

RECEIV E AUG 0 : 1994 FORT ST. JUNA MINISTRY OF ENVIRONMENT

## WESTCOAST ENERGY INC FIREWEED OFFLOAD PIPELINE PROJECT

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# FISHERIES HABITAT ASSESSMENT

JULY 1994

Prepared for: WESTCOAST ENERGY INCORPORATED 1333 West Georgia Street Vancouver, B.C. V6E 3K9

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## TABLE OF CONTENTS

- 1.0 INTRODUCTION
- 2.0 PROJECT AND SITE DESCRIPTION
- 3.0 FISHERIES VALUES
  - 3.1 AITKEN CREEK
    - 3.1.1 Methods
    - 3.1.2 Results
      - 3.1.2.1 Biophysical Inventory
      - 3.1.2.2 Species Inventory
    - 3.1.3 Discussion
  - 3.2 NORTH AITKEN CREEK
    - 3.2.1 Methods
    - 3.2.2 Results
      - 3.2.2.1 Biophysical Inventory 3.2.2.2 Species Inventory
    - 3.2.3 Discussion
  - 3.3 UNNAMED TRIBUTARY TO NORTH AITKEN CREEK
  - 3.4 RECOMMENDATIONS

## LIST OF FIGURES

- Figure 1: Location of Project Area, 1:600,000
- Figure 2: Location of Proposed Crossings and Stream Survey sites, 1:50,000

#### LIST OF APPENDICES

- Appendix I: Appendix "A", Pre-Impact Assessment For Small Stream Crossings, Sampling Protocol And Mandatory Reporting (N.E. Down)
- Appendix II: Aitken Creek Stream Survey Forms and Site Photographs
- Appendix III: North Aitken Creek Stream Survey Forms and Site Photographs

#### 1.0 INTRODUCTION

Westcoast Energy Inc plans to expand its natural gas gathering system within the Beatton 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-Beatton 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.

1





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 gasgenerator 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.

4

## 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, redside 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.

5

## 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 Manadatory 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 indivduals 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; parisites 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

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	Mean Depth(m)		1														
	Mean Velocity (m/s)		1														
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c 3	FISH S Species No. Size Range LKC 25 34-7- RSC 4 69-76 W34 7 66-38 TP 7 55-66	CUMMARY (mm) Life Phase 2 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	Use Me	tho	1/Rei.			PLAN		/VALI Lookir	LEY CRC ng Downs VIEW	ISS-SE( tream)			A. A.	The second se	R
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(Ca)													Date	YM	0:940	TA	33

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	11	77		27	11	74	
3	11	44		28	11	72	
4	11	50		29	11	69	
5	11	64		30	WSU	67	
6	R	52		31	11	66	
7	11	58		32	11	90	
8		34		33	11	87	
9	11	64		34	11	76	
10	*1	36		35	11	348	
11		35		36		388	
12	11	64		37	LSU	83	
13	<b>F1</b>	61		38	71	75	
14		72		39	11	115	
15	••	58		40	TP	60	
16		68		41	11	55	
17	••	66		42	••	57	
18	••	61		43	11	66	
19	••	77		44	11	56	
20		48		45	11	57	
21	11	67		46	11	61	
22		55		47	CAS	75	
23	11	63		48			
24	11	62		49			
25	11	60		50			

