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AN INVENTORY OF THE OOTSANEE LAKE DRAINAGE,
TRIBUTARY TO CHESLATTA LAKE, AND STREAMS
TRIBUTARY TO THE SOUTH BANK OF CHESLATTA LAKE

Prepared by

G. B. Caw

Field Work by

J. Burns
G. Caw
D. Phillip
A. Witt

Dates of Field Work

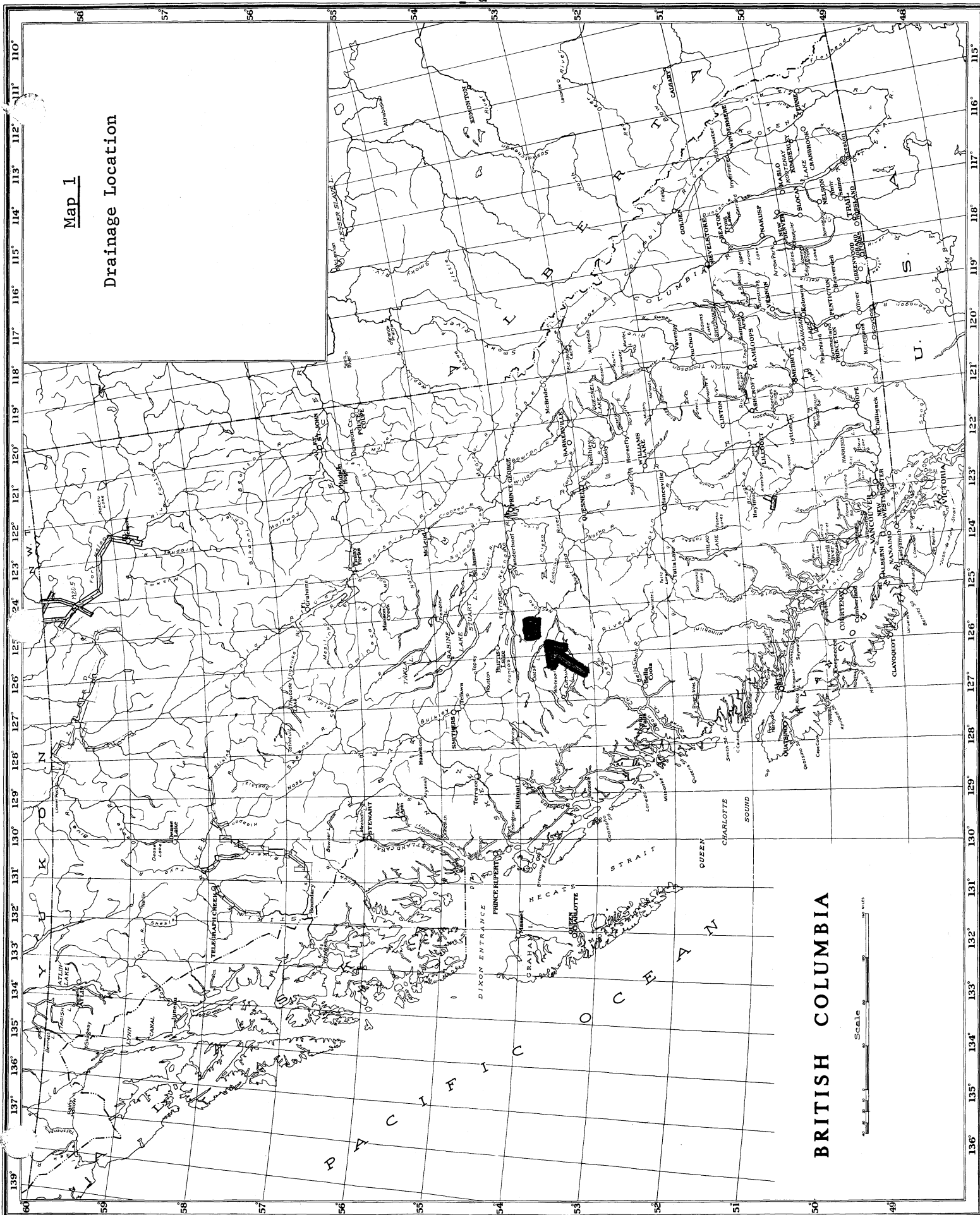
June 26 - August 4, 1977

Stream Inventory

Fish & Wildlife Branch

Victoria, B. C.

February, 1978



Map 1

Drainage Location

BRITISH COLUMBIA



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ABSTRACT

Ootsanee Lake outlet/inlets and some tributaries to the opposite (south) bank of Cheslatta Lake were surveyed between June 26 - August 4, 1977 for purposes of management and protection of a resource which will be the site of varied land use in oncoming years. Water levels were very low at the time of survey but rearing rainbow trout (3.5 - 5.0 cm) were found to be abundant throughout most streams. The small ($<0.03 \text{ m}^3/\text{sec}$ or 1 cfs) tributary appears to be the backbone of the Cheslatta Lake fishery. Overall stability is very high but the sensitivity of such small tributaries necessitates careful land use. Detailed lake inventory data on Getzuni (1976) and Ootsanee (1977) Lakes is on file in the Fish and Wildlife Regional Office, Smithers, B. C.

ACKNOWLEDGEMENTS

I wish to thank John Burns, Dave Phillip and Andy Witt, the field crew, and Mary Negraeff the typist.

1. INTRODUCTION

1.1 Study Area

Ootsanee Lake Outlet and streams tributary to the south bank of Cheslatta Lake were surveyed by Headquarters Stream and Lake Inventory personnel between June 26 and August 4, 1977. Cheslatta Lake is drained by the Cheslatta River into the Nechako River and the Fraser River system. The area is accessible via gravel road from the town of Burns Lake, 60 Km to the north. A good dirt trail through pasture land allows for easy boat launching at the west end of the north bank (refer to Map 2).

1.2 Methodology & Objectives

The objectives of this survey were to assess overall fisheries capability and productivity of the portion of this drainage which is to see land use in the near future. Detailed physical parameters characterize the streams and surrounding terrain are recorded so as to enable management and protection of the fisheries resource.

Where possible, streams are broken down into physically homogeneous reaches so as to enable detailed watershed mapping (Maps 3-4). All streams were walked from boat access points and some were flown so as to allow observation of headwater areas.

As angling was very unsuccessful during the survey, the recorded presence of fish is based on visual observation and from specific sites electroshocked using the Smith-Root Mark V electrofisher. The recorded presence of fish in tributaries to Ootsanee Lake is based solely on visual observation by Lake Inventory personnel.

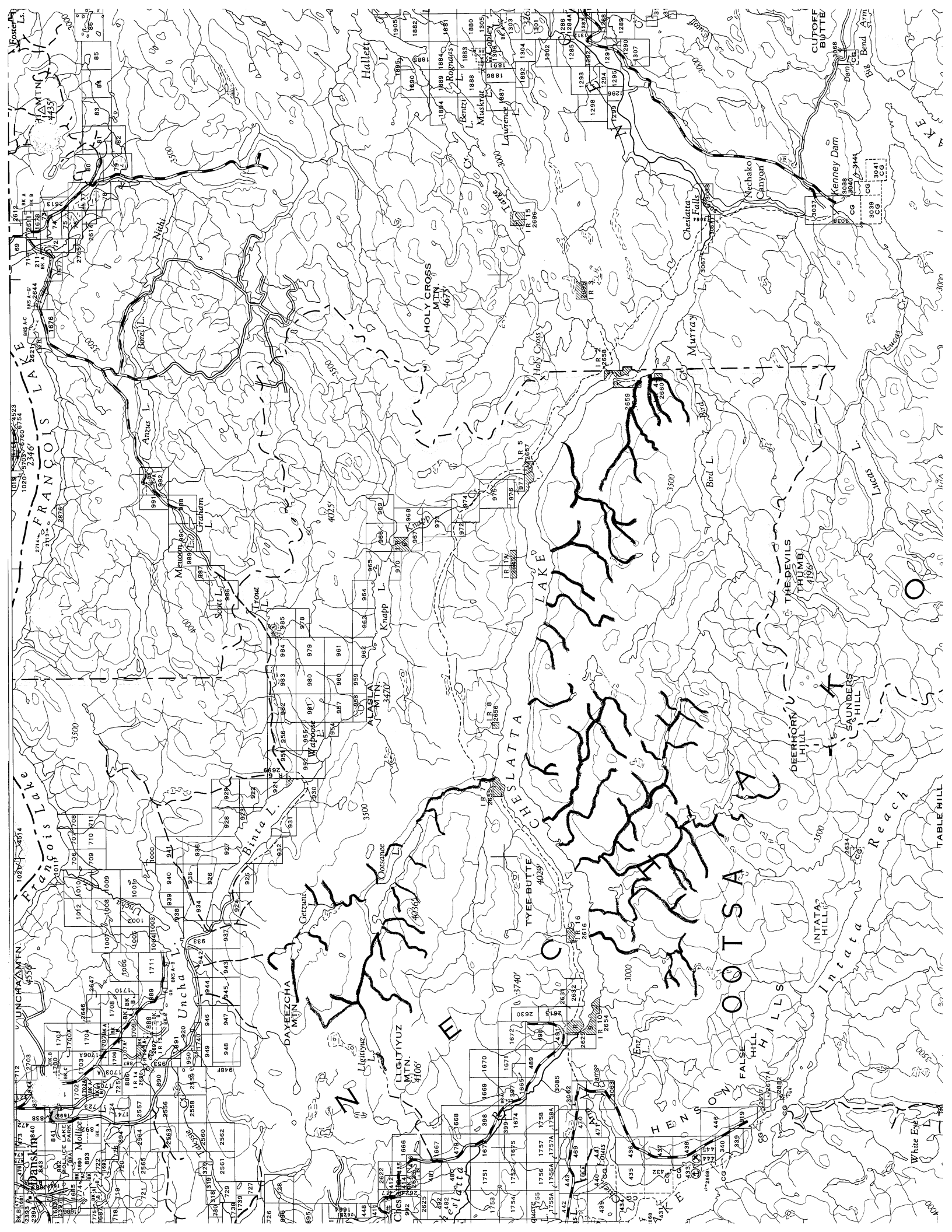
Detailed stream data is presented in the Stream Data Reports, section 3 of this report. The theft of a recorder and reconnaissance tape has resulted

in the loss of a great deal of information on the upper portions of many streams. Detailed mapping (Maps 3 & 4) uses the code as set by the Resource Analysis Unit of the E.L.U.C. Secretariat in Aquatic Systems Mapping and Data Management, July, 1976. A breakdown of the system is given in Appendix I.

8 (a)

Cheslatta Lake

Map 2 - 1:250,000 Reference



2. RESULTS & DISCUSSION

2.1 General Description

All streams are small ($0.14 \text{ m}^3/\text{sec}$ or 5 cfs) with moderate/low gradient over those areas accessible to migratory fish. Unusually low volume discharge characterized almost all streams at the time of survey. Only a few exceeded $0.028 \text{ m}^3/\text{sec}$ (1 cfs).

Although volume discharge was hardly at desirable levels, overall productivity seemed high relative to stream conditions. Rainbow trout (3.5 - 5.0 cm) the only salmonid sampled, were found to be abundant in the smallest of streams, the apparent biological backbone of this lake drainage. The fact that a number of tributaries were dry at the time of survey will doubtlessly contribute to 1977 being relatively a low production year.

2.2 Present Productivity and Potential Capability

Table 1 summarizes stream reach rearing, holding and spawning capabilities (P-Poor, L-Low, F-Fair, G-Good, E-Excellent). Species present represent those fish species observed or sampled (Rb-rainbow; OS-other species, in this case sculpins and suckers; \emptyset -no fish). Where species abbreviations are bracketed it is indicative of suspected presence, i.e. no verification. (\emptyset) indicates that no sampling done but there are physical characters that are probably limiting the presence of any fish species.

