.4	Weather:	
Discharge estimate (m³/s):				Cloudy, windy, cool, rainy	

Hab		Dist. fr			Depth (m)		Width (m)		Bed Material						Pool Info			Fish Passage	
Unit	Hab	start	Length	Slope		Bank-		Bank-	Fines	Sand	Gravel	Cobble	Boulder	Bedrock		Depth (m)		Barriers	
No.	Type	(m)	(m)	(%)	Mean	full	Mean	full	(%)	(%)	(%)	(%)	(%)	(%)	Type	Max	Crest	Type	T/P
1	C	0	41	4-5	-	-	36	41						100*	-	-	-	-	-
2	R	41	26	1-2	~ 2-3	-	58	58				15*	15*	70*	-	-	-	-	-
3	G	68	132+	1	~ 2-3	-	71	78	unknown						-	-	-	-	-
4																			
5																			
6																			
7																			
8																			
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14																			
15																			
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17																			
18																			
19																			
20																			

Flow Conditions:	H = High flow, M = Medium flow, L = Low flow
Habitat Unit:	Under bankfull conditions: 0 - 2.5 m = > 1 m^2, 2.5 - 5 m = > 2 m^2, 5 - 10 m = > 4 m^2, 10 -15 m = > 6 m^2, 15 -20 = > 8 m^2, > 20 m = > 10 m^2
Hab Type:	P = pool, G = glide, R = riffle, C = cascade, O = other
Dist. fr start:	distance from beginning of the survey to the beginning of the habitat unit being surveyed
Pool Type:	S = scour, D = dammed, U = unknown
Substrate:	Sand (silt, clay, fine organic< 2 mm), Gravel (2 - 64 mm), Cobble (64 - 256 mm), Boulders (256 - 4000 mm), Bedrock (>4000 mm)
Fish Passage Barriers:	IF = Impassible waterfall
	BF = Boulder Field, passage through the boulder arrangement is not possible for fish
	D = dry channel, no stream flow
	NC = no distinct channel, water drains over land
	N = no barrier to fish passage through the habitat unit
T/P:	T = temporary, portion of open water season
	P = Permanent, all year round
	* = Difficult to see bottom, this is an estimate

Overall Rating

Spawning: Poor/None	Rearing: Poor	Adult Feeding: Fair	Over-wintering: N/A	Migration: Fair
- Predominately bedrock substrate	- Fast flow			- Fast flows over cascade, but
- Fast flow	- Potential rearing habitat upstream			no barrier to fish migration,
- Tidal influenced downstream of cascade	of cascade			paticulary Arctic Char

Appendix 3.1-3. Detailed Fish Habitat Assessment Protocol (FHAP) Data Sheets and Site Photographs, Hope Bay Belt Project, 2009

Station ID:	Koignuk D/S
Survey Date:	28-Jun-09
Survey Crew:	KE/TR
Survey Distance (m):	

Hab Unit No.	Banks of Channel				Instream Cover							Riparian Cover (%)			Photos (Role #) (Photo #)
	L Bank Height (m)	R Bank Height (m)	L Bank Stab	R Bank Stab	Pool %	Boulder %	Instream Veg %	Overhang Veg %	Undercut Bank %	LWD %	SWD %	Canopy	LB	RB	
1	-	-	H	H		10						-	-	-	
2	-	-	H	H		20						-	-	-	
3	-	-	H	H		10						-	-	-	
4															
5															
6															
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19															
20															

Comments:
Photos: 331-336
Site is most likely a migration corridor for Arctic Char
No barriers to Arctic Char movement observed along the Koignuk River

Banks of Channel (Stability): H = highly stable, S = stable, U = unstable

Appendix 3.1-3. Detailed Fish Habitat Assessment Protocol (FHAP) Data Sheets and Site Photographs, Hope Bay Belt Project, 2009

Station ID:	Koignuk D_S	Survey Date (d/m/y):	5-Aug-09	Coordinates:	E 429570 N 7554875	Coordinates:	E 429629 N 7554454
Survey Distance (m):	420 m	Survey Crew:	EG/CK	0m		420 m	
		Time:					

Temperature (°C):	n/a	Transparency:	clear	Comments:	S2 - fish bearing (SLSC) 5-20 m channel width
Channel Velocity (m/s):	n/a	Conductivity (µS/cm):	n/a		
Current Flow Conditions:	n/a	pH:	n/a	Weather:	
Discharge estimate (m³/s):	n/a				

Hab Unit No.	Hab Type	Dist. fr start (m)	Length (m)	Slope (%)	Depth (m)		Width (m)		Bed Material					Pool Info			Fish Passage Barriers	
					Mean	Bank-full	Mean	Bank-full	Sand (%)	Gravel (%)	Cobble (%)	Boulder (%)	Bedrock (%)	Type	Depth (m) Max	Depth (m) Crest	Type	T/P
1	F	0	5	0.5	0.30	>1	2	4	0	0	0	10	90	/	/	/	N	/
2	P	6	5	0	0.50	>1	6	8	85	0	5	10	0	/	>1.5	/	N	/
3	G	11	50	0	0.40	>1	12.0	30	78	2	5	10	0	/	/	/	N	/
4	R	51	250	0	0.25	0.50	30.0	50.0	80	10	5	5	0	/	/	/	N	/
5	G	251	110	0	0.25	0.50	25	40.0	60	30	5	5	0	/	/	/	N	/
6																		
7																		
8																		
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10																		
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12																		
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14																		
15																		
16																		
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18																		
19																		
20																		

Flow Conditions:	H = High flow, M = Medium flow, L = Low flow
Habitat Unit:	Under bankfull conditions: 0 - 2.5 m = > 1 m^2, 2.5 - 5 m = > 2 m^2, 5 - 10 m = > 4 m^2, 10 -15 m = > 6 m^2, 15 -20 = > 8 m^2, > 20 m = > 10 m^2
Hab Type:	P = pool, G = glide, R = riffle, C = cascade, O = other
Dist. fr start:	distance from beginning of the survey to the beginning of the habitat unit being surveyed
Pool Type:	S = scour, D = dammed, U = unknown
Substrate:	Sand (silt, clay, fine organic< 2 mm), Gravel (2 - 64 mm), Cobble (64 - 256 mm), Boulders (256 - 4000 mm), Bedrock (>4000 mm)
Fish Passage Barriers:	IF = Impassible waterfall
	BF = Boulder Field, passage through the boulder arrangement is not possible for fish
	D = dry channel, no stream flow
	NC = no distinct channel, water drains over land
	N = no barrier to fish passage through the habitat unit
T/P:	T = temporary, portion of open water season
	P = Permanent, all year round

Overall Rating

Spawning:	Good - gravel beds	**Rearing:**	Fair	**Adult Feeding:**	Poor	**Over-wintering:**	None	**Migration:**	Good (falls passable?

