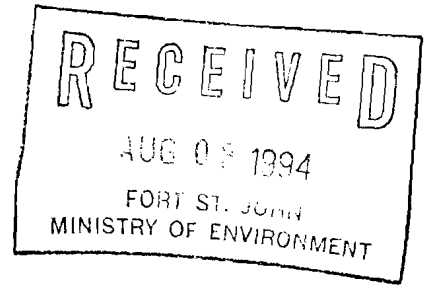


HAOSSS



**WESTCOAST ENERGY INC
FIREWEED OFFLOAD PIPELINE PROJECT**

FISHERIES HABITAT ASSESSMENT

JULY 1994

Prepared for:
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FORT ST. JOHN
ENVIRONMENTAL
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1.0 INTRODUCTION

Westcoast Energy Inc plans to expand its natural gas gathering system within the Beaton River watershed in northeastern British Columbia (Figure 1). The project will involve the construction of a 273.1 mm pipeline for the purpose of offloading natural gas between the existing Fireweed and Nig Creek pipeline systems.

This pre-impact habitat assessment was conducted on June 30, 1994 to identify and evaluate fish habitat along the proposed ROW associated with this project.

2.0 PROJECT AND SITE DESCRIPTION

The project is situated within the Blueberry River drainage and is located in the Sikanni-Beaton Plateau ecoregion. Within this ecoregion, the ROW lies entirely within the Boreal White and Black Spruce (BWBS) biogeoclimatic zone. Vegetative cover is mixed-wood forest comprised chiefly of trembling aspen and white spruce with scattered lodgepole pine and balsam poplar.

Local topography is dominated by a gently undulating plateau incised by the shallow valleys of Aitken Creek and North Aitken Creek.

The project involves the construction of approximately 9.1 kilometres of pipeline, commencing at an existing facility on the west bank of Aitken Creek (Figure 2). The ROW immediately crosses Aitken Creek, heads northeast to cross North Aitken Creek at its approximate mid-point, then crosses an unnamed tributary of North Aitken Creek near the east-end tie-in.

3.0 FISHERIES VALUES

Significant fisheries values were found to occur in both Aitken Creek and North Aitken Creek. The unnamed tributary of North Aitken Creek was considered to contain no fisheries values in the area of the proposed crossing.

3.1 AITKEN CREEK

3.1.1 METHODS

Aitken Creek was evaluated to determine the possible impacts of pipeline construction on fish and their habitat. This evaluation included an inventory of fish species present and an assessment of fish habitat and related biophysical environment.

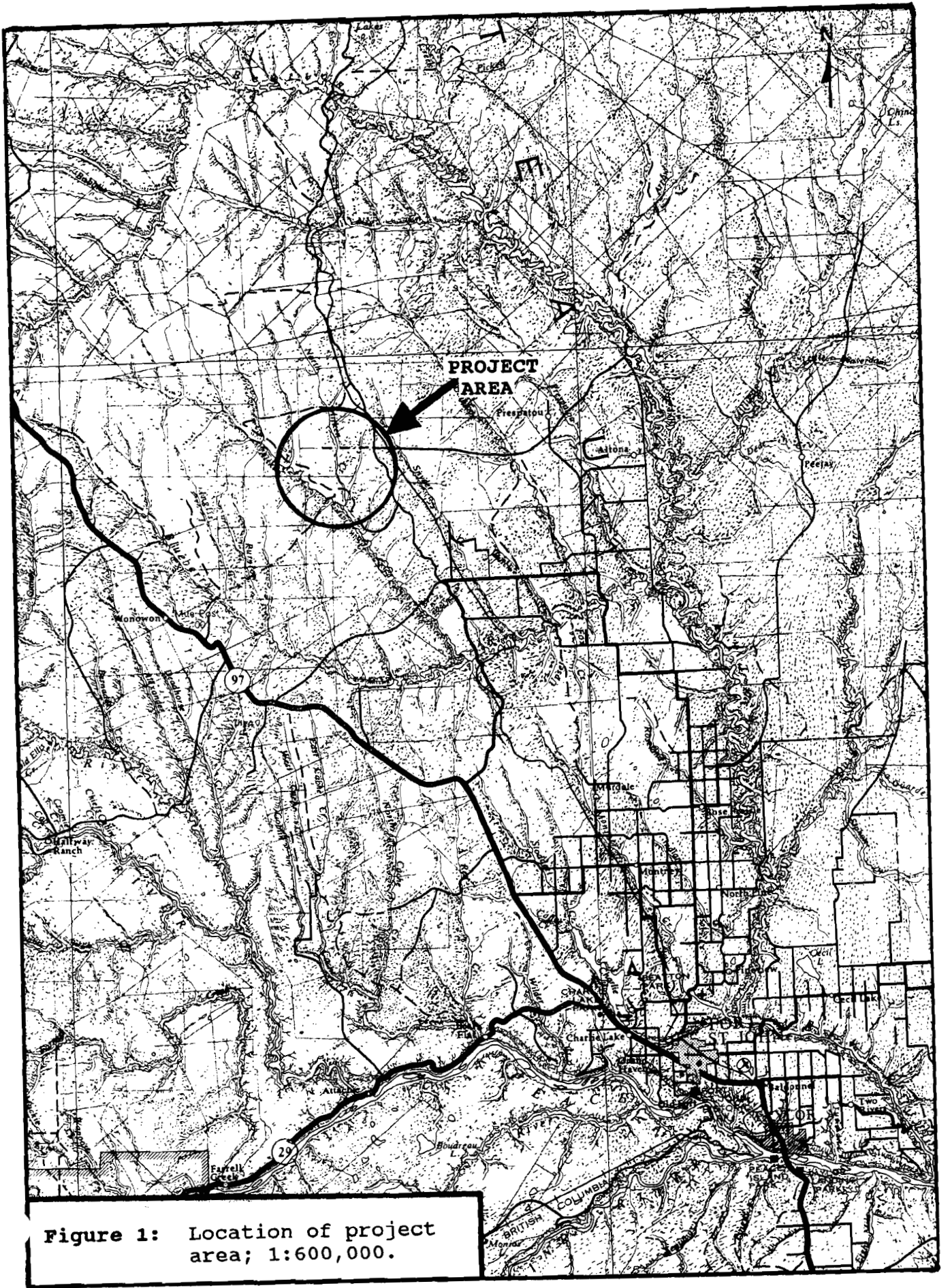


Figure 1: Location of project area; 1:600,000.

