1986
KOOTENAY LAKE
SOUTH ARM
STREAM
INVENTORY

sponsored by

CRESTON VALLEY ROD AND GUN CLUB

INCORPORATED

for

Province of British Columbia Ministry of Environment Fish and Wildlife Branch

310 Ward Street, Nelson, British Columbia V1L 5S4

ACKNOWLEDGEMENTS

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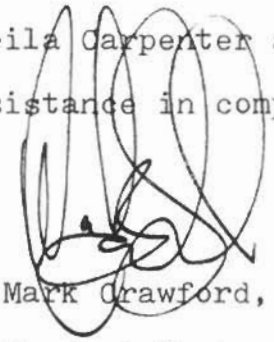
As Chairman of the Fisheries Committee, Creston Valley Rod and Gun Club, I would like to thank the participants:

- Sheila Carpenter
- Gay Downing
- Kathy Frei
- Bob Hallam

for their data collection, and a special thanks to Sheila Carpenter and Kathy Frei for their assistance in compiling the data.



Mark Crawford,
Project Manager

Financial Contributions were made by:

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CONTENTS

INTRODUCTION

PURPOSE

This report and inventory was compiled to provide the Ministry of Environment Fisheries Staff with a base-line of information on available spawning and rearing habitat within streams tributary to the South Arm of Kootenay Lake.

BACKGROUND

Regional Fisheries Biologist, Harvey Andrusak identified the need for a base-line of information during the April 1985 Fisheries Management and Regulations Seminar held in Castlegar, B.C. Following this seminar, the Creston Valley Rod and Gun Club's Fisheries Committee began to develop a proposal whereby the Club could sponsor the needed inventory.

In October of 1985, Fisheries Committee Chairman, Mark Crawford, submitted the proposal to the Employment Development Branch for funding consideration. Funding was approved in February 1986. The grant received was substantially less than the amount applied for and the Creston Valley Rod and Gun Club voted to provide $ 4,465.00 to ensure that the participants recieved adequate training.

A ten week intensive training programme, provided by Robert O. Purdy and Associates was completed prior to the field work. At this time, Harvey Andrusak provided the "team" with the necessary equipment and permit to gather the data for the base-line of information.

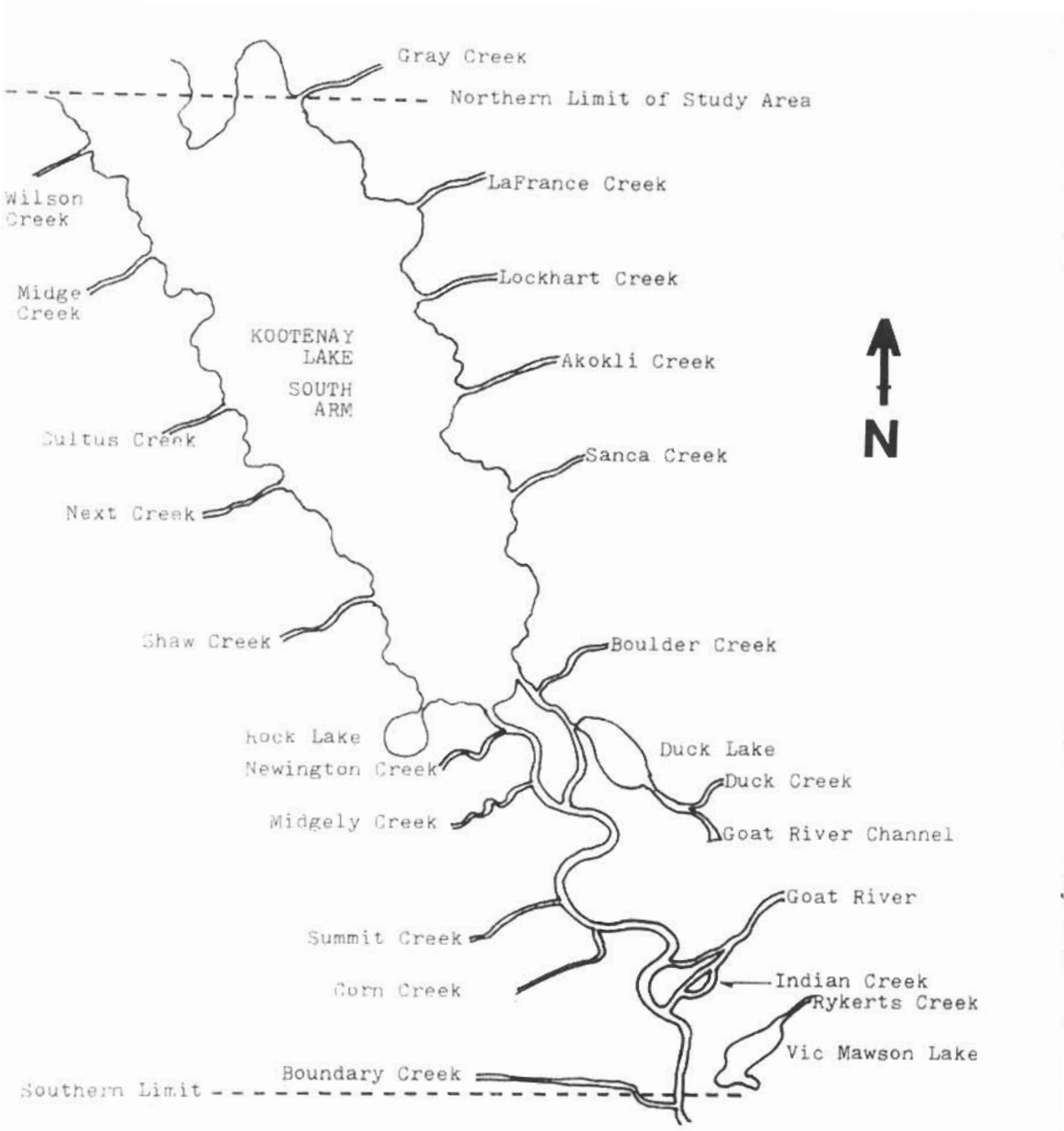
STUDY AREA

The study area for this report includes those streams tributary to the South Arm of Kootenay Lake and the Kootenay River which were deemed accessible to spawning Kokanee. Accessibility was determined by measuring the gradient and flow of the streams. This report includes only the portion of the streams below any barrier which would prohibit the passage of spawners.

The South Arm of Kootenay Lake was delineated as follows. The Northern limit was designated by an East-West line crossing the lake at the confluence of Gray Creek. The Southern limit was the International Boundary near Rykerts, B.C. (see figure 1.)

Although the confluence of Boundary Creek is South of the study, it was included because of the length of stream which is within the study area.

Vic Mawson Lake and Rykerts Creek are included because of their potential for enhancement.



KOOTENAY LAKE/SOUTH ARM STREAM INVENTORY STUDY AREA
(not to scale)

FIGURE 1.

METHODOLOGY

The project began with a ten week training programme covering stream survey techniques, basic limnology, stream mechanics, flora and fauna identification, and an introduction to the fish and aquatic insects found within the study area.

The entire length of stream deemed accessible to spawning Kokanee was walked by the research team. Based on observations, a portion of the stream which was representative of the stream as a whole, was chosen as a "typical reach" and surveyed.

Typical reaches were surveyed using a Ranger compass and 30 metre chain. All compass directions were verified by back-azimuths in accordance with commonly accepted survey procedures. All survey stations were established at the water's edge.

The following observations were recorded for each typical reach:

- -Turbidity: clarity of water
- -Substrate analysis: composition of streambed
- -Stream profile: (eg. "U" shaped bottom)
- -Armouring: stability of streambed
- -Riffle/Run/Pool ratios
- -Streambank cover: (eg. shrubs, grasses etc.)
- -Vegetation: (eg. moss, coniferous trees, reeds etc.)
- -Streambank analysis: (eg. sloping bedrock)

Surface velocity was determined by timing a styrofoam chip, floating on the water, over a measured distance. The standard formula ($\frac{wdl}{t}$) was used where w = width, d = depth, l = length and t = time. Three times were obtained and the average was used for this report.

Gradients were determined by sighting upstream along the water's edge. The resulting gradient was verified by sighting downstream. All gradients were recorded as percentages. (ie. metres of rise per 100 metres of run).

Using kick-nets, aquatic insects were collected from a one square metre section of streambed. Insects were identified, to Order, on-site and the frequency recorded as sparse, moderate or abundant.

PRESENTATION OF DATA

Each stream in this report has an information page, a map of the typical reach and a photo inventory.

The information page was adapted from the stream inventory form used by the Department of Fisheries and Oceans. This page contains the pertinent information, benchmark data, geographical location of the confluence and identification of the photographs.

The typical reach page includes a map of the typical reach, compass orientation symbol and a comment section. The comment section contains information on physical characteristics, observations not listed on the information page and location of the barrier for each stream.

The photographs, unless otherwise noted on the information page appear in the following order:

- -Typical reach looking upstream
- -Typical reach looking downstream
- -Barrier
- -Confluence

Fish collection data begins on page 99. Kokanee were collected and measured for the following:

- -Number of fish observed at peak count
- -Number of eggs per gravid female
- -Length
- -Weight

Photographs depicting comparisons, measurements, eggs and parasites follow the data pages.

1986 KOOTENAY LAKE / SOUTH ARM STREAM INVENTORY

STREAM: AKOKLI CREEK **LOCATION:** _____ **LONG** 116°45'20

DATE: Nov. 5/86 **TIME:** 14:00 hr **LAT** 49°25'35"

TURBIDITY: Crystalline

WATER TEMP: 6°C.

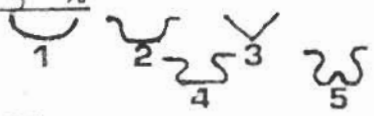
AIR TEMP: 10°C.

FLOW: (surface) 0.87 m./sec.

GRADIENT: 2%

SUBSTRATE: silt 5 % sand 15 % gravel 30 % stone 20 % cobble 15 % rubble 10 % boulder 5 %

STREAM PROFILE: #1



ARMOURING: poor ☐ fair ☐ moderate ☒ good ☐

RUN 60 % **RIFFLE** 20 % **POOL** 20 %

SURROUNDING VEGETATION:

type:	abundant	mod	sparse	none
shrub			X	
conif				X
decid	X			
grass		X		

OBSTRUCTIONS:

	height	location
dam		
falls	approx. 8m.	approx 120 m
culvert		above Hwy. 3a
log jam		bridge
other		

AREAS OF COVER

	abundant	mod	sparse	oth
logs				
root wads			X	
rocks	X			
undercuts				
other				

STREAM BANKS: steep ☐ sloping ☐ undercut ☐ eroded ☐ rock ☒ soil ☐

SURROUNDING LAND USE: forest ☒ rangeland ☐ suburban ☐ recreational ☒ farmland ☐

PLANTS:

type:	abundant	moderate	sparse
poplar	X		
knapweed		X	
grasses		X	

INSECTS:	abundant	mod	sparse
aquatic:			
Ephemeroptera		X	
Plecoptera		X	
Tricoptera		X	

land-based			

COMMENTS:

Benchmark= Poplar tree on North bank at the Cummings Resort Campsite bridge.

Photo#1 Typical Reach looking upstream

#2 Typical Reach looking downstream

#3 Barrier

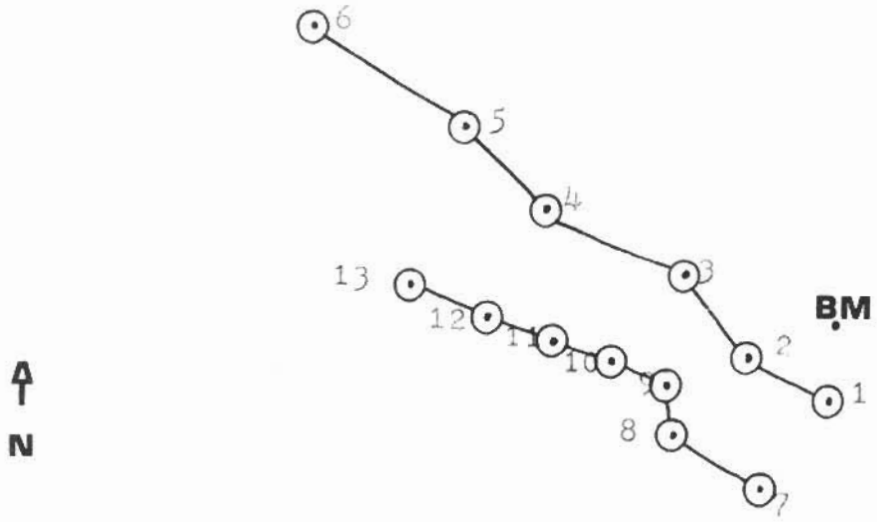
#4 Confluence (aerial)

n.b. Total length of stream accessible is approx. 2 km.

1986 KOOTENAY LAKE/SOUTH ARM STREAM INVENTORY
TYPICAL REACH

Stream Name: AKOKLI CREEK

Scale:1cm-4m



Comments: Narrow, steep stream. Has few pools or areas of cover. Portion below bridge has been channelized and rip-rapped. Barrier is 120 meters above highway bridge.

1986 KOOTENAY LAKE/ SOUTH ARM STREAM INVENTORY PHOTOGRAPHS

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1986 KOOTENAY LAKE/ SOUTH ARM STREAM INVENTORY PHOTOGRAPHS

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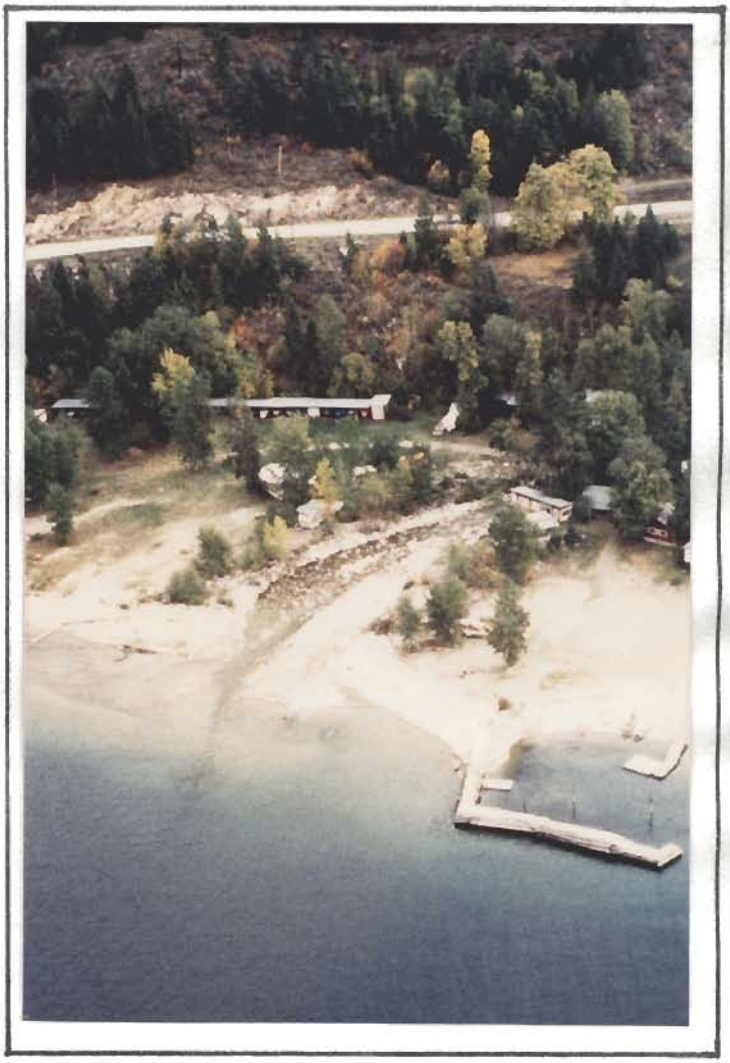

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1986 KOOTENAY LAKE / SOUTH ARM STREAM INVENTORY

STREAM: BOULDER CREEK **LOCATION:** _____ **LONG** 116°09'30

DATE: July 10/86 **TIME:** 06:45 hr. **LAT** 49°15'45"

TURBIDITY: Clear

WATER TEMP: 10°C.

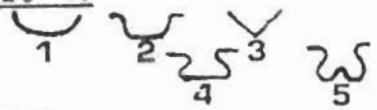
AIR TEMP: 14°C.

FLOW: (surface) 1.2 m./sec.

GRADIENT: from 1% to 6%

SUBSTRATE: silt 2 % sand 5 % gravel 10 % stone 13 % cobble 30 % rubble 30 % boulder 10 %

STREAM PROFILE: #1



ARMOURING: poor ☐ fair ☐ moderate ☒ good ☐

RUN 30 % **RIFFLE** 30 % **POOL** 40 %

SURROUNDING VEGETATION:

type:	abundant	mod	sparse	none
shrub	X			
conif		X		
decid	X			
grass				X

OBSTRUCTIONS:

	height	location
dam		
falls	approx. 2.5m	approx. 100m above Hwy 3a bridge
culvert		
log jam		
other		

AREAS OF COVER

	abundant	mod	sparse	oth
logs			X	
root wads		X		
rocks			X	
undercuts		X		
other				

STREAM BANKS: steep ☒ sloping undercut ☒ eroded ☒ rock ☒ soil ☒

SURROUNDING LAND USE: forest ☒ rangeland ☐ suburban ☐ recreational ☐ farmland ☐

PLANTS:

type:	abundant	moderate	sparse
alder	X		
poplar		X	
D.fir			X

INSECTS:	abundant	mod	sparse
aquatic:			
Ephemeroptera			X
Odonata		X	
Diptera	X		
land-based			
Hymenoptera			X
horseflies		X	

COMMENTS:

Benchmark= Cedar tree on the North bank approx. 10 m. below barrier

Photo #1 Beaver Dam

#2 Aerial view of middle portion of creek and meadow

#3 Barrier

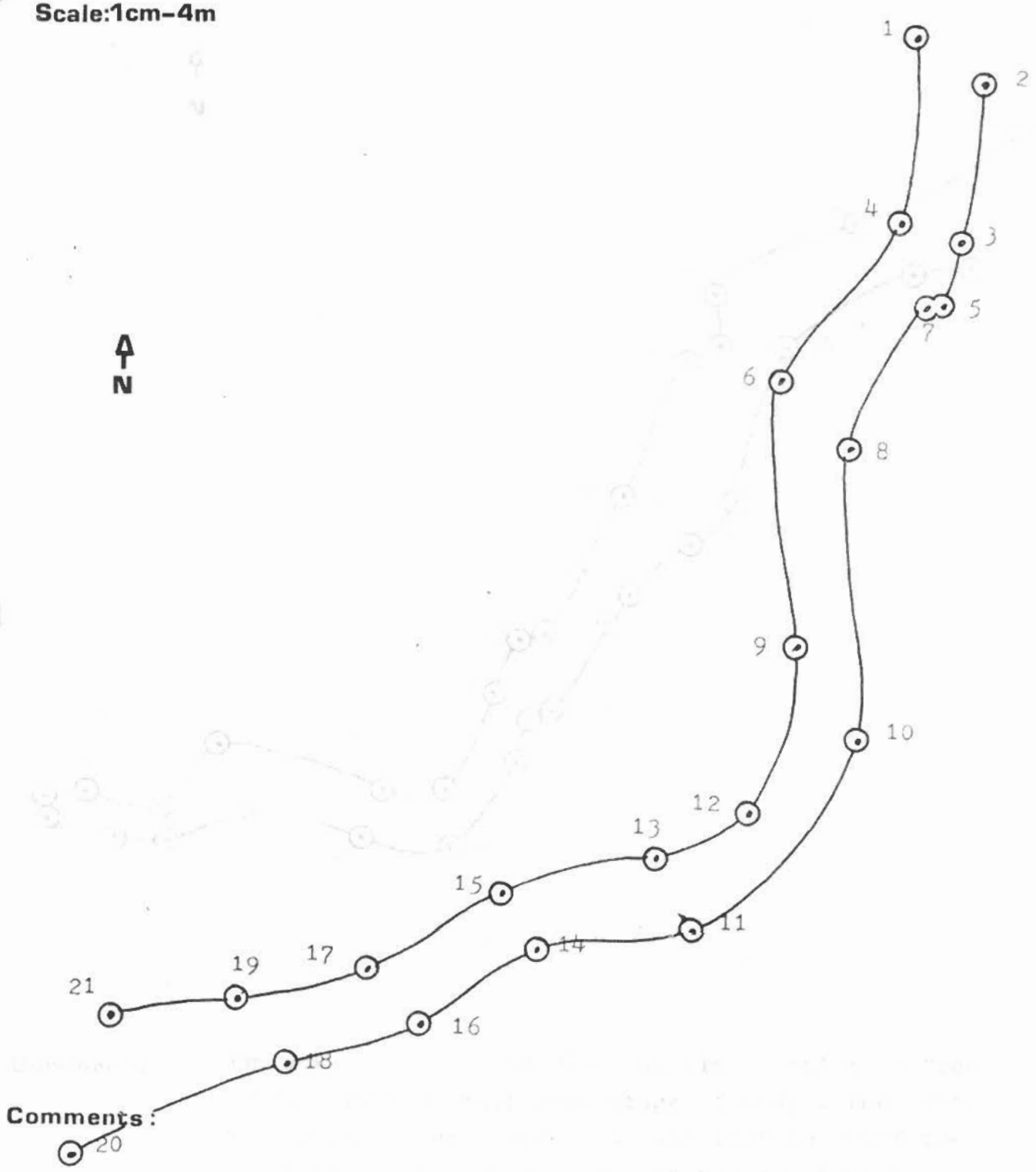
#4 Confluence (aerial)

n.b. Total length of stream accessible is approx 2 km.

1986 KOOTENAY LAKE/SOUTH ARM STREAM INVENTORY
TYPICAL REACH

Stream Name: BOULDER CREEK-BM:1 to 21:20

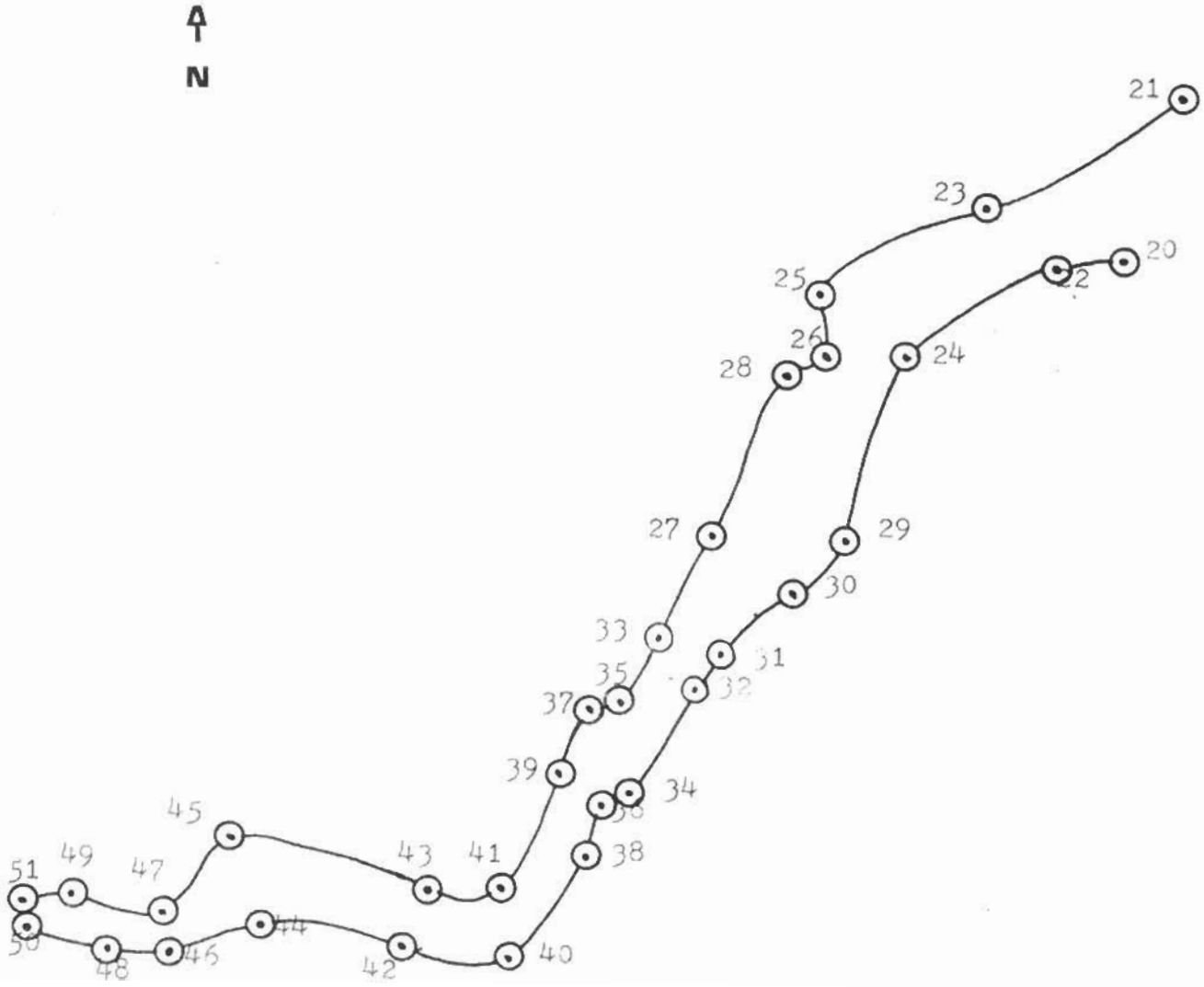
Scale:1cm-4m



Comments:

1986 KOOTENAY LAKE/SOUTH ARM STREAM INVENTORY
TYPICAL REACH

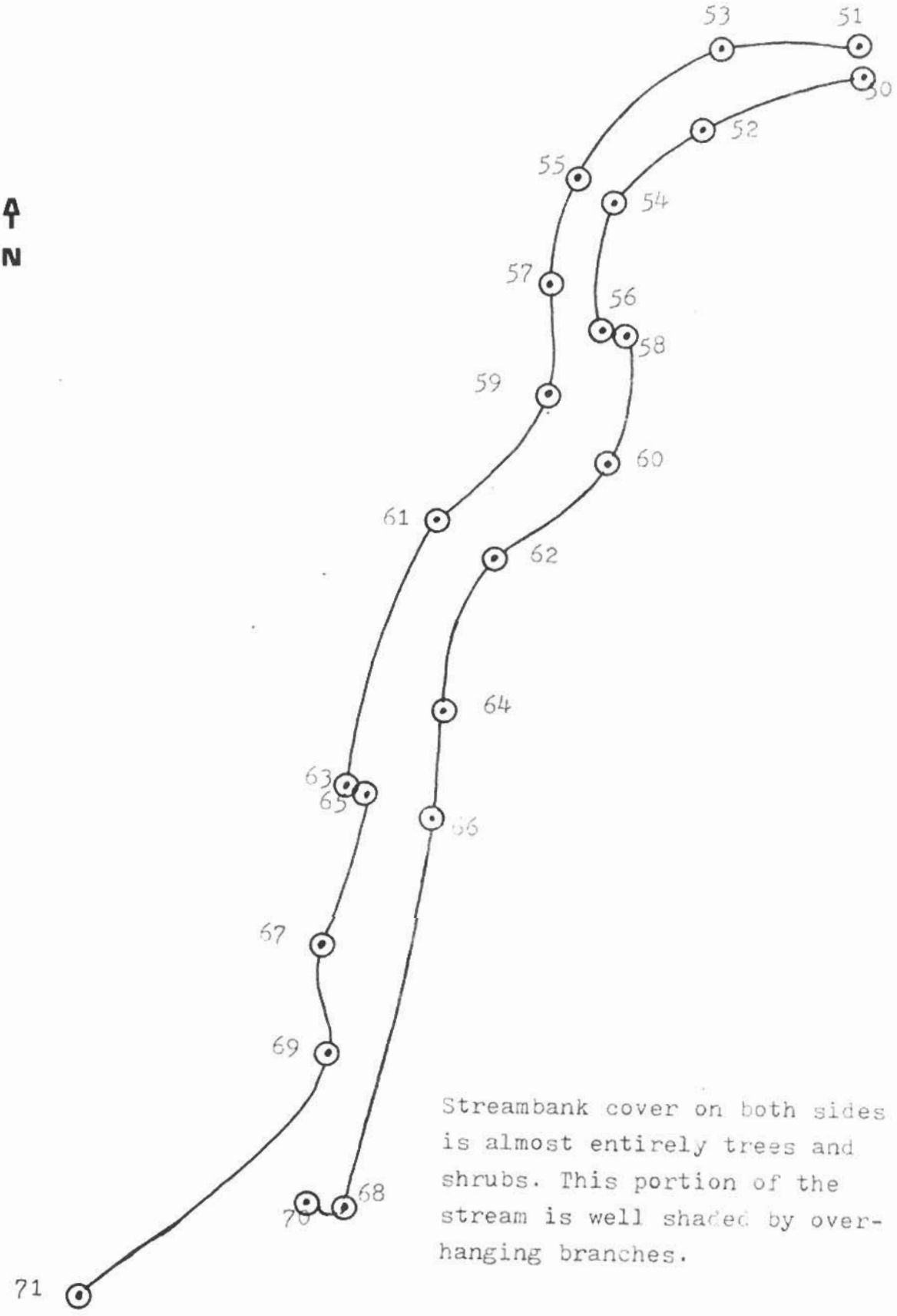
Stream Name: BOULDER CREEK-21:20 to 50:51



Comments: Streambank cover on both sides is almost entirely trees and shrubs with a small percentage of grass. The South-west side has several undercuts and root wads and the entire reach is well shaded by overhanging branches.