Appendix 3.1-3. Detailed Fish Habitat Assessment Protocol (FHAP) Data Sheets and Site Photographs, Hope Bay Belt Project, 2009

Station ID:	**Koignuk D/S**
Survey Date:	**Aug. 5, 2009**
Survey Crew:	**EG/CK**
Survey Distance (m):	**420**

Hab Unit No.	Banks of Channel				Instream Cover							Riparian Cover (%)			Photos (Role #) (Photo #)
	L Bank Height (m)	R Bank Height (m)	L Bank Stab	R Bank Stab	Pool %	Boulder %	Instream Veg %	Overhang Veg %	Undercut Bank %	LWD %	SWD %	Canopy	LB	RB	
1	n/a	n/a	n/a	n/a	0	10	0	0	0	0	0	0	0	0	1450
2	n/a	n/a	n/a	n/a	2	10	0	0	0	0	0	0	0	0	to
3	n/a	n/a	n/a	n/a	0	10	0	0	0	0	0	0	0	0	1470
4	n/a	n/a	n/a	n/a	0	10	0	0	0	0	0	0	0	0	
5	n/a	n/a	n/a	n/a	0	10	0	0	0	0	0	0	0	0	
6															
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19															
20															

Comments:

Overall Habitat Rating: Fair

Photos:	1454 and 1458 - facing d/s @ falls	1459- sandy bank mid river	1464- riffle mid river
	1456 - facing u/s @ falls	1460- facing u/s	1468- 500 m u/s of falls
	1456 - east side @ falls	1461- side pool u/s at falls MT set here, no fish	1469, 1470- u/s of falls
	1457 - west side @ falls	1463- falls	

Banks of Channel (Stability): H = highly stable, S = stable, U = unstable

Appendix 3.1-3. Detailed Fish Habitat Assessment Protocol (FHAP) Data Sheets and Site Photographs, Hope Bay Belt Project, 2009

Station ID:	Koignuk M/S	Survey Date (d/m/y):	29-Jun-09	Coordinates:	Coordinates:
Survey Distance (m):	200	Survey Crew:	KE/TR		
		Time:	15:33	431015 7546380	
				Comments:	
Temperature (°C):	6.1	Transparency:	Medium	River with steep clay left-bank. Right-bank is marshy with lots of vegetation	
Channel Velocity (m/s):	-	Conductivity (µS/cm):	51.9		
Current Flow Conditions:	Fast	pH:	7.81	Weather:	
Discharge estimate (m³/s):	-			Cloudy	

Hab		Dist. fr			Depth (m)		Width (m)		Bed Material						Pool Info			Fish Passage	
Unit	Hab	start	Length	Slope		Bank-		Bank-	Fines	Sand	Gravel	Cobble	Boulder	Bedrock		Depth (m)		Barriers	
No.	Type	(m)	(m)	(%)	Mean	full	Mean	full	(%)	(%)	(%)	(%)	(%)	(%)	Type	Max	Crest	Type	T/P
1	G	0	200+	1-2	*		80	80	100*						-	-	-	-	-
2																			
3																			
4																			
5																			
6																			
7																			
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17																			
18																			
19																			
20																			

Flow Conditions: H = High flow, M = Medium flow, L = Low flow

Habitat Unit: Under bankfull conditions: 0 - 2.5 m = > 1 m^2, 2.5 - 5 m = > 2 m^2, 5 - 10 m = > 4 m^2, 10 -15 m = > 6 m^2, 15 -20 = > 8 m^2, > 20 m = > 10 m^2

Hab Type: P = pool, G = glide, R = riffle, C = cascade, O = other

Dist. fr start: distance from beginning of the survey to the beginning of the habitat unit being surveyed

Pool Type: S = scour, D = dammed, U = unknown

Substrate: Sand (silt, clay, fine organic< 2 mm), Gravel (2 - 64 mm), Cobble (64 - 256 mm), Boulders (256 - 4000 mm), Bedrock (>4000 mm)

Fish Passage Barriers: IF = Impassible waterfall

BF = Boulder Field, passage through the boulder arrangement is not possible for fish

D = dry channel, no stream flow

NC = no distinct channel, water drains over land

N = no barrier to fish passage through the habitat unit

T/P: T = temporary, portion of open water season

P = Permanent, all year round

* Cannot estimate because too deep and turbid

Overall Rating

Spawning: Poor	Rearing: Fair	Adult Feeding: Good	Over-wintering: Good	Migration: Good
- Predominately fine clay substrate	- Good depth		- Depth over 3m	- No limits to migration through this section of river
- Little rock substrate	- Little instream cover			

Appendix 3.1-3. Detailed Fish Habitat Assessment Protocol (FHAP) Data Sheets and Site Photographs, Hope Bay Belt Project, 2009

Station ID:	Koignuk M/S
Survey Date:	29-Jun-09
Survey Crew:	KE/TR
Survey Distance (m):	200+

	Banks of Channel				Instream Cover							Riparian Cover (%)			
Hab Unit No.	L Bank Height (m)	R Bank Height (m)	L Bank Stab	R Bank Stab	Pool %	Boulder %	Instream Veg %	Overhang Veg %	Undercut Bank %	LWD %	SWD %	Canopy	LB	RB	Photos (Role #) (Photo #)
1	*	*	U	H		*		1		*		-	-	1	
2															
3															
4															
5															
6															
7															
8															
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18															
19															
20															

Comments:
Photos: 397-400
Overall habitat quality: Important
Recommend to re-evaluate in summer low flow

* Cannot estimate because too deep and turbid

Banks of Channel (Stability): H = highly stable, S = stable, U = unstable

Appendix 3.1-3. Detailed Fish Habitat Assessment Protocol (FHAP) Data Sheets and Site Photographs, Hope Bay Belt Project, 2009

Station ID:	Koignuk M/S	**Survey Date (d/m/y):**	6-Aug-09	**Coordinates:**	E 431082 N 7546699
Survey Distance (m):	400 m	**Survey Crew:**	EG/CK	**0m**	
		Time:			

Temperature (°C):	/	**Transparency:**	fair
Channel Velocity (m/s):	/	**Conductivity (µS/cm):**	/
Current Flow Conditions:	/	**pH:**	/
Discharge estimate (m³/s):	/		

Comments:

Weather: overcast, cool, light wind

Coordinates: 400 m upstream

Hab Unit No.	Hab Type	Dist. fr start (m)	Length (m)	Slope (%)	Depth (m) Mean	Depth (m) Bank-full	Width (m) Mean	Width (m) Bank-full	Bed Material Sand (%)	Gravel (%)	Cobble (%)	Boulder (%)	Bedrock (%)	Pool Info Type	Pool Info Depth (m) Max	Pool Info Depth (m) Crest	Fish Passage Barriers Type	Fish Passage Barriers T/P
1	G	0	400	0	1.50	3	25	60	80	0	5	10	5	U	>3 m	/	N	/
2	slow meandering, wide, deep where fisheries survey was conducted																	
3	G	400	150	0	0.50	> 1	25.0	50	65	0	5	20	10	U	/	/	N	/
4	R	550	3	< 5	0.25	0.50	4.5	10.0	60	0	10	25	5	/	/	/	N	/
5	end @ south confluence (Koig R and outflow from small lake)																	
6	going other way (north)																	
7	R	10	5	< 5	0.50	0.75	3.5	8.0	70	5	10	15	0	/	/	/	N	/
8																		
9																		
10																		
11																		
12																		
13																		
14																		
15																		
16																		
17																		
18																		
19																		
20																		

Flow Conditions:	H = High flow, M = Medium flow, L = Low flow
Habitat Unit:	Under bankfull conditions: 0 - 2.5 m = > 1 m^2, 2.5 - 5 m = > 2 m^2, 5 - 10 m = > 4 m^2, 10 -15 m = > 6 m^2, 15 -20 = > 8 m^2, > 20 m = > 10 m^2
Hab Type:	P = pool, G = glide, R = riffle, C = cascade, O = other
Dist. fr start:	distance from beginning of the survey to the beginning of the habitat unit being surveyed
Pool Type:	S = scour, D = dammed, U = unknown
Substrate:	Sand (silt, clay, fine organic< 2 mm), Gravel (2 - 64 mm), Cobble (64 - 256 mm), Boulders (256 - 4000 mm), Bedrock (>4000 mm)
Fish Passage Barriers:	IF = Impassible waterfall
	BF = Boulder Field, passage through the boulder arrangement is not possible for fish
	D = dry channel, no stream flow
	NC = no distinct channel, water drains over land
	N = no barrier to fish passage through the habitat unit
T/P:	T = temporary, portion of open water season
	P = Permanent, all year round

Overall Rating Fair

Spawning: Poor **Rearing:** Good **Adult Feeding:** Poor **Over-wintering:** None **Migration:** Good

Appendix 3.1-3. Detailed Fish Habitat Assessment Protocol (FHAP) Data Sheets and Site Photographs, Hope Bay Belt Project, 2009

Station ID: Koignuk M/S
Survey Date:
Survey Crew:
Survey Distance (m): BACK PAGE WAS COMPLETELY BLANK

Hab Unit No.	Banks of Channel				Instream Cover							Riparian Cover (%)			Photos (Role #) (Photo #)
	L Bank Height (m)	R Bank Height (m)	L Bank Stab	R Bank Stab	Pool %	Boulder %	Instream Veg %	Overhang Veg %	Undercut Bank %	LWD %	SWD %	Canopy	LB	RB	
1															
2															
3															
4															
5															
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16															
17															
18															
19															
20															

Comments:

Banks of Channel (Stability): H = highly stable, S = stable, U = unstable

Station ID:	Glenn O/F1	Survey Date (d/m/y):	28-Jun-09	Coordinates:	Coordinates:
Survey Distance (m):	200	Survey Crew:	KE/TR		
		Time:	13:50	431657 7563884	
				Comments:	
Temperature (°C):	-	Transparency:	Very Turbid		
Channel Velocity (m/s):	-	Conductivity (µS/cm):	-		
Current Flow Conditions:	-	pH:	-	Weather:	
Discharge estimate (m³/s):	-				

Hab Unit No.	Hab Type	Dist. fr start (m)	Length (m)	Slope (%)	Depth (m) Mean	Depth (m) Bank-full	Width (m) Mean	Width (m) Bank-full	Bed Material Fines (%)	Sand (%)	Gravel (%)	Cobble (%)	Boulder (%)	Bedrock (%)	Pool Info Type	Pool Info Depth (m) Max	Pool Info Depth (m) Crest	Fish Passage Barriers Type	Fish Passage Barriers T/P
1	O	0	200+	<1	>1.0	1.50			90	5	5	5			-	-	-	-	-
2																			
3																			
4																			
5																			
6																			
7																			
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16																			
17																			
18																			
19																			
20																			

Flow Conditions:	H = High flow, M = Medium flow, L = Low flow
Habitat Unit:	Under bankfull conditions: 0 - 2.5 m = > 1 m^2, 2.5 - 5 m = > 2 m^2, 5 - 10 m = > 4 m^2, 10 -15 m = > 6 m^2, 15 -20 = > 8 m^2, > 20 m = > 10 m^2
Hab Type:	P = pool, G = glide, R = riffle, C = cascade, O = other
Dist. fr start:	distance from beginning of the survey to the beginning of the habitat unit being surveyed
Pool Type:	S = scour, D = dammed, U = unknown
Substrate:	Sand (silt, clay, fine organic< 2 mm), Gravel (2 - 64 mm), Cobble (64 - 256 mm), Boulders (256 - 4000 mm), Bedrock (>4000 mm)
Fish Passage Barriers:	IF = Impassible waterfall
	BF = Boulder Field, passage through the boulder arrangement is not possible for fish
	D = dry channel, no stream flow
	NC = no distinct channel, water drains over land
	N = no barrier to fish passage through the habitat unit
T/P:	T = temporary, portion of open water season
	P = Permanent, all year round

Overall Rating

Spawning: None	Rearing: Poor	Adult Feeding: Poor	Over-wintering: N/A	Migration: Good
- Abundance of fine substrates	- No cover			- No barriers
- No Arctic char spawning site	- Little habitat for juvenile fish			- Arctic char free to migrate from ocean

Appendix 3.1-3. Detailed Fish Habitat Assessment Protocol (FHAP) Data Sheets and Site Photographs, Hope Bay Belt Project, 2009

Station ID:	Glenn O/F1
Survey Date:	28-Jun-09
Survey Crew:	KE/TR
Survey Distance (m):	200

