



AN INVENTORY OF THE FLATHEAD RIVER AND TRIBUTARIES

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Stream Inventory

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Victoria, B. C.

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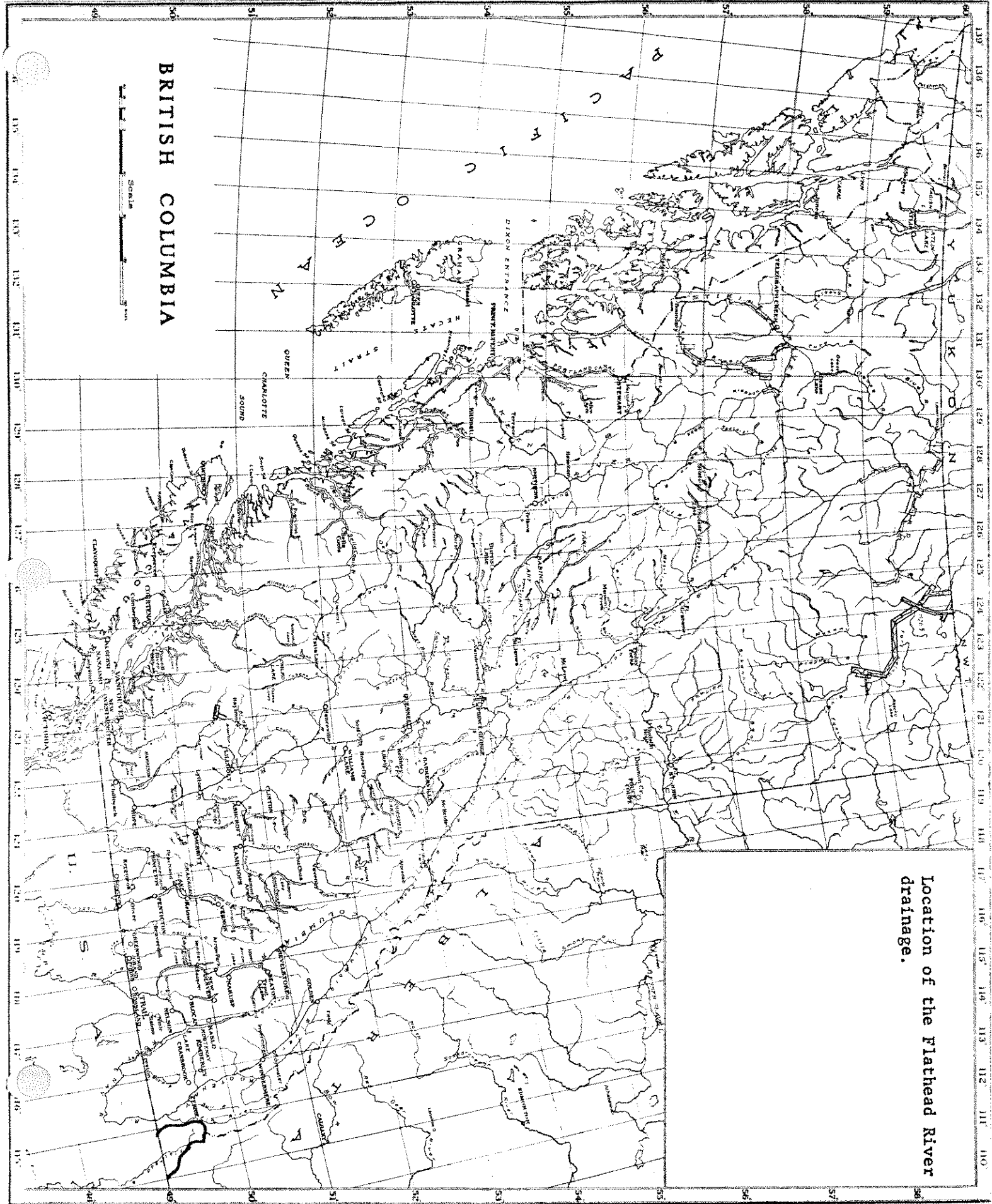
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I INTRODUCTION





BRITISH COLUMBIA

Scale
1:50,000

Location of the Flathead River drainage.

Flathead River and Tributaries

INTRODUCTION

The survey was conducted between August 9 and September 16, 1975. Most tributary streams were walked from road access points, while a few were flown. Portions of the main river were walked, flown and floated.

The Flathead River System is in a subalpine Englemann spruce-subalpine fir biogeoclimatic zone. Data compiled by the Meteorological Branch, Department of Transport for 1963, 1967, 1969 and 1971 in the Elko-Fernie area shows that the greatest amount of precipitation (40% of annual) occurs in December and January in the form of snow; while July, August and September are typically dry months. Minimum temperatures are usually in December or January with maximum yearly temperatures occurring in the month of August. Significant increases in temperature are usually recorded for April and May, corresponding to the ice break up and initiation of the spring runoff.

Seasonal fluctuation of discharge is severe in the Flathead system. The greater percentage of annual precipitation occurs during the cold winter months as snow, a build up which causes a tremendous volume of snow and ice melt in the spring. Results from this flushing are visible in the large active beds throughout many sections of the main river and tributaries. Surface water data compiled by the Inland Waters Branch of the Department of the Environment for a 41 year period (1929-1970) shows that mean flow for the month of March (188CFS or $5.32\text{m}^3/\text{sec}$) increases by almost 500% for April (900CFS or $25.4\text{m}^3/\text{sec}$) and by almost 2,000% in May (3600CFS or $101\text{m}^3/\text{sec}$). May and June are the critical months. Mean flow

for the month of June is comparatively only slightly lower than that in May.

FISHERIES POTENTIAL AND PRODUCTIVITY

Species Present

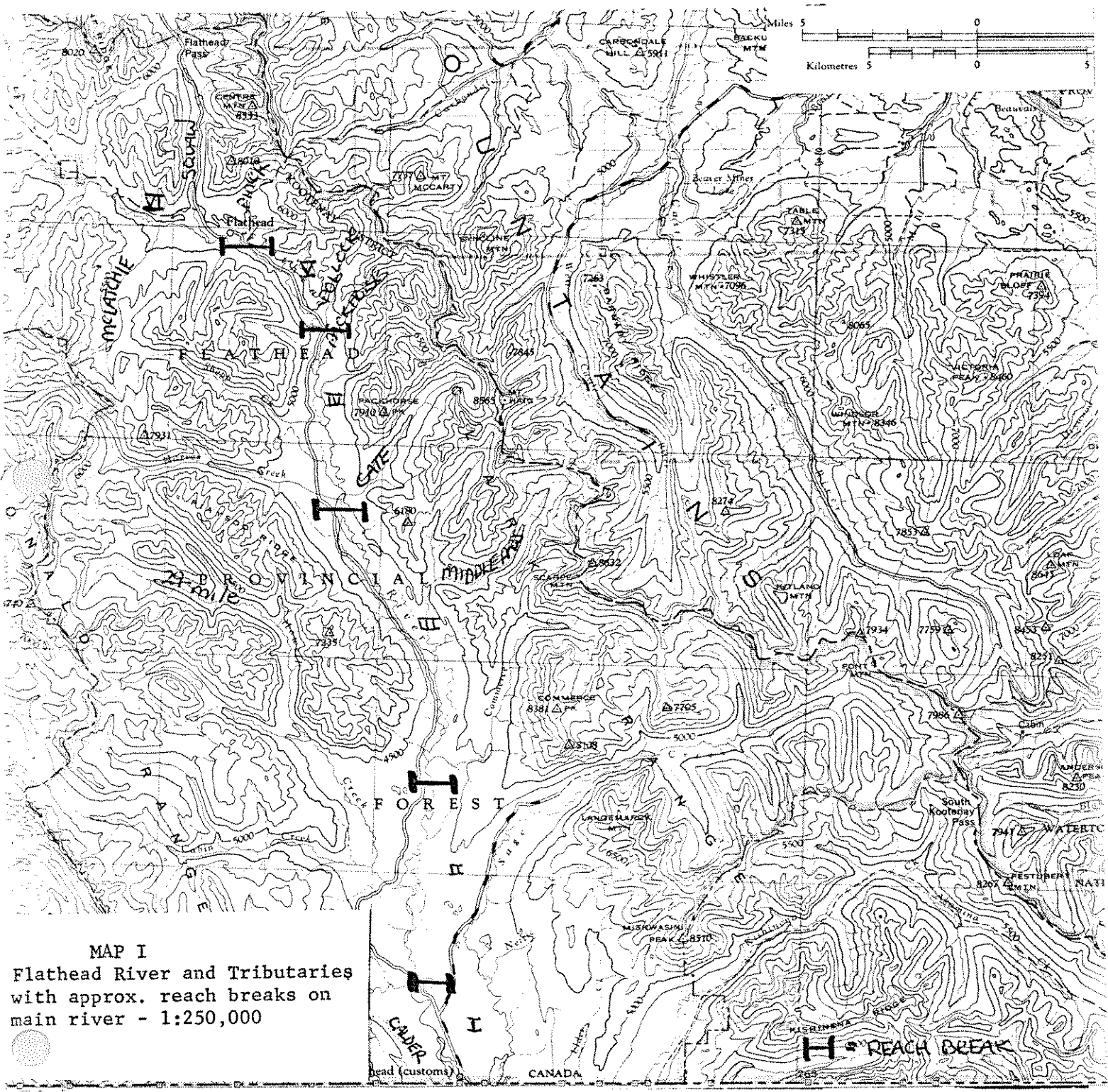
- a) a resident population of yellowstone cutthroat trout
(Salmo clarki lewisi)
- b) a resident and probable migratory population of
Mountain Whitefish (Prospium williamsoni)
- preparing to spawn at time of survey
- c) a spawning migratory population and a rearing
population of Dolly Varden (Salvelinus malma).
It's possible that frozen lake (Couldrey Creek)
supports a resident population.
- d) a resident population of the Slimy Sculpin (Cottus
cognatus)

Tributaries

The following table summaries rearing/spawning potentials and overall productivity of streams tributary to the Flathead River (poor = P, good = G, excellent = E), and for species present in samples (DV, CT, WF, S), Stream names from top to bottom are in order of estimated value to the system. Species abbreviations in brackets indicates that their presence is reported or that they were in a creel census: See individual reports for specific information.

TABLE I POTENTIAL VS. PRODUCTIVITY - TRIBUTARIES AND MAIN RIVER REACHES

<u>Name</u>	<u>Potential</u>	<u>Species Utilization</u>	<u>Overall Productivity</u>
1. Couldrey Burnham	E (R&S)	DV, CT, S	E
2. a) Howell	E (S) G (R)	(DV), CT, S	G
b) 29-Mile	G (R&S)	CT	E
c) Cabin	G (R&S)	DV, CT, S	G
3. Sage	E (R&S)	CT, WF, S	G
4. Kishinena	E (R.&S)	CT	G
5. Commerce	E. (R&S)	CT	F
6. Harvey	E (E&S)	CT	F
7. Pollock	E (R&S)	CT	F
8. Calder	L(S) G(R)	CT	L
9. Parker	L (R&S)	CT	L
10. Middlepass	F(S) L(R)	---	P
11. Cate	F(S) L(R)	---	P
12. Squaw	F (R&S)	---	P
13. McLatchie	F (R&S)	---	L
14. McEvoy	L (S) F (R)	---	Unclassified
15. Pincher	P (R&S)	---	P
16. Main River			
Reach I	P (R&S)	(DV), CT, (WF)	G
Reach II	E (R&S)	(DV), CT (WF)	E
Reach III	E (R&S)	CT (WF)	E
Reach IV	E (R&S)	CT	G
Reach V	G (S) L (R)	(DV - one report)	---
Reach VI	L(S&R)	---	---



MAP I
Flathead River and Tributaries
with approx. reach breaks on
main river - 1:250,000

H = REACH BREAK

In general, the tributaries on the east side do not appear as productive as those on the west side of the river. Aside from generally poorer quality habitat (rearing/spawning potential), it seems that these tributaries (Pollock, Cate, Middlepass, Commerce), are adversely affected by large volume spring run-off. Degree of channel movement, subsequent washing out of roads and bridges, and the wider, higher alpine drainage sources (larger snow/ice pack), all suggest that spring runoff from the east side is much greater than that on the west side. This would obviously be limiting to the spring spawning cutthroat and possibly account for the low abundance of this species on the east side. Those creeks which cannot adequately handle the tremendous increase in discharge (eg. Middlepass, Cate) are the extreme example as opposed to a stream such as Sage which has a sufficiently wide active bed/flood plain in the lower reaches to allow maintenance of some rearing habitat.

Slimy sculpins appeared in only the most productive streams. Also spring spawners, they would be limited by high spring discharge in the above mentioned eastern tributaries.

Couldrey Creek appears to be the most important Dolly Varden producer. It also supports a substantial cutthroat population.

Further Work Needed

Very little is known concerning the abundance, migration timing etc., of the Flathead Dolly Varden. This inventory determined that large Dolly Varden were being caught in the main river between Couldrey and Howell creeks and that there are spawning and rearing fish in Howell, Cabin, Couldrey, Frozen and Burnham creeks. Couldrey appeared to be the major producer among these.

Much valuable information could be obtained concerning timing, distribution, and abundance through the use of varied fish counting techniques, (swimming, netting, fences, etc.) Such information would be of tremendous value to the maintenance and possible improvement of the Dolly Varden fishery of the Flathead system.



II MAIN RIVER REPORT



STREAM INVENTORY PARAMETERS

15/75

NAME Flathead River DATE Aug. 15-Sept. REF. NO. _____
 Mo. Day Year

TEAM Caw and Gunville

TRIBUTARY TO Flathead Lake (Montana);-- i.e. Columbia River system.

SURVEY; TYPE flying/floating ; QUALITY baseline-good MAP NO. 82/G SE

REACH entire Canadian drainage REF. NO. _____

LOCATION LAT: 49 00 00 LONG 114 28 20 OTHER MAPPING Sage creek, lower flathead
 Deg. Min. Sec. Deg. Min. Sec. upper flathead 1:50,000 series

LENGTH (KM) 68 LENGTH ACCESSIBLE TO 60 AVG. DEPTH AT _____
 MIGRANT FISH (KM) _____ AVG. WETTED WIDTH _____

ELEVATION RANGE 4000' - 6000' DRAINAGE AREA 1165.5 km.² T.D.S. (PPM) _____

WETTED WIDTH (AVG.) _____ ACTIVE BED WIDTH (AVG.) _____ ph _____
 RANGE _____ RANGE _____ O₂ (PPM) _____

FLOOD PLAIN WIDTH _____ DISCHARGE ; ACTUAL _____ ; RANGE _____

TIME/TEMP. °C AIR _____ COLOUR _____

TIME/TEMP. °C WATER _____ TURBIDITY _____

WEATHER CONDITIONS _____

CHECK LIST: X = RECORDED IN REPORT : N.R.= NOT RECORDED : N.N.= NOT NOTED

- | | |
|-----------------------------------|--|
| 1. <u>X</u> GENERAL DESCRIPTION | 13. <u>X</u> BANK AND HILLSIDE STABILITY |
| 2. <u>X</u> OVERALL PRODUCTIVITY | 14. <u>X</u> GENERAL VEGETATION TYPE |
| 3. <u>X</u> GRADIENT-SUBSTRATE | 15. <u>X</u> TRIBUTARIES |
| 4. <u>X</u> CHANNEL TYPE | 16. <u>X</u> LAND USE |
| 5. <u>X</u> FLOW PATTERN | 17. <u>X</u> ACCESS |
| 6. <u>X</u> POOL-RUN-RIFFLE RATIO | 18. <u>X</u> POLLUTION SOURCES |
| 7. <u>X</u> OBSTRUCTIONS | 19. <u>X</u> RECREATIONAL POTENTIAL |
| 8. <u>X</u> STREAM COVER | 20. <u>X</u> IMPROVEMENT POTENTIAL |
| 9. <u>X</u> FISH | 21. <u>X</u> PROTECTION PROBLEMS |
| 10. <u>X</u> AQUATIC PLANTS | 22. <u>NN</u> ADDITIONAL NOTES |
| 11. <u>X</u> INVERTEBRATES | 23. <u>N</u> HISTORICAL INFORMATION |
| 12. <u>X</u> BANK MATERIAL | |

* Note if parameters are measured (MEAS) or estimated (EST) .

STREAM INVENTORY PARAMETERS

NAME Flathead River DATE Sept 6/75 REF.NO. _____
 Mo. Day Year

TEAM Caw and Gunville

TRIBUTARY TO Flathead Lake--- Columbia River System.

SURVEY; TYPE flying/floating; QUALITY baseline-good MAP NO. 82G/SE

REACH 49th parallel to 7.5 km. Reach I REF.NO. _____

LOCATION LAT: _____ LONG _____ OTHER MAPPING _____
 Deg. Min. Sec. Deg. Min. Sec.

LENGTH (KM) 7.5 LENGTH ACCESSIBLE TO 7.5 AVG. DEPTH AT 0.7m
 MIGRANT FISH (KM) _____ AVG. WETTED WIDTH _____

ELEVATION RANGE - DRAINAGE AREA _____ T.D.S. (PPM) _____

WETTED WIDTH (AVG.) 14 m. ACTIVE BED WIDTH (AVG.) 16.0 m. ph _____
 RANGE 10 - 17 m. RANGE 15 - 20m. O₂ (PPM) _____

FLOOD PLAIN WIDTH 20 m. DISCHARGE ; ACTUAL 78m³/sec ; RANGE _____

TIME/TEMP. °C AIR 1200 - 23.5°C COLOUR clear

TIME/TEMP. °C WATER 1200 -10.5 TURBIDITY _____

WEATHER CONDITIONS sunny and clear

CHECK LIST: X = RECORDED IN REPORT : N.R.= NOT RECORDED : N.N.= NOT NOTED

- | | |
|--------------------------------|---------------------------------------|
| 1. _____ GENERAL DESCRIPTION | 13. _____ BANK AND HILLSIDE STABILITY |
| 2. _____ OVERALL PRODUCTIVITY | 14. _____ GENERAL VEGETATION TYPE |
| 3. _____ GRADIENT-SUBSTRATE | 15. _____ TRIBUTARIES |
| 4. _____ CHANNEL TYPE | 16. _____ LAND USE |
| 5. _____ FLOW PATTERN | 17. _____ ACCESS |
| 6. _____ POOL-RUN-RIFFLE RATIO | 18. _____ POLLUTION SOURCES |
| 7. _____ OBSTRUCTIONS | 19. _____ RECREATIONAL POTENTIAL |
| 8. _____ STREAM COVER | 20. _____ IMPROVEMENT POTENTIAL |
| 9. _____ FISH | 21. _____ PROTECTION PROBLEMS |
| 10. _____ AQUATIC PLANTS | 22. _____ ADDITIONAL NOTES |
| 11. _____ INVERTEBRATES | 23. _____ HISTORICAL INFORMATION |
| 12. _____ BANK MATERIAL | |

* Note if parameters are measured (MEAS) or estimated (EST)

STREAM INVENTORY PARAMETERS

NAME Flathead River DATE Sept. 6/75 REF.NO. _____
Mo. Day Year
TEAM Caw and Gunville
TRIBUTARY TO Flathead Lake i.e. Columbia River System
SURVEY; TYPE flying/floating; QUALITY baseline-good MAP NO. 82G/SE
REACH 7.5 km. to 20.0 Reach II REF.NO. _____
LOCATION LAT: _____ LONG _____ OTHER MAPPING _____
Deg. Min. Sec. Deg. Min. Sec.
LENGTH (KM) 12.5 LENGTH ACCESSIBLE TO 12.5 AVG. DEPTH AT 0.5 m.
MIGRANT FISH (KM) _____ AVG. WETTED WIDTH _____
ELEVATION RANGE _____ DRAINAGE AREA _____ T.D.S. (PPM) _____
WETTED WIDTH (AVG.) 14 m. ACTIVE BED WIDTH (AVG.) 17.0 m ph _____
RANGE 10-20 RANGE 15-25 O₂ (PPM) _____
FLOOD PLAIN WIDTH 25 - 50m DISCHARGE ; ACTUAL 6.36m³/sec; RANGE _____
TIME/TEMP. °C AIR 1100 - 23.5 °C COLOUR clear
TIME/TEMP. °C WATER 1100 - 10.5 °C TURBIDITY clear to light below Howell
clear above
WEATHER CONDITIONS sunny and clear

CHECK LIST: X = RECORDED IN REPORT : N.R.= NOT RECORDED : N.N.= NOT NOTED

- | | |
|--------------------------------|---------------------------------------|
| 1. _____ GENERAL DESCRIPTION | 13. _____ BANK AND HILLSIDE STABILITY |
| 2. _____ OVERALL PRODUCTIVITY | 14. _____ GENERAL VEGETATION TYPE |
| 3. _____ GRADIENT-SUBSTRATE | 15. _____ TRIBUTARIES |
| 4. _____ CHANNEL TYPE | 16. _____ LAND USE |
| 5. _____ FLOW PATTERN | 17. _____ ACCESS |
| 6. _____ POOL-RUN-RIFFLE RATIO | 18. _____ POLLUTION SOURCES |
| 7. _____ OBSTRUCTIONS | 19. _____ RECREATIONAL POTENTIAL |
| 8. _____ STREAM COVER | 20. _____ IMPROVEMENT POTENTIAL |
| 9. _____ FISH | 21. _____ PROTECTION PROBLEMS |
| 10. _____ AQUATIC PLANTS | 22. _____ ADDITIONAL NOTES |
| 11. _____ INVERTEBRATES | 23. _____ HISTORICAL INFORMATION |
| 12. _____ BANK MATERIAL | |

* Note if parameters are measured (MEAS) or estimated (EST)

STREAM INVENTORY PARAMETERS

NAME Flathead River DATE Sept. 5/76 REF.NO. _____
 Mo. Day Year

TEAM Caw and Gunville

TRIBUTARY TO Flathead lake i.e. Columbia River System

SURVEY; TYPE floating - flying; QUALITY baseline-good MAP NO. 82G/SE

REACH 20.0 - 34.5 reach III REF.NO. _____

LOCATION LAT: _____ LONG _____ OTHER MAPPING _____
 Deg. Min. Sec. Deg. Min. Sec.

LENGTH (KM) 14.5 LENGTH ACCESSIBLE TO 14.5 AVG. DEPTH AT .3
 MIGRANT FISH (KM) _____ AVG. WETTED WIDTH _____

ELEVATION RANGE _____ DRAINAGE AREA _____ T.D.S. (PPM) _____

WETTED WIDTH (AVG.) 15 m. ACTIVE BED WIDTH (AVG.) 25 m. ph _____
 RANGE _____ RANGE 20-50 O₂ (PPM) _____

FLOOD PLAIN WIDTH 25-100m. DISCHARGE ; ACTUAL 3.4m³/sec ; RANGE _____

TIME/TEMP. °C AIR 1400 - 25°C COLOUR clear

TIME/TEMP. °C WATER 1400-10.0°C TURBIDITY clear

WEATHER CONDITIONS sunny and clear

CHECK LIST: X = RECORDED IN REPORT : N.R. = NOT RECORDED : N.N. = NOT NOTED

- | | |
|--------------------------------|---------------------------------------|
| 1. _____ GENERAL DESCRIPTION | 13. _____ BANK AND HILLSIDE STABILITY |
| 2. _____ OVERALL PRODUCTIVITY | 14. _____ GENERAL VEGETATION TYPE |
| 3. _____ GRADIENT-SUBSTRATE | 15. _____ TRIBUTARIES |
| 4. _____ CHANNEL TYPE | 16. _____ LAND USE |
| 5. _____ FLOW PATTERN | 17. _____ ACCESS |
| 6. _____ POOL-RUN-RIFFLE RATIO | 18. _____ POLLUTION SOURCES |
| 7. _____ OBSTRUCTIONS | 19. _____ RECREATIONAL POTENTIAL |
| 8. _____ STREAM COVER | 20. _____ IMPROVEMENT POTENTIAL |
| 9. _____ FISH | 21. _____ PROTECTION PROBLEMS |
| 10. _____ AQUATIC PLANTS | 22. _____ ADDITIONAL NOTES |
| 11. _____ INVERTEBRATES | 23. _____ HISTORICAL INFORMATION |
| 12. _____ BANK MATERIAL | |

* Note if parameters are measured (MEAS) or estimated (EST)

STREAM INVENTORY PARAMETERS

NAME Flathead River DATE Sept. 5, 1975 REF.NO. _____
Mo. Day Year

TEAM Caw and Gunville

TRIBUTARY TO Flathead Lake i.e. Columbia River System

SURVEY; TYPE floating/flying ; QUALITY baseline-good MAP NO. 82 G/SE

REACH 34.5 to 44.5km. Reach IV REF.NO. _____

LOCATION LAT: _____ LONG _____ OTHER MAPPING _____
Deg. Min. Sec. Deg. Min. Sec.

LENGTH (KM) 10 km. LENGTH ACCESSIBLE TO 10 km. AVG. DEPTH AT .3m.
MIGRANT FISH (KM) AVG. WETTED WIDTH

ELEVATION RANGE _____ DRAINAGE AREA _____ T.D.S. (PPM) _____

WETTED WIDTH (AVG.) 13 m ACTIVE BED WIDTH (AVG.) 20 m ph _____
RANGE 10-16 m. RANGE 18-30 m. O₂ (PPM) _____

FLOOD PLAIN WIDTH 25-100m DISCHARGE ; ACTUAL 2.26 ; RANGE _____

TIME/TEMP. °C AIR 1200 - 23.5 °C COLOUR clear

TIME/TEMP. °C WATER 1200-10.0°C TURBIDITY clear

WEATHER CONDITIONS sunny and clear

CHECK LIST: X = RECORDED IN REPORT : N.R.= NOT RECORDED : N.N.= NOT NOTED

- | | |
|--------------------------------|---------------------------------------|
| 1. _____ GENERAL DESCRIPTION | 13. _____ BANK AND HILLSIDE STABILITY |
| 2. _____ OVERALL PRODUCTIVITY | 14. _____ GENERAL VEGETATION TYPE |
| 3. _____ GRADIENT-SUBSTRATE | 15. _____ TRIBUTARIES |
| 4. _____ CHANNEL TYPE | 16. _____ LAND USE |
| 5. _____ FLOW PATTERN | 17. _____ ACCESS |
| 6. _____ POOL-RUN-RIFFLE RATIO | 18. _____ POLLUTION SOURCES |
| 7. _____ OBSTRUCTIONS | 19. _____ RECREATIONAL POTENTIAL |
| 8. _____ STREAM COVER | 20. _____ IMPROVEMENT POTENTIAL |
| 9. _____ FISH | 21. _____ PROTECTION PROBLEMS |
| 10. _____ AQUATIC PLANTS | 22. _____ ADDITIONAL NOTES |
| 11. _____ INVERTEBRATES | 23. _____ HISTORICAL INFORMATION |
| 12. _____ BANK MATERIAL | |

* Note if parameters are measured (MEAS) or estimated (EST)

STREAM INVENTORY PARAMETERS

NAME Flathead River DATE Sept. 5, 1975 REF. NO. _____
 Mo. Day Year

TEAM Caw and Gunville

TRIBUTARY TO Flathead Lake i.e. Columbia River System

SURVEY; TYPE road/flying; QUALITY baseline-good MAP NO. 82G/ SE

REACH 44.5 to 50.0 Reach V REF. NO. _____

LOCATION LAT: _____ LONG _____ OTHER MAPPING _____
 Deg. Min. Sec. Deg. Min. Sec.

LENGTH (KM) 6.0km. LENGTH ACCESSIBLE TO 6.0 km. AVG. DEPTH AT _____
 MIGRANT FISH(134) _____ AVG. WETTED WIDTH _____

ELEVATION RANGE _____ DRAINAGE AREA _____ T.D.S.(PPM) _____

WETTED WIDTH(AVG.) 10 m ACTIVE BED WIDTH(AVG.) 15 m ph _____
 RANGE 8-13 m. RANGE 13-18 m. O₂ (PPM) _____

FLOOD PLAIN WIDTH 20m. DISCHARGE ;ACTUAL 3.4 ;RANGE _____

TIME/TEMP. °C AIR 1100 - 23.0 °C COLOUR clear

TIME/TEMP. °C WATER 1100-90°C TURBIDITY clear

WEATHER CONDITIONS Sunny and clear

CHECK LIST: X = RECORDED IN REPORT : N.R.= NOT RECORDED : N.N.= NOT NOTED

- | | |
|--------------------------------|---------------------------------------|
| 1. _____ GENERAL DESCRIPTION | 13. _____ BANK AND HILLSIDE STABILITY |
| 2. _____ OVERALL PRODUCTIVITY | 14. _____ GENERAL VEGETATION TYPE |
| 3. _____ GRADIENT-SUBSTRATE | 15. _____ TRIBUTARIES |
| 4. _____ CHANNEL TYPE | 16. _____ LAND USE |
| 5. _____ FLOW PATTERN | 17. _____ ACCESS |
| 6. _____ POOL-RUN-RIFFLE RATIO | 18. _____ POLLUTION SOURCES |
| 7. _____ OBSTRUCTIONS | 19. _____ RECREATIONAL POTENTIAL |
| 8. _____ STREAM COVER | 20. _____ IMPROVEMENT POTENTIAL |
| 9. _____ FISH | 21. _____ PROTECTION PROBLEMS |
| 10. _____ AQUATIC PLANTS | 22. _____ ADDITIONAL NOTES |
| 11. _____ INVERTEBRATES | 23. _____ HISTORICAL INFORMATION |
| 12. _____ BANK MATERIAL | |

* Note if parameters are measured (MEAS) or estimated (EST)

-10-
STREAM INVENTORY PARAMETERS

NAME Flathead River DATE Sept. 15/75 REF. NO. _____
Mo. Day Year

TEAM Caw and Gunville

TRIBUTARY TO Flathead Lake i.e. Columbia River System.

SURVEY; TYPE flying; QUALITY overview MAP NO. 82/G SE

REACH 50.5 to 68.0 Reach VI REF. NO. _____

LOCATION LAT: _____ LONG _____ OTHER MAPPING _____
Deg. Min. Sec. Deg. Min. Sec.