1986 KOOTENAY LAKE/SOUTH ARM STREAM INVENTORY
TYPICAL REACH

Stream Name: BOULDER CREEK-50:51 to 70:71

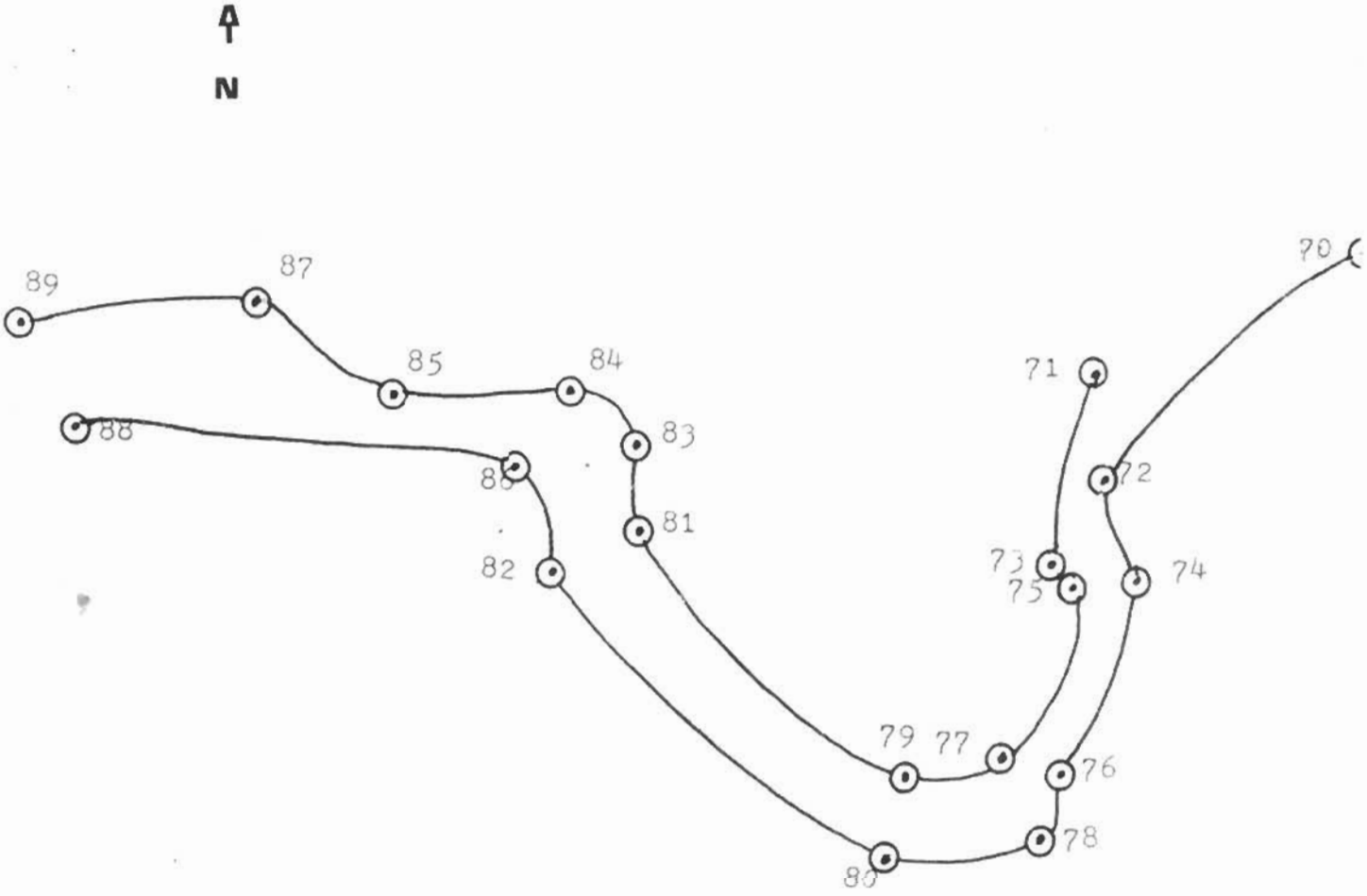


Comments:

Streambank cover on both sides is almost entirely trees and shrubs. This portion of the stream is well shaded by over-hanging branches.

1986 KOOTENAY LAKE/SOUTH ARM STREAM INVENTORY
TYPICAL REACH

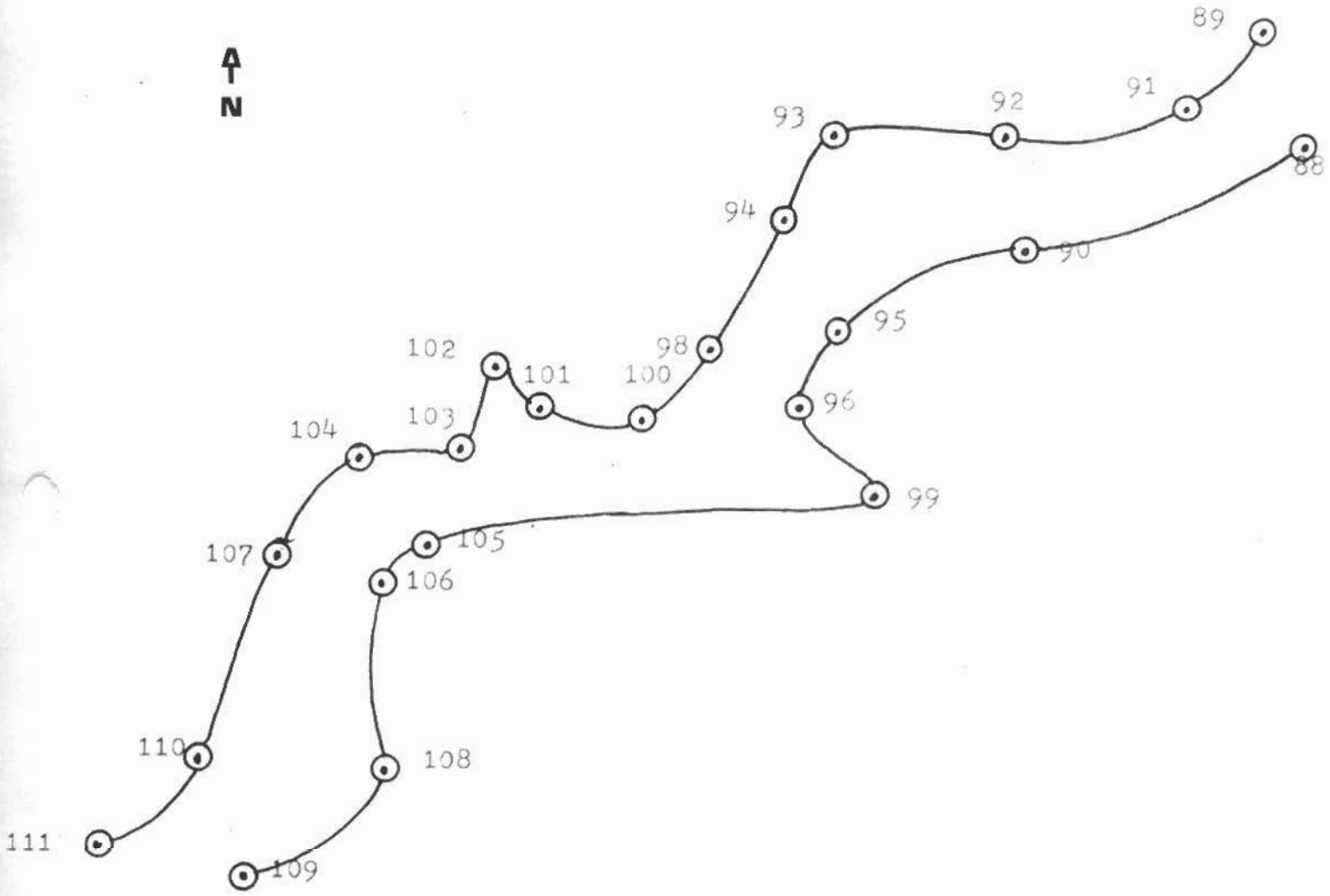
Stream Name: BOULDER CREEK-70:71 to 88:89



Comments: Substrate is 20% sand, 40% gravel and 40% stone.(approx) North side of streambank cover is grasses and shrubs with a few trees. South side is mostly shrubs and trees but some grass and thistle is present.

1986 KOOTENAY LAKE/SOUTH ARM STREAM INVENTORY
TYPICAL REACH

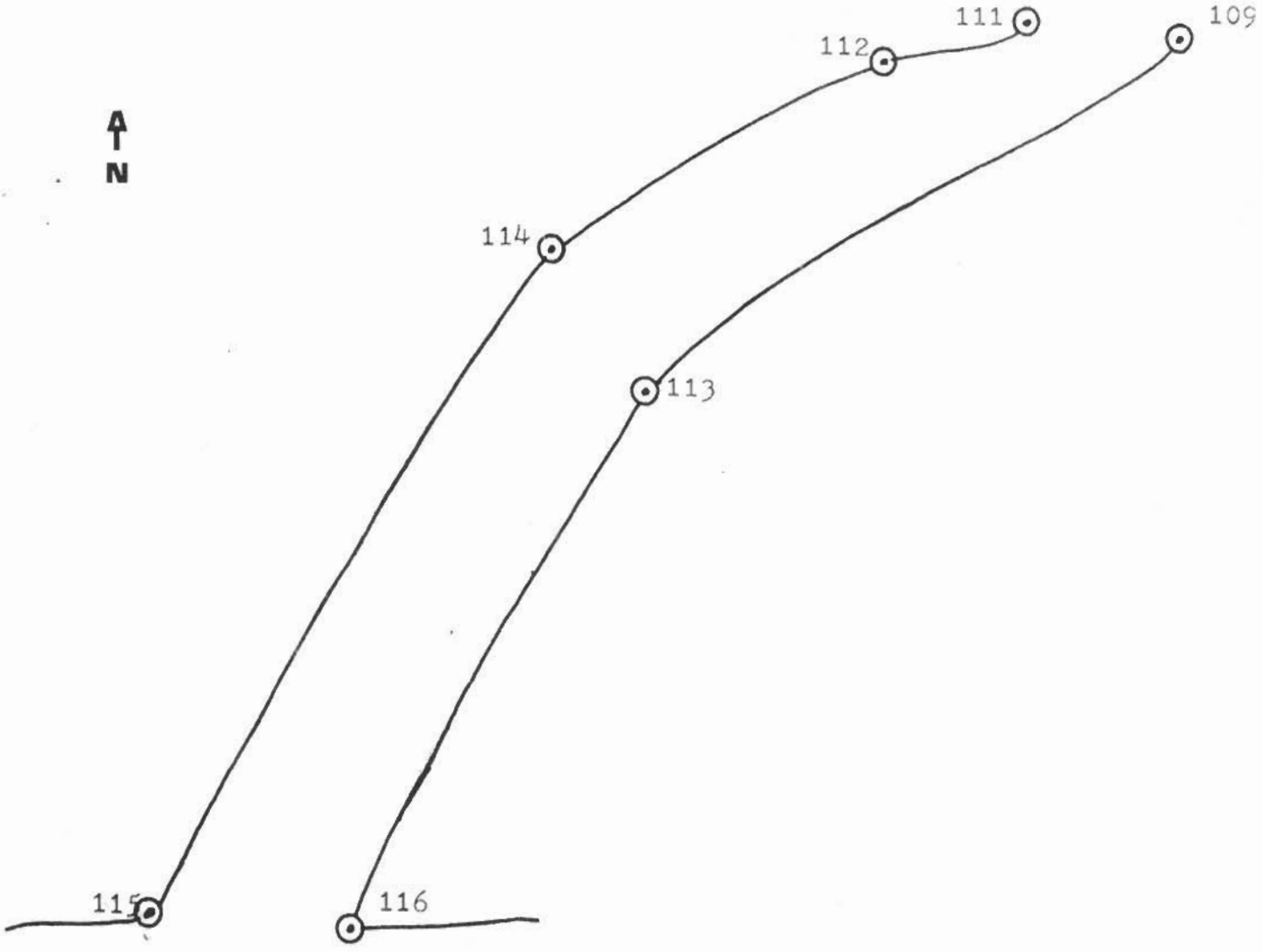
Stream Name: BOULDER CREEK-88:89 to 109:111



Comments: There is no gravel below station 88:89. Substrate is is all silt and sand. North side of streambank cover is grass with undercuts for cover. South side is mostly grass and thistle with a few shrubs. The Diptern population was very dense; mostly mosquitos.

1986 KOOTENAY LAKE/SOUTH ARM STREAM INVENTORY
TYPICAL REACH

Stream Name: BOULDER CREEK-109:111 to Kootenay River Channel



Comments: Beavers are evident along this reach. There is a beaver dam at station 109:111 that may be an obstacle, but it may not be tall enough to constitute a barrier. No Kokanee were evident in this stream.

1986 KOOTENAY LAKE/ SOUTH ARM STREAM INVENTORY PHOTOGRAPHS

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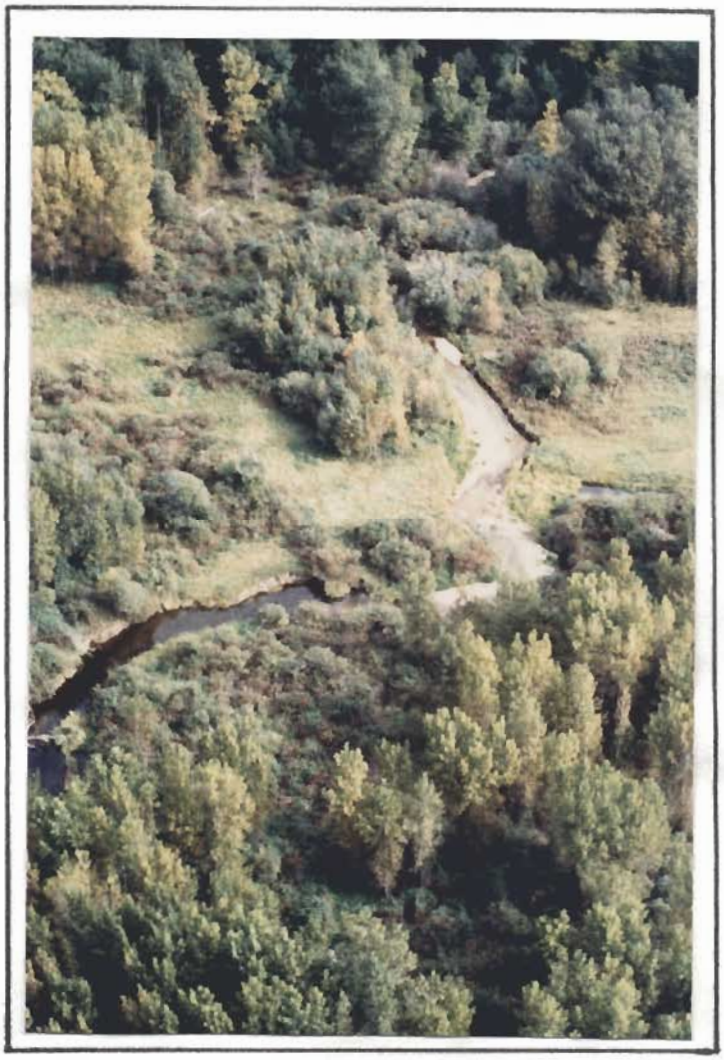

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1986 KOOTENAY LAKE/ SOUTH ARM STREAM INVENTORY PHOTOGRAPHS

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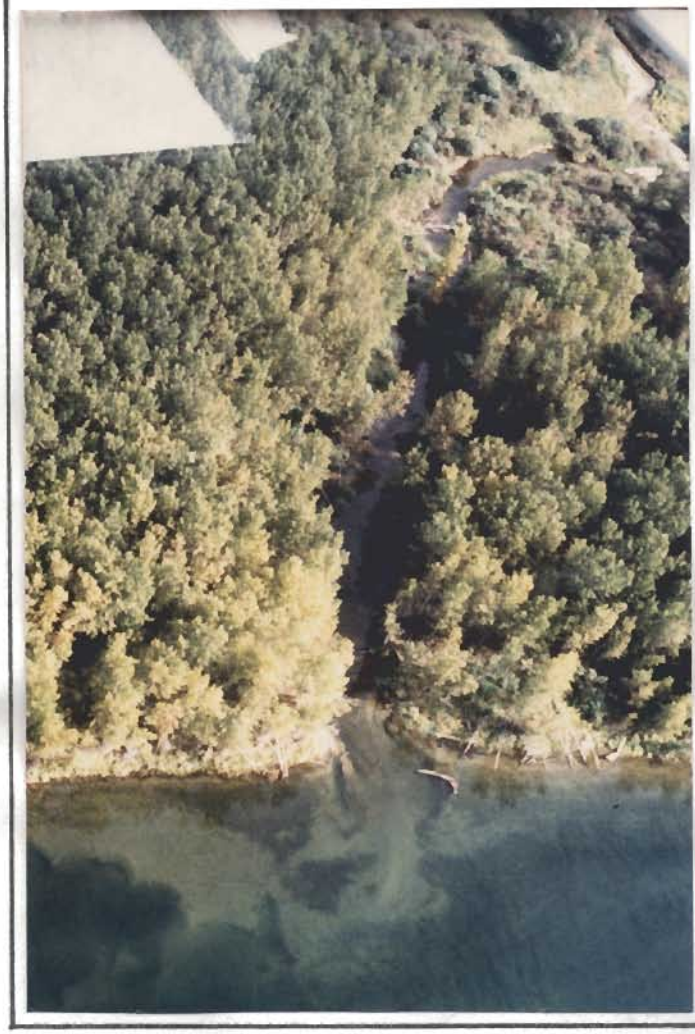

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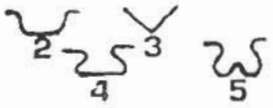
1986 KOOTENAY LAKE / SOUTH ARM STREAM INVENTORY

STREAM: BOUNDARY CREEK **LOCATION:** _____ **LONG** 116°30'15
DATE: Oct. 16/86 **TIME:** 16:40 hr. **LAT** 49°00'06"
TURBIDITY: Clear
WATER TEMP: 4.5°C.
AIR TEMP: 13.5°C.
FLOW: (surface) 1.33 m./sec.
GRADIENT: 2%
SUBSTRATE: silt Ø % sand 2.5 % gravel 2.5 % stone 2.5 % cobble 2.5 % rubble 70 % boulder 20 %
STREAM PROFILE: #1 

ARMOURING: poor ☐ fair ☐ moderate ☐ good ☒
RUN 40 % **RIFFLE** 50 % **POOL** 10 %

SURROUNDING VEGETATION:

type:	abundant	mod	sparse	none
shrub			X	
conif		X		
decid	X			
grass			X	

OBSTRUCTIONS:

	height	location
dam		
falls	approx. 2m.	approx 12 km
culvert		from
logjam		confluence
other		

AREAS OF COVER

	abundant	mod	sparse	oth
logs			X	
root wads			X	
rocks		X		
undercuts			X	
other				

STREAM BANKS: steep ☐ sloping ☒ undercut ☐ eroded ☐ rock ☒ soil ☐

SURROUNDING LAND USE: forest ☒ rangeland ☒ suburban ☐ recreational ☐ farmland ☐

PLANTS:

type:	abundant	moderate	sparse
poplar	X		
alder		X	
D. fir			X

INSECTS:	abundant	mod	sparse
aquatic:			
Ephemeroptera		X	
Plecoptera		X	
Tricoptera		X	
land-based			
horseflies		X	
spiders	X		
millipedes			X

COMMENTS:

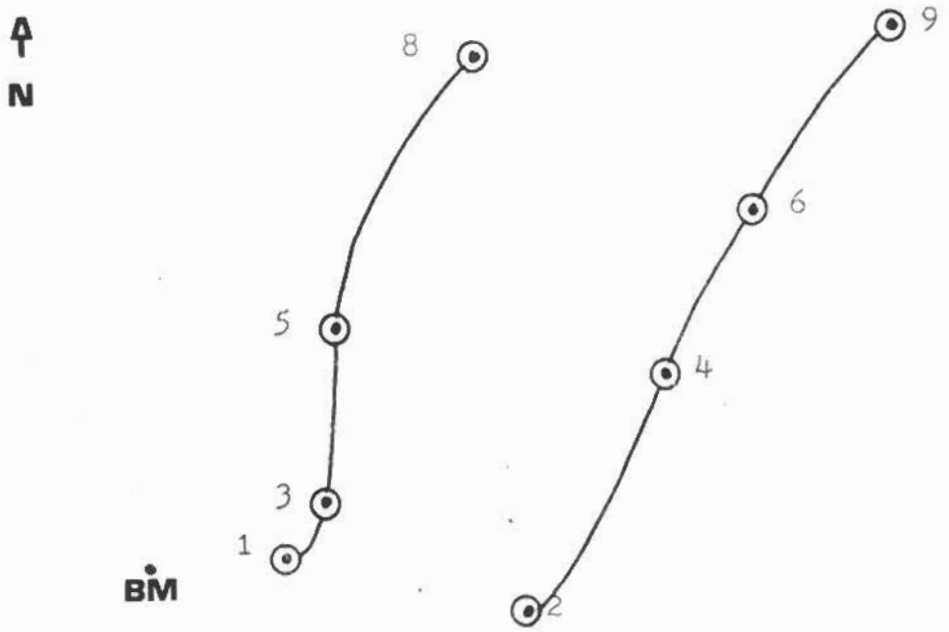
Benchmark= Cedar tree between old bridge and trolley cable near "American Corral"

Photo #1 Typical Reach looking upstream
#2 Typical Reach looking downstream
#3 Barrier (aerial)
#4 Confluence

1986 KOOTENAY LAKE/SOUTH ARM STREAM INVENTORY
TYPICAL REACH

Stream Name: BOUNDARY CREEK

Scale: 1cm–4m



Comments: Water level and clarity vary greatly with substantial rainfalls and thaws. Stream bank cover, trees and shrubs. Few pools, undercuts, etc. Lower 1.5 km very slow and deep with steep banks. No stream bank cover.