DF	O/MŌE	
STREAM	SURVEY	FORM

Watershed Code 23321613356	Reach No. 3 Site No. 2 C34 Fish Card Y (	Length(km	)
Location FROM PROPOSED CROSSING Map# 94A/13 DOWN STREAM FOR 100 M. UT.M. 10,5896,630	3 Site No. 2	Lthsury(m	
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		N) C	Field Hist.
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Ave.Wet.Width (m) 11.0 RF			
Ave.Max.Riffle Depth (cm) 20 T			
Ave.Max.Pool Depth (cm) 75 T		1	
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% Pool 9 0 Riffle 1 0 Run Other GE Fines clay, silt, sand (<2mm) 55 50	Height(m) 1.7 %Unstab	He EO	
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Area% 000-5 \$ 5-15 >15 Gravels large (16-64mm) 40	Confinement	EN CO	OC UC N/
Debris Stable % 80 GE (4-128mm) 5	Valley: Channel Ratio	0-2) 2-5	5-10 10 · N//
COVER: Total % 100 GE Larges Ige. cobble (128-256mm) 10 5	Stage	Dry L	A H Floc
Comp. Dp Pcol L.O.D. Boulder In Veg Over Veg Cutbank boulder (>256mm)	Flood Signs Ht(m)	2.1 Braid	ded Y N
1 Sum 100% 80 0 10 0 10 0 Bedrock (R) 0 0	Bars (%)	DH	Odppm)
Crown Closure % O C Aspect C Dan(cm) C Compaction OM H	Water Temp (*C) 36 Tu	rb.(cm) 15	Cond.(25°C)
DISCHARGE	BEACH	+ SYMBOL	
Parameter Value Method Specific Data		(Fish)	
Wetted Width (m) 3.5 T			
Mean Depth (m) . 44 T		1	
Mean Velocity im/s) 0.23 FC			
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c 2	Species LKC RSC WGU LSU TP	NO. 223 8 3 3	FISH'SUM Size Range(mm) 36 - 75 54 - 70 60 - 91 65 - 94 51 - 58	MARY Life Phase Us	e Mothod/Roj.		STREAM/VALLEY CRO (Looking Downst PLANIMETRIC VIEW	SS-SECTION ream)		THE REAL PROPERTY OF	
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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												
ELECT	ROSHOCK	ING SECONI	DS <u>670</u>		AREA SA	MPLED 11	.00 m2					
NO	SP	LENGTH (mm)	COMMENTS	NO	SP	LENGTH (mm)	COMMENTS					
1	LKC	59		26	WSU	61						
2		58		27	11	91						
3	11	45		28	11	74						
4	11	68		29	11	72						
5	11	74		30	11	62						
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9	11	75		34	LSU	68						
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11	**	62		36	11	65						
12	**	62		37	TP	58						
13	••	71		38	11	58						
14	11	57		39	11	51						
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16	11	61		41	11	64						
17	11	61		42	TP	430						
18	11	58		43								
19	11	54		44								
20	11	36		45								
21	- 11	61		46								
22	11	52		47								
23	RSC	70		48								
24	11	54		49								
25	- 11	60		50								

## DFO/MOE STREAM SURVEY FORM

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1	COVER: Total %		10	0	GE		Larges	Ige.cob	ble (128-256mm)	10	5		·····S	tage decision.	Dry	L	M	) н	Flood
r.	Comp. Dp Pcol L.O.D.	Boulder	In Veg	Over Veg	Cutbank	240	1.4	boulder	(>256mm)		0		Flood Si	gns Ht(m)	2.1	Braid	led	Y (	N
100	100% 80 0	10	0	10	0	-28	Bedroc	k (R)	alo I di Norda	0	0	183	Bars (%)	10	рН		0.	(ppm)	
dig.	Crown Closure %	10	C	Aspect	E		D <sub>90</sub> (cm)	15	C Compaction	0	мн	68	WaterTemp	· (°C) 35	Turb.lcm)	15	Cond	(25°C)	
alla				DISC	HARGE									REA	CH SYN	BOL			
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ġ2.,	Wetted Width (m)																		
196	Mean Depth(m)																		
in.	Mean Velocity (m/s)																		
2	Discharge (m <sup>3</sup> /s)	0.27	1									Wid	ith.Valley:Ch	hannel,Slope	1			(Bed N	daterial)