Hab Unit No.	Banks of Channel				Instream Cover							Riparian Cover (%)			Photos (Role #) (Photo #)
	L Bank Height (m)	R Bank Height (m)	L Bank Stab	R Bank Stab	Pool %	Boulder %	Instream Veg %	Overhang Veg %	Undercut Bank %	LWD %	SWD %	Canopy	LB	RB	
1	1.50	1.50	U	U					5			-	-	-	
2															
3															
4															
5															
6															
7															
8															
9															
10															
11															
12															
13															
14															
15															
16															
17															
18															
19															
20															

Comments:
Photos: 352-359
Possible Arctic char spawning stream
Arctic char are able to freely migrate from ocean to Glenn Lake outflow
Stream is very marginal fish habitat, especially for char.
No spawning habitat although char could migrate from ocean

Banks of Channel (Stability): H = highly stable, S = stable, U = unstable

Appendix 3.1-3. Detailed Fish Habitat Assessment Protocol (FHAP) Data Sheets and Site Photographs, Hope Bay Belt Project, 2009

Station ID:	Glenn O/F1	Survey Date (d/m/y):	31-Jul-09	Coordinates:		Coordinates:		
Survey Distance (m):	200	Survey Crew:	EG/JK					
		Time:		431756	7563960	431548	7563557	
				Comments:				
Temperature (°C):		Transparency:	clear					
Channel Velocity (m/s):		Conductivity (µS/cm):		S3 - fish bearing, 1.5-5m				
Current Flow Conditions:		pH:		Weather:				
Discharge estimate (m³/s):								
				cool, clear, sunny				

Hab		Dist. fr			Depth (m)		Width (m)		Bed Material						Pool Info			Fish Passage	
Unit	Hab	start	Length	Slope		Bank-		Bank-	Fines	Sand	Gravel	Cobble	Boulder	Bedrock		Depth (m)		Barriers	
No.	Type	(m)	(m)	(%)	Mean	full	Mean	full	(%)	(%)	(%)	(%)	(%)	(%)	Type	Max	Crest	Type	T/P
1	R	0	50	0	0.25	0.75	3	5		70	20	10						N	
2	P	50	10	0	0.50	>1	8	10		60	20	20						N	
3	R	60	140	<2	0.50	>1	4	5		70	5	20	5					N	
4	R	140	60	<2	0.50	>1	4	5		100								N	
5	R	200	500	0	0.30	>1	3	5		75	5	10	10					N	
6																			
7																			
8																			
9																			
10																			
11																			
12																			
13																			
14																			
15																			
16																			
17																			
18																			
19																			
20																			

Flow Conditions:	H = High flow, M = Medium flow, L = Low flow
Habitat Unit:	Under bankfull conditions: 0 - 2.5 m = > 1 m^2, 2.5 - 5 m = > 2 m^2, 5 - 10 m = > 4 m^2, 10 -15 m = > 6 m^2, 15 -20 = > 8 m^2, > 20 m = > 10 m^2
Hab Type:	P = pool, G = glide, R = riffle, C = cascade, O = other
Dist. fr start:	distance from beginning of the survey to the beginning of the habitat unit being surveyed
Pool Type:	S = scour, D = dammed, U = unknown
Substrate:	Sand (silt, clay, fine organic< 2 mm), Gravel (2 - 64 mm), Cobble (64 - 256 mm), Boulders (256 - 4000 mm), Bedrock (>4000 mm)
Fish Passage Barriers:	IF = Impassible waterfall
	BF = Boulder Field, passage through the boulder arrangement is not possible for fish
	D = dry channel, no stream flow
	NC = no distinct channel, water drains over land
	N = no barrier to fish passage through the habitat unit
T/P:	T = temporary, portion of open water season
	P = Permanent, all year round

Overall Rating

Spawning:	good/fair	Rearing:	poor	Adult Feeding:	poor	Over-wintering:	none	Migration:	good

Appendix 3.1-3. Detailed Fish Habitat Assessment Protocol (FHAP) Data Sheets and Site Photographs, Hope Bay Belt Project, 2009

Station ID:	Glenn O/F1
Survey Date:	July 31/09
Survey Crew:	EG/JK
Survey Distance (m):	200

Hab Unit No.	Banks of Channel				Instream Cover							Riparian Cover (%)			Photos (Role #) (Photo #)
	L Bank Height (m)	R Bank Height (m)	L Bank Stab	R Bank Stab	Pool %	Boulder %	Instream Veg %	Overhang Veg %	Undercut Bank %	LWD %	SWD %	Canopy	LB	RB	
1	>1	>1	mucky but stable												1333-1334
2	>1	>1	mucky but stable		100										
3	>1	>1	mucky but stable												
4															
5															
6															
7															
8															
9															
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11															
12															
13															
14															
15															
16															
17															
18															
19															
20															

Comments:

Banks of Channel (Stability): H = highly stable, S = stable, U = unstable

Appendix 3.1-3. Detailed Fish Habitat Assessment Protocol (FHAP) Data Sheets and Site Photographs, Hope Bay Belt Project, 2009

Station ID:	Glenn O/F2	Survey Date (d/m/y):	28-Jun-09	Coordinates:	Coordinates:
Survey Distance (m):	200	Survey Crew:	KE/TR	Start	
		Time:	13:00	431154 7563342	
				Comments:	
Temperature (°C):	5	Transparency:	Very Turbid	Cannot see bottom of stream; banks are all mud.	
Channel Velocity (m/s):	-	Conductivity (µS/cm):	104		
Current Flow Conditions:	Freshet	pH:	8.2	Weather:	
Discharge estimate (m³/s):	-			Partly Cloudy, sunny, windy	

Hab		Dist. fr			Depth (m)		Width (m)		Bed Material						Pool Info			Fish Passage	
Unit	Hab	start	Length	Slope		Bank-		Bank-	Fines	Sand	Gravel	Cobble	Boulder	Bedrock		Depth (m)		Barriers	
No.	Type	(m)	(m)	(%)	Mean	full	Mean	full	(%)	(%)	(%)	(%)	(%)	(%)	Type	Max	Crest	Type	T/P
1	G	0	200+	1-2	~ 0.75	~ 1.05	3	8	100						-	-	-	-	-
2																			
3																			
4																			
5																			
6																			
7																			
8																			
9																			
10																			
11																			
12																			
13																			
14																			
15																			
16																			
17																			
18																			
19																			
20																			

