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

Station ID:	Doris I/F3	Survey Date (d/m/y):	28-Jun-09	Coordinates:	Coordinates:
Survey Distance (m):		Survey Crew:	KE/TR	Start	
		Time:	16:38	434738 7553696	
			Comments:		
Temperature (°C):	16.3	Transparency:	Clear		
Channel Velocity (m/s):	-	Conductivity (µS/cm):	54		
Current Flow Conditions:	Freshet - Fast	pH:	7.5	Weather:	
Discharge estimate (m³/s):	-			sunny and warm	

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	0.26	0.26	0.75*	**	100						-	-	-	-	-
2																			
3																			
4																			
5																			
6																			
7																			
8																			
9																			
10																			
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12																			
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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

* Main Channel

** Very large wetland, area to big and expansive to measure

Overall Rating

Spawning:	Rearing:	Adult Feeding:	Over-wintering:	Migration:
None	Poor	None	None	Poor
- No rock substrate	- Very shallow			- Connected to Doris Lake
	- Very limited habitat for fish			no barriers, very shallow
				and small ephemeral stream

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

Station ID:	Doris I/F3
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	0.26	0.26	H	H			100					-	-	-	
2															
3															
4															
5															
6															
7															
8															
9															
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14															
15															
16															
17															
18															
19															
20															

Comments:
Photos: 366-371
Very large wetland, area too big/expansive to measure
Overall: Marginal fish habitat
Very limited fish habitat, all life cycles and species apply
Stream flows through wetland at south end of Doris Lake
Stream is predominately overland flow at freshet period.

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:	P.O. O/F1	Survey Date (d/m/y):	27-Jun-09	Coordinates:	Coordinates:
Survey Distance (m):	200	Survey Crew:	TR/KE	Start	Finish
		Time:	9:57	436591 7550740	200 m from start
				Comments:	
Temperature (°C):	4.6	Transparency:	Clear	Bear was sighted nearby - therefore change of plans	
Channel Velocity (m/s):	Hydro st.	Conductivity (µS/cm):	180		
Current Flow Conditions:	High/Freshet	pH:	8.7	Weather:	
Discharge estimate (m³/s):	Hydro st.			High cloud, partly blue skies	

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	21.4	1-2	0.50	0.65	14	14	60		35		5		-	-	-	None	
2	C	21.4	10.1	3	0.45	0.65	8	10	40		50		10		-	-	-	None	
3	R	31.5	10.0	1-2	0.45	0.75	9.4	9.4	30		65		5		-	-	-	None	
4	P	41.5	10.0	1-2	1.50	1.80	12	12	30	40	10		20		5	1.5	0.75	None	
5	G	51.5	148.5	1	0.90	1.20	20	20	30		60		10		-	-	-	None	
6																			
7																			
8																			
9																			
10																			
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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 m², 2.5 - 5 m = > 2 m², 5 - 10 m = > 4 m², 10 -15 m = > 6 m², 15 -20 = > 8 m², > 20 m = > 10 m²
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:
Fair	Good	Good	N/A	Good