儒教			FISH SUM	MARY		627 \$	STREAM/VALLEY CRC	SS-SECTION	
с 3	Species LKC REC WSU	× 2351-	Size Range(mm) 37-70 45-72 45-93 359	Life Phase Us	se Method/Ref.		PLANIMETRIC VIEW		
· · · · · · · · · · · · · · · · · · ·	TP	2	54-ี6เ						What when the second se
國家						-	0		
2	Channa	Sta	bilitu Dobrig	Magagam	ant Concorne		S Biogripp Zong Wallow M	all Processes	
2	VER	1 1	AIGH 2	SPENDE	D SILT		Roulding Mo	ST OF T	HE IONER,
2	FO	2	DETERN	AINED	N ST	E 2.			
3	ELEC MM:	TR	NC-56	g <del>s</del> ec , RSC -	55, W	541. AND	rage Jamp	LE LENG	TUS IN
CA	RUP	AR E.	UAN ZON	JE: WH	ITE SPR	ence, Hope	ETAL, MOUR	POAVIN	E, WILLOW,
調節								Ec	ate Y M D: 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.

LOCATION From 500 m below crossing, downstream for 100 m.												
DATEJune 30 / 94SITE NO3 UTM10.5898.63033												
ELECT	ROSHOCK	ING SECONE	)S541		AREA SA	MPLED <u>11</u>	20 m2					
NO	SP	LENGTH (mm)	COMMENTS	NO	SP	LENGTH (mm)	COMMENTS					
1	LKC	37		26	RSC	72						
2	11	61		27	н	49						
3	11	48		28	11	45						
4	"	55		29	WSU	93						
5	11	70		30	11	75						
6	11	60		31	11	75						
7	11	62		32	11	68						
8	11	63		33	11	45						
9	11	55		34	LSU	359						
10	11	54		35	TP	61						
11	11	59		36		54						
12	11	45		37								
13	11	56		38								
14	11	61		39								
15	11	54		40								
16	11	48		41								
17	11	67		42								
18		60		43								
19	11	69		44								
20		50		45								
21	11	58		46								
22	91	55		47								
23	81	48		48								
24	11	52		49								
25	11	51		50								

STREAM NAME Aitken Creek

# Appendix III:

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

								STRI	EAM SUR	VEY F	ORI	N								
Str	eam Name (gaz.)	N	ARTH	P	THE	NC	20	EK (10	cal)							Acc	ess	1/2	1	Method
Wa	tershed Code	1.1		1.1				1 1			1.1		1	Reach No		Lengt	h(km)			
Lo	ation FROM	F	ROP	755		2095	NG	a.up	STREAM	Map#				Site No.	1	Lth.su	rv.(m)	10	0	RF
F	OR 100	M.						.,	1	J T.M.				Fish Card	Y	1	C	Field	X	list.
Dat	O LP DWAN	6	301	īme	320	Agency	De	S Crew	KN BC	/ Ph	otos			Air Photos	5					
С	PARAME	TER		VAL	UE	METH.				SP	ECIF	IC D	ATA				0	BSTR	UCTIO	SNC
	Ave.Chan.Width	(m)	3.24	8.	6	RF											С	Ht(m)	Туре	Loc'n
	Ave.Wet.Width (	m) 🎲	2127	5	3	RF											-			
	Ave.Max.Riffle C	Depth	n (cm)	2:	2	T														
	Ave.Max.Pool D	epth	(cm)	7:	5	T														
	Gradient %	19.3	の合語	1.0	0	CL	C	TR. E	BED MATERI	AL	0	6	С	В	ANKS					
	% Pool O Riffle	41	Run	Ot	her	GE	Res.	Fines	clay,silt,sand	(<2mm)	20	20		Height(m) 2.0	0%Unsta	able 90	1.00			
	Side Chan.%	0	0-10 10	-40	]>40	GE	54	The second	smail (2-16mn	1)	1340	20	Par	Texture (	F) G	LA	12			
-	Area%	0	0-5	5-15	>15	GE		Gravels	large (16-64m	m)	40	20	135	Confin	ement	EN CC	FC	) 00	UC	N/A
	Stable %			20	5	GE	12	a tarang	sm.cobble (64 -	128mm)	たい	15	端	Valley: Chan	nel Ratio	0-2	2-5	5-10	10 •	N/A
1	COVER: Tota	11 %		10	0	GE	22	Larges	Ige cobble (12)	3-256mm)	40	5	鸿	Stag	e serieur	Dry	L	M	н	Flood
1	Comp. Dp Pcol L	O.D.	Boulder	In Veg	Over Veg	Cutbank	-33	10.10	boulder (>256r	nm)	10	10	108	Flood Signs	Ht(m)	1.8	Braid	ed	Y (	N
1	100% 60 2	20	10	0	10	0		Bedroo	k (R)	L'AND THE	0	0	96	Bars (%)	30	рН		0.	(ppm)	
	Crown Closure %	1	0	C	Aspect	S	稽	D <sub>90</sub> (cm	3700	ompaction	L	MA	30	Wate: Temp (°C	16	Turb.lcml	13	Cond	(25°C)	
					DISCI	HARGE			· · · · · · · · · · · · · · · · · · ·						REAC	CH SYN	BOL			·
	Parameter		Value	N	lethod			Spe	cific Data							(Fish)				
	Wetted Width (r	m)																		
	Mean Depth(m)																			
	Mean Velocity i	m/s)																		
2	Discharge (m <sup>3</sup> /s	5)	0.10										(Wid	th,Valley:Chann	el,Slope)	- t			(Bed N	Aaterial)
-		FIS	SH SUN	MMAR	AY.		1				STRE	EAM/	VAL	LEY CROS	S-SEC	TION 5	X	19.		
C	Species No. Siz	e Ra	inge (mm	Life	Phase	Use Me	hod	Ref.	L			(L	.ooki	ng Downstre	am)		Ĩ.,		r I	R