LENGTH (KM) 18.5 LENGTH ACCESSIBLE TO 10.0 AVG. DEPTH AT 3m.
MIGRANT FISH(KM) _____ AVG. WETTED WIDTH _____

ELEVATION RANGE _____ DRAINAGE AREA _____ T.D.S.(PPM) _____

WETTED WIDTH(AVG.) 10m. ACTIVE BED WIDTH(AVG.) 13 m. ph _____
RANGE 8-14 m. RANGE 11 - 15 m. O₂ (PPM) _____

FLOOD PLAIN WIDTH 40m. DISCHARGE ;ACTUAL 1.4m³/sec;RANGE _____

TIME/TEMP. °C AIR _____ COLOUR clear

TIME/TEMP. °C WATER _____ TURBIDITY clear

WEATHER CONDITIONS _____

CHECK LIST: X = RECORDED IN REPORT : N.R.= NOT RECORDED : N.N.= NOT NOTED

- | | |
|--------------------------------|---------------------------------------|
| 1. _____ GENERAL DESCRIPTION | 13. _____ BANK AND HILLSIDE STABILITY |
| 2. _____ OVERALL PRODUCTIVITY | 14. _____ GENERAL VEGETATION TYPE |
| 3. _____ GRADIENT-SUBSTRATE | 15. _____ TRIBUTARIES |
| 4. _____ CHANNEL TYPE | 16. _____ LAND USE |
| 5. _____ FLOW PATTERN | 17. _____ ACCESS |
| 6. _____ POOL-RUN-RIFFLE RATIO | 18. _____ POLLUTION SOURCES |
| 7. _____ OBSTRUCTIONS | 19. _____ RECREATIONAL POTENTIAL |
| 8. _____ STREAM COVER | 20. _____ IMPROVEMENT POTENTIAL |
| 9. _____ FISH | 21. _____ PROTECTION PROBLEMS |
| 10. _____ AQUATIC PLANTS | 22. _____ ADDITIONAL NOTES |
| 11. _____ INVERTEBRATES | 23. _____ HISTORICAL INFORMATION |
| 12. _____ BANK MATERIAL | |

* Note if parameters are measured (MEAS) or estimated (EST)

Flathead River

General Description - Overall Productivity

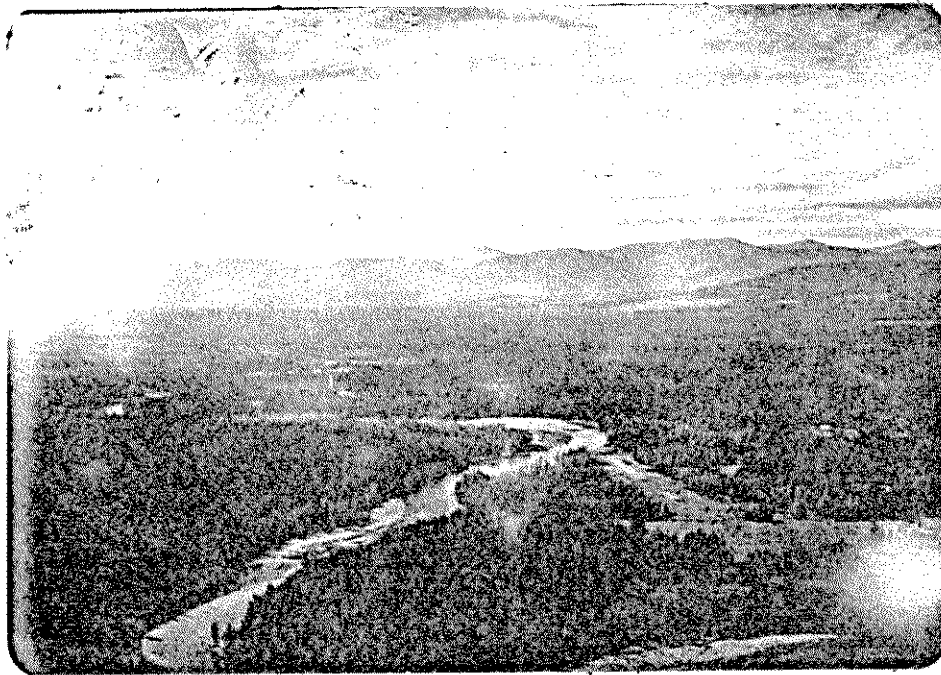
The Canadian portion of the Flathead River may be broken down into six broad reaches (see map II).

Reach I, the first 7.5 km. above the 49th parallel is a steep fast flowing section characterized by a well confined channel, very coarse substrate, rapids, chutes and wide deep pools. The 49th parallel although primarily an arbitrary reach break, is in effect the approximate location of a true physical reach break. Below the "line", the river flattens out as illustrated in picture 1.

Reach II, the next 12.5 km., is also a confined channel, but characterized by a wider bed width (active and wetted), shallower mean depth, finer substrate and a lesser gradient. Picture 2 illustrates the transition zone between reaches I and II, taken at the top of reach I, just below the old oil well (see map II). This picture typifies the gradual narrowing of the channel and the high exposed banks common to much of the lower river.

Reach III, the next 14.5 km., is a relatively flat, unconfined section. The river maintains a multi-thread character throughout most of this 14.0 km. stretch, with extreme debris accumulation aiding the natural channel movement in many sections. The flow makes extensive use of the wide active/bed flood plain (picture 3) in this broad river valley (picture 4).

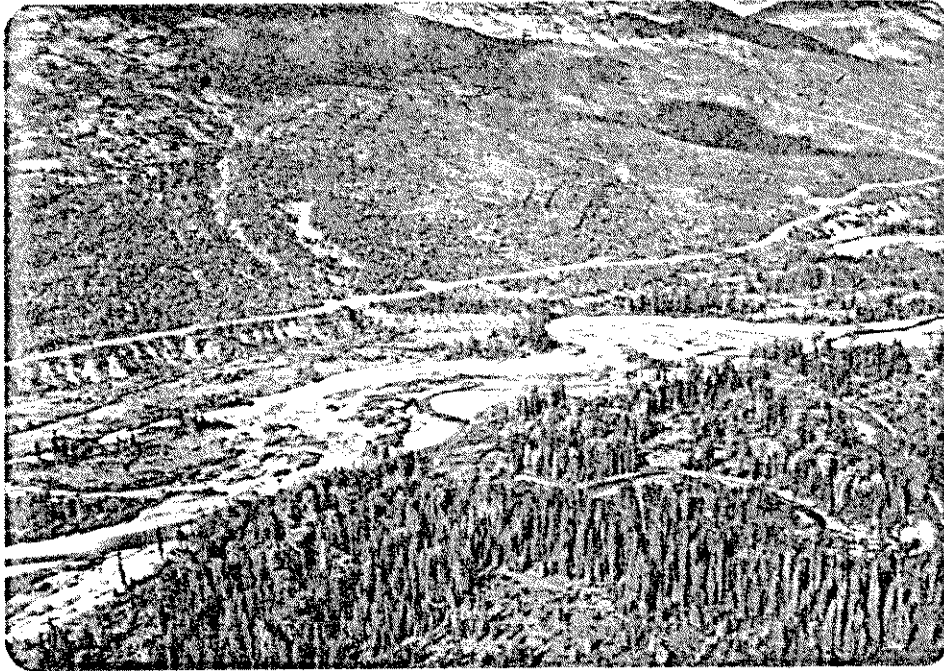
Reach IV is similar to reach III, but is distinct in its somewhat narrower active bed, absence of debris, slightly steeper gradient, high % fine gravels and uniform pool riffle sequence.



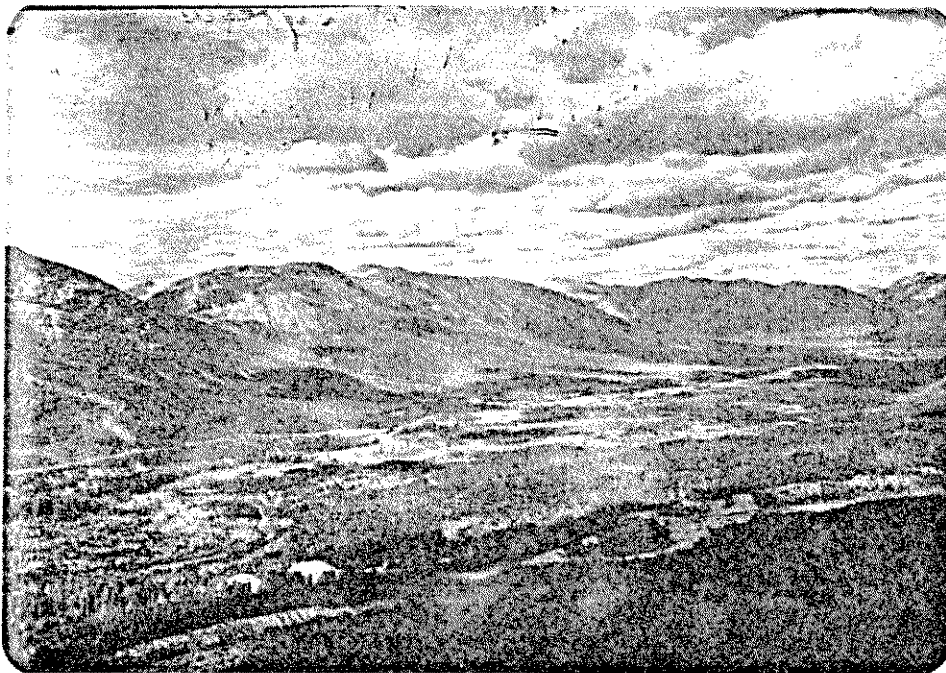
Picture 1 - Flathead River just below the 49th parallel



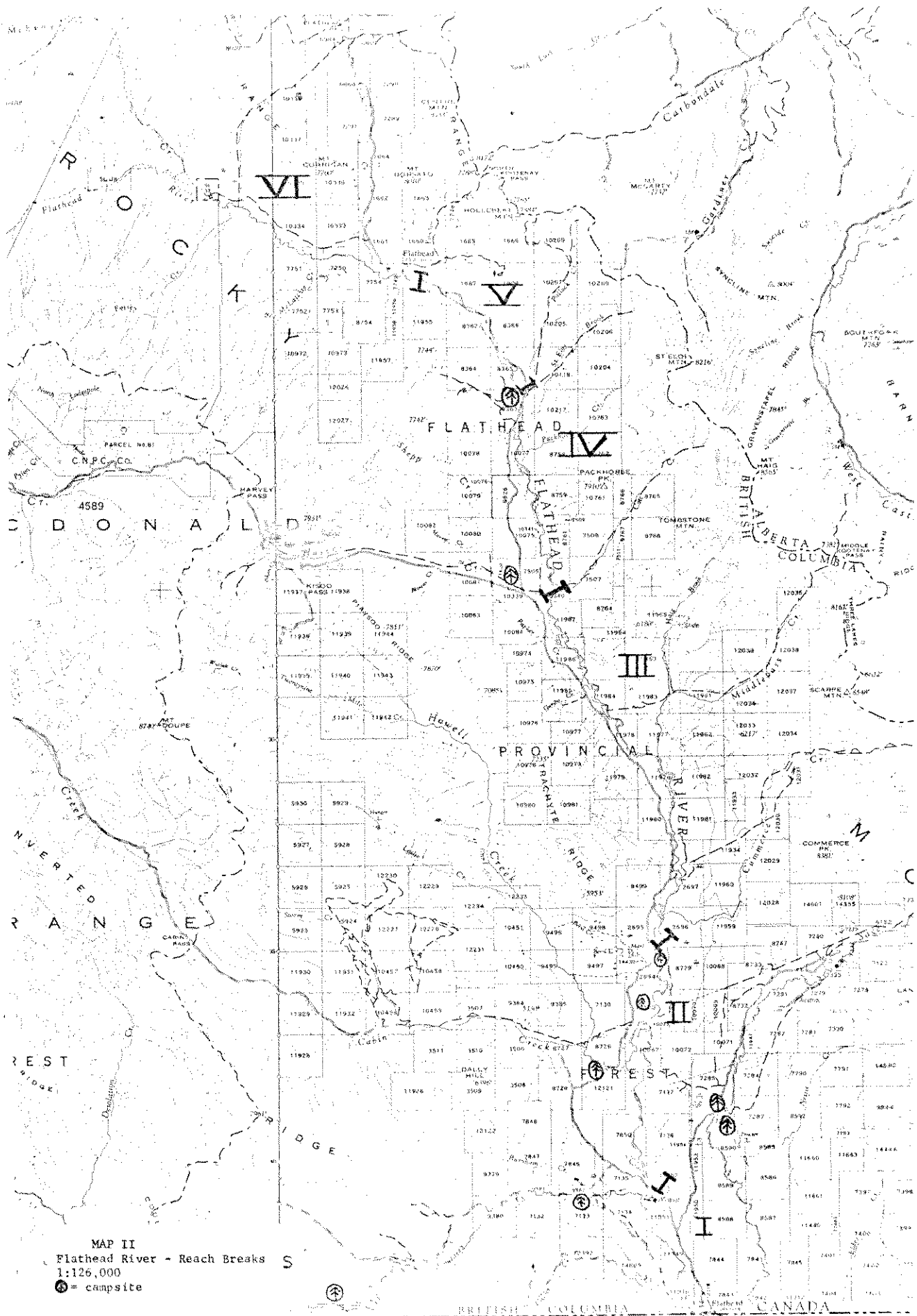
Picture 2 - A section of the transition area between reaches I & II.
The high steep exposed clay bank illustrated in the picture
is a common feature of the upper $\frac{1}{2}$ of reach I, and the lower
 $\frac{1}{2}$ of reach II. Firm compaction gives these banks stability.



Picture 3 - Typical section of reach III illustrating wide active bed and flood plain.



Picture 4 - The Flathead valley in vicinity of upper reach III and lower reach IV.



MAP II
 Flathead River - Reach Breaks
 1:126,000
 ☉ = campsite



Braiding is not nearly as acute as that observed in reach III. Substrate is coarser towards the top of reach IV.

Gradient increases and bed widths decrease in the well confined reach V. Steep stable banks are its most noticeable character with bedrock present in a few sections.

Reach VI is similar to reach IV for the first 4 - 5 km. of its 18.0 km. Being relatively unconfined over this lower portion, with a great deal of exposed substrate, this character changes to a gentle meander through low, flat swamp - meadow terrain.

Rearing and spawning potential are high in reaches II, III, and IV. On the basis of substantial fish population and the abundance of a good rearing/spawning/holding habitat in both the main river and its tributaries; overall productivity is rated as good to excellent.

Gradient Substrate

Reach I Gradient Over the first 2 km. gradient averages 3.5%. This increases to 4-6% over the next 4.0 km., gradually dropping to the 2.0% gradient at the top of the reach.

Substrate - averages

- 15% coarse sand
- 10% large gravel
- 25% small rubble
- 25% large rubble
- 35% boulder
- 10% bedrock and block

Low to fair spawning and rearing due to coarse substrate and fast flow. Suitable for holding larger fish.

Reach II Gradient - 3.0 - 3.5% the first 2 - 3 km., decreasing to 2.5% over the remaining portion.

Substrate - % composition shows more rubble at the bottom of reach II, % fines increasing towards the top.

average at bottom - 20% large gravel

40% small rubble

40% large rubble

1% boulder

average at top 10% small gravel

30% large gravel

30% small rubble

30% large rubble

- fair to good spawning and rearing.

Reach III Gradient 1-2%

Substrate - averages 15% small gravel

15% large gravel

40% small rubble

30% large rubble

- good spawning and rearing material

Reach IV Gradient 1.5 - 2.5% A step type sequence, with runs averaging 1.5%, riffle 2.5% is common throughout reach IV (see picture 5)

Substrate averages 20% small gravel

20% large gravel

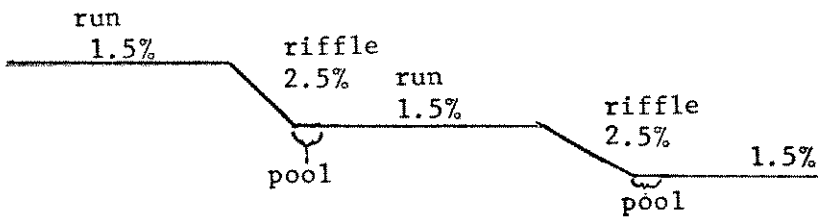
30% small rubble

30% large rubble

- good spawning and rearing material.



Picture 5 - Typical section of reach IV illustrating wide active bed and uniform pool-run-riffle-pool sequence associated with "step" type gradient.



Reach V - Gradient 2.5 - 3.5%

Substrate - averages 10% small gravel
15% large gravel
30% small rubble
40% large rubble
5% boulder

with a few bedrock sections.

- fair spawning and rearing.

Reach VI - Gradient 2.0 2.5 on lower 7 km. decreasing to 1.5% above.

Substrate - averages 20% small gravel in lower portion
30% large gravel
30% small rubble
20% large rubble

with a large increase in fines and coarse sand, with some muck,
in the meandering upper section.

- low to fair spawning and good rearing.

Channel Type - see general description

Reach I - confined - side and back channels very rare.

Reach II - confined - limited side and back channels

- some undercovering of banks.

Reach III - unconfined and braided - frequent side and back channels and
undercut banks.

- many exposed bars and log jams.

Reach IV - unconfined character decreases towards top of reach.

Reach V - confined-little side or back channeling.

Reach VI - unconfined in lower section becoming a confined meander in upper section.

Flow Pattern - Pool-Run-Riffle Ratio

Reach I - Flow varies from sections of uniform swirl to tumbling, cascading rapids.

Pool-Run-Riffle ratio averages - 20% pool
80% run

Reach II - Flow is a uniform swirl.

Pool-Run-Riffle averages - 20% pool
60% run
20% riffle

Reach III - uniform swirl - 20% pool

50% run
30% riffle

Reach IV - uniform swirl - 25% pool

50% run
25% riffle

Throughout most of reach IV there is a very uniform pool-run-riffle ratio. Typically (picture 5) there is a long, relatively deep section of run followed by a wide shallow riffle at a bend, and then a pool. Picture 5 doesn't adequately illustrate one of the wide riffle sections, often 4 - 5 times the average wetted width. The overall picture is like a series of steps.

Reach V - overall, uniform swirl with a few broken sections.

15% pool

70% run

15% riffle

Reach VI - uniform swirl with 20% pool

50% run

30% riffle

Obstructions - Rapids and chutes in reach I and debris jams in reach III may be partial or selective.

Stream Cover - Stream cover is very low for the entire river. Some smaller side channels have heavy scrub- type growth.

Fish - Fish data was collected by electroshocking, extensive angling, a creel census stop on the main Canadian exit road set up on August 10, 1975 and from personal sitings. Data from individual tributaries is presented in each individual report.

Although angling and electroshocking for Dolly Varden and Mountain whitefish were unsuccessful the creel census and personal sitings afforded valuable information regarding these two species.

A) Electroshocking

i) Sample site I - side and back channeled section in reach III

(see map I I)

- cutthroat only

Size (cm.)	5.5
	6.5 (X 3)
	8.0
	12.0

ii) sample site II - top of reach IV

- cutthroat only

Size (cm.) 6.0

6.5 (X2)

14.0

B. Angling

The two major angling sample sites were at the lower Flathead bridge (49th parallel) and in the upper 1/4 of reach III. All attempts at angling for Dolly Varden were unsuccessful. Cutthroat trout were relatively easy to catch throughout reaches I, II, and III the angling size fish being less abundant above reach III. There was no obvious difference in mean size or stage of maturity at or between the upper and lower angling sites.

Site I (reach I)

Site II (reach III)

*17.5 cm. immature ♀

18.0 cm. maturing ♂

*18.0 cm. maturing ♂

*20.0 cm. maturing ♂

20.0 cm. maturing ♂

*21.5 cm. maturing ♂

*27.0 cm. maturing ♂

*23.0 cm. maturing ♂

* indicates scale sample taken

*21.0 cm. maturing ♂

C. Creel Census - (Roman numeral indicates reach where caught)

Dolly Varden

Mountain Whitefish

*58 cm. I mature ♀

*27 cm. (X6) III mature

62 cm. V mature ♂

28 cm. (X6) I mature ♂

*69 cm. I mature (8 lbs.) ♂

*30 cm. III mature ♀

*77 cm. II mature (13.5 lbs.) ♂

*78 cm. II mature ♀

*79 cm. II mature ♀

* indicates scale sample taken

D. Personal Sightings and Verbal Reports

A large Dolly Varden was sited in a pool under the Sage Creek Road bridge (upper reach II). During a floatdown of the river (Sept. 5-6) groups (10-15) of large (30 cm.) whitefish were observed in many of the pools in reaches II and III. Verbal reports from anglers in reach I, on the same day, were that the whitefish catch was 3-4 times that of cutthroat.

Mr. R. Evans, United States Treasury Customs and Immigration Officer at the U.S. border reported that during his routine border checks he had seen approximately 60 Dolly Varden in the creels of U. S. fishermen, between July 4 and mid August. He also added that the Dolly Varden caught were somewhat larger than the previous year. He estimated a mean weight somewhere between 9-12 lbs. with some in the 16-18 lb. class.

Summary

1. There is a resident population of Yellowstone cutthroat.
2. There is a large population of Rocky Mountain whitefish, which were found to be congregating in schools of 10-15, in large pools, presumably preparing to spawn.
3. Dolly Varden migrate to the upper Flathead to spawn. Exact timing of the run is not known but they have been known to start migration from Flathead Lake as early as the first major ice break up.
4. Fish abundance appears higher in the lower river (reaches I - III) than in the upper section (reaches IV - VI). It is important to note that two of the highest potential and highest rated overall producers, Couldrey and Howell, enter into the Flathead in reach II.

5. All adult whitefish and Dolly Varden were sexually mature. All cutthroat males of angling size were approaching sexual maturity while females were consistently immature.

Aquatic Plants - none

Invertebrates - Present in particular abundance in reach III.

Bank Material - Bank and Hillside Stability

Reach I - Steep, high exposed clay banks, as illustrated in picture 2 are common in the upper portion of the reach. The lower 3/4 of reach I has very stable well vegetated banks, generally with thick forest and heavy undergrowth.

Reach II - Steep, high exposed clay banks are common throughout most of the lower 1/2 of reach II. Banks are stable with the exception of these isolated sections.

Usually these high banks are well compacted making soil movement and erosion negligible (see picture 2).

Reach III and IV - have more gravels and rubbles mixed with the clays making the intermittent high banks more unstable. Usually these unstable sections do not affect the river which is in most cases protected by a wide active bed. There is much instability associated with the road in some steeper sections but overall stability for reaches III and IV is high because of generally flat surrounding terrain.

Reach V - has characteristically higher banks and a resulting high instability where bedrock is not present.

Reach VI - flat with no potentially unstable conditions observed.

General Vegetation Type

Spruce - fir - pine forest with a higher percentage lodgepole pine in reach I.

Tributaries

Separate reports follow on the following major tributaries.

Calder	Harvey	McLatchie
Couldrey	Middlepass	McEvoy
Burnham	29 Mile	Shepp
Kishinena	Cate	Parker
Sage	Pollock	Tribs #1-9
Howell	St. Eloi	Squaw
Cabin	Pincer	Commerce

(refer to maps I and II)

III TRIBUTARIES TO THE LOWER FLATHEAD

Calder
Couldrey
Frozen
Burnham
Cabin
Howell
29-Mile
Kishinena
Sage



STREAM INVENTORY PARAMETERS

NAME Calder DATE Aug. 31/75 REF.NO. _____
 Mo. Day Year

TEAM Caw and Gunville

TRIBUTARY TO Flathead River

SURVEY; TYPE road/walking; QUALITY baseline-fair MAP NO. 82G/SE

REACH entire drainage REF.NO. _____

LOCATION LAT: 48 59 00 LONG 114 28 30 OTHER MAPPING 82G/2
 Deg. Min. Sec. Deg. Min. Sec.

LENGTH (KM) 8 km. (est) LENGTH ACCESSIBLE TO 4.0 km. AVG. DEPTH AT _____
 MIGRANT FISH(KM) _____ AVG. WETTED WIDTH _____

ELEVATION RANGE 4300-6400' DRAINAGE AREA 20 sq. km. (est) T.D.S. (PPM) _____

WETTED WIDTH(AVG.) _____ ACTIVE BED WIDTH(AVG.) _____ ph _____
 RANGE _____ RANGE _____ O₂ (PPM) _____

FLOOD PLAIN WIDTH _____ DISCHARGE ;ACTUAL _____ ;RANGE _____

TIME/TEMP. °C AIR _____ COLOUR _____

TIME/TEMP. °C WATER _____ TURBIDITY _____

WEATHER CONDITIONS _____

CHECK LIST: X = RECORDED IN REPORT : N.R.= NOT RECORDED : N.N.= NOT NOTED

- | | |
|-----------------------------------|--|
| 1. <u>X</u> GENERAL DESCRIPTION | 13. <u>X</u> BANK AND HILLSIDE STABILITY |
| 2. <u>X</u> OVERALL PRODUCTIVITY | 14. <u>NN</u> GENERAL VEGETATION TYPE |
| 3. <u>X</u> GRADIENT-SUBSTRATE | 15. <u>NN</u> TRIBUTARIES |
| 4. <u>X</u> CHANNEL TYPE | 16. <u>X</u> LAND USE |
| 5. <u>X</u> FLOW PATTERN | 17. <u>X</u> ACCESS |
| 6. <u>X</u> POOL-RUN-RIFFLE RATIO | 18. <u>NN</u> POLLUTION SOURCES |
| 7. <u>X</u> OBSTRUCTIONS | 19. <u>X</u> RECREATIONAL POTENTIAL |
| 8. <u>X</u> STREAM COVER | 20. <u>NN</u> IMPROVEMENT POTENTIAL |
| 9. <u>X</u> FISH | 21. <u>NN</u> PROTECTION PROBLEMS |
| 10. <u>X</u> AQUATIC PLANTS | 22. <u>X</u> ADDITIONAL NOTES |
| 11. <u>X</u> INVERTEBRATES | 23. <u>NN</u> HISTORICAL INFORMATION |
| 12. <u>X</u> BANK MATERIAL | |

* Note if parameters are measured (MEAS) or estimated (EST) .

STREAM INVENTORY PARAMETERS

NAME Calder Creek DATE Aug. 31/75 REF.NO. _____
 Mo. Day Year

TEAM Caw and Gunville

TRIBUTARY TO Flathead River

SURVEY; TYPE road/walking; QUALITY baseline-fair MAP NO. 82G/SE

REACH mouth to lake Reach I REF.NO. _____

LOCATION LAT: _____ LONG _____ OTHER MAPPING 82G/2
 Deg. Min. Sec. Deg. Min. Sec.

LENGTH (KM) 4.0 km. LENGTH ACCESSIBLE TO 4.0 km. AVG. DEPTH AT 1.5 cm.
 MIGRANT FISH(KM) _____ AVG. WETTED WIDTH _____

ELEVATION RANGE _____ DRAINAGE AREA _____ T.D.S.(PPM) _____

WETTED WIDTH(AVG.) 2 ACTIVE BED WIDTH(AVG.) 3 ph _____
 RANGE 1-5 RANGE 2-6

FLOOD PLAIN WIDTH 15 m. DISCHARGE ;ACTUAL .113m³ / sec ;RANGE .1 → .425 m³ / sec
 O₂ (PPM) _____

TIME/TEMP. °C AIR 1400/24°C COLOUR light tannic

TIME/TEMP. °C WATER 1400/8°C TURBIDITY light

WEATHER CONDITIONS 5/10 overcast

CHECK LIST: X = RECORDED IN REPORT : N.R.= NOT RECORDED : N.N.= NOT NOTED

- | | |
|--------------------------------|---------------------------------------|
| 1. _____ GENERAL DESCRIPTION | 13. _____ BANK AND HILLSIDE STABILITY |
| 2. _____ OVERALL PRODUCTIVITY | 14. _____ GENERAL VEGETATION TYPE |
| 3. _____ GRADIENT-SUBSTRATE | 15. _____ TRIBUTARIES |
| 4. _____ CHANNEL TYPE | 16. _____ LAND USE |
| 5. _____ FLOW PATTERN | 17. _____ ACCESS |
| 6. _____ POOL-RUN-RIFFLE RATIO | 18. _____ POLLUTION SOURCES |
| 7. _____ OBSTRUCTIONS | 19. _____ RECREATIONAL POTENTIAL |
| 8. _____ STREAM COVER | 20. _____ IMPROVEMENT POTENTIAL |
| 9. _____ FISH | 21. _____ PROTECTION PROBLEMS |
| 10. _____ AQUATIC PLANTS | 22. _____ ADDITIONAL NOTES |
| 11. _____ INVERTEBRATES | 23. _____ HISTORICAL INFORMATION |
| 12. _____ BANK MATERIAL | |

* Note if parameters are measured (MEAS) or estimated (EST) .

STREAM INVENTORY PARAMETERS

NAME Calder Creek DATE Aug. 31/75 REF.NO. _____

Mo. Day Year

TEAM Caw and Gunville

TRIBUTARY TO Flathead River

SURVEY; TYPE *road/walking; QUALITY baseline-fair MAP NO. 82G/SE

REACH lake to end Reach II REF.NO. _____

LOCATION LAT: _____ LONG _____ OTHER MAPPING 82G/2
Deg. Min. Sec. Deg. Min. Sec.

LENGTH (KM) 4.0 LENGTH ACCESSIBLE TO _____ AVG. DEPTH AT 10 cm.
MIGRANT FISH (KM) _____ AVG. WETTED WIDTH _____

ELEVATION RANGE _____ DRAINAGE AREA _____ T.D.S. (PPM) _____

WETTED WIDTH (AVG.) 2 m. ACTIVE BED WIDTH (AVG.) 3 m. ph _____
RANGE 1-3 m. RANGE 2-4 m.

O₂ (PPM) _____

FLOOD PLAIN WIDTH 10 m. DISCHARGE ; ACTUAL .014m³/sec RANGE 0.0 → 2.8
(0.5 CFS)

TIME/TEMP. °C AIR 1300/6°C COLOUR light tannic

TIME/TEMP. °C WATER 1300/6°C TURBIDITY light

WEATHER CONDITIONS 5/10 overcast

CHECK LIST: X = RECORDED IN REPORT : N.R.= NOT RECORDED : N.N.= NOT NOTED

- | | |
|--------------------------------|---------------------------------------|
| 1. _____ GENERAL DESCRIPTION | 13. _____ BANK AND HILLSIDE STABILITY |
| 2. _____ OVERALL PRODUCTIVITY | 14. _____ GENERAL VEGETATION TYPE |
| 3. _____ GRADIENT-SUBSTRATE | 15. _____ TRIBUTARIES |
| 4. _____ CHANNEL TYPE | 16. _____ LAND USE |
| 5. _____ FLOW PATTERN | 17. _____ ACCESS |
| 6. _____ POOL-RUN-RIFFLE RATIO | 18. _____ POLLUTION SOURCES |
| 7. _____ OBSTRUCTIONS | 19. _____ RECREATIONAL POTENTIAL |
| 8. _____ STREAM COVER | 20. _____ IMPROVEMENT POTENTIAL |
| 9. _____ FISH | 21. _____ PROTECTION PROBLEMS |
| 10. _____ AQUATIC PLANTS | 22. _____ ADDITIONAL NOTES |
| 11. _____ INVERTEBRATES | 23. _____ HISTORICAL INFORMATION |
| 12. _____ BANK MATERIAL | |

* Note if parameters are measured (MEAS) or estimated (EST) .

Calder Creek

General Description - Overall Productivity

Calder Creek, according to the mapping of this area is comprised of two components. One is the inlet to a small lake, the other being the outlet, which flows across the 49th parallel into the Flathead (see map III)

Reach II, i.e. the inlet, is a moderate to steep gradient, low volume transport stream.

Overall productivity of this inlet is rated as very low on the basis of low discharge and poor water quality. Siltation and stagnation were active processes at the time of the survey.

The small lake may be considered a stream reach, but will not be considered so in this report. It is a shallow pan, doubtlessly unable to overwinter a fish population.

Reach I, i.e. the outlet stream, although sharing some of the poor water quality associated with reach II, had a larger discharge (10 X) which was able to "cleanse" the channel somewhat. Although a low potential spawning stream, rearing potential was relatively high. Rearing cutthroat trout were found in this section. Overall productivity of the outlet is rated as fair, on the basis of good rearing habitat and abundant food items.