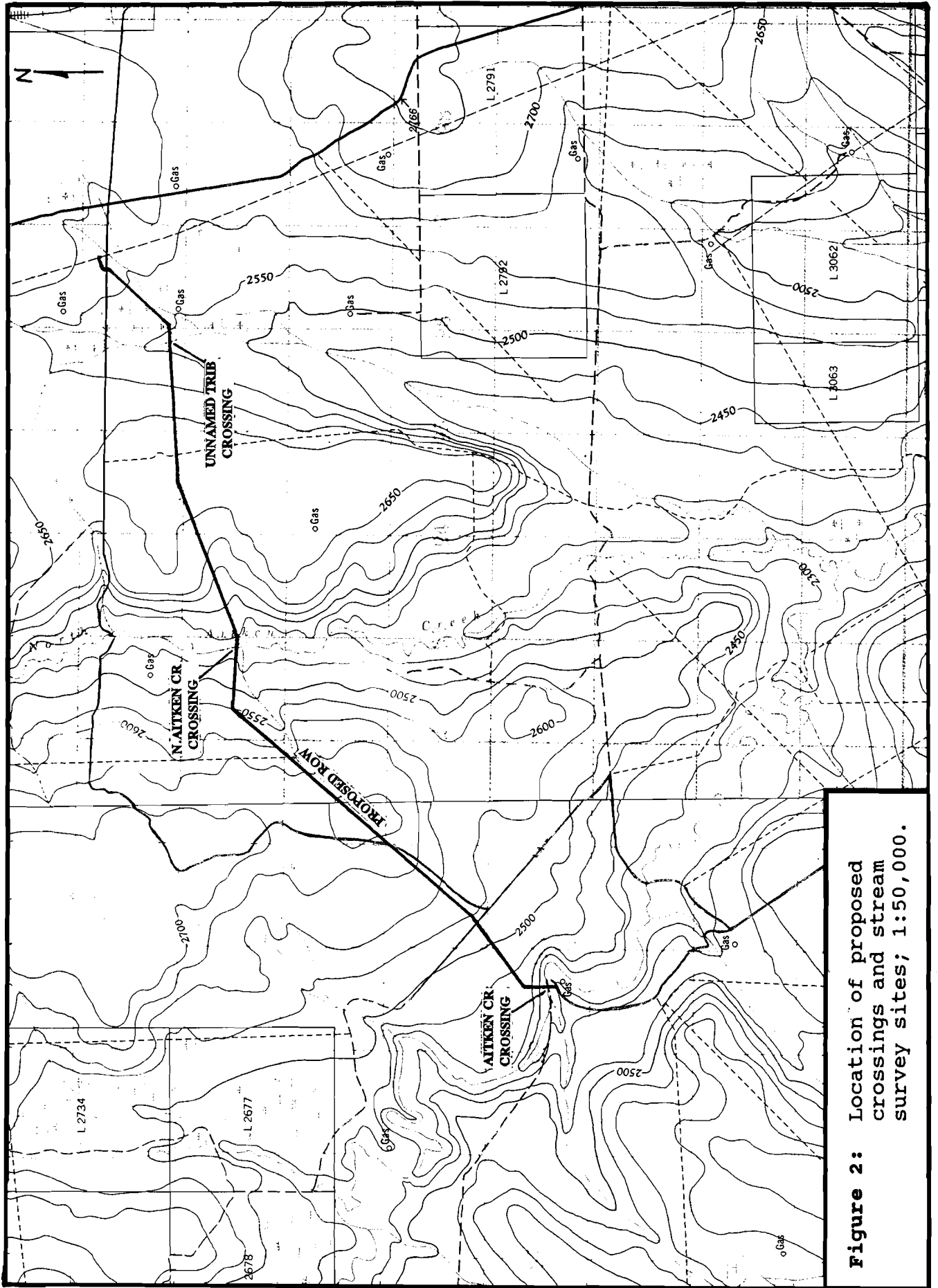


Figure 2: Location of proposed crossings and stream survey sites; 1:50,000.

Three 100 metre sections of Aitken Creek were evaluated, as per B.C. Environment's Appendix "A", *Pre-Impact Assessment For Small Stream Crossings, Sampling Protocol And Mandatory Reporting* (Appendix I). Sample section 1 lay immediately upstream of the crossing, section 2 lay immediately downstream and section 3 began 500 metres downstream.

All fisheries habitat work was conducted to the standards described in the *Fish Habitat Inventory and Information Program* (DFO & BCMOE, 1989). This included a photographic record of the sample sites. A fish species inventory was undertaken using a Coffelt gas-generator electro-fisher.

3.1 AITKEN CREEK

3.1.2 RESULTS

3.1.2.1 Biophysical Inventory

The proposed crossing of Aitken Creek is located approximately 34 kilometres upstream of its confluence with the Blueberry River.

The stream, in the area of the crossing, winds relatively unconfined within a narrow, shallow valley. Riparian vegetation in the vicinity of the proposed crossing includes trembling aspen, white spruce, willow, alder, shepherdia, rose, horsetail and grasses.

The channel is contained by banks up to 2.0 metres in height. At the time of this assessment the flow stage was low to moderate. Average wetted width was 11 metres. Flood sign was observed an additional 2.1 metres above the water surface.

The stream consists of low gradient pool/riffle habitat with a very low proportion of riffles. The substrate is comprised of approximately 50% silt and fines and 50% gravel and cobble (Appendix II).

Stream banks were composed of fine materials and were subject to variable sloughing throughout. Turbidity was moderate to high due to suspended silt. Discharge was measured at approximately .27 m³/sec. Water temperature at the time of the assessment was 13.5 degrees Celsius.

The three sample sections assessed were considered to be representative of the middle reaches of the stream.

3.1.2.2 Species Inventory

125 fish, representing eight species, were captured in the three sample sections on Aitken Creek. Lake chub were the most abundant followed by white sucker, troutperch, redbreast shiner, longnose sucker, longnose dace, prickly sculpin and northern pike.

3.1.3 DISCUSSION

Aitken Creek, in the area of the proposed crossing, was found to support a relatively high diversity of fish species. The habitat type is particularly suited to most of the species present.

A single adult northern pike, in poor condition, was the only representative of a "sportfish" species captured. No juvenile pike were found nor have any been recorded during past sampling in Aitken Creek or the upper Blueberry River (FISS 1994).

The only other "sportfish" species known to exist in the upper Blueberry River system is Arctic grayling. However, their distribution and numbers are thought to be limited. Rearing juvenile grayling were found in Inglis Creek during October 1993 (D.E.S. 1993). Inglis Creek is a small tributary of the Blueberry River. It is characterized by large granular substrate, relatively low turbidity and moderate gradient, and is located approximately 36 kilometres upstream of the Aitken/Blueberry confluence.

By contrast, Aitken Creek contains little habitat suited to Arctic grayling. High suspended solid loads (extreme during high flows), low proportion of granular substrates, lack of riffle/run habitat and high summer temperatures likely restrict potential for all salmonid species including Arctic grayling.

The proposed crossing is located at the base of the shallow riffle area of large granular substrate. A deep, slow, extended pool area lies immediately downstream. This downstream area contains substrate comprised mainly of fines and will act as a silt trap to minimized the downstream effects of instream disturbance.

3.2 NORTH AITKEN CREEK

3.2.1 METHODS

Methods employed at North Aitken Creek were identical to those described for Aitken Creek.

3.2.2 RESULTS

3.2.2.1 Biophysical Inventory

The proposed crossing of North Aitken Creek is located approximately 6.5 kilometres upstream of its confluence with Aitken Creek.