DFO/MOE

1	市场为这些	になった	FISH SUM	MARY	A SUBBLE		STREAM/VALLEY CROSS-	SECTION M
С	Species	No.	Size Range(mm)	Life Phase	Use Method/Ref.	L		R
3	LKC	26	47-109			12 7 1	PLANIMETRIC VIEW	i
alle .	WSU	٩	49-115			IN TO THE		1634
31	LSU	2	86-92					and Billor
强人	TP	1	66					
100	LNC	1	80					June 19 1 1 1 1
1620								( –
潮							~	
恋								
過点							00000	
-						-		_
驗						COMMENTS		
CXI	Channe	Sta	bility 🔄 Debris	Manage	ement Concerns[	; Obstructions; R	iparian Zone 🗹, Valley Wall Pr	ocesses; Etc.
15	VER	4 4	IGH SUE	PENOR	TO SILT	LOND PRO	NIDING MOST O	F THE COVER,
c2	Fro	2	DETERM	INED	IN SITE	2.		
03	ELEC	R	SHOCKING	G SEC	ONDS: 51	8. AVERACE	SAMPLE LENGT	HS IN MM:
100	LKC	- (	ol WSU	- 84.				
Gal	RIP	AR	LIGN ZO	NE: SC	RUB BIY	RCH CINQUE	FOIL WHITE SPRI	LOE WILLOW
金	YAR	20	W. GRAS	5 FIF	KEWEED.	PEAVINE	)	, ,
			8					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.

)ATE\_June 30 / 94 SITE NO. 1 UTM\_10.5929.63066

LECTROSHOCKING SECONDS 518 AREA SAMPLED 530 m2

NO	SP	LENGTH (mm)	COMMENTS	NO	SP	LENGTH (mm)	COMMENTS
1	LKC	65		26	LKC	51	
2	11	61		27	WSU	90	
3	11	58		28	11	78	
4	11	56		29	11	75	
_5	11	51		30	11	90	
6	11	54		31	11	74	
7	11	62		32	11	115	
8	11	75		33	11	112	
9	11	64		34	FT	49	
10	11	67		35	11	69	
11	11	53		36	LSU	92	
12	11	57		37	11	86	
13	11	68		38	TP	66	
14	11	54		39	LNC	80	
15	11	109		40			
16	11	56		41			
17	••	57		42			
18	11	67		43			
19	11	65		44			
20	11	65		45			
21	11	47		46			
22	11	54		47			
23	- 11	52		48			
24	11	59		49			
25	64	65		50			

