



**WINTER MEASUREMENTS OF
DISSOLVED OXYGEN AT SELECTED
SITES IN THE BULKLEY WATERSHED**

**34560-27/BLK/BULKLEY
BULKLEY RIVER -BULK- 460-000000**

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David Bustard & Associates

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SITES IN THE BULKLEY WATERSHED**

Prepared by

DAVID BUSTARD AND ASSOCIATES

for

**DEPARTMENT OF FISHERIES AND OCEANS
NORTHERN SALMON STOCK ASSESSMENT
PACIFIC BIOLOGICAL STATION**

MARCH 1996

1.0 BACKGROUND AND METHODS

Dissolved oxygen and water temperature measurements were conducted at 50 locations in the Bulkley Watershed during the period March 12 to March 18, 1996. The field studies were conducted by Rob Dams and David Bustard.

Access to most sites was by vehicle. Sites in the upper Telkwa, Gosnell, and lower McBride Creek were accessed by Northern Mountain Helicopters.

A YSI Dissolved Oxygen Meter was used to measure dissolved oxygen and water temperatures. GPS was derived from a Magellan GPS Satellite Navigator. Observations of snow, ice and water depth were recorded at each site. Photos were taken at nearly all of the sites.

2.0 RESULTS

The results are presented in Tables 1 to 5. All sites requested by DFO were sampled. There was some confusion on GPS coordinates for the upper Telkwa River sites, and judgement was used in locating two pond sites on the Telkwa River floodplain that appeared to be accessible from the Telkwa River during high flows and offered potential overwinter habitat for coho. Additional sites were added in the Telkwa River at sites being considered by SEP for the development of off-channel rearing sites.

Table 1. Dissolved Oxygen and Water Temperature Measurements at Selected Sites in Toboggan Creek and the Upper Bulkley River.

SITE #	LOCATION	DATE	GPS	PHOTO #	SITE DESCRIPTION			DISSOLVED OXYGEN PROFILE		
					SNOW COVER	ICE COVER	WATER DEPTH	DEPTH (M)	TEMP (C)	D0 (PPM)
TOBOGGAN CREEK										
1	Toboggan Creek at SEP counting fence.	Mar 12	54 55' 36 N 127 17' 27 W	3	0	0.12 – some open pockets	0.25	0.20	0.2	12.3
2	Toboggan Creek, 200 m below hatchery.	Mar 12	54 53' 34 N 127 16' 02 W	2	0	clear – with some shelf ice	0.20	0.10	1.5	12.1
3	Toboggan Creek bridge crossing above hatchery.	Mar 12	54 53' 20 N 127 15' 46 W	1	0	clear – with some shelf ice	0.20	0.10	1.0	12.1
UPPER BULKLEY RIVER										
4	Bulkley River at SEP counting fence.	Mar 13	54 24' 04 N 126 39' 57 W	4	0.3	0.25 – < 10% open water	N/A	0.20	0.1	11.0
5	Bulkley River, 50 m below McKilligan road crossing.	Mar 13	54 26' 42 N 126 33' 30 W	5	0.3	0.15 – < 10% open water	N/A	0.10	0.1	11.0
6	Bulkley River at the Day Lake bridge crossing.	Mar 13	54 24' 35 N 126 11' 52 W	10	0.1	0.25 – < 10% open water	0.3	0.20	0.1	11.1
7	Bulkley River at the lake outlet bridge crossing.	Mar 13	54 23' 14 N 126 08' 16 W	9	0	clear with shelf ice	1	surface	1.5	11.0
								0.50	1.4	11.4
								1.00	1.4	11.4
UPPER BULKLEY RIVER TRIBUTARIES										
8	McQuarrie Creek between the highway and railway.	Mar 13	54 30' 52 N 126 27' 44 W	6	0.1	1	trickle flow	0.10	0.1	11.6
9	Byman Creek 25 m above railway crossing.	Mar 13	54 31' 03 N 126 26' 24 W	7	0	0.12 – 20% open water	nearly stagnant	0.15	0.9	7.6
10	Richfield Creek 75 m above railway crossing.	Mar 13	54 30' 32 N 126 20' 25 W	8	0.06	0.55	0.12	0.10	0.1	12.2
11	Ailport Creek at private access road.	Mar 13	54 28' 22 N 126 14' 03 W	12	0.1	0.5	0.06 trickle flow	0.05	0.1	12.5
12	Foxy Creek at bridge crossing.	Mar 13	54 18' 50 N 126 07' 30 W	11	0	0.1 – < 10% open water	0.1	0.10	1.0	11.8

Table 2. Dissolved Oxygen and Water Temperature Measurements at Selected Telkwa River Sites.

SITE #	LOCATION	DATE	GPS	PHOTO #	SITE DESCRIPTION			DISSOLVED OXYGEN PROFILE		
					DEPTH (M)	SNOW COVER	ICE COVER	WATER DEPTH	DEPTH (M)	TEMP (C)
TELKWA RIVER OFF-CHANNEL SITES										
13	Mainstem Telkwa River at Km 11.9 (near DFO ponds).	Mar 14	54 37' 55 N 127 16' 38 W	23	0.2	0.35 - < 10% open water	N/A	0.20	0.2	13.5
14	Eastern side of Telkwa River (lower end of seepage trib located at approx Km 8).	Mar 14	54 38' 15 N 127 14' 49 W	24	0.2	0.7	0.4	surface	N/A	N/A
								0.40	0.9	11.9
								0.10	1.0	11.9
15	Eastern side of Telkwa River (outlet of Km 8 upper pond)	Mar 14	N/A	25	0.6	0.4	0.1	0.10	0.1	2.1
16	Telkwa River DFO ponds at approx Km 11. (Channel #1)	Mar 14	54 38' 02 N 127 16' 00 W	19	0.05	0.6	0.4	0.40	0.5	7.0
								0.10	1.0	5.6
17	Telkwa River DFO ponds at approx Km 11. (Channel #4)	Mar 14	54 38' 06 N 127 16' 04 W	13	0.05	0.15 - < 10% open water	1.8	surface	1.5	7.1
								0.50	2.8	7.4
								1.00	3.0	7.4
								1.50	3.2	6.3
18	Telkwa River DFO ponds at approx Km 11. (Channel #5)	Mar 14	54 38' 02 N 127 16' 08 W	16	0	0.3	0.2	0.15	3.5	5.5
19	Telkwa River DFO ponds at approx Km 11. (Channel #6)	Mar 14	54 38' 03 N 127 16' 13 W	15	0.15	0.35	0.7	0.70	2.0	0.8
								0.20	3.1	0.6
20	Telkwa River DFO ponds at approx Km 11. (Channel #7)	Mar 14	54 38' 07 N 127 16' 06 W	14	0.1	0.6	0.2	0.20	0.1	3.9
21	Telkwa River DFO ponds at approx Km 11. (Channel 5a)	Mar 14	54 38' 06 N 127 16' 19 W	17	0	0.25	0.25	0.20	4.5	7.5
22	Telkwa River DFO ponds at approx Km 11. (Channel 5b)	Mar 14	54 38' 00 N 127 16' 16 W	18	0	clear	0.5	surface	5.0	8.7
								0.40	4.9	8.8
23	Telkwa River DFO ponds at outlet culvert.	Mar 14	54 38' 02 N 127 16' 00 W	20	0	0.02 - broken ice	0.5	surface	1.0	7.0
								0.40	1.0	7.0
24	Telkwa R - Km 19 wetland right side above road.	Mar 14	54 36' 25 N 127 23' 13 W	21	0.7	0.15	0.15	0.1	0.4	2.2
25	Telkwa R - Km 19 wetland mid - channel above road.	Mar 14	54 36' 25 N 127 23' 13 W	N/A	0.7	0.15	0.15	0.1	0.1	9.8

Table 3. Dissolved Oxygen and Water Temperature Measurements at Selected Sites along the Telkwa and Morice Rivers.