Gradient - Substrate

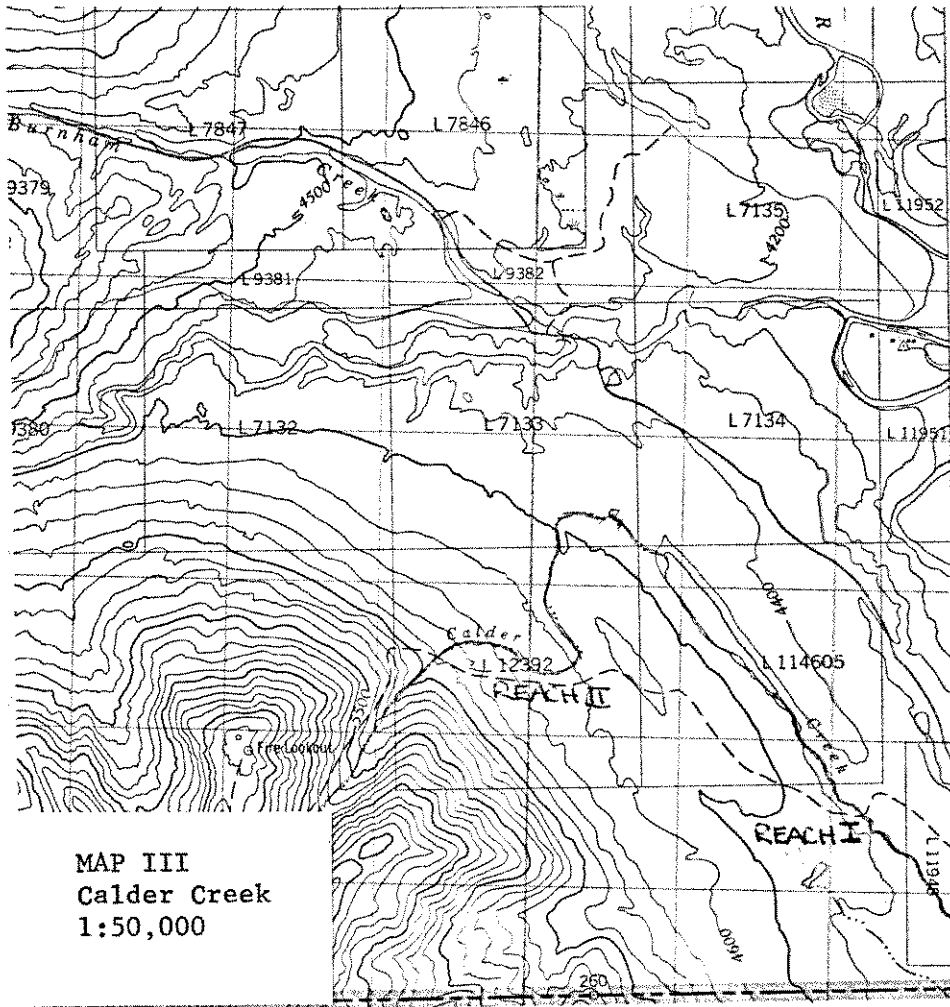
Reach II averaged 3-4% gradient, 2-3 km. above the lake. Substrate averaged

30% small gravel ,

30% large gravel

40% sand/silt

with isolated mud bottom pools.



Reach I was a low gradient (1-2%) stream with a similar substrate average composition.

Channel Type

Channel type is extremely variable. Debris jams, cut banks, side and back channels are common in both reaches. The side and back waters of reach I provide good rearing habitat, especially amongst associated debris buildups.

Flow Pattern - Pool-Run-Riffle Ratio

The pool-run-riffle terminology is not applicable to the low discharge of reach II. Reach I, characterized by placid to swirling flow, had up to 40% pool in most sections.

Obstructions

Abundant partial barriers by debris jams.

Stream Cover

Thick underbrush and surrounding forest provided 5/10 - 8/10 stream cover over most of both reaches.

Fish

I There are no fish in the lake inlet.

II The outlet supports a rearing population of cutthroat trout.

Electroshocking of a 50 m. section of backwaters and debris built pools yielded

Yellowstone Cutthroat	sizes (cm.)
	4.5 (X 2)
	6.5
	8.5
	11.5

Aquatic Plants

Abundant grasses in and surrounding larger pools.

Invertebrates

Relative high abundance of aquatics and terrestrials.

Bank Material - Bank and Hillside Stability

Banks not steep, but unconsolidated materials are contributing a lot of silt and mud to the system.

Land Use

None.

Access

Road leading to Forest Service lookout follows part of upper Calder.

(reach II)

Recreational Potential

Low.

Additional Notes

Reach I, the lake outlet, is referred to by a few locals as Coates Creek. The lake has been called 3-Mile Lake.

-39-
STREAM INVENTORY PARAMETERS

NAME Couldrey Creek DATE Aug. 19/75 REF. NO. _____
Mo. Day Year

TEAM Ball and Cav

TRIBUTARY TO Flathead River

SURVEY; TYPE road/walking; QUALITY good MAP NO. 82G/SE

REACH entire drainage REF. NO. _____

LOCATION LAT: 49 02 00 LONG 114 30 30 OTHER MAPPING 82G/2 (1:50,000)
Deg. Min. Sec. Deg. Min. Sec. Fernie P.S.Y.U. 82-G-2-a

LENGTH (KM) 20.0 LENGTH ACCESSIBLE TO 10.0 AVG. DEPTH AT _____
MIGRANT FISH(KM) _____ AVG. WETTED WIDTH _____

ELEVATION RANGE 3800' - 5000' DRAINAGE AREA 136 sq. km. T.D.S.(PPM) _____

WETTED WIDTH(AVG.) _____ ACTIVE BED WIDTH(AVG.) _____ ph _____
RANGE _____ RANGE _____ O₂ (PPM) _____

FLOOD PLAIN WIDTH _____ DISCHARGE ;ACTUAL _____ ;RANGE _____

TIME/TEMP. °C AIR _____ COLOUR _____

TIME/TEMP. °C WATER _____ TURBIDITY _____

WEATHER CONDITIONS _____

CHECK LIST: X = RECORDED IN REPORT : N.R.= NOT RECORDED : N.N.= NOT NOTED

- | | |
|-----------------------------------|--|
| 1. <u>X</u> GENERAL DESCRIPTION | 13. <u>X</u> BANK AND HILLSIDE STABILITY |
| 2. <u>X</u> OVERALL PRODUCTIVITY | 14. <u>X</u> GENERAL VEGETATION TYPE |
| 3. <u>X</u> GRADIENT-SUBSTRATE | 15. <u>X</u> TRIBUTARIES |
| 4. <u>X</u> CHANNEL TYPE | 16. <u>X</u> LAND USE |
| 5. <u>X</u> FLOW PATTERN | 17. <u>X</u> ACCESS |
| 6. <u>X</u> POOL-RUN-RIFFLE RATIO | 18. <u>X</u> POLLUTION SOURCES |
| 7. <u>X</u> OBSTRUCTIONS | 19. <u>X</u> RECREATIONAL POTENTIAL |
| 8. <u>X</u> STREAM COVER | 20. <u>NR</u> IMPROVEMENT POTENTIAL |
| 9. <u>X</u> FISH | 21. <u>NR</u> PROTECTION PROBLEMS |
| 10. <u>X</u> AQUATIC PLANTS | 22. <u>NR</u> ADDITIONAL NOTES |
| 11. <u>X</u> INVERTEBRATES | 23. <u>NR</u> HISTORICAL INFORMATION |
| 12. <u>X</u> BANK MATERIAL | |

* Note if parameters are measured (MEAS) or estimated (EST) .

STREAM INVENTORY PARAMETERS

NAME Couldrey Creek DATE Aug. 19/75 REF.NO. _____
Mo. Day Year
TEAM Ball and Caw
TRIBUTARY TO Flathead River
SURVEY; TYPE walking; QUALITY good MAP NO. 82G/SE
REACH mouth to 4.25 km. Reach I REF.NO. _____
LOCATION LAT: _____ LONG _____ OTHER MAPPING 82G/2 (1:50,000)
Deg. Min. Sec. Deg. Min. Sec.
LENGTH (KM) 4.25 km. LENGTH ACCESSIBLE TO 4.25 km. AVG. DEPTH AT 50 cm.
MIGRANT FISH (KM) _____ AVG. WETTED WIDTH _____
ELEVATION RANGE _____ DRAINAGE AREA _____ T.D.S. (PPM) _____
WETTED WIDTH (AVG.) 5 m. ACTIVE BED WIDTH (AVG.) 10 m. ph _____
RANGE 5.0 - 12.0 RANGE 8-12 m. O₂ (PPM) _____
FLOOD PLAIN WIDTH 10-20 m. DISCHARGE ; ACTUAL 1.12m³/sec. ; RANGE .28 - 3.0 /m³/sec
TIME/TEMP. °C AIR 1200 18° C COLOUR clear
TIME/TEMP. °C WATER 1200 10.5° C TURBIDITY clear
WEATHER CONDITIONS overcast

CHECK LIST: X = RECORDED IN REPORT : N.R.= NOT RECORDED : N.N.= NOT NOTED

- | | |
|--------------------------------|---------------------------------------|
| 1. _____ GENERAL DESCRIPTION | 13. _____ BANK AND HILLSIDE STABILITY |
| 2. _____ OVERALL PRODUCTIVITY | 14. _____ GENERAL VEGETATION TYPE |
| 3. _____ GRADIENT-SUBSTRATE | 15. _____ TRIBUTARIES |
| 4. _____ CHANNEL TYPE | 16. _____ LAND USE |
| 5. _____ FLOW PATTERN | 17. _____ ACCESS |
| 6. _____ POOL-RUN-RIFFLE RATIO | 18. _____ POLLUTION SOURCES |
| 7. _____ OBSTRUCTIONS | 19. _____ RECREATIONAL POTENTIAL |
| 8. _____ STREAM COVER | 20. _____ IMPROVEMENT POTENTIAL |
| 9. _____ FISH | 21. _____ PROTECTION PROBLEMS |
| 10. _____ AQUATIC PLANTS | 22. _____ ADDITIONAL NOTES |
| 11. _____ INVERTEBRATES | 23. _____ HISTORICAL INFORMATION |
| 12. _____ BANK MATERIAL | |

* Note if parameters are measured (MEAS) or estimated (EST) .

STREAM INVENTORY PARAMETERS

NAME Couldrey Creek DATE Aug. 19/75 REF. NO. _____
Mo. Day Year

TEAM Ball and Caw

TRIBUTARY TO Flathead River

SURVEY; TYPE road/*walking; QUALITY good MAP NO. 82G/SE

REACH 4.25 km. to falls (approximately mo. of Frozen Creek) REF. NO. _____

LOCATION LAT: _____ LONG _____ OTHER MAPPING 82G/2
Deg. Min. Sec. Deg. Min. Sec. Fernie P.S.Y.U. 82-G-2-a

LENGTH (KM) 6.0 LENGTH ACCESSIBLE TO 6.0 AVG. DEPTH AT 30-48 cm.
MIGRANT FISH(KM) _____ AVG. WETTED WIDTH _____

ELEVATION RANGE 4100' - 4500' DRAINAGE AREA _____ T.D.S.(PPM) _____

WETTED WIDTH(AVG.) 6.5 m. ACTIVE BED WIDTH(AVG.) 12.0m. ph _____
RANGE 5.0 - 12.0 m. RANGE 9.0 - 15.0 m

FLOOD PLAIN WIDTH 10-25 m. DISCHARGE ;ACTUAL 1.12m³/sec O₂ (PPM) _____
RANGE .28 - 3.0 m³/sec

TIME/TEMP. °C AIR 1200/18.0°C COLOUR none

TIME/TEMP. °C WATER 1200/10.5°C TURBIDITY cleary to very light

WEATHER CONDITIONS overcast

CHECK LIST: X = RECORDED IN REPORT : N.R.= NOT RECORDED : N.N.= NOT NOTED

- | | |
|--------------------------------|---------------------------------------|
| 1. _____ GENERAL DESCRIPTION | 13. _____ BANK AND HILLSIDE STABILITY |
| 2. _____ OVERALL PRODUCTIVITY | 14. _____ GENERAL VEGETATION TYPE |
| 3. _____ GRADIENT-SUBSTRATE | 15. _____ TRIBUTARIES |
| 4. _____ CHANNEL TYPE | 16. _____ LAND USE |
| 5. _____ FLOW PATTERN | 17. _____ ACCESS |
| 6. _____ POOL-RUN-RIFFLE RATIO | 18. _____ POLLUTION SOURCES |
| 7. _____ OBSTRUCTIONS | 19. _____ RECREATIONAL POTENTIAL |
| 8. _____ STREAM COVER | 20. _____ IMPROVEMENT POTENTIAL |
| 9. _____ FISH | 21. _____ PROTECTION PROBLEMS |
| 10. _____ AQUATIC PLANTS | 22. _____ ADDITIONAL NOTES |
| 11. _____ INVERTEBRATES | 23. _____ HISTORICAL INFORMATION |
| 12. _____ BANK MATERIAL | |

* Note if parameters are measured (MEAS) or estimated (EST) .

STREAM INVENTORY PARAMETERS

NAME Couldrey Creek DATE Aug. 19/75 REF.NO. _____
 Mo. Day Year

TEAM Ball and Caw

TRIBUTARY TO Flathead River

SURVEY; TYPE road/*walking; QUALITY good MAP NO. 82G/SE

REACH above falls Reach III REF.NO. _____

LOCATION LAT: _____ LONG _____ OTHER MAPPING 82G/2
 Deg. Min. Sec. Deg. Min. Sec. Fernie P.S.Y.U. 82-G-2-a

LENGTH (KM) 8.0 km. LENGTH ACCESSIBLE TO 0.0 AVG. DEPTH AT .15 m.
 MIGRANT FISH(KM) _____ AVG. WETTED WIDTH _____

ELEVATION RANGE 4500' - 5000' DRAINAGE AREA _____ T.D.S.(PPM) _____

WETTED WIDTH(AVG.) 4.56m. ACTIVE BED WIDTH(AVG.) 7.62 ph _____
 RANGE 1.83 - 7.62 RANGE 3.05 - 12.2 O₂ (PPM) _____

FLOOD PLAIN WIDTH 0-300m. DISCHARGE ;ACTUAL 0.34m³/sec;RANGE 0.14 - 0.84 m³/sec

TIME/TEMP,°C AIR 1000/17.0°C COLOUR none

TIME/TEMP,°C WATER 1000/ 8.5°C TURBIDITY clear to very light

WEATHER CONDITIONS overcast

CHECK LIST: X = RECORDED IN REPORT : N.R.= NOT RECORDED : N.N.= NOT NOTED

- | | |
|--------------------------------|---------------------------------------|
| 1. _____ GENERAL DESCRIPTION | 13. _____ BANK AND HILLSIDE STABILITY |
| 2. _____ OVERALL PRODUCTIVITY | 14. _____ GENERAL VEGETATION TYPE |
| 3. _____ GRADIENT-SUBSTRATE | 15. _____ TRIBUTARIES |
| 4. _____ CHANNEL TYPE | 16. _____ LAND USE |
| 5. _____ FLOW PATTERN | 17. _____ ACCESS |
| 6. _____ POOL-RUN-RIFFLE RATIO | 18. _____ POLLUTION SOURCES |
| 7. _____ OBSTRUCTIONS | 19. _____ RECREATIONAL POTENTIAL |
| 8. _____ STREAM COVER | 20. _____ IMPROVEMENT POTENTIAL |
| 9. _____ FISH | 21. _____ PROTECTION PROBLEMS |
| 10. _____ AQUATIC PLANTS | 22. _____ ADDITIONAL NOTES |
| 11. _____ INVERTEBRATES | 23. _____ HISTORICAL INFORMATION |
| 12. _____ BANK MATERIAL | |

* Note if parameters are measured (MEAS) or estimated (EST) .

Couldrey Creek

General Description - Overall Productivity

A clean, clear, moderately fast flowing stream, Couldrey Creek provides many combinations of both rearing and spawning type habitat through variation in gradient, substrate and channel size/form.

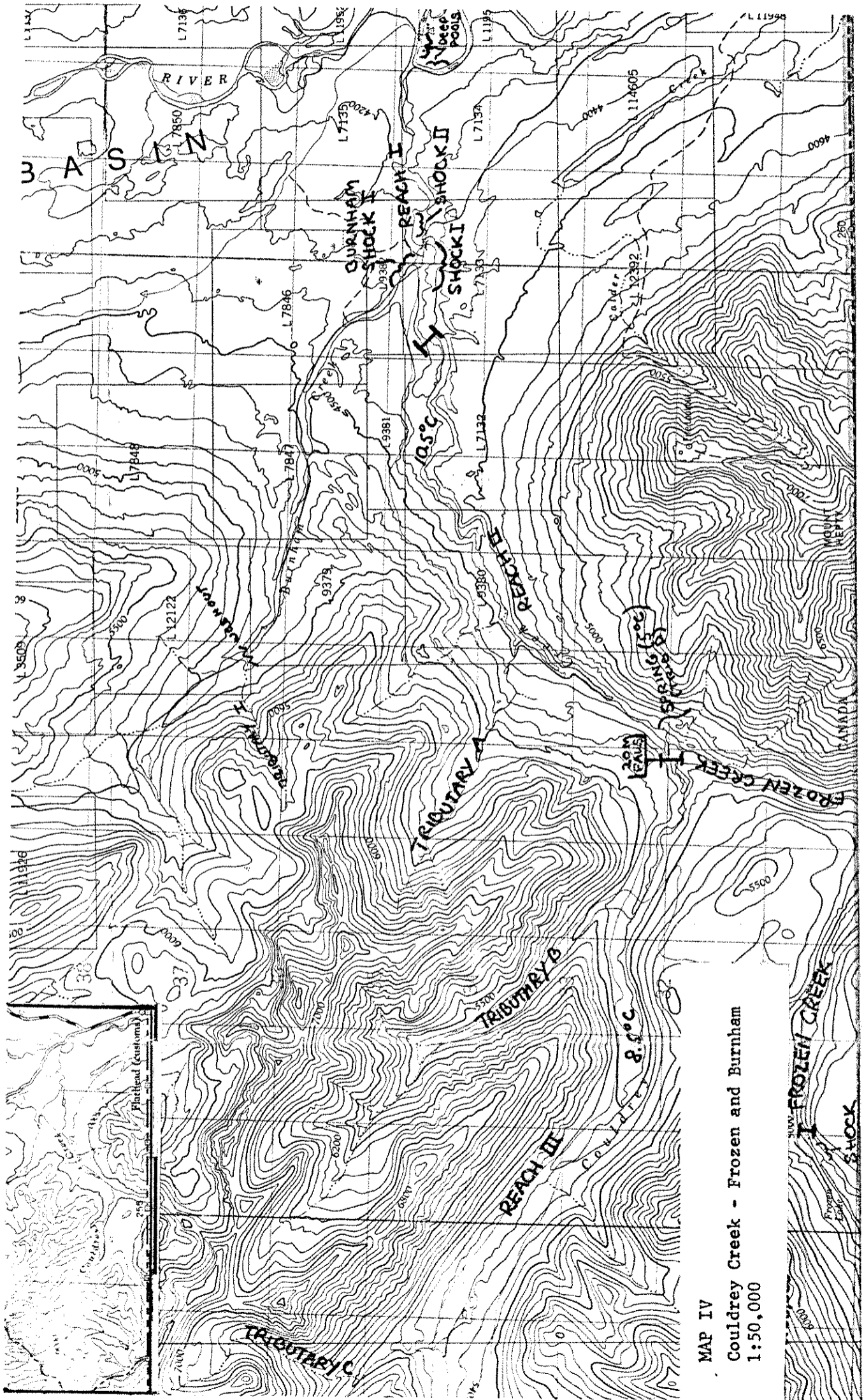
From a steep uniform run at the mouth the stream quickly changes to a wide channelized area until entering a wide steep flatbottom canyon where the channel narrows to a somewhat more confined state, finally reaching a 12.0 meter falls $\frac{1}{2}$ km. above the mouth of the Frozen Lake outlet. (see picture 6) This falls is a total barrier to fish on the mainstem of Couldrey, but fish may continue further from the Flathead by route of Frozen Creek, outlet to Frozen Lake (refer to map IV)

Overall productivity is rated as excellent, with both spawning and rearing potential being very high. Water quality is doubtlessly enhanced by such factors as drainage from Frozen Lake and a high TDS spring at the mouth of Frozen Creek. (high TDS indicated by mineral deposits bedrock channel and taste)

Gradient - Substrate

3-3.5% at mouth quickly dropping to a 1.0 - 2.0% average over the first 4.0 km. Gradient picks up through the canyon to a 2.5% average over the 6.25 km. to the falls. The 2.5% average observed below the falls, resumes above.

The smooth, moderately compacted substrate in reach



MAP IV
Couldrey Creek - Frozen and Burnham
1:50,000

I is excellent spawning material and proved to be good rearing/holding material for Dolly Varden.

Average % composition - Reach I

20% small gravel

25% large gravel

25% small rubble

20% large rubble

5% coarse sand

5% boulder

We observe a shift to a higher percentage coarser as we enter reach II.

10% small gravel

15% large gravel

30% small rubble

30% large rubble

5% coarse sand

10% boulder

Bedrock becomes predominant from the mouth of Frozen Creek .5 km. upstream to the falls. Above the falls there is a short (20 m.), narrow bedrock channel followed by reach II type substrate above. The headwaters are up to 60% a coarse sand/silt/clay composite the rest consisting of the small gravel to small rubble classes.

Stream Channel

The lower reach is characteristically a single thread with extensive braiding in the wider areas (see map IV) Many areas are reasonably well confined, with bar-built side and back channels in curved portion. Banks are not cut, bottom varying from a regular to partially irregular in wider stretches. Once into the canyon (reach II) the stream is a regular uncut channel with bars still relatively prevalent. Channel is quite well confined above the falls.

Flow Pattern - Pool-Run-Riffle

Flow is 90% swirling over the entire stream with turbulence increasing upstream through the canyon and reaching a peak below the falls.

Holding/rearing type habitat is optimal in reach I averaging

pool 20%

run 60%

riffle 20%

with pool dropping to < 10% above.

Obstructions

12 m. falls $\frac{1}{2}$ km. upstream from Frozen Creek mouth. Estimate 15-meters high i.e. definite barrier - see map IV and picture 6.

Fish

Fly fishing sample from shock area to mouth, at Flathead, yielded 5 yellowstone cutthroat in the 20-25 cm. size range. One scale sample taken 25 cm.

Electroshocker sample -

I August 19 - upstream of Flathead Road bridge

<u>Dolly Varden</u>	<u>Cutthroat</u>
15.5 cm. (all imm)	12.0 cm. maturing
12.5 cm.	3.0 cm.
10.5 cm.	
9.5 cm.	
5.5 cm.	
4.5 cm.	

II August 20 - downstream of Flathead Road bridge

<u>Dolly Varden</u>	
13.5 cm. (imm)	
6.0 cm.	
5.0 cm.	
4.75 cm.	(refer to map IV)

Both species showed an equally wide size distribution in the electroshocker sampling. Angling samples yielded only cutthroat, indicative of difficulty in catching Dolly Varden with a fly. Dolly Varden appear to be most abundant, and their use of Couldrey Creek as a spawning rearing area makes it one of the most important tributaries to the upper Flathead. At the mouth of Couldrey Creek on the Flathead, is a series of deep pools referred to as the "Licks". This area is a famous fishing area for large migratory Dolly Varden. The slimy sculpin was also abundant in lower Couldrey Creek. One was discovered in the gut of a 15.0 cm. Dolly Varden.

There were no fish above the falls.



Picture #6 - 12 m. falls on mainstem Couldrey Creek, approximately $\frac{1}{2}$ km.
above mouth of Frozen Creek (map IV)

Aquatic Plants -

None.

Invertebrates

Side and back channels are rich in aquatic invertebrates. Gut analysis of fish sample showed terrestrial invertebrates such as ants and small beetles are an important food item.

Bank Material - Bank and Hillside Stability

Banks average

60% sand/gravel

40% glacial till

with a medium texture soil.

Banks are stable throughout reach I with some slumping off canyon walls in reach II. Considering the high slope in this canyon, slumping and soil movement is generally negligible. In most cases the flow is protected by the canyons flat bottom in which the stream runs.

General Vegetation Type

Throughout reach I there is a high percentage scrub willow and coniferous. Reach II is largely coniferous with some cotton wood and long pine ridges.

Tributaries

1. Burham Creek - separate report
2. Frozen Creek - separate report
3. Tributary A. - see map IV - steep, low discharge

4. Tributary B & C - B-8.0°C C-5.5°C - both steep, low discharge, no fish. (Only flow in tributary B and C above falls on same side as tributary A).
5. Tributary D - .14m³/sec (5CFS) spring fed stream. Water is upwelling from bedrock 100 m. from mouth. Cold and clear it is not important for spawning rearing etc. but inorganic deposits suggest a contribution to water quality (inorganic nutrients).

Land Use

Logged area present at headwaters.

Access

Excellent road access to washout at tributary C, on Couldrey Creek Road.

Recreational Potential

An excellent sport fishery at mouth of Couldrey and cutthroat to the falls. Forest service campsites located near mouth of Burnham Creek and at Frozen Lake. A hunting/ trapping cabin is located near tributary B on Couldrey Creek.

-51-
STREAM INVENTORY PARAMETERS

NAME Frozen Lake Outlet DATE Aug. 27/75 REF.NO. _____
 Mo. Day Year

TEAM Ball, Caw, Gunville, Sebastian

TRIBUTARY TO Couldrey Creek Flathead River

SURVEY; TYPE walking baseline; QUALITY good MAP NO. 82G/SE

REACH whole stream REF.NO. _____

LOCATION LAT: 49 01 00 LONG 114 36 25 OTHER MAPPING 82G/2 11:50,000
 Deg. Min. Sec. Deg. Min. Sec.

LENGTH (KM) 7.0 LENGTH ACCESSIBLE TO 7.0 AVG. DEPTH AT .3048 m.
 MIGRANT FISH(KM) AVG. WETTED WIDTH

ELEVATION RANGE 4500'-5000' DRAINAGE AREA 9 sq. km. T.D.S.(PPM) _____

WETTED WIDTH(AVG.) 6.5 m. ACTIVE BED WIDTH(AVG.) 7.6 ph _____
 RANGE 3-9 m. RANGE 6-12 m. O₂ (PPM) _____

FLOOD PLAIN WIDTH 20-50 m. DISCHARGE ;ACTUAL .7m³/sec ;RANGE .28 - 1.2 m³/sec

TIME/TEMP, °C AIR 1400/25°C COLOUR none
 (lake)

TIME/TEMP, °C WATER 1400/11.0°C (13.5 at TURBIDITY clear

WEATHER CONDITIONS sunny and clear

CHECK LIST: X = RECORDED IN REPORT : N.R.= NOT RECORDED : N.N.= NOT NOTED

- | | |
|-----------------------------------|--|
| 1. <u>X</u> GENERAL DESCRIPTION | 13. <u>X</u> BANK AND HILLSIDE STABILITY |
| 2. <u>X</u> OVERALL PRODUCTIVITY | 14. <u>X</u> GENERAL VEGETATION TYPE |
| 3. <u>X</u> GRADIENT-SUBSTRATE | 15. <u>X</u> TRIBUTARIES |
| 4. <u>X</u> CHANNEL TYPE | 16. <u>X</u> LAND USE |
| 5. <u>X</u> FLOW PATTERN | 17. <u>X</u> ACCESS |
| 6. <u>X</u> POOL-RUN-RIFFLE RATIO | 18. <u>NR</u> POLLUTION SOURCES |
| 7. <u>X</u> OBSTRUCTIONS | 19. <u>X</u> RECREATIONAL POTENTIAL |
| 8. <u>X</u> STREAM COVER | 20. <u>NN</u> IMPROVEMENT POTENTIAL |
| 9. <u>X</u> FISH | 21. <u>X</u> PROTECTION PROBLEMS |
| 10. <u>NN</u> AQUATIC PLANTS | 22. <u>NR</u> ADDITIONAL NOTES |
| 11. <u>X</u> INVERTEBRATES | 23. <u>NR</u> HISTORICAL INFORMATION |
| 12. <u>X</u> BANK MATERIAL | |

* Note if parameters are measured (MEAS) or estimated (EST) .

Frozen Lake Outlet

A clear, clean fast flowing lake fed stream, Frozen Creek is limited in its lack of rearing/holding type habitat. Although moderately sloped (2-3%), overall pooling is less than 5%. From the lake, downstream approximately 1 km., a large population of both mature and immature Dolly Varden and yellow-stone cutthroat is supported by environmental qualities derived from the lake, and a high% rearing/holding type habitat associated with this lower slope area.

Overall productivity of Frozen Creek is poor, but this judgement is made ignoring an obvious fisheries enhancement by the lake source. Frozen Lake supports a large population of Dolly Varden and Cutthroat, but it is not known how important Frozen Creek is to this population. It appears that Upper Frozen Creek, adjacent to the lake, is an important spawning location for lake resident fish, but a lack of habitat makes the lower 6.0 km. quite unproductive. The fact that the lake is fully accessible from Couldrey Creek, a major migrant Dolly Varden stream, might suggest that Frozen Creek is a migration route, or important for spawning as the substrate is quite suitable. At this time we cannot assess the importance of a comparatively poor fry rearing situation in the lower 6.0 km. of this stream.

A short section of Frozen Creek passes through Northern Montana.

Gradient Substrate

Gradient averages 2½% with a variation from 1½% at lake to 3%. Substrate size distribution is quite constant at estimated

- 10% small gravel
- 30% large gravel
- 40% small rubble
- 20% large rubble
- 5% boulder

with an increase in the % fines (especially coarse sand) adjacent to the lake.

Substrate is consistantly moderately compacted with a degree of angularity in some sections.

Channel Type

Single-thread confined for most of stream. Some minor braiding in low grade sections, but generally regular with intermittent one side cutting. Minor log jams 2.5 - 4.0 km. from lake with some adjacent to lake, enhancing fry habitat in this extremely productive section.

Flow Pattern - Pool-Run-Riffle Ratio

Uniform swirling	(see picture 7 - typical)
pool	5%
run	70%
riffle	20%

Obstructions

Some minor log jams but no barriers.

Stream Cover

Predominantly alder and scrub willow. Cover up to 10%. Some overhanging shrub. (see picture 7 and 8)

Fish

None taken by angling.

Shocking sample adjacent to lake (see map IV)

Dolly Varden

Yellowstone Cutthroat

10.5 cm.

5.0 cm.

11.5 cm.

7.0 cm.

12.5 cm.

8.5 cm.

16.5 cm. - imm ♂

13.0 cm.

18.0 cm. - imm ♂

plus 2 D.V. > 35 cm. (estimated fish escaped)

The shocking sample raised questions as to whether we were observing a migrant stream population or a lake resident population. The latter seems more probable on the basis of male cutthroat sexual immaturity, generally a rare occurrence in the Flathead drainage at time of survey.

Invertebrates

Abundant aquatics present.