As with Aitken Creek, the stream winds relatively unconfined within a shallow valley. Riparian vegetation includes trembling aspen, white spruce, willow, bog birch, creamy peavine and grasses. The channel is contained by banks up to 2.4 metres in height. At the time of this assessment the flow stage was low to moderate. Average wetted width was 4.5 metres. Flood sign was observed an additional 1.8 metres above the present water surface.

The stream consists of low gradient pool/riffle habitat. The proportion of riffle habitat is higher than in Aitken Creek (30%) but pools still dominate (70%). The substrate is comprised of approximately 20% silt and fines and 80% gravel, cobble and boulder (Appendix III).

Stream banks were composed of fine materials and were subject to variable sloughing throughout. Turbidity was moderate to high due to suspended silt. Discharge was measured at approximately .10 m³/sec, just over half that of Aitken Creek. Water temperature at the time of the assessment was 16 degrees Celsius.

The three sample sections assessed were considered to be representative of the middle reaches of the stream.

3.2.2.2 Species Inventory

100 fish, representing five species, were captured in the three sample sections on Aitken Creek. Lake chub were the most abundant followed by white sucker, longnose sucker, longnose dace and troutperch.

3.2.3 DISCUSSION

North Aitken Creek, in the area of the proposed crossing, supports a typical diversity of cyprinid and catostomid species.

Its suitability to salmonid species, such as arctic grayling, is slightly higher than Aitken Creek, due to the larger proportion of granular substrate and riffle habitat, in addition to better instream cover. However, its potential as grayling habitat is still restricted by high suspended silt loads, high summer water temperatures and the general unsuitability of the downstream system.

The proposed crossing is situated on a narrow, shallow pool area bordered by short riffles and would lend itself to a block and pump procedure.

3.3 UNNAMED TRIBUTARY TO NORTH AITKEN CREEK

The unnamed tributary of North Aitken Creek, located near the east end of the project, was considered to have no fisheries values in the vicinity of the proposed crossing.

The crossing is located at the site of a drained beaver pond slightly upstream of a large washed-out beaver dam. The channel, both upstream and downstream, is comprised almost entirely of fines and organic material and is, in places, barely definable amid bog birch, willow and sedges.

Flow appears to be seasonally intermittent and at the time of this assessment was estimated at 0.0013 m³/sec.

Beaver activity and associated channel barriers are common.

Routine electro-fishing resulted in no fish being captured.

4.0 RECOMMENDATIONS

If instream work on Aitken Creek and North Aitken Creek can be completed at current low to moderate flow rates using block and pump or fluming procedures, there would appear to be no significant advantage in delaying construction until the July 15 instream window.

The unnamed tributary to North Aitken Creek contains no fisheries values in the vicinity of the proposed crossing. However, measures may be necessary to restrict downstream siltation into North Aitken Creek depending on flow rates at the time of the crossing.

REFERENCES

Fisheries Inventory Summary System (FISS). Updated March 1994.
Environment Canada Fisheries & Oceans and B.C. Environment
Fisheries Branch.

Diversified Environmental Services. 1993. Excel Energy Inc. Birch
Oil Sales Pipeline Pre-Impact Fisheries Habitat Assessment.
Fort St. John, B.C. 39 pp.

Appendix I:

Appendix "A"
Pre-impact Assessment For Small Stream Crossings
Sampling Protocol and Mandatory Reporting
B.C. Environment

APPENDIX 'A'

PRE-IMPACT ASSESSMENT FOR SMALL STREAM CROSSINGS. SAMPLING PROTOCOL AND MANDATORY REPORTING.

All fisheries habitat survey work must be conducted to the standards described in the "Fish Habitat Inventory & Information Program" (D.F.O. & B.C.M.O.E., 1989). Copies of the guide and the appropriate forms to be used are available c/o the MOE Fisheries Branch, Inventory and Data Systems Unit, 780 Blanshard St., Victoria B.C., V8V 1X5.

For proposed stream crossings requiring a pre-impact assessment, a habitat survey will be conducted for at least 100m upstream and 100m downstream of the proposed crossing site. An additional 100m section of river will be surveyed approximately 500m downstream the proposed crossing site. Fish presence and abundance will be assessed for each of the sections of river surveyed using appropriate techniques (usually some combination of electrofishing, seining and angling).

Every effort should be made to maintain captured fish alive and in good condition so that they can be released back into the waters from which they were captured. All fish captured should be identified to species and the total number of each species captured will be recorded. All individuals of sport species should be measured (fork length) to the nearest mm and a non-lethal aging structure should be collected (scales from all species other than Percids from which dorsal spines should be collected). Anaesthetics may be used to quiet fish prior to sampling but fish should be fully recovered before being released into the wild. The following information will be recorded for individuals that die incidentally during capture or handling: weight; sex; maturity; stomach contents; parasites or other lesions. Otoliths should be removed and saved from any char that die. If fish ages are not specifically required for the study in question then aging structures will be included with all the relevant data as part of the final report.

For non-sport species the total number captured and the range of fork lengths for each species will be recorded. A representative sample of each non-sports species (up to 20 individuals representing the full size range captured with the exception that suckers and squawfish longer than 15 cm need not be kept) should be fixed in 10% formalin and delivered to the Regional Fisheries Biologist in Fort St. John.

The final report must include the following information as a minimum:

- a map (1:50,000 scale or less) showing the precise location of all sampling sites;
- a completed Stream Survey Card for each sample location;
- a photographic record with at least one upstream and one downstream shot at each sample location;
- all fish data collected, summarized in tabular form;
- techniques, effort (eg. electroshocking seconds), and area sampled (square meters) for each sample location;
- problems encountered that might influence the results;
- a summary of the major habitat components and the fisheries potential for the stream surveyed, comments indicating how typical the surveyed area was relative to the stream as a whole;
- an assessment of the probable impacts as a result of the planned in-stream activities.

Appendix II:

Aitken Creek
Stream Survey Forms,
Site Photographs and
Fish Data Sheets

**DFO / MOE
STREAM SURVEY FORM**

Stream Name (gaz.) AITKEN CREEK (local)		Access V2	Method
Watershed Code 2,3,3,2,6,1,3,3,5,6		Reach No.	Length(km)
Location FROM PROPOSED CROSSING		Map# 94A/13	Site No. 1
UPSTREAM FOR 100 M.		UT.M. 10,5894,63033	Lthsurv(m) 100
Date YMD 9/4/06	Time 09:50	Agency DES	Crew KN/BC/
Fish Card Y (N) C		Field <input checked="" type="checkbox"/>	Hist. <input type="checkbox"/>
Date YMD 9/4/06		Time 09:50	Agency DES
Crew KN/BC/		Photos	Air Photos