1986 KOOTENAY LAKE/ SOUTH ARM STREAM INVENTORY PHOTOGRAPHS

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1986 KOOTENAY LAKE/ SOUTH ARM STREAM INVENTORY PHOTOGRAPHS

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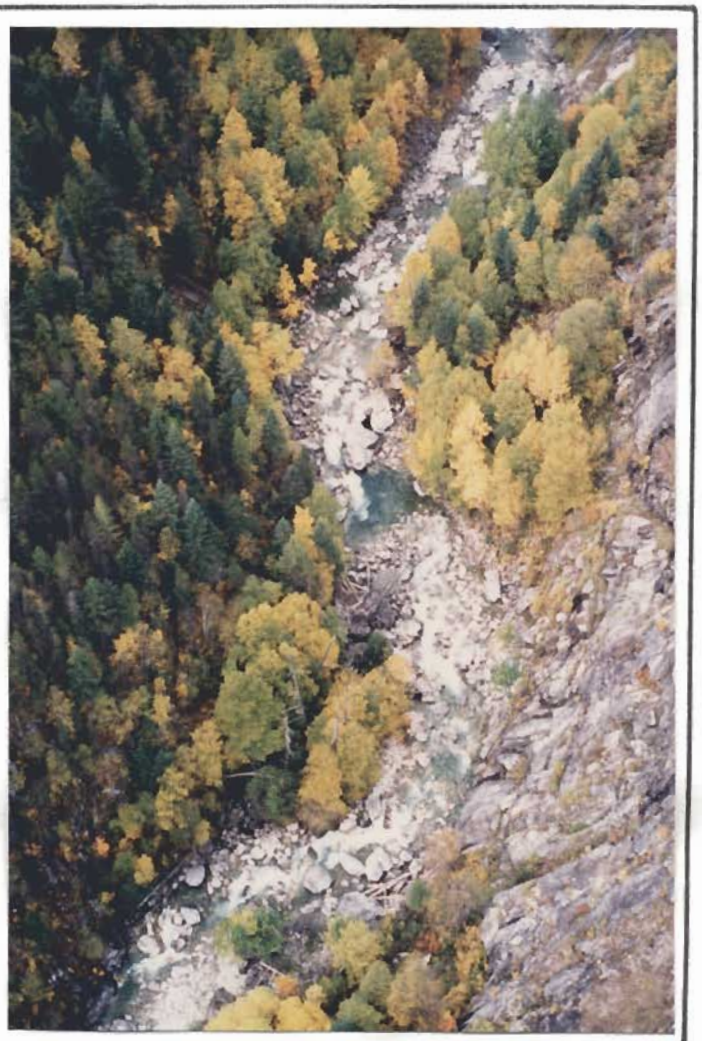

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1986 KOOTENAY LAKE/ SOUTH ARM STREAM INVENTORY PHOTOGRAPHS

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1986 KOOTENAY LAKE / SOUTH ARM STREAM INVENTORY

STREAM: CORN CREEK **LOCATION:** _____ LONG 116°36'40"
LAT 49°08'55"

DATE: July 2/86 **TIME:** 06:30 hr.

TURBIDITY: Clear

WATER TEMP: 13°C.

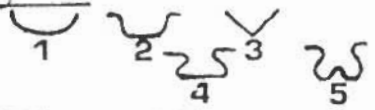
AIR TEMP: 13°C.

FLOW: (surface) 0.67 m./sec.

GRADIENT: 2%

SUBSTRATE: silt 2 % sand 4 % gravel 6 % stone 14 % cobble 45 % rubble 25 % boulder 5 %

STREAM PROFILE: #1



ARMOURING: poor ☐ fair ☐ moderate ☒ good ☐

RUN 35 % **RIFFLE** 35 % **POOL** 30 %

SURROUNDING VEGETATION:

type:	abundant	mod	sparse	none
shrub		X		
conif			X	
decid	X			
grass			X	

OBSTRUCTIONS:

	height	location
dam		
falls	approx. 3m	approx 2.5 km
culvert		from West
log jam		Creston bridge
other		

AREAS OF COVER

	abundant	mod	sparse	oth
logs			X	
root wads			X	
rocks		X		
undercuts		X		
other				

STREAM BANKS: steep ☐ sloping ☐ undercut ☐ eroded ☐ rock ☒ soil ☐

SURROUNDING LAND USE: forest ☒ rangeland ☐ suburban ☐ recreational ☒ farmland ☒

PLANTS:

type:	abundant	moderate	sparse
poplar		X	
alder		X	
D.fir			X

INSECTS:	abundant	mod	sparse
aquatic:			
Ephemeroptera		X	
Plecoptera		X	
Tricoptera		X	
land-based			
Hymenoptera		X	
Horseflies		X	

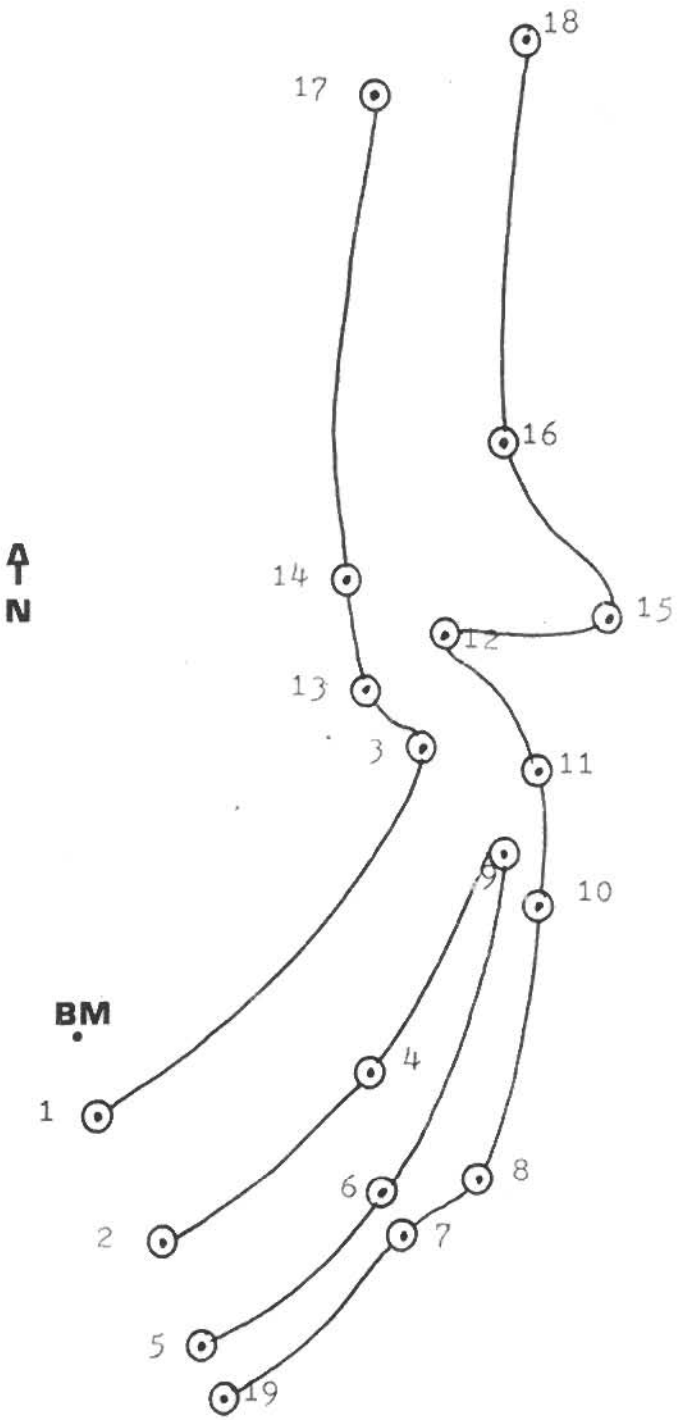
COMMENTS:

Benchmark= South end of log pile
approx 2 km. above West Creston bridge (on the South bank)
Photo #1 Typical Reach looking downstream
#2 Typical Reach looking upstream
#3 Barrier
#4 Unstable Clay Banks approx. 1.5 km. below West Creston bridge
#5 Unstable Clay Bank approx 1.5 km. above West Creston bridge
n.b. Total length of stream accessible is approx 6.5 km.

1986 KOOTENAY LAKE/SOUTH ARM STREAM INVENTORY
TYPICAL REACH

Stream Name: CORN CREEK

Scale: 1cm-4m



Comments: Although Rainbow Trout utilize this stream for spawning, there were no Kokanee evident. There is a braid of this stream which flows into the Kootenay River, but the main flow is into the Corn Creek Marsh and the Creston Valley Wildlife Management Area.

1986 KOOTENAY LAKE/ SOUTH ARM STREAM INVENTORY PHOTOGRAPHS

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1986 KOOTENAY LAKE/ SOUTH ARM STREAM INVENTORY PHOTOGRAPHS

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1986 KOOTENAY LAKE/ SOUTH ARM STREAM INVENTORY PHOTOGRAPHS

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1986 KOOTENAY LAKE / SOUTH ARM STREAM INVENTORY

STREAM: CULTUS CREEK **LOCATION:** _____ **LONG** 116°47'30"
LAT 49°19'45"

DATE: Sept 5/86 **TIME:** 11:30 hr.

TURBIDITY: Clear

WATER TEMP: 13°C.

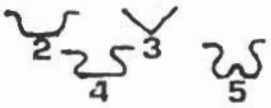
AIR TEMP: 21°C.

FLOW: (surface) 1.46 m./sec.

GRADIENT: 2.5%

SUBSTRATE: silt Ø % sand 1 % gravel 4 % stone 2.5% cobble 7.5 % rubble 45 % boulder 40 %

STREAM PROFILE: #1



ARMOURING: poor ☐ fair ☐ moderate ☐ good ☒

RUN 40 % **RIFFLE** 40 % **POOL** 20 %

SURROUNDING VEGETATION:

type:	abundant	mod	sparse	none
shrub			X	
conif		X		
decid			X	
grass			X	

OBSTRUCTIONS:

	height	location
dam		
falls (tiered)	approx. 2m.	approx 1.8km upstream from confluence
culvert		
log jam		
other		

AREAS OF COVER

	abundant	mod	sparse	oth
logs			X	
root wads			X	
rocks			X	
undercuts			X	
other				

STREAM BANKS: steep ☐ sloping ☐ undercut ☐ eroded ☐ rock ☒ soil ☐

SURROUNDING LAND USE: forest ☒ rangeland ☐ suburban ☐ recreational ☐ farmland ☐

PLANTS:

type:	abundant	moderate	sparse
poplar		X	
D, Fir		X	
alder			X

INSECTS:	abundant	mod	sparse
aquatic:			
Ephemeroptera		X	
Plecoptera		X	
Tricoptera		X	

land-based			
flies		X	
spiders		X	

COMMENTS:

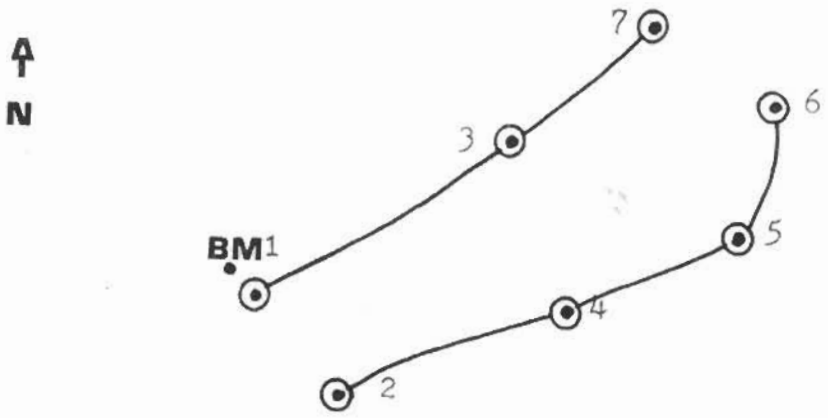
Benchmark= Tree overhanging large granite boulder at the end of tourist path to creek

Photo #1 Typical Reach looking downstream
#2 Typical Reach looking upstream
#3 Barrier
#4 Confluence

1986 KOOTENAY LAKE/SOUTH ARM STREAM INVENTORY
TYPICAL REACH

Stream Name: CULTUS CREEK

Scale: 1cm-4m



Comments: Broad delta at confluence. Heavily silted. Very little cover for rearing areas (pools). No resident fish evident.

1986 KOOTENAY LAKE/ SOUTH ARM STREAM INVENTORY PHOTOGRAPHS

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1986 KOOTENAY LAKE/ SOUTH ARM STREAM INVENTORY
PHOTOGRAPHS

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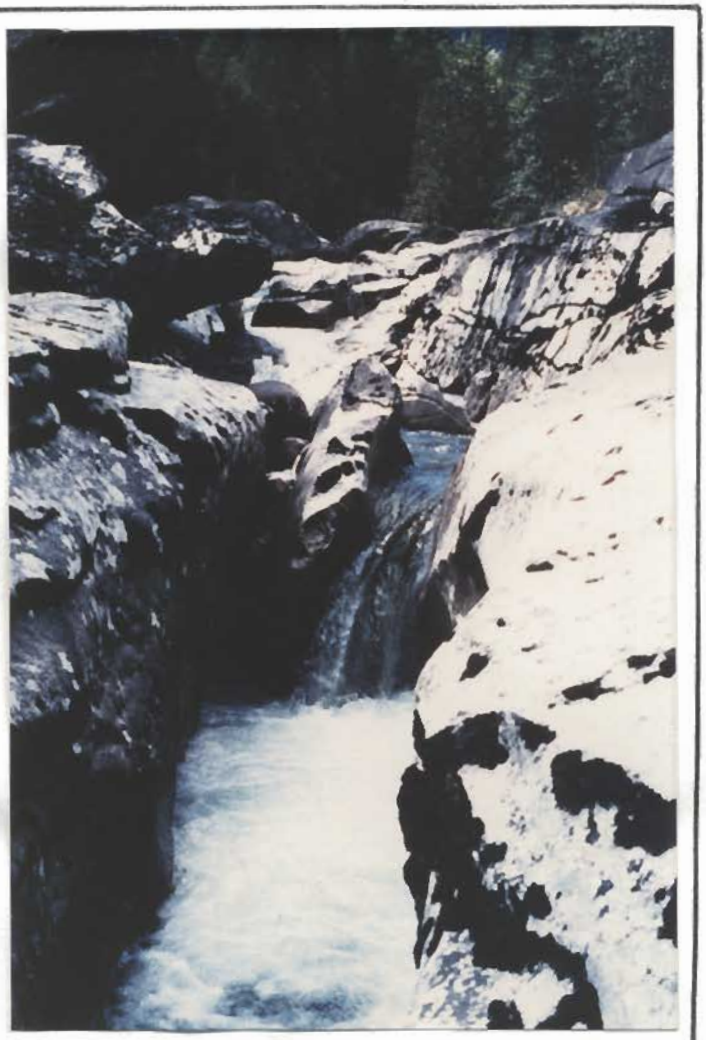

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1986 KOOTENAY LAKE / SOUTH ARM STREAM INVENTORY

STREAM: DUCK CREEK **LOCATION:** _____ **LONG** 116°06'2
DATE: Nov.5/86 **TIME:** 15:00 hr. **LAT** 49°12'45

TURBIDITY: Clear

WATER TEMP: 6°C.

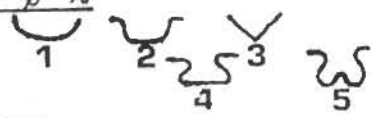
AIR TEMP: 10°C.

FLOW: (surface) 2.04 m./sec.

GRADIENT: 1%

SUBSTRATE: silt 5 % sand 10 % gravel 30 % stone 40 % cobble 15 % rubble Ø % boulder Ø %

STREAM PROFILE: #1



ARMOURING: poor ☐ fair ☐ moderate ☐ good ☒

RUN 45 % **RIFFLE** 45 % **POOL** 10 %

SURROUNDING VEGETATION:

type:	abundant	mod	sparse	none
shrub		X		
conif			X	
decid			X	
grass		X		

OBSTRUCTIONS:

	height	location
dam		
falls		
culvert	approx.1.5m	where Hwy 3a
log jam		crosses
other		stream

AREAS OF COVER

	abundant	mod	sparse	oth
logs				
root wads		X		
rocks			X	
undercuts				
other	X			

STREAM BANKS: steep ☐ sloping undercut ☒ eroded ☐ rock ☐ soil ☐

SURROUNDING LAND USE: forest ☐ rangeland ☐ suburban ☐ recreational ☐ farmland ☒

PLANTS:

type:	abundant	moderate	sparse
alder	X		
poplar	X		
rosehip	X		

INSECTS:	abundant	mod	sparse
aquatic:			
Ephemeroptera		X	
Plecoptera		X	
Tricoptera		X	
land-based			
Hymenoptera	X		

COMMENTS:

Benchmark= Stone cairn on South bank of dyke at the end of Wigen Road

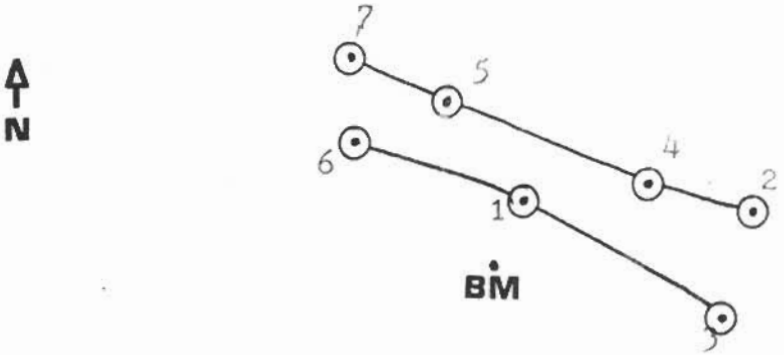
Photo #1 Typical Reach looking upstream

#2 Typical Reach looking downstream

n.b. Confluence is approx.2 km. North on the Goat River Channel. This stream is no longer utilized by spawning Kokanee. Barrier is the culvert under Highway 3a.(no Kokanee, Dolley or Rainbow above this point) Length accessible; approx. 2.5 km.

1986 KOOTENAY LAKE/SOUTH ARM STREAM INVENTORY
TYPICAL REACH

Stream Name: DUCK CREEK
Scale: 1cm - 4m



Comments: Stream bank cover includes trees, shrubs, and grasses. Several large undercuts and pools. Rainbow trout and Dolly Varden utilize this stream for spawning; however, no Kokanee since Goat River diversion.

1986 KOOTENAY LAKE/ SOUTH ARM STREAM INVENTORY PHOTOGRAPHS

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1986 KOOTENAY LAKE/ SOUTH ARM STREAM INVENTORY PHOTOGRAPHS

(3)

1986 KOOTENAY LAKE / SOUTH ARM STREAM INVENTORY

STREAM: GOAT RIVER

LOCATION: _____ **LONG** 116°05'00"

DATE: July 22/86 **TIME:** 07:40 hr (start of braided section. See Photo #4) **LAT** 49°00'04"

TURBIDITY: Clear

WATER TEMP: 10° C.

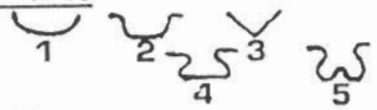
AIR TEMP: 20° C.

FLOW: (surface) 1.73 m./sec.

GRADIENT: 1 %

SUBSTRATE: silt 2.5% sand 5 % gravel 7.5 % stone 50 % cobble 25 % rubble 10 % boulder Ø %

STREAM PROFILE: # 1



ARMOURING: poor ☐ fair ☐ moderate ☐ good ☒

RUN 50 % **RIFFLE** 40 % **POOL** 10 %

SURROUNDING VEGETATION:

type:	abundant	mod	sparse	none
shrub			X	
conif				X
decid		X		
grass			X	

OBSTRUCTIONS:

	height	location
dam	approx. 10m	approx. 6.5km above Hwy 21 bridge
falls		
culvert		
log jam		
other		

AREAS OF COVER

	abundant	mod	sparse	oth
logs			X	
root wads			X	
rocks			X	
undercuts			X	
other				

STREAM BANKS: steep ☐ sloping X undercut ☐ eroded ☐ rock ☒ soil ☐

SURROUNDING LAND USE: forest ☒ rangeland ☐ suburban ☒ recreational ☐ farmland ☐ gravel pit

PLANTS:

type:	abundant	moderate	sparse
poplar		X	
alder		X	
willow			X

INSECTS:

aquatic:	abundant	mod	sparse
Ephemeroptera		X	
Plecoptera			
Tricoptera			

land-based			

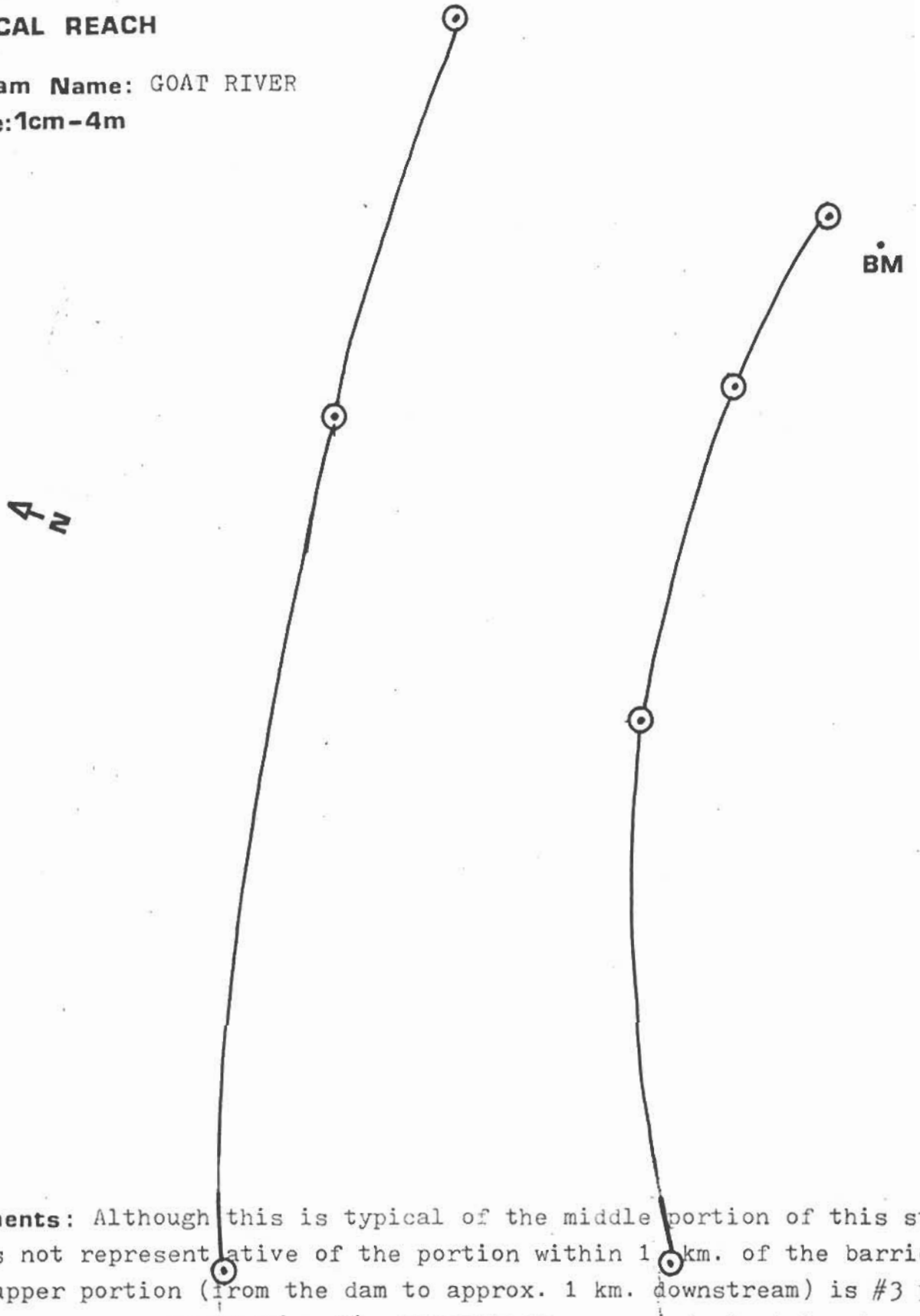
COMMENTS:

Photo # 1 Typical Reach looking Upstream
2 Typical Reach looking Downstream
3 Log Jam on South Braid
4 Beginning of Braided section
5 Goat River Dam
6 Unstable clay bank approx. 3 km. above Hwy. 21 Bridge

n.b. Length of stream (s) accessible which has gravel present is approx. 10.5 km. including the portions of the North and South braids which do not have a clay, silt or sand bottom.

1986 KOOTENAY LAKE/SOUTH ARM STREAM INVENTORY
TYPICAL REACH

Stream Name: GOAT RIVER
Scale: 1cm-4m



Comments: Although this is typical of the middle portion of this stream, it is not representative of the portion within 1 km. of the barrier. The upper portion (from the dam to approx. 1 km. downstream) is #3 profile and has a gradient of 3% - 5%. Streambanks are predominately steep bedrock and there are approx. 10% - 15% boulders. (R/R/P = 20/50/30) Very little streambank cover throughout.