Flow Conditions:	H = High flow, M = Medium flow, L = Low flow
Habitat Unit:	Under bankfull conditions: 0 - 2.5 m = > 1 m^2, 2.5 - 5 m = > 2 m^2, 5 - 10 m = > 4 m^2, 10 -15 m = > 6 m^2, 15 -20 = > 8 m^2, > 20 m = > 10 m^2
Hab Type:	P = pool, G = glide, R = riffle, C = cascade, O = other
Dist. fr start:	distance from beginning of the survey to the beginning of the habitat unit being surveyed
Pool Type:	S = scour, D = dammed, U = unknown
Substrate:	Sand (silt, clay, fine organic< 2 mm), Gravel (2 - 64 mm), Cobble (64 - 256 mm), Boulders (256 - 4000 mm), Bedrock (>4000 mm)
Fish Passage Barriers:	IF = Impassible waterfall
	BF = Boulder Field, passage through the boulder arrangement is not possible for fish
	D = dry channel, no stream flow
	NC = no distinct channel, water drains over land
	N = no barrier to fish passage through the habitat unit
T/P:	T = temporary, portion of open water season
	P = Permanent, all year round

Overall Rating

Spawning:	Rearing:	Adult Feeding:	Over-wintering:	Migration:
None	F	Poor	N/A	Good
- Stream bed is completely fines (clay/silt) substrate	- Good depth with limited cover for juvenile fish	- Very poor water clarity - No cover		- No obstructions

Detailed Fish Habitat Assessment Protocol (FHAP) Data Sheet Used to Assess Fish Habitat in the Hope Bay Project Area, 2009 (completed)

Station ID:	Glenn O/F2
Survey Date:	28-Jun-09
Survey Crew:	TR/KE
Survey Distance (m):	

Hab Unit No.	Banks of Channel				Instream Cover							Riparian Cover (%)			Photos (Role #) (Photo #)
	L Bank Height (m)	R Bank Height (m)	L Bank Stab	R Bank Stab	Pool %	Boulder %	Instream Veg %	Overhang Veg %	Undercut Bank %	LWD %	SWD %	Canopy	LB	RB	
1	1.05	1.05	H	H			10		10			-	-	-	
2															
3															
4															
5															
6															
7															
8															
9															
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11															
12															
13															
14															
15															
16															
17															
18															
19															
20															

Comments:
Photos: 342-350
Site assessed as stream crossing location for proposed infrastructure road.

Banks of Channel (Stability): H = highly stable, S = stable, U = unstable

Appendix 3.1-3. Detailed Fish Habitat Assessment Protocol (FHAP) Data Sheets and Site Photographs, Hope Bay Belt Project, 2009

Station ID:	Windy O/F1	Survey Date (d/m/y):	28-Jun-09	Coordinates:	Coordinates:
Survey Distance (m):		Survey Crew:	KE/TR	Start	End
		Time:	10:09	431405 7555594	431371 7555484
				Comments:	
Temperature (°C):	3.3	Transparency:	Clear		
Channel Velocity (m/s):	-	Conductivity (µS/cm):	90		
Current Flow Conditions:	Freshet - Fast	pH:	8.2	Weather:	
Discharge estimate (m³/s):	-			Windy	

Hab		Dist. fr			Depth (m)		Width (m)		Bed Material						Pool Info			Fish Passage	
Unit	Hab	start	Length	Slope		Bank-		Bank-	Fines	Sand	Gravel	Cobble	Boulder	Bedrock		Depth (m)		Barriers	
No.	Type	(m)	(m)	(%)	Mean	full	Mean	full	(%)	(%)	(%)	(%)	(%)	(%)	Type	Max	Crest	Type	T/P
1	R	0	13.1	1-2	0.37	0.47	5.8	5.8	30		30	20	20		-	-	-	-	-
2	G	13.1	35.0	1-2	0.75	0.95	12.0	20.0	90 (silt)			10			-	-	-	-	-
3	R	48.1	12.0	1-2	0.63	0.85	3.7	4.3	80		10	5	5		-	-	-	-	-
4	P	60.1	8.2	1	>1.0	>1.2	8.0	8.0	95 (silt)		5				S	>1.0	0.39	-	-
5	G	69.0	62+	1	0.60	0.90	4.0	8.0	90	5	5				-	-	-	-	-
6																			
7																			
8																			
9																			
10																			
11																			
12																			
13																			
14																			
15																			
16																			
17																			
18																			
19																			
20																			

Flow Conditions:	H = High flow, M = Medium flow, L = Low flow
Habitat Unit:	Under bankfull conditions: 0 - 2.5 m = > 1 m^2, 2.5 - 5 m = > 2 m^2, 5 - 10 m = > 4 m^2, 10 -15 m = > 6 m^2, 15 -20 = > 8 m^2, > 20 m = > 10 m^2
Hab Type:	P = pool, G = glide, R = riffle, C = cascade, O = other
Dist. fr start:	distance from beginning of the survey to the beginning of the habitat unit being surveyed
Pool Type:	S = scour, D = dammed, U = unknown
Substrate:	Sand (silt, clay, fine organic< 2 mm), Gravel (2 - 64 mm), Cobble (64 - 256 mm), Boulders (256 - 4000 mm), Bedrock (>4000 mm)
Fish Passage Barriers:	IF = Impassible waterfall
	BF = Boulder Field, passage through the boulder arrangement is not possible for fish
	D = dry channel, no stream flow
	NC = no distinct channel, water drains over land
	N = no barrier to fish passage through the habitat unit
T/P:	T = temporary, portion of open water season
	P = Permanent, all year round

Overall Rating

Spawning: Poor	Rearing: Good	Adult Feeding: Good	Over-wintering: N/A	Migration: Good
- Few areas of gravel substrate	- Good cover for juvenile fish			- No barriers from outlow
- Predominately fine/organic substrate				of Windy Lake to end of site

Appendix 3.1-3. Detailed Fish Habitat Assessment Protocol (FHAP) Data Sheets and Site Photographs, Hope Bay Belt Project, 2009

Station ID:	Windy O/F1
Survey Date:	28-Jun-09
Survey Crew:	KE/TR
Survey Distance (m):	

Hab Unit No.	Banks of Channel				Instream Cover							Riparian Cover (%)			Photos (Role #) (Photo #)
	L Bank Height (m)	R Bank Height (m)	L Bank Stab	R Bank Stab	Pool %	Boulder %	Instream Veg %	Overhang Veg %	Undercut Bank %	LWD %	SWD %	Canopy	LB	RB	
1	0.47	0.47	H	H		20	30	5				-	-	5	
2	0.95	0.95	H	H			90					-	-	-	
3	0.85	0.85	H	H			80	5	5			-	-	5	
4	>1.2	>1.2	H	H			90		5			-	-	-	
5	0.85	0.85	H	H			90					-	-	-	
6															
7															
8															
9															
10															
11															
12															
13															
14															
15															
16															
17															
18															
19															
20															