Bank Material - Bank and Hillside Stability

Banks are largely a clay/gravel composite with upland soils being glacial till. There are some short bedrock areas. (see picture 8)

The bank/hillside type is generally quite steep, as shown in the top right corner of picture I. Although steep, they are quite stable because of vegetative colonization and some bedrock reinforcement. (see picture 8)

General Vegetation Type

Picture 7 illustrates the two major vegetation types found along Frozen Creek i.e., variation from

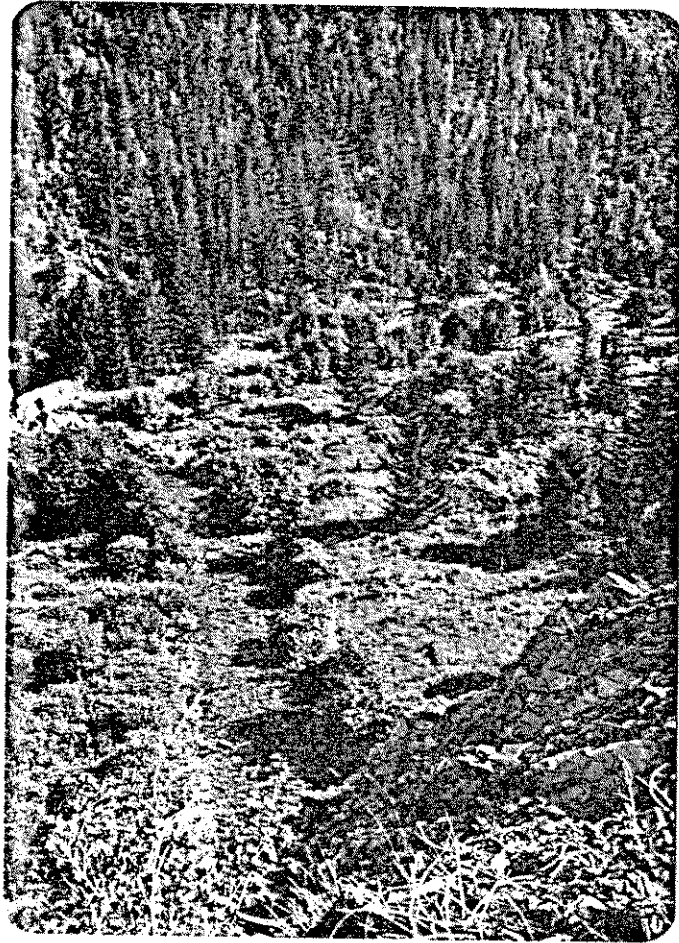
60% grass	< 10% grass
25% shrub	to 15% shrub
10% coniferous	50% coniferous tree
5% deciduous	25% deciduous tree

Tributaries

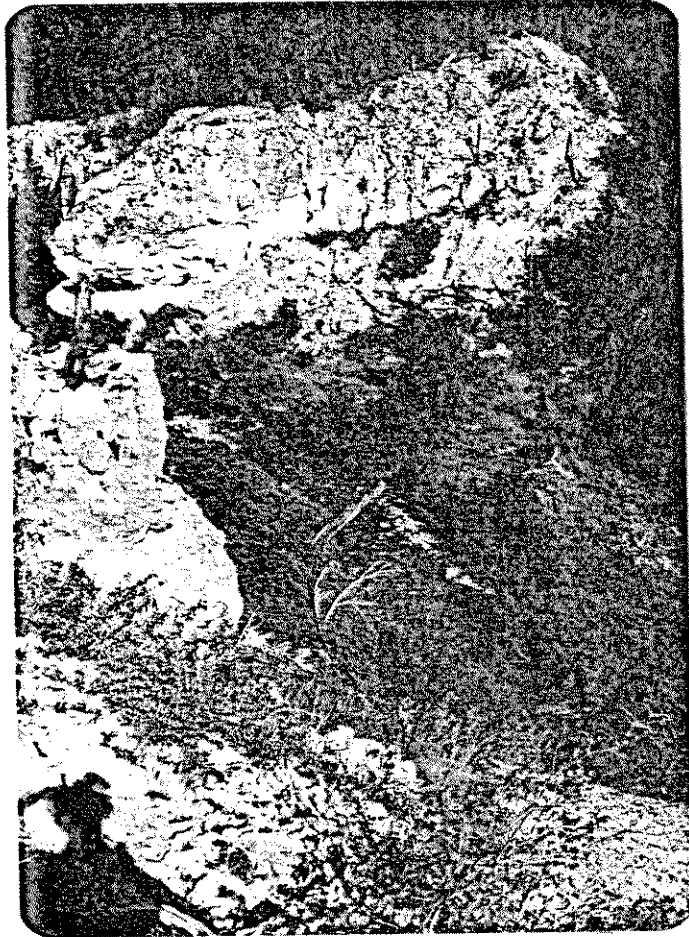
No significant tributaries. A 5 CFS tributary on Montana side has 60' falls over bedrock.

Land Use

Patch logging occurring on Montana side, with no associated problems.



Picture 7 - Typical section of Frozen Creek - illustrating grassy shrub covered undercut banks and typical flow pattern.



Picture 8 - Bedrock section below picture 7 - illustrating high % run type flow and high % rubble substrate composition.

Hunting/fishing utilization of lake area is high.

Access

An off-shoot of Couldrey Creek Road crosses Couldrey Creek and leads directly to Frozen Lake.

Recreational Potential

High recreational potential, with new B.C. Forest Service campsite at lake. Frozen Lake is known for it's good fishing and the abundance of game, in the surrounding hills.

Protection Problems

No land use problems below lake as access is only by hard walking.

STREAM INVENTORY PARAMETERS

NAME Burnham Creek DATE Aug. 26/75 REF. NO. _____
Mo. Day Year

TEAM Ball and Caw

TRIBUTARY TO Couldrey Creek → Flathead River

SURVEY; TYPE walking/baseline; QUALITY good MAP NO. 82G/SE

REACH whole stream REF. NO. _____

LOCATION LAT: 49 02 30 LONG 114 32 00 OTHER MAPPING 82G/2 (1:50,000)
Deg. Min. Sec. Deg. Min. Sec.

LENGTH (KM) 7.5 km. LENGTH ACCESSIBLE TO 5.0 AVG. DEPTH AT 15.25 cm.
MIGRANT FISH (KM) _____ AVG. WETTED WIDTH _____

ELEVATION RANGE 4200'-5500' DRAINAGE AREA 18 km.² T.D.S. (PPM) _____

WETTED WIDTH (AVG.) 3.0 m. ACTIVE BED WIDTH (AVG.) 6.1 m ph _____
RANGE 1.83 - 6.5 m. RANGE 4.6 - 9.2

O₂ (PPM) _____

FLOOD PLAIN WIDTH 50-100 m. DISCHARGE ; ACTUAL .25m³/sec; RANGE .11-.85m³/sec.

TIME/TEMP. °C AIR 1200/20.5°C COLOUR slight tannic

TIME/TEMP. °C WATER 1200/10.5 - 12.5°C TURBIDITY clear to light siltation

WEATHER CONDITIONS _____

CHECK LIST: X = RECORDED IN REPORT : N.R.= NOT RECORDED : N.N.= NOT NOTED

- | | |
|-----------------------------------|--|
| 1. <u>X</u> GENERAL DESCRIPTION | 13. <u>X</u> BANK AND HILLSIDE STABILITY |
| 2. <u>X</u> OVERALL PRODUCTIVITY | 14. <u>NR</u> GENERAL VEGETATION TYPE |
| 3. <u>X</u> GRADIENT-SUBSTRATE | 15. <u>X</u> TRIBUTARIES |
| 4. <u>X</u> CHANNEL TYPE | 16. <u>X</u> LAND USE |
| 5. <u>X</u> FLOW PATTERN | 17. <u>X</u> ACCESS |
| 6. <u>X</u> POOL-RUN-RIFFLE RATIO | 18. <u>X</u> POLLUTION SOURCES |
| 7. <u>X</u> OBSTRUCTIONS | 19. <u>X</u> RECREATIONAL POTENTIAL |
| 8. <u>X</u> STREAM COVER | 20. <u>NR</u> IMPROVEMENT POTENTIAL |
| 9. <u>X</u> FISH | 21. <u>X</u> PROTECTION PROBLEMS |
| 10. <u>X</u> AQUATIC PLANTS | 22. <u>NR</u> ADDITIONAL NOTES |
| 11. <u>X</u> INVERTEBRATES | 23. <u>X</u> HISTORICAL INFORMATION |
| 12. <u>X</u> BANK MATERIAL | |

* Note if parameters are measured (MEAS) or estimated (EST) .

Burnham Creek

General Description - Overall Productivity

Burnham Creek is a moderately sloped stream, entering Couldrey Creek at a point where rearing fish were found to be particularly abundant. The lower 2 km. of Burnham was found to support an equally high rearing population; proportionate to the adjacent section of Couldrey Creek.

The lower 2 km. of Burnham Creek is characterized by a uniform pool/riffle sequence, enhanced by adequate coarse to large substrate, providing more than adequate fry habitat. The upper 3-4 km. steepens as it approaches a vast unstable clear cut section.

Overall productivity is rated as good for rearing/holding and fair for spawning. (refer to map IV)

Gradient-Substrate

Both gradient and substrate are relatively constant over the entire stream. Substrate averages

- 10% boulder
- 25% small rubble
- 25% large rubble
- 15% large gravel
- 15% small gravel
- 10% coarse sand

Coarse sand is more prevalent in the headwaters and in a section upstream of the mouth; as well as occasional isolated pockets of finer material. A narrow short (50 m.) 90% bedrock channel was observed approximately 3 km.

from mouth. Boulder/large rubble increase was noted above this area. Substrate

is smooth and moderate in compaction.

Gradient averages 2-3% with a wider range (up to 4%) above the bedrock area and a large increase into the slash/headwaters area.

A washout approximately 3 km. from mouth is indicative of high runoff flow.

Stream Channel

Straight, single thread is regular in most sections, and generally well confined over the entire area.

Some exposed bars in slightly curved, lower gradient sections. Little side channeling present, with some back channeling associated with chutes and some cutting of banks between the 2 and 4 km. points.

Flow Pattern - Pool/Run/Riffle Ratio

Flow is a uniform running swirl with no turbulent surface breaks. The lower 4 km. is pooling up to 25% while upstream this diminishes to 5-10%. An average PRR ratio for the whole stream is:

65% run

20% pool

15% riffle

Obstructions

None.

Stream Cover

Lower portion is up to 20% conifer

30% scrub deciduous

50% grass/herb

with an increase in large deciduous and coniferous going upstream. Headwaters are clear cut.

There is little vegetative overhang over any portion of the stream.

Stream cover is 1%

Fish

No angling sample.

Electroshocker sample

I. <u>Dolly Varden</u>	<u>Cutthroat</u>
5.5 (X 2)	10.5 cm.
6.0 cm.	12.0 (X 2)
14.0 cm.	13.0 cm.
II. <u>Dolly Varden</u>	<u>Cutthroat</u>
none	3.5 cm.
	4.0 (X 3)
	4.5 (X 2)
	9.0
	12.0

Electroshocker sample I was from the lower portion of the stream, at 100 yards from the mouth. Typical juvenile habitat, in that there are lots of hiding places amongst the large substrate. Sample II was taken 1-3 km. from the mouth. In both samples the cutthroat males were sexually maturing or mature. The Dolly Varden in sample I were sexually immature.

Slimy Sculpins (Cottus cognatus) were taken at both sample sites with a variation in size from 3.5 to 6.5 cm. From our sampling it appears that this species is at least as abundant as the trout.

Spawning would take place approximately 1.0 - 2½ km. from the mouth, with most of the stream up to 3 km. being good rearing habitat.

No Dolly Varden were found above sample site I.

Aquatic Plants

None.

Invertebrates

Aquatics present. No estimation of abundance made.

Bank Material - Bank and Hillside Stability

Banks average	50% glacial till
	20% bedrock
	30% sand/gravel/clay

with upland soils largely glacial till with some organic associates with slash area. Large outwash in vicinity of mouth.

Banks are generally quite stable with the exception of a few as such as the the bedrock channel section which has a high slumping face on one side. Stability is lower into the logged area with much loose bank material.

Tributaries

Tributary #1 1-3 km. from mouth

10.5°C - A very steep creek, with a flow of approximately 2 CFS, not suitable for fish.

Land Use

Popular hunting area and logging in upper portion.

Access

Burnham Creek Road.

Pollution Sources

Silt from logging clear cut area.

Recreational Potential

Limited to hunting.

Protection Problems

Siltation from logged area should be reason for protecting lower portion of Burnham Creek from such activity.

Historical Information

Old oil derrick on official historical site , Burnham Creek Road, 2 km. from mouth.

STREAM INVENTORY PARAMETERS

NAME Cabin Creek DATE Aug. 11 75 REF.NO. _____
Mo. Day Year

TEAM Ball and Caw

TRIBUTARY TO Howell Creek Flathead River

SURVEY; TYPE road/walking; QUALITY good MAP NO. 82G/SE

REACH entire drainage REF.NO. _____

LOCATION LAT: 49 06 00 LONG 114 32 00 OTHER MAPPING 82G-2-a (Fernie P.S.Y.U.)
Deg. Min. Sec. Deg. Min. Sec.

LENGTH (KM) 18.5 km. LENGTH ACCESSIBLE TO 11.0 km. AVG. DEPTH AT _____
MIGRANT FISH(KM) _____ AVG. WETTED WIDTH _____

ELEVATION RANGE 4200' - 6000' DRAINAGE AREA 130 sq.km. T.D.S.(PPM) _____

WETTED WIDTH(AVG.) _____ ACTIVE BED WIDTH(AVG.) _____ ph _____
RANGE _____ RANGE _____
O₂ (PPM) _____

FLOOD PLAIN WIDTH _____ DISCHARGE ;ACTUAL _____ ;RANGE _____

TIME/TEMP.°C AIR _____ COLOUR _____

TIME/TEMP.°C WATER _____ TURBIDITY _____

WEATHER CONDITIONS _____

CHECK LIST: X = RECORDED IN REPORT : N.R.= NOT RECORDED : N.N.= NOT NOTED

- | | |
|-----------------------------------|--|
| 1. <u>X</u> GENERAL DESCRIPTION | 13. <u>X</u> BANK AND HILLSIDE STABILITY |
| 2. <u>X</u> OVERALL PRODUCTIVITY | 14. <u>X</u> GENERAL VEGETATION TYPE |
| 3. <u>X</u> GRADIENT-SUBSTRATE | 15. <u>X</u> TRIBUTARIES |
| 4. <u>X</u> CHANNEL TYPE | 16. <u>X</u> LAND USE |
| 5. <u>X</u> FLOW PATTERN | 17. <u>X</u> ACCESS |
| 6. <u>X</u> POOL-RUN-RIFFLE RATIO | 18. <u>X</u> POLLUTION SOURCES |
| 7. <u>X</u> OBSTRUCTIONS | 19. <u>X</u> RECREATIONAL POTENTIAL |
| 8. <u>X</u> STREAM COVER | 20. <u>X</u> IMPROVEMENT POTENTIAL |
| 9. <u>X</u> FISH | 21. <u>X</u> PROTECTION PROBLEMS |
| 10. <u>X</u> AQUATIC PLANTS | 22. <u>NN</u> ADDITIONAL NOTES |
| 11. <u>X</u> INVERTEBRATES | 23. <u>NN</u> HISTORICAL INFORMATION |
| 12. <u>X</u> BANK MATERIAL | |

* Note if parameters are measured (MEAS) or estimated (EST) .

STREAM INVENTORY PARAMETERS

NAME Cabin Creek DATE Aug 11/75 REF.NO. _____
Mo. Day Year

TEAM Ball and Cav

TRIBUTARY TO Howell Creek Flathead River

SURVEY; TYPE _____; QUALITY _____ MAP NO. _____

REACH mouth to falls Reach I REF.NO. _____

LOCATION LAT: _____ LONG _____ OTHER MAPPING _____
Deg. Min. Sec. Deg. Min. Sec.

LENGTH (KM) 11.0 km. LENGTH ACCESSIBLE TO 11.0 km. AVG. DEPTH AT .305
MIGRANT FISH(KM) AVG. WETTED WIDTH

ELEVATION RANGE 4200' - 4600' DRAINAGE AREA _____ T.D.S.(PPM) _____

WETTED WIDTH(AVG.) 6.1 m. ACTIVE BED WIDTH(AVG.) 7.62 m. ph _____
RANGE 3.05 9.15 m. RANGE 4.6 12.2 m. O₂ (PPM) _____

FLOOD PLAIN WIDTH 15 50 m. DISCHARGE ;ACTUAL 1.13m³/sec RANGE .28 2.8 m³/sec

TIME/TEMP.°C AIR 1200/30.5°C COLOUR slight tannic

TIME/TEMP.°C WATER 1200/13.0°C TURBIDITY moderate to heavy (precipitation dependent)

WEATHER CONDITIONS sunny and clear

CHECK LIST: X = RECORDED IN REPORT : N.R.= NOT RECORDED : N.N.= NOT NOTED

- | | |
|--------------------------------|---------------------------------------|
| 1. _____ GENERAL DESCRIPTION | 13. _____ BANK AND HILLSIDE STABILITY |
| 2. _____ OVERALL PRODUCTIVITY | 14. _____ GENERAL VEGETATION TYPE |
| 3. _____ GRADIENT-SUBSTRATE | 15. _____ TRIBUTARIES |
| 4. _____ CHANNEL TYPE | 16. _____ LAND USE |
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| 8. _____ STREAM COVER | 20. _____ IMPROVEMENT POTENTIAL |
| 9. _____ FISH | 21. _____ PROTECTION PROBLEMS |
| 10. _____ AQUATIC PLANTS | 22. _____ ADDITIONAL NOTES |
| 11. _____ INVERTEBRATES | 23. _____ HISTORICAL INFORMATION |
| 12. _____ BANK MATERIAL | |

* Note if parameters are measured (MEAS) or estimated (EST) .

STREAM INVENTORY PARAMETERS

NAME Cabin Creek DATE Aug. 11/75 REF. NO. _____
Mo. Day Year

TEAM Ball and Caw

TRIBUTARY TO Howell Creek Flathead River

SURVEY; TYPE _____; QUALITY _____ MAP NO. _____

REACH Above falls ReachII REF. NO. _____

LOCATION LAT: _____ LONG _____ OTHER MAPPING _____
Deg. Min. Sec. Deg. Min. Sec.

LENGTH (KM) 7.5 km. LENGTH ACCESSIBLE TO zilch AVG. DEPTH AT 0.153 m.
MIGRANT FISH(KM) _____ AVG. WETTED WIDTH _____

ELEVATION RANGE 4600'-6000' DRAINAGE AREA _____ T.D.S.(PPM) _____

WETTED WIDTH(AVG.) 2.5 m. ACTIVE BED WIDTH(AVG.) 4.57 m. ph _____
RANGE 1.22 4.57 m. RANGE 1.83 6.01 m.

O₂ (PPM) _____

FLOOD PLAIN WIDTH 10 m. DISCHARGE ;ACTUAL 0.28m³/sec;RANGE 0.14 1.12m³/sec

TIME/TEMP. °C AIR 1300/29°C COLOUR slight tannic

TIME/TEMP. °C WATER 1300/10.5°C TURBIDITY moderate to heavy

WEATHER CONDITIONS sunny and clear

CHECK LIST: X = RECORDED IN REPORT : N.R.= NOT RECORDED : N.N.= NOT NOTED

- | | |
|--------------------------------|---------------------------------------|
| 1. _____ GENERAL DESCRIPTION | 13. _____ BANK AND HILLSIDE STABILITY |
| 2. _____ OVERALL PRODUCTIVITY | 14. _____ GENERAL VEGETATION TYPE |
| 3. _____ GRADIENT-SUBSTRATE | 15. _____ TRIBUTARIES |
| 4. _____ CHANNEL TYPE | 16. _____ LAND USE |
| 5. _____ FLOW PATTERN | 17. _____ ACCESS |
| 6. _____ POOL-RUN-RIFFLE RATIO | 18. _____ POLLUTION SOURCES |
| 7. _____ OBSTRUCTIONS | 19. _____ RECREATIONAL POTENTIAL |
| 8. _____ STREAM COVER | 20. _____ IMPROVEMENT POTENTIAL |
| 9. _____ FISH | 21. _____ PROTECTION PROBLEMS |
| 10. _____ AQUATIC PLANTS | 22. _____ ADDITIONAL NOTES |
| 11. _____ INVERTEBRATES | 23. _____ HISTORICAL INFORMATION |
| 12. _____ BANK MATERIAL | |

* Note if parameters are measured (MEAS) or estimated (EST) .

Cabin Creek

General Description - Overall Productivity

Cabin Creek is a low to medium slope stream with a moderate silt load observed to increase drastically with rainfall. The first 11.0 km. is accessible to migrant fish but most of this habitat is of the holding/rearing type, as opposed to spawning. Above the falls at 11.0 km. there is good spawning and rearing habitat, supporting a resident population of yellowstone cutthroat. It is above the falls, well into Cabin Pass, where a siltation problem originates, polluting all of Cabin, and lower Howell Creeks.

Overall productivity is rated as good.

Gradient-Substrate

The first 5.0 km. is typically a low gradient (less than 2%) area with an increase to 2.5% over the remainder of reach I. A 3.5 to 4.0% slope is characteristic of the first 0.5 km. above the falls, levelling to 2½% up to Cabin Pass.

Substrate is moderately compacted and smooth throughout the stream, and throughout reach I we see an average composition of

10% small gravel
20% large gravel
30% small rubble
30% large rubble
5% silt/coarse sand
5% boulder

with a brief break of 80% bedrock - see map V. There is a slight increase in % boulder in upper reach I..

Immediately above the falls substrate is much the same with;

10% large gravel

10% small gravel

30% small rubble

10% sand/silt

10% boulder

and relative consistency to the headwaters where we see up to 30% coarse sand.

Stream Channel

Cabin Creek is a single thread, well confined channel, with bars, back channels and cut banks common in the lower 4.0 km. Several large pools are created by log jams in this area.

Flow Pattern-Pool/Run/Riffle

Lower reach #1 is characterized by a uniform pool/run sequence with a gradual drop in pools as we go upstream. There is little turbulent flow, with the exception of the falls, and immediately above it. The lower 5.0 km. is typically:

50% run

20% riffle

30% pool

moving to 70% run

20% riffle

10% pool

over the remaining 13.0 km.

Obstructions

The falls at 11.0 km. is 2-3 meters high and is probably a total barrier.

Stream Cover

Scrub, alder and willow with other small shrubs, are dominant in lower 5.0 km., provide very little cover (<2%). Moving into the heavily forested upper area this increases. The upper section has been logged.

Fish

Angling sample yielded 2 Dolly Varden (15-18) and 6 cutthroat (13.0 - 21.0 cm.) in the lower 5.0 km. with 2 cutthroat (*22.0 cm.) caught in the bedrock area below the falls.

Shocking samples showed that there was a resident population of cutthroat above the falls, in mainstem Cabin and in the tributary, Storm Creek.

Shock Site I

Vicinity of minig camp - see map V.

Dolly Varden

Cutthroat

5.0 cm.

14.0 cm. mat. 0

5.5 cm.

17.5 cm.

6.0 cm.

18.0 cm.

15.0 cm.*

17.0 cm.*

18.0 cm.*

plus numerous slimy sculpins within the size range 4-7 cm.

An 8 lb. and 3 lb. Dolly Varden were caught in this area by mining company employees.

Site II

Storm Creek - cutthroat - see map V

14.0 cm. * mat. 0
14.5 cm. mat. 0
15.0 cm. imm. 0
16.0 cm.* mat. 0

* indicates scale sample taken

Site III - Cabin Pass - cutthroat only - 20 fish

15.5 cm.*
14.5 cm.*
10.0 cm.* (X3)
9.75 cm. (X3)
9.0 (X2)
8.5 (X2)
8.0
7.5

Fish population density throughout the Cabin Creek system was low-moderate except for this extreme upper region. Sample site III was a low flow (3-4 CFS or $.11\text{m}^3/\text{sec}$) area, characterized by high slumping banks, very small sandy pools behind small debris build ups. I might add that this area is a major source of silt to the system.

All cutthroat males were sexually mature or maturing while the lone female sampled was immature. Juvenile Dolly Varden were sexually immature. The reports from mining employees on the 8 lb. and 3 lb. Dolly Varden caught near the mine, was that they were gravid females.

Aquatic Plants

No vascular plants - same algae in pools.

Invertebrates

Extremely abundant and diverse aquatic insect population: Caddis larvae particularly abundant near mouth. Small crustaceans abundant throughout the entire drainage.

Bank Material - Bank and Hillside Stability

Banks average: 10-20% bedrock
 10-15% boulder
 60-70% glacial till/sand gravel

with a high percentage of loose clays in the headwaters.

Upland soils consisted of sedimentary deposits of bituminous coal and shale with a high percentage glacial till.

Soils were medium to coarse in texture, the headwaters having large pockets of finer material.

Upland non-consolidated material was quite deep on mining sites at North and Dolly Hills. Slope is 100-150% (est). Erosion off the new access road may be dangerously significant due to steepness and type of road construction.

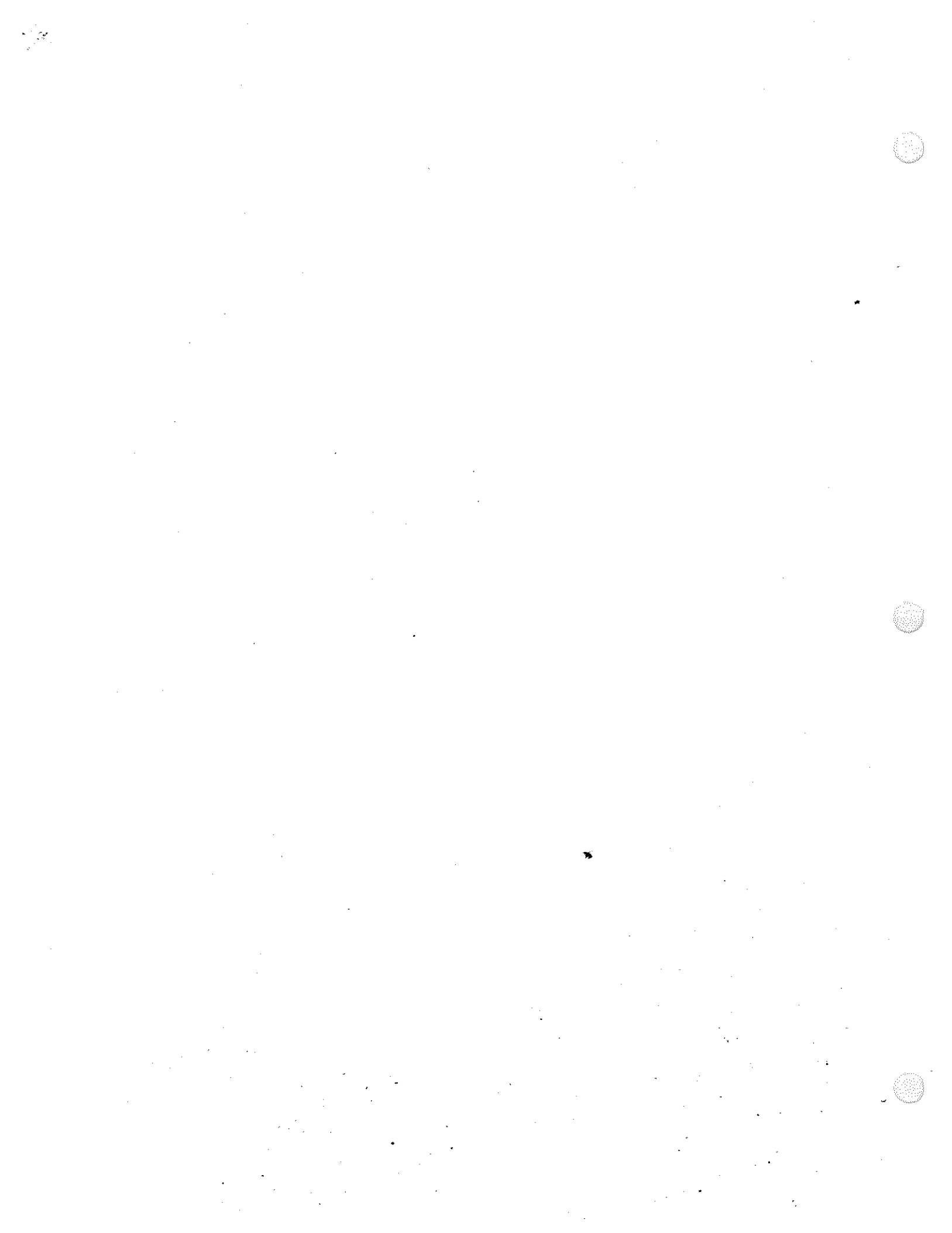
Erosion of loose material and high unstable slumping banks in logged headwaters region contributing a high % of silt load.

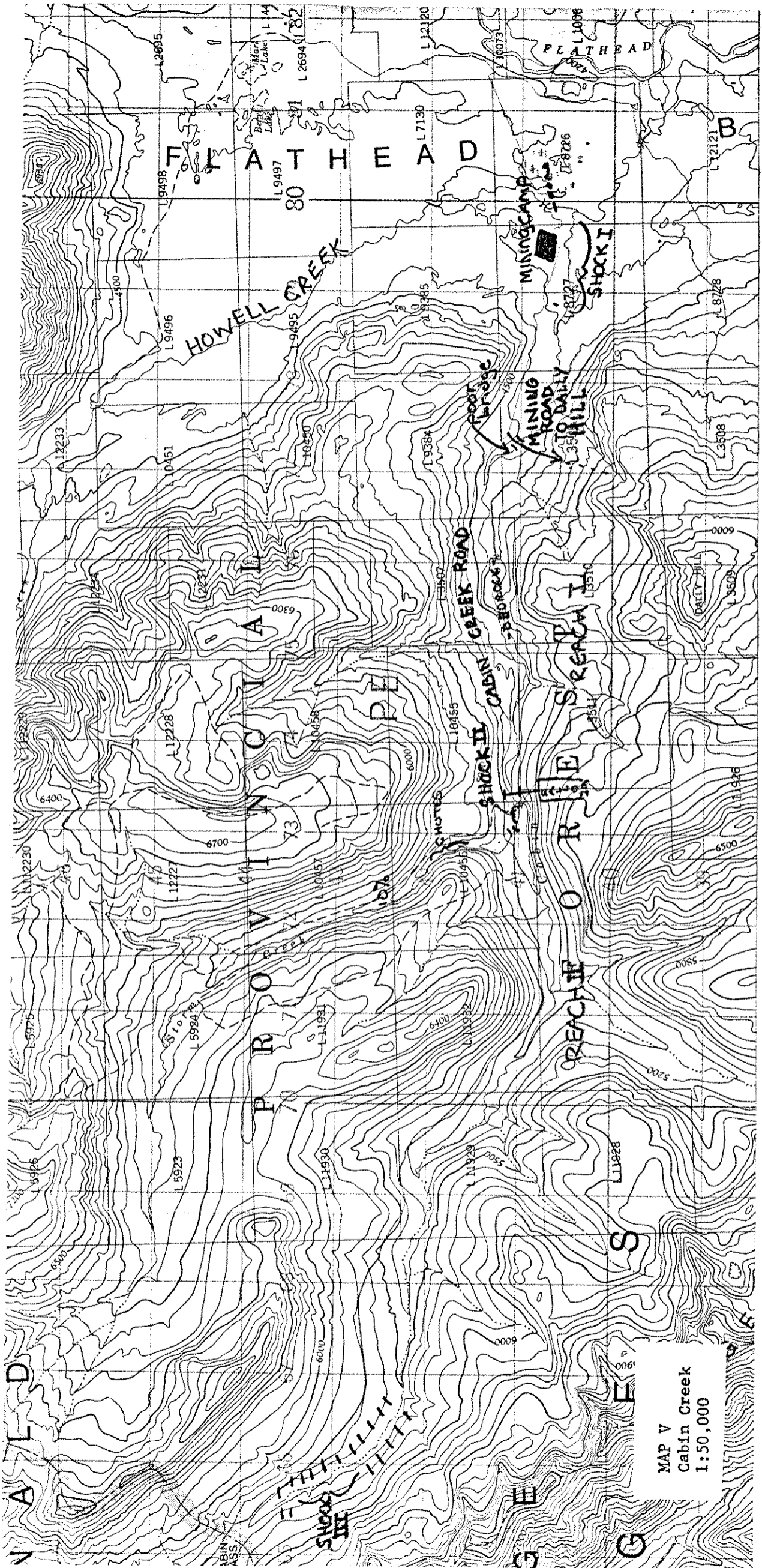
General Vegetation Type

Scrub deciduous predominant in lower 5.0 km., returning to spruce, true fir, cottonwood, trembling aspen, lodgepole pine forest. Some scattered larch present.