1986 KOOTENAY LAKE/ SOUTH ARM STREAM INVENTORY PHOTOGRAPHS

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1986 KOOTENAY LAKE/ SOUTH ARM STREAM INVENTORY PHOTOGRAPHS

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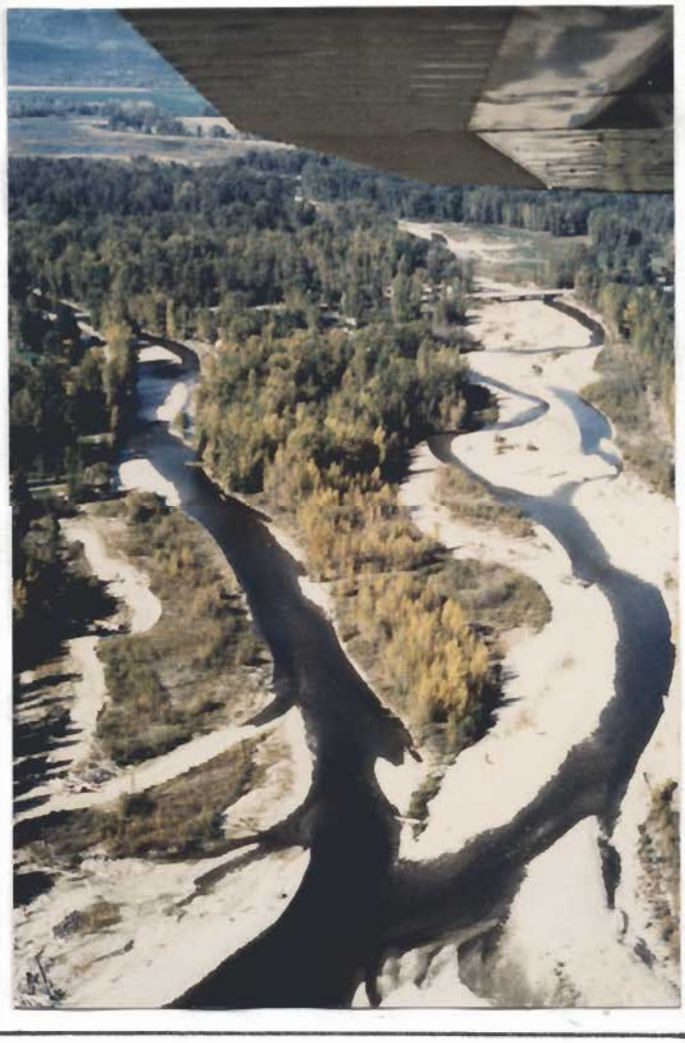

1986 KOOTENAY LAKE/ SOUTH ARM STREAM INVENTORY
PHOTOGRAPHS

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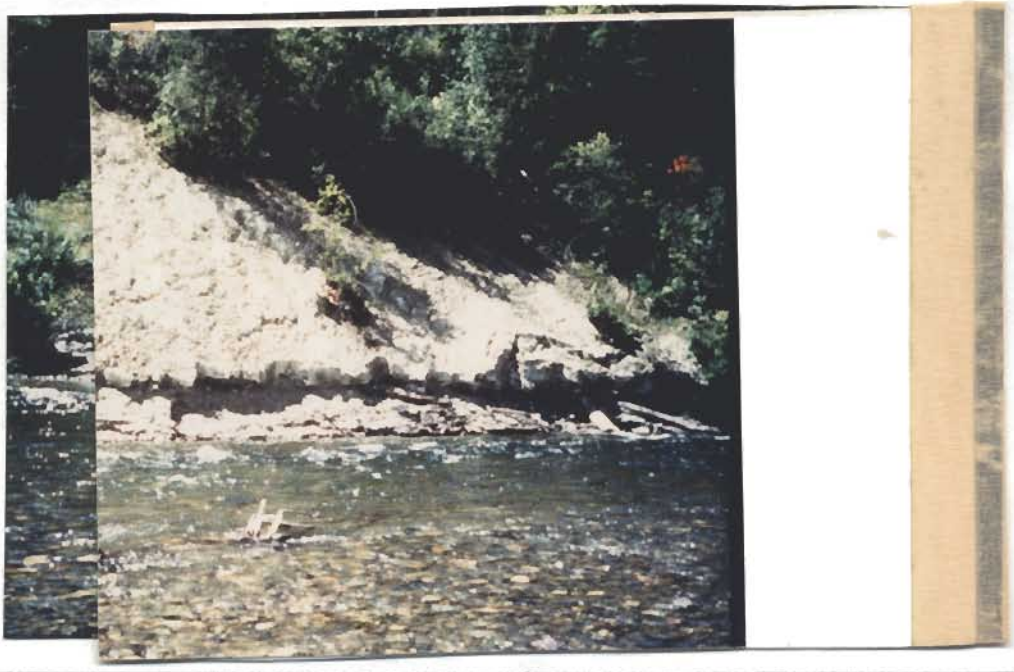


1986 KOOTENAY LAKE / SOUTH ARM STREAM INVENTORY

STREAM: GOAT RIVER CHANNEL **LOCATION:** _____ **LONG** 116°33'40 **LAT** 49°05'25"

DATE: July 15/86 **TIME:** 11:20 hr.

TURBIDITY: Clear

WATER TEMP: 18°C.

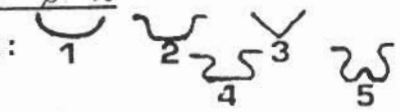
AIR TEMP: 19°C.

FLOW: (surface) 0.51 m./sec.

GRADIENT: less than 1%

SUBSTRATE: silt 50 % sand 50 % gravel Ø % stone Ø % cobble Ø % rubble Ø % boulder Ø %

STREAM PROFILE: #4



ARMOURING: poor [X] fair [ ] moderate [ ] good [ ]

RUN Ø % **RIFFLE** Ø % **POOL** 100 %

SURROUNDING VEGETATION:

type:	abundant	mod	sparse	none
shrub			X	
conif				X
decid	X			
grass	X			

OBSTRUCTIONS:

	height	location
dam		
falls		
culvert		approx 0.5 km South of Duck Lake Road Intersection
logjam		
other Dyke	N/A	

AREAS OF COVER

	abundant	mod	sparse	oth
logs			X	
root wads		X		
rocks				
undercuts		X		
other Weedbeds		X		

STREAM BANKS: steep [X] sloping [ ] undercut [ ] eroded [ ] rock [ ] soil [X]

SURROUNDING LAND USE: forest [ ] rangeland [X] suburban [ ] recreational [ ] farmland [X]

PLANTS:

type:	abundant	moderate	sparse
aquatic		X	
rushes		X	
poplar		X	

INSECTS:	abundant	mod	sparse
aquatic:			
Diptera	X		
Odonata		X	
Hemiptera		X	
land-based			
grasshoppers		X	
spiders		X	

COMMENTS:

Benchmark=Wood Duck nesting box

nearest South End (Duck Lake) pumping station intake channel

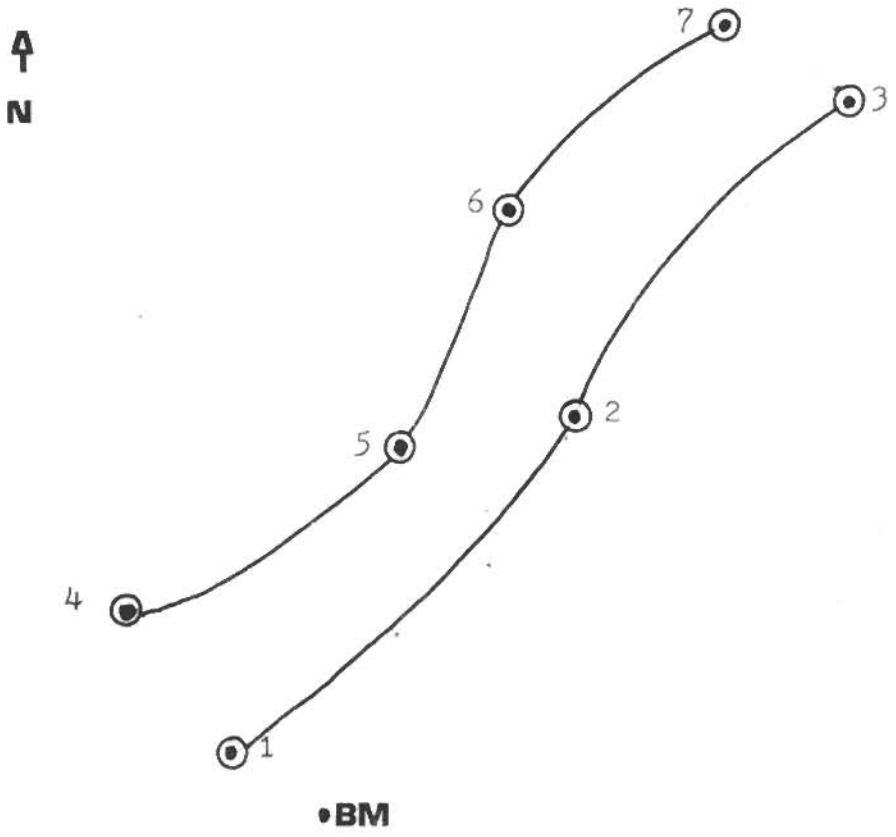
Photo #1 Typical Reach looking upstream

#2 Typical Reach looking downstream

1986 KOOTENAY LAKE/SOUTH ARM STREAM INVENTORY
TYPICAL REACH

Stream Name: GOAT RIVER CHANNEL (between Duck Creek & Duck Lake)

Scale : 1cm - 4m



Comments: Rainbow trout and Dolly Varden utilize this channel to access spawning gravel within Duck Creek. No Kokanee evident. Local history states that since the Goat River diversion no Kokanee run here.

1986 KOOTENAY LAKE/ SOUTH ARM STREAM INVENTORY PHOTOGRAPHS

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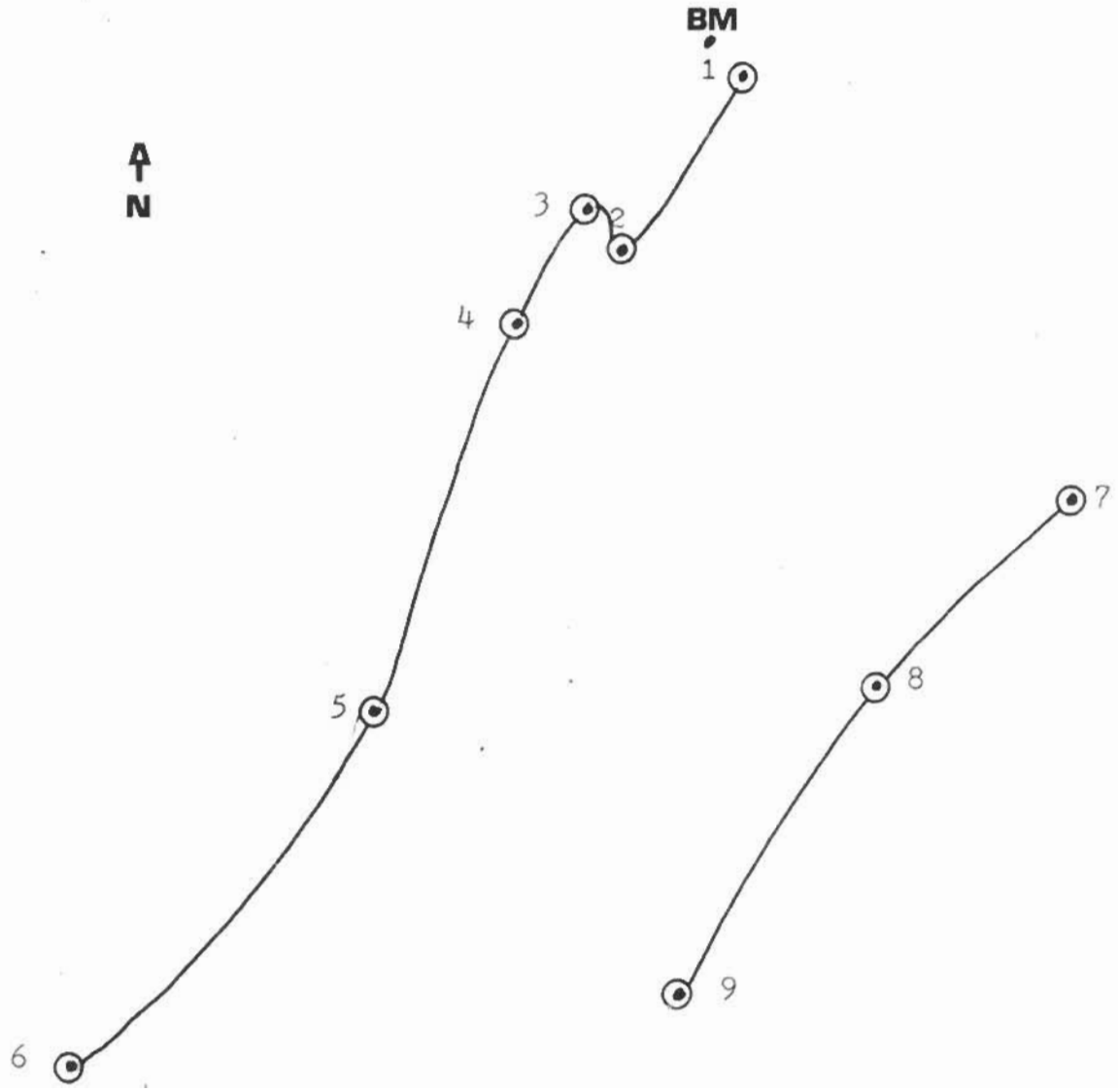
1986 KOOTENAY LAKE/SOUTH ARM STREAM INVENTORY
TYPICAL REACH

Stream Name: GOAT RIVER / NORTH BRAID

Scale: 1cm - 4m



Comments: Well-channelized. During spawning run, no Kokanee observed below 1/2 km from Highway 21 bridge, lower 75% silt/clay bottom. No substantial stream bank cover.

1986 KOOTENAY LAKE/ SOUTH ARM STREAM INVENTORY PHOTOGRAPHS

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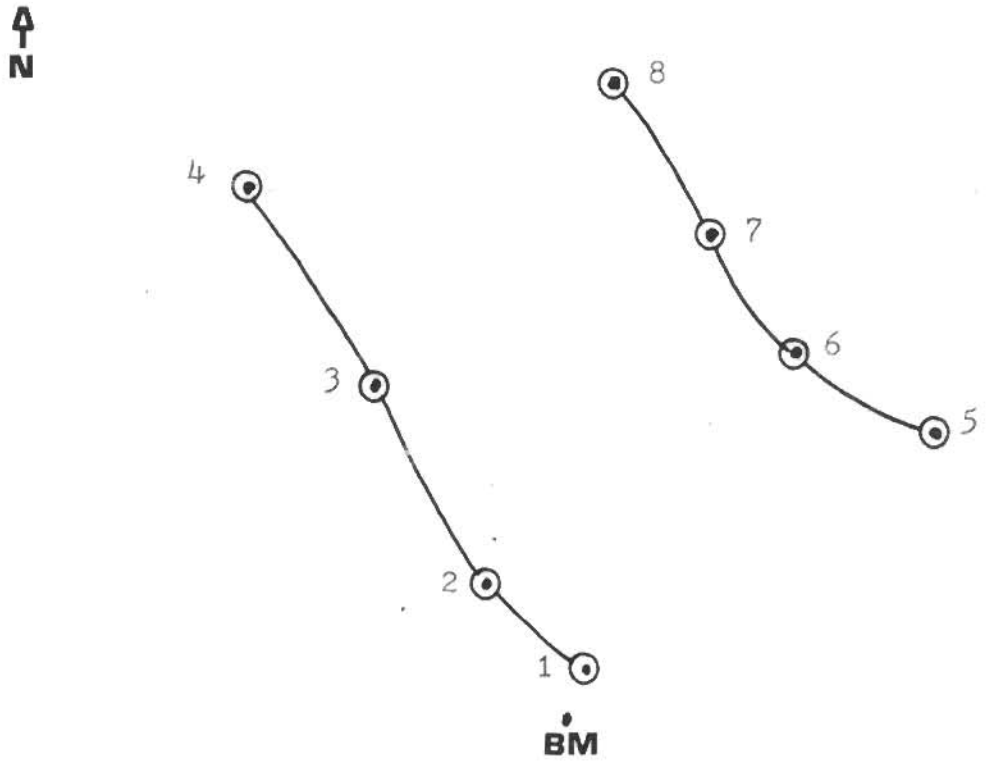
1986 KOOTENAY LAKE/SOUTH ARM STREAM INVENTORY
TYPICAL REACH

Stream Name: GOAT RIVER / SOUTH BRAID

Scale: 1cm—4m



Comments: Well channelized. During spawning run, no Kokanee observed below 1/2 kilometer from Highway bridge. Lower 75% silt/clay bottom. No substantial stream bank cover. One massive log jam, approximately 40 meters by 1.5 kilometers.

1986 KOOTENAY LAKE/ SOUTH ARM STREAM INVENTORY PHOTOGRAPHS

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1986 KOOTENAY LAKE / SOUTH ARM STREAM INVENTORY

STREAM: GRAY CREEK **LOCATION:** _____ **LONG** 116°47'45

DATE: Aug. 21/86 **TIME:** 11:00 hr. **LAT** 49°34'50"

TURBIDITY: Clear

WATER TEMP: 10.5°C.

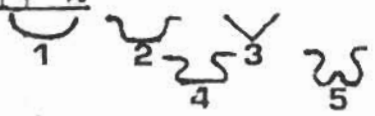
AIR TEMP: 14°C.

FLOW (surface) 1.09 m./sec.

GRADIENT: 6%

SUBSTRATE: silt Ø % sand 5 % gravel 20 % stone 20 % cobble 20 % rubble 20 % boulder 15 %

STREAM PROFILE: #1



ARMOURING: poor ☐ fair ☐ moderate ☐ good ☒

RUN 33 % **RIFFLE** 33 % **POOL** 33 %

SURROUNDING VEGETATION:

type:	abundant	mod	sparse	none
shrub			X	
conif			X	
decid			X	
grass				X

OBSTRUCTIONS:

	height	location
dam		
falls	approx. 2.5m	approx. 300m. above Hwy. 3a bridge
culvert		
log jam		
other		

AREAS OF COVER

	abundant	mod	sparse	oth
logs			X	
root wads			X	
rocks		X		
undercuts			X	
other				

STREAM BANKS: steep ☐ sloping ☐ undercut ☐ eroded ☐ rock ☒ soil ☐

SURROUNDING LAND USE: forest ☐ rangeland ☐ suburban ☐ recreational ☒ farmland ☐

PLANTS:

type:	abundant	moderate	sparse
moss		X	
dogwood			X
alder			X

INSECTS:	abundant	mod	sparse
aquatic:			
Ephemeroptera		X	
Plecoptera		X	
Tricoptera		X	
land-based			
horsefly			X

COMMENTS:

Benchmark= crack in curbing of the Hwy 3a bridge on the South side.

Photo #1 Typical Reach looking upstream

#2 Typical Reach looking downstream

#3 Barrier

#4 Confluence (aerial)

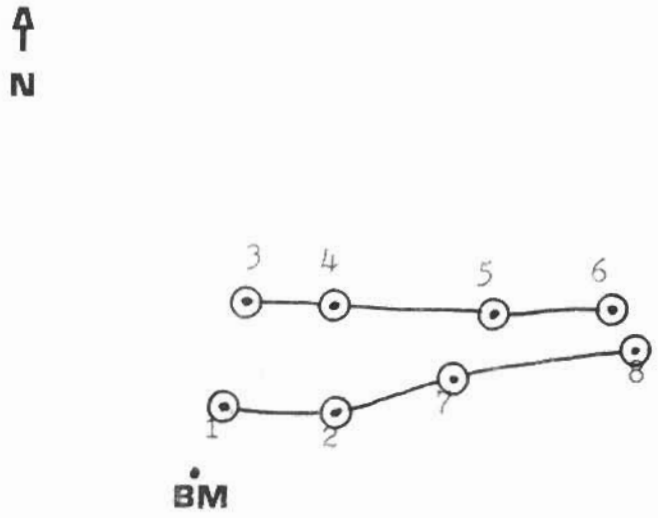
#5 Intake Pond South of campsite # 19, Old Crow Campground.

n.b. Total length of stream accessible is approx. 1.5 km.

1986 KOOTENAY LAKE/SOUTH ARM STREAM INVENTORY
TYPICAL REACH

Stream Name: GRAY CREEK

Scale: 1cm-4m



Comments: Very little stream bank cover. Few undercuts, pools, or root wads. Large pool for irrigation intake pipe (south of campsite #19, Old Crow Campground), provided a resting/spawning area for at least 70 Kokanee. Mineral rich bed rock made it very difficult to obtain credible compass readings.

1986 KOOTENAY LAKE/ SOUTH ARM STREAM INVENTORY PHOTOGRAPHS

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1986 KOOTENAY LAKE/ SOUTH ARM STREAM INVENTORY PHOTOGRAPHS

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1986 KOOTENAY LAKE / SOUTH ARM STREAM INVENTORY

STREAM: INDIAN CREEK **LOCATION:** _____ LONG 116°33'30
LAT 49°05'25"

DATE: July 17/86 **TIME:** 11:00 hr.

TURBIDITY: Clear

WATER TEMP: 10°C.

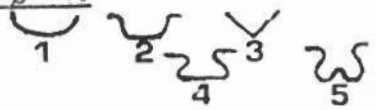
AIR TEMP: 14°C.

FLOW: (surface) 0.21 m./sec.

GRADIENT: less than 1%

SUBSTRATE: silt 90 % sand 8 % gravel 2 % stone ø % cobble ø % rubble ø % boulder ø %

STREAM PROFILE: #2



ARMOURING: poor [X] fair [ ] moderate [ ] good [ ]

RUN 50 % **RIFFLE** 10 % **POOL** 40 %

SURROUNDING VEGETATION:

type:	abundant	mod	sparse	none
shrub	X			
conif				X
decid				X
grass	X			

OBSTRUCTIONS:

	height	location
dam		
falls		
culvert		
log jam	N/A	1 km. below
other		Hwy 21 bridge

AREAS OF COVER

	abundant	mod	sparse	oth
logs				
root wads			X	
rocks				
undercuts			X	
other				

STREAM BANKS: steep [X] sloping [ ] undercut [ ] eroded [X] rock [ ] soil [ ]

SURROUNDING LAND USE: forest [ ] rangeland [X] suburban [ ] recreational [ ] farmland [X]

PLANTS:

type:	abundant	moderate	sparse
sedges	X		
alder		X	
grasses	X		

INSECTS:

	abundant	mod	sparse
aquatic:			
Odonata		X	
Diptera		X	
land-based			
grasshoppers	X		
spiders	X		

COMMENTS:

Benchmark= Northwest bank near cattle bridge on the L.K.I.B. Reserve

Photo #1 Typical Reach looking upstream

#2 Typical Reach looking downstream

n.b. Total length of stream accessible is approx. 3.5 km.

1986 KOOTENAY LAKE/SOUTH ARM STREAM INVENTORY
TYPICAL REACH

Stream Name: INDIAN CREEK

Scale:1cm-4m

Comments: Tributary of south braid of Goat River. Deeply channelized clay. Stream bank cover predominantly grasses. Less than 200 square meters gravel. Very slow flow. Chub and suckers observed.

1986 KOOTENAY LAKE/ SOUTH ARM STREAM INVENTORY PHOTOGRAPHS

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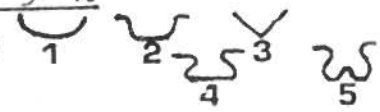
1986 KOOTENAY LAKE / SOUTH ARM STREAM INVENTORY

STREAM: LaFRANCE CREEK **LOCATION:** _____ **LONG** 116°47'5
DATE: Aug. 26/86 **TIME:** 08:00 hr. **LAT** 49°31'20
TURBIDITY: Clear
WATER TEMP: 10°C.
AIR TEMP: 16°C.
FLOW: (surface) 2.19m./sec.
GRADIENT: 3.5%
SUBSTRATE: silt Ø % sand 15 % gravel 10 % stone 10 % cobble 25 % rubble 25 % boulder 5 %
STREAM PROFILE: #1 

ARMOURING: poor ☐ fair ☐ moderate ☐ good ☒
RUN 33 % **RIFFLE** 33 % **POOL** 33 %

SURROUNDING VEGETATION:

type:	abundant	mod	sparse	none
shrub		X		
conif	X			
decid			X	
grass				X

OBSTRUCTIONS:

	height	location
dam		
falls		
culvert		
log jam		approx 4 km. from Hwy. 3a
other (CHUTE)	approx 1.5m	bridge

AREAS OF COVER

	abundant	mod	sparse	oth
logs	X			
root wads		X		
rocks		X		
undercuts		X		
other			X	

STREAM BANKS: steep ☐ sloping ☐ undercut ☐ eroded ☐ rock ☒ soil ☐

SURROUNDING LAND USE: forest ☒ rangeland ☐ suburban ☐ recreational ☐ farmland ☐

PLANTS:

type:	abundant	moderate	sparse
moss	X	X	
Oregon grape		X	
Salmonberry			

INSECTS:	abundant	mod	sparse
aquatic:			
Ephemeroptera		X	
Tricoptera		X	
Plecoptera		X	
land-based			
horseflies			X

COMMENTS:

Benchmark= Log across creek 2 km. from Highway 3a turnoff.

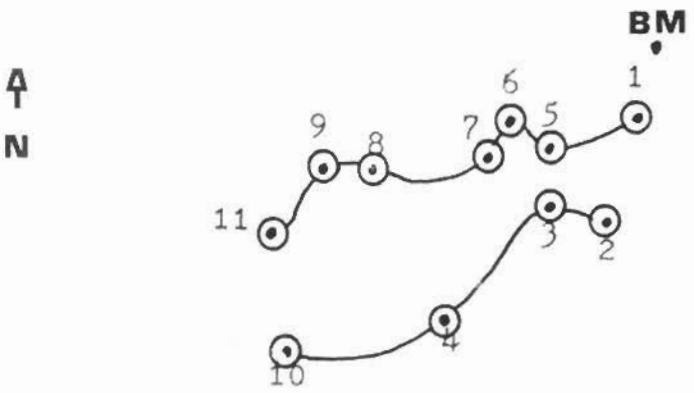
Photo #1 Typical Reach looking upstream
#2 Typical Reach looking downstream
#3 Confluence (aerial)

n.b. No photo of barrier available
Total length of stream accessible is approx. 5 km.

1986 KOOTENAY LAKE/SOUTH ARM STREAM INVENTORY
TYPICAL REACH

Stream Name: LaFRANCE CREEK

Scale: 1cm–4m



Comments: Portion of creek above highway bridge well-shaded by overhanging trees and shrubs. Portion below highway bridge very little stream bank cover. Very little silt evident.