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

Station ID:	P.O. O/F1
Survey Date:	27-Jun-09
Survey Crew:	TR/KE
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	0.65	0.65	H	H		5	60	2				-	2	2	
2	0.65	0.65	H	H		20	40	10				-	5	5	
3	0.75	0.75	H	H		10	20	20	15		5	-	10	10	
4	1.80	1.80	H	H	30		30	2	20			-	2	2	
5	1.20	1.20	H	H		5	30	10	20		5	-	5	5	
6															
7															
8															
9															
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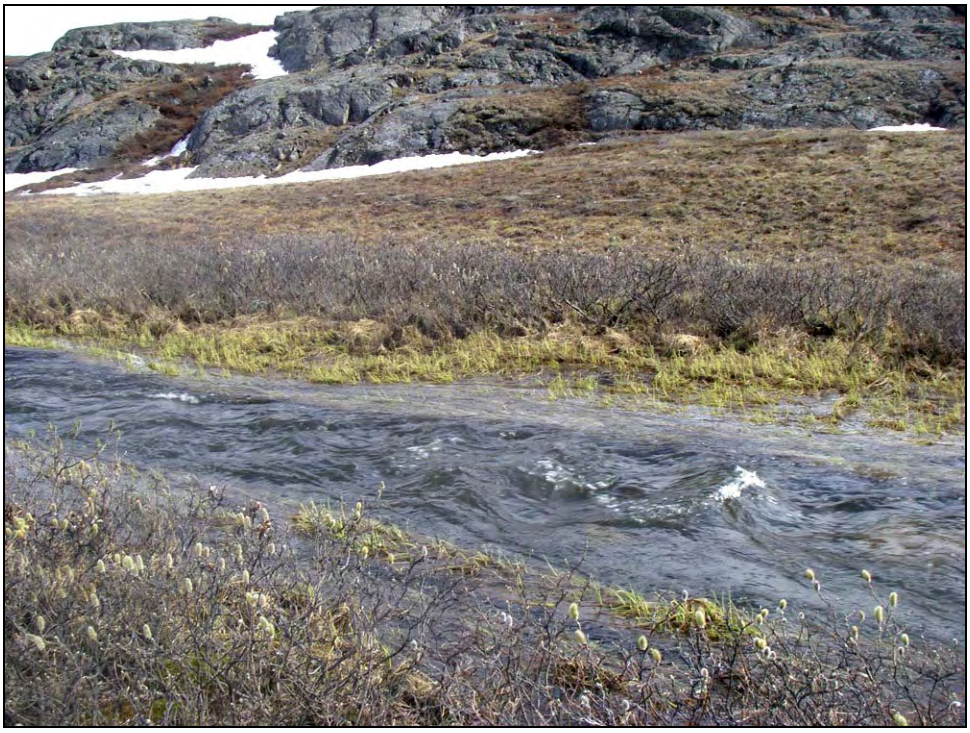
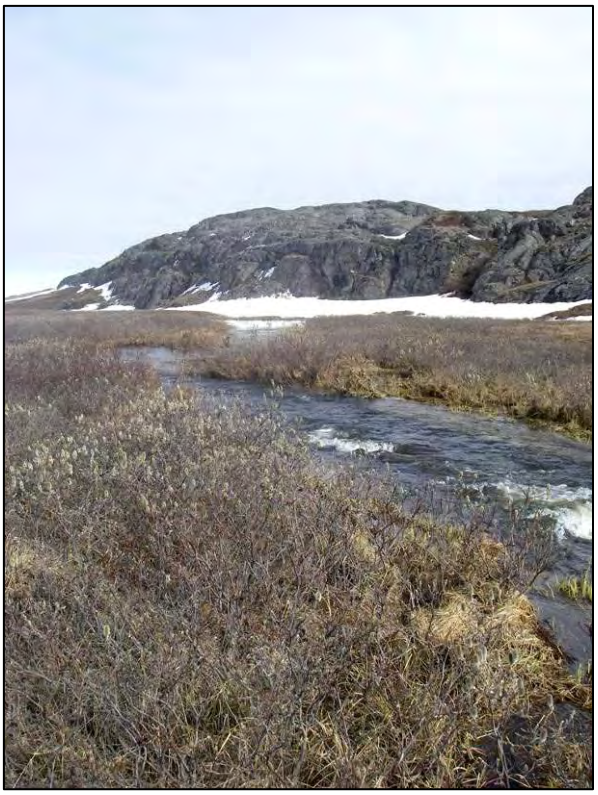
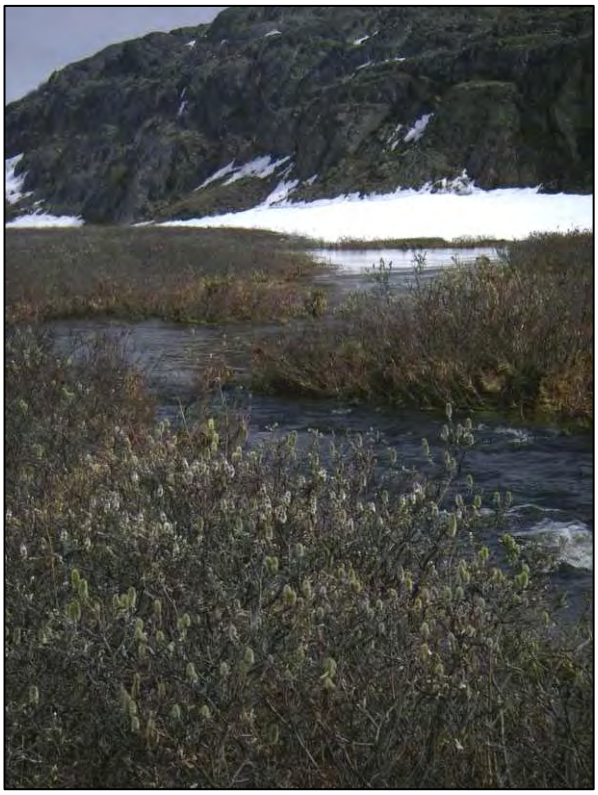
18															
19															
20															