Tributaries

All minor tributaries are insignificant except Storm Creek, above the falls, which is supporting a resident trout population (see fish).





MAP V
Cabin Creek
1:50,000

Storm Creek is a steep fast flowing stream with a temperature of 8.5^oC. It is a major flow source (20 CFS or .57 m³/sec) to Cabin Creek, being of much higher discharge than Cabin Creek itself at this point. (wetted width 25' avg.)

There are 4 chutes in succession 1.0 km. from the mouth, all being velocity and height barriers. The 1.0 km. stretch from the mouth is however, a productive area, rich in invertebrates. Substrate is 70% coarse with a 2.0 → 3½% gradient.

The channel is confined and there are no back channels or spawning beds.

Above the 4 chute barriers gradient rises to 10% limiting fish inhabitation.

Land Use

Mining, logging and recreation.

Access

Cabin Creek Road (see map V)

Recreational Potential

Good road access to prime trout fishing and hunting.

Pollution Sources

Siltation of lower reach gravels caused by erosion of upper logged area. A poor bridge leading to Dolly Hill is causing heavy machinery to ford the creek. (see map V)

Improvement Possibilities

1. New bridge at access to Dolly Hill (see map) .
2. Reenforcement of slumping areas in headwaters.
3. Settling pond to collect silt load from headwaters.

Protection Problems

1. Mining road construction
2. Eventual strip mining
3. Poor bridges

STREAM INVENTORY PARAMETERS

NAME Howell Creek DATE Sept. 14/75 REF.NO. _____
Mo. Day Year

TEAM Ball, Caw, Gunville

TRIBUTARY TO Flathead River

SURVEY; TYPE walking/flying; QUALITY good MAP NO. 82G/SE

REACH entire stream REF.NO. _____

LOCATION LAT: 49 05 00 LONG 114 31 00 OTHER MAPPING 82-G-e,g,h. Fernie P.S.Y
Deg. Min. Sec. Deg. Min. Sec.

LENGTH (KM) 26.0 LENGTH ACCESSIBLE TO 17.0 AVG. DEPTH AT _____
MIGRANT FISH(KM) _____ AVG. WETTED WIDTH _____

ELEVATION RANGE 4000-6000' DRAINAGE AREA 300 sq. km. T.D.S.(PPM) _____

WETTED WIDTH(AVG.) _____ ACTIVE BED WIDTH(AVG.) _____ ph _____
RANGE _____ RANGE _____
O₂ (PPM) _____

FLOOD PLAIN WIDTH _____ DISCHARGE ;ACTUAL _____ ;RANGE _____

TIME/TEMP. °C AIR _____ COLOUR _____

TIME/TEMP. °C WATER _____ TURBIDITY _____

WEATHER CONDITIONS _____

CHECK LIST: X = RECORDED IN REPORT : N.R.= NOT RECORDED : N.N.= NOT NOTED

- | | |
|-----------------------------------|--|
| 1. <u>X</u> GENERAL DESCRIPTION | 13. <u>X</u> BANK AND HILLSIDE STABILITY |
| 2. <u>X</u> OVERALL PRODUCTIVITY | 14. <u>NN</u> GENERAL VEGETATION TYPE |
| 3. <u>X</u> GRADIENT-SUBSTRATE | 15. <u>X</u> TRIBUTARIES |
| 4. <u>X</u> CHANNEL TYPE | 16. <u>X</u> LAND USE |
| 5. <u>X</u> FLOW PATTERN | 17. <u>X</u> ACCESS |
| 6. <u>X</u> POOL-RUN-RIFFLE RATIO | 18. <u>X</u> POLLUTION SOURCES |
| 7. <u>X</u> OBSTRUCTIONS | 19. <u>X</u> RECREATIONAL POTENTIAL |
| 8. <u>X</u> STREAM COVER | 20. <u>NN</u> IMPROVEMENT POTENTIAL |
| 9. <u>X</u> FISH | 21. <u>NN</u> PROTECTION PROBLEMS |
| 10. <u>X</u> AQUATIC PLANTS | 22. <u>NN</u> ADDITIONAL NOTES |
| 11. <u>X</u> INVERTEBRATES | 23. <u>NN</u> HISTORICAL INFORMATION |
| 12. <u>X</u> BANK MATERIAL | |

* Note if parameters are measured (MEAS) or estimated (EST) .

STREAM INVENTORY PARAMETERS

NAME Howell Creek DATE Sept. 14/75 REF.NO. _____
Mo. Day Year

TEAM Ball, Caw, Gunville

TRIBUTARY TO Flathead River

SURVEY; TYPE walking/flying; QUALITY good MAP NO. 82G/SE

REACH mouth to 2.0 km. reach I REF.NO. _____

LOCATION LAT: _____ LONG _____ OTHER MAPPING 82-G-2-a Fernie P.S.Y.U.
Deg. Min. Sec. Deg. Min. Sec.

LENGTH (KM) 2.0 LENGTH ACCESSIBLE TO 2.0 AVG. DEPTH AT .488 m.
MIGRANT FISH(KM) _____ AVG. WETTED WIDTH _____

ELEVATION RANGE _____ DRAINAGE AREA _____ T.D.S.(PPM) _____

WETTED WIDTH(AVG.) 9.15 m. ACTIVE BED WIDTH(AVG.) 15.24 m. ph _____
RANGE 6.10 - 15.24 m. RANGE 12.2 - 24.4 m. O₂ (PPM) _____

FLOOD PLAIN WIDTH 25-75m. DISCHARGE ;ACTUAL 2.24m³/sec RANGE 0.84 - 3.35 m³/sec

TIME/TEMP.°C AIR 1200 - 24°C COLOUR none

TIME/TEMP.°C WATER 1200 - 11.0°C TURBIDITY moderate to heavy from Cabin C

WEATHER CONDITIONS 9/10 overcast

CHECK LIST: X = RECORDED IN REPORT : N.R.= NOT RECORDED : N.N.= NOT NOTED

- | | |
|--------------------------------|---------------------------------------|
| 1. _____ GENERAL DESCRIPTION | 13. _____ BANK AND HILLSIDE STABILITY |
| 2. _____ OVERALL PRODUCTIVITY | 14. _____ GENERAL VEGETATION TYPE |
| 3. _____ GRADIENT-SUBSTRATE | 15. _____ TRIBUTARIES |
| 4. _____ CHANNEL TYPE | 16. _____ LAND USE |
| 5. _____ FLOW PATTERN | 17. _____ ACCESS |
| 6. _____ POOL-RUN-RIFFLE RATIO | 18. _____ POLLUTION SOURCES |
| 7. _____ OBSTRUCTIONS | 19. _____ RECREATIONAL POTENTIAL |
| 8. _____ STREAM COVER | 20. _____ IMPROVEMENT POTENTIAL |
| 9. _____ FISH | 21. _____ PROTECTION PROBLEMS |
| 10. _____ AQUATIC PLANTS | 22. _____ ADDITIONAL NOTES |
| 11. _____ INVERTEBRATES | 23. _____ HISTORICAL INFORMATION |
| 12. _____ BANK MATERIAL | |

* Note if parameters are measured (MEAS) or estimated (EST) .

STREAM INVENTORY PARAMETERS

NAME Howell Creek DATE Sept. 14/75 REF.NO. _____
 Mo. Day Year

TEAM Ball, Caw, Gunville

TRIBUTARY TO Flathead River

SURVEY; TYPE walking/flying; QUALITY good MAP NO. 82G/SE

REACH 2.0 km. to 17.5 km. (falls) reach II REF.NO. _____

LOCATION LAT: _____ LONG _____ OTHER MAPPING 82-G-A,H,G
 Deg. Min. Sec. Deg. Min. Sec. Fernie P.S.Y.U.

LENGTH (KM) 15.5 LENGTH ACCESSIBLE TO 15.5 AVG. DEPTH AT .3m.
 MIGRANT FISH(KM) _____ AVG. WETTED WIDTH _____

ELEVATION RANGE _____ DRAINAGE AREA _____ T.D.S.(PPM) _____

WETTED WIDTH(AVG.) 7.6 m. ACTIVE BED WIDTH(AVG.) 12.2m. ph _____
 RANGE 4.6 - 9.2 m. RANGE 6.1 - 18.3 m.

FLOOD PLAIN WIDTH 15m. - 30 m DISCHARGE ;ACTUAL 1.13; RANGE .566 3.5 m³/sec

TIME/TEMP.°C AIR 1300/24° COLOUR none

TIME/TEMP.°C WATER 1300/10.0° TURBIDITY clear

WEATHER CONDITIONS 9/10 overcast

CHECK LIST: X = RECORDED IN REPORT : N.R.= NOT RECORDED : N.N.= NOT NOTED

- | | |
|--------------------------------|---------------------------------------|
| 1. _____ GENERAL DESCRIPTION | 13. _____ BANK AND HILLSIDE STABILITY |
| 2. _____ OVERALL PRODUCTIVITY | 14. _____ GENERAL VEGETATION TYPE |
| 3. _____ GRADIENT-SUBSTRATE | 15. _____ TRIBUTARIES |
| 4. _____ CHANNEL TYPE | 16. _____ LAND USE |
| 5. _____ FLOW PATTERN | 17. _____ ACCESS |
| 6. _____ POOL-RUN-RIFFLE RATIO | 18. _____ POLLUTION SOURCES |
| 7. _____ OBSTRUCTIONS | 19. _____ RECREATIONAL POTENTIAL |
| 8. _____ STREAM COVER | 20. _____ IMPROVEMENT POTENTIAL |
| 9. _____ FISH | 21. _____ PROTECTION PROBLEMS |
| 10. _____ AQUATIC PLANTS | 22. _____ ADDITIONAL NOTES |
| 11. _____ INVERTEBRATES | 23. _____ HISTORICAL INFORMATION |
| 12. _____ BANK MATERIAL | |

* Note if parameters are measured (MEAS) or estimated (EST) .

STREAM INVENTORY PARAMETERS

NAME Howell Creek DATE Sept. 15/75 REF.NO. _____
Mo. Day Year

TEAM Ball, Cav, Gunville

TRIBUTARY TO Flathead River

SURVEY; TYPE walking/flying; QUALITY good MAP NO. 82G/SE

REACH 17.5 km. to 26.0 km. (above falls) reach III REF.NO. _____

LOCATION LAT: _____ LONG _____ OTHER MAPPING 82-G-2-G
Deg. Min. Sec. Deg. Min. Sec. Fernie P.S.Y.U.

LENGTH (KM) 8.5 km. LENGTH ACCESSIBLE TO 0.0 km. AVG. DEPTH AT _____
MIGRANT FISH(KM) _____ AVG. WETTED WIDTH _____

ELEVATION RANGE _____ DRAINAGE AREA _____ T.D.S.(PPM) _____

WETTED WIDTH(AVG.) 3.05m. ACTIVE BED WIDTH(AVG.) 6.1 m. ph _____
RANGE 1.83-4.5 m. RANGE 4.5 - 7.62 m. O₂ (PPM) _____

FLOOD PLAIN WIDTH 25-150 m. DISCHARGE ;ACTUAL .4245m³/sec RANGE .28 1.132/m³/sec

TIME/TEMP.°C AIR 1200/26° COLOUR none

TIME/TEMP.°C WATER 1200/10° TURBIDITY none

WEATHER CONDITIONS clear sunny

CHECK LIST: X = RECORDED IN REPORT : N.R.= NOT RECORDED : N.N.= NOT NOTED

- | | |
|--------------------------------|---------------------------------------|
| 1. _____ GENERAL DESCRIPTION | 13. _____ BANK AND HILLSIDE STABILITY |
| 2. _____ OVERALL PRODUCTIVITY | 14. _____ GENERAL VEGETATION TYPE |
| 3. _____ GRADIENT-SUBSTRATE | 15. _____ TRIBUTARIES |
| 4. _____ CHANNEL TYPE | 16. _____ LAND USE |
| 5. _____ FLOW PATTERN | 17. _____ ACCESS |
| 6. _____ POOL-RUN-RIFFLE RATIO | 18. _____ POLLUTION SOURCES |
| 7. _____ OBSTRUCTIONS | 19. _____ RECREATIONAL POTENTIAL |
| 8. _____ STREAM COVER | 20. _____ IMPROVEMENT POTENTIAL |
| 9. _____ FISH | 21. _____ PROTECTION PROBLEMS |
| 10. _____ AQUATIC PLANTS | 22. _____ ADDITIONAL NOTES |
| 11. _____ INVERTEBRATES | 23. _____ HISTORICAL INFORMATION |
| 12. _____ BANK MATERIAL | |

* Note if parameters are measured (MEAS) or estimated (EST) .

Howell Creek

General Description - Overall Productivity

Howell Creek is a major tributary to the Canadian portion of the Flathead River. Over the first 2.0 km. (area below Cabin Creek) the stream is a low gradient wide area with many wide, deep pools capable of holding large fish. Above this, gradient picks up for a stretch of 2-3 km.; this area being a good coarse substrate spawning region. The stream flattens out and winds through a semi-swampy irregular valley (see picture 9) until it reaches the falls. (17.0 km.) A brief steep bedrock/angular rubble above the falls quickly disappears giving way to the flat winding channel characteristic of below the falls.

Siltation of lower Howell, from Cabin Creek is extremely noticeable after a couple of hours of heavy rainfall, and it is hoped that any mining operation on Cabin Creek will not make a bad situation worse. (refer to map VI)

Overall productivity is rated as good to excellent as there is abundant variable habitat in Howell itself as well as the input of Cabin and 29-mile creek.

Gradient-Substrate

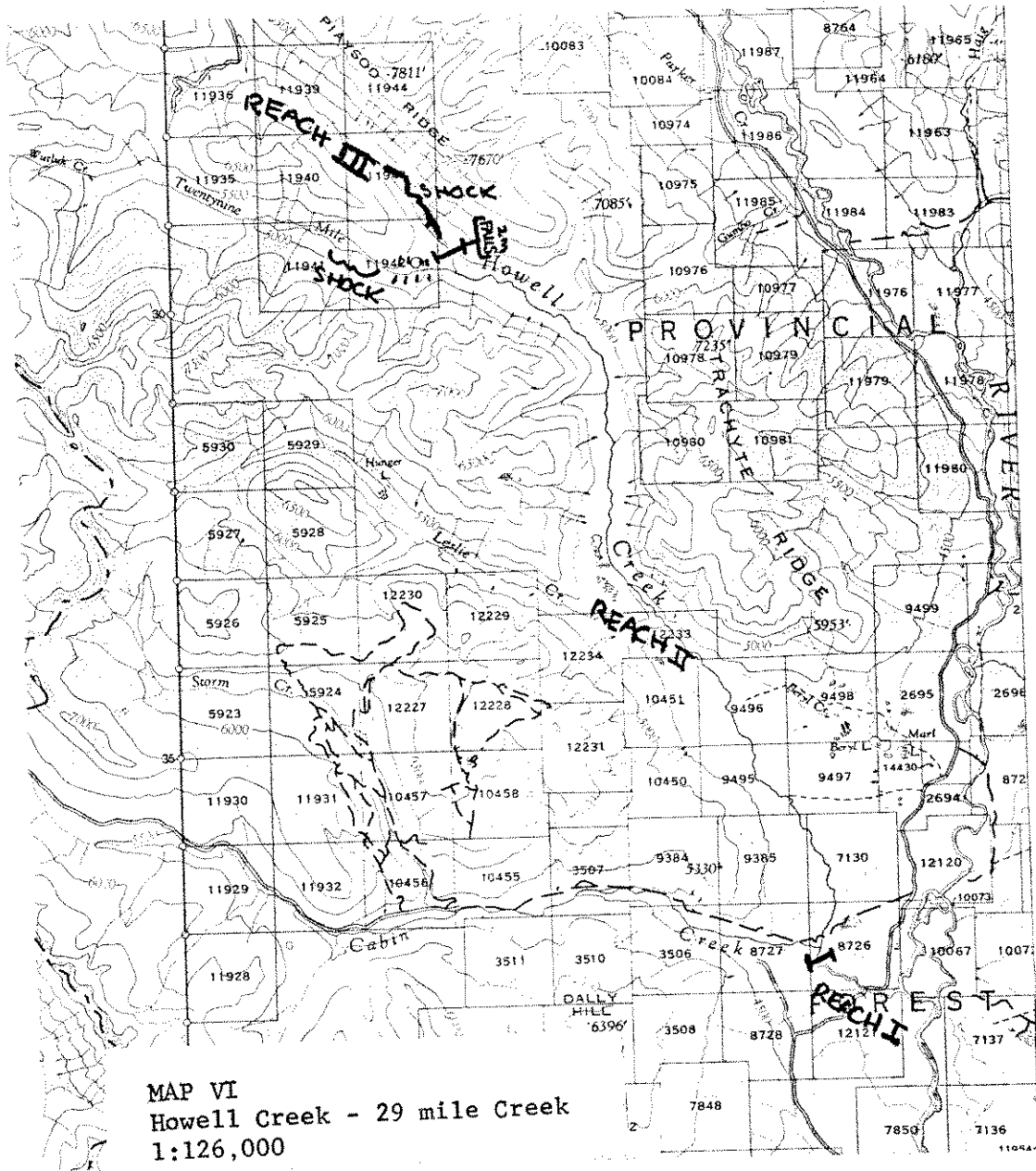
Over the first 2.0 km. gradient averages 1.5-2%, picking up to 2-3% and then dropping down to 2%. Generally, the stream gradient fluctuates (\pm .5%) around 2% with some steep sections in the valley (3%), just below and just above the falls (4-5%).

Substrate is coarser throughout the first 5.0 km. with more sandy pools and channels in the lower 2.0 km. Composition averages :

10% small gravel

20% large gravel

30% small rubble



MAP VI
Howell Creek - 29 mile Creek
1:126,000

30% large rubble

9% sand

1% boulder

and is consistent to the falls with the exception of large sandy pockets in the meandering channel in the valley and some higher % boulder 1 km. below the falls.

Channel Type

The lower 2.0 km. is a single thread curing channel with many bar built and debris built back eddies and pools. Channel bottom is regular and intermittently undercut on one side. Above Cabin Creek Road bridge braiding increases. Bars, side channels back channels are abundant. Some permanent and semi-permanent islands have led to the formation of 2 main channels 2-3 km. above Cabin Creek Road bridge. A distinct meandering channel with undercut banks develops above this, and continues in much the same manner until steeping 1 km. below the falls. Relative confinement immediately above the falls is succeeded by a curved confined channel with some bank undercutting, before steepening at the headwaters.

Flow Pattern - Pool-Run-Riffle

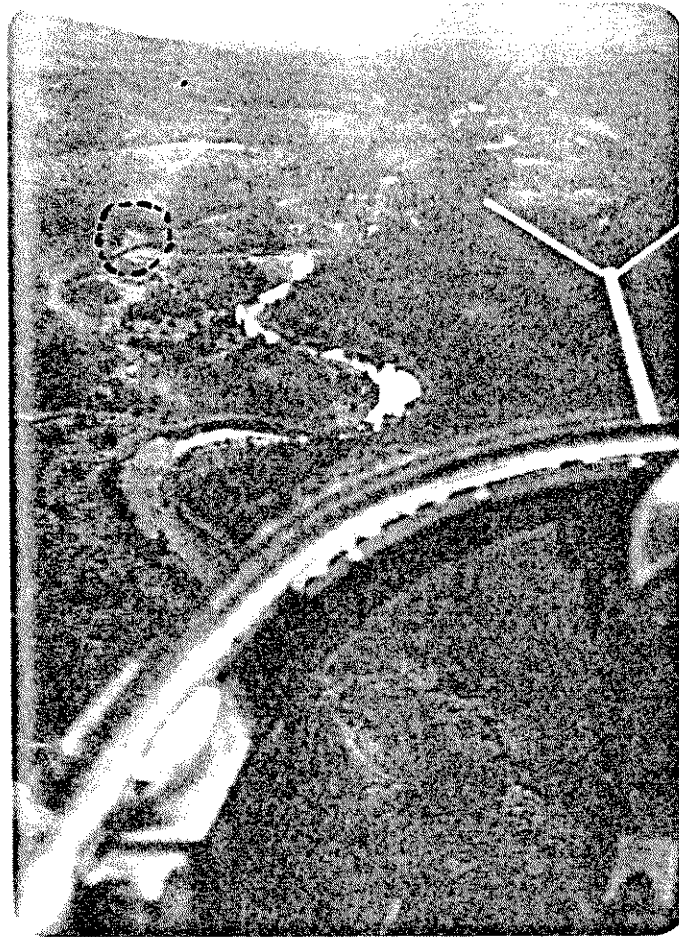
The flow in Howell Creek is quite consistent within each reach.

Reach #1 10% placid 90% swirl

Reach #2 5% placid 95% swirl

Reach #3 1% placid 99% swirl

(estimation from aerial reconnaissance)



Picture 9 - Winding flat section of Howell Creek (reach II) note slumping bank in top left.

"Placid" should not be taken directly as inferring the existence of pools, as many pools are far from being placid.

Over the first 2.0 km. we observe the best area for holding of large fish, as the pools are large, deep and numerous. Pool/run/riffle figures average

30% pool

60% run

10% riffle

with a sharp drop in % pool to 5% for the 2.0 to 4.0 km. section. Above this % pooling rises to 10-15% and is characteristic of the remaining 20.0 km. of Howell Creek.

Obstructions

2.0 - 3.0 m. falls 17.5 km. from mouth. Could be total barrier in low water. (see map VI)

Stream Cover

Scrub vegetation and forest provides up to 3/10 cover in reach I, with little or no cover above this section.

Fish

Angling samples were easily obtainable throughout reach I. Nine cutthroat were taken using a fly or mepps spinner. Size ranged from 14 cm. to 24 cm. All were mature males. It was reported that a large Dolly Varden was taken near the Flathead Road bridge.

Electroshocking

Reach I was difficult to shock. Repeated sampling of accessible portions yielded only great numbers of slimy sculpins. Electroshocking of 3 sample sites above the falls suggests that the resident cutthroat population in this reach does not exceed 14 cm. in length, or that individuals over 14 cm. are rare. (5 fish 10-14 cm. range)

Aquatic Plants

None.

Invertebrates

Aquatic insects, small crustaceans present. No estimation of abundance made.

Bank Material - Bank and Hillside Stability

Glacial till is predominant throughout reach I. Reach II is also high in sand gravel/glacial till but with a significant amount of clay silt as well. Reach III has bedrock pockets amongst the sand/gravel.

Slumping occurs in one place in reach I, just below the mouth of Cabin Creek, and in reach II we see a similar situation in three of four sections. (see circled area in picture #7) Aside from these sections, banks are generally stable.

- Tributaries
1. Cabin Creek - see report
 2. 29-Mile Creek - see report
 3. Leslie Creek - $.142\text{m}^3/\text{sec}$ with 3-4% gradient
coarse substrate with fines at swampy region near mouth. Rearing/spawning potential is fair.

All other minor tributaries are too steep to be significant.

Land Use

Logging in headwaters.

Access

Bridges on main Flathead Road and on Cabin Creek Road. Logging roads found in headwaters. Most of Howell Creek is accessible by walking only.

Pollution Sources

1. Siltation from logging in headwaters.
2. Trucks fording at Cabin Creek Road bridge.
3. Silt from Cabin Creek.

Recreational Potential

The Howell Creek area is considered a good hunting and fishing area. The mouth of Howell Creek is known to be a good fishing spot for large Dolly Varden.

STREAM INVENTORY PARAMETERS

NAME 29 Mile Creek DATE Sept. 14/75 REF.NO. _____
Mo. Day Year

TEAM Caw and Gunville

TRIBUTARY TO Howell Creek Flathead River

SURVEY; TYPE walking*/flying; QUALITY good MAP NO. 82G/SE

REACH entire stream REF.NO. _____

LOCATION LAT: 49 12 30 LONG 114 37 00 OTHER MAPPING 82G-2-g
Deg. Min. Sec. Deg. Min. Sec.

LENGTH (KM) 8.5 LENGTH ACCESSIBLE TO 8.5 AVG. DEPTH AT 0.3 m.
MIGRANT FISH(KM) AVG. WETTED WIDTH

ELEVATION RANGE 4700-6500' DRAINAGE AREA 20 sq. km. T.D.S.(PPM) _____

WETTED WIDTH(AVG.) 3.0 m. ACTIVE BED WIDTH(AVG.) 7.0 m. ph _____
RANGE 1.5 - 5.0 m. RANGE 5.2 - 12.2 m.
O₂ (PPM) _____

FLOOD PLAIN WIDTH 50 m. DISCHARGE ;ACTUAL 0.28 ;RANGE .085 - 1.132

TIME/TEMP.°C AIR 1200/29°C COLOUR none

TIME/TEMP.°C WATER 1200/12.5°C TURBIDITY light siltation

WEATHER CONDITIONS _____

CHECK LIST: X = RECORDED IN REPORT : N.R.= NOT RECORDED : N.N.= NOT NOTED

- | | |
|-----------------------------------|--|
| 1. <u>X</u> GENERAL DESCRIPTION | 13. <u>X</u> BANK AND HILLSIDE STABILITY |
| 2. <u>X</u> OVERALL PRODUCTIVITY | 14. <u>X</u> GENERAL VEGETATION TYPE |
| 3. <u>X</u> GRADIENT-SUBSTRATE | 15. <u>X</u> TRIBUTARIES |
| 4. <u>X</u> CHANNEL TYPE | 16. <u>X</u> LAND USE |
| 5. <u>X</u> FLOW PATTERN | 17. <u>X</u> ACCESS |
| 6. <u>X</u> POOL-RUN-RIFFLE RATIO | 18. <u>X</u> POLLUTION SOURCES |
| 7. <u>X</u> OBSTRUCTIONS | 19. <u>X</u> RECREATIONAL POTENTIAL |
| 8. <u>X</u> STREAM COVER | 20. <u>NN</u> IMPROVEMENT POTENTIAL |
| 9. <u>X</u> FISH | 21. <u>NN</u> PROTECTION PROBLEMS |
| 10. <u>X</u> AQUATIC PLANTS | 22. <u>NN</u> ADDITIONAL NOTES |
| 11. <u>X</u> INVERTEBRATES | 23. <u>NN</u> HISTORICAL INFORMATION |
| 12. <u>X</u> BANK MATERIAL | |

* Note if parameters are measured (MEAS) or estimated (EST) .

29-Mile Creek

General Description - Overall Productivity

29-Mile Creek is a low gradient, low velocity transport stream with abundant spawning and rearing areas. Full utilization of these qualities by fish was initially not expected, due to low discharge and the fact that 90% of the stream passes through a clear cut area. It was found after electroshocking that Yellowstone cutthroat of a large size variation, made use of the large (3mL X 1.5 mw) pools, undercut banks and debris accumulations. Population density was moderate while biomass/m³ was relatively high (i.e., most fish were quite large in relation to stream size). It is on this basis that we rate overall productivity as good. (refer to map VI.)

Gradient-Substrate

The canyon area slope averages 2.0% while it averages 1.5% over most of the stream with a rise to 5-7% as we approach the headwaters.

Substrate is generally of a smooth fine texture averaging :

25% small gravel

25% large gravel

25% small rubble

15% large rubble

10% coarse sand

Compaction is loose.

Channel Type

29-Mile Creek is a single thread varying from straight to slightly meandering. There is a high% back channeling, and curves in the stream are usually areas of undercut overhanging banks on one or both sides. Entrenchment is negligible.

Flow-Pool-Run Riffle

Flow character is a consistent alternation of placid and swirling, corresponding to Run/pool figures.

50% run

10% riffle

30% pool

Obstructions

None.

Stream Cover

3/10 covered by scrub vegetation for the first 2 km. Clearcut area is above this.

Fish

Electroshocker sample 4 km. from mouth (see map VI) yielded cutthroat only.

Size (cm.)	Remarks
8.0 cm.	maturing ♂
12.0 cm.** (X3)	maturing ♂
15.0 cm.*	mature ♂
16.0 cm.	mature ♂
21.0 cm.*	mature ♂
22.5 cm.	mature ♂
23.0 cm.*	mature ♂

29-Mile Creek was the only stream of its size in the Flathead found to support cutthroat larger than 20 cm. Most of the sample was caught amongst debris accumulations associated with pools, or under overhang cut banks.

No Dolly Varden were found in 29-Mile Creek.

Aquatic Plants

None.

Invertebrates

Only small crustaceans observed in any abundance.

Bank Material - Bank and Hillside Stability

Banks, as well as upland soils consist of a high percentage glacial till with banks also consisting of glacial outwash and alluvium.

The lower 2-3 km. has the highest instability, but is unlogged and holding well.

Tributaries

Tributaries were steep and of low discharge.

Land Use

Logging.

Access

2 wheel drive to canyon. It is suggested that 4 wheel drive and winch be obtained to proceed to mouth.

Pollution Sources

Siltation from clearcut area.

Recreational Potential

Valley was full of hunters at time of survey. Three moose were taken within a two day period.

STREAM INVENTORY PARAMETERS

NAME Kishinena Creek DATE Sept. 14/75 REF.NO. _____

Mo. Day Year

TEAM Caw and Gunville

TRIBUTARY TO Flathead River

SURVEY; TYPE flying; QUALITY baseline-good MAP NO. 82G/SE

REACH entire drainage REF.NO. _____

LOCATION LAT: 48 57 00 LONG 114 25 00 OTHER MAPPING "Sage Creek" 82G 1:50,000
Deg. Min. Sec. Deg. Min. Sec. "South Eastern B.C." 1" = 10miles

LENGTH (KM) 28 m. LENGTH ACCESSIBLE TO 18 km. AVG. DEPTH AT _____
MIGRANT FISH(KM) _____ AVG. WETTED WIDTH _____

ELEVATION RANGE 4000'-7000' DRAINAGE AREA approx. 100 T.D.S.(PPM)
sq. km.