Table I Stream Capabilities And Species Utilization

	<u>Spawning</u>	<u>Rearing</u>	<u>Holding</u>	<u>Species</u>
Tributary A	G	G	L	Rb, OS
B	Dry			
C	F-G	G	F-G	Rb, OS
D	P	F	P	(OS)
E	F-G	G	F	Rb, OS
F	F-G	G	F	(Rb)
G	L	F-G	L	(Rb)
Ootsanee Outlet	F-G	G-E	G	Rb, OS
Inlet #1	F	F-G	F	Rb
#2	F-G	F-G	L	Rb
#3	F	F-G	F	Rb

The physical bases for Table I are the detailed Stream Data Reports, section 3 of this report. Subjective estimates of rearing, spawning and holding capabilities are made on the basis of the quality and quantity of these habitat types in each reach. It can be concluded from stream report data summarized in Table I that practically all of these relatively small streams are in some way important to rainbow trout production. The abundance of first year fry supports this hypothesis.

The summer of 1977 presented unusually low water conditions. Most streams were less than $0.03 \text{ m}^3/\text{sec}$ (1 cfs) while many were dry. In terms of capability, it is obvious that potential would be much greater in years of larger runoff. It is obvious, however, that these small tributaries are extremely valuable rainbow trout rearing areas.

2.3 Protection Problems

Overall stability throughout the drainage is very high. The only critically unstable section noted was a large slumping bank on lower Tributary C. The steep ridges above 1.0 Km on Tributary C and the loose banks of Tributary F were also noted as being potentially unstable but were presenting no problems at time of survey because of thick forest growth.

2.4 Enhancement Possibilities

No feasible enhancement projects are envisioned.

2.5 Recreational Potential

The Cheslatta Lake area is of significant value for boating, fishing and hunting. The streams, because of size, are of no value to the angler.

2.6 Further Work Needed

A detailed seasonal sampling program might assist in the management and protection of this fisheries resource.

3. Stream Data Reports

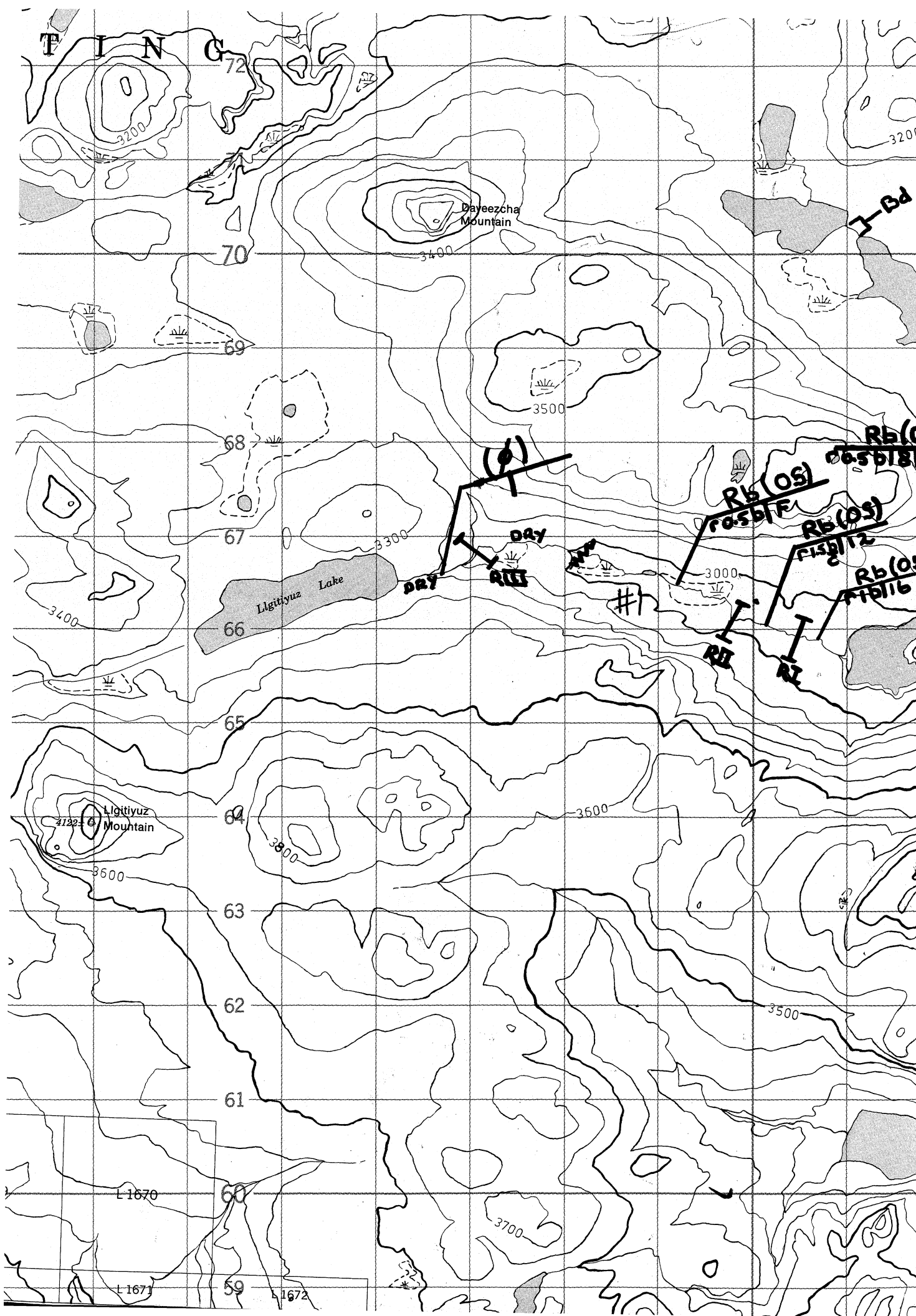
3.1 Ootsanee Lake Outlet/Inlets

Map 3

Ootsanee Lake Drainage

Aquatic Systems Mapping

1:50,000



Drainage Area ~ 30 km².

GENERAL DESCRIPTION - OVERALL PRODUCTIVITY

presenting good spawning rearing and holding habitat.

Reach Ootsanee Outlet - Reach I Map no. 93F
 Survey Method walking Team Caw & Witt
 Date July 2, 1977 Ref. No. _____
 Length 0.7 Km km. Elevation Range _____ m.
 Avg. depth at 0.3 m. Avg. velocity at 0.5 m/sec.
 Avg. wetted width _____ time of survey _____
 Wetted width (avg.) 2 m. Active bed width (avg.) 3 m.
 Range 1.5-4 m. Range 2.5-7 m.
 Flood Plain Width 50 m. Discharge Actual .085 m³/sec.
 Range _____ m³/sec.
 Colour slight tannic Turbidity clear
 Time/Temp. (°C) Air 17.0°C Water 12.0°C
 Weather Conditions sunny, 3/10 cloud cover
 Debris Load light % Static 10
 % Transient 90
 Aquatic Plants None
 Invertebrates aquatic invertebrates very abundant - no I.D.
 Access boat/4-wheel drive
 Land Use cattle grazing at mouth

Check List X = Recorded in report: N.R. = Not recorded: N.N. = Not noted.

- | | |
|---|---------------------------------------|
| 1. <u>X</u> Gradient - Substrate | 7. <u>X</u> Bank & Hillside Stability |
| 2. <u>X</u> Channel Type | 8. <u>NN</u> Tributaries |
| 3. <u>X</u> %Pool and Run | 9. <u>NN</u> Protection Problems |
| 4. <u>X</u> Obstructions | 10. <u>NN</u> Improvement Potential |
| 5. <u>X</u> General Vegetation
Type & Stream cover | 11. <u>NN</u> Additional Notes |
| 6. <u>X</u> Fish | |

Ootsanee Lake Outlet - Reach I

1. Gradient-Substrate

Gradient: 1.5-2.0%

Substrate: 20% fines

10% small gravel

20% large gravel

40% small cobble

- smooth texture, moderate compaction

- fair to good spawning character

2. Channel Type

The channel is a regular bounded/confined single thread with very little side channelling. Abundant backwaters and undercut banks provide ample rearing habitat.

3. Pool-Run Percentages

Pool: 25%

Run: 75% - broken swirling

4. Obstructions

There is a 1 meter falls over bedrock at 0.7 Km. This is only a partial barrier.

5. General Vegetation Type and Stream Cover

The lower 0.5 Km is predominantly small alder (90%) and cottonwood with spruce (see picture) becoming dominant above. Crown closure is 10-20% in the lower 0.5 Km increasing to 20-30% above. The understory is generally quite low, offering 20-40% cover.

6. Fish

Electroshocking in the lower 300 meters yielded two longnose suckers (8.0 cm, 35.0 cm), many sculpin (4-7 cm) and 14 rainbow (7-15 cm, 20 cm). Holding/rearing capabilities are high in this reach and full utilization is being made.

7. Bank and Hillside Stability

Although generally quite undercut, the banks in Reach I are stable, inherent with their low profile and well rooted riparian timber.



Photo 1: Typical forest of lower kilometer

Reach Ootsanee Outlet - Reach II Map no. 93F

Survey Method walking/flying Team Caw & Witt

Date July 2, 1977 Ref. No. _____

Length 2.25 km. Elevation Range _____ m.

Avg. depth at 0.3 m. Avg. velocity at 0.5 m/sec.
 Avg. wetted width _____ time of survey _____

Wetted width (avg.) 1.75 m. Active bed width (avg.) 2.5 m.
 Range 1.5-2.5 m. Range 2.0-5.0 m.

Flood Plain Width 15 m. Discharge Actual .085 m³/sec.
 Range - m³/sec.

Colour slight tannic Turbidity clear

Time/Temp. (°C) Air 17.0°C Water 12.0°C

Weather Conditions sunny 3/10 cloud cover

Debris Load light % Static 10
 % Transient 90

Aquatic Plants None

Invertebrates None observed

Access Walking

Land Use None

Check List X = Recorded in report: N.R. = Not recorded: N.N. = Not noted.

- | | |
|---|---------------------------------------|
| 1. <u>X</u> Gradient - Substrate | 7. <u>X</u> Bank & Hillside Stability |
| 2. <u>X</u> Channel Type | 8. <u>NN</u> Tributaries |
| 3. <u>X</u> %Pool and Run | 9. <u>NN</u> Protection Problems |
| 4. <u>X</u> Obstructions | 10. <u>NN</u> Improvement Potential |
| 5. <u>X</u> General Vegetation
Type & Stream cover | 11. <u>NN</u> Additional Notes |
| 6. <u>X</u> Fish | |

Ootsanee Lake Outlet - Reach II

1. Gradient: 2.5-3.0%

Substrate: 10% fines

10% small gravel

20% large gravel

30% small cobble

20% large cobble

10% boulder

2. Channel Type

The channel is a regular confined single thread with very little side channelling.

3. Pool-Run Percentages

Pool: 10%

Run: 90% (swirling, broken, rolling)

4. Obstructions

None

5. General Vegetation Type and Stream Cover

Crown closure from the spruce forest is 40%. Cover from overhang is less than 20%.

6. Fish

No sampling was attempted in this reach but utilization by rainbow trout is almost certain. Spawning and rearing character of the reach is low to fair.

7. Bank and Hillside Stability

Small windfall is abundant but conditions are stable inherent with thick forest growth and pockets of bedrock.

Reach Ootsanee Lake Outlet - Reach III Map no. 93F
 Survey Method flying Team Caw and Witt
 Date July 2, 1977 Ref. No. _____
 Length 1.9 km. Elevation Range _____ m.
 Avg. depth at N.R. m. Avg. velocity at est 0.3 m/sec.
 Avg. wetted width _____ time of survey _____
 Wetted width (avg.) 1.5 m. Active bed width (avg.) 2 m.
 Range 1-2 m. Range 1.5-2.5 m.
 Flood Plain Width 40 m. Discharge Actual .085 m³/sec.
 Range - m³/sec.
 Colour slight tannic Turbidity clear
 Time/Temp. (°C) Air N.R. Water N.R.
 Weather Conditions N.R.
 Debris Load light % Static 40
 % Transient 60
 Aquatic Plants None observed
 Invertebrates None observed
 Access Walking
 Land Use None

Check List X = Recorded in report: N.R. = Not recorded: N.N. = Not noted.