Comments:
Photos: 337 to 342
fines=organics

Banks of Channel (Stability): H = highly stable, S = stable, U = unstable

Appendix 3.1-3. Detailed Fish Habitat Assessment Protocol (FHAP) Data Sheets and Site Photographs, Hope Bay Belt Project, 2009

Station ID:	Windy O/F	Survey Date (d/m/y):	July 28/09	Coordinates:	Coordinates:
Survey Distance (m):	300m	Survey Crew:	EG/JK		
		Time:		431444 7555566	431410 7555417

Temperature (°C):		Transparency:	clear
Channel Velocity (m/s):		Conductivity (µS/cm):	
Current Flow Conditions:		pH:	
Discharge estimate (m³/s):			

Comments:

S5 - fish bearing (LKTR), <3m

Weather:

cool, overcast, windy

Hab Unit No.	Hab Type	Dist. fr start (m)	Length (m)	Slope (%)	Depth (m)		Width (m)		Bed Material						Pool Info			Fish Passage Barriers	
																Depth (m)			
					Mean	Bank-full	Mean	Bank-full	Fines (%)	Sand (%)	Gravel (%)	Cobble (%)	Boulder (%)	Bedrock (%)	Type	Max	Crest	Type	T/P
1	R/G	0	300	0	0.75	1.50	2	4.5	100									N	
2																			
3																			
4																			
5																			
6																			
7																			
8																			
9																			
10																			
11																			
12																			
13																			
14																			
15																			
16																			
17																			
18																			
19																			
20																			

Flow Conditions:	H = High flow, M = Medium flow, L = Low flow
Habitat Unit:	Under bankfull conditions: 0 - 2.5 m = > 1 m^2, 2.5 - 5 m = > 2 m^2, 5 - 10 m = > 4 m^2, 10 -15 m = > 6 m^2, 15 -20 = > 8 m^2, > 20 m = > 10 m^2
Hab Type:	P = pool, G = glide, R = riffle, C = cascade, O = other
Dist. fr start:	distance from beginning of the survey to the beginning of the habitat unit being surveyed
Pool Type:	S = scour, D = dammed, U = unknown
Substrate:	Sand (silt, clay, fine organic< 2 mm), Gravel (2 - 64 mm), Cobble (64 - 256 mm), Boulders (256 - 4000 mm), Bedrock (>4000 mm)
Fish Passage Barriers:	IF = Impassible waterfall
	BF = Boulder Field, passage through the boulder arrangement is not possible for fish
	D = dry channel, no stream flow
	NC = no distinct channel, water drains over land
	N = no barrier to fish passage through the habitat unit
T/P:	T = temporary, portion of open water season
	P = Permanent, all year round

Overall Rating

Spawning:	Poor	**Rearing:**	Fair	**Adult Feeding:**	Poor	**Over-wintering:**	na	**Migration:**	good

Appendix 3.1-3. Detailed Fish Habitat Assessment Protocol (FHAP) Data Sheets and Site Photographs, Hope Bay Belt Project, 2009

Station ID:	**Windy O/F**
Survey Date:	**28-Jul-09**
Survey Crew:	**EG/JK**
Survey Distance (m):	**300m**

Hab Unit No.	Banks of Channel				Instream Cover							Riparian Cover (%)			Photos (Role #) (Photo #)
	L Bank Height (m)	R Bank Height (m)	L Bank Stab	R Bank Stab	Pool %	Boulder %	Instream Veg %	Overhang Veg %	Undercut Bank %	LWD %	SWD %	Canopy	LB	RB	
1	<0.5	<0.5	Stab	Stab			90								1273-1279
2															
3															
4															
5															
6															
7															
8															
9															
10															
11															
12															
13															
14															
15															
16															
17															
18															
19															
20															

Comments:

1273 - facing d/s at start of shocking
1274 - facing u/s towards Windy L
1275 - pretty yellow flowers along shore
1276 - lake trout released after sampling
1277 - facing d/s
1279 - facing d/s at end of shocking
***very turbid once disturbed, lots of instream veg, no gravel or cobble**

Banks of Channel (Stability): H = highly stable, S = stable, U = unstable

Appendix 3.1-3. Detailed Fish Habitat Assessment Protocol (FHAP) Data Sheets and Site Photographs, Hope Bay Belt Project, 2009

Station ID:	Windy I/F	Survey Date (d/m/y):	2-Jul-09	Coordinates:		Coordinates:
Survey Distance (m):	200	Survey Crew:	KE/TB	Downstream		Upstream
		Time:	13:08	432218	7549585	432119 7549448
				Comments:		
Temperature (°C):	15.4	Transparency:	Clear	Fish bearing, wetland - not true channalized stream		
Channel Velocity (m/s):	-	Conductivity (µS/cm):	192			
Current Flow Conditions:	Freshet	pH:	7.7	Weather:		
Discharge estimate (m^3/s):	-					

Hab		Dist. fr			Depth (m)		Width (m)		Bed Material						Pool Info			Fish Passage	
Unit	Hab	start	Length	Slope		Bank-		Bank-	Fines	Sand	Gravel	Cobble	Boulder	Bedrock		Depth (m)		Barriers	
No.	Type	(m)	(m)	(%)	Mean	full	Mean	full	(%)	(%)	(%)	(%)	(%)	(%)	Type	Max	Crest	Type	T/P
1	O*	0	150	1	0.17	0.32	1.0	13.12	100						-	-	-	-	-
2	F	151	49	1	0.25	0.30	4.1	15.2	100						-	-	-	-	-
3	O*																		
4																			
5																			
6																			
7																			
8																			
9																			
10																			
11																			
12																			
13																			
14																			
15																			
16																			
17																			
18																			
19																			
20																			

Flow Conditions:	H = High flow, M = Medium flow, L = Low flow
Habitat Unit:	Under bankfull conditions: 0 - 2.5 m = > 1 m^2, 2.5 - 5 m = > 2 m^2, 5 - 10 m = > 4 m^2, 10 -15 m = > 6 m^2, 15 -20 = > 8 m^2, > 20 m = > 10 m^2
Hab Type:	P = pool, G = glide, R = riffle, C = cascade, O = other
Dist. fr start:	distance from beginning of the survey to the beginning of the habitat unit being surveyed
Pool Type:	S = scour, D = dammed, U = unknown
Substrate:	Sand (silt, clay, fine organic< 2 mm), Gravel (2 - 64 mm), Cobble (64 - 256 mm), Boulders (256 - 4000 mm), Bedrock (>4000 mm)
Fish Passage Barriers:	IF = Impassible waterfall
	BF = Boulder Field, passage through the boulder arrangement is not possible for fish
	D = dry channel, no stream flow
	NC = no distinct channel, water drains over land
	N = no barrier to fish passage through the habitat unit
T/P:	T = temporary, portion of open water season
	P = Permanent, all year round
	O* = Wetland