1986 KOOTENAY LAKE/ SOUTH ARM STREAM INVENTORY PHOTOGRAPHS

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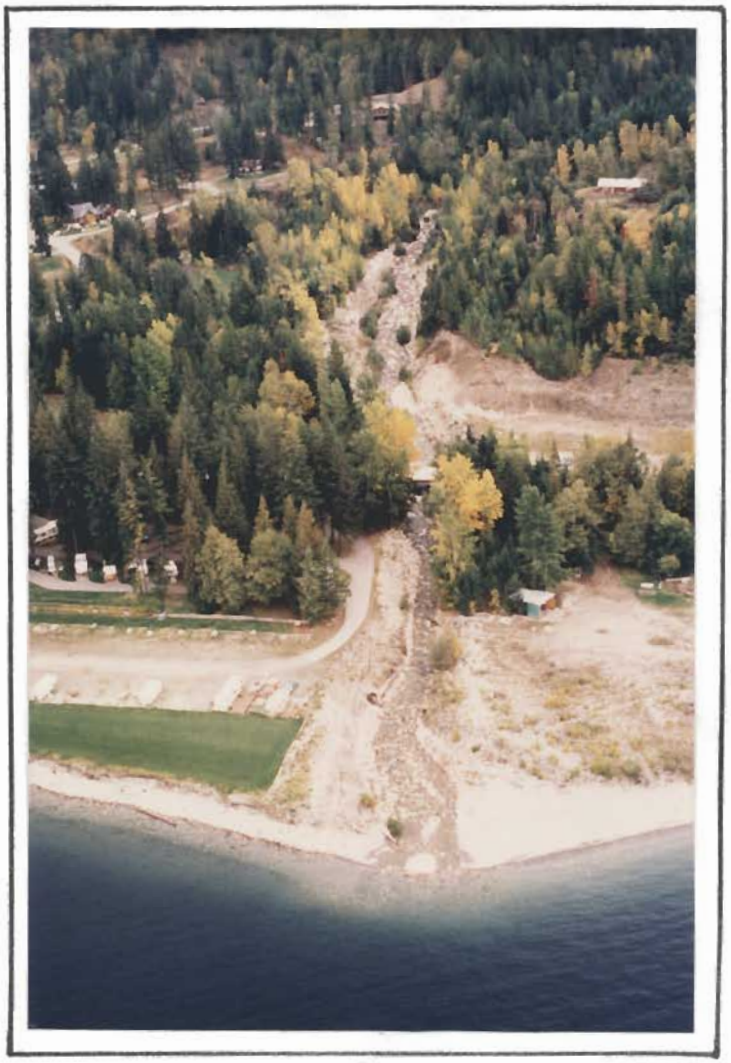
1986 KOOTENAY LAKE/ SOUTH ARM STREAM INVENTORY PHOTOGRAPHS



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1986 KOOTENAY LAKE / SOUTH ARM STREAM INVENTORY

STREAM: LOCKHART CREEK **LOCATION:** _____ **LONG** 116°47'02
LAT 49°30'30"

DATE: Aug. 26/86 **TIME:** 09:30 hr.

TURBIDITY: Crystalline

WATER TEMP: 11°C.

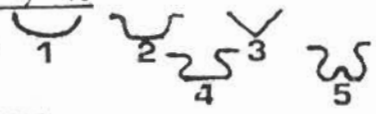
AIR TEMP: 12.5°C.

FLOW: (surface) 1.6 m./sec.

GRADIENT: 2%

SUBSTRATE: silt Ø % sand 2.5 % gravel 2.5 % stone 20 % cobble 45 % rubble 25 % boulder 5 %

STREAM PROFILE: #1



ARMOURING: poor ☐ fair ☐ moderate ☐ good ☒

RUN 30 % **RIFFLE** 40 % **POOL** 30 %

SURROUNDING VEGETATION:

type:	abundant	mod	sparse	none
shrub	X			
conif			X	
decid		X		
grass		X		

OBSTRUCTIONS:

	height	location
dam		
falls	approx. 2m.	1.5 km. above
culvert		Hwy.3a bridge
log jam		
other		

AREAS OF COVER

	abundant	mod	sparse	oth
logs			X	
root wads		X		
rocks			X	
undercuts		X		
other				

STREAM BANKS: steep ☐ sloping ☐ undercut ☐ eroded ☐ rock ☒ soil ☐

SURROUNDING LAND USE: forest ☒ rangeland ☐ suburban ☐ recreational ☒ farmland ☐

PLANTS:

type:	abundant	moderate	sparse
poplar		X	
alder		X	
moss		X	

INSECTS:

	abundant	mod	sparse
aquatic:		X	
Ephemeroptera		X	
Plecoptera		X	
Tricoptera			

land-based			
cabbage whites		X	
butterflies			X

COMMENTS:

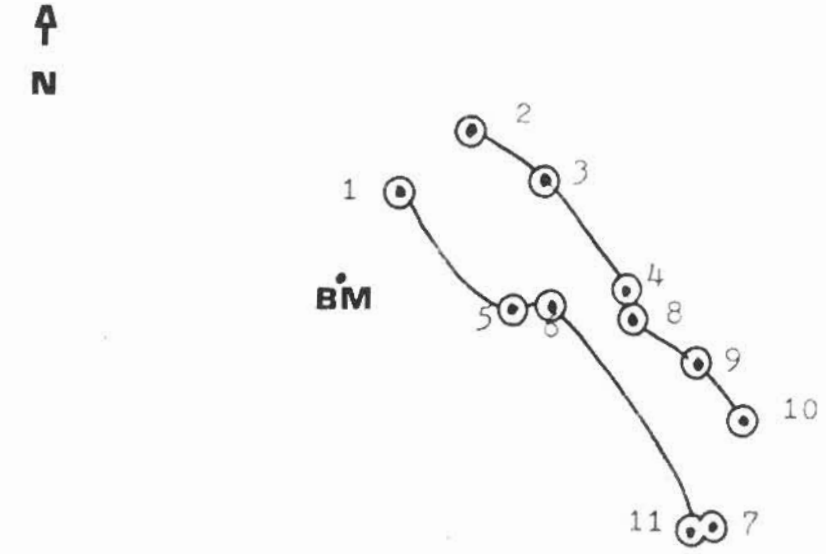
Benchmark= Large Ponderosa Pine at campsite # 12, Lockhart Creek Prov. Camp.

Photo #1 Typical Reach looking upstream
#2 Typical Reach looking downstream
#3 Barrier
#4 Confluence (aerial)

n.b. Total length of stream accessible is approx. 2.2 km.

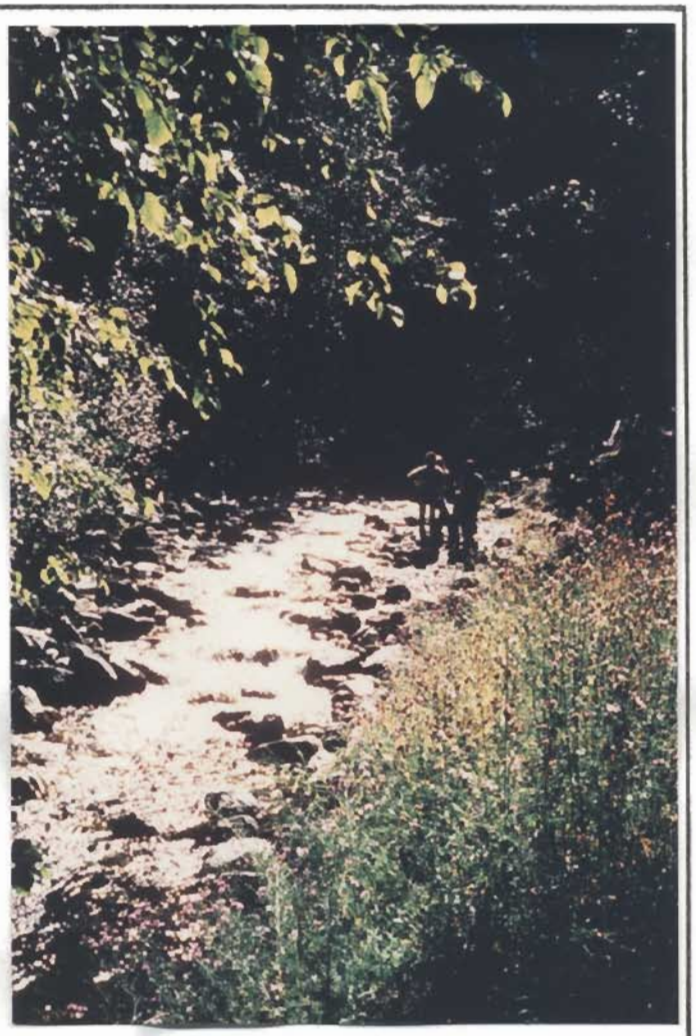
1986 KOOTENAY LAKE/SOUTH ARM STREAM INVENTORY
TYPICAL REACH

Stream Name: LOCKHART CREEK
Scale:1cm-4m



Comments: Upper 75% of accessible stream is well-shaded by overhanging trees and shrubs. Lower 25% , no stream bank cover.

1986 KOOTENAY LAKE/ SOUTH ARM STREAM INVENTORY PHOTOGRAPHS



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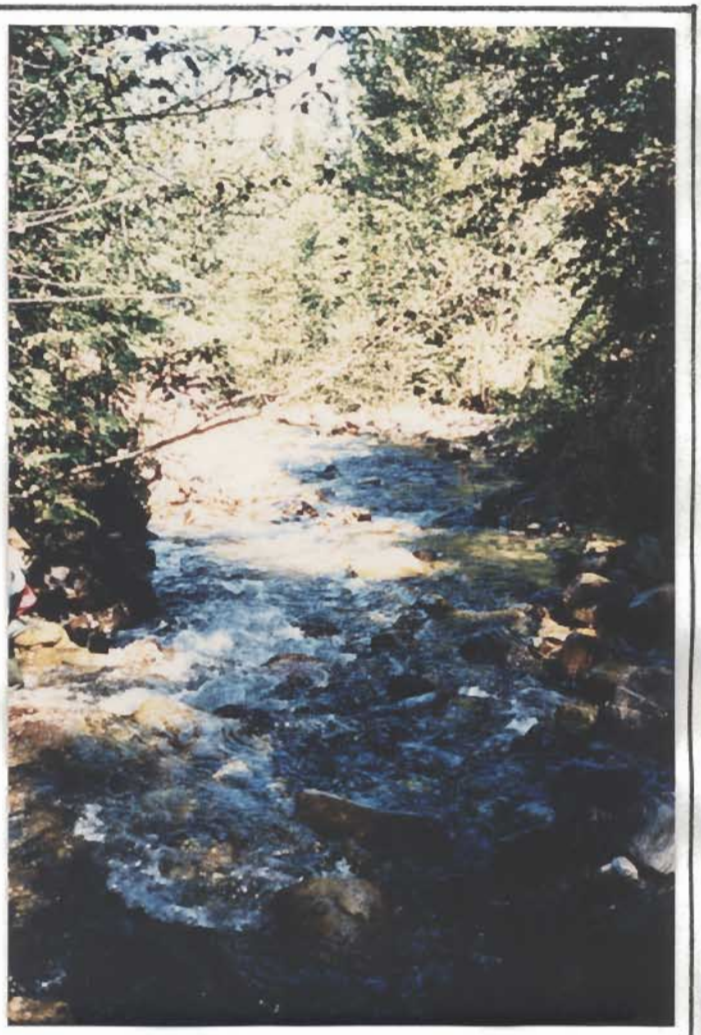

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1986 KOOTENAY LAKE/ SOUTH ARM STREAM INVENTORY PHOTOGRAPHS

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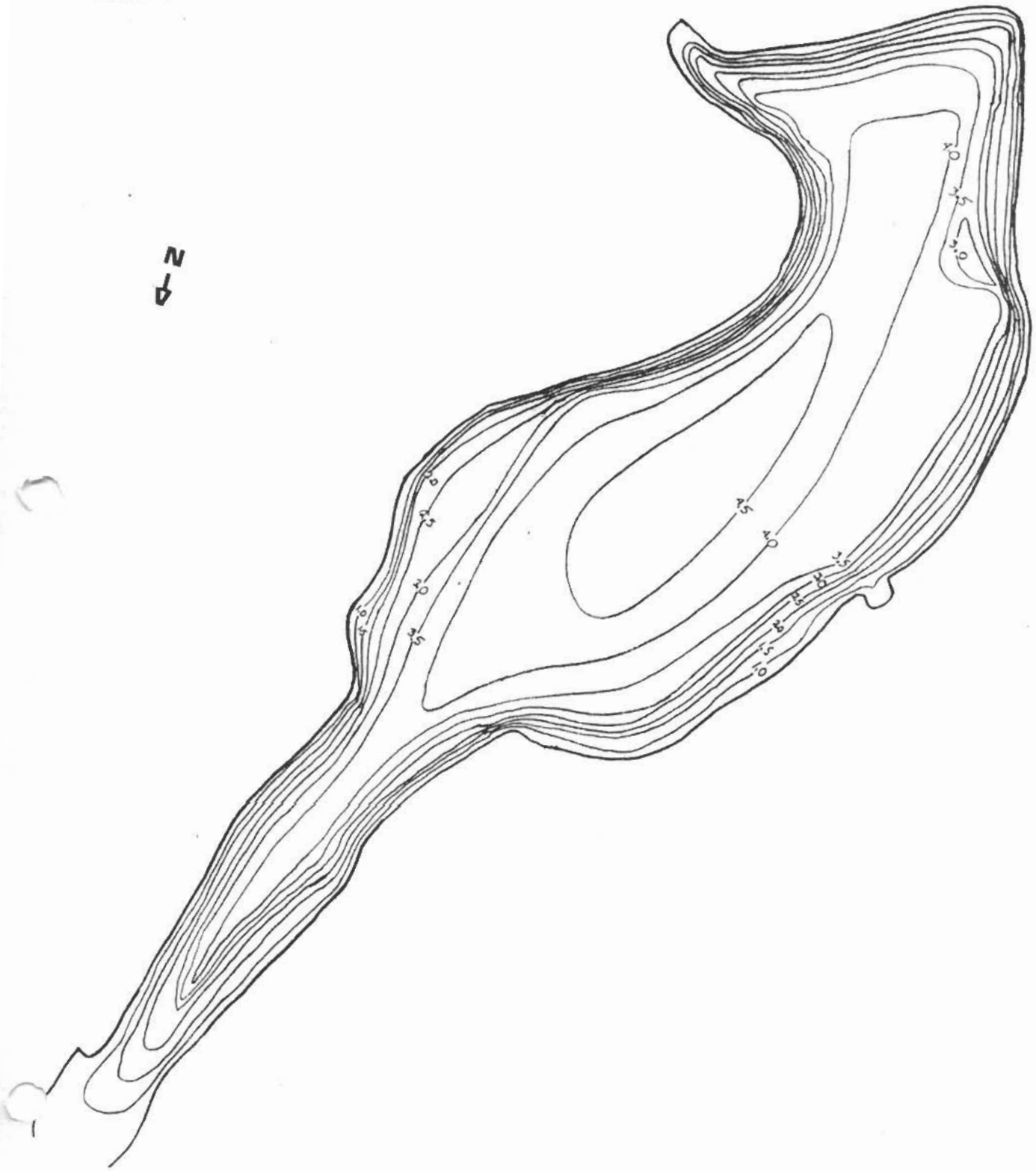
Vic Mawson Lake is a man-made impoundment near the international boundary at Rykerts, B.C. The lake and property surrounding it is owned by the Creston Valley Rod and Gun Club. It is included in this inventory because of the Creston Valley Rod and Gun Club's desire to enhance and develop the area. Due to the relatively small volume of water feeding the lake, and the lack of spawning habitat, Vic Mawson Lake does not appear to be well suited for the stocking and rearing of Salmonidae.

Fish now found in the lake include Black Bullheads, Yellow Perch, Squawfish, Bluegills and a few stocked trout.

An abundance of Odonatae and Dipterns was noted within the lake around the shoreline.

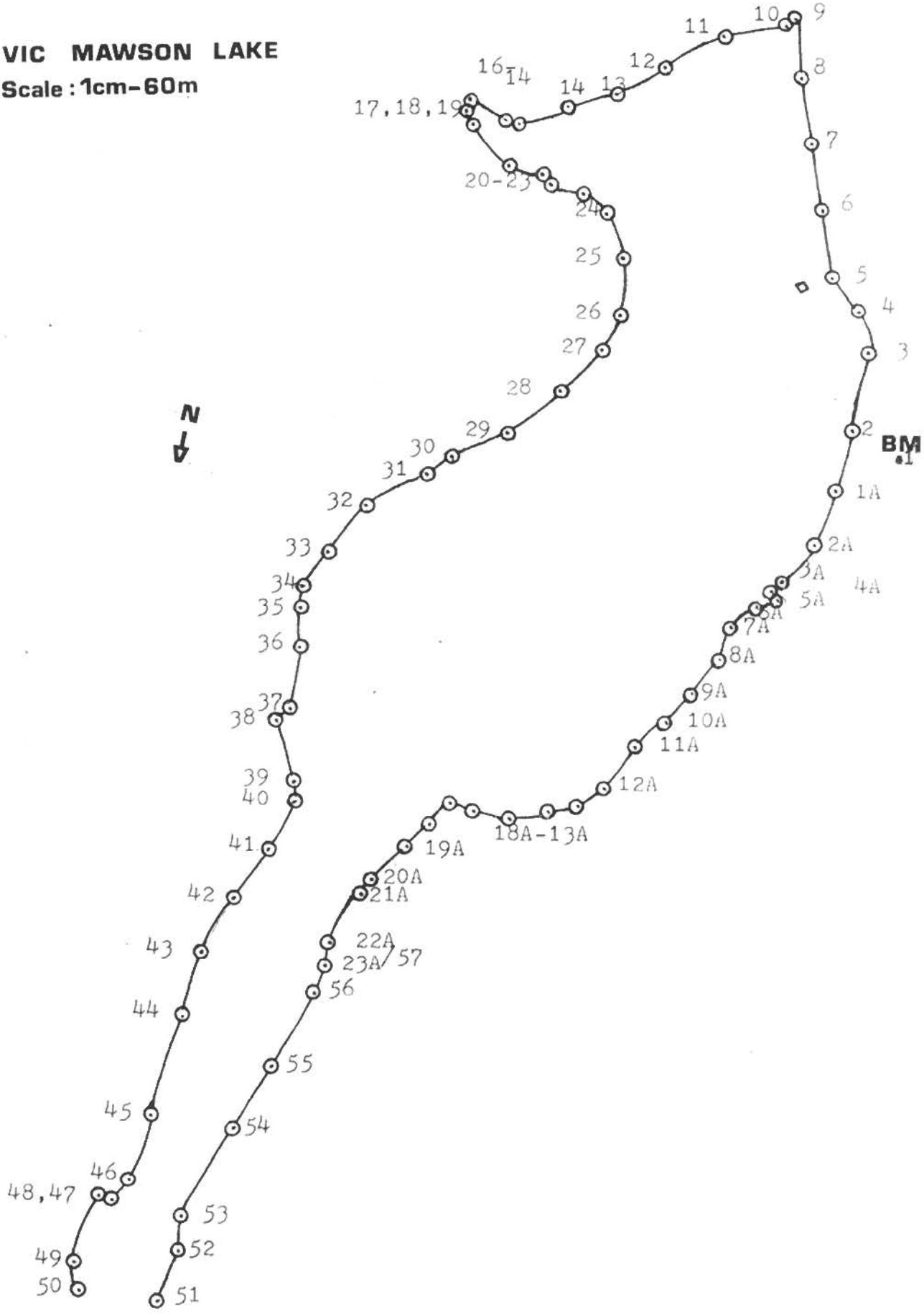
Lake bottom is entirely silt, sand and clay with an abundance of aquatic vegetation providing cover for resident fish. The entire shoreline is very steep and well shaded by Coniferous and Deciduous trees and shrubs as well as tall grasses and rushes. The Southwest portion of the shoreline has a moderate to sparse covering of shrubs but grasses are abundant.

VIC MAWSON LAKE
DEPTHS
Scale: 1cm–60m



VIC MAWSON LAKE

Scale : 1cm–60m



1986 KOOTENAY LAKE/ SOUTH ARM STREAM INVENTORY PHOTOGRAPHS

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1986 KOOTENAY LAKE / SOUTH ARM STREAM INVENTORY

STREAM: MIDGE CREEK **LOCATION:** LONG 116°48'15"
LAT 49°22'30"

DATE: Oct.21/86 **TIME:** 11:50 hr.

TURBIDITY: Clear

WATER TEMP: 4.5°C.

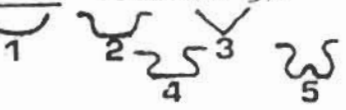
AIR TEMP: 14°C.

FLOW: (surface) 2.1 m./sec.

GRADIENT: 4%

SUBSTRATE: silt 2.5% sand 2.5 % gravel 5 % stone 5 % cobble 5 % rubble 15 % boulder 60 % bedrock 5%

STREAM PROFILE: #1



ARMOURING: poor ☐ fair ☐ moderate ☐ good ☒

RUN 40 % **RIFFLE** 40 % **POOL** 20 %

SURROUNDING VEGETATION:

type:	abundant	mod	sparse	none
shrub			X	
conif			X	
decid		X		
grass				X

OBSTRUCTIONS:

	height	location
dam		
falls	approx. 2m.	approx. 5km.
culvert		from
log jam		confluence
other		

AREAS OF COVER

	abundant	mod	sparse	oth
logs				
root wads			X	
rocks		X		
undercuts			X	
other				

STREAM BANKS: steep ☐ sloping ☐ undercut ☐ eroded ☐ rock ☒ soil ☐

SURROUNDING LAND USE: forest ☒ rangeland ☐ suburban ☐ recreational ☒ farmland ☐

PLANTS:

type:	abundant	moderate	sparse
poplar	X		
alder		X	
P.pine		X	

INSECTS:	abundant	mod	sparse
aquatic:			
Ephemeroptera		X	
Plecoptera		X	
Tricoptera		X	

land-based			

COMMENTS:

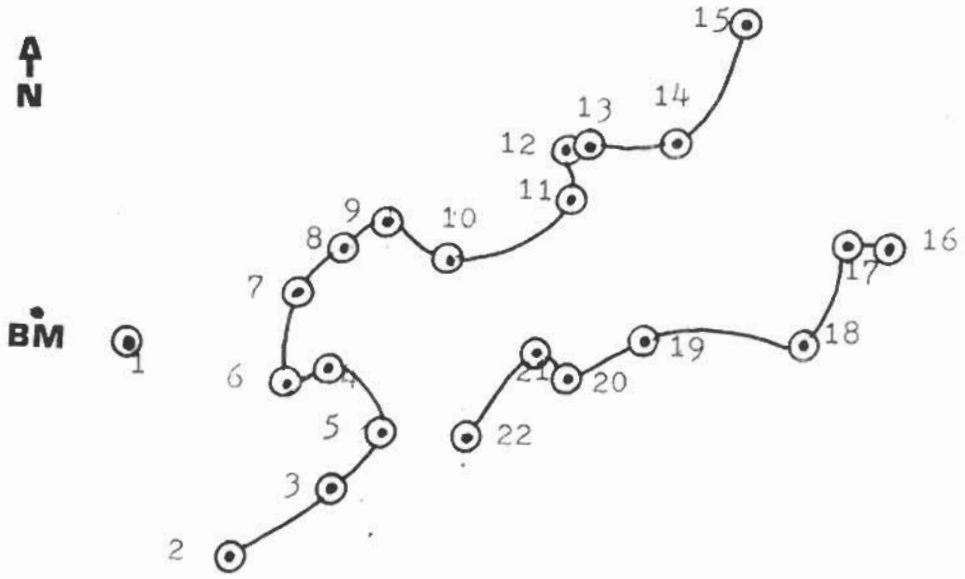
Benchmark= small Cedar tree on the North bank approx 500 m. from C.P.R. bridge.

Photo #1 Typical Reach looking upstream
#2 Typical Reach looking downstream
#3 Barrier (aerial)
#4 Confluence (aerial)

1986 KOOTENAY LAKE/SOUTH ARM STREAM INVENTORY
TYPICAL REACH

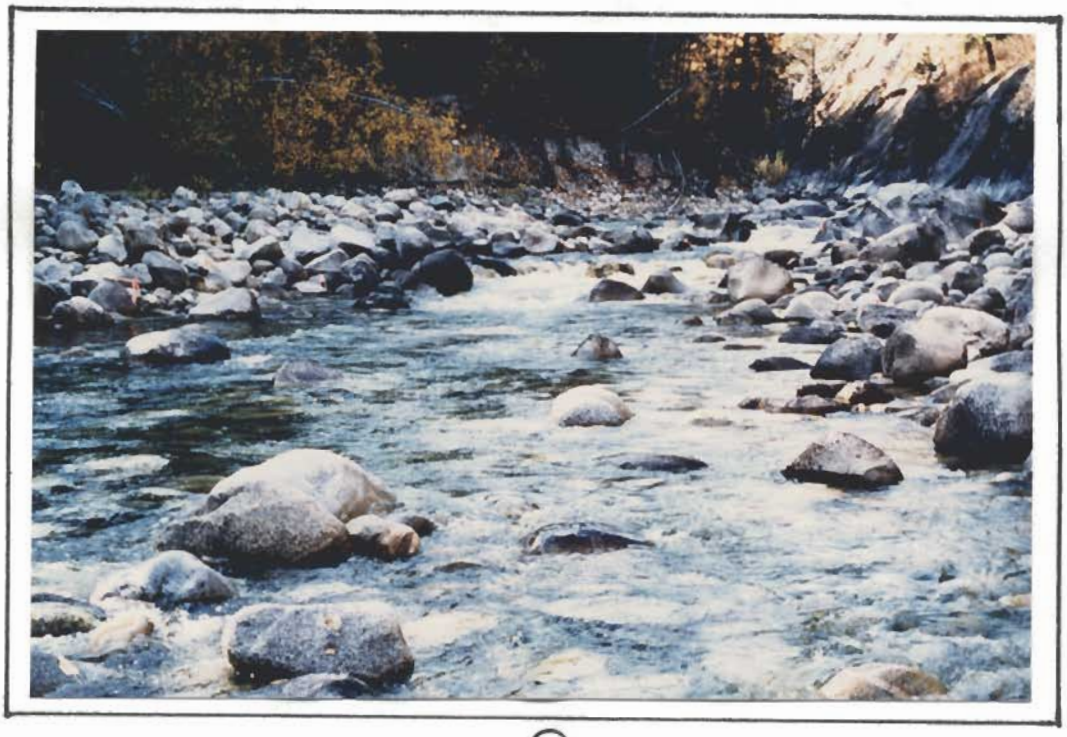
Stream Name: MIDGE CREEK

Scale: 1cm-4m



Comments: Very little stream bank cover; however, there are several pools and back eddies. 15% bedrock stream bed.