SITE #	LOCATION	DATE	GPS	PHOTO #	SITE DESCRIPTION			DISSOLVED OXYGEN PROFILE		
					SNOW COVER	ICE COVER	WATER DEPTH	DEPTH (M)	TEMP (C)	D0 (PPM)
TELKWA RIVER OFF-CHANNEL SITES (Con't)										
26	Telkwa R – Km 19 wetland left side above road.	Mar 13	54 36' 25 N 127 23' 13 W	21	0.7	0.15	0.25	0.20	0.1	8.4
27	Jonas Flat pond 20 m below road.	Mar 13	54 36' 16 N 127 24' 05 W	N/A	1	0.25	0.1	0.10	0.1	1.4
28	Jonas Flat pond 100 m below road.	Mar 13	54 36' 16 N 127 24' 04 W	22	1.1	0.8	0.3	0.30	0.1	3.0
								0.10	0.3	1.1
29	Jonas Flat pond 150 m below road.	Mar 13	54 36' 16 N 127 24' 04 W	N/A	0.9	1	0.15	0.10	0.1	1.5
30	Telkwa R wetland at base of Elliot Ck, 250 m above outlet	Mar 18	54 34' 51 N 127 34' 04 W	14	0	0.4	0.4	surface	0.1	3.4
								0.35	0.1	3.1
31	Telkwa R wetland at base of Elliot Ck, pond above outlet	Mar 18	54 34' 51 N 127 34' 04 W	15	0	0.45	0.1	0.10	0.1	2.5
32	Telkwa R wetland at base of Elliot Ck, outlet channel	Mar 18	54 34' 51 N 127 34' 04 W	16	0	0.06 est 2 cfs	N/A	0.10	0.1	2.7
33	Telkwa R wetland below Milk Creek, middle of pond.	Mar 18	54 34' 53 N 127 35' 97 W	17	0	0.6	1.2	surface	1.0	0.3
								0.50	2.0	0.3
								1.00	2.8	0.3
34	Telkwa R wetland below Milk Creek, near pond outlet.	Mar 18	54 34' 32 N 127 35' 49 W	18	0	0.9	0.6	surface	0.1	2.5
								0.50	1.5	0.6
MORICE RIVER OFF-CHANNEL SITES										
35	Owen Creek, 100 m above bridge crossing.	Mar 14	54 12' 07 N 126 51' 24 W	1	0	1.1	0.2	0.15	0.1	12.5
36	Morice River, Bustard's pond at outlet channel.	Mar 14	54 12' 02 N 126 52' 19 W	2	0	0.5	0.15	0.10	1.0	0.5
37	Morice River, Bustard's pond at upper spur road.	Mar 14	54 12' 02 N 126 52' 23 W	3	0.1	0.7	0.2	0.25	0.5	7.0
								0.10	1.0	5.0
38	Morice River, Bustard's pond at upper end near inlet ck.	Mar 14	54 12' 03 N 126 52' 29 W	4	0.04	0.85	1.15	surface	0.1	8.8
								0.50	0.5	7.7
								1.00	0.9	6.5

Table 4. Dissolved Oxygen and Water Temperature Measurements at Selected Sites along the Morice River and Gosnell Creek.

SITE #	LOCATION	DATE	GPS	PHOTO #	SITE DESCRIPTION			DISSOLVED OXYGEN PROFILE		
					SNOW COVER	ICE COVER	WATER DEPTH	DEPTH (M)	TEMP (C)	D0 (PPM)
MORICE RIVER OFF-CHANNEL SITES (Con't)										
39	Morice River Km 33 sidechannel.	Mar 14	54 12' 03 N 126 52' 29 W	5	0	0.3 – two open pockets	0.25 est 20 cfs	0.20	0.1	12.7
40	Morice River Km 38.5 sidechannel.	Mar 14	54 11' 52 N 127 00' 17 W	6	0	0.3	0.15	0.10	0.8	1.7
41	Morice River backchannel at Km 45.5 (below road).	Mar 14	54 10' 47 N 127 06' 04 W	7	0	0.3 – 25% open water	0.25	0.20	3.4	1.2
42	Morice River backchannel at Km 45.5 (outlet channel).	Mar 14	54 10' 47 N 127 06' 04 W	8	0	clear	est 3 cfs	0.10	2.0	4.8
43	Morice River Km 55.5 sidechannel (upper end).	Mar 14	54 11' 11 N 127 10' 04 W	9	0	0.35	0.1	0.10	1.0	5.8
44	Morice River Km 55.5 sidechannel (lower end).	Mar 14	54 11' 11 N 127 10' 04 W	N/A	0	0.35	0.1	0.10	1.0	5.5
45	McBride Creek below Nanika FSR.	Mar 14	54 04' 19 N 127 23' 08 W	10	0	clear	est 10 cfs	0.30	1.0	11.2
46	McBride Creek at the Morice Lake confluence.	Mar 18	54 04' 19 N 127 23' 08 W	24	0	clear	est 10 cfs	0.15	1.0	10.2
GOSNELL CREEK										
47	Gosnell Creek seepage channel above Shea Creek. (Sampled upstream 100 m).	Mar 18	54 13' 38 N 127 30' 56 W	19	0.1	0.6	1	surface	0.1	2.6
								0.50	0.1	2.5
								1.00	0.1	2.3
48	Gosnell Creek seepage ch. (Sampled upstream 50 m).	Mar 18	54 13' 38 N 127 30' 56 W	N/A	0.1	1	0.2	surface	0.1	1.9
								0.20	0.1	1.9
49	Upper Gosnell Creek backchannel near outlet.	Mar 18	54 11' 46 N 127 38' 93 W	21	0	0.5	0.5	surface	2.0	8.4
								0.50	2.8	7.8
50	Upper Gosnell Creek backchannel near top end.	Mar 18	54 11' 46 N 127 38' 93 W	23	0	0.25	0.7	surface	2.5	8.6
								0.60	3.0	5.0

Table 5. Dissolved Oxygen and Water Temperature Measurements at Selected Sites along the Upper Zymoetz River.

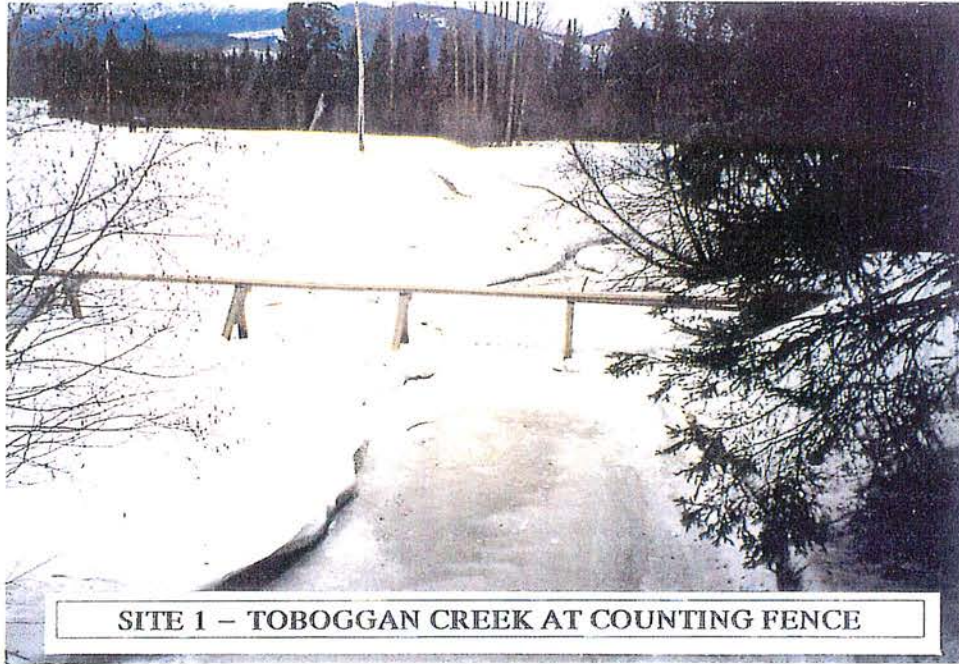
SITE #	LOCATION	DATE	GPS	PHOTO #	SITE DESCRIPTION			DISSOLVED OXYGEN PROFILE		
					DEPTH (M)			DEPTH (M)	TEMP (C)	D0 (PPM)
					SNOW COVER	ICE COVER	WATER DEPTH			
UPPER ZYMOETZ RIVER										
51	Upper Zymoetz River at Dennis Lake outlet bridge.	Mar 15	54 46' 12 N 127 27' 11 W	11	0	clear with shelf ice		0.30	1.0	9.0
52	Lower Hankin Creek bridge crossing.	Mar 15	54 47' 54 N 127 30' 12 W	12	0	0.35	0.2	0.15	0.1	12.9

APPENDIX 1. Miscellaneous Site Comments for Sample Locations 1 to 50.