Comments:
Photo: 285-289
Bear spotted in area, were forced to move prior to completing survey

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:	P.O. O/F2	Survey Date (d/m/y):	29-Jun-09	Coordinates:	Coordinates:
Survey Distance (m):	~ 50 m total length of stream	Survey Crew:	KE/TR	Start 436649 7550190	
		Time:	10:45		
Temperature (°C):	2.9	Transparency:	Clear	Comments: Good stream channel with large banks, wetland area surrounding it	
Channel Velocity (m/s):	-	Conductivity (µS/cm):	181		
Current Flow Conditions:	Medium-Slow	pH:	8.19	Weather: Windy/cloudy	
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	G	0	*	1-2	~1	~1.15	25	28	95				5		-	-	-	-	-
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 m², 2.5 - 5 m = > 2 m², 5 - 10 m = > 4 m², 10 -15 m = > 6 m², 15 -20 = > 8 m², > 20 m = > 10 m²
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
	* = **Entire length of the stream**

Overall Rating

Spawning:	None	**Rearing:**	Poor	**Adult Feeding:**	Poor	**Over-wintering:**	N/A	**Migration:**	Good
- No rock substrate		- Poor cover/habitat						- No barriers, good depth	

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

Station ID:	PO Outflow 2
Survey Date:	29-Jun-09
Survey Crew:	TR/KE
Survey Distance (m):	Entire Length

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	1.15	1.15	H	H			90					-	-	-	383
2															to
3															385
4															
5															
6															
7															
8															
9															
10															
11															
12															
13															
14															
15															
16															
17															
18															
19															
20															

Comments:
Overall Habitat = Marginal
Flooded channelized stream channel observed at freshet.

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:	P.O. O/F2	Survey Date (d/m/y):	July-26/09	Coordinates:	Coordinates:
Survey Distance (m):	45 m	Survey Crew:	EG/JK		
		Time:	16:05	436648 7550208	436652 7550175
				Comments:	
Temperature (°C):	-	Transparency:	poor	S6 - no fish, <3m channel width	
Channel Velocity (m/s):	-	Conductivity (µS/cm):	-		
Current Flow Conditions:	low	pH:	-	Weather:	
Discharge estimate (m³/s):	-			cool, cloudy, windy	