									STRI	EAM SUI	RVEY F	OR	M									
Str	eam Nan	ie (gi	az.) N	nor	4 ANT	XEN	CY	200	K llo	cal)								Acc	ess	1.	2	Method
Wa	tershed (	Code					1 1	1	11		11	1 1			Reach	No.		Leng	angth(km)			
Lo	cation	an	NE	20nc	ren	con	-	N	6	1	Map#				Site N	lo.	2	Lth.su	rv.(m)	NO	2	RF
-	Davis	10		The	Ent	2 10	n		, eq. ,		UT.M.				Fish, (	Card	Y	N	C	Field	X	Hist.
Da	te Y M D	au	n.L.	30	Time 135	Age	ncy h	DDC	Crew	141/20	/ Ph	otos			Air Pt	notos			1			
C	Р	ARA	METER	501	VALUE	ME	TH	m		NR O	SP	ECIF	IC D	ATA					0	BSTRI	JCTI	ONS
F-	Ave.Ch	an.Wi	dth (m)	1.35	7.4	0	G												C	Ht(m)	Туре	Loc'n
	Ave.We	t.Wid	th (m)	-helps.	4 a	0	C												3.24			
	Ave Ma	x Biff	le Denti	n (cm)	17	R	-							-					-			
	Ave Ma	* Poo	Deoth	(cm)	15	-	-												22			
	Gradier	nt %	7/ -2	- Sale	100	0.	1	C	AN AN P		IAI	0	6	С		BA	NKS		des			
	% Pool	- CAR	ittle 21	Run	Other		-	1115	Fines	clay, silt, sand	(<2mm)	20	20	the	Height(m	12H	%Unst		96			
$\vdash$	Side Cha	19%	5	0-10				2000	Valender.	small (2-16m	im)		25	35	Texture	F	G	LR	index.			
-		0.0%		0-5	5-15 215		-	20	Gravels	larce (16-64	mm)	50	25	Sec. 1	C	onfine	ment	EN C	O FC	) 00	UC	N/A
	Debris	Stable	- %		50	- 6	-	Add Ca	Sugar -	sm cobbie (6)	4-128mm)	12.50	10	22	Valley:	Chann	el Ratio	0-2	6-5	5-10	10+	N/A
	COV	FR	otal %	-	100	C	2	-	Larges	Ige.cobble (1	28-256mm)	30	10	die.	10122	Stage	-finited	Dry	L	M	н	Flood
-	Como	00.0-		Boulder	In Very Over	Ven Cutt	ank	and the second	The second	boulder ()250	(mm)	12	10	Sec.	Flood	Sions	Ht(m)	1.0	Braid	ed	Y	N
	sum -	200	10.0		010			Test-	Bedrou	rk (B)	1155 Talks	0	0	100	Bars 19	1	an	0H		0	1000	-
-	Crown			0	C Aco	ect o	$\leftarrow$	392	D. (cm	2010	Compaction	0	MA	1949	Water Ter	np (°C)	11-	Turb (cm)	12	Cond	(25°C	
⊢	Crown C	Josun	9 70	0		SCHAD	2	NPR:	90,011	BOL	Compaction	10.		39%	in aller har		10	CH CV	1201	00.10.		1
-	Pa	(2000	tor	Value	Metho	d I	GE		Soe	cific Data				{			HEA	(Fish)	ABOL			
⊢	Watted	Widt		Value	Mictilo	-			000	one butu	-											
-	Mean D	enth	(m)	2.0	1																	
	Mean V	elocit	v im/s)	0.5	50																	
-	Dischar		,	0.1	The																	
C	Species	ge (n	Size Ra	SH SU	MMARY	ase Use	Meth	hod/	(Reil			STRE	EAM/	(VAL ooki	LEY CF	ROSS	S-SEC	TION [	X		(Bed )	R
	Species LWC NGU TP LNC Channe VER	No. 274 4 2 1 2 1 2 1 2 1 3 1 3 1 3 1 3 1 3 1 3 1	51/51 Size Ra 54- 92 - 95 - 57 66-	0.10 sH SU 75 141 141 142 -69			Meth	nod/		COM		STRE PLAN			LEY Cf ng Dow VIEW	Wall	S-SEC am)		Etc.			R
	Species LVC NGU TP LNC Channe VER LNC Channe LNC		57 57 66 67 67 66 67 66 67 66 67 66 67 67	0.10 SH SU ange(m 75 141 141 142 69 141 142 69 141 142 69 141 142 69 141 142 69 141 142 69 141 142 69 144 144 142 144 144 144 144 144						COM Obstruction LOAC					Valley Valley	Wall	Proces					R
	Species LWC NGU TP LNC Channe VER ELE LNC		57 52- 92- 95- 57 66- 66- 57 66- 66- 66- 66- 66- 66- 66- 66	0.10 SH SU ange(m 75 141 141 142 69 141 142 69 141 142 69 141 142 69 141 142 69 141 142 69 141 142 69 144 144 142 144 144 144 144 144						COM Obstruction	MENTS IS Rip PP PVERY LOPA	STRE PLAN			Valley Valley	Wall	Process					R