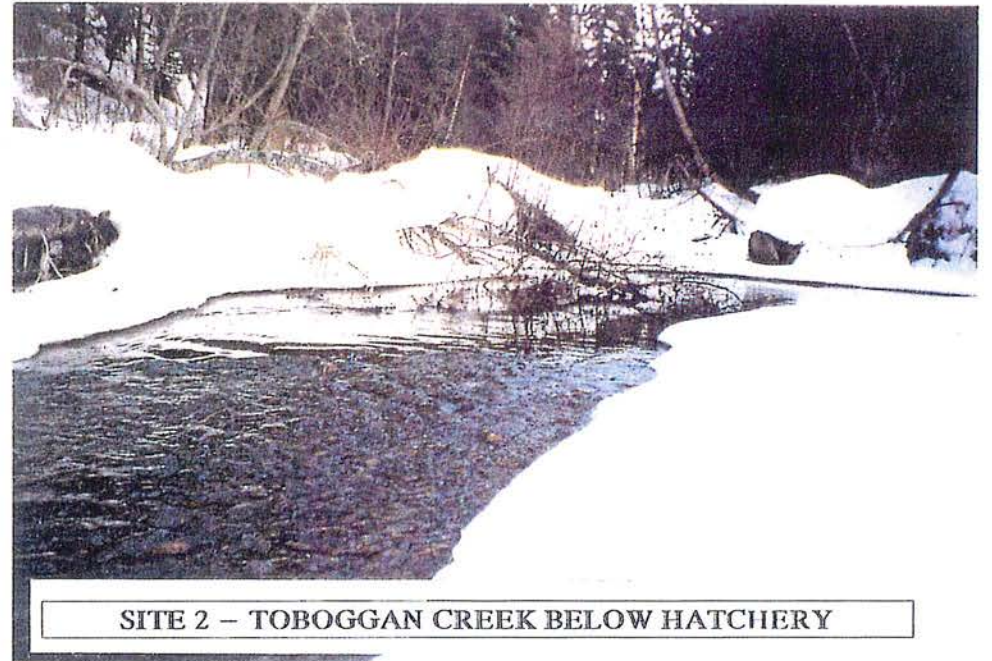
SITE #	LOCATION	COMMENTS
2	Toboggan Creek, 200 m below hatchery.	Sampled approximately 30 m downstream from the rearing channel outlet.
8	McQuarrie Creek between the highway and railway.	Some difficulty experienced in locating the channel due to thickness of ice.
9	Byman Creek 25 m above railway crossing.	Byman Creek was totally iced – over upstream along the highway.
10	Richfield Creek 75 m above railway crossing.	Accessed lower Richfield Creek through a private driveway.
13	Mainstem Telkwa River at Km 11.9 (near DFO ponds).	Telkwa River was only open in fast – running sections.
14	Eastern side of Telkwa River (lower end of seepage trib located at approx Km 8).	Accessed this site across Telkwa R on ice. Deep snow on ground. Could hear flowing water at tributary confluence with Telkwa River. Freshwater shrimp observed at ice hole.
15	Eastern side of Telkwa River (outlet of Km 8 upper pond)	No evidence of flowing water at the outlet of this upper pond (stagnant ?).
16	Telkwa River DFO ponds at approx Km 11. (Channel #1)	Surface mud from road – flowing directly into pond area! See Bustard (1995) for channel # location map – Report done for Greg Bonnell – DFO.
17	Telkwa River DFO ponds at approx Km 11. (Channel #4)	Melt has just started – must be careful on ice. Beavers active in this pond.
18	Telkwa River DFO ponds at approx Km 11. (Channel #5)	Small open area at top of this channel.
19	Telkwa River DFO ponds at approx Km 11. (Channel #6)	Smell of decomposition from ice hole.
21	Telkwa River DFO ponds at approx Km 11. (Channel 5a)	New site on PNG channel nearest to hillside. Some open water between this site and Site 5.
22	Telkwa River DFO ponds at approx Km 11. (Channel 5b)	New site on PNG channel nearest to Telkwa River. Clear in top 25 m of this channel.
23	Telkwa River DFO ponds at outlet culvert.	Appeared to be very little flow. Small oil slicks observed on water surface – likely originated from road surface.
24	Telkwa R – Km 19 wetland right side above road.	Difficult to locate main channel due to snow depth.
25	Telkwa R – Km 19 wetland mid – channel above road.	Suspect this reading is high due to shallow depth.

APPENDIX 1 (Cont'd). Miscellaneous Site Comments at Sample Locations 1 to 50.

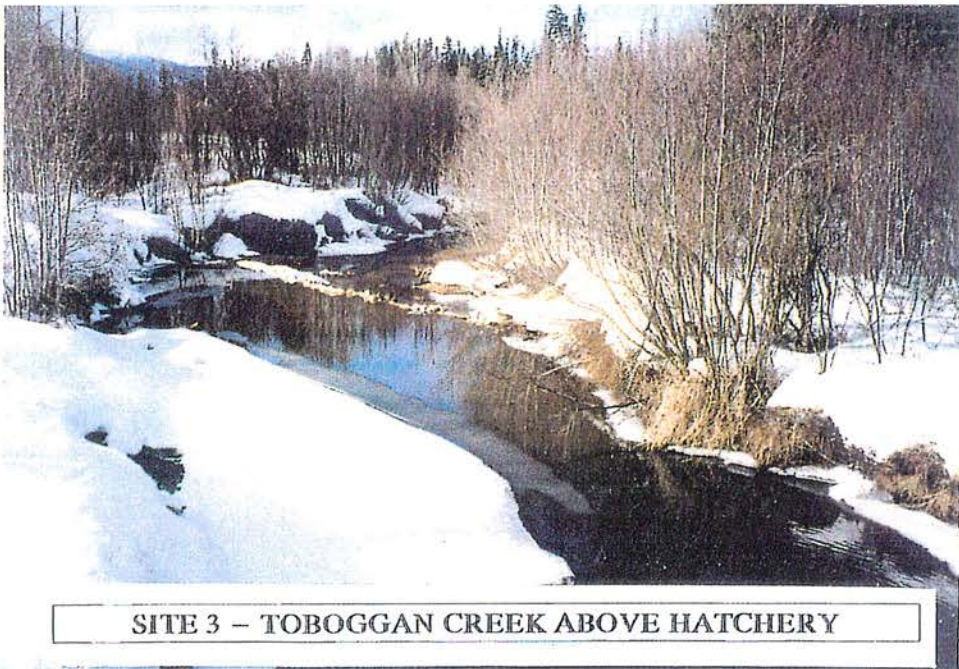
SITE #	LOCATION	COMMENT
26	Telkwa R – Km 19 wetland left side above road.	Suspect this reading is high due to the shallow water depth combined with mixing from the ice auger.
27	Telkwa River at Jonas Flat Pond 20 m below road.	Smell of decomposition from ice hole.
30	Telkwa R wetland at base of Elliot Ck, 250 m above outlet	This wetland is connected to the Telkwa with a 50 m long connector channel that has a small beaver dam. Telkwa River was ice-free throughout this upper reach.
33	Telkwa R wetland below Milk Creek, middle of pond.	Small pond on west side of Telkwa – 100 m to river.
35	Owen Creek, 100 m above bridge crossing.	Creek has flowed on surface of ice – caused very thick ice to form.
36	Morice River, Bustard's pond at outlet channel.	Smell of decomposition from ice hole.
39	Morice River Km 33 sidechannel.	Soft snow on hillside below road (must have snowshoes).
40	Morice River Km 38.5 sidechannel.	Appeared stagnant – river right channel was dewatered in upper open sections. Sampled the channel along road above the fork.
42	Morice River backchannel at Km 45.5 (outlet channel).	Could hear water running under ice at road culvert.
43	Morice River Km 55.5 sidechannel (upper end).	Sampled approx 100 m from road and upstream from boat launch. Difficult to find any other sidechannels.
45	McBride Creek below Nanika FSR.	Lake is still frozen over.
46	McBride Creek at the Morice Lake confluence.	Creek had sections iced over upstream.
47	Gosnell Creek seepage channel above Shea Creek. (Sampled upstream 100 m).	Sampled 100 m above the Gosnell – beaver dams present – assume accessible.
50	Upper Gosnell Creek backchannel near top end.	Clear of ice in upper section.



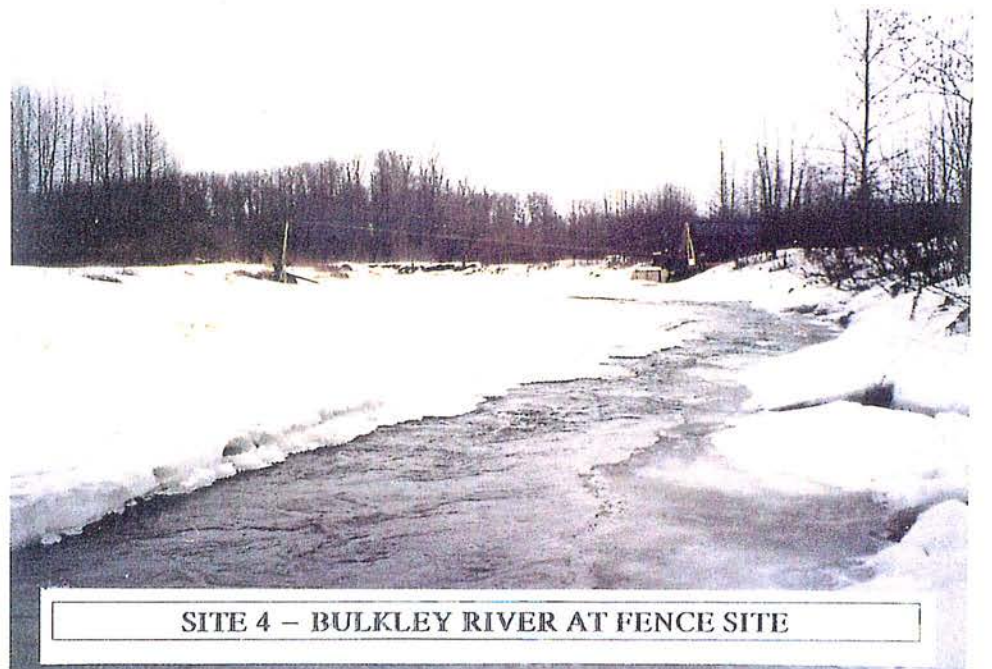
SITE 1 – TOBOGGAN CREEK AT COUNTING FENCE