WETTED WIDTH(AVG.) _____ ACTIVE BED WIDTH(AVG.) _____ ph _____
RANGE _____ RANGE _____ O₂ (PPM) _____

FLOOD PLAIN WIDTH _____ DISCHARGE ;ACTUAL _____ ;RANGE _____

TIME/TEMP. °C AIR _____ COLOUR _____

TIME/TEMP. °C WATER _____ TURBIDITY _____

WEATHER CONDITIONS _____

CHECK LIST: X = RECORDED IN REPORT : N.R.= NOT RECORDED : N.N.= NOT NOTED

- | | |
|-----------------------------------|--|
| 1. <u>X</u> GENERAL DESCRIPTION | 13. <u>X</u> BANK AND HILLSIDE STABILITY |
| 2. <u>X</u> OVERALL PRODUCTIVITY | 14. <u>X</u> GENERAL VEGETATION TYPE |
| 3. <u>X</u> GRADIENT-SUBSTRATE | 15. <u>X</u> TRIBUTARIES |
| 4. <u>X</u> CHANNEL TYPE | 16. <u>X</u> LAND USE |
| 5. <u>X</u> FLOW PATTERN | 17. <u>X</u> ACCESS |
| 6. <u>X</u> POOL-RUN-RIFFLE RATIO | 18. <u>NN</u> POLLUTION SOURCES |
| 7. <u>X</u> OBSTRUCTIONS | 19. <u>X</u> RECREATIONAL POTENTIAL |
| 8. <u>X</u> STREAM COVER | 20. <u>NN</u> IMPROVEMENT POTENTIAL |
| 9. <u>X</u> FISH | 21. <u>NN</u> PROTECTION PROBLEMS |
| 10. <u>X</u> AQUATIC PLANTS | 22. <u>NN</u> ADDITIONAL NOTES |
| 11. <u>X</u> INVERTEBRATES | 23. <u>NN</u> HISTORICAL INFORMATION |
| 12. <u>X</u> BANK MATERIAL | |

* Note if parameters are measured (MEAS) or estimated (EST) .

STREAM INVENTORY PARAMETERS

NAME Kishinena Creek DATE Sept. 14/75 REF.NO. _____
Mo. Day Year

TEAM Caw and Gunville

TRIBUTARY TO Flathead River

SURVEY; TYPE flying; QUALITY baseline-good MAP NO. 82G/SE

REACH mouth to 14.0 km. Reach I REF.NO. _____

LOCATION LAT: _____ LONG _____ OTHER MAPPING _____
Deg. Min. Sec. Deg. Min. Sec.

LENGTH (KM) 14.0 LENGTH ACCESSIBLE TO 14.0 km. AVG. DEPTH AT 2.0 cm.
MIGRANT FISH(KM) _____ AVG. WETTED WIDTH _____

ELEVATION RANGE _____ DRAINAGE AREA _____ T.D.S.(PPM) _____

WETTED WIDTH(AVG.) 10 m. ACTIVE BED WIDTH(AVG.) 15 m. ph _____
RANGE 7-14 RANGE 10-40 m. O₂ (PPM) _____

FLOOD PLAIN WIDTH 20-100 m. DISCHARGE ;ACTUAL 2.12 ;RANGE 1.1 4.2m³/sec

TIME/TEMP.°C AIR 1400 - 27°C COLOUR clear

TIME/TEMP.°C WATER 1400-9°C TURBIDITY clear

WEATHER CONDITIONS sunny - 3/10 cloud cover

CHECK LIST: X = RECORDED IN REPORT : N.R.= NOT RECORDED : N.N.= NOT NOTED

- | | |
|--------------------------------|---------------------------------------|
| 1. _____ GENERAL DESCRIPTION | 13. _____ BANK AND HILLSIDE STABILITY |
| 2. _____ OVERALL PRODUCTIVITY | 14. _____ GENERAL VEGETATION TYPE |
| 3. _____ GRADIENT-SUBSTRATE | 15. _____ TRIBUTARIES |
| 4. _____ CHANNEL TYPE | 16. _____ LAND USE |
| 5. _____ FLOW PATTERN | 17. _____ ACCESS |
| 6. _____ POOL-RUN-RIFFLE RATIO | 18. _____ POLLUTION SOURCES |
| 7. _____ OBSTRUCTIONS | 19. _____ RECREATIONAL POTENTIAL |
| 8. _____ STREAM COVER | 20. _____ IMPROVEMENT POTENTIAL |
| 9. _____ FISH | 21. _____ PROTECTION PROBLEMS |
| 10. _____ AQUATIC PLANTS | 22. _____ ADDITIONAL NOTES |
| 11. _____ INVERTEBRATES | 23. _____ HISTORICAL INFORMATION |
| 12. _____ BANK MATERIAL | |

* Note if parameters are measured (MEAS) or estimated (EST) .

STREAM INVENTORY PARAMETERS

NAME Kishinena Creek DATE Sept. 14/75 REF.NO. _____
Mo. Day Year

TEAM Caw and Gunville

TRIBUTARY TO Flathead River

SURVEY; TYPE flying; QUALITY _____ MAP NO. _____

REACH 14.0 km. to 20.0 km. Reach II REF.NO. _____

LOCATION LAT: _____ LONG _____ OTHER MAPPING _____
Deg. Min. Sec. Deg. Min. Sec.

LENGTH (KM) 6 km. LENGTH ACCESSIBLE TO 4.0 km. AVG. DEPTH AT 20 cm.
MIGRANT FISH(KM) _____ AVG. WETTED WIDTH _____

ELEVATION RANGE _____ DRAINAGE AREA _____ T.D.S.(PPM) _____

WETTED WIDTH(AVG.) 9 m. ACTIVE BED WIDTH(AVG.) 10 m. ph _____
RANGE 7-14 m. RANGE 8-12 m. O₂ (PPM) _____

FLOOD PLAIN WIDTH 15 m. DISCHARGE ;ACTUAL 1.4m³/sec;RANGE 0.85 2.1 m³/sec

TIME/TEMP.°C AIR 1400 - 27°C COLOUR clear

TIME/TEMP.°C WATER 1400 - 9°C TURBIDITY clear

WEATHER CONDITIONS sunny - 3/10 cloud cover

CHECK LIST: X = RECORDED IN REPORT : N.R.= NOT RECORDED : N.N.= NOT NOTED

- | | |
|--------------------------------|---------------------------------------|
| 1. _____ GENERAL DESCRIPTION | 13. _____ BANK AND HILLSIDE STABILITY |
| 2. _____ OVERALL PRODUCTIVITY | 14. _____ GENERAL VEGETATION TYPE |
| 3. _____ GRADIENT-SUBSTRATE | 15. _____ TRIBUTARIES |
| 4. _____ CHANNEL TYPE | 16. _____ LAND USE |
| 5. _____ FLOW PATTERN | 17. _____ ACCESS |
| 6. _____ POOL-RUN-RIFFLE RATIO | 18. _____ POLLUTION SOURCES |
| 7. _____ OBSTRUCTIONS | 19. _____ RECREATIONAL POTENTIAL |
| 8. _____ STREAM COVER | 20. _____ IMPROVEMENT POTENTIAL |
| 9. _____ FISH | 21. _____ PROTECTION PROBLEMS |
| 10. _____ AQUATIC PLANTS | 22. _____ ADDITIONAL NOTES |
| 11. _____ INVERTEBRATES | 23. _____ HISTORICAL INFORMATION |
| 12. _____ BANK MATERIAL | |

* Note if parameters are measured (MEAS) or estimated (EST) .

STREAM INVENTORY PARAMETERS

NAME Kishinena Creek DATE Sept. 14/75 REF.NO. _____
 Mo. Day Year

TEAM Caw and Gunville

TRIBUTARY TO Flathead River

SURVEY; TYPE flying; QUALITY baseline-good MAP NO. 82G/SE

REACH above 20.0 km. Reach III REF.NO. _____

LOCATION LAT: _____ LONG _____ OTHER MAPPING _____
 Deg. Min. Sec. Deg. Min. Sec.

LENGTH (KM) 8 km. LENGTH ACCESSIBLE TO 0 AVG. DEPTH AT 20 cm.
 MIGRANT FISH(KM) _____ AVG. WETTED WIDTH _____

ELEVATION RANGE _____ DRAINAGE AREA _____ T.D.S.(PPM) _____

WETTED WIDTH(AVG.) 9 m. ACTIVE BED WIDTH(AVG.) 10 m. ph _____
 RANGE 7-14 m. RANGE 8-12 m. O₂ (PPM) _____

FLOOD PLAIN WIDTH 15-20 m. DISCHARGE ;ACTUAL 1.13 ;RANGE .7-2.1 m³/sec.

TIME/TEMP.°C AIR 1400 - 27° C COLOUR clear

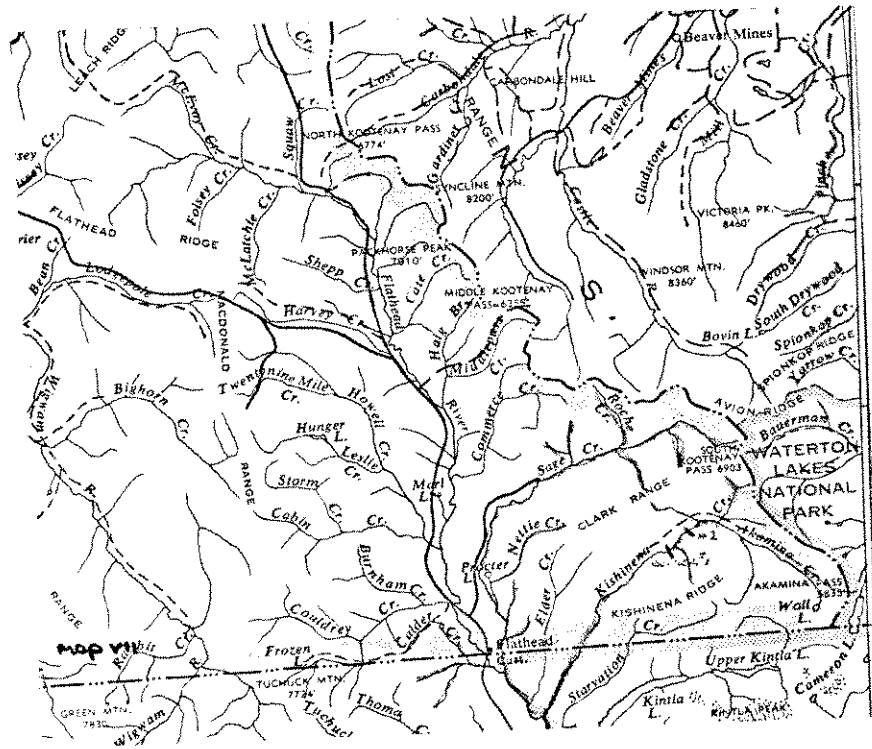
TIME/TEMP.°C WATER 1400 - 8° C TURBIDITY clear

WEATHER CONDITIONS sunny - 3/10 cloud cover

CHECK LIST: X = RECORDED IN REPORT : N.R.= NOT RECORDED : N.N.= NOT NOTED

- | | |
|--------------------------------|---------------------------------------|
| 1. _____ GENERAL DESCRIPTION | 13. _____ BANK AND HILLSIDE STABILITY |
| 2. _____ OVERALL PRODUCTIVITY | 14. _____ GENERAL VEGETATION TYPE |
| 3. _____ GRADIENT-SUBSTRATE | 15. _____ TRIBUTARIES |
| 4. _____ CHANNEL TYPE | 16. _____ LAND USE |
| 5. _____ FLOW PATTERN | 17. _____ ACCESS |
| 6. _____ POOL-RUN-RIFFLE RATIO | 18. _____ POLLUTION SOURCES |
| 7. _____ OBSTRUCTIONS | 19. _____ RECREATIONAL POTENTIAL |
| 8. _____ STREAM COVER | 20. _____ IMPROVEMENT POTENTIAL |
| 9. _____ FISH | 21. _____ PROTECTION PROBLEMS |
| 10. _____ AQUATIC PLANTS | 22. _____ ADDITIONAL NOTES |
| 11. _____ INVERTEBRATES | 23. _____ HISTORICAL INFORMATION |
| 12. _____ BANK MATERIAL | |

* Note if parameters are measured (MEAS) or estimated (EST) .



MAP VII - Mouth locations, Calder Kishena, Sage
1" = 10 miles.

Kishinena Creek

General Description - Overall Productivity

Kishinena Creek is a major tributary of the Northern Flathead drainage. It is a moderate gradient, clear, fast flowing stream, with 18 of its total 28 km. length accessible to migratory fish. The first 7.0 km. are in the United States (see map VII).

It's size (and seasonal fluctuation in size), fisheries potential, banks and surrounding terrain are comparable to Sage Creek, just north of the Kishinena.

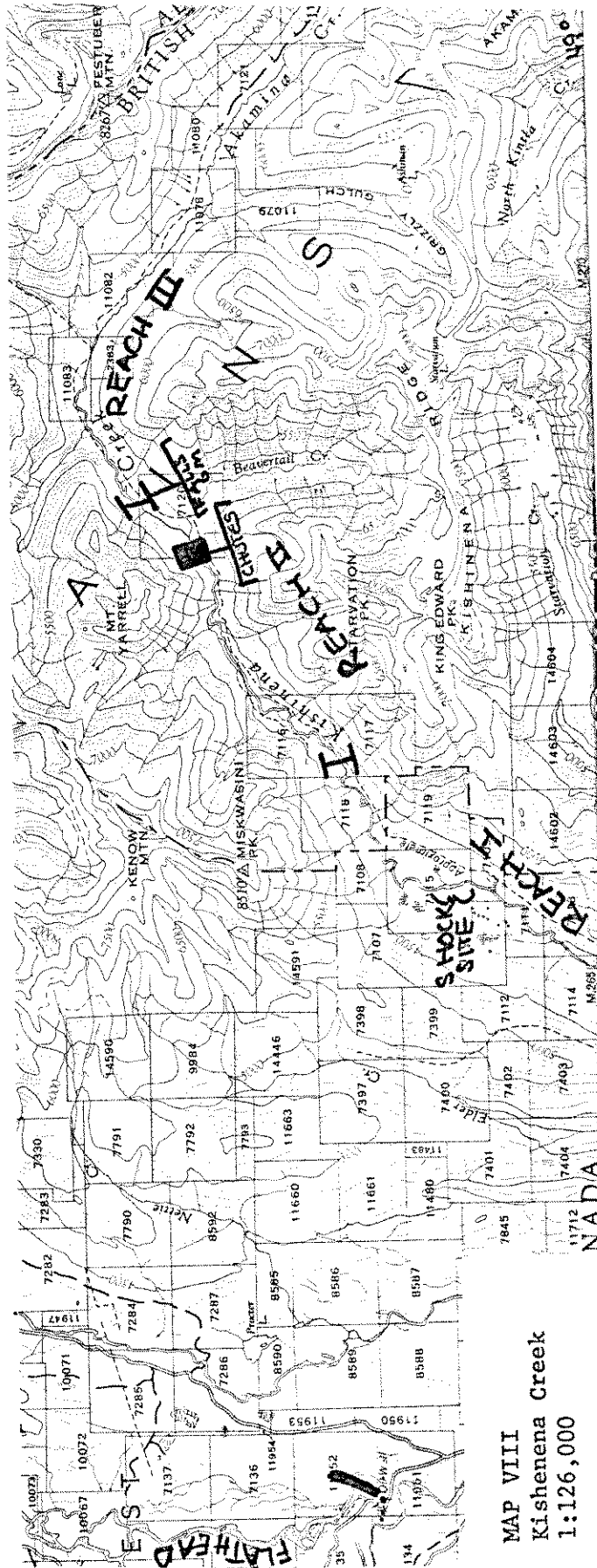
Overall productivity is rated as good, on the basis of high rearing/spawning potential and the known presence of a rearing population of cutthroat trout. Slimy sculpins were also abundant.

Gradient-Substrate - (refer to map VIII)

Gradient averages 2% over the first 14.0 km. with a gradual increase to 3½% over the next 3.5 km. As bedrock becomes more predominant, gradient increases up to 5-6% (see picture 12 and 13). Many "steps" in the form of chutes, with flatter areas between (3.5%) comprise the average 6% over the section between 17.5 and 20.0 km. This section is considered a barrier to migratory fish. Above the falls at 20.0 km. (pictures 13 and 14) the stream flattens out considerably.

Substrate may be broadly classed as fine over the first 14.0 km. Percentage composition averages :

50% gravel
40% rubble
5% boulder



MAP VIII
Kishenena Creek
1:126,000

over the first 7 km. with % rubble increasing to 60% over the next 4.0 km. A typical section of this high % rubble section is illustrated in picture 11.

Rubble and boulder dominate the section between 14.0 - 17.5 km. Between 17.5 and 21.0 km. bedrock is predominant with high percentages of boulder and large rubble (see picture 11 and 13). A slight angularity is characteristic of this section.

The smooth compacted fines of the lower 7.0 km. of km. of stream provided sections of excellent spawning material. It was surprising to find cutthroat fry rearing amongst the coarse material characteristic of the next 7.0 km. (see Fish and picture #11)

Stream Channel Type (refer to map VIII)

The stream channel is unconfined and slightly meandering, moving freely within the wide active bed characteristics of the first 14.0 km. (see picture 11).

Minor log jams are prevalent at braided sections 3.0 km. from the mouth, with major build ups 8 km. from the mouth. None of these are considered barriers. Undercut banks are common in the lower 4-5 km.

The stream is a well confined single thread in bedrock above 17.0 km. with the section between 14.0 and 17.0 km. being a transition zone for this change in channel type. Above 22 km., bedrock diminishes, allowing some minor unconfinement.

Flow Pattern - Pool/Run/Riffle Ratio

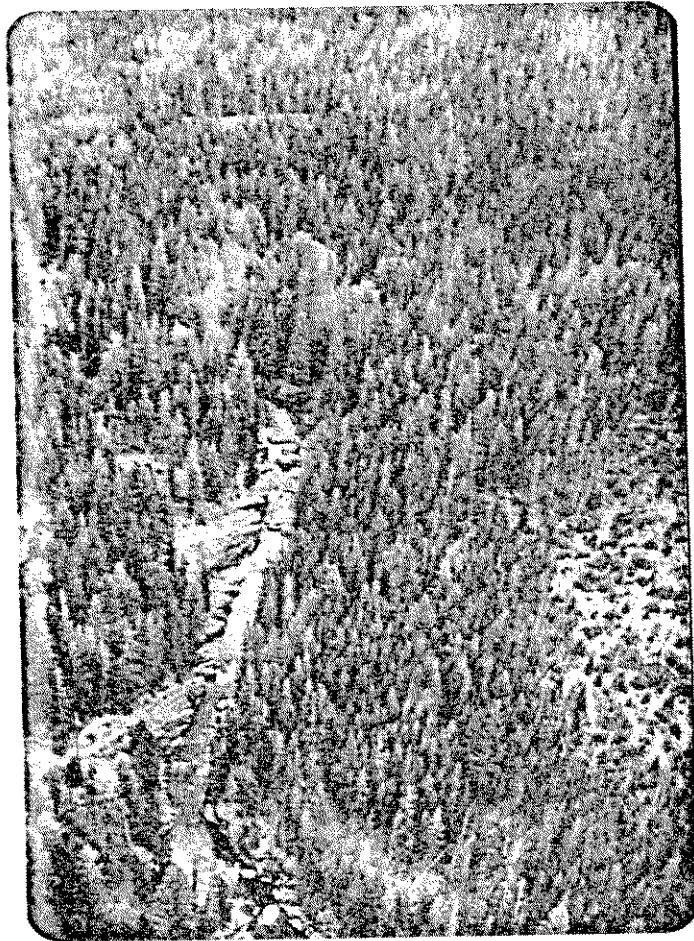
The flow pattern is a uniform swirl over the first 17.0 km.

Pool-Run-Riffle averages:

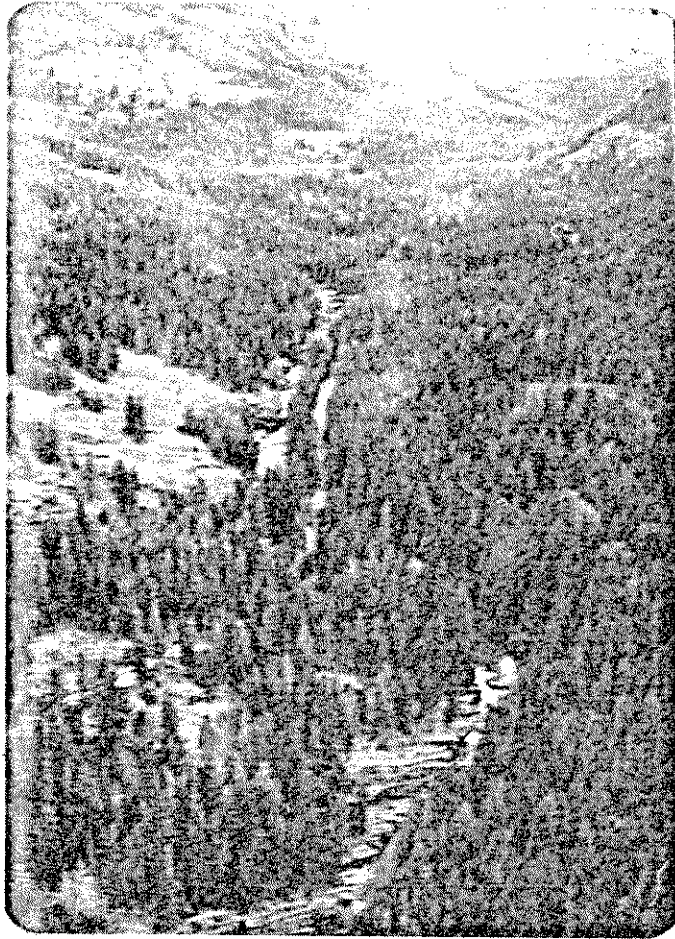
20% pool
15% riffle
65% run



Picture 10 - Kishenina electroshocking site 11.5 km. from mouth.



Picture 11 - Beginning of confined bedrock section 17.0 km. from mouth.



Picture 12 - Bedrock channel with chutes (barrier)

over the first 2 km. with percentage pool increasing to 25% above and remaining consistent over 8 km. At 12.0 km. from the mouth pool drops to 15% and remains consistent to 17.0 km.

At 17.0 km. flow becomes: 60% swirl

 40% broken

with a Pool/Riffle/Run average of: 10% pool

 20% riffle

 70% run

A high percentage broken flow (up to 90% at 18.0 km. and 20 km.) is characteristic of the section between 17.0 km. and 21.0 km. This is succeeded by a more uniform swirl pooling to 20%.

Obstructions

Total barriers, chutes over bedrock at 18.0 km. and 5 m. falls at 20.0 km. (see pictures 13 - 15)

Stream Cover

Lower sections have little stream cover because of the wide active bed as shown in picture Confinement of the channels allows some cover by forest canopy through the bedrock sections, increasing above the falls at 20.0 km. because of heavily covered banks.

Fish

There was no fish found above the 18.0 km. barrier. Electroshocking at 11.5 km. yielded the following

Yellowstone Cutthroat

3.0 cm.

5.5 cm.

6.0 cm. (X2)

6.5 cm.

9.0 cm.

Slimy Sculpins

6.0 cm.

6.5 cm.

6.8 cm.

7.5 cm



Picture 13. - Falls 20 km. from mouth - person in middle right for perspective.



Picture 14-. 5 m. falls at 20 km. showing stream channel above.

The actual shocking site is shown in picture 10. It was surprising that in this section no fish were found in a nearby side channel, but instead were found amongst the rubble in the foreground. It appeared that the spaces between the rubble offered more protection than the rather barren side channels.

Angling was unsuccessful.

Aquatic Plants

None.

Invertebrates

Low abundance at 11.5 and 20.0 km. points. Probable abundance high in slower moving lower sections.

Bank Material - Bank and Hillside Stability

High steep slumping clay/gravel-rubble banks are frequent over the lower 6.0 km. This character is acute at the mouth, similar to the steep banks at the mouth of Sage Creek. Banks are more stable with slumping rare above 6.0 km. Between 6.0 km. and 16.0 km. the banks are lower with abundant vegetation. In most sections the banks are protected by a wide active bed with minor unstable portions. (see picture 10).

Between 16.0 and 22.0 km. the banks are 100% bedrock. (see pictures 12 and 15) % bedrock decreases drastically above 22.0 km., but is present, as an important underlying stability factors in sections that would otherwise be unstable.

General Vegetation Type

Spruce - Pine - Fir forest.

Tributaries

No significant tributaries below the first total barrier.

Land Use

None.

Access

Road. 4 wheel drive access from United States and Alberta with B.C. trail impassable at time of survey. Conservation Officer Jack Williams has particulars concerning access to upper Kishinena.

STREAM INVENTORY PARAMETERS

NAME Sage Creek DATE Sept 1/75 REF.NO. _____
Mo. Day Year

TEAM Ball, Caw, Gunville

TRIBUTARY TO Flathead River

SURVEY; TYPE walking*/road; QUALITY good MAP NO. 82C/SE

REACH entire drainage REF.NO. _____

LOCATION LAT: 48 59 15 LONG 114 27 30 OTHER MAPPING Sage Creek 1:50,000
Deg. Min. Sec. Deg. Min. Sec.

LENGTH (KM) 36 km. (est) ENGLTH ACCESSIBLE TO 18 km. AVG. DEPTH AT _____
MIGRANT FISH(KM) _____ AVG. WETTED WIDTH _____

ELEVATION RANGE 4000'-6000' DRAINAGE AREA 430 sq. km. T.D.S.(PPM) _____

WETTED WIDTH(AVG.) _____ ACTIVE BED WIDTH(AVG.) _____ ph _____
RANGE _____ RANGE _____
O₂ (PPM) _____

FLOOD PLAIN WIDTH _____ DISCHARGE ;ACTUAL _____ ;RANGE _____

TIME/TEMP. °C AIR _____ COLOUR _____

TIME/TEMP. °C WATER _____ TURBIDITY _____

WEATHER CONDITIONS _____

CHECK LIST: X = RECORDED IN REPORT : N.R.= NOT RECORDED : N.N.= NOT NOTED

- | | |
|--------------------------------|---------------------------------------|
| 1. _____ GENERAL DESCRIPTION | 13. _____ BANK AND HILLSIDE STABILITY |
| 2. _____ OVERALL PRODUCTIVITY | 14. _____ GENERAL VEGETATION TYPE |
| 3. _____ GRADIENT-SUBSTRATE | 15. _____ TRIBUTARIES |
| 4. _____ CHANNEL TYPE | 16. _____ LAND USE |
| 5. _____ FLOW PATTERN | 17. _____ ACCESS |
| 6. _____ POOL-RUN-RIFFLE RATIO | 18. _____ POLLUTION SOURCES |
| 7. _____ OBSTRUCTIONS | 19. _____ RECREATIONAL POTENTIAL |
| 8. _____ STREAM COVER | 20. _____ IMPROVEMENT POTENTIAL |
| 9. _____ FISH | 21. _____ PROTECTION PROBLEMS |
| 10. _____ AQUATIC PLANTS | 22. _____ ADDITIONAL NOTES |
| 11. _____ INVERTEBRATES | 23. _____ HISTORICAL INFORMATION |
| 12. _____ BANK MATERIAL | |

* Note if parameters are measured (MEAS) or estimated (EST) .

STREAM INVENTORY PARAMETERS

NAME Sage Creek DATE Sept. 1/75 REF.NO. _____

Mo. Day Year

TEAM Ball, Caw, Gunville

TRIBUTARY TO Flathead River

SURVEY; TYPE walking; QUALITY good MAP NO. 82G/SE

REACH mouth to 14.0 km. (4.0 km. below falls) reach I REF.NO. _____

LOCATION LAT: _____ LONG _____ OTHER MAPPING _____
Deg. Min. Sec. Deg. Min. Sec.

LENGTH (KM) 14.0 km. LENGTH ACCESSIBLE TO 14.0 km. AVG. DEPTH AT .46 m.
MIGRANT FISH(KM) _____ AVG. WETTED WIDTH _____

ELEVATION RANGE 4000'-4300' DRAINAGE AREA _____ T.D.S.(PPM) _____

WETTED WIDTH(AVG.) 9.14 m. ACTIVE BED WIDTH(AVG.) 12.2 m. ph _____
RANGE 7.62 30 m. RANGE 10.0 m. O₂ (PPM) _____

FLOOD PLAIN WIDTH up to 1000 m DISCHARGE ;ACTUAL 2.8/sec ;RANGE .8 4.26 m³/sec

TIME/TEMP. °C AIR 1300/24°C COLOUR none

TIME/TEMP. °C WATER 1300/10.5°C TURBIDITY light

WEATHER CONDITIONS sunny - 9/10 cloud cover

CHECK LIST: X = RECORDED IN REPORT : N.R.= NOT RECORDED : N.N.= NOT NOTED

- | | |
|--------------------------------|---------------------------------------|
| 1. _____ GENERAL DESCRIPTION | 13. _____ BANK AND HILLSIDE STABILITY |
| 2. _____ OVERALL PRODUCTIVITY | 14. _____ GENERAL VEGETATION TYPE |
| 3. _____ GRADIENT-SUBSTRATE | 15. _____ TRIBUTARIES |
| 4. _____ CHANNEL TYPE | 16. _____ LAND USE |
| 5. _____ FLOW PATTERN | 17. _____ ACCESS |
| 6. _____ POOL-RUN-RIFFLE RATIO | 18. _____ POLLUTION SOURCES |
| 7. _____ OBSTRUCTIONS | 19. _____ RECREATIONAL POTENTIAL |
| 8. _____ STREAM COVER | 20. _____ IMPROVEMENT POTENTIAL |
| 9. _____ FISH | 21. _____ PROTECTION PROBLEMS |
| 10. _____ AQUATIC PLANTS | 22. _____ ADDITIONAL NOTES |
| 11. _____ INVERTEBRATES | 23. _____ HISTORICAL INFORMATION |
| 12. _____ BANK MATERIAL | |

* Note if parameters are measured (MEAS) or estimated (EST) .

STREAM INVENTORY PARAMETERS

NAME Sage Creek DATE Sept. 1/75 REF.NO. _____
Mo. Day Year

TEAM Ball, Caw, Gunville

TRIBUTARY TO Flathead River

SURVEY; TYPE walking; QUALITY good MAP NO. 82G/SE

REACH 14.0 km. to 18.0 km. (falls) reach II REF.NO. _____

LOCATION LAT: _____ LONG _____ OTHER MAPPING _____
Deg. Min. Sec. Deg. Min. Sec.

LENGTH (KM) 4.0 km. LENGTH ACCESSIBLE TO 4.0 km. AVG. DEPTH AT .305
MIGRANT FISH(KM) _____ AVG. WETTED WIDTH _____

ELEVATION RANGE 4300'-4400' DRAINAGE AREA _____ T.D.S.(PPM) _____

WETTED WIDTH(AVG.) 7.0 m. ACTIVE BED WIDTH(AVG.) 9.1m. ph _____
RANGE _____ RANGE 7.6 12.2 m. O₂ (PPM) _____

FLOOD PLAIN WIDTH 20 m. DISCHARGE ;ACTUAL 1.5m³/sec ;RANGE 0.8 3.6m³/sec

TIME/TEMP.°C AIR 1100/26°C COLOUR clear

TIME/TEMP.°C WATER 1100/9.0°C TURBIDITY light

WEATHER CONDITIONS sunny 9/10 cloud cover

CHECK LIST: X = RECORDED IN REPORT : N.R.= NOT RECORDED : N.N.= NOT NOTED

- | | |
|--------------------------------|---------------------------------------|
| 1. _____ GENERAL DESCRIPTION | 13. _____ BANK AND HILLSIDE STABILITY |
| 2. _____ OVERALL PRODUCTIVITY | 14. _____ GENERAL VEGETATION TYPE |
| 3. _____ GRADIENT-SUBSTRATE | 15. _____ TRIBUTARIES |
| 4. _____ CHANNEL TYPE | 16. _____ LAND USE |
| 5. _____ FLOW PATTERN | 17. _____ ACCESS |
| 6. _____ POOL-RUN-RIFFLE RATIO | 18. _____ POLLUTION SOURCES |
| 7. _____ OBSTRUCTIONS | 19. _____ RECREATIONAL POTENTIAL |
| 8. _____ STREAM COVER | 20. _____ IMPROVEMENT POTENTIAL |
| 9. _____ FISH | 21. _____ PROTECTION PROBLEMS |
| 10. _____ AQUATIC PLANTS | 22. _____ ADDITIONAL NOTES |
| 11. _____ INVERTEBRATES | 23. _____ HISTORICAL INFORMATION |
| 12. _____ BANK MATERIAL | |

* Note if parameters are measured (MEAS) or estimated (EST) .