Hab		Dist. fr			Depth (m)		Width (m)		Bed Material						Pool Info			Fish Passage	
Unit	Hab	start	Length	Slope		Bank-		Bank-	Fines	CLAY	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	0	0.75	1.30	1.2	1.3		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: Poor **Rearing:** Poor **Adult Feeding:** None **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:	P.O. O/F2
Survey Date:	July 26-09
Survey Crew:	EG/JK
Survey Distance (m):	45 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	0.75	0.75	Stab	Stab	100	0	0	0	0	0	0	0	0	0	1229-1231
2	*very mucky and swamy, clay bottom														
3															
4															
5															
6															
7															
8															
9															
10															
11															
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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:	Ogama O/F1	Survey Date (d/m/y):	27-Jun-09	Coordinates:	Coordinates:
Survey Distance (m):	200	Survey Crew:	KE/TR		
		Time:	17:00	435223 7555438	
				Comments:	
Temperature (°C):	4	Transparency:	Medium	Ice chunks flowing	
Channel Velocity (m/s):	-	Conductivity (µS/cm):	4		
Current Flow Conditions:	Freshet	pH:	7.87	Weather:	
Discharge estimate (m³/s):	-			Sunny/clear	

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	G	0	70	1-2	0.75	0.95	9	9	*unknown						-	-	-	-	-
2	R	70	15	2	0.36	0.46	6	6	49			50	1		-	-	-	-	-
3	G	85	115+	1-2	1.33	1.53	15	15	*unknown						-	-	-	-	-
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
	* Cannot see bottom - very deep

Overall Rating

Spawning:	Poor	**Rearing:**	Good	**Adult Feeding:**	Fair	**Over-wintering:**	N/A	**Migration:**	Good
- Stream bed is predominately fine substrate		- Good cover for juvenile fish						- No barriers to migration, good depth	

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

Station ID:	Ogama O/F1
Survey Date:	27-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	0.95	0.95	H	H			60*		10			-	-	-	
2	0.46	0.46	H	H			20	10	10		5	-	-	10	
3	1.53	1.53	H	H			20		20			-	-	-	
4															
5															
6															
7															
8															
9															
10															
11															
12															
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14															
15															
16															
17															
18															
19															
20															

Comments:
Photos 318-324
Return in summer to evaluate substrate types due to deep water at freshet

* maybe more instream vegetation but difficult to see
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:	Ogama O/F2	Survey Date (d/m/y):		Coordinates:	Coordinates:
Survey Distance (m):		Survey Crew:			
*at confluence with Doris inflow		Time:		435059 7555575	435250 7555393

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

Comments: S3 - fish bearing, 1.5-5m

Weather: cold, overcast

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	P	0	10	0	0.75	>1	6.0	8.0	75		10	10	5			>1		N	
2	R	10	50	0	0.50	>1	1.5	3.0	60		15	10	15					N	
3	P	60	12	0	0.75	>1	4.5	6.0	unsure, can't see bottom							>1		N	
4	R	72	10	0	0.25	0.75	1.0	1.5	50		20	15	15					N	
5	P	82	10	0	1.00	>1.5	2.0	3.0	unsure, can't see bottom							>1.5		N	
6	R	92	40	0	0.50	>1	1.0	2.5	35		40	10	10	5				N	
7	P	122	20	0	>1	>1.5	20.0	30.0	unsure, can't see bottom							>1.5		N	
8	R	140	5	<5	0.25	0.50	0.8	1.5	30		35	15	15					N	
9																			
10	R	0	100	<5	0.50	>1	1.5-2	4.0	35		25	15	15	10				N	
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:
good	fair	good		
gravelly sites		minnows	na	good

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

Station ID:	Ogama O/F2
Survey Date:	July 29/09
Survey Crew:	EG/JK
Survey Distance (m):	300