SITE 2 – TOBOGGAN CREEK BELOW HATCHERY



SITE 3 – TOBOGGAN CREEK ABOVE HATCHERY



SITE 4 – BULKLEY RIVER AT FENCE SITE



SITE 5 – McKILLIGAN CREEK AT ROAD CROSSING



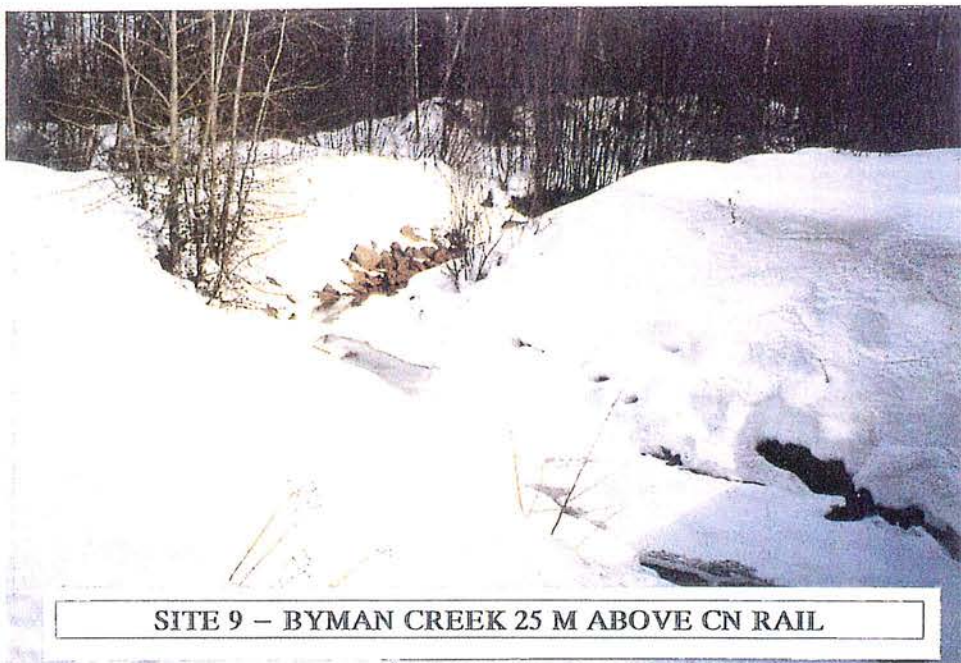
SITE 6 – BULKLEY RIVER AT DAY LAKE BRIDGE