PARAMETER	VALUE	METH.	SPECIFIC DATA				OBSTRUCTIONS									
Ave.Chan.Width (m)	12.0	RF					C	Ht(m)	Type	Loc'n						
Ave.Wet.Width (m)	11.8	RF														
Ave.Max.Riffle Depth (cm)	20	T														
Ave.Max.Pool Depth (cm)	65	T														
Gradient %	1.0	CL														
% Pool	90	Riffle	10	Run	Other											
Side Chan.%	0	0-10	10-40	>40												
Debris Area%	0	0-5	5-15	>15												
Stable %	70	GE														
COVER: Total %	100	GE														
Comp sum 100%	60	Dp Pool	10	L.O.D	10	Boulder	10	In Veg	10	Over Veg	10	Cutbank				
Crown Closure %	0	C	Aspect	E												
DISCHARGE			BED MATERIAL				BANKS									
Parameter	Value	Method														
Wetted Width (m)			Fines	clay,silt,sand (<2mm)	20	20	Height(m)	1.7	%Unstable	50						
Mean Depth (m)			Gravels	small (2-16mm)	30	10	Texture	F	G	L	R					
Mean Velocity (m/s)				large (16-64mm)	50	20	Confinement				EN	CO	F	OC	UC	N/A
Discharge (m ³ /s)	0.27			sm.cobble (64-128mm)	10	20	Valley: Channel Ratio				0-2	2-5	5-10	10+	N/A	
				lge.cobble (128-256mm)	0	0	Stage				Dry	L	M	H	Flood	
				boulder (>256mm)	0	0	Flood Signs Ht(m)				2.1	Braided	Y	N		
				Bedrock (R)	0	0	Bars (%)				10	pH		O ₂ (ppm)		
				D ₉₀ (cm)	35	C	Water Temp (°C)				13.5	Turb.(cm)	15	Cond.(25°C)		
				Compaction	L	M	REACH SYMBOL (Fish)									
							Width,Valley,Channel,Slope)									
							(Bed Material)									

FISH SUMMARY						STREAM/VALLEY CROSS-SECTION (Looking Downstream)	
C	Species	No.	Size Range(mm)	Life Phase	Use	Method/Ref.	<input checked="" type="checkbox"/>
3	LKC	25	34-77				<input type="checkbox"/>
	RSC	4	69-76				
	WSU	7	66-388				
	TP	7	55-66				
	LSU	3	75-115				
	CAS	1	75				
PLANIMETRIC VIEW							
COMMENTS							
CX	Channel Stability <input type="checkbox"/> ; Debris <input type="checkbox"/> ; Management Concerns <input type="checkbox"/> ; Obstructions <input type="checkbox"/> ; Riparian Zone <input checked="" type="checkbox"/> ; Valley Wall Processes <input type="checkbox"/> ; Etc.						
C1	VERY HIGH SUSPENDED SILT LOAD PROVIDING MOST OF THE COVER.						
C2	FLOW DETERMINED IN SITE 2.						
C3	ELECTROSHOCKING SECONDS: 798. AVERAGE SAMPLE LENGTHS IN MM: LKC-58, RSC-73, WSU- , TP-59, LSU-						
C4	RIPARIAN ZONE: MATURE AND IMMATURE WHITE SPRUCE, ALDER, WILLOW, ROSE, HORSETAIL, FIREWEED, POPLAR, CREAMY PEAVINE.						
	Edited by: KN						Date YMD: 9/4/06

Stream Survey Form - Aitken Creek
Site 1; above proposed crossing.



Aitken Creek - Site 1
View upstream; upper half of site.



Aitken Creek - Site 1
View upstream; lower half of site.

STREAM NAME Aitken Creek

LOCATION From proposed crossing, upstream for 100 m.

DATE June 30 / 94 SITE NO. 1 UTM 10.5894.63033

ELECTROSHOCKING SECONDS 798 AREA SAMPLED 1180 m2

NO	SP	LENGTH (mm)	COMMENTS	NO	SP	LENGTH (mm)	COMMENTS
1	LKC	64		26	RSC	76	
2	"	77		27	"	74	
3	"	44		28	"	72	
4	"	50		29	"	69	
5	"	64		30	WSU	67	
6	"	52		31	"	66	
7	"	58		32	"	90	
8	"	34		33	"	87	
9	"	64		34	"	76	
10	"	36		35	"	348	
11	"	35		36	"	388	
12	"	64		37	LSU	83	
13	"	61		38	"	75	
14	"	72		39	"	115	
15	"	58		40	TP	60	
16	"	68		41	"	55	
17	"	66		42	"	57	
18	"	61		43	"	66	
19	"	77		44	"	56	
20	"	48		45	"	57	
21	"	67		46	"	61	
22	"	55		47	CAS	75	
23	"	63		48			
24	"	62		49			
25	"	60		50			

**DFO / MOE
STREAM SURVEY FORM**

Stream Name (gaz.) <u>Aitken Creek</u> (local)		Access <u>V2</u> Method	
Watershed Code <u>2.33.2.1.13.3.56</u>		Reach No.	Length(km)
Location <u>FROM PROPOSED CROSSING</u>		Map# <u>94A/13</u>	Site No. <u>2</u> Lthsurv(m) <u>100</u> RF
<u>DOWNSTREAM FOR 100 M.</u>		U.T.M. <u>10.5896.63034</u>	Fish Card <u>Y</u> <u>(N)</u> <u>(C)</u> Field <input checked="" type="checkbox"/> Hist. <input type="checkbox"/>
Date YMD <u>9.4.06.30</u>	Time <u>1050</u>	Agency <u>DES</u>	Crew <u>KN/EL</u> Photos Air Photos
C	PARAMETER	VALUE	METH.
	Ave.Chan.Width (m)	<u>11.0</u>	<u>RF</u>
	Ave.Wet.Width (m)	<u>11.0</u>	<u>RF</u>
	Ave.Max.Riffle Depth (cm)	<u>20</u>	<u>T</u>
	Ave.Max.Pool Depth (cm)	<u>75</u>	<u>T</u>
	Gradient %	<u>0.5</u>	<u>CL</u>
	%Pool <u>90</u> Riffle <u>10</u> Run Other		<u>GE</u>
	Side Chan.%	<u>0</u> <input checked="" type="checkbox"/> 0-10 <input type="checkbox"/> 10-40 <input type="checkbox"/> >40	<u>GE</u>
	Debris Area% <u>0</u> Stable % <u>80</u>	<u>0</u> <input type="checkbox"/> 0-5 <input checked="" type="checkbox"/> 5-15 <input type="checkbox"/> >15	<u>GE</u>
1	COVER: Total %	<u>100</u>	<u>GE</u>
1	Comp. sum 100%	<u>80</u> <u>0</u> <u>10</u> <u>0</u> <u>10</u> <u>0</u>	<u>0</u>
	Crown Closure % <u>0</u>	<u>0</u>	<u>C</u> Aspect <u>E</u>
	Bedrock (R)	<u>0</u> <u>0</u>	<u>0</u> <u>0</u>
	D ₉₀ (cm)	<u>0</u>	<u>C</u> Compaction <u>0</u> <u>M</u> <u>H</u>
			Water Temp (°C) <u>13.5</u> Turb.(cm) <u>15</u> Cond.(25°C)
DISCHARGE		REACH SYMBOL (Fish)	
Parameter	Value	Method	Specific Data
Wetted Width (m)	<u>3.5</u>	<u>T</u>	
Mean Depth (m)	<u>.44</u>	<u>T</u>	
Mean Velocity (m/s)	<u>0.23</u>	<u>FC</u>	
Discharge (m ³ /s)	<u>0.27</u>		
		(Width, Valley Channel, Slope)	
		(Bed Material)	