## DFO/MOE STREAM SURVEY FORM

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									
LOCAT	ION <u>F</u>	rom propos	sed crossing	r, dov	vnstream	for 100	<u>m.</u>		
DATE_	June 3	0 / 94 5	SITE NO. 2		UTM <u>10</u>	.5929.630	64		
ELECT	ROSHOCK	ING SECONI	DS <u>437</u>		AREA SA	MPLED <u>49</u>	0 m2		
NO	SP	LENGTH (mm)	COMMENTS	NO	SP	LENGTH (mm)	COMMENTS		
1	LKC	<u>69</u>		26	LKC	65			
2	11	65		27	11	60			
3	11	72		28	wsu	121			
4	81	62		29	11	141			
5	11	74		30	11	86			
6		66		31	11	82			
7		65		32	LSU	112			
8		65		33	**	85			
9	11	75		34	TP	57			
10	11	64		35	LNC	66			
11	11	75		36	"	69			
12	**	65		37					
13	11	70		38					
14	11	71		39					
15	11	70		40					
16	"	56		41					
17	11	65		42					
18	- 11	66		43					
19	- 11	<u>70</u>		44					
20	11	71		45					
21	11	61		46					
22	- 11	66		47					
23	- 11	60		48					
24	- 11	54		49					
25		64		50					