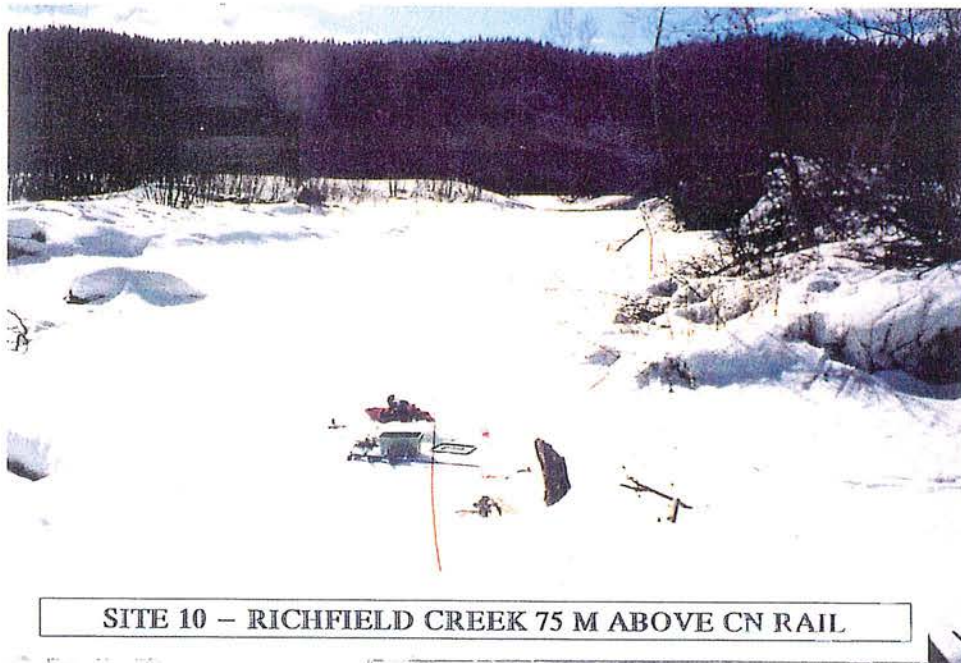
SITE 7 – BULKLEY RIVER BELOW LAKE



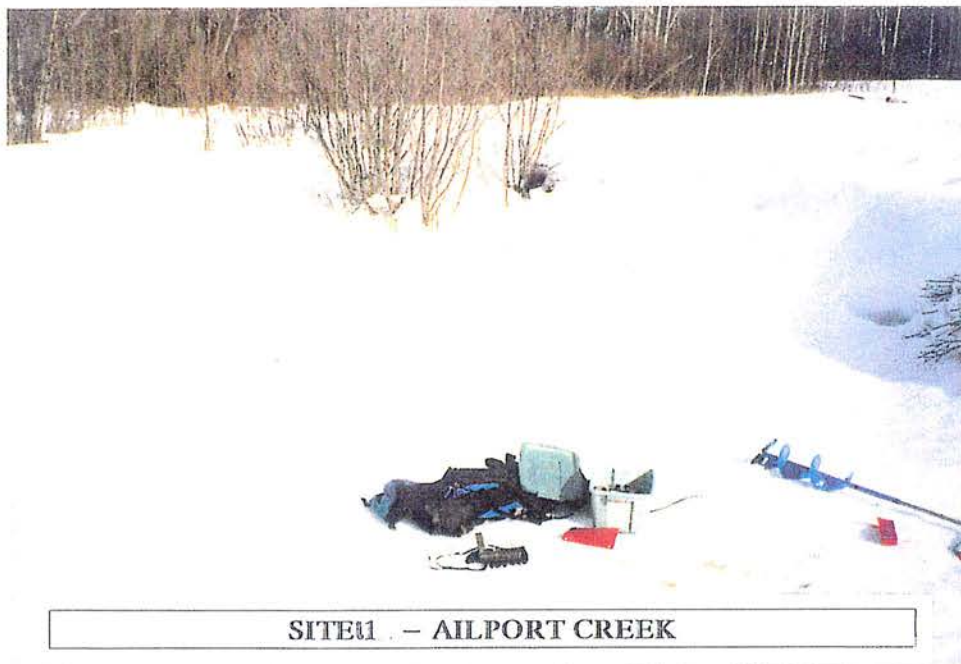
SITE 8 – McQUARRIE CREEK



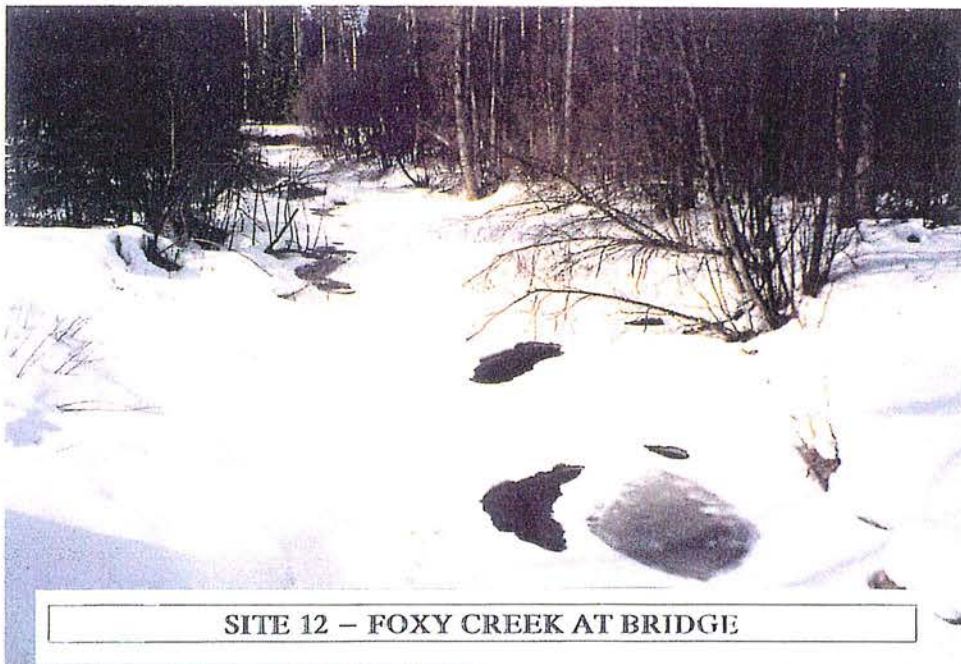
SITE 9 – BYMAN CREEK 25 M ABOVE CN RAIL



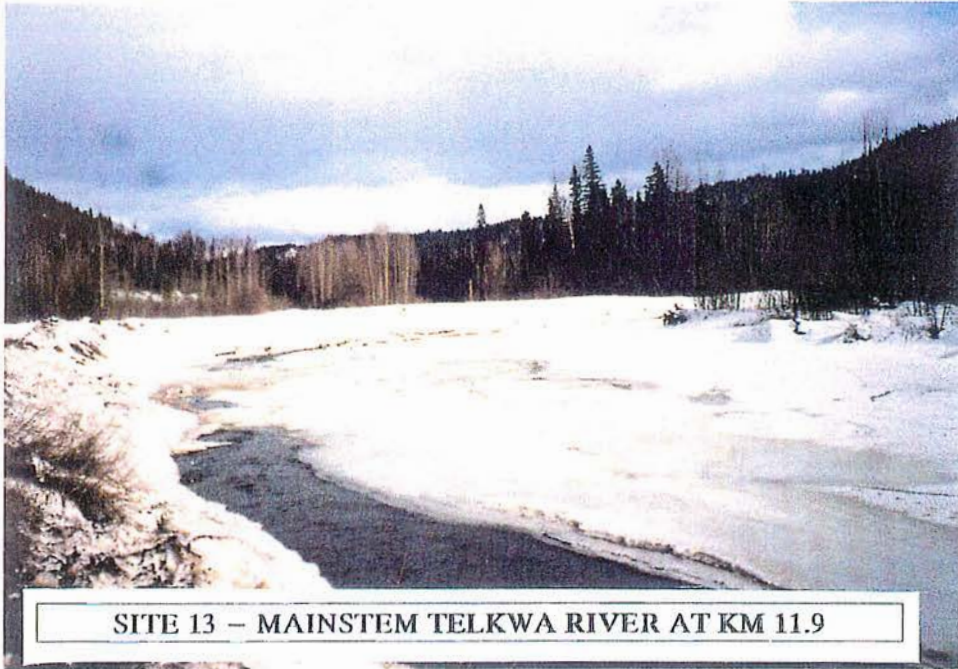
SITE 10 – RICHFIELD CREEK 75 M ABOVE CN RAIL



SITE 11 – AILPORT CREEK



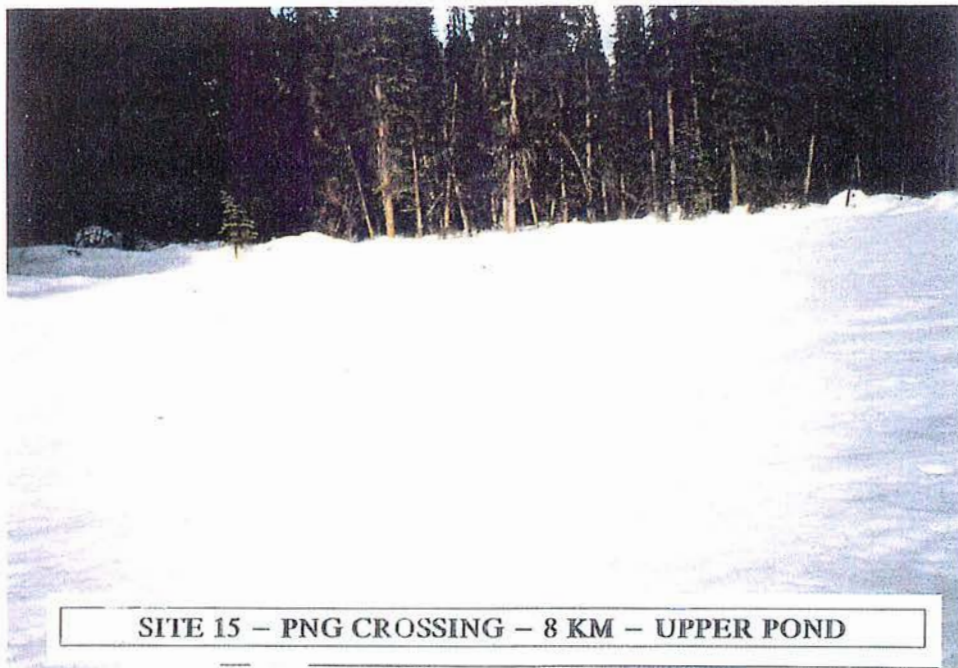
SITE 12 – FOXY CREEK AT BRIDGE



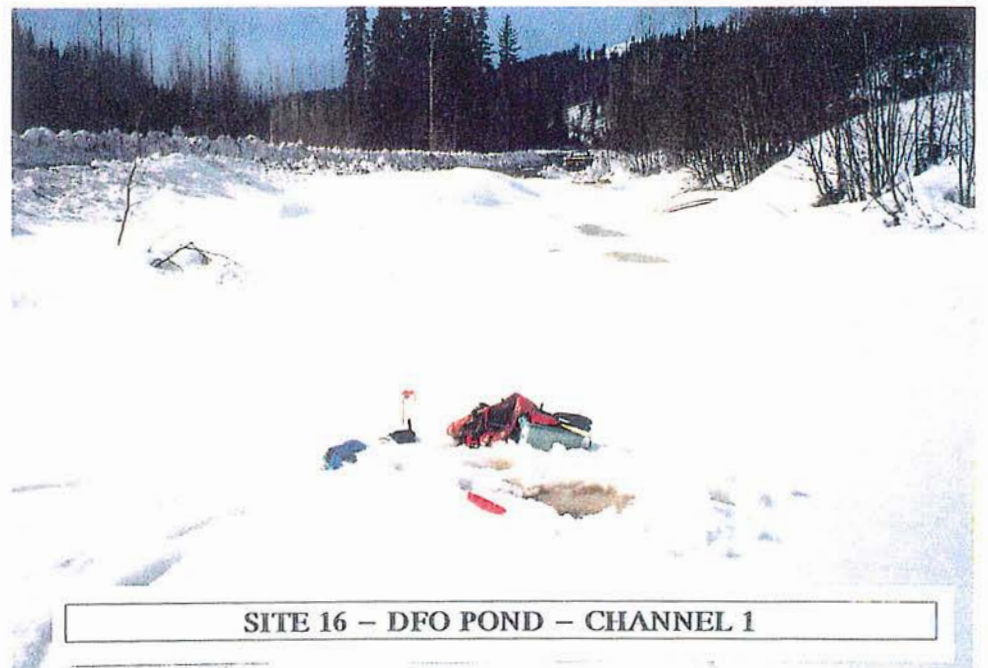
SITE 13 – MAINSTEM TELKWA RIVER AT KM 11.9