FISH SUMMARY						L	STREAM/VALLEY CROSS-SECTION (Looking Downstream) <input checked="" type="checkbox"/>	
C	Species	No.	Size Range (mm)	Life Phase	Use		Method/Ref.	PLANIMETRIC VIEW <input type="checkbox"/>
<u>2</u>	<u>LKC</u>	<u>22</u>	<u>36-75</u>					
	<u>RSC</u>	<u>3</u>	<u>54-70</u>					
	<u>WSU</u>	<u>8</u>	<u>60-91</u>					
	<u>LSU</u>	<u>3</u>	<u>65-94</u>					
	<u>TP</u>	<u>3</u>	<u>51-58</u>					
	<u>LNC</u>	<u>2</u>	<u>63-64</u>					
	<u>NP</u>	<u>1</u>	<u>430</u>					
COMMENTS								
<u>C1</u>	Channel Stability <input type="checkbox"/> ; Debris <input type="checkbox"/> ; Management Concerns <input type="checkbox"/> ; Obstructions <input type="checkbox"/> ; Riparian Zone <input checked="" type="checkbox"/> ; Valley Wall Processes <input type="checkbox"/> ; Etc.							
<u>C1</u>	<u>VERY HIGH SUSPENDED SILT LOAD PROVIDING MOST OF THE COVER.</u>							
<u>C2</u>	<u>ELECTROSHOCKING SECONDS: 670. AVERAGE SAMPLE LENGTHS IN MM: LKC-61, RSC-61, WSU-69, LSU-76, TP-57, LNC-64.</u>							
<u>C1</u>	<u>RIPARIAN ZONE: WILLOW, WHITE SPRUCE, LABRADOR TEA, SHEPHERDIA, FIREWEED, HORSETAIL, ROSE, GRASS, PEYNE.</u>							
Edited by: <u>KN</u>							Date YMD <u>09.04.06</u>	

Stream Survey Form - Aitken Creek
Site 2; below proposed crossing.



Aitken Creek - Site 2
View upstream; upper half of site.



Aitken Creek - Site 2
View downstream; lower half of site.

STREAM NAME Aitken Creek

LOCATION From proposed crossing, downstream for 100 m.

DATE June 30 / 94 SITE NO. 2 UTM 10.5896.63034

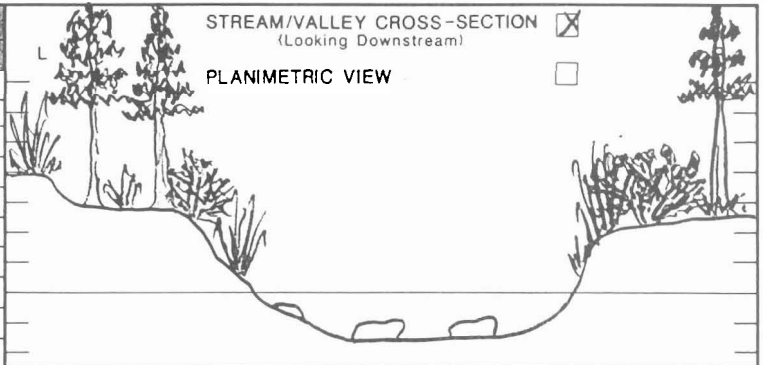
ELECTROSHOCKING SECONDS 670 AREA SAMPLED 1100 m2

NO	SP	LENGTH (mm)	COMMENTS	NO	SP	LENGTH (mm)	COMMENTS
1	LKC	59		26	WSU	61	
2	"	58		27	"	91	
3	"	45		28	"	74	
4	"	68		29	"	72	
5	"	74		30	"	62	
6	"	57		31	"	64	
7	"	64		32	"	64	
8	"	60		33	"	60	
9	"	75		34	LSU	68	
10	"	69		35	"	94	
11	"	62		36	"	65	
12	"	62		37	TP	58	
13	"	71		38	"	58	
14	"	57		39	"	51	
15	"	67		40	LNC	63	
16	"	61		41	"	64	
17	"	61		42	TP	430	
18	"	58		43			
19	"	54		44			
20	"	36		45			
21	"	61		46			
22	"	52		47			
23	RSC	70		48			
24	"	54		49			
25	"	60		50			

**DFO / MOE
STREAM SURVEY FORM**

Stream Name (gaz.) AITKEN CREEK (local)		Access V2		Method	
Watershed Code 2.3.326.1.33.56				Reach No.	
Location FROM 500M BELOW PROPOSED CROSSING DOWN			Map# 94A/13	Site No. 3	Lthsurv.(m) 100 RF
Date YMD 94.06.30		Time 1205	Agency DES	Crew KN/BC/	UT.M. 10.5898.63033
Fish Card Y <input checked="" type="checkbox"/> N <input type="checkbox"/> C <input type="checkbox"/>		Photos		Air Photos	
Field <input checked="" type="checkbox"/> Hist. <input type="checkbox"/>					
C PARAMETER		VALUE	METH.	SPECIFIC DATA	
Ave.Chan.Width (m)		11.7	RF		
Ave.Wet.Width (m)		11.2	RF		
Ave.Max.Riffle Depth (cm)		20	T		
Ave.Max.Pool Depth (cm)		85	T		
Gradient %		0.5	CL		
C BED MATERIAL		%	C BANKS	OBSTRUCTIONS	
% Pool	10	Riffle	10	Run	Other
Side Chan.%		<input checked="" type="checkbox"/> 0-10	<input type="checkbox"/> 10-40	<input type="checkbox"/> >40	
Debris Area%		<input type="checkbox"/> 0-5	<input checked="" type="checkbox"/> 5-15	<input type="checkbox"/> >15	
Stable %		70			
1 COVER: Total %		100	GE		
1 Comp. sum 100%		80	0	10	0
Crown Closure %		10	C	Aspect	E
D ₉₀ (cm)		15	C	Compaction	L M H
Water Temp (°C)		13.5	Turb.(cm)	15	Cond.(25°C)
DISCHARGE		Parameter		Value	
Wetted Width (m)		Method		Specific Data	
Mean Depth (m)					
Mean Velocity (m/s)					
2 Discharge (m ³ /s)		0.27			
REACH SYMBOL (Fish)					
(Width, Valley Channel, Slope)		(Bed Material)			

FISH SUMMARY					
C	Species	No.	Size Range (mm)	Life Phase	Use Method/Ref.
3	LXC	25	37-70		
	RSC	3	45-72		
	WSU	5	45-93		
	LSU	1	359		
	TP	2	54-61		



COMMENTS

C1 Channel Stability ; Debris ; Management Concerns ; Obstructions ; Riparian Zone ; Valley Wall Processes ; Etc.

C1 VERY HIGH SUSPENDED SILT LOAD PROVIDING MOST OF THE COVER.

C2 FLOW DETERMINED IN SITE 2.