- 110 -
STREAM INVENTORY PARAMETERS

NAME Sage Creek DATE Sept 2/75 REF.NO. _____
Mo. Day Year

TEAM Ball, Caw, Gunville

TRIBUTARY TO Flathead River

SURVEY; TYPE road/*walking; QUALITY good MAP NO. 82G/SE

REACH 18.0 km. to 36.0 km. (above falls) Reach III REF.NO. _____

LOCATION LAT: _____ LONG _____ OTHER MAPPING _____
Deg. Min. Sec. Deg. Min. Sec.

LENGTH (KM) 18.0 km. LENGTH ACCESSIBLE TO 0.0 km. AVG. DEPTH AT _____
MIGRANT FISH(KM) _____ AVG. WETTED WIDTH _____

ELEVATION RANGE 4400-6000' DRAINAGE AREA _____ T.D.S.(PPM) _____

WETTED WIDTH(AVG.) 6.1 m. ACTIVE BED WIDTH(AVG.) 9.14 m. ph _____
RANGE 4.56 7.62m. RANGE 6.1 12.2m.

O₂ (PPM) _____

FLOOD PLAIN WIDTH up to 100 m DISCHARGE ;ACTUAL 1.132m³/sec; RANGE .56 2.1 m³/sec

TIME/TEMP, °C AIR 1200/26 °C COLOUR none

TIME/TEMP, °C WATER 1200/9.0 °C TURBIDITY light

WEATHER CONDITIONS sunny 9/10 cc

CHECK LIST: X = RECORDED IN REPORT : N.R.= NOT RECORDED : N.N.= NOT NOTED

- | | |
|--------------------------------|---------------------------------------|
| 1. _____ GENERAL DESCRIPTION | 13. _____ BANK AND HILLSIDE STABILITY |
| 2. _____ OVERALL PRODUCTIVITY | 14. _____ GENERAL VEGETATION TYPE |
| 3. _____ GRADIENT-SUBSTRATE | 15. _____ TRIBUTARIES |
| 4. _____ CHANNEL TYPE | 16. _____ LAND USE |
| 5. _____ FLOW PATTERN | 17. _____ ACCESS |
| 6. _____ POOL-RUN-RIFFLE RATIO | 18. _____ POLLUTION SOURCES |
| 7. _____ OBSTRUCTIONS | 19. _____ RECREATIONAL POTENTIAL |
| 8. _____ STREAM COVER | 20. _____ IMPROVEMENT POTENTIAL |
| 9. _____ FISH | 21. _____ PROTECTION PROBLEMS |
| 10. _____ AQUATIC PLANTS | 22. _____ ADDITIONAL NOTES |
| 11. _____ INVERTEBRATES | 23. _____ HISTORICAL INFORMATION |
| 12. _____ BANK MATERIAL | |

* Note if parameters are measured (MEAS) or estimated (EST) .

Sage Creek

General Description - Overall Productivity (refer to map IX)

Sage Creek is a low/moderate sloped stream presenting a large variation in channel form, from narrow and confined to shallow and diffuse. It is relatively fast flowing, with very little siltation considering the potential for this form of pollution in the logged upper part of the drainage. (see pictures 18 and 19).

A large seasonal fluctuation in discharge is evident from wide variation in active bed size and deposition of logs in the bedrock channel at the falls (see picture 17). It is reported to be a "wild creek" in the spring.

A falls 18.0 km. from the mouth (map IX - picture 17) is a barrier to fish. This is unfortunate as there is abundant habitat above the falls in both the mainstem and the tributaries.

Overall productivity is rated as fair. Considering fantastic abundance of spawning/rearing habitat, both fish density and mean size are low.

The United States portion of Sage Creek is shown in map VII.

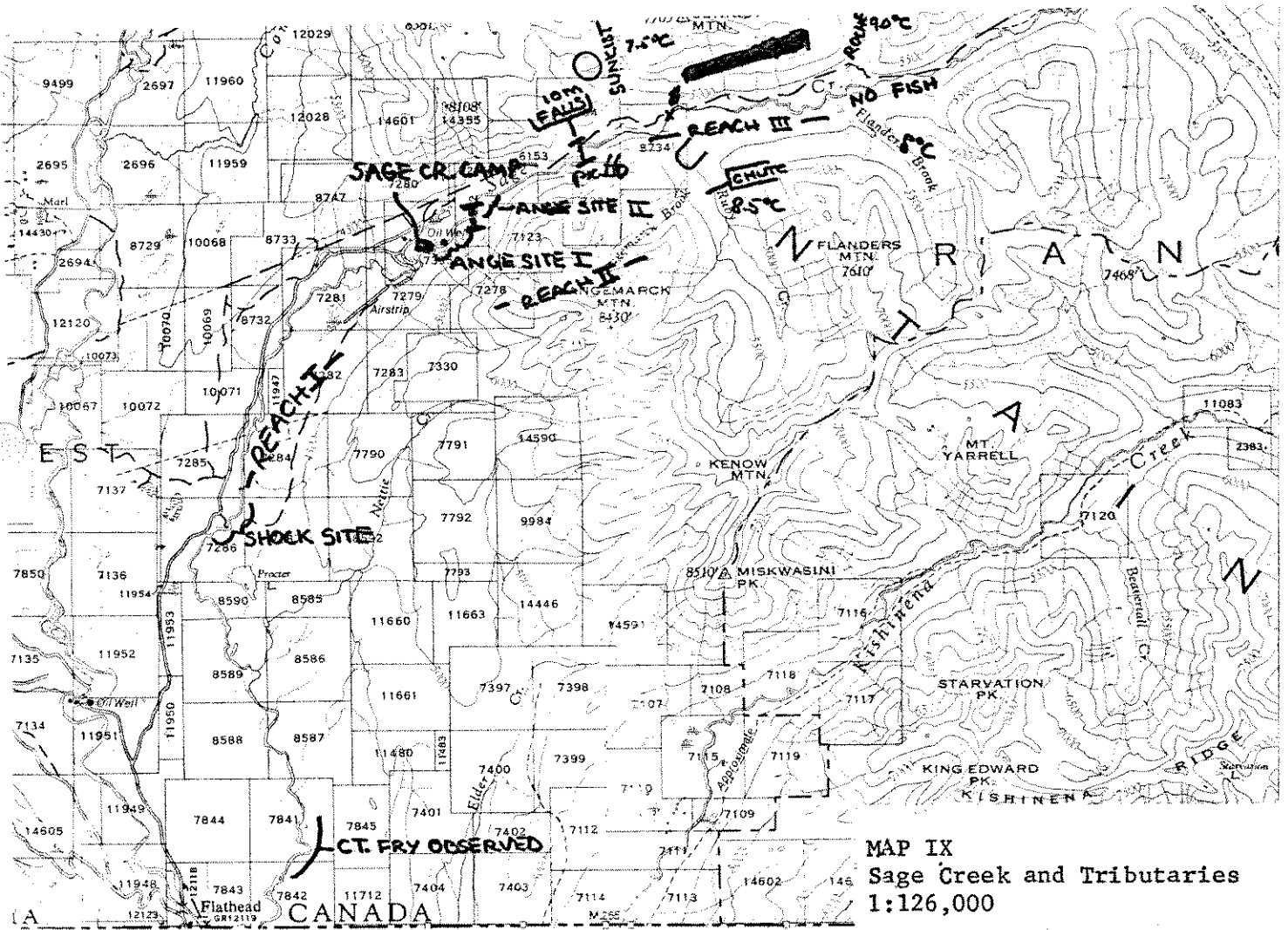
Gradient-Substrate

Over most of reach I, up to 14.0 km., variation in gradient is $\pm 0.5\%$ around a 2% average. From 14.0 km. to the falls there is a similar $\pm 0.5\%$ variation, around 2.5%, with the variation increasing to $\pm 1.0\%$ above.

Picture 16 illustrates the wide gravel bed associated with the mouth.

Substrate texture is smooth with:

- 30% small gravel
- 30% large gravel



MAP IX
Sage Creek and Tributaries
1:126,000

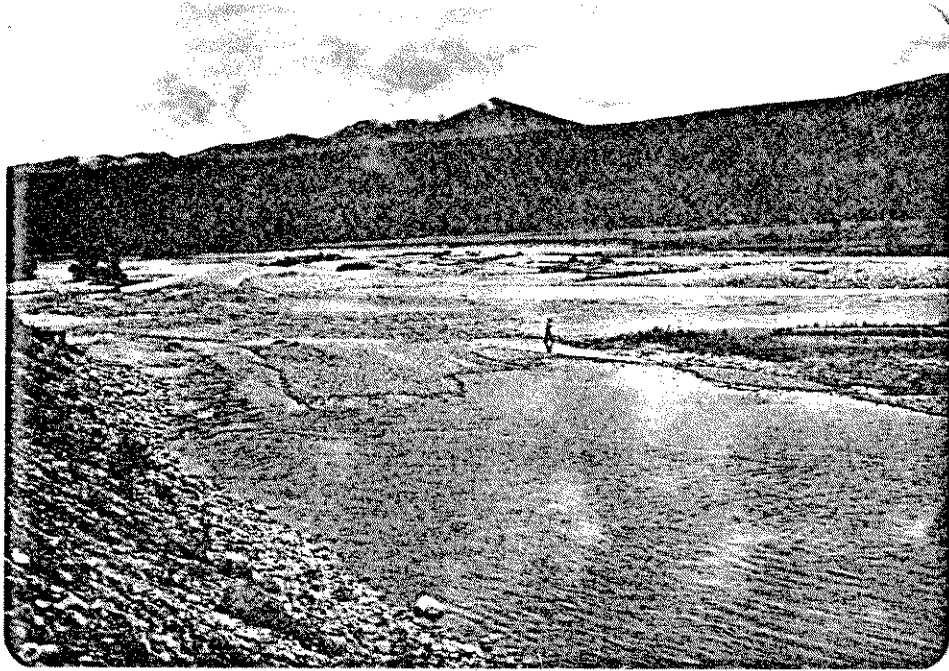
30% small rubble

5% large rubble

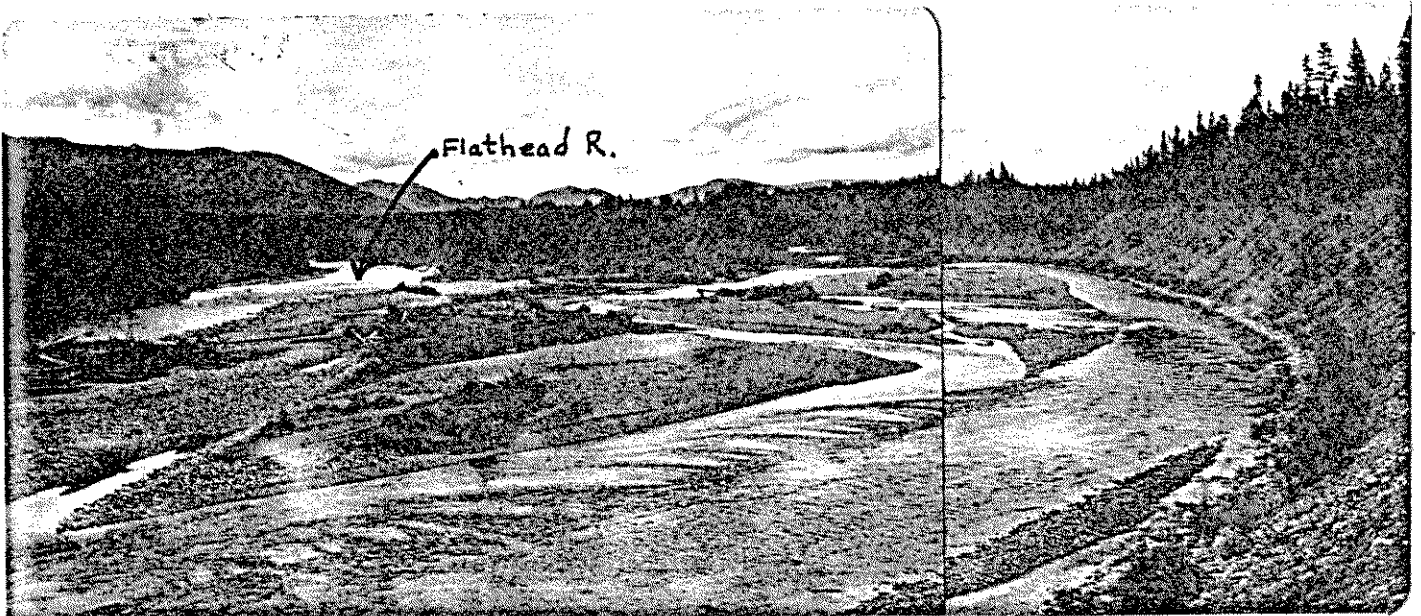
5% coarse sand

1% boulder

moderate compaction. This region has good potential as a spawning bed.



Picture 15 - Mouth of Sage Creek showing entry into river.



Picture 16 - looking upstream from Sage Creek mouth illustrating wide active bed flood plain and loose unstable bank.

The remainder of reach I is characterized by a coarser substrate composition, averaging:

- 15% small gravel
- 20% large gravel
- 30% small rubble
- 30% large rubble
- 5% coarse sand

There are several areas with up to 10% boulder, and areas such as pools with up to 40% sand, but these are exceptions.

Reach II and reach III become progressively coarser in substrate.

Reach II averages:

- 15% small gravel
- 15% large gravel
- 25% small rubble
- 25% large rubble
- 10% boulder
- 10% bedrock

with:

- 10% small gravel
- 15% large gravel
- 30% small rubble
- 35% large rubble
- 10% boulder

in reach III with 50% angular.

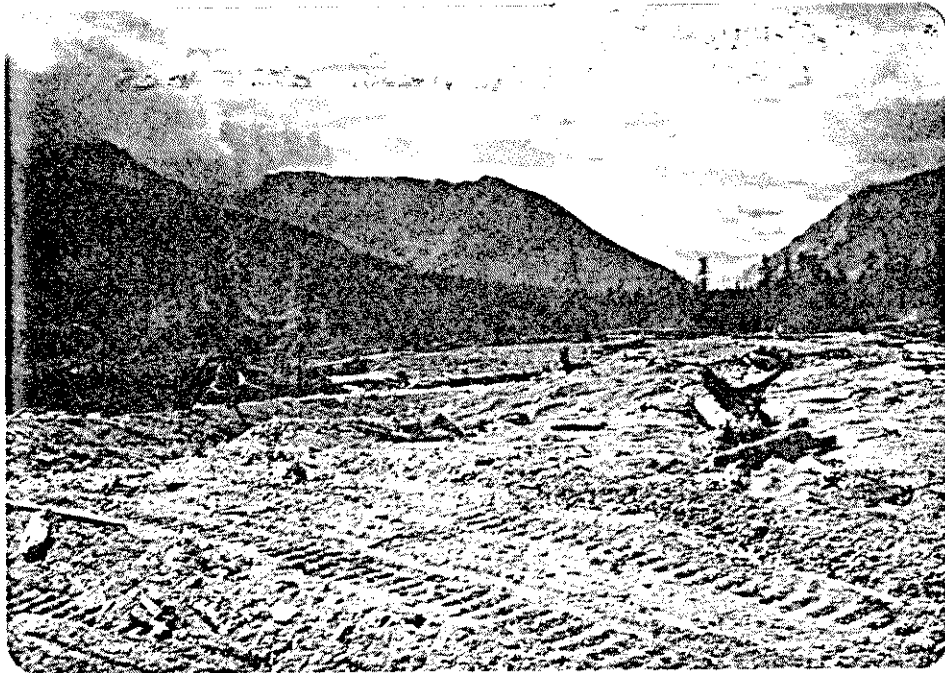
Channel Type

Most of reach I is highly braided. Bars, back channels, side channels, log jams are extremely abundant.

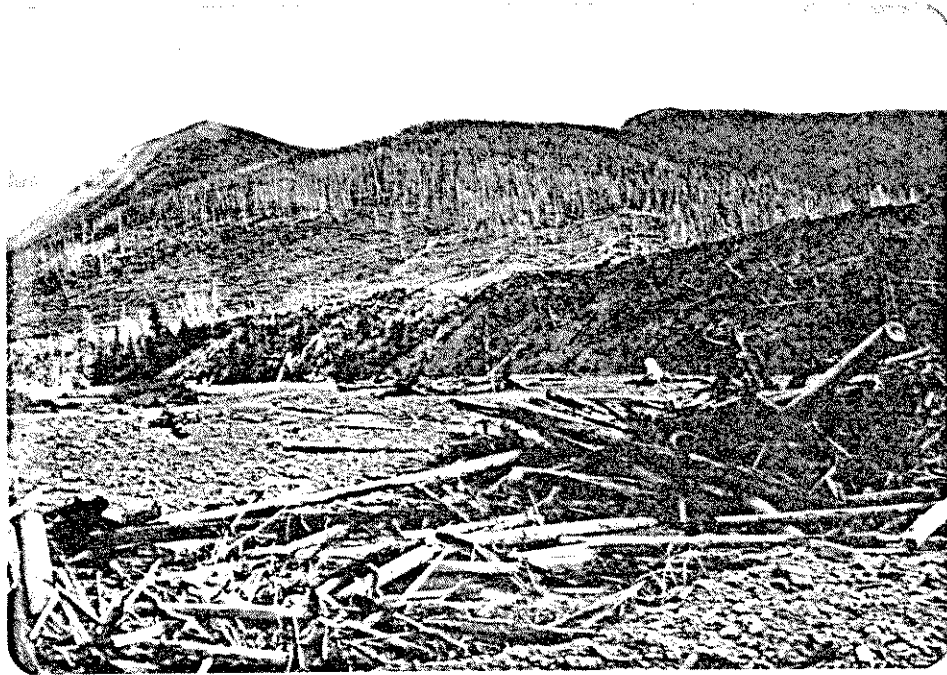
The channel is generally braided with little or no incision, often being a permanent multiple thread, but usually we see a dispersal of flow over a very large active bed, as in picture 16. There is minor undercutting of banks in narrower sections.



Picture 17 - Reach break between reaches II and III at 18 km. Deeply insised channel with successive chutes and falls. Total Barrier to migratory fish.



Picture 18 - Sage above falls looking downstream from mouth of Roche Creek into the valley of Reach II.



Picture 19 - Sage Creek above falls looking upstream from Roche Creek - Note fine bank material with slumping and drainage channels. Wood debris and signs of channel movement characterize lower reach III.

It is worth noting that reach I could be broken into several reaches on the basis of channel type. Variation in degree of braiding and active bed width are so extreme over such short stretches of stream that the breakdown into more reaches would not be worth the effort required. It is sufficient to say that this 14.0 km. stretch is very braided with the occasional short break in this multi-thread character.

Braiding in reach II diminishes to the point where it is best described as a single thread with some bar built side and back channels. Channel confinement is high throughout reach II, steep high hillsides and bedrock accounting for it.

Although having a wider active bed than reach II, reach III is unbraided, due to a relatively steep gradient. The channel is generally straight and well confined.

Flow Pattern - Pool-Run-Riffle

Reach I is a uniform swirl averaging :

60% run

20% pool

20% riffle

Run approaches 75-80% as we enter and is carried on well up into reach III. Flow is a uniform swirl with the exception of a bedrock section at the beginning of reach II, and at the falls at 18.0 km.

Obstructions

Successive chutes and a falls (8m.) from mouth, channel deeply incised into bedrock. (see picture 17). A barrier to fish.

Stream Cover

Stream is covered up to 3/10 by thick scrub vegetation in lower reach I, with 0/10 cover in a large section with a wide active bed. Cover from Procter Lake outlet to the falls (reach III) is 2/10 - 3/10. Above the falls, logging has removed 99% of the riparian vegetation. (pictures 18 and 19)

Fish

There are no fish present above the falls on Sage Creek. Sampling techniques yielded Yellowstone Cutthroat and Rocky Mountain Whitefish only. All whitefish were sexually mature, and a large number (est. 20) were congregated in the pool below the falls, presumably preparing to spawn.

Angling sample I cutthroat - 15.0 cm.

Angling sample II

Cutthroat

Rocky Mountain Whitefish

14.0 cm.

30 cm. mature

*16.5 cm. mature 0

*24.5 cm. mature 0

*30.0 cm. mature 0

*scale sample taken

Electroshocker sample (see map IX)

Cutthroat - plus 6 slimy sculpins ranging from 4.0 - 9.5 cm.

5.5 cm.

6.0 (X2)

Overall abundance of fish is quite low. The two angling sites were the only place where fly/spinner sampling was successful. It appears that the fish

in Sage Creek are constantly migrating within the drainage. Angling site I was fished extensively for many evenings with no strikes. One evening 10-15 small trout were observed surface feeding. One was caught at that time. Fish were not observed at this point again.

Angling site II was suggested as a good fishing spot after many hours of attempting to sample Sage Creek. The information proved to be correct, sample site II, a 90% bedrock bend in the stream, had several large trout and whitefish in its two deep pools.

Aquatic Plants

None.

Invertebrates

Presence of some small crustaceans and aquatic insects noted but no estimation of abundance. Probable low/moderate density.

Bank Material - Bank and Hillside Stability

A very high % loose unsorted sand gravel rubble. Picture 16 illustrates the high loose banks at the mouth, very common in form throughout the Flathead drainage. Picture 19 illustrates above the falls a similar situation in the finer high% clay material. Note the slumping banks with runoff channels in picture 19 and compare to pictures 15 and 16. A combination of finer bank material and water movement throughout the clearcut has increased the bank instability above the falls. Generally we have a movement from coarse to fine material as we move upstream from the mouth. The lower portion being largely sand gravel with the upper drainage being a high percentage clay silt with some sand/gravel.

Most of reach I is quite flat and bank stability is quite high. The unstable portions of II and III as illustrated in picture 18, are intermittent. Siltation potential is highest in reach III.

General Vegetation Type

Variation from 50% scrub 50% forest in reach I to 90% coniferous forest in reach II, to clearcut in reach III.

Tributaries

There is only one significant tributary below the falls, Nettie Creek, which may be of some rearing importance. It is very poorly confined at its mouth and has a characteristically muddy bottom through most of its course. Procter Lake outlet has little or no significance to the Sage Creek system. Procter lake has a resident cutthroat population thanks to Fish and Wildlife stocking of the lake.

Tributaries above the falls are summarized in Table I and in map IX.

Table I

Stream	Temp.	Discharge	Substrate Type	Gradient	Accessible length to fish	Fisheries Potential
Sunkist Cr.	7.5°C	0.23m ³ /sec	75% coarse	10% 1km. from mouth	1 km.	H-F R-F S-P
Ruby Cr.	8.5°C	1.42m ³ /sec	90% coarse	3-6%	1 km.	
Flanders Cr.*	8.0°C	0.23m ³ /sec	50% coarse/ 30% bedrock	3-8%	1 km.	H-G R-G S-L
Roche Cr.*	9.0°C	0.23m ³ /sec	30% bedrock 20% fine 50% coarse	2-4%	3 km.	H-F R-F S-L H-G R-G S-G

(reference key on next page)

Water quality was good in all cases.

* indicates adjacent logging

spawning (S) - rearing (R) - holding (H)

Potential graded - poor (P) - fair (F) - good (G) - excellent (E)

Land Use

Logging and small scale gravel mining.

Pollution Sources

Erosion in upper drainage (see picture 19)

Recreational Potential

Some hunting - Sage Creek Hunting camp.

Improvement Potential

Abundant good habitat above the falls but low abundance fish below the falls indicates that a fish ladder would probably be a wasted effort.

Historical Notes

An old oil well is situated on Joe McDougals property. Mr. McDougal is a guide/outfitter who has been on Sage Creek for over 25 years. His knowledge of the Flathead Valley was of great assistance.

Additional Notes

It was reported to us by Mr. McDougal that people had been using explosives in the pool below the falls to capture fish.



IV TRIBUTARIES TO THE MIDDLE FLATHEAD

Commerce
Parker
Tributaries 1-9
Middlepass
Cate
Pollock
St. Eloi
Shepp
Harvey

(refer to Map XI)



-124
STREAM INVENTORY PARAMETERS

NAME Commerce Creek DATE Aug. 23/75 REF. NO. _____
Mo. Day Year

TEAM Gunville Sebastian

TRIBUTARY TO Flathead River

SURVEY; TYPE road/*walking; QUALITY good MAP NO. 82G/SE

REACH entire drainage REF. NO. _____

LOCATION LAT: 49 03 00 LONG 114 29 40 OTHER MAPPING 82F/1
Deg. Min. Sec. Deg. Min. Sec.

LENGTH (KM) 14.5 LENGTH ACCESSIBLE TO 14.5 AVG. DEPTH AT _____
MIGRANT FISH (KM) AVG. WETTED WIDTH _____

ELEVATION RANGE 4300' - 6800' DRAINAGE AREA 100 sq. km. T.D.S. (PPM) _____

WETTED WIDTH (AVG.) _____ ACTIVE BED WIDTH (AVG.) _____ ph _____
RANGE _____ RANGE _____ O₂ (PPM) _____

FLOOD PLAIN WIDTH _____ DISCHARGE ; ACTUAL _____ ; RANGE _____

TIME / TEMP. °C AIR _____ COLOUR _____

TIME / TEMP. °C WATER _____ TURBIDITY _____

WEATHER CONDITIONS _____

CHECK LIST: X = RECORDED IN REPORT : N.R. = NOT RECORDED : N.N. = NOT NOTED

- | | |
|-----------------------------------|--|
| 1. <u>X</u> GENERAL DESCRIPTION | 13. <u>X</u> BANK AND HILLSIDE STABILITY |
| 2. <u>X</u> OVERALL PRODUCTIVITY | 14. <u>X</u> GENERAL VEGETATION TYPE |
| 3. <u>X</u> GRADIENT-SUBSTRATE | 15. <u>X</u> TRIBUTARIES |
| 4. <u>X</u> CHANNEL TYPE | 16. <u>X</u> LAND USE |
| 5. <u>X</u> FLOW PATTERN | 17. <u>X</u> ACCESS |
| 6. <u>X</u> POOL-RUN-RIFFLE RATIO | 18. <u>NN</u> POLLUTION SOURCES |
| 7. <u>X</u> OBSTRUCTIONS | 19. <u>X</u> RECREATIONAL POTENTIAL |
| 8. <u>X</u> STREAM COVER | 20. <u>NN</u> IMPROVEMENT POTENTIAL |
| 9. <u>X</u> FISH | 21. <u>NN</u> PROTECTION PROBLEMS |
| 10. <u>X</u> AQUATIC PLANTS | 22. <u>NN</u> ADDITIONAL NOTES |
| 11. <u>X</u> INVERTEBRATES | 23. <u>NN</u> HISTORICAL INFORMATION |
| 12. <u>X</u> BANK MATERIAL | |

* Note if parameters are measured (MEAS) or estimated (EST)

STREAM INVENTORY PARAMETERS

NAME Commerce Creek DATE Aug. 23, 1975 REF. NO. _____
 Mo. Day Year

TEAM Gunville and Sebastian

TRIBUTARY TO Flathead River

SURVEY; TYPE road/walking; QUALITY good MAP NO. 82G/SE

REACH mouth to 3.5 km. Reach I REF. NO. _____

LOCATION LAT: _____ LONG _____ OTHER MAPPING _____
 Deg. Min. Sec. Deg. Min. Sec.

LENGTH (KM) 3.5 LENGTH ACCESSIBLE TO 3.5 AVG. DEPTH AT .23
 MIGRANT FISH (KM) _____ AVG. WETTED WIDTH _____

ELEVATION RANGE 4300-4400 DRAINAGE AREA _____ T.D.S. (PPM) _____

WETTED WIDTH (AVG.) 7m. ACTIVE BED WIDTH (AVG.) 10m. ph _____
 RANGE 5 - 10 m. RANGE 8 - 15 m.

FLOOD PLAIN WIDTH up to 50m. DISCHARGE ; ACTUAL .7075m³/sec RANGE .28 - 1.75m³/sec

TIME/TEMP. °C AIR 1200/26°C COLOUR none

TIME/TEMP. °C WATER 1200/10°C TURBIDITY clear

WEATHER CONDITIONS 9/10 overcast

CHECK LIST: X = RECORDED IN REPORT : N.R. = NOT RECORDED : N.N. = NOT NOTED

- | | |
|--------------------------------|---------------------------------------|
| 1. _____ GENERAL DESCRIPTION | 13. _____ BANK AND HILLSIDE STABILITY |
| 2. _____ OVERALL PRODUCTIVITY | 14. _____ GENERAL VEGETATION TYPE |
| 3. _____ GRADIENT-SUBSTRATE | 15. _____ TRIBUTARIES |
| 4. _____ CHANNEL TYPE | 16. _____ LAND USE |
| 5. _____ FLOW PATTERN | 17. _____ ACCESS |
| 6. _____ POOL-RUN-RIFFLE RATIO | 18. _____ POLLUTION SOURCES |
| 7. _____ OBSTRUCTIONS | 19. _____ RECREATIONAL POTENTIAL |
| 8. _____ STREAM COVER | 20. _____ IMPROVEMENT POTENTIAL |
| 9. _____ FISH | 21. _____ PROTECTION PROBLEMS |
| 10. _____ AQUATIC PLANTS | 22. _____ ADDITIONAL NOTES |
| 11. _____ INVERTEBRATES | 23. _____ HISTORICAL INFORMATION |
| 12. _____ BANK MATERIAL | |

* Note if parameters are measured (MEAS) or estimated (EST)

STREAM INVENTORY PARAMETERS

NAME Commerce Creek DATE Aug. 23 75 REF. NO. _____
 Mo. Day Year

TEAM Gunville and Sebastian

TRIBUTARY TO Flathead River

SURVEY; TYPE *walking/road; QUALITY good MAP NO. 82G/SE

REACH 3.5 - 9.0 km. Reach II REF. NO. _____

LOCATION LAT: _____ LONG _____ OTHER MAPPING 82/GI
 Deg. Min. Sec. Deg. Min. Sec.