- | | |
|---|---------------------------------------|
| 1. <u>X</u> Gradient - Substrate | 7. <u>X</u> Bank & Hillside Stability |
| 2. <u>X</u> Channel Type | 8. <u>NN</u> Tributaries |
| 3. <u>X</u> %Pool and Run | 9. <u>NN</u> Protection Problems |
| 4. <u>X</u> Obstructions | 10. <u>NN</u> Improvement Potential |
| 5. <u>X</u> General Vegetation
Type & Stream cover | 11. <u>NN</u> Additional Notes |
| 6. <u>X</u> Fish | |

Ootsanee Lake Outlet - Reach III1. Gradient-Substrate

Gradient: 1.5%

Substrate: estimate 60% fines
30% gravels
10% cobble

2. Channel Type

The channel is a gently meandering regular, bounded single thread.

3. Pool-Run Percentages

Pool: 30%

Run: 70% mostly placid

4. Obstructions

None

5. General Vegetation Type of Stream Cover

Stream cover is very low through this section of grassy meadows.

6. Fish

No sampling was attempted in this reach. Spawning character is poor while rearing is fair.

7. Bank and Hillside Stability

The surrounding terrain is very flat and grassy. No unstable portions were observed.

Stream SheetName Tributary #1 Ref. No. Tributary to Ootsanee Lake → Cheslatta Lake → Cheslatta RiverDate August 4, 1977 Quality baseline overviewMap No. 93F Other Mapping 93 F/13Location: Lat. 53 49 Long. 125 34
Deg. Min. Sec. Deg. Min. Sec.Length 6.5 km. Length Accessible to 6.5 km.
Migrant FishElevation Range NN m. to NN m.Drainage Area ~ 9.0 km².GENERAL DESCRIPTION - OVERALL PRODUCTIVITYTributary #1 presents low to fair spawning habitat but good rainbowrearing relative to its size.

Reach Tributary #1 - Reach I Map no. 93 F/13

Survey Method Walking Team Burns and Phillip

Date August 4, 1977 Ref. No. _____

Length 1.0 km. Elevation Range NN m.

Avg. depth at 0.2 m. Avg. velocity at ~0.3 m/sec.
 Avg. wetted width _____ time of survey _____

Wetted width (avg.) 1.5 m. Active bed width (avg.) 2 m.
 Range 1-2 m. Range 1.5-3 m.

Flood Plain Width N.R. m. Discharge Actual 0.042 m³/sec.
 Range NN m³/sec.

Colour tannic Turbidity none

Time/Temp. (°C) Air N.R. Water 16.0°C

Weather Conditions N.R.

Debris Load light % Static 50
 % Transient 50

Aquatic Plants None

Invertebrates None observed

Access flying/boat/walking

Land Use None

Check List X = Recorded in report: N.R. = Not recorded: N.N. = Not noted.

- | | |
|---|---------------------------------------|
| 1. <u>X</u> Gradient - Substrate | 7. <u>X</u> Bank & Hillside Stability |
| 2. <u>X</u> Channel Type | 8. <u>NN</u> Tributaries |
| 3. <u>X</u> %Pool and Run | 9. <u>NN</u> Protection Problems |
| 4. <u>X</u> Obstructions | 10. <u>NN</u> Improvement Potential |
| 5. <u>X</u> General Vegetation
Type & Stream cover | 11. <u>NN</u> Additional Notes |
| 6. <u>X</u> Fish | |

Tributary #1 to Ootsanee Lake1. Gradient-Substrate

Gradient: 1.0%

Substrate: 10% fines

25% small gravel

30% large gravel

15% small cobble

10% large cobble

10% boulder

- moderate compaction, angular rounded texture

- fair spawning character

2. Channel Type

The channel is a regular, bounded single thread with low undercut banks.

3. Pool-Run Percentages

Pool: 70% average depth of 0.2 m

Run: 30%

4. Obstructions

None

5. General Vegetation Type of Stream Cover

Crown closure from the spruce-lodgepole pine forest is approximately 20%.

Cover from overhang is up to 40%.

6. Fish

Rainbow fry to 5.0 cm were noticeably abundant. Spawning capability is low to fair while rearing is generally good.

7. Bank and Hillside Stability

The surrounding terrain is well vegetized, very low profile and subsequently quite stable. Minor bank undercutting is evident throughout the reach.



Photo 2: Typical section of Reach I, Tributary #1 to Ootsanee Lake.

Reach Tributary #1 - Reach II Map no. 93F/13
 Survey Method walking Team Burns and Phillip
 Date August 4, 1977 Ref. No. _____
 Length 0.6 km. Elevation Range NN m.
 Avg. depth at 0.15 m. Avg. velocity at 0.4 m/sec.
 Avg. wetted width _____ time of survey _____
 Wetted width (avg.) 1.5 m. Active bed width (avg.) 2 m.
 Range 1-2 m. Range 1.5-2.5 m.
 Flood Plain Width NN m. Discharge Actual 0.042 m³/sec.
 Range N.N. m³/sec.
 Colour tannic Turbidity clear
 Time/Temp. (°C) Air N.R. Water 17.5° C
 Weather Conditions N.R.
 Debris Load light % Static 10
 % Transient 90
 Aquatic Plants abundant - species not noted
 Invertebrates none observed
 Access walking
 Land Use none

Check List X = Recorded in report: N.R. = Not recorded: N.N. = Not noted.

- | | |
|---|--|
| 1. <u>X</u> Gradient - Substrate | 7. <u>NN</u> Bank & Hillside Stability |
| 2. <u>X</u> Channel Type | 8. <u>NN</u> Tributaries |
| 3. <u>X</u> %Pool and Run | 9. <u>NN</u> Protection Problems |
| 4. <u>X</u> Obstructions | 10. <u>NN</u> Improvement Potential |
| 5. <u>X</u> General Vegetation
Type & Stream cover | 11. <u>NN</u> Additional Notes |
| 6. <u>X</u> Fish | |

Tributary #1 to Ootsanee Lake - Reach II1. Gradient-Substrate

Gradient: 1.5%

Substrate: 10% fines

10% small gravel

10% large gravel

25% small cobble

25% large cobble

20% boulder

- moderate compaction, angular-rounded texture

- poor spawning character, fair to good rearing

2. Channel Type

The channel is a regular, bounded/confined single thread with virtually no side channelling but abundant small backwaters associated with relatively slow water velocity.

3. Pool-Run Percentages

Pool: 40% average depth 0.15 m

Run: 60%



Photo 3: Typical section of Reach II, Tributary #1 to Ootsanee Lake.

4. Obstructions

None

5. General Vegetation Type and Stream Cover

Forest cover (spruce/lodgepole pine) becomes more sparse in Reach II.

Crown closure is generally less than 20% while cover from overhanging shrub is as high as 70%.

6. Fish

Rainbow fry to 4.0 cm were moderately abundant. The spawning capability of this reach is very low while rearing is fair to good.

Reach Tributary #1 - Reach III Map no. 93F/13
 Survey Method walking/flying Team Burns and Phillip
 Date August 4, 1977 Ref. No. _____
 Length _____ km. Elevation Range NN m.
 Avg. depth at 0.4 m. Avg. velocity at 0.15 m/sec.
 Avg. wetted width _____ time of survey _____
 Wetted width (avg.) 2 m. Active bed width (avg.) 2 m.
 Range 1.5-3 m. Range 1.5-3 m.
 Flood Plain Width N.N. m. Discharge Actual 0.042 m³/sec.
 Range - m³/sec.
 Colour tannic Turbidity clear
 Time/Temp. (°C) Air N.R. Water 19.0°
 Weather Conditions N.R.
 Debris Load light % Static 0%
 % Transient 100%
 Aquatic Plants abundant
 Invertebrates none observed
 Access walking
 Land Use none

Check List X = Recorded in report: N.R. = Not recorded: N.N. = Not noted.

- | | |
|---|--|
| 1. <u>X</u> Gradient - Substrate | 7. <u>NN</u> Bank & Hillside Stability |
| 2. <u>X</u> Channel Type | 8. <u>NN</u> Tributaries |
| 3. <u>X</u> %Pool and Run | 9. <u>NN</u> Protection Problems |
| 4. <u>X</u> Obstructions | 10. <u>NN</u> Improvement Potential |
| 5. <u>X</u> General Vegetation
Type & Stream cover | 11. <u>X</u> Additional Notes |
| 6. <u>X</u> Fish | |

Tributary #1 to Ootsanee Lake - Reach III1. Gradient-Substrate

Gradient: 0.5%

Substrate: 90% fines

5% small cobble

5% large cobble

- silty, no spawning capability

2. Channel Type

The channel is a regular, bounded, meandering single thread with no side or back waters.

3. Pool-Run Percentages

- flow is 100% deep placid run

4. Obstructions

The stream channel proper disappears immediately above the second marsh area. It appears that flow between Llgitiyuz Lake and this point is underground, limiting accessibility above this point.



Photo 4: Typical slow moving placid run of Reach III,
Tributary #1 to Ootsanee Lake,

5. General Vegetation Type & Stream Cover

The meadow type vegetation of Reach III affords virtually no stream cover.

6. Fish

There were no fish observed in this reach. Spawning habitat is non-existent; rearing is low.

11. Additional Notes: Above the Reach III boundary illustrated on Map 3 the channel is steeper and more confined. It was dry at the time of survey.

Reach Tributary #1 - Reach IV Map no. 93 F/13

Survey Method Fixed wing Team Burns and Phillip

Date August 4, 1977 Ref. No. _____

Length 1.3 km. Elevation Range _____ m.

Avg. depth at _____ m. Avg. velocity at _____ m/sec.
 Avg. wetted width _____ time of survey

Wetted width (avg.) 0 m. Active bed width (avg.) _____ m.
 Range 0 m. Range _____ m.

Flood Plain Width _____ m. Discharge Actual Dry m³/sec.
 Range _____ m³/sec.

Colour _____ Turbidity _____

Time/Temp. (°C) Air _____ Water _____

Weather Conditions _____

Debris Load _____ % Static _____
 % Transient _____

Aquatic Plants _____

Invertebrates _____

Access _____

Land Use _____

Check List X = Recorded in report: N.R. = Not recorded: N.N. = Not noted.

- | | |
|--|------------------------------------|
| 1. _____ Gradient - Substrate | 7. _____ Bank & Hillside Stability |
| 2. _____ Channel Type | 8. _____ Tributaries |
| 3. _____ %Pool and Run | 9. _____ Protection Problems |
| 4. _____ Obstructions | 10. _____ Improvement Potential |
| 5. _____ General Vegetation
Type & Stream cover | 11. _____ Additional Notes |
| 6. _____ Fish | |

Stream SheetName Tributary #2 (Getzuni Outlet) Ref. No. _____Tributary to Ootsanee Lake → Cheslatta LakeDate August 4, 1977 Quality baseline overviewMap No. 93F Other Mapping 93F/Location: Lat. 53 49 Long. 125 31
Deg. Min. Sec. Deg. Min. Sec.Length 2.05 km. Length Accessible to ~ 1.0 km.
Migrant FishElevation Range - m. to - m.Drainage Area 10 km².GENERAL DESCRIPTION - OVERALL PRODUCTIVITY

Tributary #2 presents good trout spawning and rearing habitat. No
fry were observed above a beaver dam at 1.0 km. Getzuni Lake has a
mean depth of 4.5 m, maximum 8.0 meters. Sampling of Getzuni Lake
in August of 1976 (sinking monofilament) yielded 78 rainbow (15.0-37.7 cm)
and 105 Lake Chub.