C3 ELECTROSHOCKING SECONDS: 541. AVERAGE SAMPLE LENGTHS IN MM: LXC-56, RSC-55, WSU-71.

C4 RIPARIAN ZONE: WHITE SPRUCE, HORSETAIL, FLOWER, REDWINE, WILLOW, ROSE.

Edited by: **KN**
Date YMD: **940703**

Stream Survey Form - Aitken Creek
Site 3; 500 m below proposed crossing.



Aitken Creek - Site 3
View upstream; top 30 m of site.



Aitken Creek - Site 3
View downstream; centre of site.

STREAM NAME Aitken Creek

LOCATION From 500 m below crossing, downstream for 100 m.

DATE June 30 / 94 SITE NO. 3 UTM 10.5898.63033

ELECTROSHOCKING SECONDS 541 AREA SAMPLED 1120 m2

NO	SP	LENGTH (mm)	COMMENTS	NO	SP	LENGTH (mm)	COMMENTS
1	LKC	37		26	RSC	72	
2	"	61		27	"	49	
3	"	48		28	"	45	
4	"	55		29	WSU	93	
5	"	70		30	"	75	
6	"	60		31	"	75	
7	"	62		32	"	68	
8	"	63		33	"	45	
9	"	55		34	LSU	359	
10	"	54		35	TP	61	
11	"	59		36	"	54	
12	"	45		37			
13	"	56		38			
14	"	61		39			
15	"	54		40			
16	"	48		41			
17	"	67		42			
18	"	60		43			
19	"	69		44			
20	"	50		45			
21	"	58		46			
22	"	55		47			
23	"	48		48			
24	"	52		49			
25	"	51		50			

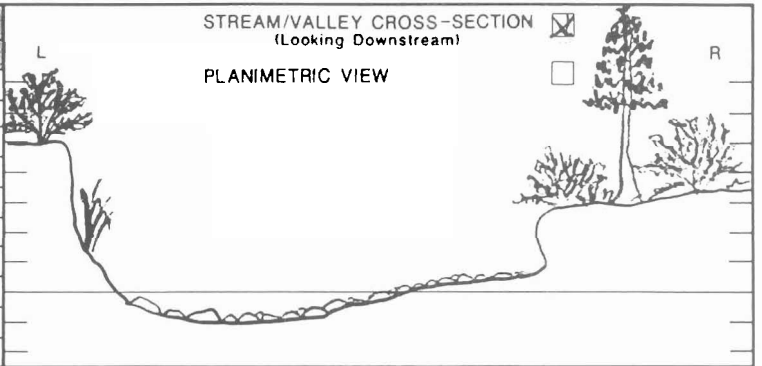
Appendix III:

North Aitken Creek
Stream Survey Forms,
Site Photographs and
Fish Data Sheets

**DFO / MOE
STREAM SURVEY FORM**

Stream Name (gaz.) NORTH AITKEN CREEK (local)		Access V2		Method	
Watershed Code				Reach No.	Length(km)
Location FROM PROPOSED CROSSING, UPSTREAM				Map#	Site No. 1
FOR 100 M.				U.T.M.	Lthsurv.(m) 100
Date YMD 94 06 30	Time 1320	Agency DES	Crew KN/BC/	Photos	Fish Card Y <input checked="" type="checkbox"/> N <input type="checkbox"/> C <input type="checkbox"/>
Date YMD 94 06 30		Time 1320	Agency DES	Crew KN/BC/	Photos
Air Photos		Field <input checked="" type="checkbox"/>		Hist. <input type="checkbox"/>	
C	PARAMETER	VALUE	METH.	SPECIFIC DATA	
	Ave.Chan.Width (m)	8.0	RF		
	Ave.Wet.Width (m)	5.3	RF		
	Ave.Max.Riffle Depth (cm)	22	T		
	Ave.Max.Pool Depth (cm)	75	T		
	Gradient %	1.0	CL		
	%Pool 60	Riffle 40	Run		
	Other				
	Side Chan.%	<input type="checkbox"/> 0-10 <input type="checkbox"/> 10-40 <input type="checkbox"/> >40			
	Debris	Area% <input type="checkbox"/> 0-5 <input type="checkbox"/> 5-15 <input checked="" type="checkbox"/> >15			
	Stable %	20			
1	COVER: Total %	100	GE		
	Comp. sum 100%	60 20 10 0 10 0			
	Crown Closure %	10	C	Aspect S	
	DISCHARGE		REACH SYMBOL (Fish)		
	Parameter	Value	Method	Specific Data	
	Wetted Width (m)				
	Mean Depth (m)				
	Mean Velocity (m/s)				
2	Discharge (m ³ /s)	0.10			
				(Width, Valley Channel, Slope)	
				(Bed Material)	

FISH SUMMARY					
C	Species	No.	Size Range(mm)	Life Phase	Use Method/Ref.
3	LXC	26	47-109		
	WSU	9	49-115		
	LSU	2	86-92		
	TP	1	66		
	LNC	1	80		



COMMENTS	
C11	Channel Stability <input type="checkbox"/> ; Debris <input type="checkbox"/> ; Management Concerns <input type="checkbox"/> ; Obstructions <input type="checkbox"/> ; Riparian Zone <input checked="" type="checkbox"/> ; Valley Wall Processes <input type="checkbox"/> ; Etc.
C1	VERY HIGH SUSPENDED SILT LOAD PROVIDING MOST OF THE COVER.
C2	FLOW DETERMINED IN SITE 2.
C3	ELECTROSHOCKING SECONDS: 518. AVERAGE SAMPLE LENGTHS IN MM: LXC - 61, WSU - 84.
C11	RIPARIAN ZONE: SCRUB BIRCH, CINQUFOIL, WHITE SPRUCE, WILLOW, YARROW, GRASS, FIREWEED, PEAVINE.
	Edited by: KN
	Date YMD 940703

Stream Survey Form - North Aitken Creek
Site 1; above proposed crossing.



North Aitken Creek - Site 1
View upstream; upper half of site.



North Aitken Creek - Site 1
View downstream; lower end of site.

STREAM NAME North Aitken Creek

LOCATION From proposed crossing, upstream for 100 m.