Overall Rating

Spawning: Poor	Rearing: Good	Adult Feeding: Poor	Over-wintering: N/A	Migration: Fair
- Absence of rock/sand substrate	- Good rearing conditions for SLSC	- Very Shallow		- Stream channel is relatively shallow and choked with vegetation in some locations
- 100% organic substrate	- Abundant instream/aquatic vegetation			
- Potential for SLSC spawning				

Appendix 3.1-3. Detailed Fish Habitat Assessment Protocol (FHAP) Data Sheets and Site Photographs, Hope Bay Belt Project, 2009

Station ID:	Windy I/F
Survey Date:	2-Jul-09
Survey Crew:	KE/TB
Survey Distance (m):	200

Hab Unit No.	Banks of Channel				Instream Cover							Riparian Cover (%)			Photos (Role #) (Photo #)
	L Bank Height (m)	R Bank Height (m)	L Bank Stab	R Bank Stab	Pool %	Boulder %	Instream Veg %	Overhang Veg %	Undercut Bank %	LWD %	SWD %	Canopy	LB	RB	
1	0.15	0.15	H	H	-	-	100	-	-	-	-	-	-	-	
2	0.15	0.15	H	H	-	-	100	-	-	-	-	-	-	-	
3															
4															
5															
6															
7															
8															
9															
10															
11															
12															
13															
14															
15															
16															
17															
18															
19															
20															

Comments:
Photo: 479-485
Overall Habitat Quality = Important
Numerous SLSC observed in shallow wetland areas of stream site
Abundance of submergent and emergent aquatic vegetation, suggesting the stream is permanent
Return for electrofishing in summer to assess fish community/species

Banks of Channel (Stability): H = highly stable, S = stable, U = unstable

Appendix 3.1-3. Detailed Fish Habitat Assessment Protocol (FHAP) Data Sheets and Site Photographs, Hope Bay Belt Project, 2009

Station ID:	Glenn I/F	Survey Date (d/m/y):	1-Jul-09	Coordinates:	Coordinates:
Survey Distance (m):	200	Survey Crew:	KE/TR	Start (d/s)	End (u/s)
		Time:	8:42	431028 7559547	431113 7559888
Temperature (°C):	8.4	Transparency:	Clear	Comments:	
Channel Velocity (m/s):	-	Conductivity (µS/cm):	99	Assessed due to location near proposed tailings area east of Glenn Lake	
Current Flow Conditions:	Freshet	pH:	7.73	Weather:	
Discharge estimate (m³/s):	-				

Hab		Dist. fr			Depth (m)		Width (m)		Bed Material						Pool Info			Fish Passage	
Unit	Hab	start	Length	Slope		Bank-		Bank-	Fines	Sand	Gravel	Cobble	Boulder	Bedrock		Depth (m)		Barriers	
No.	Type	(m)	(m)	(%)	Mean	full	Mean	full	(%)	(%)	(%)	(%)	(%)	(%)	Type	Max	Crest	Type	T/P
1	G	0	45	1	0.20	0.45	7.1	11.1	100						-	-	-	-	-
2	R	46	3	2	0.15	0.40	1.0	1.0	100						-	-	-	-	-
3	G	50	27	1	0.18	0.43	8.3	14.5	100						-	-	-	-	-
4	R	78	4	2	0.15	0.40	2.5	2.7	100						-	-	-	-	-
5	G	83	14	1	0.20	0.70	4.4	4.6	100						-	-	-	-	-
6	R	98	3	2	0.11	0.37	0.3	0.3	100						-	-	-	-	-
7	G	101	99	1	0.18	0.38	7.2	8.3	100						-	-	-	-	-
8																			
9																			
10																			
11																			
12																			
13																			
14																			
15																			
16																			
17																			
18																			
19																			
20																			

Flow Conditions: H = High flow, M = Medium flow, L = Low flow

Habitat Unit: Under bankfull conditions: 0 - 2.5 m = > 1 m^2, 2.5 - 5 m = > 2 m^2, 5 - 10 m = > 4 m^2, 10 -15 m = > 6 m^2, 15 -20 = > 8 m^2, > 20 m = > 10 m^2

Hab Type: P = pool, G = glide, R = riffle, C = cascade, O = other

Dist. fr start: distance from beginning of the survey to the beginning of the habitat unit being surveyed

Pool Type: S = scour, D = dammed, U = unknown

Substrate: Sand (silt, clay, fine organic< 2 mm), Gravel (2 - 64 mm), Cobble (64 - 256 mm), Boulders (256 - 4000 mm), Bedrock (>4000 mm)

Fish Passage Barriers: IF = Impassible waterfall

BF = Boulder Field, passage through the boulder arrangement is not possible for fish

D = dry channel, no stream flow

NC = no distinct channel, water drains over land

N = no barrier to fish passage through the habitat unit

T/P: T = temporary, portion of open water season

P = Permanent, all year round

Overall Rating

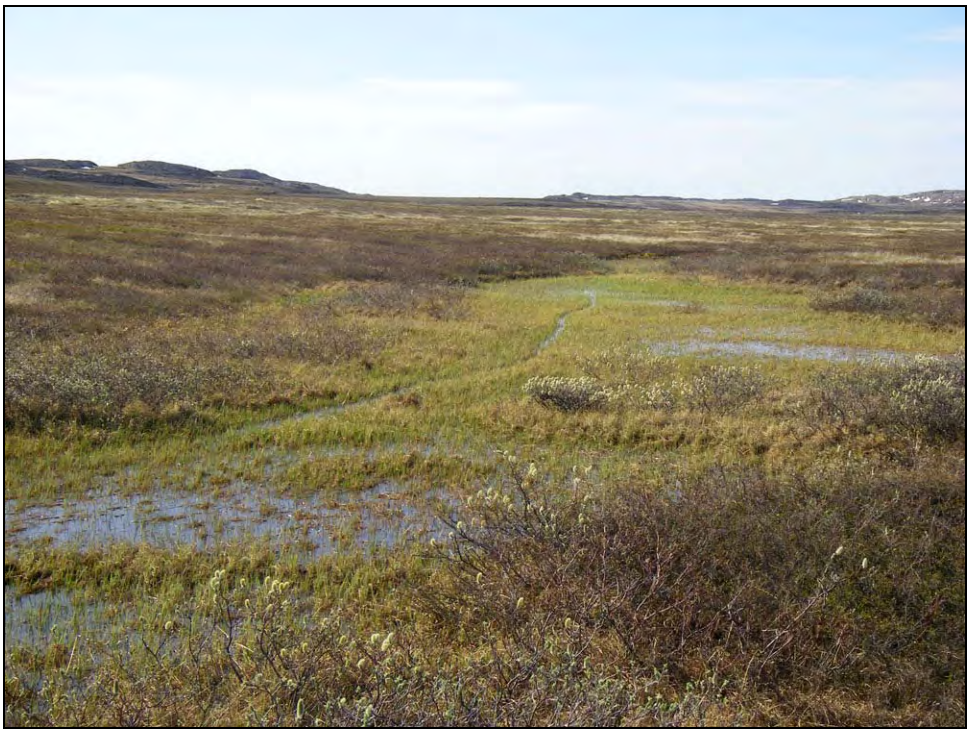
Spawning:	Rearing:	Adult Feeding:	Over-wintering:	Migration:
None	None	None	N/A	Poor
- No rock substrates	- No depth			- Very shallow, narrow
	- No pools for cover			- Heavy vegetation