SITE 14 – OUTLET SEEPAGE AT PNG CROSSING – TELKWA



SITE 15 – PNG CROSSING – 8 KM – UPPER POND



SITE 16 – DFO POND – CHANNEL 1



SITE 17 – DFO POND – CHANNEL 4



SITE 18 – DFO POND – CHANNEL 5



SITE 19 – DFO POND – CHANNEL 6



SITE 20 – DFO POND – CHANNEL 7



SITE 21 – DFO POND – CHANNEL 5a



SITE 22 – DFO POND – CHANNEL 5b



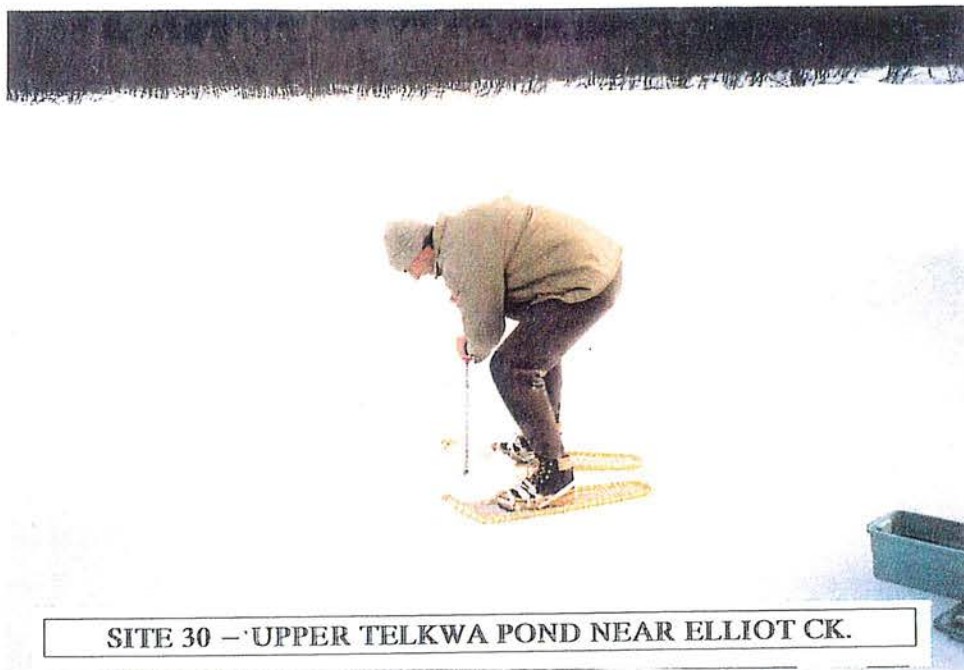
SITE 23 – DFO POND @ OUTLET CREEK



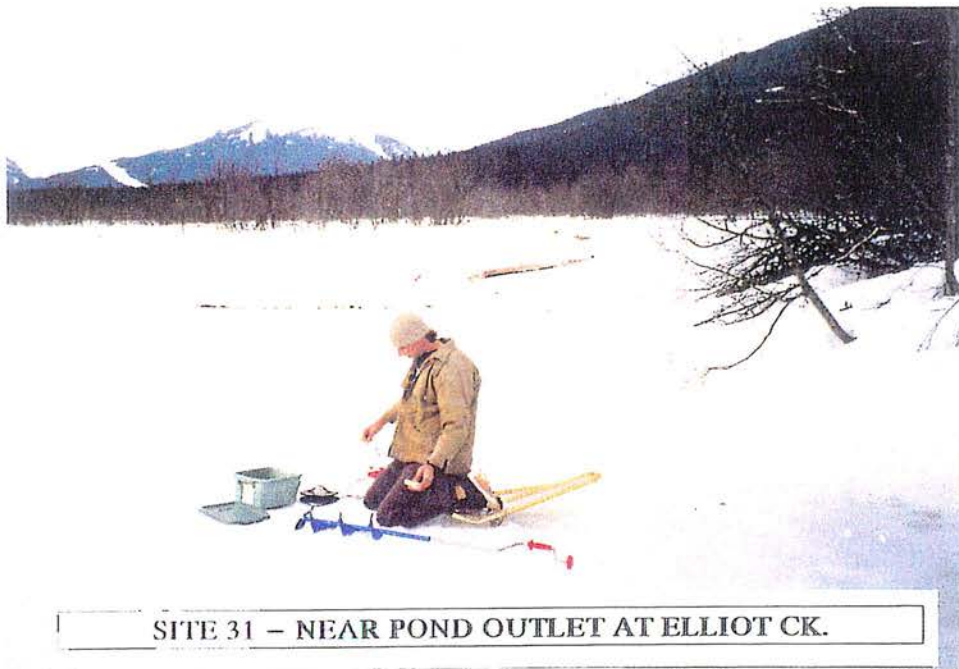
SITE 24 – KM 19 WETLAND



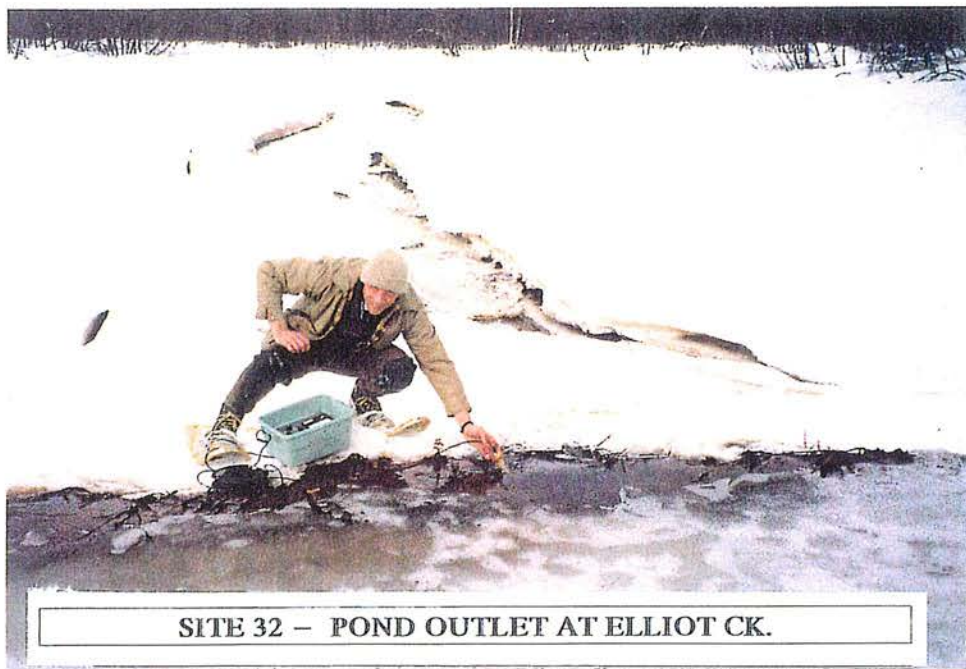
SITE 28 – JONAS POND



SITE 30 – UPPER TELKWA POND NEAR ELLIOT CK.



SITE 31 – NEAR POND OUTLET AT ELLIOT CK.



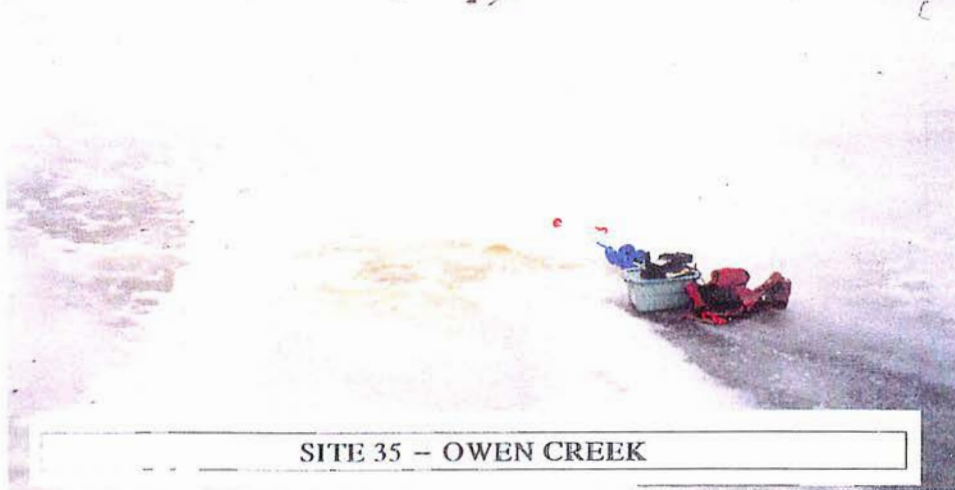
SITE 32 – POND OUTLET AT ELLIOT CK.