DATE June 30 / 94 SITE NO. 1 UTM 10.5929.63066

ELECTROSHOCKING SECONDS 518 AREA SAMPLED 530 m2

NO	SP	LENGTH (mm)	COMMENTS	NO	SP	LENGTH (mm)	COMMENTS
1	LKC	65		26	LKC	51	
2	"	61		27	WSU	90	
3	"	58		28	"	78	
4	"	56		29	"	75	
5	"	51		30	"	90	
6	"	54		31	"	74	
7	"	62		32	"	115	
8	"	75		33	"	112	
9	"	64		34	"	49	
10	"	67		35	"	69	
11	"	53		36	LSU	92	
12	"	57		37	"	86	
13	"	68		38	TP	66	
14	"	54		39	LNC	80	
15	"	109		40			
16	"	56		41			
17	"	57		42			
18	"	67		43			
19	"	65		44			
20	"	65		45			
21	"	47		46			
22	"	54		47			
23	"	52		48			
24	"	59		49			
25	"	65		50			

**DFO / MOE
STREAM SURVEY FORM**

Stream Name (gaz.) NORTH AITKEN CREEK (local)		Access 1/2		Method	
Watershed Code		Reach No.		Length(km)	
Location FROM PROPOSED CROSSING, DOWNSTREAM FOR 100 M.		Map#		Site No. 2	
Date Y M D 9/4/06 Time 1350		Agency DES Crew RN/BC		Fish Card Y <input checked="" type="checkbox"/> N <input type="checkbox"/> C <input type="checkbox"/>	
Lth.surv.(m) 100		U.T.M.		Field <input checked="" type="checkbox"/> Hist. <input type="checkbox"/>	
Air Photos		Photos			

C	PARAMETER	VALUE	METH.	SPECIFIC DATA	OBSTRUCTIONS
	Ave.Chan.Width (m)	7.4	RF		C Ht(m) Type Loc'n
	Ave.Wet.Width (m)	4.9	RF		
	Ave.Max.Riffle Depth (cm)	17	T		
	Ave.Max.Pool Depth (cm)	65	T		
	Gradient %	1.0	CL		
	% Pool 70 Riffle 30 Run				
	Side Chan.%	<input checked="" type="checkbox"/> 0-10 <input type="checkbox"/> 10-40 <input type="checkbox"/> >40	GE		
	Debris Area% <input type="checkbox"/> 0-5 <input checked="" type="checkbox"/> 5-15 <input type="checkbox"/> >15		GE		
	Stable %	50	GE		
	COVER: Total %	100	GE		
	Comp. sum 100%	80 10 0 0 10 0			
	Crown Closure %	10	C Aspect S		

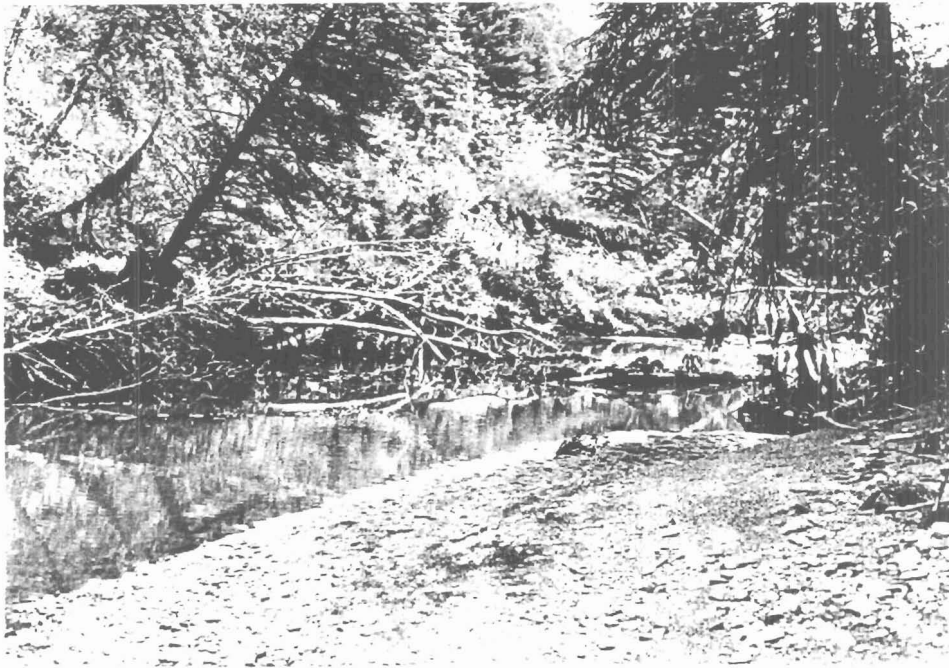
C	BED MATERIAL	%	C	BANKS	EN	CO	OC	UC	N/A
	Fines clay, silt, sand (<2mm)	20 20		Height(m) 24 %Unstable 30					
	Gravels small (2-16mm)	50 25		Texture (F) G L R					
	large (16-64mm)	25		Confinement					
	Larges sm. cobble (64-128mm)	10		Valley: Channel Ratio					
	lge. cobble (128-256mm)	30 10		Stage					
	boulder (>256mm)	10		Flood Signs Ht(m)					
	Bedrock (R)	0 0		Bars (%) 80 pH					
	D ₉₀ (cm) 30 C Compaction L M H			Water Temp (°C) 16 Turb.(cm) 13 Cond.(25°C)					

DISCHARGE			REACH SYMBOL (Fish)		
Parameter	Value	Method	[]		
Wetted Width (m)	2.0	T	[]		
Mean Depth (m)	0.5	T	[]		
Mean Velocity (m/s)	0.13	FC	[]		
Discharge (m ³ /s)	0.10		[]		

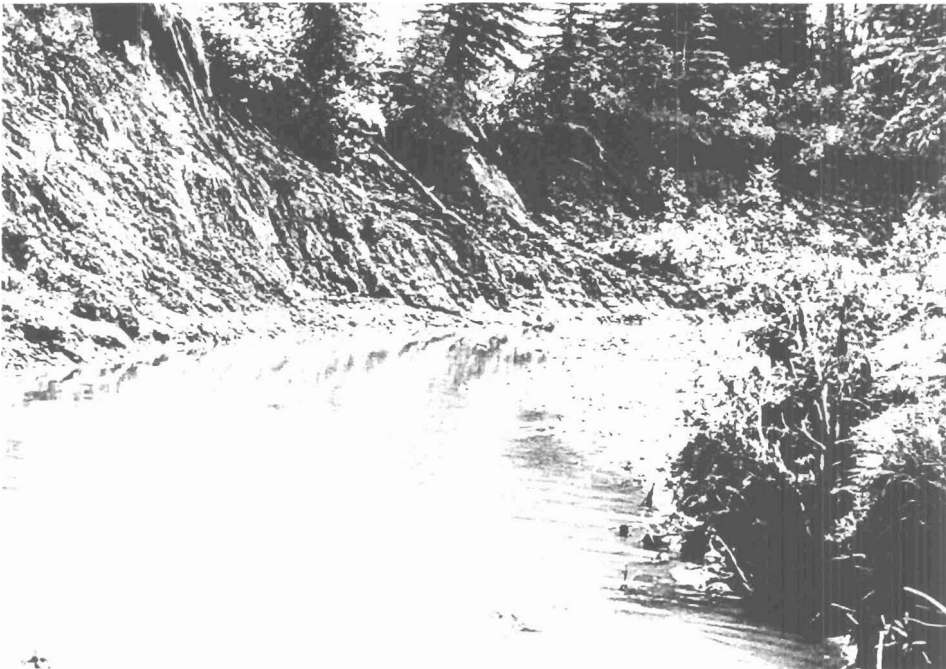
FISH SUMMARY						STREAM/VALLEY CROSS-SECTION (Looking Downstream) <input checked="" type="checkbox"/>	
C	Species	No.	Size Range(mm)	Life Phase	Use	Method/Rel.	PLANIMETRIC VIEW <input type="checkbox"/>
2	LKC	27	54-75				R
	WSU	4	82-141				
	LSU	2	85-112				
	TP	1	57				
	LNC	2	66-69				