Reach Tributary #2 - Reach I Map no. 93F/13
 Survey Method walking Team Burns and Phillip
 Date August 4, 1977 Ref. No. _____
 Length 1.5 km. Elevation Range - m.
 Avg. depth at 0.1 m. Avg. velocity at 0.3 m/sec.
 Avg. wetted width _____ time of survey _____
 Wetted width (avg.) 0.5 m. Active bed width (avg.) 2 m.
 Range 0.1-1 m. Range 1.5-4 m.
 Flood Plain Width N.R. m. Discharge Actual 0.0003 m³/sec.
 Range - m³/sec.
 Colour slight tannic Turbidity clear
 Time/Temp. (°C) Air N.R. Water 12.0°C
 Weather Conditions N.R.
 Debris Load moderate % Static 50
 % Transient 50
 Aquatic Plants None
 Invertebrates None observed
 Access Walking
 Land Use None

Check List X = Recorded in report: N.R. = Not recorded: N.N. = Not noted.

- | | |
|---|--|
| 1. <u>X</u> Gradient - Substrate | 7. <u>NN</u> Bank & Hillside Stability |
| 2. <u>X</u> Channel Type | 8. <u>NN</u> Tributaries |
| 3. <u>X</u> %Pool and Run | 9. <u>NN</u> Protection Problems |
| 4. <u>X</u> Obstructions | 10. <u>NN</u> Improvement Potential |
| 5. <u>X</u> General Vegetation
Type & Stream cover | 11. <u>X</u> Additional Notes |
| 6. <u>X</u> Fish | |

Tributary #2 to Ootsanee Lake - Reach I1. Gradient-Substrate

Gradient: 1.0%-2.0%

Substrate: 10% fines

10% small gravel

20% large gravel

25% small cobble

25% large cobble

10% boulder

- moderate compaction, rounded-angular texture

- fair to good spawning character

2. Channel Type

The channel is a regular, confined single thread with no side or back channelling.

3. Pool-Run Percentages

Pool: 30% average depth 0.1 m

Run: 70%

4. Obstructions

There are four beaver dams (1.0 Km, 1.01 Km, 1.25 Km and 1.5 Km) all impassable at the time of survey.

5. General Vegetation Type and Stream Cover

Crown closure by the spruce forest is approximately 40%. Cover from overhanging vegetation is 50%.

6. Fish

Rainbow fry (3-5 cm) were noticeably abundant to the first beaver dam at 1.0 Km. None were observed above.

11. Additional Notes: Getzuni Lake was surveyed by H. Q. Lake Inventory personnel on August 18, 1976. Mean depth is recorded as being 4.5 m, maximum 8.0 m. An overnight sinking monofilament set (experimental mesh) yielded 78 rainbow (15.0-37.7 cm) and 105 Lake Chub.



Photo 5: Typical section of Reach I, Tributary #2 to Ootsanee Lake.

Stream SheetName Tributary #3 Ref. No. _____Tributary to Ootsanee Lake → Cheslatta LakeDate August 4, 1977 Quality baseline overviewMap No. 93F Other Mapping 93F/13, 93F/14Location: Lat. 53 49 Long. 125 30
Deg. Min. Sec. Deg. Min. Sec.Length 1.8 km. Length Accessible to 1.8 km.
Migrant FishElevation Range - m. to - m.Drainage Area 2.5 km².GENERAL DESCRIPTION - OVERALL PRODUCTIVITYTributary #3 presents good spawning and rearing habitat over the lower0.3 Km but quickly steepens above, limiting its use.

Reach Tributary #3 - Reach I Map no. 93F/13
Survey Method walking Team Burns and Phillip
Date August 4, 1977 Ref. No. -
Length 0.3 km. Elevation Range - m.
Avg. depth at 0.10 m. Avg. velocity at 0.5 m/sec.
Avg. wetted width _____ time of survey _____
Wetted width (avg.) 0.75 m. Active bed width (avg.) 2 m.
Range 0.5-1.5 m. Range 1.5-4 m.
Flood Plain Width - m. Discharge Actual 0.0141 m³/sec.
Range - m³/sec.
Colour None Turbidity clear
Time/Temp. (°C) Air N.R. Water 12.0°C
Weather Conditions N.R.
Debris Load light % Static 20
% Transient 80
Aquatic Plants None
Invertebrates None observed
Access boat
Land Use none

Check List X = Recorded in report: N.R. = Not recorded: N.N. = Not noted.

- | | |
|---|--|
| 1. <u>X</u> Gradient - Substrate | 7. <u>NN</u> Bank & Hillside Stability |
| 2. <u>X</u> Channel Type | 8. <u>NN</u> Tributaries |
| 3. <u>NN</u> %Pool and Run | 9. <u>NN</u> Protection Problems |
| 4. <u>X</u> Obstructions | 10. <u>NN</u> Improvement Potential |
| 5. <u>X</u> General Vegetation
Type & Stream cover | 11. <u>NN</u> Additional Notes |
| 6. <u>X</u> Fish | |

Tributary #3 to Ootsanee Lake - Reach I1. Gradient-Substrate

Gradient: 3.0%

Substrate: 15% fines

25% small gravel

35% large gravel

20% small cobble

5% large cobble

- loose compaction, rounded-angular texture

- fair spawning character

2. Channel Type

The channel is a regular confined single thread with no side channelling

4. Obstructions

None

5. General Vegetation Type and Stream Cover

Crown closure from the spruce forest is only 20% while thick overhanging vegetation gives up to 80% cover.

6. Fish

Rainbow fry to 4.0 cm were observed to be quite abundant.



Photo 6: Typical section of Reach I, Tributary #3
to Ootsanee Lake.

Reach Tributary #3 - Reach II Map no. 93F/13

Survey Method walking Team Burns and Phillip

Date August 4, 1977 Ref. No. _____

Length 1.5 km. Elevation Range _____ m.

Avg. depth at N.R. m. Avg. velocity at N.R. m/sec.
 Avg. wetted width _____ time of survey

Wetted width (avg.) 0.75 m. Active bed width (avg.) 1.5 m.
 Range 0.5-1.0 m. Range 1.5-3.0 m.

Flood Plain Width - m. Discharge Actual 0.0141 m³/sec.
 Range - m³/sec.

Colour None Turbidity clear

Time/Temp. (°C) Air N.R. Water 12.0°

Weather Conditions N.R.

Debris Load light % Static 20
 % Transient 80

Aquatic Plants none

Invertebrates none observed

Access walking

Land Use none

Check List X = Recorded in report: N.R. = Not recorded: N.N. = Not noted.

- | | |
|---|--|
| 1. <u>X</u> Gradient - Substrate | 7. <u>NN</u> Bank & Hillside Stability |
| 2. <u>X</u> Channel Type | 8. <u>NN</u> Tributaries |
| 3. <u>NN</u> %Pool and Run | 9. <u>NN</u> Protection Problems |
| 4. <u>X</u> Obstructions | 10. <u>NN</u> Improvement Potential |
| 5. <u>X</u> General Vegetation
Type & Stream cover | 11. <u>NN</u> Additional Notes |
| 6. <u>X</u> Fish | |

Tributary #3 to Ootsanee Lake - Reach II1. Gradient-Substrate

Gradient: stepped, 5%

Substrate: 10% fines

10% small gravel

20% large gravel

20% small cobble

30% large cobble

10% boulder

- loose compaction, rounded-angular texture

- low spawning character

2. Channel Type

The channel is an irregular confined single thread

4. Obstructions

Not known, as survey ceased at 0.5 Km.

5. General Vegetation Type and Stream Cover

Crown closure (spruce) is 20% while cover from overhang is as high as 80%.

6. Fish

A few 2.5-4.0 cm rainbow were observed.

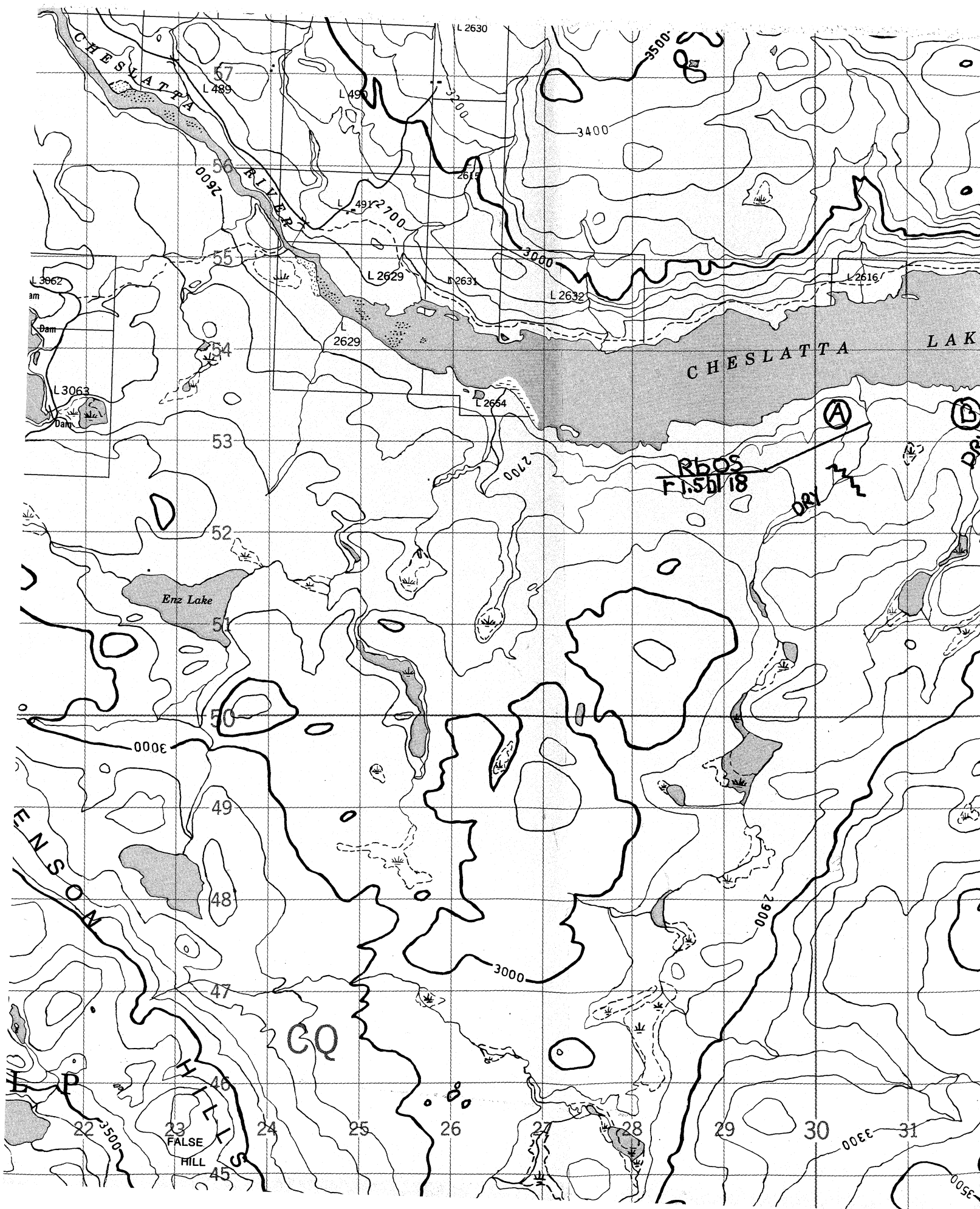
3.2 Tributaries to the south bank of Cheslatta Lake