DF	O/MOE	
STREAM	SURVEY	FORM

Stre	am N	ame (gaz.)	NO	RTH	F	hTK	en c	R	EEK	cal)								Acc	ess	V2	M	Method	
Wat	ershe	d Code	1.1		1.1		11	1	11			11	1	1	Reach	No.		Lengt	h(km)				
Loc	ation	FROM	5	100	4	BEL	and	P	ROPC	SED	Map#				Site No	0.14	3	Lthsu	rv.(m)	1C	0	RF	
C	205	SING	V	MN	ST	REAM	1 FO	R	100	M.	U T.M.				Fish C	ard	Y	N	C	Field	X	list.	
Dat	YMI	0940	6	301	īme V	430	Agency	De	Crew	KN B	C/ Ph	otos			Air Ph	otos							
С		PARAMET	TER		VAL	UE	METH.				SP	ECIF	IC D	ATA					0	BSTR	UCTIC	ONS	
	Ave.C	Chan.Width	(m)		12.	3	RF												C	Ht(m)	Туре	Loc'n	
	Ave.V	Vet.Width (n	n)		3.	2	RF												18				
	Ave.N	Max.Riffle D	epth	(cm)	65	5	T												53				
	Ave.N	Max.Pool De	pth	(cm)	12		T												波行			1	
0	Grad	ient %			1.0	0	CL	C	E	ED MATE	RIAL		%	C	1	BAN	IKS		22			1	
-	% Pool	6 O Riffle	40	Run	01	her	GE	-	Fines	clay.silt.sand	d (<2mm)	20	20	188	Height(m)	2.3	&Unst	table 70	1993			1	
	Side C	han.%	000	0-10 10	-40	>40	GE	110		small (2-16)	mm)	-	25	144	Texture	P	G	LR	933			1	
35	Area% o			0-5 0 5-15 >15			GE	影	Gravels	large (16-64mm)		50	25	100	Confinement Ef			EN CO	FC	) 00	UC	N/A	
12	Debris	Stable %			5	)	GE	122	1	sm.cobble (6	54-128mm)	1	10		Valley: Channel Ratio		0-2	0-2 (2-5)		10+	• N/A		
1	CC	VER: Total	1 %		10	0	GE	123	Larges Ige cobble (128-256mm)		30	10	-36	S	stage	24	Dry	L	(M)	н	Floo		
	Comp	Do Pool L	0.D.	Boulder	Boulder In Veg Over Veg		Cutbank	沒	1.2	boulder (>25	6mm)	-	10	30	Flood Si	ians H	(m)	1.9	Braid	led (	D	N	
1	sum 1009	50 2	0	10	0	10	10	193	Bedroo	k (B)		0	0	Sit	Bars 1%	a	0	OH		0	(000)	1	
	Crown		Ť	0	C	Aspect	G	191	D (cm	20 0	Compaction		MA	1665	Water Tem	p (°C)	iL	Turb (cm)	13	Cond	(25°C)		
-	CIOWI	I Closure la			1000	DISCI	HARGE	N. SIL	90,011	120	Joompaction	1		25.75			DEA	CH CVI		loond	-20 01	1	
		Parameter		Value	N	lethod	IANGL		Soe	cific Data							HEA	(Fish)	SYMBOL Fish)				
1.	Wette	d Width (a	n.)	Taide	-																		
-	Mean	Depth (m)			-													1					
-	Mean	Velocity in	n/s		-																		
2	Disch	arge (m <sup>3</sup> /s	)	0.10										Wid	Ith,Valley C	hannel.	Slope)	1			(Bed N	Aaterial	
~				0.0																			

-	a le le t	12	FISH SUM	MARY		STREAM/VALLEY CROSS-SECTION X
C	Species	No.	Size Range(mm)	Life Phase	se Method/Ref.	
3	IKC	15	60-31			PLANIMETRIC VIEW
1	WSU	5	81-150			
ž	LSU	3	120-150		-	
	LNC	1	75			
	TP	1	59			
23			-			
34						- Vi.
No.						h prost
:10:						
洒						
R.						COMMENTS
CXI	Channe	Sta	bility; Debris	. Manager	ment Concerns	]. Obstructions 🔄, Riparian Zone 🗹, Valley Wall Processes 🔲, Etc.
21	VER	4	HIGH SU	SPEND	D SIL	F LOAD PROVIDING MOST OF THE CONDR.
48						
02	1. IAT	ER	- East	DETERA	AINED IN	SITE 2.
19/03	- MAI					
PE	50		2001000	NG C	Fails	336 ALERAGE SAMAE LENGTHS IN MM!
	LKC	-1	to WSU	-109	LSU-1	37. Some OF THE LAKE CHUB WERE
1353	IN .	50	ANING	Candia	ION.	
141						
CXI	RI	2A	RIAN ZO	NE: WH	ITE SPO	LUCE SCRUB BIRCH CINQUEFOIL GRASS
-M	DEA	VIT	VE.			Edited by: KN
湯						Date YMD: QUOTO3

Ţ

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