COMMENTS	
C1	Channel Stability <input type="checkbox"/> ; Debris <input type="checkbox"/> ; Management Concerns <input type="checkbox"/> ; Obstructions <input type="checkbox"/> ; Riparian Zone <input checked="" type="checkbox"/> ; Valley Wall Processes <input type="checkbox"/> ; Etc.
C1	VERY HIGH SUSPENDED SILT LOAD PROVIDING MOST OF THE COVER.
C2	ELECTROSHOCKING SECONDS: 437. AVERAGE SAME LENGTHS IN MM: LKC-66, WSU-108. SOME OF THE LAKE CHUB WERE SPAWNING.
C1	RIPARIAN ZONE: SCRUB BIRCH, CINQUEFOIL, PEAVINE, STRAWBERRY, GRASS, HONEYSUCKLE.
Edited by: RN	
Date Y M D: 9/4/06	

Stream Survey Form - North Aitken Creek
Site 2; below proposed crossing.



North Aitken Creek - Site 2
View downstream; middle of site.



North Aitken Creek - Site 2
View downstream; lower end of site.

STREAM NAME North Aitken Creek

LOCATION From proposed crossing, downstream for 100 m.

DATE June 30 / 94 SITE NO. 2 UTM 10.5929.63064

ELECTROSHOCKING SECONDS 437 AREA SAMPLED 490 m2

NO	SP	LENGTH (mm)	COMMENTS	NO	SP	LENGTH (mm)	COMMENTS
1	LKC	69		26	LKC	65	
2	"	65		27	"	60	
3	"	72		28	WSU	121	
4	"	62		29	"	141	
5	"	74		30	"	86	
6	"	66		31	"	82	
7	"	65		32	LSU	112	
8	"	65		33	"	85	
9	"	75		34	TP	57	
10	"	64		35	LNC	66	
11	"	75		36	"	69	
12	"	65		37			
13	"	70		38			
14	"	71		39			
15	"	70		40			
16	"	56		41			
17	"	65		42			
18	"	66		43			
19	"	70		44			
20	"	71		45			
21	"	61		46			
22	"	66		47			
23	"	60		48			
24	"	54		49			
25	"	64		50			

**DFO / MOE
STREAM SURVEY FORM**

Stream Name (gaz.) NORTH AITKEN CREEK (local)		Access V2		Method	
Watershed Code				Reach No.	Length(km)
Location FROM 500M BELOW PROPOSED CROSSING DOWNSTREAM FOR 100 M.			Map#	Site No. 3	Lth.surv.(m) 100 RF
Date YMD 9/4/06 3:10			Time 1430	Agency DES	Crew KN/BC
PARAMETER		VALUE	METH.	SPECIFIC DATA	
Ave.Chan.Width (m)		12.3	RF		
Ave.Wet.Width (m)		3.2	RF		
Ave.Max.Riffle Depth (cm)		65	T		
Ave.Max.Pool Depth (cm)		12	T		
Gradient %		1.0	CL		
% Pool 60		Riffle 40	Run		
Side Chan.%		<input checked="" type="checkbox"/> 0-10 <input type="checkbox"/> 10-40 <input type="checkbox"/> >40			
Debris Area%		<input type="checkbox"/> 0-5 <input checked="" type="checkbox"/> 5-15 <input type="checkbox"/> >15			
Stable %		50	GE		
COVER: Total %		100	GE		
Comp. sum 100%		Dp Pool 50	L.O.D. 20	Boulder 10	In Veg 0
Crown Closure %		10	Aspect S	Over Veg 10	Cutbank
BED MATERIAL		%		BANKS	
Fines clay,silt,sand (<2mm)		20	20	Height(m) 2.3 %Unstable 70	
Gravels small (2-16mm)		50	25	Texture (F) G L R	
large (16-64mm)		30	10	Confinement EN CO (FC) OC UC N/A	
Larges sm.cobble (64-128mm)		10	10	Valley: Channel Ratio 0-2 (2-5) 5-10 10+ N/A	
boulder (>256mm)		0	0	Stage Dry L (M) H Flood	
Bedrock (R)		0	0	Flood Signs H(m) 1.8 Braided (Y) N	
D ₉₀ (cm) 28		Compaction L M H		Bars (%) 90 pH 9.0 O ₂ (ppm)	
Water Temp (°C) 16		Turb.(cm) 13		Cond.(25°C)	
DISCHARGE				REACH SYMBOL (Fish)	
Parameter		Value	Method	Specific Data	
Wetted Width (m)					
Mean Depth (m)					
Mean Velocity (m/s)					
2 Discharge (m ³ /s)		0.10			

FISH SUMMARY					
C	Species	No.	Size Range(mm)	Life Phase	Use Method/Ref.
3	LKC	15	60-81		
	WSU	5	81-150		
	LSU	3	120-150		
	LNC	1	75		
	TP	1	59		

STREAM/VALLEY CROSS-SECTION (Looking Downstream)

PLANIMETRIC VIEW

COMMENTS

CX1 Channel Stability ; Debris ; Management Concerns ; Obstructions ; Riparian Zone ; Valley Wall Processes ; Etc.

C1 VERY HIGH SUSPENDED SILT LOAD PROVIDING MOST OF THE COVER.

C2 WATER FLOW DETERMINED IN SITE 2.

C3 ELECTROSHOCKING BECONDS: 336. AVERAGE SAMPLE LENGTHS IN MM: LKC-66, WSU-109, LSU-137. SOME OF THE LAKE CHUB WERE IN SPAWNING CONDITION.

CX1 RIPARIAN ZONE: WHITE SPRUCE, SCRUB BIRCH, CINQUEFOIL, GRASS, PEAVINE.

Edited by: **KN**
Date YMD: **9/4/06**

Stream Survey Form - North Aitken Creek
Site 3; 500 m below proposed crossing.



North Aitken Creek - Site 3
View downstream; top of site.



North Aitken Creek - Site 3
View downstream; lower end of site.

STREAM NAME North Aitken Creek

LOCATION From 500 m below crossing, downstream for 100 m.

DATE June 30 / 94 SITE NO. 3 UTM 10.5925.63061

ELECTROSHOCKING SECONDS 336 AREA SAMPLED 320 m2

NO	SP	LENGTH (mm)	COMMENTS	NO	SP	LENGTH (mm)	COMMENTS
1	LKC	67		26			
2	"	60		27			
3	"	60		28			
4	"	72		29			
5	"	66		30			
6	"	81		31			
7	"	60		32			
8	"	75		33			
9	"	68		34			
10	"	61		35			
11	"	62		36			
12	"	64		37			
13	"	62		38			
14	"	69		39			
15	"	65		40			
16	WSU	150		41			
17	"	112		42			
18	"	116		43			
19	"	81		44			
20	"	87		45			
21	LSU	140		46			
22	"	150		47			
23	"	120		48			
24	LNC	75		49			
25	TP	59		50			