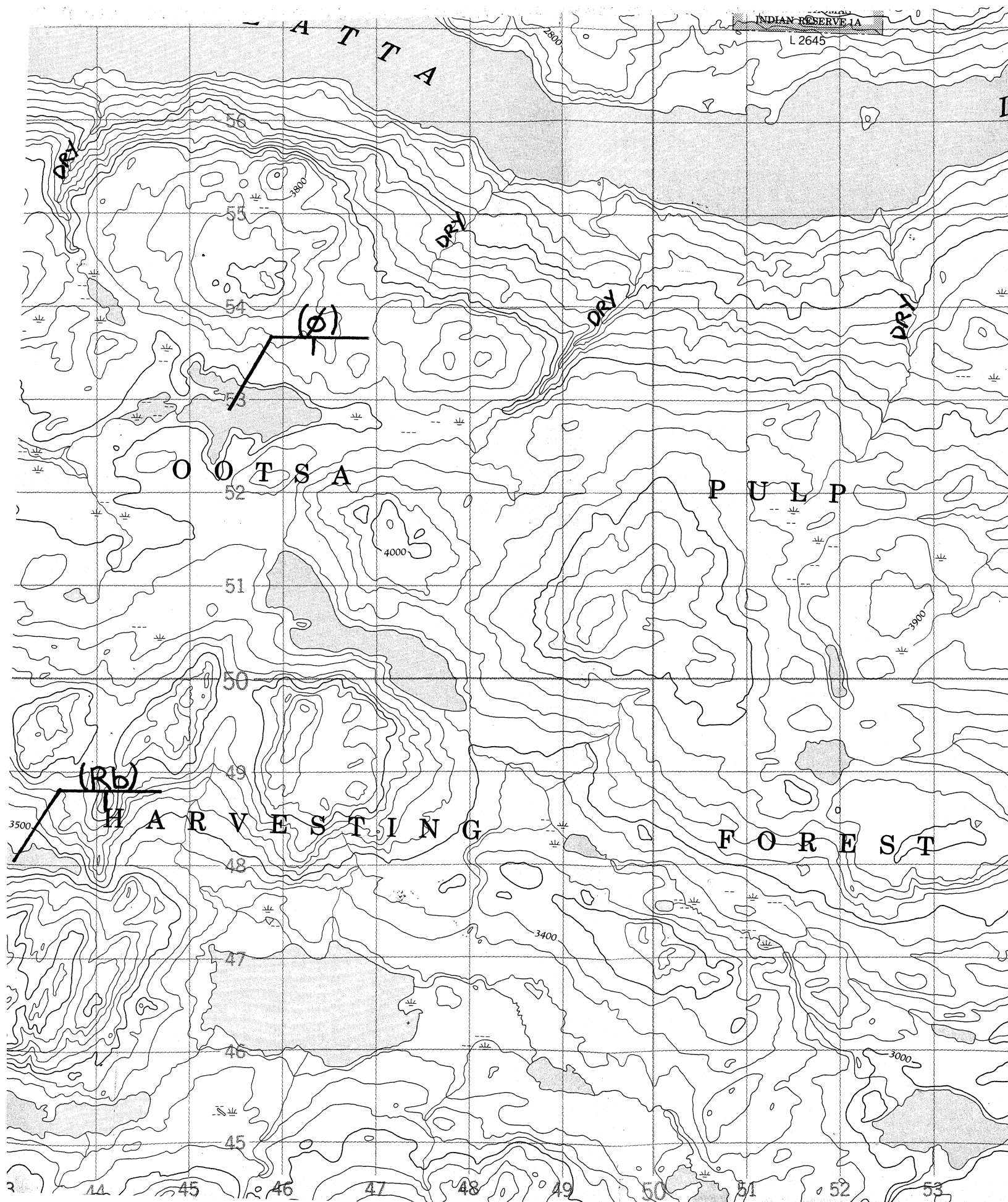
Map 4

Cheslatta Lake Tributaries

Aquatic Systems Mapping

1:50,000





Stream Sheet

Name Tributary A Ref. No. _____
Tributary to Cheslatta Lake → Cheslatta River → Nechako River
Date June 26, 1977 Quality baseline
Map No. 93F Other Mapping 93F/12
Location: Lat. 53 44 Long. 125 34
 Deg. Min. Sec. Deg. Min. Sec.
Length ~16 km. Length Accessible to 1.0 km.
 Migrant Fish
Elevation Range 800 m. to 1100 m.
Drainage Area ~20 km².

GENERAL DESCRIPTION - OVERALL PRODUCTIVITY

Tributary A was experiencing extremely low discharge at the time of
survey, and was dry above 1.0 Km. The lower kilometer although with
very little water afforded good clean rainbow rearing habitat. Air
photographs reveal extensive marsh areas in the headwaters.

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Reach Tributary A - Reach I Map no. 93 F/12
 Survey Method walking Team Caw and Witt
 Date June 26, 1977 Ref. No. _____
 Length 1.0 km. Elevation Range - m.
 Avg. depth at 0.2 m. Avg. velocity at 0.3 m/sec.
 Avg. wetted width _____ time of survey _____
 Wetted width (avg.) 1 m. Active bed width (avg.) 4 m.
 Range 0.5-2 m. Range 3-6 m.
 Flood Plain Width 20 m. Discharge Actual 0.01 m³/sec.
 Range - m³/sec.
 Colour None Turbidity clear
 Time/Temp. (°C) Air _____ Water 9.0°C
 Weather Conditions 10/10 overcast
 Debris Load light % Static 60
 % Transient 40
 Aquatic Plants None
 Invertebrates None observed
 Access boat
 Land Use none

Check List X = Recorded in report: N.R. = Not recorded: N.N. = Not noted.

- | | |
|---|---------------------------------------|
| 1. <u>X</u> Gradient - Substrate | 7. <u>X</u> Bank & Hillside Stability |
| 2. <u>X</u> Channel Type | 8. <u>NN</u> Tributaries |
| 3. <u>X</u> %Pool and Run | 9. <u>NN</u> Protection Problems |
| 4. <u>X</u> Obstructions | 10. <u>NN</u> Improvement Potential |
| 5. <u>X</u> General Vegetation
Type & Stream cover | 11. <u>NN</u> Additional Notes |
| 6. <u>X</u> Fish | |

Tributary A to Cheslatta Lake1. Gradient-Substrate

Gradient: 1.5%

Substrate: 10% fines

50% small gravel

30% large gravel

10% small cobble

- smooth texture, loose compaction

- good spawning character

2. Channel Type

The channel is a regular bounded single thread with little or no side channelling (due to very low volume discharge).

4. Obstructions

The channel is dry above 1.0 Km.

5. Fish

Electroshocking (600 seconds) in the lower 100 meters yielded one 6.0 cm longnose sucker, many 4-7 cm sculpins and sixteen 5.0-6.0 cm rainbow.

Productivity in this very small stream is high.

7. Bank and Hillside Stability

Overall stability in the lower 1.75 Km is very high.

Stream Sheet

Name Tributary B Ref. No. _____
Tributary to Cheslatta Lake
Date June 26, 1977 Quality baseline
Map No. 93F Other Mapping 93 F/12
Location: Lat. 53 44 Long. 125 33
 Deg. Min. Sec. Deg. Min. Sec.
Length ~ 7 km. Length Accessible to - km.
 Migrant Fish
Elevation Range - m. to - m.
Drainage Area 12 km².

GENERAL DESCRIPTION - OVERALL PRODUCTIVITY

Tributary B was dry at the time of survey. Channel character closely
resembles that of Tributary A.

Stream Sheet

Name Tributary C Ref. No. _____

Tributary to Cheslatta Lake

Date June 27, 1977 Quality baseline

Map No. 93F Other Mapping 93 F/11 & F/12

Location: Lat. 53 45 Long. 125 31
 Deg. Min. Sec. Deg. Min. Sec.

Length ~15 km. Length Accessible to 15 km.
 Migrant Fish

Elevation Range 800 m. to 1200 m.

Drainage Area ~ 35 km².

GENERAL DESCRIPTION - OVERALL PRODUCTIVITY

Tributary C is a clean, fast flowing, moderate gradient stream with a
significant population of rearing rainbow trout. Steep ridges
characterize the terrain from above 1.0 Km. Volume discharge is
divided between two forks at 2.75 Km, gradient and channel type are
maintained in both forks with a slight shift to larges in substrate
composition. The upper ends of both forks are characterized by marsh
fed lakes. It was determined by aerial reconnaissance that these
lakes are accessible to migratory fish.

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Reach Tributary C - Reach I Map no. 93F/11, 93F/12
 Survey Method walking Team Caw & Witt
 Date June 27, 1977 Ref. No. _____
 Length 2.75 km. Elevation Range 800-900 m.
 Avg. depth at 0.25 m. Avg. velocity at 0.4 m/sec.
 Avg. wetted width _____ time of survey _____
 Wetted width (avg.) 2.5 m. Active bed width (avg.) 7 m.
 Range 2.0-5.0 m. Range 5-15 m.
 Flood Plain Width 25 m. Discharge Actual 0.1 m³/sec.
 Range wide m³/sec.
 Colour slight tannic Turbidity none
 Time/Temp. (°C) Air N.R. Water 9.5°C
 Weather Conditions 10/10 o.c.
 Debris Load light % Static 40
 % Transient 60
 Aquatic Plants None
 Invertebrates None observed
 Access boat
 Land Use None

Check List X = Recorded in report: N.R. = Not recorded: N.N. = Not noted.

- | | |
|---|---------------------------------------|
| 1. <u>X</u> Gradient - Substrate | 7. <u>X</u> Bank & Hillside Stability |
| 2. <u>X</u> Channel Type | 8. <u>NN</u> Tributaries |
| 3. <u>X</u> %Pool and Run | 9. <u>X</u> Protection Problems |
| 4. <u>X</u> Obstructions | 10. <u>NN</u> Improvement Potential |
| 5. <u>X</u> General Vegetation
Type & Stream cover | 11. <u>NN</u> Additional Notes |
| 6. <u>X</u> Fish | |

Tributary C to Cheslatta Lake1. Gradient-Substrate

Gradient: 2% increasing to 2.5% towards top of reach

Substrate: 5% fines

30% small gravel

30% large gravel

20% small cobble

15% large cobble

- moderate to hard compaction, rounded angular texture

- fair spawning character

2. Channel Type

The channel is a regular confined single thread with some side channelling and abundant small backwater pools.

3. Pool-Run Percentages

Pool: 15% average depth - 0.3 m

Run: 85% (30% placid, 30% swirling, 40% rolling).

4. Obstructions

None

5. General Vegetation Type and Stream Cover

The surrounding forest is 95% coniferous (mainly spruce) and 5% large alder. Stream cover is less than 10% in the lower kilometer increasing with the development of high ridges (crown closure) in the top half of the reach.

6. Fish

Easy electroshocking (580 seconds) in the lower 200 meters yielded 14 rainbow (4.5-5.5 cm) and many sculpins (3-5 cm).

7. Bank and Hillside Stability

The banks are largely a sand/gravel/cobble composite with the occasional bedrock outcropping. Although generally stable the top half of the reach is characterized by very steep ridges which would pose problems if radically disturbed. A large slumping bank exists in the lower kilometer (see map 3).

9. Protection Problems

Land use should be well away from the steep ridges above 1.0 Km.



Photo 7: Typical section of lower Tributary C



Photo 8: Aerial view of lower Tributary C illustrating large slumping bank (refer to map 4).

Drainage Area 9 km².

GENERAL DESCRIPTION - OVERALL PRODUCTIVITY

The shoreline area near the mouth is covered with dead timber making access very difficult.

Reach Tributary D - Reach I Map no. 93F/11
 Survey Method walking Team Caw & Witt
 Date July 1 Ref. No. _____
 Length +2.5 km. Elevation Range _____ m.
 Avg. depth at 0.15 m. Avg. velocity at 0.4 m/sec.
 Avg. wetted width _____ time of survey _____
 Wetted width (avg.) 1.25 m. Active bed width (avg.) 3 m.
 Range 0.5-1.75 m. Range 2-4 m.
 Flood Plain Width 30 m. Discharge Actual 0.028 m³/sec.
 Range N.R. m³/sec.
 Colour tannic Turbidity light
 Time/Temp. (°C) Air N.R. Water 10.0°
 Weather Conditions N.R.
 Debris Load moderate to heavy % Static 80
 % Transient 20
 Aquatic Plants None
 Invertebrates None observed
 Access boat
 Land Use none

Check list X = Recorded in report: N.R. = Not recorded: N.N. = Not noted.