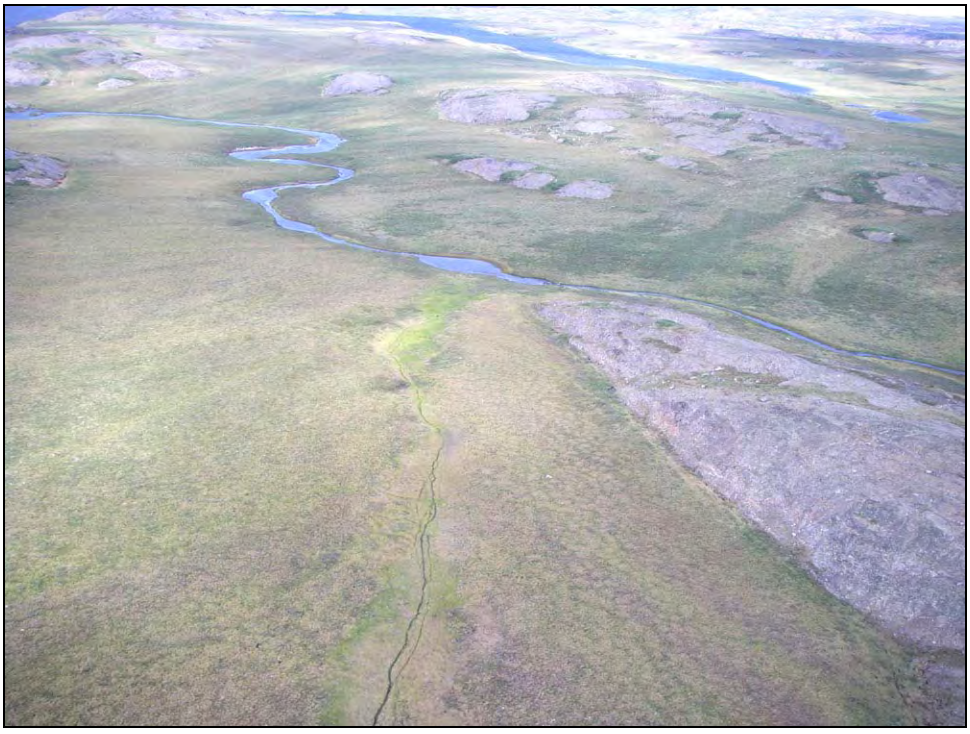
Hab Unit No.	Banks of Channel				Instream Cover							Riparian Cover (%)			Photos (Role #) (Photo #)
	L Bank Height (m)	R Bank Height (m)	L Bank Stab	R Bank Stab	Pool %	Boulder %	Instream Veg %	Overhang Veg %	Undercut Bank %	LWD %	SWD %	Canopy	LB	RB	
1	varies only	relatively stable			100	5-10	5-15		5-10			no cover anywhere!			1284-1298
2	slightly	(under cut in pools)				5-10	5-15		5-10						
3	due to				100	5-10	5-15		5-10						
4	no definite					5-10	5-15		5-10						
5	banks...				100	5-10	5-15		5-10						
6	<1m					5-10	5-15		5-10						
7															
8															
9															
10															
11															
12															
13															
14															
15															
16															
17															
18															
19															
20															

Comments:

1284 - facing N	1289 - facing Ogama L	1293 - LKWH
1285- facing N	1290 - facing Ogama L	1294 - fish (kept)
1286 - pool	1291	1298 - LKWH
1287 - facing S	1291 - riffle/small cascade	
1288 - facing Ogama	1292 - LKWH	

1299-1300 - confluence of Doris inflow, Ogama outflow and small creek (dry) from unidentified pond between Doris L and Ogama L.

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:	Ogama O/F3	Survey Date (d/m/y):	29-Jul-09	Coordinates:	Coordinates:
Survey Distance (m):	200	Survey Crew:	EG/WK		
		Time:		434784 7555878	434999 7555848

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

Comments:
S3 - fish bearing (LKTR and whitefish), 1.5-5m

Weather:
cool, sunny, windy

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	200	<5	0.30	>1	1.5	4	20		25	25	20	10		>1.5		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:	Good	**Rearing:**	fair	**Adult Feeding:**	good	**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:	Ogama O/F3
Survey Date:	29-Jul-09
Survey Crew:	EG/WK
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 and deep holes		5.0	5-10	25-45								1315-1317
2															
3															
4															
5															
6															
7															
8															
9															
10															
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12															
13															
14															
15															
16															
17															
18															
19															
20															

Comments:

Constant riffle habitat, pretty deep with mucky (clay) bottom edges surrounded by vegetation--thick mats, very concentrated

1315 - u/s facing SE (towards Ogama L)

1316 - d/s facing NW (towards Doris L)

1317 - opening of inflow into Doris L

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:	Patch O/F	Survey Date (d/m/y):	29-Jun-09	Coordinates:	Coordinates:
Survey Distance (m):	The length of the outflow	Survey Crew:	KE/TR		
		Time:	8:41	4362255 7549016	
				Comments:	
Temperature (°C):	4.2	Transparency:	Clear		
Channel Velocity (m/s):		Conductivity (µS/cm):	152		
Current Flow Conditions:	Medium	pH:	8.26	Weather:	
Discharge estimate (m³/s):				Windy	

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	Fines (%)	Sand (%)	Gravel (%)	Cobble (%)	Boulder (%)	Bedrock (%)	Type	Depth (m) Max	Depth (m) Crest	Type	T/P
1	G	0	*	1-2	0.52	0.52	10.5	14	50	25	10	5	10		-	-	-	None	
2																			
3																			
4																			
5																			
6																			
7																			
8																			
9																			
10																			
11																			
12																			
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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
	* = **Assessed entire ouflow < 200 m**

Overall Rating

Spawning:	Rearing:	Adult Feeding:	Over-wintering:	Migration:
Poor	Fair	Fair	N/A	G
- Predominately fines/organic substrate	- Fair cover and depth for juvenile fish, especially at inflow to PO Lake			- Good connection between Patch and PO Lakes at Freshet

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

Station ID:	Patch O/F
Survey Date:	29-Jun-09
Survey Crew:	KE/TR
Survey Distance (m):	Entire outflow

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	0.52	0.52	H	H		10	50	5				-	2.5	2.5	
2															
3															
4															
5															
6															
7															
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20															

Comments:
Photos 379-382
Overall habitat quality = Marginal

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:	Patch O/F		Survey Date (d/m/y):		27-Jul-09		Coordinates:				Coordinates:					
			Survey Distance (m):	123m		Survey Crew:		EG/WK											
							Time:	1430-1530		436651	7550173					436255	7549004		
									Comments:										
			Temperature (°C):			Transparency:	clear												
			Channel Velocity (m/s):			Conductivity (µS/cm):			S1-S2 (varying channel width), fish bearing, (NSSB and LKTR)										
			Current Flow Conditions:			pH:			Weather:										
			Discharge estimate (m³/s):						cool, windy, overcast										

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	Depth (m) Max	
1	P	0	55	<5	>1	>1	12	35	100 (Clay)							>2	
2	R	55	250	<5	>1	>1	1.3	4	50	25	20	5					
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

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

Station ID:	Patch O/F
Survey Date:	July 27/09
Survey Crew:	EG/WK
Survey Distance (m):	123

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	0.75	0.75	U	U	100		15							1228-1236 (walking E to W)	
2	0.50	0.75	Stab	Stab	25		15								
3															
4															
5															
6															
7															
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

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

Station ID:	Patch I/F	Survey Date (d/m/y):	30-Jun-09	Coordinates:	Coordinates:
Survey Distance (m):	200	Survey Crew:	KE/TR	Start	
		Time:	9:47	433821 7552530	
				Comments:	
Temperature (°C):	9.5	Transparency:	Clear	Near the major laydown area	
Channel Velocity (m/s):	-	Conductivity (µS/cm):	76.5	Lots of braids to the stream	
Current Flow Conditions:	Fast	pH:	7.6	Weather:	
Discharge estimate (m³/s):	-			Partly cloudy skies	