1986 KOOTENAY LAKE/ SOUTH ARM STREAM INVENTORY PHOTOGRAPHS



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1986 KOOTENAY LAKE/ SOUTH ARM STREAM INVENTORY PHOTOGRAPHS

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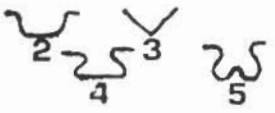
1986 KOOTENAY LAKE / SOUTH ARM STREAM INVENTORY

STREAM: MIDGELY CREEK **LOCATION:** _____ **LONG** 116° 39' 2"
DATE: Aug. 27/86 **TIME:** 08:30 hr. **LAT** 49° 12' 05"
TURBIDITY: Slightly Cloudy
WATER TEMP: 11°C.
AIR TEMP: 17°C.
FLOW: (surface) less than 1 m./min.
GRADIENT: less than 1%
SUBSTRATE: silt 80 % sand 15 % gravel 5 % stone Ø % cobble Ø % rubble Ø % boulder Ø %
STREAM PROFILE: #2



ARMOURING: poor [X] fair [ ] moderate [ ] good [ ]
RUN 5 % **RIFFLE** 5 % **POOL** 90 %

SURROUNDING VEGETATION:

type:	abundant	mod	sparse	none
shrub			X	
conif				X
decid				X
grass	X			

OBSTRUCTIONS:

	height	location
dam		
falls		
culvert		
log jam		
other	poor flow poor volume	Midgely Meadow

AREAS OF COVER

	abundant	mod	sparse	oth
logs			X	
root wads				
rocks				
undercuts				
other aquatic veg. X				

STREAM BANKS: steep [X] sloping [ ] undercut [ ] eroded [ ] rock [ ] soil [X]

SURROUNDING LAND USE: forest [ ] rangeland [X] suburban [ ] recreational [ ] farmland [ ]

PLANTS:

type:	abundant	moderate	sparse
reeds		X	
rushes		X	
grasses	X		

INSECTS:

	abundant	mod	sparse
aquatic:			
Diptera	X		
Odonata		X	
Hemiptera			X
land-based			
spiders		X	
flies	X		
dewworms			

COMMENTS:

Photo #1 Confluence
#2 Midgely Meadow (aerial)
#3 Widest area just above confluence
#4 Typical Reach through meadow

1986 KOOTENAY LAKE/SOUTH ARM STREAM INVENTORY
TYPICAL REACH

Stream Name: Midgely Creek
Scale: 1cm-4m

N

Comments: Because the volume of water and the accessible streambed did not appear to be sufficient to support a spawning run of Kokanee, we did not deem it necessary to survey a typical reach. Photo # 3 is 100% clay bottom. Photo # 4 shows middle reach which is 12-14 cm. deep and less than 1 metre average width.

1986 KOOTENAY LAKE/ SOUTH ARM STREAM INVENTORY PHOTOGRAPHS

(1)

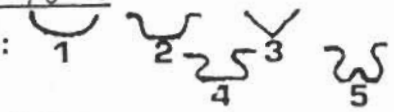
(2)

1986 KOOTENAY LAKE/ SOUTH ARM STREAM INVENTORY PHOTOGRAPHS

(3)

(4)

1986 KOOTENAY LAKE / SOUTH ARM STREAM INVENTORY

STREAM: NEWINGTON CREEK **LOCATION:** _____ **LONG** 116°40'40"
DATE: Oct. 2/86 **TIME:** 08:00hr. **LAT** 49°13'20"
TURBIDITY: Clear
WATER TEMP: 5°C.
AIR TEMP: 9°C.
FLOW: (surface) 1.35m./sec.
GRADIENT: from 1%-12%
SUBSTRATE: silt Ø % sand 2.5 % gravel 2.5 % stone 5 % cobble 5 % rubble 15 % boulder 70 %
STREAM PROFILE: 

#1

ARMOURING: poor ☐ fair ☐ moderate ☐ good ☒

RUN 45 % **RIFFLE** 40 % **POOL** 15 %

SURROUNDING VEGETATION:

type:	abundant	mod	sparse	none
shrub			X	
conif	X			
decid		X		
grass				X

OBSTRUCTIONS:

	height	location
dam		
falls (tiered)	approx. 2m	approx 1 km. West of confluence
culvert		
log jam		
other		

AREAS OF COVER

	abundant	mod	sparse	oth
logs			X	
root wads		X		
rocks		X		
undercuts		X		
other				

STREAM BANKS: steep ☐ sloping ☐ undercut ☐ eroded ☐ rock ☒ soil ☐

SURROUNDING LAND USE: forest ☒ rangeland ☐ suburban ☐ recreational ☐ farmland ☐

PLANTS:

type:	abundant	moderate	sparse
mushrooms	X		
moss	X		

INSECTS:

	abundant	mod	sparse
aquatic:			
Plecoptera		X	
Diptera		X	
Tricoptera		X	

land-based			

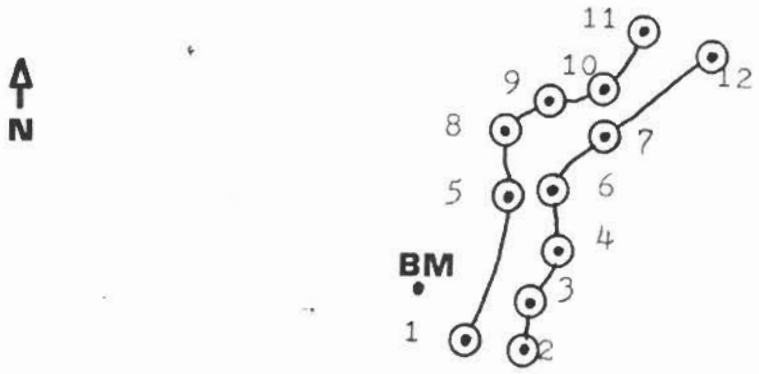
COMMENTS:

Benchmark= Cedar tree approx 30 m. below barrier on the North bank

Photo #1 Typical Reach looking downstream
#2 Typical Reach looking upstream
#3 Barrier
#4 Confluence

1986 KOOTENAY LAKE/SOUTH ARM STREAM INVENTORY
TYPICAL REACH

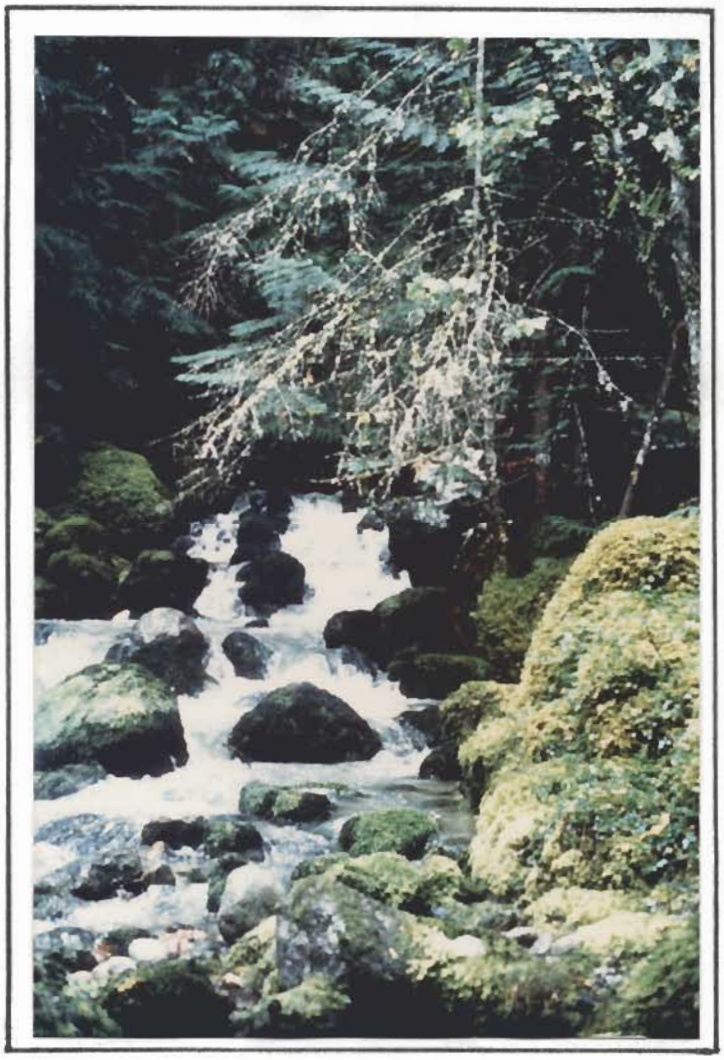
Stream Name: Newington Creek
Scale: 1cm - 4m



Comments: Very few holding areas, boulders, etc. Lower 100 meters predominantly fine gravel and sand.

1986 KOOTENAY LAKE/ SOUTH ARM STREAM INVENTORY PHOTOGRAPHS

(1)



(2)

1986 KOOTENAY LAKE/ SOUTH ARM STREAM INVENTORY PHOTOGRAPHS

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1986 KOOTENAY LAKE / SOUTH ARM STREAM INVENTORY

STREAM: NEXT CREEK **LOCATION:** _____ **LONG** 116°45'25

DATE: Aug. 9/86 **TIME:** 10:00 hr **LAT** 49°18'10"

TURBIDITY: Crystalline

WATER TEMP: 4°C.

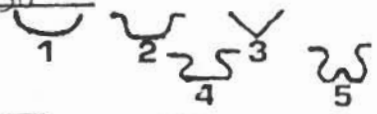
AIR TEMP: 20°C.

FLOW: (surface) 0.93m./sec.

GRADIENT: 3.5%

SUBSTRATE: silt 2.5 % sand 2.5 % gravel 5 % stone 2.5 % cobble 12.5 % rubble 25 % boulder 50 %

STREAM PROFILE: #1



ARMOURING: poor ☐ fair ☐ moderate ☐ good ☒

RUN 25 % **RIFFLE** 60 % **POOL** 15 %

SURROUNDING VEGETATION:

type:	abundant	mod	sparse	none
shrub			X	
conif		X		
decid		X		
grass			X	

OBSTRUCTIONS:

	height	location
dam		
falls (tiered)	3-4 m.	approx. 1.5
culvert		km. from
log jam		confluence
other		

AREAS OF COVER

	abundant	mod	sparse	oth
logs				
root wads			X	
rocks		X		
undercuts			X	
other				

STREAM BANKS: steep ☒ sloping ☐ undercut ☐ eroded ☐ rock ☒ soil ☐

SURROUNDING LAND USE: forest ☒ rangeland ☐ suburban ☐ recreational ☐ farmland ☐

PLANTS:

type:	abundant	moderate	sparse
Alder		X	
Moss		X	
P.Pine		X	

INSECTS:	abundant	mod	sparse
aquatic:			
Ephemeroptera		X	
Plecoptera		X	
Tricoptera		X	
land-based			
gnats		X	

COMMENTS:

Benchmark= Large Cedar approx. 120 m. below barrier on North bank.

Photo#1 Typical Reach looking upstream

#2 Typical Reach looking downstream

#3 Survey Area

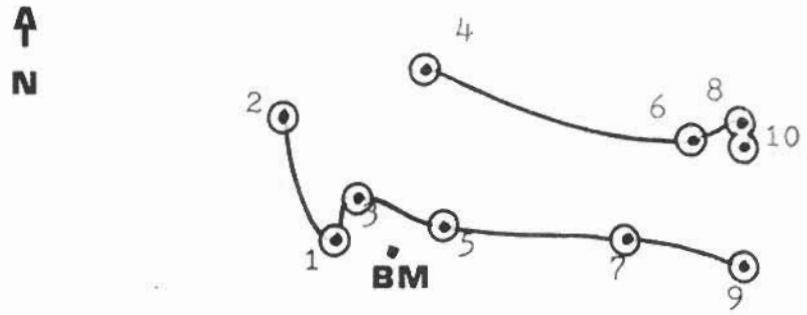
#4 Confluence (aerial)

#5 Confluence (looking North from beach)

1986 KOOTENAY LAKE/SOUTH ARM STREAM INVENTORY
TYPICAL REACH

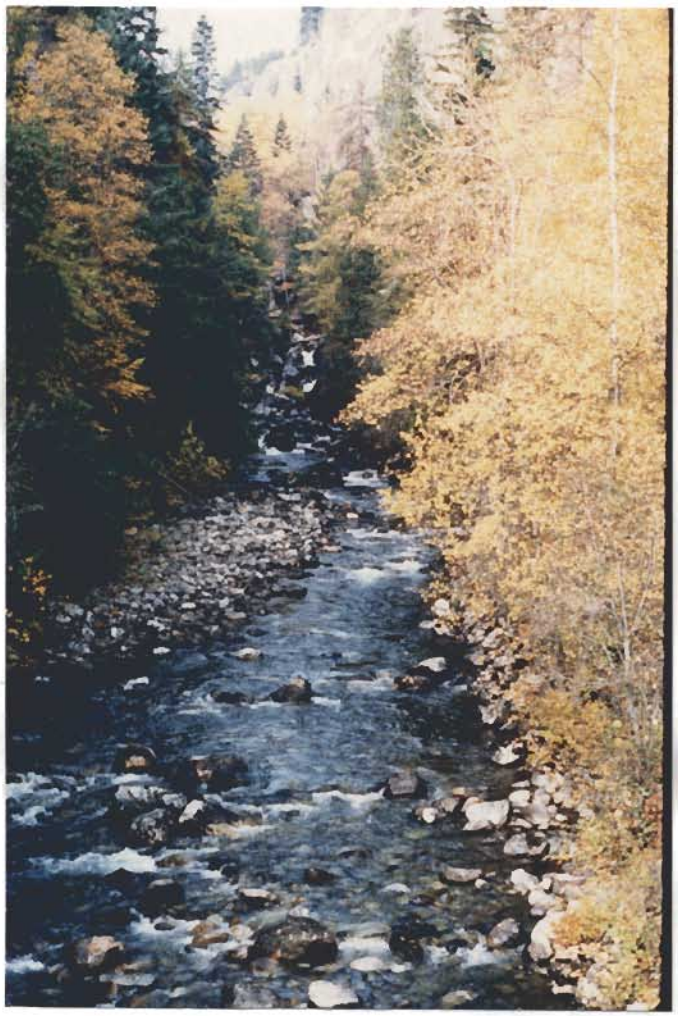
Stream Name: NEXT CREEK

Scale:1cm-4m



Comments: It appears to be more suitable spawning gravel in delta than in entire length of stream accessible. Very little stream bank cover, few pools. Because of steep canyon walls, most of stream is shaded.

1986 KOOTENAY LAKE/ SOUTH ARM STREAM INVENTORY PHOTOGRAPHS



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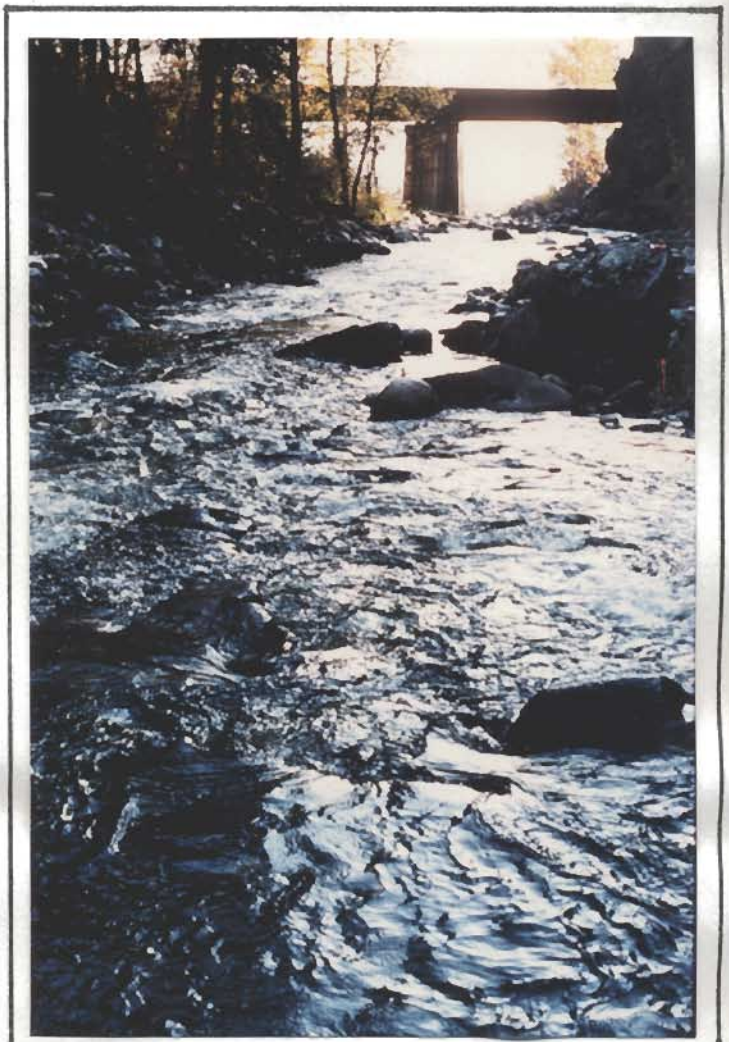

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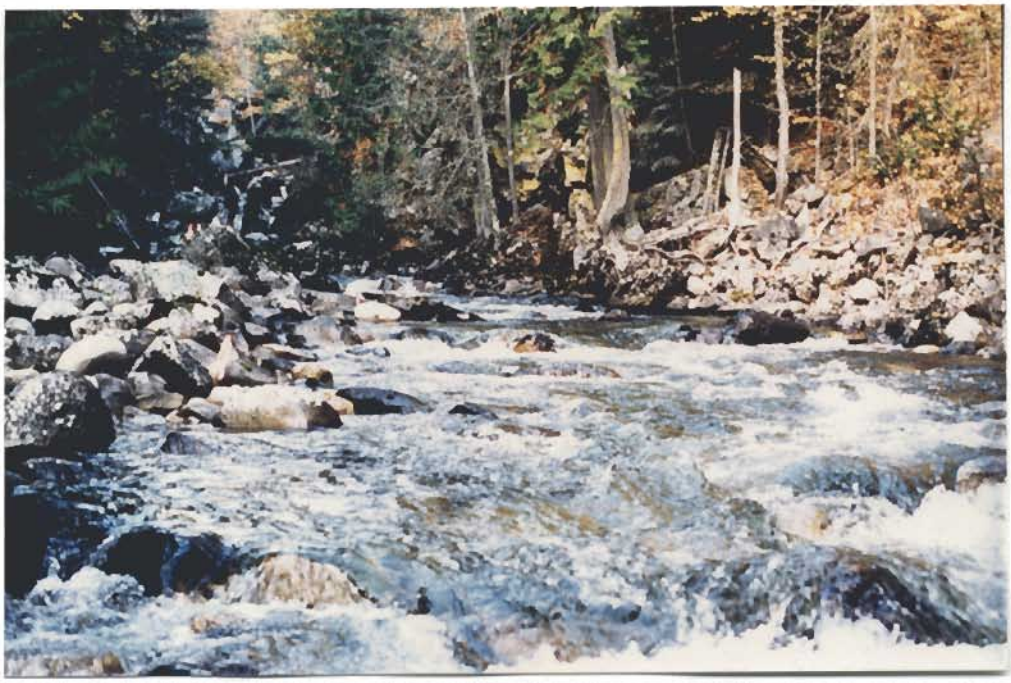

1986 KOOTENAY LAKE/ SOUTH ARM STREAM INVENTORY PHOTOGRAPHS

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1986 KOOTENAY LAKE / SOUTH ARM STREAM INVENTORY

STREAM: RYKERTS CREEK **LOCATION:** _____ **LONG** 116°29'50"
LAT 49°00'06"

DATE: June 12/86 **TIME:** 06:00 hr.

TURBIDITY: Slightly Turbid

WATER TEMP: 15°C.

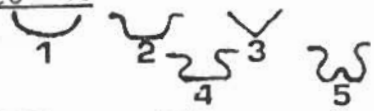
AIR TEMP: 15°C.

FLOW: (surface) 2.94 m./sec.

GRADIENT: 3%

SUBSTRATE: silt 15 % sand 10 % gravel 10 % stone 5 % cobble 10 % rubble 30 % boulder 20 %

STREAM PROFILE: #1



ARMOURING: poor ☐ fair ☐ moderate ☒ good ☐

RUN 30 % **RIFFLE** 45 % **POOL** 25 %

SURROUNDING VEGETATION:

type:	abundant	mod	sparse	none
shrub		X		
conif		X		
decid	X			
grass	X			

OBSTRUCTIONS:

	height	location
dam		
falls		
culvert	approx 1 m.	under secon-
log jam		dary road at
other		lake turnoff

AREAS OF COVER

	abundant	mod	sparse	oth
logs				
root wads			X	
rocks				
undercuts			X	
overhanging other grasses		X		

STREAM BANKS: steep ☐ sloping ☐ undercut ☐ eroded ☐ rock ☒ soil ☒

SURROUNDING LAND USE: forest ☐ rangeland ☐ suburban ☐ recreational ☒ farmland ☒

PLANTS:

type:	abundant	moderate	sparse
alder		X	
birch		X	
grasses	X		

INSECTS:

	abundant	mod	sparse
aquatic:			
Plecoptera		X	
Diptera	X		
Odonata			X

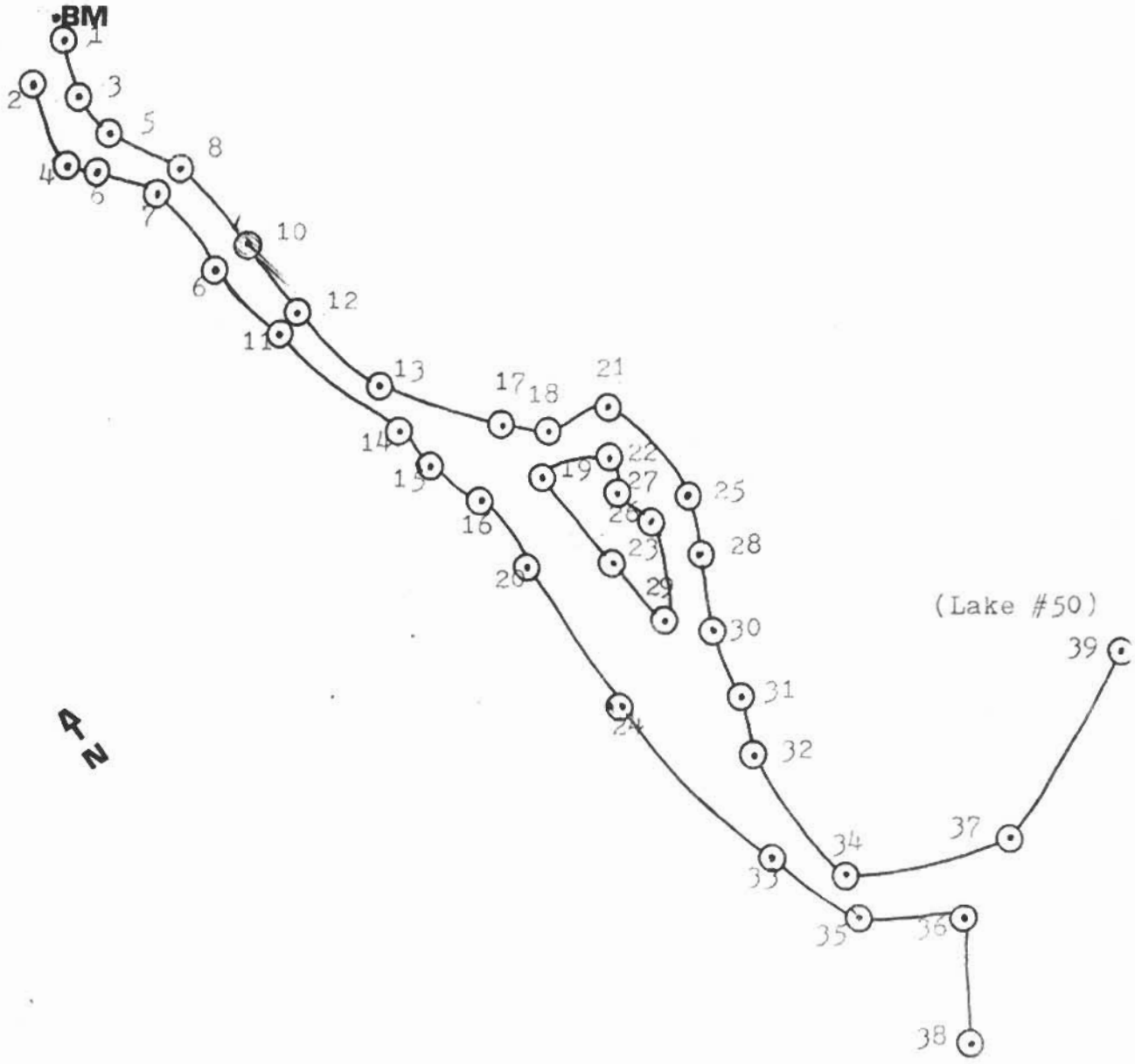
land-based			

COMMENTS:
Benchmark is West edge of culvert
Photo #1 Typical Reach looking downstream
#2 Typical Reach looking upstream

1986 KOOTENAY LAKE/SOUTH ARM STREAM INVENTORY
TYPICAL REACH

Stream Name: RYKERTS CREEK

Scale: 3m – 1cm



Comments: This stream is tributary to Vic Mawson Lake. There were numerous dead Squawfish with eggs in them along the edges of the stream and on the gravel bar.(early June) Streambank cover on Northern half is abundant trees and shrubs; Southern half is entirely grasses and rushes. The animal effluent from several large dairy farms flows into Rykerts before its entry into Mawson Lake; with obvious discolouration and odour during peak thaw and heavy rains.