- | | |
|---|---------------------------------------|
| 1. <u>X</u> Gradient - Substrate | 7. <u>X</u> Bank & Hillside Stability |
| 2. <u>X</u> Channel Type | 8. <u>NN</u> Tributaries |
| 3. <u>X</u> %Pool and Run | 9. <u>NN</u> Protection Problems |
| 4. <u>X</u> Obstructions | 10. <u>NN</u> Improvement Potential |
| 5. <u>X</u> General Vegetation
Type & Stream cover | 11. <u>X</u> Additional Notes |
| 6. <u>X</u> Fish | |

Tributary D to Cheslatta Lake1. Gradient-Substrate

Gradient: 1.5%

Substrate: 30% fines

40% small gravel

20% large gravel

10% small cobble

- gravel mostly angular, greater percentage found in hard pockets
- poor spawning character

2. Channel Type

The channel is a regular single thread confined by undercut banks 0.1-1.0 meters high. Small side channels and backwaters are common within the active width.

3. Pool-Run Percentages

Pool: 20%

Run: 80% (60% swirling/rolling, 20% riffle)

4. Obstructions

None

5. General Vegetation Type and Stream Cover

Crown closure from the 95% spruce, 5% alder forest is 20-30%. There is little undergrowth.

6. Fish

Electroshocking was unsuccessful. If fish are present in this stream it is a very meager population.

7. Bank and Hillside Stability

The surrounding terrain is quite low in profile but the immediate banks are undercut and relatively unstable due to the fine nature of composition.

Windfall is moderate to high in abundance.

11. Additional Notes

The theft of a recorder and reconnaissance tape has resulted in the loss of information on upper reaches.

Drainage Area 16 km².

GENERAL DESCRIPTION - OVERALL PRODUCTIVITY

Tributary E is a clean fast flowing stream supporting a significant population of rearing rainbow trout. A falls at 2.75 Km is probably a total barrier to migratory fish.

Reach Tributary - Reach I Map no. 93F
 Survey Method walking/flying Team Caw & Witt
 Date June 30, July 1, 1977 Ref. No. _____
 Length 2.75 km. Elevation Range N.N. m.
 Avg. depth at 0.3 m. Avg. velocity at 0.6 m/sec.
 Avg. wetted width _____ time of survey _____
 Wetted width (avg.) 1.5 m. Active bed width (avg.) 6 m.
 Range 1.0-2.5 m. Range 5-12 m.
 Flood Plain Width 30 m. Discharge Actual 0.113 m³/sec.
 Range _____ m³/sec.
 Colour slight tannic Turbidity clear
 Time/Temp. (°C) Air N.R. Water 10.5°C
 Weather Conditions N.R.
 Debris Load moderate % Static 60
 % Transient 40
 Aquatic Plants None
 Invertebrates None observed
 Access Boat
 Land Use None

Check List X = Recorded in report: N.R. = Not recorded: N.N. = Not noted.

- | | |
|---|---------------------------------------|
| 1. <u>X</u> Gradient - Substrate | 7. <u>X</u> Bank & Hillside Stability |
| 2. <u>X</u> Channel Type | 8. <u>NN</u> Tributaries |
| 3. <u>X</u> %Pool and Run | 9. <u>NN</u> Protection Problems |
| 4. <u>X</u> Obstructions | 10. <u>NN</u> Improvement Potential |
| 5. <u>X</u> General Vegetation
Type & Stream cover | 11. <u>X</u> Additional Notes |
| 6. <u>X</u> Fish | |

Tributary E to Cheslatta Lake - Reach I

1. Gradient-Substrate

Gradient: 1.5-2.0% increasing to 3.5% just below falls at 2.75 Km.

Substrate: 10% fines

30% small gravel

30% large gravel

20% small cobble

10% large cobble

- smooth texture, moderate

- fair to good spawning character

2. Channel Type

The channel is a well bounded, often confined single thread. Side channels are infrequent but small backwater pools are abundant.

3. Pool-Run Percentages

Pool: 15%

Run: 85% (20% placid, 40% rolling, 20% swirling)

4. Obstructions

There is a 2-3 m high double falls over bedrock, at 2.75 Km. This is probably a barrier to migratory fish.

5. General Vegetation Type and Stream Cover

Crown closure is 20-30% from the spruce (90%) alder forest. The understory is comprised of low shrub, and affords littler cover.

6. Fish

Easy (780 seconds) electroshocking in the lower 200 meters yielded many 4.0 cm sculpins and ten rainbow in the 7.0-12.5 cm size range. Most rainbow were found in small pools.

7. Bank and Hillside Stability

Overall stability is quite high but windfall was observed to be moderately abundant throughout the reach, indicative of potential instability.

11. Additional Notes

The theft of a recorder and reconnaissance tape has resulted in the loss of a great deal of information on upper reaches.

Although Tributary F presents good trout habitat over the lower kilometer, no fish were obtained sampling. Habitat steepens above 1.0 Km.

Reach Tributary F - Reach I Map no. 93F/11
 Survey Method walking/flying Team Caw and Witt
 Date August 5, 1977 Ref. No. _____
 Length 1.0 km. Elevation Range _____ m.
 Avg. depth at 0.25 m. Avg. velocity at 0.4 m/sec.
 Avg. wetted width _____ time of survey _____
 Wetted width (avg.) 1.5 m. Active bed width (avg.) 6 m.
 Range 1-2 m. Range 4-10 m.
 Flood Plain Width 10 m m. Discharge Actual 0.028 m³/sec.
 Range - m³/sec.
 Colour none Turbidity clear
 Time/Temp. (°C) Air N.R. Water 8.0°C
 Weather Conditions N.R.
 Debris Load light to moderate % Static 30
 % Transient 70
 Aquatic Plants None
 Invertebrates None observed
 Access Boat
 Land Use None

Check List X = Recorded in report: N.R. = Not recorded: N.N. = Not noted.

- | | |
|---|---------------------------------------|
| 1. <u>X</u> Gradient - Substrate | 7. <u>X</u> Bank & Hillside Stability |
| 2. <u>X</u> Channel Type | 8. <u>NN</u> Tributaries |
| 3. <u>X</u> %Pool and Run | 9. <u>X</u> Protection Problems |
| 4. <u>X</u> Obstructions | 10. <u>NN</u> Improvement Potential |
| 5. <u>X</u> General Vegetation
Type & Stream cover | 11. <u>X</u> Additional Notes |
| 6. <u>X</u> Fish | |

Tributary F

1. Gradient-Substrate

Gradient: 1.5% at mouth increasing to 3-5% steps above 1.0 Km.

Substrate: 20% fines

30% small gravel

25% large gravel

10% small cobble

10% large cobble

5% boulder

- moderate compaction, smooth texture

- fair to good spawning character

2. Channel Type

The channel is a regular confined single thread with virtually no side channelling.

3. Pool-Run Percentages

Pool: 20%

Run: 80% (rolling riffle)

4. Obstructions

A log jam approximately 25 meters upstream of the mouth is a partial barrier.

5. General Vegetation Type and Stream Cover

Crown closure is as high as 80% from the spruce-alder canopy. Cover from overhanging shrub is 20-30%.

6. Fish

Electroshocking was unsuccessful and no fish were observed. Spawning and rearing potential are both fair to good.

7. Bank and Hillside Stability

The immediate banks are largely sand/gravel with overlying forest soil.

Undercutting and minor erosion are contributing to silty conditions in the lower end. A major unstable area is noted on Map 3, on the south bank.

9. Protection Problems

The relatively loose character of the banks necessitates precautions in land utilization.

11. Additional Notes

The theft of a recorder and reconnaissance tape has resulted in the loss of a great deal of information on the upper reaches.

Drainage Area 9 km².

GENERAL DESCRIPTION - OVERALL PRODUCTIVITY

Tributary G presents low spawning, fair to good rearing potential throughout most of its length. Stream character is quite homogeneous throughout its entire length. No fish could be obtained electroshocking.

Reach Tributary G - Reach I Map no. 93F/11
 Survey Method walking/flying Team Caw and Witt
 Date July 10, 1977 Ref. No. _____
 Length _____ km. Elevation Range - m.
 Avg. depth at 0.25 m. Avg. velocity at 0.5 m/sec.
 Avg. wetted width _____ time of survey
 Wetted width (avg.) 1.75 m. Active bed width (avg.) 3.5 m.
 Range 1.0-3.0 m. Range 2.0-4.0 m.
 Flood Plain Width 15 m. Discharge Actual 0.028 m³/sec.
 Range - m³/sec.
 Colour slight tannic Turbidity clear
 Time/Temp. (°C) Air 1200/16.0°C Water 10.0°C
 Weather Conditions 10/10 overcast
 Debris Load light % Static 70
 % Transient 30
 Aquatic Plants None
 Invertebrates None observed
 Access Boat
 Land Use None

Check List X = Recorded in report: N.R. = Not recorded: N.N. = Not noted.

- | | |
|---|---------------------------------------|
| 1. <u>X</u> Gradient - Substrate | 7. <u>X</u> Bank & Hillside Stability |
| 2. <u>X</u> Channel Type | 8. <u>NN</u> Tributaries |
| 3. <u>X</u> %Pool and Run | 9. <u>NN</u> Protection Problems |
| 4. <u>X</u> Obstructions | 10. <u>NN</u> Improvement Potential |
| 5. <u>X</u> General Vegetation
Type & Stream cover | 11. <u>X</u> Additional Notes |
| 6. <u>X</u> Fish | |

Tributary G to Cheslatta Lake - Reach I1. Gradient-Substrate

Gradient: 1.0% at mouth, increasing to 2.0% above 200 meters.

Substrate: 10% fines

30% small gravel

30% large gravel

20% small cobble

10% large cobble

- hard compaction, angular-rounded texture

- low spawning character, fair to good rearing

2. Channel Type

The channel is a well confined single thread with no side channels.

Bank undercutting and small backwaters supply adequate rearing habitat.

3. Pool-Run Percentages

Pool: 20%

Run: 80% (rolling riffle)

4. Obstructions

A few minor debris accumulations constitute points of difficult passage but there are no barriers.

5. General Vegetation Type and Stream Cover

Crown closure from the spruce/pine/alder forest varies from 40-60% while cover from overhanging willow is generally 20-30%.

6. Fish

Electroshocking proved unsuccessful. Tributary G affords low to fair potential spawning habitat with fair to good rearing.

7. Bank and Hillside Stability

No critically unstable areas were observed although several sections would be potentially unstable if forest cover is removed.

10. Additional Notes

The theft of a recorder and reconnaissance tape has resulted in the loss of a great deal of information on the upper reaches.

APPENDIX I

Aquatic Systems Mapping Code

I AQUATIC SYSTEM MAPPING

Map information is of two types:

- I) a reach symbol which summarizes some fish, channel, and substrate characteristics of the reach,
- II) site specific symbols and information.

The map base for presentation will normally be the 1:50,000 topographic series, with topography screened to 60% and other information (stream lines) screened to 80%. For 1:20,000 applications, planimetric bases derived from B.C. Forest Service forest cover maps may have to be used. At larger scales (1:5,000) standard bases are not available, but the use of topographic maps should be encouraged.

Standard symbols are described first for 1:50,000 bases, with changes and additions at 1:20,000 indicated subsequently.

REACH SYMBOLS (1:50,000 base)

Reach symbols are applied to reaches, defined as sections of stream with relatively homogeneous properties. This definition is clearly dependent on the scale of observations and mapping. The properties most usually considered are slope, substrate and channel cross-section, all of which are of course interrelated by the fluvial processes which create a drainage system.