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	P	0	5	1	0.35	0.85	2.80	2.80	100						S	1.20	0.24	-	-
2	G	5	6	1-2	0.39	0.54	1.80	1.80	100						-	-	-	-	-
3	P	11	8	1	2.00	2.00	0.68	0.83	100						S	0.80	0.22	-	-
4	R	19	5	1-2	0.16	0.27	1.10	1.10	100						-	-	-	-	-
5	P	24	3	1	0.45	0.62	4.50	4.50	100						S	0.68	0.19	-	-
6	G	27	6	1-2	0.35	0.57	1.60	1.80	100						-	-	-	-	-
7	P	33	15	1	1.30	1.45	7.00	8.00	100						S	1.50	0.40	-	-
8	R	48	142	1-2	0.16	0.36	1.20*	1.20	100						-	-	-	-	-
9	P	190	10	1	0.90	1.06	2.10	2.60	100						S	1.10	0.44	-	-
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

* Part of a braided stream/flooded area

Overall Rating

Spawning: None	Rearing: Fair	Adult Feeding: Poor	Over-wintering: N/A	Migration: Poor
- No rock substrates	- Few good pools with cover	- Poor habitat for		- Poor connection to inflow
- All organic substrates	for fish	adult fish		of Patch Lake
				- Predominately overland flow
				at inflow

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

Station ID:	Patch I/F
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	0.85	0.85	H	H	20		20		10			-	-	-	
2	0.54	0.54	H	H			40					-	-	-	
3	0.83	0.83	H	H	40		20		5			-	-	-	
4	0.27	0.27	H	H			100					-	-	-	
5	0.62	0.62	H	H	20		25					-	-	-	
6	0.57	0.57	H	H			50					-	-	-	
7	1.45	1.45	H	H	40		30		30			-	-	-	
8	0.36	0.36	H	H			100					-	-	-	
9	1.06	1.06	H	H	75		10		15			-	-	-	
10															
11															
12															
13															
14															
15															
16															
17															
18															
19															
20															

Comments:
Photos: 409-417
Overall habitat quality: Marginal
Assess for fish presence in summer part of a braided stream/flooded area

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:	P.O. I/F1	Survey Date (d/m/y):	30-Jun-09	Coordinates:	Coordinates:
Survey Distance (m):	200	Survey Crew:	KE/TR	Start	
		Time:	13:26	438010 7546164	
				Comments:	
Temperature (°C):	10.4	Transparency:	Clear	Nice meandering stream; surrounding wetlands	
Channel Velocity (m/s):	-	Conductivity (µS/cm):	157.4	Aquatic plants permanent in stream; pool/glide complex	
Current Flow Conditions:	Fast	pH:	7.5	Weather:	
Discharge estimate (m³/s):	-			Mostly cloudy, SE wind	

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	G	0	75	1-2	0.50	0.65	14	20	100						-	-	-	-	-
2	R	75	25	1-2	0.17	0.34	12	14	100						-	-	-	-	-
3	P	100	30	1	> 2.00	+2.30	10	10	100						S	> 2	0.46	-	-
4	G	130	55	1-2	0.23	0.50	9	11	100						-	-	-	-	-
5	P	185	15	1	0.65	0.93	9	12	100						S	2	0.37	-	-
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: None	Rearing: Good	Adult Feeding: Good	Over-wintering: N/A	Migration: Good
- No rock substrate	- Good depth in pools with	- Good habitat for		- Good connectivity downstream
- Stream bed is 100% organic	excellent aquatic vegetation	adults in pools		to ancient/dried lake and
or aquatic vegetation	cover			further d/s to PO Lake

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/F1
Survey Date:	June 30. 2009
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	0.65	0.65	H	H			100					-	-	-	
2	0.34	0.34	H	H			100					-	-	-	
3	+2.30	+2.30	H	H			90	10				-	5	5	
4	0.50	0.50	H	H			100					-	-	-	
5	0.93	0.93	H	H			95	5				-	5	-	
6															
7															
8															
9															
10															
11															
12															
13															
14															
15															
16															
17															
18															
19															
20															

Comments:
Photos 418-437
Newly emerged insects
Overall habitat quality: Important
Assess in summer for fish abundance/populations
Area is located near potentially significant wildlife area
Near proposed tailings area west of surveyed stream

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