1986 KOOTENAY LAKE/ SOUTH ARM STREAM INVENTORY PHOTOGRAPHS

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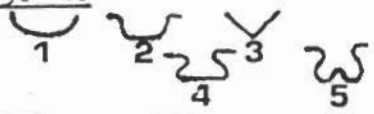
1986 KOOTENAY LAKE/ SOUTH ARM STREAM INVENTORY PHOTOGRAPHS

(3)

1986 KOOTENAY LAKE / SOUTH ARM STREAM INVENTORY

STREAM: SANCA CREEK **LOCATION:** _____ **LONG** 116°43'40"
DATE: Aug. 13/86 **TIME:** 08:30 hr. **LAT** 49°22'25"
TURBIDITY: Clear
WATER TEMP: 6° C.
AIR TEMP: 14° C.
FLOW: (surface) 1.22 m./sec.
GRADIENT: 3.5%
SUBSTRATE: silt Ø) % sand 5 % gravel 15 % stone 5 % cobble 5 % rubble 20 % boulder 50 %

STREAM PROFILE: #1



ARMOURING: poor ☐ fair ☐ moderate ☐ good ☒

RUN 45 % **RIFFLE** 45 % **POOL** 10 %

SURROUNDING VEGETATION:

type:	abundant	mod	sparse	none
shrub				X
conif			X	
decid			X	
grass			X.	

OBSTRUCTIONS:

	height	location
dam		
falls	approx. 2m.	approx 4 km.
culvert		from
log jam		confluence
other		

AREAS OF COVER

	abundant	mod	sparse	oth
logs			X	
root wads			X	
rocks		X		
undercuts			X	
other				

STREAM BANKS: steep ☒ sloping ☐ undercut ☐ eroded ☐ rock ☒ soil ☐

SURROUNDING LAND USE: forest ☒ rangeland ☐ suburban ☐ recreational ☐ farmland ☐

PLANTS:

type:	abundant	moderate	sparse

INSECTS:

	abundant	mod	sparse
aquatic:			
Ephemeroptera	X		

land-based			
ants	X		
bees		X	
wasps			X

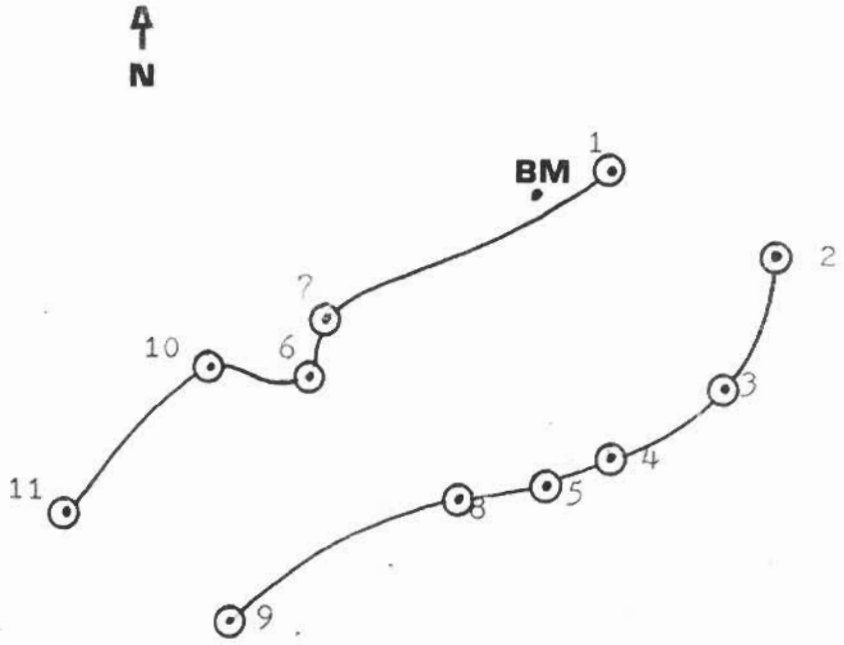
COMMENTS:

Benchmark= Cedar tree 2.5 km. above Highway 3a bridge overhanging a huge granite boulder on the North bank.

Photo #1 Typical Reach looking upstream
#2 Typical Reach looking downstream
#3 Barrier
#4 Confluence (aerial)

1986 KOOTENAY LAKE/SOUTH ARM STREAM INVENTORY
TYPICAL REACH

Stream Name: SANCA CREEK
Scale: 1cm – 4m



Comments: Very little stream bank cover. Few pools, undercuts, etc.

1986 KOOTENAY LAKE/ SOUTH ARM STREAM INVENTORY PHOTOGRAPHS

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1986 KOOTENAY LAKE/ SOUTH ARM STREAM INVENTORY PHOTOGRAPHS

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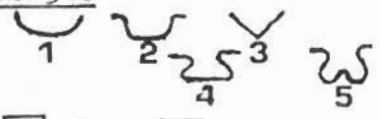
1986 KOOTENAY LAKE / SOUTH ARM STREAM INVENTORY

STREAM: SHAW CREEK **LOCATION:** _____ **LONG** 116°42'4
DATE: Oct. 2/86 **TIME:** 11:00 hr. **LAT** 49°15'40"
TURBIDITY: Clear
WATER TEMP: 7.5°C.
AIR TEMP: 13.5°C.
FLOW: (surface) 1.4 m./sec.
GRADIENT: 3-5%
SUBSTRATE: silt Ø % sand 1 % gravel Ø % stone 1.5 % cobble 5 % rubble 80 % boulder 12.5%

STREAM PROFILE: #1



ARMOURING: poor ☐ fair ☐ moderate ☐ good ☒

RUN 45 % **RIFFLE** 45 % **POOL** 10 %

SURROUNDING VEGETATION:

type:	abundant	mod	sparse	none
shrub			X	
conif			X	
decid	X			
grass			X	

OBSTRUCTIONS:

	height	location
dam		
falls	approx. 3m.	approx. 1.5
culvert		km from
log jam		confluence
other		

AREAS OF COVER

	abundant	mod	sparse	oth
logs				
root wads			X	
rocks		X		
undercuts			X	
other				

STREAM BANKS: steep ☒ sloping
undercut ☐ eroded ☐ rock ☒
soil ☐

SURROUNDING LAND USE:
forest ☒ rangeland ☐
suburban ☐ recreational ☐
farmland ☐

PLANTS:

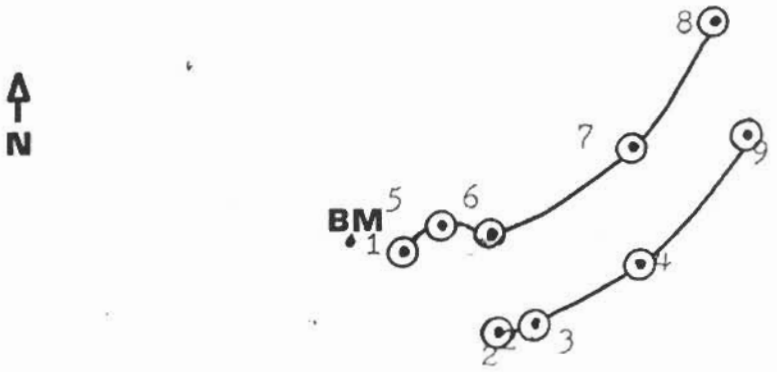
type:	abundant	moderate	sparse
alder	X		
cedar		X	
D. Fir		X	

INSECTS:	abundant	mod	sparse
aquatic:		X	
Ephemeroptera		X	
Plecoptera		X	
Tricoptera			
land-based			
spiders			X

COMMENTS:
Benchmark= tree at thebase of the path under the C.P.R. bridge on the North bank.
Photo #1 Typical Reach looking upstream
#2 Typical Reach looking downstream
#3 Barrier
#4 Aerial photo showing Confluence, Barrier and Reach

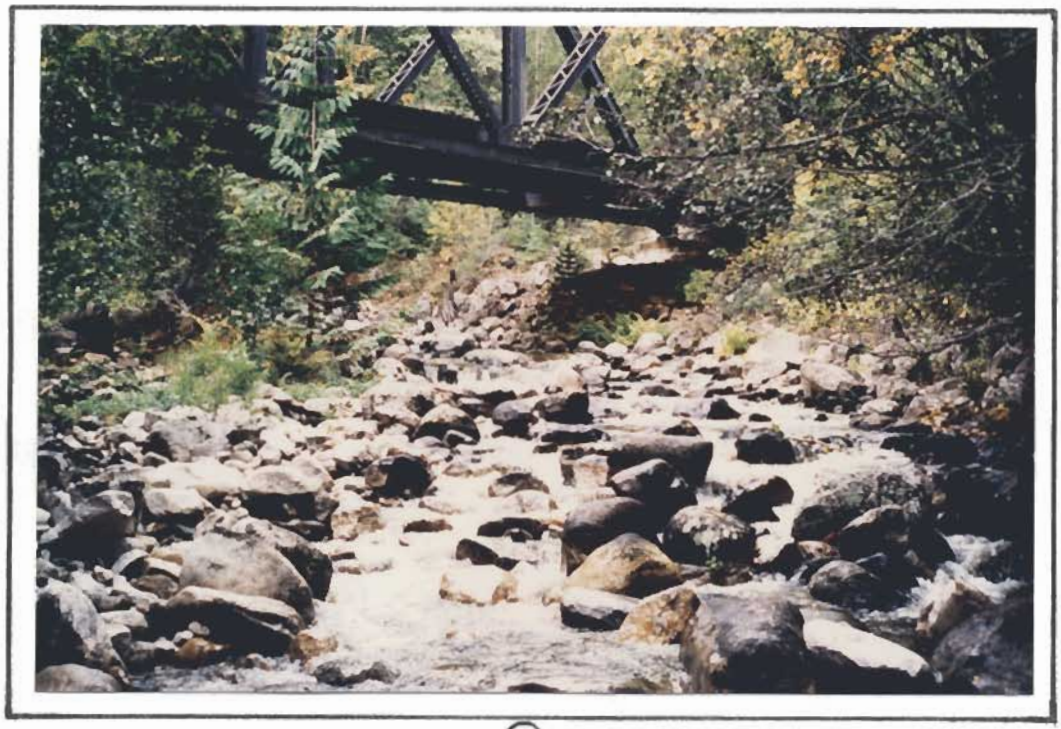
1986 KOOTENAY LAKE/SOUTH ARM STREAM INVENTORY
TYPICAL REACH

Stream Name: Shaw Creek
Scale: 1cm - 4m



Comments: Has very little gravel. Creek is sharply tiered. The short run between confluence and barrier is man-influenced along entire north side.

1986 KOOTENAY LAKE/ SOUTH ARM STREAM INVENTORY PHOTOGRAPHS



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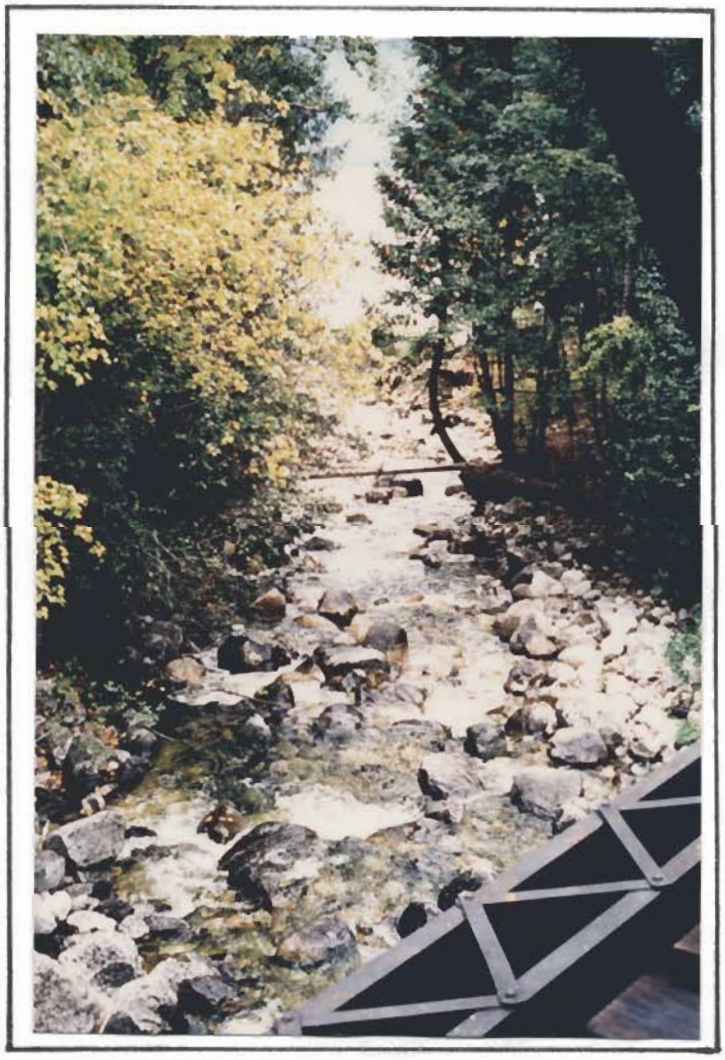

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1986 KOOTENAY LAKE/ SOUTH ARM STREAM INVENTORY PHOTOGRAPHS

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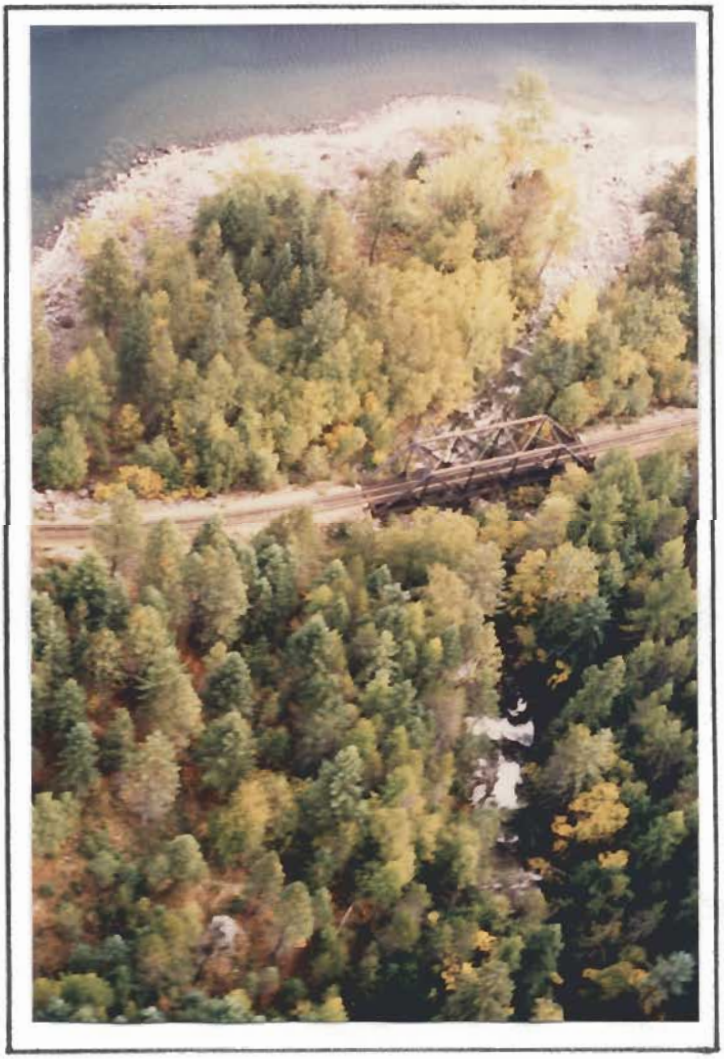

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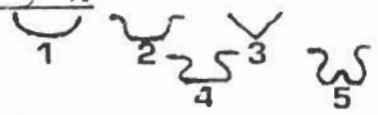
1986 KOOTENAY LAKE / SOUTH ARM STREAM INVENTORY

STREAM: SUMMIT CREEK **LOCATION:** _____ **LONG** 116°38'00
DATE: Oct. 23/86 **TIME:** 11:00 hr. **LAT** 49°09'05
TURBIDITY: Clear
WATER TEMP: 5°C.
AIR TEMP: 13°C.
FLOW: (surface) 1.56m/sec.
GRADIENT: 1%
SUBSTRATE: silt 6.5 % sand 3.5 % gravel 10 % stone 30 % cobble 40 % rubble 5 % boulder 5 %
STREAM PROFILE: #1 

ARMOURING: poor ☐ fair ☐ moderate ☐ good ☒
RUN 40 % **RIFFLE** 40 % **POOL** 20 %

SURROUNDING VEGETATION:

type:	abundant	mod	sparse	none
shrub			X	
conif		X		
decid		X		
grass			X	

OBSTRUCTIONS:

	height	location
dam		
falls	2 m.	2 km. above
culvert		Hwy. 3 bridge
log jam		
other		

AREAS OF COVER

	abundant	mod	sparse	oth
logs			X	
root wads			X	
rocks		X		
undercuts			X	
other				

STREAM BANKS: steep ☐ sloping ☐ undercut ☐ eroded ☒ rock ☒ soil ☒

SURROUNDING LAND USE: forest ☒ rangeland ☐ suburban ☐ recreational ☒ farmland ☐

PLANTS:

type:	abundant	moderate	sparse
Cedar	X		
Alder		X	
Poplar		X	

INSECTS:	abundant	mod	sparse
aquatic:			
Ephemeroptera		X	
Plecoptera		X	
Tricoptera		X	

land-based			
spiders			X

COMMENTS:

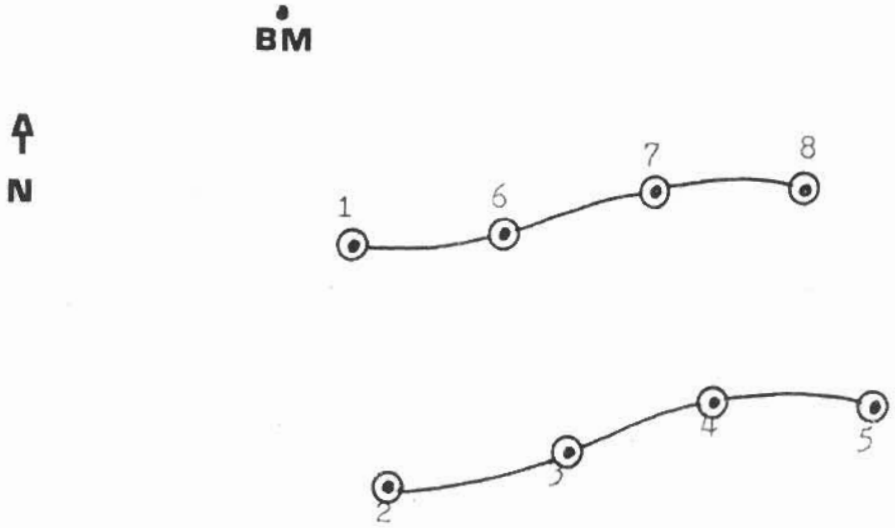
Benchmark=Largest Cedar tree on North bank approx. 200m. below Hwy. 3 bridge.

Photo#1 Typical Reach looking downstream
#2 Typical Reach looking upstream
#3 Typical Reach above Hwy. 3 bridge
#4 Confluence
#5 Barrier
#6 Barrier(aerial)

n.b. Total length of stream accessible is approx. 5 km.

1986 KOOTENAY LAKE/SOUTH ARM STREAM INVENTORY
TYPICAL REACH

Stream Name: SUMMIT CREEK
Scale: 1cm-4m



Comments: Although the barrier as indicated in this report appeared to be more of an obstacle than a barrier, no Kokanee were found above this point (3 km above highway bridge). Several pools and moderate stream bank cover of trees and shrubs. Portion within Summit Creek Park deviating constantly. One-half kilometer portion below log bridge rip-rapped on north side, but erosional zone is on south side; here to confluence slow and deep, clay bottom. There are portions which are slow and well-shaded, and may afford rearing habitat.

1986 KOOTENAY LAKE/ SOUTH ARM STREAM INVENTORY PHOTOGRAPHS

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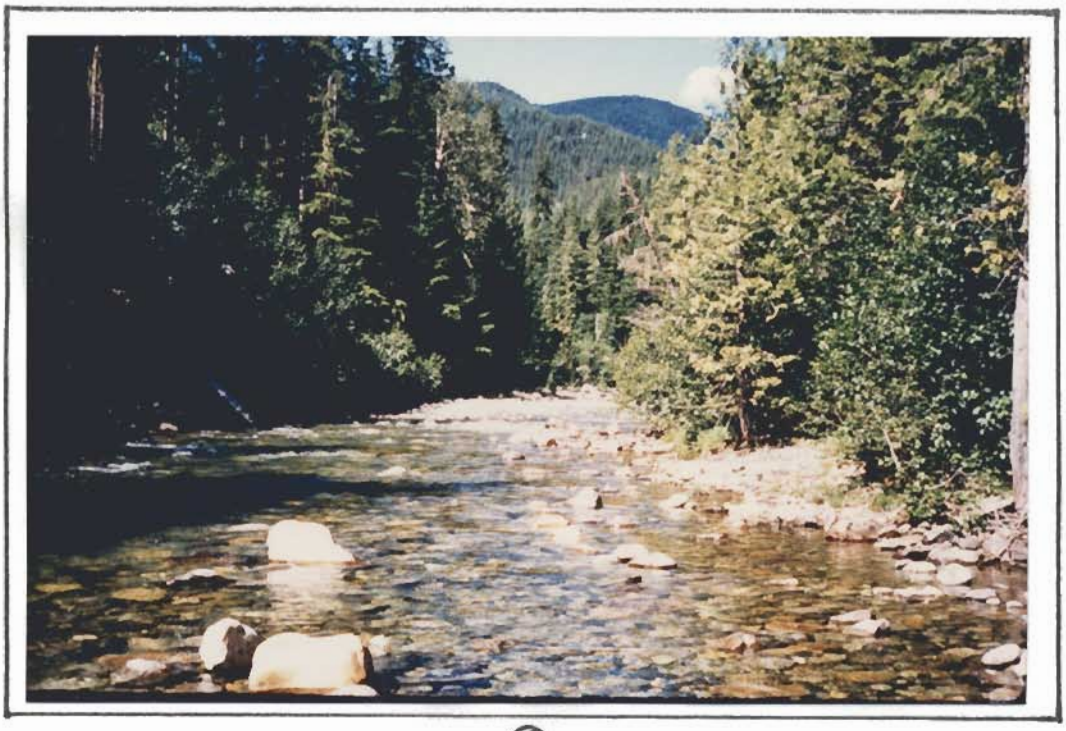
1986 KOOTENAY LAKE/ SOUTH ARM STREAM INVENTORY PHOTOGRAPHS



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1986 KOOTENAY LAKE/ SOUTH ARM STREAM INVENTORY PHOTOGRAPHS

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1986 KOOTENAY LAKE / SOUTH ARM STREAM INVENTORY

STREAM: WILSON CREEK **LOCATION:** _____ LONG 116° 51' 10"
LAT 49° 33' 45"

DATE: Sept. 19/86 **TIME:** 09:30 hr.

TURBIDITY: Clear

WATER TEMP: 8°C.

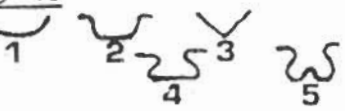
AIR TEMP: 18°C.

FLOW: (surface) 2.25m/sec.

GRADIENT: 12.5%

SUBSTRATE: silt 5 % sand 5 % gravel 5 % stone 5 % cobble 5 % rubble 10 % boulder 65 %

STREAM PROFILE: #1



ARMOURING: poor ☐ fair ☐ moderate ☒ good ☐

RUN 20 % **RIFFLE** 45 % **POOL** 35 %

SURROUNDING VEGETATION:

type:	abundant	mod	sparse	none
shrub			X	
conif		X		
decid		X		
grass			X	

OBSTRUCTIONS:

	height	location
dam		
falls (tiered)	3 m.	approx 1.5 km
culvert		from
log jam		confluence
other		

AREAS OF COVER

	abundant	mod	sparse	oth
logs			X	
root wads		X		
rocks	X			
undercuts			X	
other				

STREAM BANKS: steep ☐ sloping ☐ undercut ☐ eroded ☐ rock ☒ soil ☐

SURROUNDING LAND USE: forest ☒ rangeland ☐ suburban ☐ recreational ☐ farmland ☐

PLANTS:

type:	abundant	moderate	sparse
cedar	X		
alder		X	
moss	X		

INSECTS:	abundant	mod	sparse
aquatic:			
Ephemeroptera		X	
Plecoptera		X	
Tricoptera		X	
land-based			
spiders			X

COMMENTS:

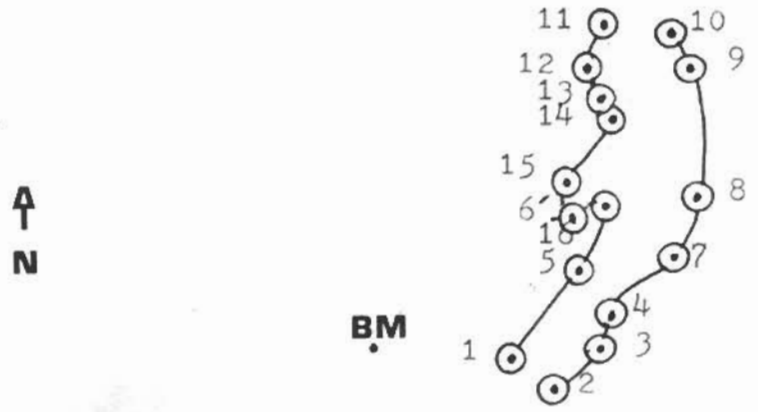
Benchmark=Cedar tree on North bank
approx. 80 m. below C.P.R. bridge

Photo#1 Typical Reach looking upstream
#2 Typical Reach looking downstream
#3 Aerial photo of Confluence
#4 Barrier

1986 KOOTENAY LAKE/SOUTH ARM STREAM INVENTORY
TYPICAL REACH

Stream Name: WILSON CREEK

Scale: 1cm-4m



Comments: Accessible portion of stream quite steep; however, there are numerous holding pools. Numerous undercuts and root wads. Stream well shaded by overhanging trees and shrubs.