Reach symbols are of the form;

Fish Species	
Channel	Substrate

except for headwater tributaries, (see below) and are coded as follows:

Fish species (listed in sequence):

1. Abbreviations (see Appendix 4) are used for common sport and commercial species.
2. Known but non-sport or non-commercial species are indicated by OS (other species). The data bank must be consulted for the complete species list for the reach or system.
3. Fish observed but not identified are indicated by Sp.
4. Ø indicates that fish were not detected in the system at the time and place of sampling.
5. Absence of any fish species symbol indicates that no sampling information was available.

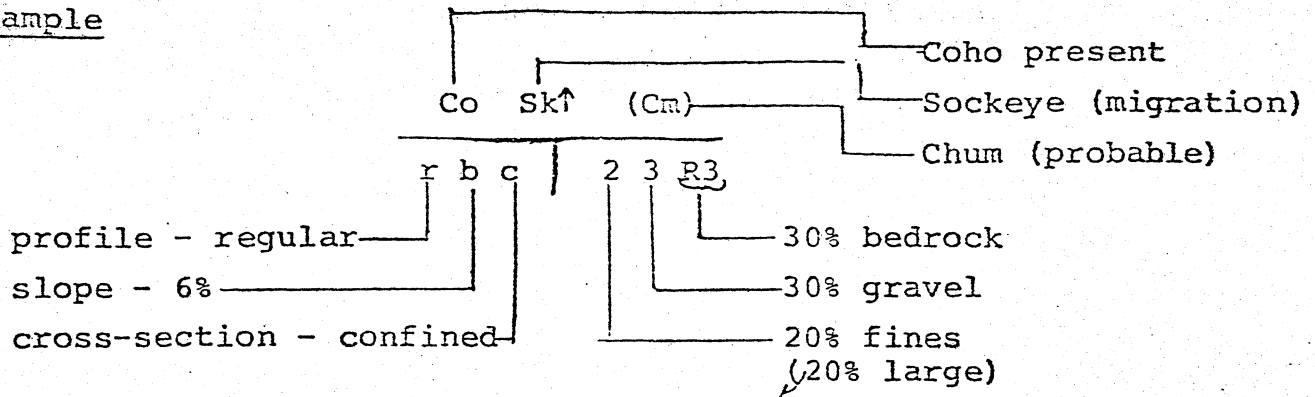
6. Symbols in parentheses (Co, St) indicate probable but unconfirmed presence, and would typically be used when fish have been sampled in a downstream reach and suitable habitat and access exist in the reach under consideration.
7. An arrow Sk↑ indicates that the reach is used by the species for migration only. It implies that the species does not have a residence population in the reach.
8. It should be noted that no specific symbol exists for a barren stream. When such a condition is suspected, it may be indicated by (Ø) which is an inference that if sampling took place, fish would not be detected.

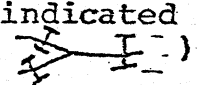
Channel (listed as profile, slope, cross-section):

1. Profile (longitudinal) is either:
 - a) stepped (s) (The cross-section and substrate of stepped reaches may be complexed. see p.8)
 - b) regular (r)
2. Slope is the average slope of the reach (length/levation gain). Slope is given to the nearest % above 3%, and to the nearest 0.1% between 0 and 3%.
3. Cross-section information will require careful consideration of the relative size of streams compared to the scale of base map. Three cross-section types are differentiated at 1:50,000.
 - a) confined (c):
 - b) bounded (b):
 - c) unconfined (u):

Substrate

1. Substrate is identified by the percentage (nearest 10%) in three ranges, plus bedrock, of the top 20-30 cm of substrate material. These are defined as:
 - Fines (0-2 mm)
 - Gravels (2-100 mm)
 - Larges (100+ mm)
 and represented by the first digit of the percentage (eg: 30% = 3). Larges are not put in the reach symbol, but are inferred as a residual.
2. Bedrock percentage is indicated by Rn, where n is an integer representing the percentage of the reach whose substrate is bedrock. R without an integer implies 0 - 10%. For example, R2 implies that 20% of the reach substrate is bedrock.
3. When 90 - 100% of a reach is in one size category, F, G, L, or R is used alone.

ExampleSymbol annotations and conventions:

1. Where the channel or substrate component is man-made, the symbol is underlined. (eg: c implies artificial channel confinement such as dyking.)
2. Where data has not been verified (eg: air photo interpretation of substrate composition) the symbol is placed in parentheses.
3. The reach symbol is applied to a stream segment as follows:
 - a) Where both an upper and lower reach break symbol exist, the reach symbol applies to the mainstream segment so defined.
 - b) Where the symbol is not so limited, it applies up to or down to the next tributary junction.
 - c) In the case of a "Y" junction with reach breaks indicated in both arms the symbol applies to both arms. (eg: )
4. For abbreviated symbols used in headwater classes, (see below) the same conventions apply, except that the last (most upstream) symbol will apply to all tributaries above the last reach break.

HEADWATER CLASSES

An abbreviated symbol may be used in headwater situations where fish and substrate information is usually lacking. The symbol will include slope, cross-section, and wetland class as follows:

1. Slope is either I (greater than 5%) or II (less than 5%).
2. Cross-section is either c (confined) or u (unconfined).
3. Wetland class is either m (marsh), b (bog), f (fen), s (swamp), or p (pond).

A typical symbol might be Ic(b) which represents a steeply sloping confined channel, probably through an alpine bog.

The first 2 parts (slope, cross-section) may be used alone.

II SITE SPECIFIC SYMBOLS

(Map Legend: 1:50,000)

A. REACH SYMBOL (Described in previous section)

Fish Species (see also Appendix 4)

<u>Symbol</u>	<u>Species</u>
Sp	Fish present; species undetermined
Ø	Fish undetected
OS	Species known but other than those listed
Ch	Chinook salmon
Co	Coho salmon
Cm	Chum salmon
Pk	Pink salmon
Sk	Sockeye salmon
Ko	Kokanee salmon
Rb	Rainbow trout
St	Steelhead trout
Ct	Cutthroat trout (coastal)
Yct	Yellowstone Cutthroat trout
EB	Eastern Brook trout
DV	Dolly Varden Char
LT	Lake trout
GB	German Brown trout
MW	Mountain Whitefish
LW	Lake Whitefish
Gr	Grayling
LMB	Largemouth bass
SMB	Smallmouth bass
NP	Northern pike
WP	Walleye pike (Pickerel)
YP	Yellow Perch
Sg	Sturgeon
Bb	Ling (Burbot)
Cp	Carp

Symbol annotations for fish species

↑ Migration only: no resident population
(Co) Probable but unconfirmed presence

Channel information

Profile

r: regular
s: stepped

Slope

nearest %, greater than 3%
nearest 0.1%, less than 3%

Cross-section

c: confined
b: bounded
u: unconfined

Substrate: ijRk

1. nearest 10% of i = 0 - 2 mm; j = 2 - 100 mm by first digit (eg: 20% = 2); k = bedrock.
2. the size fraction 100 mm + is computed by inference.
3. when the substrate is 90 - 100% in one size category, F (0 - 2 mm), G (2 - 100 mm), L (100+ mm) or R (bedrock) is used alone.

Symbol annotations for channel and substrate

1. (c) parameter inferred but not ground checked.
2. c parameter of artificial origin (man made).
3. The channel cross-section and substrate type may be complexed only if the profile is stepped. It is indicated as follows:

$\frac{c}{b}$: alternating confined and bounded sections.

$\frac{16}{R}$: alternating gravely (10% 0 - 2 mm, 60% 2 - 100 mm) and rock (90 - 100%) sections.

B. HEADWATER TRIBUTARY CLASSES

Slope

I: greater than 5%
II: less than 5%

Confinement

c: confined
u: unconfined



















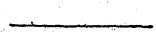

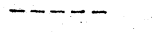
Wetland

b: bog
f: fen
m: marsh
s: swamp
p: pond

eg: II c b: less than 5% slope; confined channel; bog.

The wetland class may be left out if not applicable.

C. SPECIFIC SYMBOLS

	3R.....	An obstruction 3 m high of the following types: R (Rock), L (Logs), B (Blocks), D (Man made), Bd (Beaver dam), Ø (Culvert), F (type unknown)
	5R50....	A chute or cascade 5 m high and 50 m long of the above types
	C.....	A chute or cascade with details unknown
	Bd.....	A sequence of beaver dams
	Ch.....	Clear evidence (eg: persistent redds or observed spawning adults) of spawning by the indicated species
	*.....	A zone of flood and side channels
	.....	A persistent debris accumulation
	.....	A culvert
	.....	A bridge
	.....	A site (point) number with biophysical data available
	.....	A water quality sampling site number
	.....	A water quantity sampling site number
	.....	A reach boundary
	20R.....	A reach boundary which is an obstruction. The obstruction height is not to be included in either adjacent reach for the purposes of reach slope calculation.
	.....	A major bank or valley side wall slump zone
	.....	An alluvial sink hole without surface effluent.
	.....	A karst pothole
	.....	Persistent snow or ice
	.....	Major watershed boundary
	.....	Sub-watershed boundary
	.....	Minor watershed boundary. If a watershed boundry is mapped, that watershed has a code number and associated information in the data file.

APPENDIX II

Stream Parameter Definitions And Format

The Point Card and Reach Tally format used in this report is based upon the methodology developed and refined by the Water-Fish section of the Resource Analysis Branch, Department of the Environment. It was felt by Stream Inventory Section of the Fish and Wildlife Branch that the system could be used for purposes of fisheries management only after some modification. Thus although most of the parameters used to define a point or reach are common, some discrepancies are present. The reader is directed to: gradient, substrate, channel widths, debris, flow character, clarity, and check list segments of this appendix for differences in definition.

POINT SAMPLE

Observer _____
Method _____

GRADIENT		%		WATER		System _____	
SUBSTRATE				(A) Discharge _____ m ³ /sec		System No. _____	
D 90 cm.				(B) Flow Character		Reach No. _____ Point _____ of _____	
(A) COMPOSITION	Fines			Pool	% Avg. Depth m	Access _____	
	Small gravel			Run		Date _____ Time _____	
	Large gravel			Placid		Point Loc. _____	
	Small cobble			Swirling		VEGETATION	
	Large cobble			Rolling		(A) Composition (20m.)	
	Boulder			Broken		(B) Closure	
	Bedrock			Tumbling		Crown % _____ Overhang % _____	
(B) Compaction		L	M	H	Avg. Velocity _____ m ³ /sec		(C) Forest Type
(C) Ang. Class		R	Rs	As	A	Avg. Depth _____ m	
CHANNEL				(C) Temp. _____ °C			
(A) Flood Side		N	I	L	M	H	
(B) Thread		S		M		(D) Colour _____	
(C) Width (in meters)						(E) Clarity _____ m _____ cm	
		Avg.	Range		BANK		
Wetted					(A) % Composition	(B) Slope %	
Rooted					Fines	Avg.	
Flood Plain					Gravel	Range	
					Cobble	(C) Ht Thalweg	
					Boulder	Avg. m	
					Bed rock	Range m	
DEBRIS						Conformity of Point Data to Reach	
(A) Abundance		L	M	H			
(B) State: Transient %							

REACH TALLY

Observer _____
Method _____

GRADIENT		%		DEBRIS		System _____	
SUBSTRATE				(A) Abundance		System No. _____	
(A) COMPOSITION	Fine			L	M	H	Reach No. _____
	Gravel						Reach Length (km.) _____
	Cobble						Date _____ Time _____
	Boulder						OBSTRUCTIONS
	Bedrock						SLUMPS
(B) Stability				(B) State: Transient %		Dist. (km.) HT (m) Type	
Bars		Nil	L	M	H	Dist. (km.) Material	
Islands		Nil	L	M	H		
Braided		Nil	L	M	H		
						Total %	
WATER						VEGETATION	
(A) Discharge		m ³ /sec				(A) Banks	
(B) Flow Character						(B) Closure	
Run		%	Avg. Depth m			Crown % _____ Overhang % _____	
Placid						(C) Forest Type	
Swirling							
Rolling							
Broken							
Tumbling							
Pool							
CHANNEL						CHECK LIST	
(A) Cross Section		c	b	u			Pool Control
(B) Flood Side		Nil	L	M	H	Flow	
(C) Thread		S		M		Bank and Hillside Stability	
(D) Entrench		L	M	H			Aquatic Vegetation
(E) Form		S	I	M			Invertebrates
(F) Width (in meters)						Fisheries Potential	
		Avg	Range				Protection Problems
Wetted							Improvement Potential
Rooted							
Flood Plain							

POINT SAMPLE CARD

The information found on this card are estimates or measurements of physical criteria taken at a single point in time over a defined geographic area. Seasonal, hydrological, meteorological, or human interference will alter the sample's character to varying degrees.