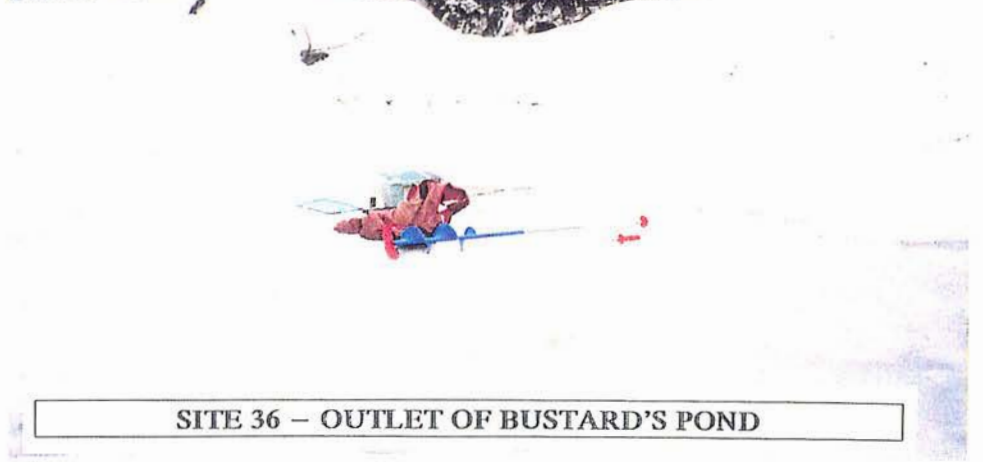
SITE 33 – TELKWA POND BELOW MILK CREEK



SITE 34 – TELKWA POND NEAR MILK CREEK



SITE 35 – OWEN CREEK



SITE 36 – OUTLET OF BUSTARD'S POND



SITE 37 - UPPER CROSSING - BUSTARD'S POND



SITE 38 - UPPER END TO BUSTARD'S POND



SITE 39 - KM 33 SIDETCHANNEL - MORICE



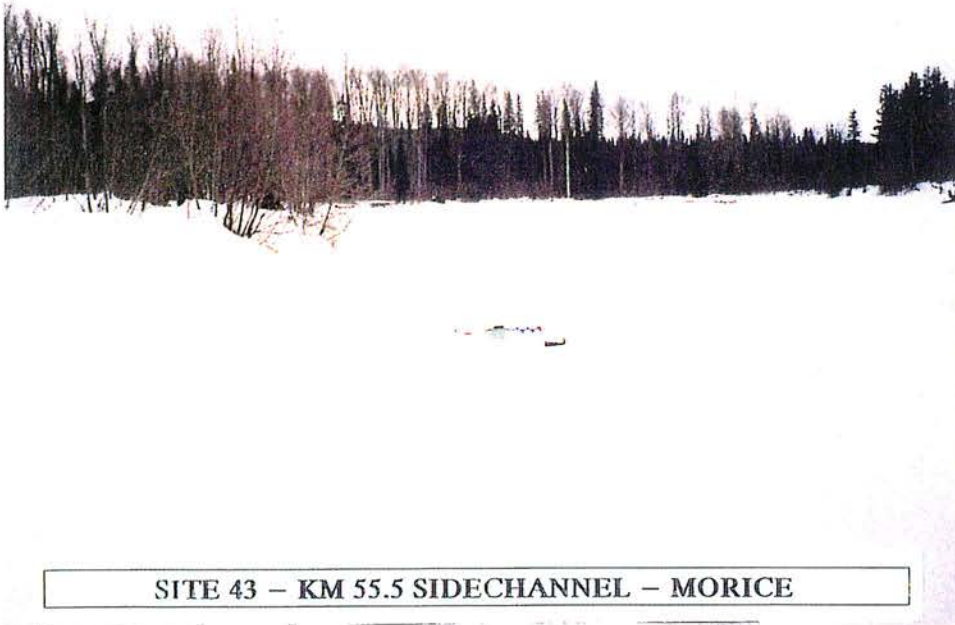
SITE 40 - KM 38.5 SIDETCHANNEL - MORICE



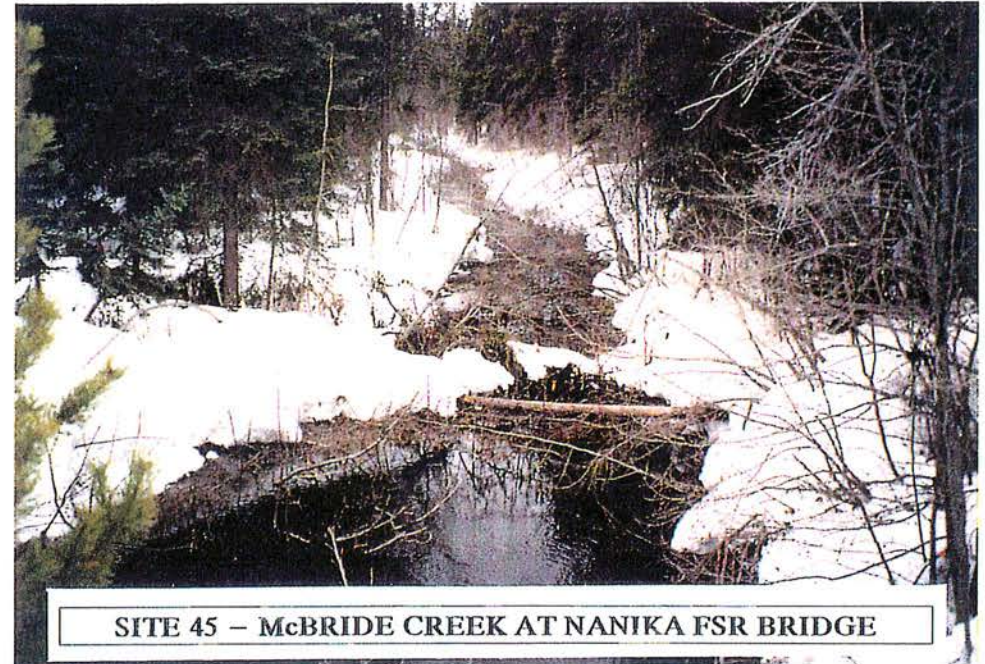
SITE 41 – KM 45.5 BELOW – MORICE



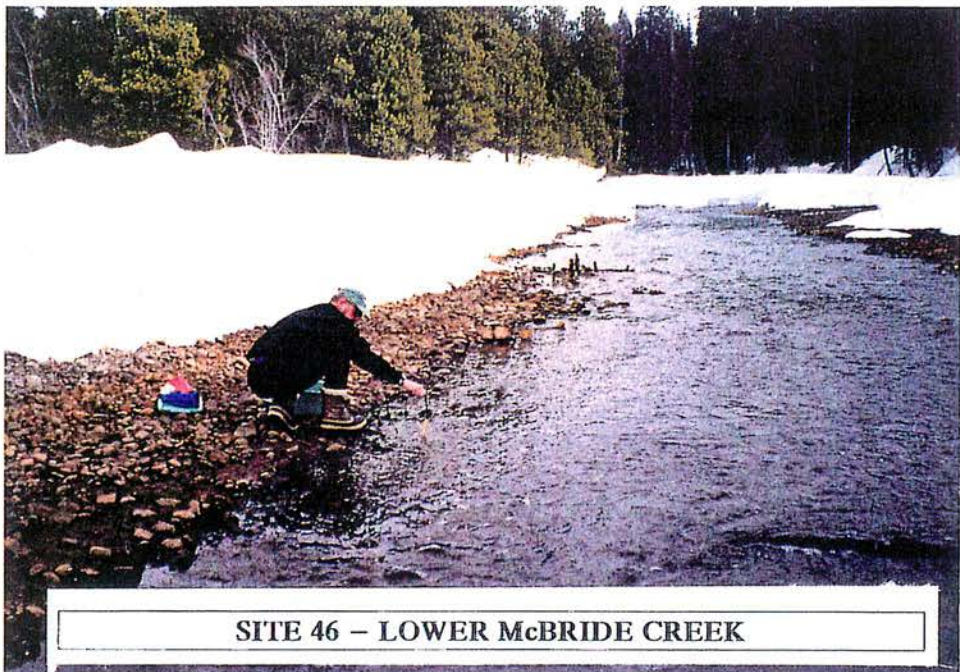
SITE 42 – KM 45.5 OUTLET CHANNEL – MORICE