1986 KOOTENAY LAKE/ SOUTH ARM STREAM INVENTORY PHOTOGRAPHS

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1986 KOOTENAY LAKE/ SOUTH ARM STREAM INVENTORY PHOTOGRAPHS

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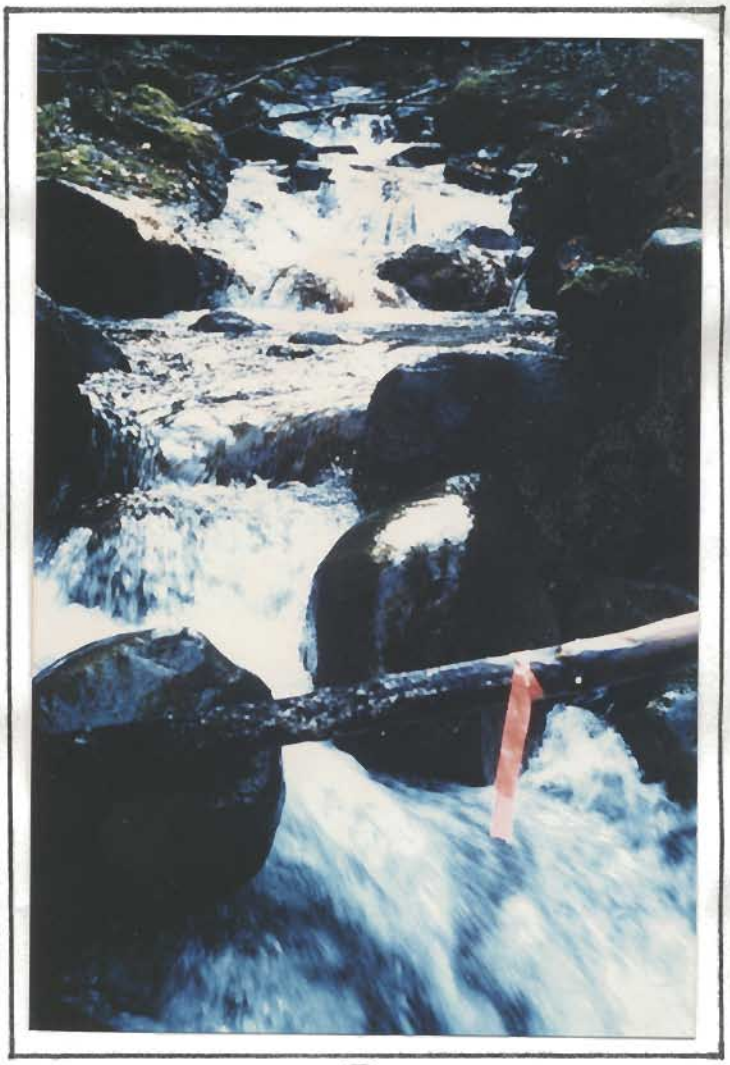

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KOKANEE INFORMATION

STREAM NAME	NUMBER	LENGTH		WEIGHT		SEX	# EGGS
		in.	cm.	oz.	gm.		
Goat River	1	8.0	20.0	2.8	80	F	56
" "	2	8.5	21.5	2.8	80	M	-
" "	3	8.0	20.0	2.5	70	M	-
" "	4	7.0	17.5	2.1	60	F	37
" "	5	7.0	17.5	2.1	60	M	-
" "	6	7.25	18.0	1.8	50	M	-
" "	7	7.5	19.0	1.4	40	M	-
" "	8	8.0	20.0	1.6	45	M	-
" "	9	7.5	19.0	1.4	40	M	-
" "	10	7.5	19.0	1.6	45	F	93
" "	11	6.75	17.0	0.4	12	M	-
" "	12	7.25	18.0	1.8	50	M	-
" "	13	6.75	17.0	3.3	93	F	34
" "	14	7.25	18.0	3.4	95	F	39
" "	15	7.5	19.0	3.0	86	F	57
" "	16	7.25	18.0	1.9	55	F	96
" "	17	7.25	18.0	1.9	55	F	58
" "	18	7.5	19.0	2.4	67	F	47
" "	19	7.5	19.0	2.1	60	M	-
" "	20	7.5	19.0	2.3	65	M	-
" "	21	7.25	18.0	1.7	47	F	8

-Peak Count occurred on September 2nd, 1986

-Average Peak Count; 3710 fish, includes 50 dead.

-Water Temperature at peak; 14.5° C.

-To obtain an estimate of the total number of Kokanee utilizing this stream in 1986, the peak live count was multiplied by 2.3

Count # 1	3650
Count # 2	3770
Average	3710
Difference	3.3%

-The total estimated Kokanee in the Goat River in 1986 is 8533.

-Skeins from most of the Kokanee examined, were not well developed

STREAM NAME	NUMBER	LENGTH		WEIGHT		SEX	# EGGS
		in.	cm.	oz.	gm.		
Summit Creek	1	7.75	19.75	2.3	65	M	-
" "	2	7.5	19.0	1.9	55	F	4
" "	3	7.5	19.0	1.9	55	F	69
" "	4	8.25	20.75	3.2	90	M	-
" "	5	8.25	20.75	2.5	70	M	-
" "	6	7.5	19.0	2.1	60	F	7
" "	7	7.5	19.0	2.3	65	F	44
" "	8	7.75	19.75	2.5	70	M	-
" "	9	7.25	18.0	1.8	50	F	1
" "	10	7.5	19.0	1.9	55	F	4
" "	11	8.0	20.0	2.5	70	M	-
" "	12	7.5	19.0	1.9	55	F	128
" "	13	7.25	18.0	1.9	55	F	5
" "	14	7.0	17.5	1.6	45	F	14
" "	15	7.75	19.75	2.1	60	M	-
" "	16	7.75	19.75	2.5	70	M	-
" "	17	8.25	20.75	2.5	72	M	-
" "	18	7.5	19.0	2.1	60	F	269
" "	19	7.5	19.0	2.5	70	M	-
" "	20	7.5	19.0	2.3	65	M	-
" "	21	7.75	19.75	2.5	70	M	-

-Peak Count occurred on September 3rd, 1986

-Average Peak Count; 2375 fish, includes 10 dead

-Water Temperature at peak; 15.0° C.

-To obtain an estimate of the total number of Kokanee utilizing this stream in 1986, the peak live count was multiplied by 2.3

Count # 1	2250
Count # 2	2500
Average	2375
Difference	10 %

-The total estimated Kokanee in Summit Creek in 1986 is 5460

-Skeins from most of the Kokanee examined, were not well developed

After the Peak Counts, we returned to Gray Creek to capture what we hoped would be spent females so we could photograph the undeveloped skeins for this report. Although the eggs were counted, it is believed that these fish had already spawned. M.C. (Date was September 17th)

	NUMBER	LENGTH		WEIGHT		SEX	# EGGS
		in.	cm.	oz.	gm.		
Gray Creek	1	7.25	18.0	1.5	41	F	14
" "	2	7.5	19.0	1.5	42	F	Ø
" "	3	7.75	19.75	1.75	50	F	6
" "	4	7.25	18.0	1.5	42	F	3
" "	5	7.5	19.0	1.75	49	F	4
" "	6	9:0	23.0	3.5	100	F	12

Peak Count Data From East Side streams tributary to the South Arm of Kootenay Lake

STREAM NAME	DATE OF PEAK COUNT	WATER TEMP.	COUNT	ESTIMATED
Akokli Cr.	Sept. 4th	11°C.	13	30
Boulder Cr.	N/A			
Goat River	Sept. 2nd	14.5°C.	3710	8533
Gray Cr.	Sept. 9th	10°C.	204	469
LaFrance Cr.	Sept. 2nd	11°C.	38	88
Lockhart Cr.	Sept. 1st	11°C.	128	294
Sanca Cr.	Sept. 3rd	11°C.	40	92
				9506

West side streams were examined in late August but because of the very low numbers of Kokanee present, it was assumed at that time that the peak had already occurred. On a subsequent trip to the West side, this assumption was confirmed by the presence of even fewer Kokanee. For this reason, Summit Creek is the only West side stream documented for a Peak Count. M.C.

1986 KOOTENAY LAKE/ SOUTH ARM STREAM INVENTORY PHOTOGRAPHS

Typical ♂, 7 3/4" - 2.47 oz. (19.7 cm. - 65 gm.)

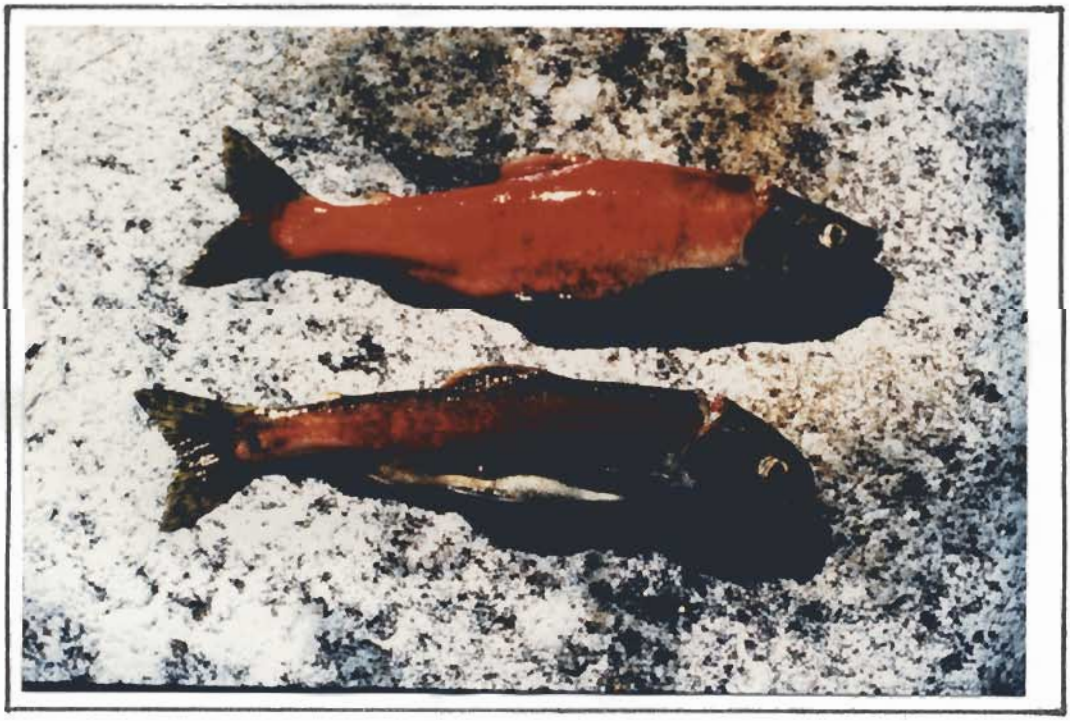
1986 KOOTENAY LAKE/ SOUTH ARM STREAM INVENTORY PHOTOGRAPHS

Typical ♀ , 7 1/2" - 3.36 oz. (19 cm. - 55 gm.)

1986 KOOTENAY LAKE/ SOUTH ARM STREAM INVENTORY PHOTOGRAPHS

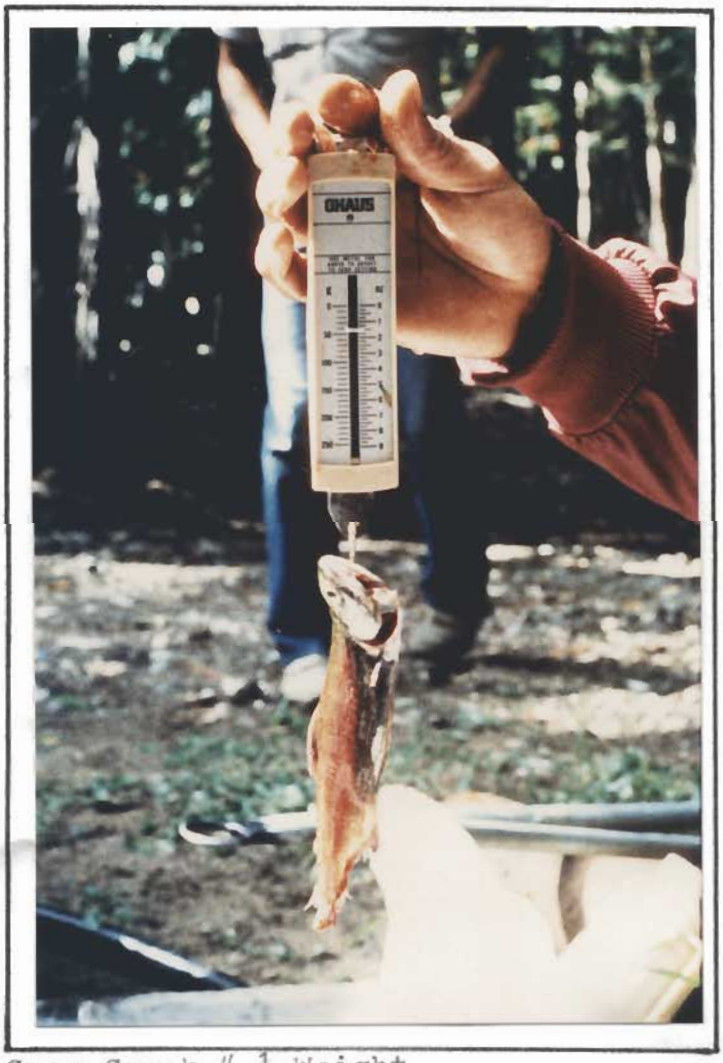
Eggs from fish #17, Goat River.

Typical ♂/♀ comparison.



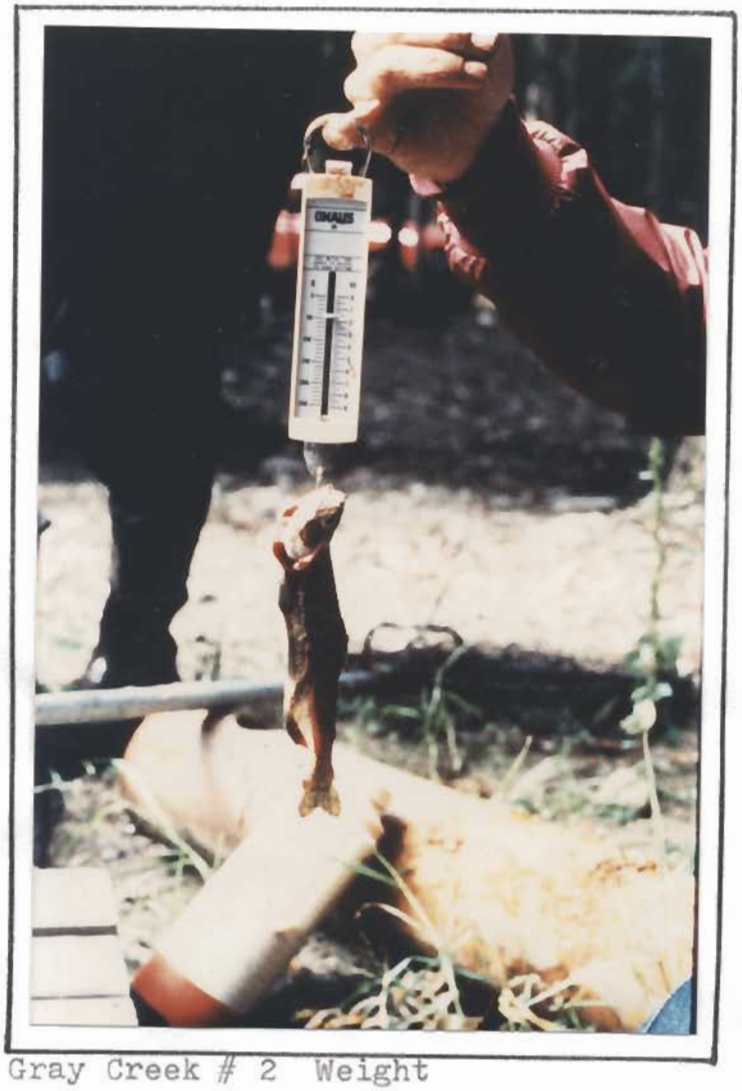
1986 KOOTENAY LAKE/ SOUTH ARM STREAM INVENTORY PHOTOGRAPHS

Gray Creek #1 Length



Gray Creek # 1 Weight

1986 KOOTENAY LAKE/ SOUTH ARM STREAM INVENTORY
PHOTOGRAPHS



Gray Creek # 2 Weight

Gray Creek # 2 Length No Eggs Present

1986 KOOTENAY LAKE/ SOUTH ARM STREAM INVENTORY PHOTOGRAPHS

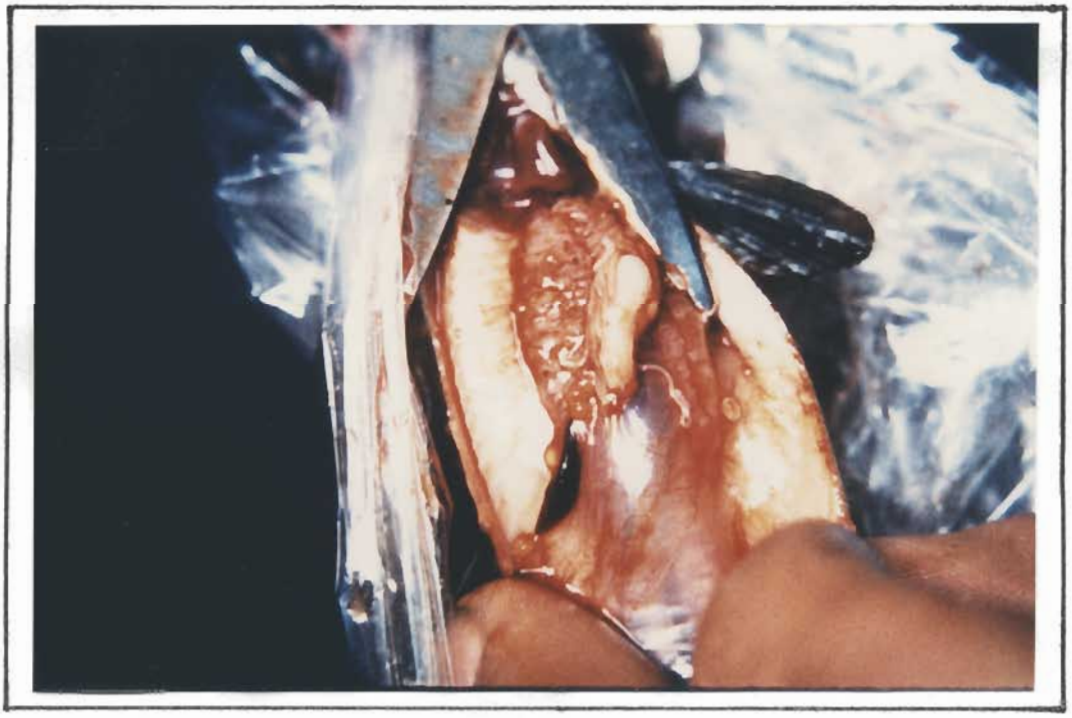
Gray Creek # 3 Weight

Gray Creek # 3 Length

1986 KOOTENAY LAKE/ SOUTH ARM STREAM INVENTORY PHOTOGRAPHS

Parasites, found in several ♀ Kokanee.

Parasites, and undeveloped skeins.

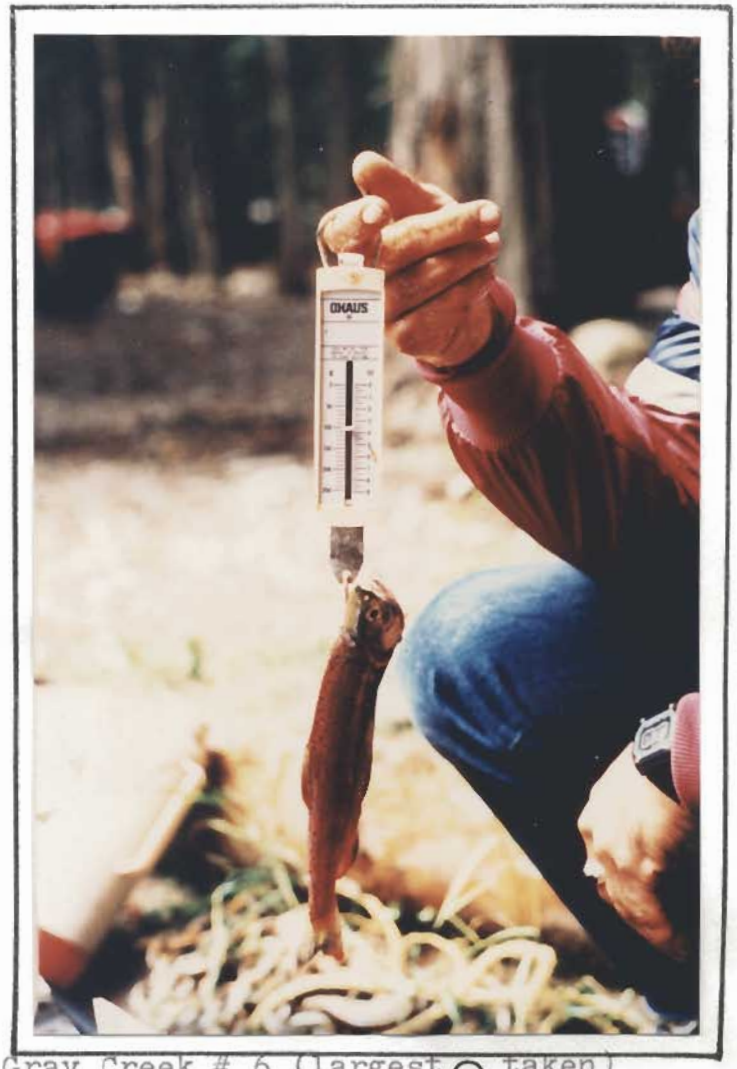


1986 KOOTENAY LAKE/ SOUTH ARM STREAM INVENTORY PHOTOGRAPHS

Comparison, undeveloped skeins and parasites.

Gray Creek, #3, eggs & undeveloped skeins.

1986 KOOTENAY LAKE/ SOUTH ARM STREAM INVENTORY PHOTOGRAPHS

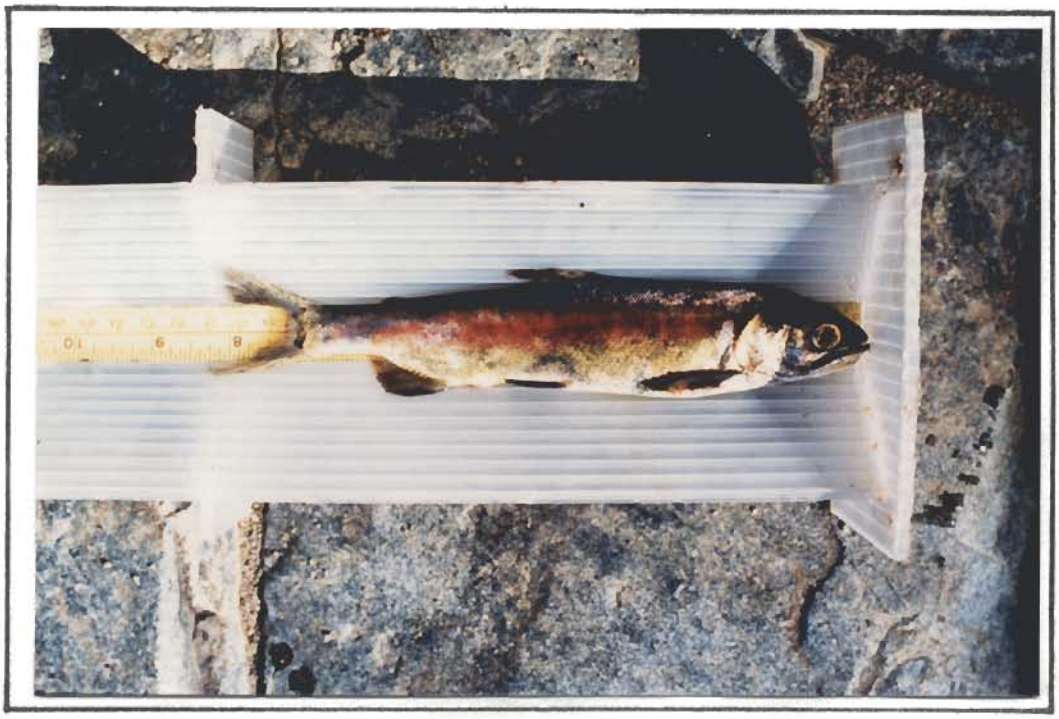


Gray Creek # 6 (largest ♀ taken)

Gray Creek # 6 12 Eggs, 2 were paler in colour

1986 KOOTENAY LAKE/ SOUTH ARM STREAM INVENTORY PHOTOGRAPHS

Goat River, fish #17



RECOMMENDATIONS AND CONCLUSIONS

As with any first time effort, this project identified several suggestions that were not presented in the content of this report.

Survey teams of three people were most effective, and a minimum of two teams would facilitate data collection during the peak spawning runs. If stream surveys are to be done concurrently with enumeration, additional teams are recommended to insure adequate time for data collection

Equipment requirements were refined through trial and error. A 250 gram scale (spring type) was used but a more precise scale is suggested for future data collection due to the small size of fish sampled. Fiberglas tapes for the surveys were superior to their steel counterparts. Steel tapes cut fingers, hang up easily on substrate, rust and eventually break.

A new design of scale board was constructed for this project and proved to be very effective and durable. The design and materials used are included in the back of this report and a copy will be provided to the Fisheries Branch.

During the spawning runs, many local residents commented that, in their opinion, the numbers were lower than in 1985. If possible, the collection of enumeration data should be continued for at least three years to include all age classes of Kokanee, or for six years to provide comparison data on specific age classes.

The Creston Valley Rod and Gun Club would like to thank all of the agencies and individuals who contributed to the sucess of this project. A special thanks goes to the Regional Fisheries Staff whose insight, patience and confidence allowed the Club to complete this project. We are optimistic that the information provided in this report will be a useful contribution toward future management strategies for the South Arm of Kootenay Lake.

For additional information please contact:

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Creston, B.C.,
V0B-1G0.