Every attempt is made to select a point which is typical of a particular reach although there are times when this is either unfeasable or impossible.

Definitions

Observer: The individuals who did the point sample; surname and initials, lead hand's name first others in alphabetical order.

Method : boat, road, walking, helicopter or best descriptions.

Gradient: The measured percentage slope of a section deemed typical within the point sample. To be measured to the nearest 0.5%.

Substrate: The estimated percentage composition of the superficial bed material.

D 90: The diameter of substrate in centimeters of which 90% is smaller.

A) Composition:

Fines	< 2 mm. diameter	
Small Gravel	2-25 mm.	"
Large Gravel	25-100mm.	"
Small Cobble	100-150 mm.	"
Large Cobble	150-250 mm.	"
Boulder	> 250 mm.	"
Bedrock		

B) Compaction: The relative density or looseness of substrate caused by: sedimentation, mineralization, and/or imbrication.

C) Angularity Class: The degree of roundness or sharpness of the edges and corners of a particle.

R - rounded

Rs- subrounded

As- subangular

Roundness does not imply sphericity, simply the complete lack of sharp edges.

Channel:

A) Flood /side (channels)

Flood channels contain water at high flows. At the time of sampling these channels may or may not contain water but the channel still exists.

Side channels are connected to the main-stream at high and low water and are characterized by low velocity flows.

Spatial frequency of flood and side channels are expressed as being: Nil, low, moderate, or high.

B) Thread

A line created by the directional flow of a stream within the main channel. It is classified as single(S) or multiple (M) thread. The latter is a situation in which the total discharge of the stream is divided nearly equally in more than one channel.

C) Width

Wetted Width: The range and average width, in meters, of the water covered channel.

Rooted Width: The range and average width of the stream channel from rooted vegetation bank to bank.

Flood Plain Width: The width of the flat land bordering a stream that shows obvious signs of flooding and/or channel shift.

DebrisA) Abundance

The relative abundance of organic material deposited within the stream channel. Expressed as: low, medium, or high. Examples are windfalls, leaves, branches, etc.

B) State

Expressed as the percentage of debris which is transient (i.e. debris which has been transported or is in the process of being moved)

WaterA) Discharge

The volume of water passing a given point per unit time. Expressed as cubic meters per second.

B) Flow Character

The surface expression of the water that is determined by: water velocity, volume, and substrate. It is described at the time of survey as:

Placid: tranquil, sluggish

Swirling: eddies, boils, swirls

Rolling: unbroken standing waves

Broken: riffles, rapids, jumps

Tumbling: cascades, usually over large boulders or rock outcrops

Each of the above is given a visual estimate as percentage of total run (as opposed to pool to be described later) with it's measured or estimated average depth in meters.

Pool makes up the remainder of the flow character and can be described as: a relatively deep, generally placid and/or swirling section which likely persists in high flows.

- C) Temperature: to be measured in degrees Celsius to the nearest 0.5 degree
- D) Colour: Material in solution with the water, define as
- 1) clear, tannic, brown, etc.
 - 2) slight, very; and if possible
 - 3) all year, seasonal, occasional,
- E) Clarity: The maximum depth of water at which the bottom is still visible.

Bank

- A) % Composition: The relative percentage of
- | | | |
|----------|-------------|----------|
| Fines: | <2 mm. | diameter |
| Gravel: | 2-100 mm. | diameter |
| Cobble: | 100-250 mm. | diameter |
| Boulder: | > 250 mm. | diameter |
| Bedrock: | | |

- B) Slope %: The estimated percentage of the banks with a slope of less than 45° . The remainder is described as vertical (greater than 45°)
- C) Height thalweg: The vertical distance between the deepest point in the stream channel and the top of the banks.

Vegetation

A) Composition:

The percentages of ground coverage of each vegetation class within 20m . of the bank. Total may be greater than 100%.

B) Closure

Crown closure: The closure over a stream by overstory vegetation (greater than 3 meters) It is expressed as a percentage of the stream (wetted width) so covered.

Overhang closure: The closure over a stream created by understory vegetation within 3 meters of water surface at the time of the survey. It is expressed as a percentage of the stream wetted width covered.

- C) Forest Type: The dominant and co-dominant vegetation of the area surrounding the stream.

Check List

Substrate Distribution: The spatial distribution of the substrate either: patchy or mixed.

Flow: Notable aspects and/or interpretations regarding Channel or Flow character. For example notes may be made in regards to limitations created by Flow on suitability of an area for recreational boating or fisheries recruitment.

Bank and Hillside Stability: A general interpretive section dealing with one's impressions of the overall bank and hillside stability within a point sample. Some justification for conclusions should be included.

Water Chemistry: Results of chemical analysis of water made at a point sample.

Aquatic Vegetation: The relative abundance and species of aquatic vegetation present.

Invertebrates: The relative abundance and species of aquatic invertebrates present.

Fish Sample Card: A comprehensive card developed by the Resource Analysis branch which can be used as an attachment.

Fisheries Potential: An interpretive section which analyzes a point samples potential for recruitment in terms of: spawning, rearing, and resident capabilities.

Protection Problems: Anticipated adverse effects on the stream which could develop with resource exploitation.

Improvement Potential: Realistic enhancement projects to increase fisheries production. For example: Fish ladders, stream clearance, spawning channels, incubation boxes, etc.

THE REACH TALLY CARD

The Reach Tally Card describes some of the properties of a stream reach. The reach may be described as a generally homogeneous section of stream of unique character or a repetitive sequence of homogeneous units.

Definitions

Observer: The individuals who gathered the reach data; surname and initials, lead hands' name first, others in alphabetical order.

Method: boat, walking, helicopter or best description

Gradient: The average estimated gradient for the entire reach to the nearest 0.5%.

Substrate: The estimated percentage composition of the superficial bed material.

A) Composition

Fines < 2 mm. diameter

Gravel 2-100mm. diameter

Cobble 100-250mm.diameter

Boulder >250 mm. diameter

Bedrock

B) Stability

Flowing water causes the movement of the stream substrate. An indication of the mobility of the substrate is the presence of:

Braiding: anastomosing stream flow

Bars: deposits of sand and gravel which are built up and removed by stream flow.

Islands: distinguished from bars by being composed of consolidated or unconsolidated material and supporting well-established vegetation.

Each of the above criteria for stability are rated as: nil, low, moderate, and high.

Channel: a natural or artificial waterway of perceptible extent which periodically or continuously contains moving water. It has definite bed and banks which serve to confine the water.

- A) Cross-section: the section of stream taken perpendicular to the stream centerline. Three cross-sections are differentiated:

Confined (c): the channel is entrenched or lateral movement is controlled at high and regular flows by banks.

bounded (b) : channel movement or flooding is limited by valley walls near the edge of the flood plain.

unconfine (u): the channel is not bounded by valley walls and much lateral movement or flooding is possible at high flows.

- B) Flood/side (channels): Flood channels contain water at high flows. At the time of the survey these channels may or may not contain water but the channel still exists.

Side channels are connected to the mainstem at high and low water and are characterized by low velocity flows.

Spatial frequency of flood and side channels are expressed as being: nil, low, moderate, or high.

- C) Thread: A line created by the directional flow of a stream within the main channel. It is classified as single (S) or multiple (M) thread. The latter is a situation in which the total discharge of the stream is divided nearly equally in more than one channel.

D) Entrenchment: The degree of stream incision resulting from fluvial processes; to be designated as low, moderate, or high.

E) Form: The appearance of the channel pattern within a reach.

It is described as:

Straight(S) - little or no curving

Irregular (I) - no clear pattern of lateral movement

Meandering (M) - clear pattern of lateral movement identified by formation of oxbows or winding curves. Pattern ranges from tortuous to curving.

F) Width:

Wetted Width: The range and average width in meters, of the water covered channel.

Rooted Width: The range and average width of the stream channel from rooted vegetation bank to bank.

Floodplain Width: The width of the flatland bordering a stream that shows obvious signs of flooding and/or channel shift.

Debris

A) Abundance: The relative abundance of organic material deposited within the stream channel. Expressed as: low, medium or high.

Examples of debris are: windfalls, branches, leaves, etc.

B) State: Expressed as the percentage of debris which is transient (i.e. debris which has been transported or is in the state of being moved)

WaterA) Discharge

The estimated volume of water passing a given point per unit time. Expressed as cubic meters per second.

B) Flow Character

The surface expression of the water that is determined by: water velocity, volume, and substrate. It is described at the time of survey as:

Placid: tranquil, sluggish

Swirling: eddies, boils, swirls

Rolling: unbroken standing waves

Broken: riffles, rapids, jumps

Tumbling: cascades, usually over large boulders or rock outcrops.

Each of the above is given a visual estimate as percentage of total run (as opposed to pool to be described latter) with it's measured or estimated average depth in meters.

Pool makes up the remainder of the flow character and can be described as: a relatively deep generally placid and/or swirling section which likely persists in high flows.

Average Velocity: The estimated typical velocity of flow in meters/second.

Average Depth: The estimated average depth of water covering the stream bed in meters.

BankA) % Sloping:

The estimated percentage of the banks with a slope of less than 45° . The remainder is described as vertical (greater than 45°).

B) Texture

The major components making up the banks

C) % Unstable

The percentage of banks showing instability

Obstructions: Any object or formation that may: impede, block or hinder waterflow and/or fish migration. Types distinguished are: falls, cascades/chutes, beaver dams, culverts, velocity and other barrier. This heading should include: the height of the obstruction in meters, the distance from the mouth in kilometers; and of course the type.

Slumps: The active mass wasting of surficial material from banks or valley walls into stream channel(s). The distance of the slump from the mouth and composition should be noted.

Vegetation:A) Composition

The percentages of ground coverage of each vegetation class within 20 m. of the bank. Total may be greater than 100%.

B) Closure

Crown Closure: The closure over a stream by overstory vegetation (greater than 3 meter). It is expressed as a percentage of the stream (wetted width) so covered.

Overhang Closure: The closure over a stream created by understory vegetation within 3 meters of water surface at the time of the survey. It is expressed as a percentage of the stream wetted width covered.

C) Forest Type

The dominant and co-dominant vegetation of the area surrounding the stream.

CHECK LIST

Pool Control: The factors which control the occurrence of pools within a reach e.g. logs, bedrock, beaver dams, etc.

Flow: Notable aspects and/or interpretations regarding Channel or Flow Character. For example notes may be made in regards to limitations created by flow on suitability of an area for recreational boating or fisheries recruitment.

Bank & Hillside Stability: A general interpretive section dealing with one's impression of the overall bank and hillside stability within a point sample. Some justification for conclusions should be included.

Aquatic Vegetation: The relative abundance and species of aquatic vegetation present.

Invertebrates: The relative abundance and species of aquatic invertebrates present.

Fisheries Potential: An interpretive section which analyzes a reach's potential for recruitment, in terms of: spawning, rearing and resident capabilities.

Protection Problems: Anticipated adverse effects on the stream which could develop with resource exploitation.

Improvement Potential: Realistic enhancement projects to increase fisheries production. For example; fish ladders, stream clearance, spawning channels, incubation boxes, etc.