Appendix 3.1-3. Detailed Fish Habitat Assessment Protocol (FHAP) Data Sheets and Site Photographs, Hope Bay Belt Project, 2009

Station ID:	Glenn I/F
Survey Date:	1-Jul-09
Survey Crew:	KE/TR
Survey Distance (m):	200

Hab Unit No.	Banks of Channel				Instream Cover							Riparian Cover (%)			Photos (Role #) (Photo #)
	L Bank Height (m)	R Bank Height (m)	L Bank Stab	R Bank Stab	Pool %	Boulder %	Instream Veg %	Overhang Veg %	Undercut Bank %	LWD %	SWD %	Canopy	LB	RB	
1	0.45	0.45	H	H			90	10				-	10	-	
2	0.25	0.25	H	H			95	5				-	5	-	
3	0.25	0.25	H	H			95	5				-	-	5	
4	0.25	0.25	H	H			85	15				-	10	5	
5	0.45	0.45	H	H			90	10				-	-	10	
6	0.25	0.25	H	H			75	25				-	25	-	
7	0.20	0.20	H	H			95	5				-	2.5	2.5	
8															
9															
10															
11															
12															
13															
14															
15															
16															
17															
18															
19															
20															

Comments:
Photos: 452-457
Overall habitat quality: Marginal to no fish habitat
Re-evaluate in summer to confirm quality



Appendix 3.1-3. Detailed Fish Habitat Assessment Protocol (FHAP) Data Sheets and Site Photographs, Hope Bay Belt Project, 2009

Station ID:	Ref A O/F	Survey Date (d/m/y):	July 28/09	Coordinates:	Coordinates:
Survey Distance (m):	49	Survey Crew:	EG/JK		
	left upstream branch	Time:	8:39	448509 7561825	448502 7561748
				Comments:	
Temperature (°C):	-	Transparency:	clear	S2-S3 fishbearing (LKTR, SLSC), 1.5-5m	
Channel Velocity (m/s):	-	Conductivity (µS/cm):	-		
Current Flow Conditions:	-	pH:	-	Weather:	
Discharge estimate (m³/s):	-			overcast, cool, clear, no precip	

Hab Unit No.	Hab Type	Dist. fr start (m)	Length (m)	Slope (%)	Depth (m) Mean	Depth (m) Bank-full	Width (m) Mean	Width (m) Bank-full	Bed Material Fines (%)	Sand (%)	Gravel (%)	Cobble (%)	Boulder (%)	Bedrock (%)	Pool Info Type	Pool Info Depth (m) Max	Pool Info Depth (m) Crest	Fish Passage Barriers Type	Fish Passage Barriers T/P
1	R	0	12	10	0.10	0.17	0.5	5			5	45	40	10				D	P
2	P	13	4	10	0.20	0.50	3.0	6				10	80	10					
3	R	18	49	10	0.20	0.33	1.5	4				25	65	10					
4																			
5																			
6																			
7																			
8																			
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18																			
19																			
20																			

Flow Conditions:	H = High flow, M = Medium flow, L = Low flow
Habitat Unit:	Under bankfull conditions: 0 - 2.5 m = > 1 m^2, 2.5 - 5 m = > 2 m^2, 5 - 10 m = > 4 m^2, 10 -15 m = > 6 m^2, 15 -20 = > 8 m^2, > 20 m = > 10 m^2
Hab Type:	P = pool, G = glide, R = riffle, C = cascade, O = other
Dist. fr start:	distance from beginning of the survey to the beginning of the habitat unit being surveyed
Pool Type:	S = scour, D = dammed, U = unknown
Substrate:	Sand (silt, clay, fine organic< 2 mm), Gravel (2 - 64 mm), Cobble (64 - 256 mm), Boulders (256 - 4000 mm), Bedrock (>4000 mm)
Fish Passage Barriers:	IF = Impassible waterfall
	BF = Boulder Field, passage through the boulder arrangement is not possible for fish
	D = dry channel, no stream flow
	NC = no distinct channel, water drains over land
	N = no barrier to fish passage through the habitat unit
T/P:	T = temporary, portion of open water season
	P = Permanent, all year round

Overall Rating

Spawning:	fair-good	**Rearing:**	good	**Adult Feeding:**	fair	**Over-wintering:**	none	**Migration:**	fair

Station ID:	Ref A O/F	left upstream branch
Survey Date:	July 28/09	
Survey Crew:	EG/JK	
Survey Distance (m):	49m	

Hab Unit No.	Banks of Channel				Instream Cover							Riparian Cover (%)			Photos (Role #) (Photo #)
	L Bank Height (m)	R Bank Height (m)	L Bank Stab	R Bank Stab	Pool %	Boulder %	Instream Veg %	Overhang Veg %	Undercut Bank %	LWD %	SWD %	Canopy	LB	RB	
1	<1	<1	Stab	Stab	0	70									1241 - bottom of outflow
2	<1	<1	Stab	Stab	100	60									1242 - right upstream branch
3	<1	<1	Stab	Stab	0	75									1243-1244 - left upstream bank
4															1246-1247 - boulder field
5															1248 - pool
6															1249 - right upsteam branch
7															1250 - left upstream riffle
8															
9															
10															
11															
12															
13															
14															
15															
16															
17															
18															
19															
20															

Comments:

Banks of Channel (Stability): H = highly stable, S = stable, U = unstable