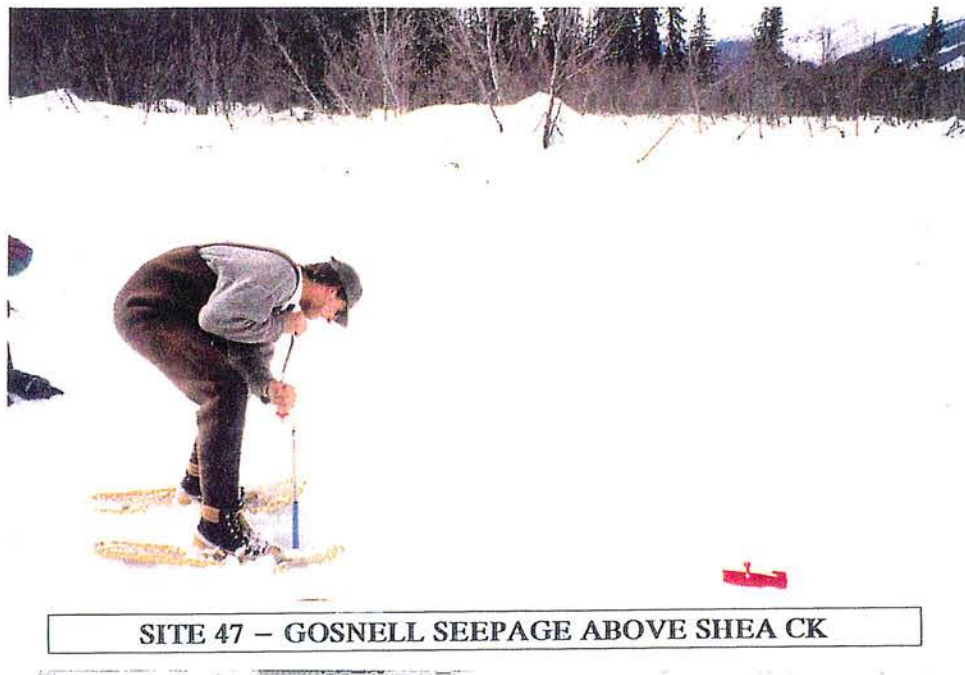
SITE 43 – KM 55.5 SIDETCHANNEL – MORICE



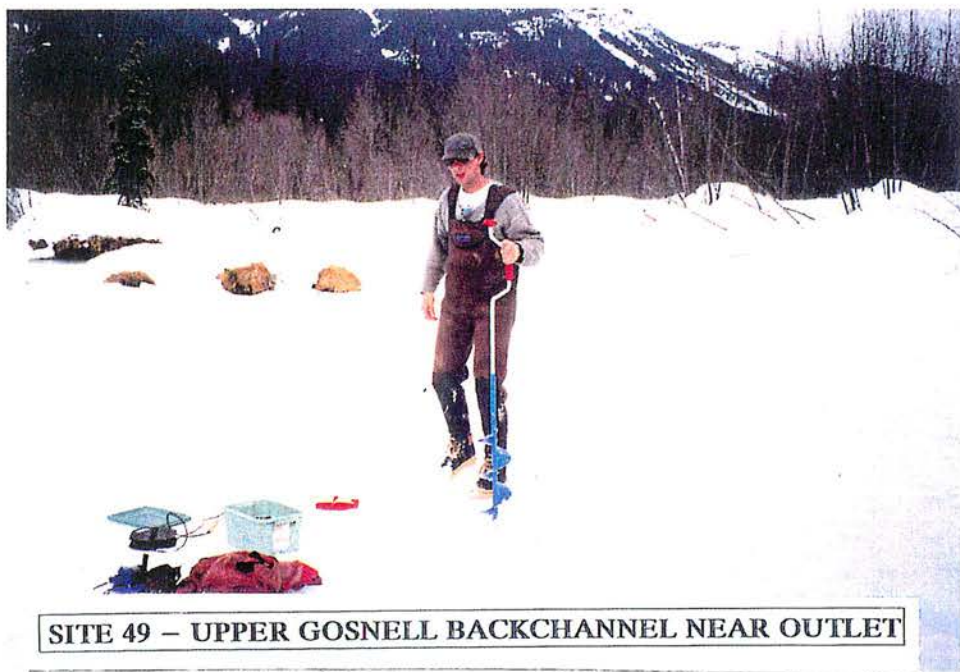
SITE 45 – McBRIDE CREEK AT NANIKA FSR BRIDGE



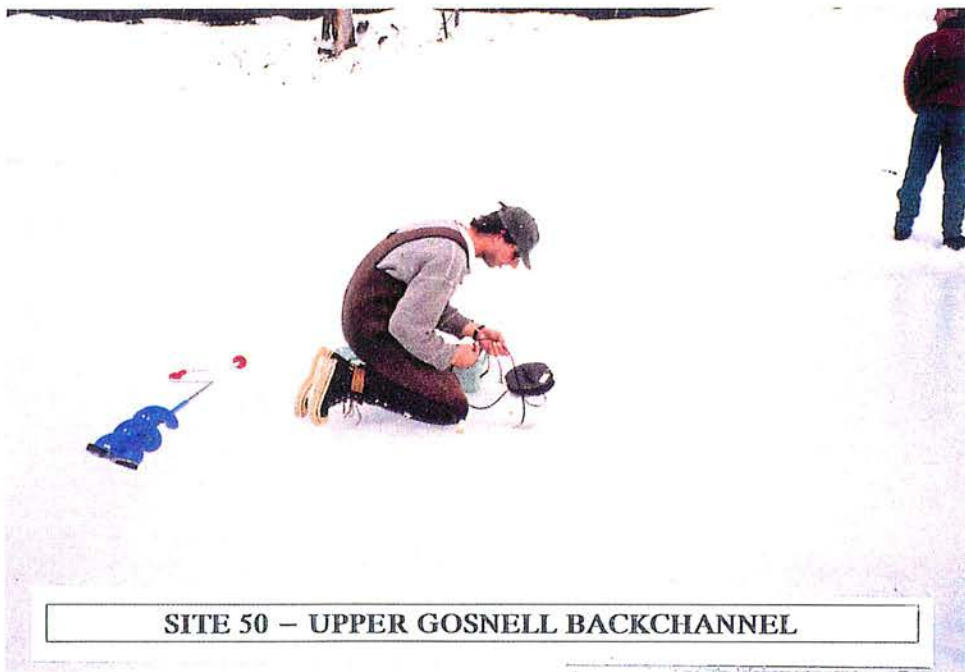
SITE 46 – LOWER McBRIDE CREEK



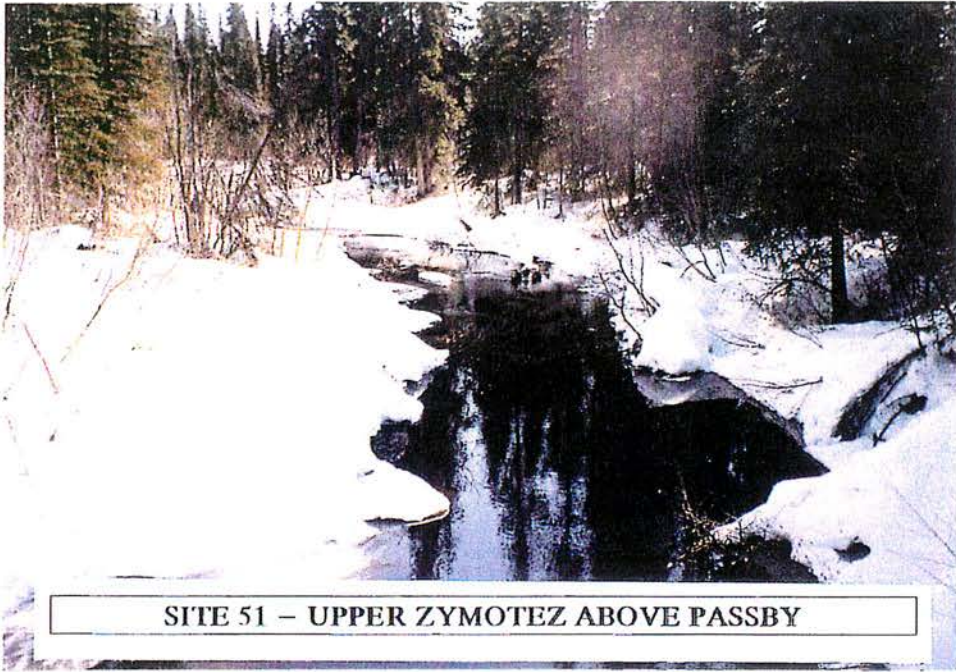
SITE 47 – GOSNELL SEEPAGE ABOVE SHEA CK



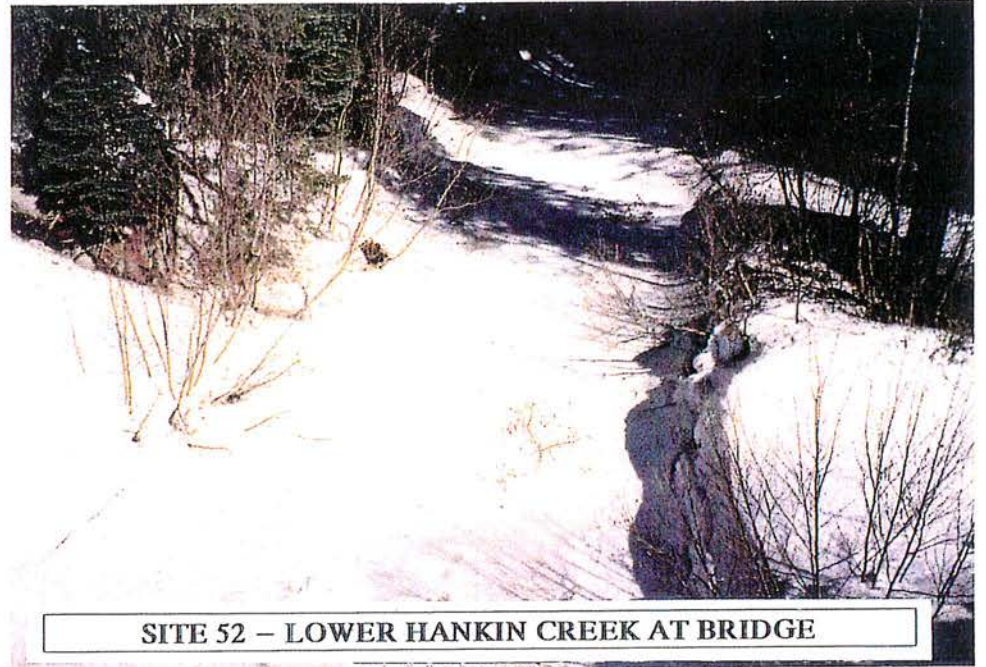
SITE 49 – UPPER GOSNELL BACKCHANNEL NEAR OUTLET



SITE 50 – UPPER GOSNELL BACKCHANNEL



SITE 51 – UPPER ZYMOTEZ ABOVE PASSBY



SITE 52 – LOWER HANKIN CREEK AT BRIDGE