LENGTH (KM) 5.5 LENGTH ACCESSIBLE TO 5.5 AVG. DEPTH AT 31'
 MIGRANT FISH (100) AVG. WETTED WIDTH _____

ELEVATION RANGE 4400-4900 DRAINAGE AREA _____ T.D.S. (PPM) _____

WETTED WIDTH (AVG.) 6m. ACTIVE BED WIDTH (AVG.) 8m. ph _____
 RANGE 5-10 m/ RANGE 6-12 m. O₂ (PPM) _____

FLOOD PLAIN WIDTH 15-30 DISCHARGE ; ACTUAL .7075; RANGE 28 - 1.75 m³/sec

TIME/TEMP. °C AIR 1400/25°C COLOUR none

TIME/TEMP. °C WATER 1400/10°C TURBIDITY clear

WEATHER CONDITIONS 9/10 overcast

CHECK LIST: X = RECORDED IN REPORT : N.R.= NOT RECORDED : N.N.= NOT NOTED

- | | |
|--------------------------------|---------------------------------------|
| 1. _____ GENERAL DESCRIPTION | 13. _____ BANK AND HILLSIDE STABILITY |
| 2. _____ OVERALL PRODUCTIVITY | 14. _____ GENERAL VEGETATION TYPE |
| 3. _____ GRADIENT-SUBSTRATE | 15. _____ TRIBUTARIES |
| 4. _____ CHANNEL TYPE | 16. _____ LAND USE |
| 5. _____ FLOW PATTERN | 17. _____ ACCESS |
| 6. _____ POOL-RUN-RIFFLE RATIO | 18. _____ POLLUTION SOURCES |
| 7. _____ OBSTRUCTIONS | 19. _____ RECREATIONAL POTENTIAL |
| 8. _____ STREAM COVER | 20. _____ IMPROVEMENT POTENTIAL |
| 9. _____ FISH | 21. _____ PROTECTION PROBLEMS |
| 10. _____ AQUATIC PLANTS | 22. _____ ADDITIONAL NOTES |
| 11. _____ INVERTEBRATES | 23. _____ HISTORICAL INFORMATION |
| 12. _____ BANK MATERIAL | |

* Note if parameters are measured (MEAS) or estimated (EST)

STREAM INVENTORY PARAMETERS

NAME Commerce Creek DATE Aug 23 75 REF. NO. _____
Mo. Day Year

TEAM Gunville and Sebastian

TRIBUTARY TO Flathead River

SURVEY; TYPE road/*Walking; QUALITY good MAP NO. 82G/SE

REACH 9.0 km. to 13.0 km. Reach III REF. NO. _____

LOCATION LAT: _____ LONG _____ OTHER MAPPING 82G/I
Deg. Min. Sec. Deg. Min. Sec.

LENGTH (KM) 4.0 LENGTH ACCESSIBLE TO _____ AVG. DEPTH AT _____
MIGRANT FISH (KM) _____ AVG. WETTED WIDTH _____

ELEVATION RANGE 4900' DRAINAGE AREA _____ T.D.S. (PPM) _____

WETTED WIDTH (AVG.) 4m. ACTIVE BED WIDTH (AVG.) 5m. ph _____
RANGE 3-8 m. RANGE 4-10m O₂ (PPM) _____

FLOOD PLAIN WIDTH up to 50m. DISCHARGE ; ACTUAL 43m³/sec; RANGE 28-10

TIME/TEMP. °C AIR 1500/25°C COLOUR none

TIME/TEMP. °C WATER 1500/8°C TURBIDITY clear

WEATHER CONDITIONS 9/10 overcast

CHECK LIST: X = RECORDED IN REPORT : N.R. = NOT RECORDED : N.N. = NOT NOTED

- | | |
|--------------------------------|---------------------------------------|
| 1. _____ GENERAL DESCRIPTION | 13. _____ BANK AND HILLSIDE STABILITY |
| 2. _____ OVERALL PRODUCTIVITY | 14. _____ GENERAL VEGETATION TYPE |
| 3. _____ GRADIENT-SUBSTRATE | 15. _____ TRIBUTARIES |
| 4. _____ CHANNEL TYPE | 16. _____ LAND USE |
| 5. _____ FLOW PATTERN | 17. _____ ACCESS |
| 6. _____ POOL-RUN-RIFFLE RATIO | 18. _____ POLLUTION SOURCES |
| 7. _____ OBSTRUCTIONS | 19. _____ RECREATIONAL POTENTIAL |
| 8. _____ STREAM COVER | 20. _____ IMPROVEMENT POTENTIAL |
| 9. _____ FISH | 21. _____ PROTECTION PROBLEMS |
| 10. _____ AQUATIC PLANTS | 22. _____ ADDITIONAL NOTES |
| 11. _____ INVERTEBRATES | 23. _____ HISTORICAL INFORMATION |
| 12. _____ BANK MATERIAL | |

* Note if parameters are measured (MEAS) or estimated (EST)

-120-
STREAM INVENTORY PARAMETERS

NAME Commerce Creek DATE Aug. 23, 75 REF. NO. _____
Mo. Day Year

TEAM Gunville and Sebastian

TRIBUTARY TO Flathead River

SURVEY; TYPE road/walking ; QUALITY good MAP NO. 82G/SE

REACH 13.0 to end Reach IV REF. NO. _____

LOCATION LAT: _____ LONG _____ OTHER MAPPING 82G/1
Deg. Min. Sec. Deg. Min. Sec.

LENGTH (KM) 3.5 LENGTH ACCESSIBLE TO 3.5 AVG. DEPTH AT _____
MIGRANT FISH (KM) _____ AVG. WETTED WIDTH _____

ELEVATION RANGE 4900-6800' DRAINAGE AREA _____ T.D.S. (PPM) _____

WETTED WIDTH (AVG.) 3m. ACTIVE BED WIDTH (AVG.) 5 m. ph _____
RANGE 2-5m. RANGE 4-7 m.

FLOOD PLAIN WIDTH 10-20m. DISCHARGE ; ACTUAL .23/m³/sec RANGE .13-8 m³/sec

TIME/TEMP. °C AIR 1500/25°C COLOUR none

TIME/TEMP. °C WATER 1500/7°C TURBIDITY clear

WEATHER CONDITIONS 9/10 overcast

CHECK LIST: X = RECORDED IN REPORT : N.R. = NOT RECORDED : N.N. = NOT NOTED

- | | |
|--------------------------------|---------------------------------------|
| 1. _____ GENERAL DESCRIPTION | 13. _____ BANK AND HILLSIDE STABILITY |
| 2. _____ OVERALL PRODUCTIVITY | 14. _____ GENERAL VEGETATION TYPE |
| 3. _____ GRADIENT-SUBSTRATE | 15. _____ TRIBUTARIES |
| 4. _____ CHANNEL TYPE | 16. _____ LAND USE |
| 5. _____ FLOW PATTERN | 17. _____ ACCESS |
| 6. _____ POOL-RUN-RIFFLE RATIO | 18. _____ POLLUTION SOURCES |
| 7. _____ OBSTRUCTIONS | 19. _____ RECREATIONAL POTENTIAL |
| 8. _____ STREAM COVER | 20. _____ IMPROVEMENT POTENTIAL |
| 9. _____ FISH | 21. _____ PROTECTION PROBLEMS |
| 10. _____ AQUATIC PLANTS | 22. _____ ADDITIONAL NOTES |
| 11. _____ INVERTEBRATES | 23. _____ HISTORICAL INFORMATION |
| 12. _____ BANK MATERIAL | |

* Note if parameters are measured (MEAS) or estimated (EST)

Commerce Creek

General Description - Overall Productivity

Commerce creek is a clear moderate gradient stream with a large seasonal fluctuation in discharge. It is similar to Sage Creek in many physical parameters, and it is similarly deficient in fish in relation to the high fisheries potential. On this basis we rate overall productivity as low.

Reach breaks have been situated on the basis of channel confinement, reaches I and III being relatively unconfined as compared to II and IV. (refer to map X)

Gradient Substrate

Gradient is within 2-3% over the entire stream. Variation within these figures is not significant. Generally reach I and lower reach II do not rise above 2.5%, while the remaining sections do not fall below 2.5%.

Substrate composition averages: 20% small gravel

25% large gravel

30% small rubble

5% large rubble

5% bedrock

5% sand

for reach I with a high % angular.

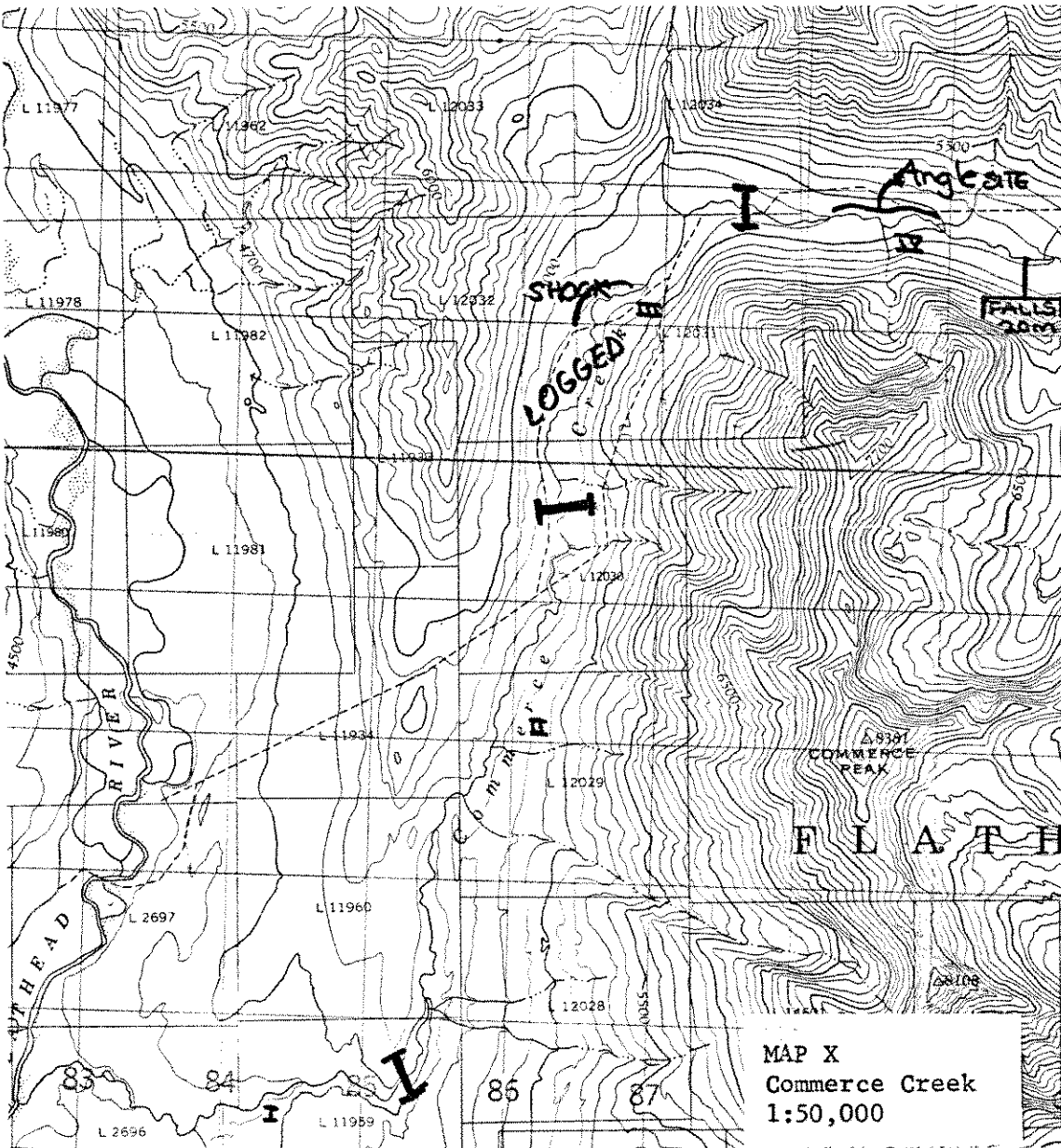
The average three reaches are relatively consistent coarser bottom type.

20% small gravel

30% large gravel

30% small rubble

20% large rubble



The compaction is moderate and suitability for spawning is good.

Channel Type

Reach I is a relatively unconfined stretch with lots of side and back channels. The wide active bed indicates a wide season fluctuation of discharge. Minor log jams are found near the mouth.

Reach II enters a steep canyon and is somewhat confined. The single thread channel is regular with some back eddies but little channelization.

Reach III is much the same as reach I, with exposed gravel bars, a wide active bed and barbuilt back and side channels.

Reach IV is more confined with some undercutting of banks but generally a regular, uncut single thread.

Flow Pattern - Pool Run Riffle

Flow is a uniform swirl throughout the drainage. Pool Run Riffle information was much the same throughout the entire drainage consistent with gradient. With the exception of reach IV, the average was:

20% pool
60% run
20% riffle

In reach IV pool was less due to a slight increase in gradient.

10% pool
65% run
25% riffle

Obstructions - 20 m. falls approximately 17.0km. from mouth.

Stream Cover

Most stream cover is provided by alder and willow (10-20%).

Fish

Abundance in this system appeared low, individuals seemed to be

in isolated pockets with one or two other fish, as in Sage Creek. A few fry (3-5cm.) were seen in the backwaters of reach I and electroshocking in reach II yielded one 4.5 cm. cutthroat. (map X) Three (13 cm., 17 cm, 20 cm) trout were obtained through angling in reach IV (see map X)

Our data confirms that Commerce Creek is definitely a spawning/rearing system, but no realistic estimation of population density was possible.

Aquatic plants

Green algae was abundant on rocks in some streams.

Invertebrates

Small aquatic invertebrates were extremely abundant.

Bank Material - Bank and Hillside Stability

Banks are largely clay/gravel with some sedimentary sections. Stability is moderate. Upland soils are largely alluvium and very unstable. In the wider flood plains, cutbanks were common. Slumpage in the logged area was negligible. Overall land stability is not a problem in the Commerce Creek drainage.

General Vegetation Type

Scrub vegetation dominates in the lower reach with the uppers being almost 100% coniferous forest. Pine ridges are dominant in the steep sections.

Tributaries

All tributaries were steep and very limited in fisheries potential.

Land Use

Logging

Access

Road (washout - fordable)

Recreational Potential

Good hunting area, would be good for fishing if they were more abundant.

PARKER CREEK AND TRIBUTARIES 1-9

(refer to map XI)

I Parker Creek

II Tributaries 1-9



STREAM INVENTORY PARAMETERS

NAME Parker Creek DATE Sept. 6, 1975 REF. NO. _____
Mo. Day Year

TEAM Cawn and Gunville

TRIBUTARY TO Flathead River

SURVEY; TYPE walking; QUALITY good MAP NO. 82G/SE

REACH entire drainage REF. NO. _____

LOCATION LAT: 49 14 00 LONG 114 33 00 OTHER MAPPING 82G/2
Deg. Min. Sec. Deg. Min. Sec.

LENGTH (KM) 4.0 km. LENGTH ACCESSIBLE TO 0 AVG. DEPTH AT _____
MIGRANT FISH (KM) _____ AVG. WETTED WIDTH _____

ELEVATION RANGE 4300-5500' DRAINAGE AREA 6 sq. km. T.D.S. (PPM) _____

WETTED WIDTH (AVG.) _____ ACTIVE BED WIDTH (AVG.) _____ ph _____
RANGE _____ RANGE _____ O₂ (PPM) _____

FLOOD PLAIN WIDTH _____ DISCHARGE ; ACTUAL _____ ; RANGE _____

TIME/TEMP. °C AIR _____ COLOUR _____

TIME/TEMP. °C WATER _____ TURBIDITY _____

WEATHER CONDITIONS _____

CHECK LIST: X = RECORDED IN REPORT : N.R. = NOT RECORDED : N.N. = NOT NOTED

- | | |
|-----------------------------------|--|
| 1. <u>X</u> GENERAL DESCRIPTION | 13. <u>X</u> BANK AND HILLSIDE STABILITY |
| 2. <u>X</u> OVERALL PRODUCTIVITY | 14. <u>X</u> GENERAL VEGETATION TYPE |
| 3. <u>X</u> GRADIENT-SUBSTRATE | 15. <u>X</u> TRIBUTARIES |
| 4. <u>X</u> CHANNEL TYPE | 16. <u>X</u> LAND USE |
| 5. <u>X</u> FLOW PATTERN | 17. <u>X</u> ACCESS |
| 6. <u>X</u> POOL-RUN-RIFFLE RATIO | 18. <u>NN</u> POLLUTION SOURCES |
| 7. <u>X</u> OBSTRUCTIONS | 19. <u>NN</u> RECREATIONAL POTENTIAL |
| 8. <u>X</u> STREAM COVER | 20. <u>X</u> IMPROVEMENT POTENTIAL |
| 9. <u>X</u> FISH | 21. <u>NN</u> PROTECTION PROBLEMS |
| 10. <u>X</u> AQUATIC PLANTS | 22. <u>NN</u> ADDITIONAL NOTES |
| 11. <u>X</u> INVERTEBRATES | 23. <u>NN</u> HISTORICAL INFORMATION |
| 12. <u>X</u> BANK MATERIAL | |

* Note if parameters are measured (MEAS) or estimated (EST)

STREAM INVENTORY PARAMETERS

NAME Parker Creek DATE Sept 6, 75 REF. NO. _____
Mo. Day Year

TEAM Caw and Gunville

TRIBUTARY TO Flathead River

SURVEY; TYPE walking; QUALITY good MAP NO. 82G/SE

REACH lower 1.0 km. Reach I REF. NO. _____

LOCATION LAT: _____ LONG _____ OTHER MAPPING 82G/2
Deg. Min. Sec. Deg. Min. Sec.

LENGTH (KM) 1.0 km. LENGTH ACCESSIBLE TO 0 AVG. DEPTH AT .5m
MIGRANT FISH (KM) AVG. WETTED WIDTH

ELEVATION RANGE _____ DRAINAGE AREA _____ T.D.S. (PPM) _____

WETTED WIDTH (AVG.) 20m. ACTIVE BED WIDTH (AVG.) 40m. ph _____
RANGE 10-50 RANGE 20-75

O₂ (PPM) _____

FLOOD PLAIN WIDTH up to 100m DISCHARGE ; ACTUAL .339m³/sec; RANGE .28-1.4

TIME/TEMP. °C AIR 1400-24°C COLOUR none

TIME/TEMP. °C WATER 1400-11°C TURBIDITY light

WEATHER CONDITIONS sunny and clear

CHECK LIST: X = RECORDED IN REPORT : N.R.= NOT RECORDED : N.N.= NOT NOTED

- | | |
|--------------------------------|---------------------------------------|
| 1. _____ GENERAL DESCRIPTION | 13. _____ BANK AND HILLSIDE STABILITY |
| 2. _____ OVERALL PRODUCTIVITY | 14. _____ GENERAL VEGETATION TYPE |
| 3. _____ GRADIENT-SUBSTRATE | 15. _____ TRIBUTARIES |
| 4. _____ CHANNEL TYPE | 16. _____ LAND USE |
| 5. _____ FLOW PATTERN | 17. _____ ACCESS |
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| 11. _____ INVERTEBRATES | 23. _____ HISTORICAL INFORMATION |
| 12. _____ BANK MATERIAL | |

* Note if parameters are measured (MEAS) or estimated (EST)

STREAM INVENTORY PARAMETERS

NAME Parker Creek DATE Sept: 6/75 REF. NO. _____
Mo. Day Year

TEAM Caw and Gunville

TRIBUTARY TO Flathead River

SURVEY; TYPE walking; QUALITY good MAP NO. 82G/SE

REACH upper 3.0 km. Reach II REF. NO. _____

LOCATION LAT: _____ LONG _____ OTHER MAPPING 82/G2
Deg. Min. Sec. Deg. Min. Sec.

LENGTH (KM) 3.0 km. LENGTH ACCESSIBLE TO 0 AVG. DEPTH AT 5m
MIGRANT FISH (KM) _____ AVG. WETTED WIDTH _____

ELEVATION RANGE _____ DRAINAGE AREA _____ T.D.S. (PPM) _____

WETTED WIDTH (AVG.) 6m. ACTIVE BED WIDTH (AVG.) 10m ph _____
RANGE 4-8 m. RANGE 8-15 m.

FLOOD PLAIN WIDTH 15-50m DISCHARGE ; ACTUAL 339m³/sec; RANGE 28 1.4 m³/sec.

TIME/TEMP. °C AIR 1400 - 24°C COLOUR none

TIME/TEMP. °C WATER 1400-5°C TURBIDITY none

WEATHER CONDITIONS sunny and clear

CHECK LIST: X = RECORDED IN REPORT : N.R.= NOT RECORDED : N.N.= NOT NOTED

- | | |
|--------------------------------|---------------------------------------|
| 1. _____ GENERAL DESCRIPTION | 13. _____ BANK AND HILLSIDE STABILITY |
| 2. _____ OVERALL PRODUCTIVITY | 14. _____ GENERAL VEGETATION TYPE |
| 3. _____ GRADIENT-SUBSTRATE | 15. _____ TRIBUTARIES |
| 4. _____ CHANNEL TYPE | 16. _____ LAND USE |
| 5. _____ FLOW PATTERN | 17. _____ ACCESS |
| 6. _____ POOL-RUN-RIFFLE RATIO | 18. _____ POLLUTION SOURCES |
| 7. _____ OBSTRUCTIONS | 19. _____ RECREATIONAL POTENTIAL |
| 8. _____ STREAM COVER | 20. _____ IMPROVEMENT POTENTIAL |
| 9. _____ FISH | 21. _____ PROTECTION PROBLEMS |
| 10. _____ AQUATIC PLANTS | 22. _____ ADDITIONAL NOTES |
| 11. _____ INVERTEBRATES | 23. _____ HISTORICAL INFORMATION |
| 12. _____ BANK MATERIAL | |

* Note if parameters are measured (MEAS) or estimated (EST)



MAP XI
East side Tributaries and West Side
Minor tributaries to Flathead River
1:126,000

I Parker Creek

General Description - Overall Productivity

Like most streams entering the Flathead along this western side, the mouth of Parker Creek is blocked by severe debris buildups and beaver dams, creating a swamp at the mouth. These obstructions are probably passable during high water.

The lower 4-5 km. of stream, as shown in map XI, no longer exists. After crossing the Flathead Road (see map XI) the first time, the flow diffuses into a large section of swamp and small muddy ponds. Water seeps into the Flathead from this area. There was no evidence of the old stream bed below this point.

Reach II of Parker Creek has low to fair spawning and rearing potential, Reach I constituting an excellent rearing holding situation with large pools, warmer water and abundant invertebrate food items. Electroshocking just above this section was quite successful in the 10-17 cm. size class of cutthroat trout.

Overall productivity is rated as good, on the basis of good conditions for resident fish in the lower reach.

Gradient - Substrate

The lower portion is generally less than 1% sloped with this increasing to 2% into reach II. Reach I has some gravel in the transition zone between reach I and II, but it is generally very muddy.

The loose smooth substrate of reach II averages:

20% small gravel

40% large gravel
25% small rubble
10% large rubble
5% silt

Channel Type

Reach I very unconfined, excessive wood debris and permanent beaver dams. There is no defined channel.

Reach II is characterized by a confined channel, and frequent undercutting of the small banks.

Flow Pattern -Pool Run Riffle

Reach I is 100% swamp and placid pools. The flow pattern of reach II is a uniform swirl and average pool/run/riffle ratio of:

10% pool
30% riffle
60% run

The "transition" zone between reaches I and II averages 40% pool.

Obstructions

Log jams, beaverdams in reach I are blocking the stream during low water. The channels is probably passable during high water. There was no defined "mouth" at the time of survey.

Fish

Electroshocking of the transition zone between reaches I and II yielded the following cutthroat trout.

10.5 cm. 15 g. maturing ♂
12.0 cm. (X 2)
14.5 cm.
15.0 cm. (X 2)
17.0 cm. * 100 g. maturing ♂

The stream is most likely used by cutthroat spawners in the spring, but is cut off from the main river by the fall.

* indicates scale sample taken

Aquatic Plants

Typical swamp vegetation in lower reach I i.e. abundance grasses etc.

Invertebrates

Abundance of both aquatics and terrestrials.

Bank Material - Bank and Hillside Stability

There are no well defined banks in the lower section. Above this region banks are 90% clay-gravel-rubble. The banks are generally quite flat and stable throughout the lower 2 km. of reach II with minor erosion movement potential above.

General Vegetation Type

100% scrub vegetation in reach I is gradually succeeded by a pine-spruce forest into reach II.

Land Use - none

Access - creek crossed by main Flathead River Road, about 1 km. from the "mouth". (See map XI)

Improvement Possibilities

Clearance of debris in reach I might improve production, but at the expense of good rearing habitat.

II Tributaries (1-9)

Introduction

Tributaries 1 through 9, flow into the Flathead from the west. (see map XI) All are low discharge, low potential streams; no fish were found in any except #7. Tributaries 2-9, and Parker Creek constitute the only streams for a 19.0 km. stretch of the Flathead River. A brief description and summary of physical parameters follows in order of location along the North-South axis.

Tributary#1 - September 5, 1975

Temperature - 8°C

Average gradient - 2.5%

Wetted width - 2-4 meters

Active bed width - 5-10 m.

Substrate - fine (80% gravels)

Colour - nil

Discharge - .1132 m³/sec (4 CFS)

Tributary #1 provides approximately 1.5 km. of accessible stream to migratory fish. A 4 m. falls followed by a series of 60° chutes constitutes a definite barrier. Picture #20 illustrates the barrier; the extremely unstable banks and the high percentage of debris and stream cover typical of this stream. These factors are not nearly to extreme in the unconfined lower 1.5 km. Log jams are prevalent in this lower portion.

Relative to size, rearing and spawning potential appear good over the accessible section. Electroshocking was unsuccessful.



Picture 20 - Tributary #1 1.5 cm. from mouth illustrating barrier, unstable banks and thick streamside vegetation.

Tributary #2 Dry

Tributary #3 September 6, 1975

Temperature -8°C

Average Gradient - 4%

Wetted Width - 1-2m.

Active bed width - 2-5m.

Substrate - 60% gravel
30% small rubble
10% large rubble - slight angularity

color - nil.

discharge - .0566 m³/sec (2CFS)

Most of tributary #3 is heavily covered by scrub vegetation.

At the time of the survey the 200m. adjacent to the mouth was a wide swamp.

The first 1-2 km. may be accessible to fish during high water but overall potential is rated as very low due to lack of holding water, (50% riffle, 50% run) and low discharge. Banks were a stable clay ground mixture.

Channel is a confined single thread.

Tributary #4 - dry, 90% covered by scrub vegetation. Bed similar to that of tributary #3.

Tributary #5 September 6, 1975

Temperature 9°C

Average Gradient 12%

Wetted Width 1-2m.

Active bed width 2-5m.

Substrate - 90% smooth rubble

Discharge - a trickle (0.005 m³/sec)

color - nil

High gradient and low discharge are limiting to fish.

Tributary #6 September 6, 1975

Temperature 80°C

Gradient 7%

Wetted width 1-2 m.

Active bed width 3 m.

Discharge .028 m³/sec (ICFS)

Substrate 80% gravel

Too steep to allow fish, plus a culvert at road would block fish migration.

Tributary #7 September 6, 1975

Temperature 8°C

Average Gradient 4%

Wetted width 2-3 m.

Active bed width 3-6 m.

Substrate - 60% gravel
30% small rubble - smooth

color - nil

discharge - .028 m³/sec

Low discharge and 5% pooling are factors limiting to a fish population:

Stream cover up to 70% by scrub vegetation. The lower .5 km. is quite flat. Debris buildups have created many good pools. One cutthroat was shocked (14 cm.)

Tributary #8 - Dry

Tributary #9 September 7, 1975

Temperature 8.5°C

Average gradient 2%

Wetted width 3-5 m.

Active bed width 4-8 m.

Substrate 80% smooth gravel

color clear

Tributary #9 is blocked by a 2 m. falls and excessive wood debris, 200 m. from the mouth. Limited fisheries potential. May be minor rearing area in extreme lower portions.

STREAM INVENTORY PARAMETERS

NAME Middle Pass Creek DATE Sept 12, 1975 REF. NO. _____
Mo. Day Year

TEAM Caw and Gunville

TRIBUTARY TO Flathead River

SURVEY; TYPE walking/flying; QUALITY good MAP NO. 82G/SE

REACH entire drainage REF. NO. _____

LOCATION LAT: 49 11 00 LONG 114 29 45 OTHER MAPPING 82G/I
Deg. Min. Sec. Deg. Min. Sec.

LENGTH (KM) 11.0 km. LENGTH ACCESSIBLE TO nil AVG. DEPTH AT _____
MIGRANT FISH (M) AVG. WETTED WIDTH _____

ELEVATION RANGE 4400-7500' DRAINAGE AREA 250 km. T.D.S. (PPM) _____

WETTED WIDTH (AVG.) _____ ACTIVE BED WIDTH (AVG.) _____ ph _____
RANGE _____ RANGE _____ O₂ (PPM) _____

FLOOD PLAIN WIDTH _____ DISCHARGE ; ACTUAL _____ ; RANGE _____

TIME/TEMP. °C AIR _____ COLOUR _____

TIME/TEMP. °C WATER _____ TURBIDITY _____

WEATHER CONDITIONS _____

CHECK LIST: X = RECORDED IN REPORT : N.R. = NOT RECORDED : N.N. = NOT NOTED

- | | |
|-----------------------------------|--|
| 1. <u>X</u> GENERAL DESCRIPTION | 13. <u>X</u> BANK AND HILLSIDE STABILITY |
| 2. <u>X</u> OVERALL PRODUCTIVITY | 14. <u>X</u> GENERAL VEGETATION TYPE |
| 3. <u>X</u> GRADIENT-SUBSTRATE | 15. <u>X</u> TRIBUTARIES |
| 4. <u>X</u> CHANNEL TYPE | 16. <u>X</u> LAND USE |
| 5. <u>X</u> FLOW PATTERN | 17. <u>X</u> ACCESS |
| 6. <u>X</u> POOL-RUN-RIFFLE RATIO | 18. <u>NN</u> POLLUTION SOURCES |
| 7. <u>X</u> OBSTRUCTIONS | 19. <u>X</u> RECREATIONAL POTENTIAL |
| 8. <u>X</u> STREAM COVER | 20. <u>NN</u> IMPROVEMENT POTENTIAL |
| 9. <u>X</u> FISH | 21. <u>NN</u> PROTECTION PROBLEMS |
| 10. <u>X</u> AQUATIC PLANTS | 22. <u>X</u> ADDITIONAL NOTES |
| 11. <u>X</u> INVERTEBRATES | 23. <u>NN</u> HISTORICAL INFORMATION |
| 12. <u>X</u> BANK MATERIAL | |

* Note if parameters are measured (MEAS) or estimated (EST)

STREAM INVENTORY PARAMETERS

NAME Middlepass DATE Sept 12, 1975 REF. NO. _____
Mo. Day Year

TEAM Caw and Gunville

TRIBUTARY TO Flathead River

SURVEY; TYPE walking/flying; QUALITY good MAP NO. m 82G/SE

REACH mouth to 3.0 km. (mouth to Haig Brook) Reach I REF. NO. _____

LOCATION LAT: _____ LONG _____ OTHER MAPPING 82G/I
Deg. Min. Sec. Deg. Min. Sec.

LENGTH (KM) 3.0 km. LENGTH ACCESSIBLE TO _____ AVG. DEPTH AT .3 m
MIGRANT FISH (KM) _____ AVG. WETTED WIDTH _____

ELEVATION RANGE _____ DRAINAGE AREA _____ T.D.S. (PPM) _____

WETTED WIDTH (AVG.) 7 m. ACTIVE BED WIDTH (AVG.) 9 m. ph _____
RANGE 3-10 m. RANGE 6-20m. O₂ (PPM) _____

FLOOD PLAIN WIDTH 10- 30 m. DISCHARGE ; ACTUAL 1.415 ; RANGE .566 → 2.83

TIME/TEMP. °C AIR . 1100/24°C COLOUR clear

TIME/TEMP. °C WATER 1100/11°C TURBIDITY none

WEATHER CONDITIONS sunny and clear

CHECK LIST: X = RECORDED IN REPORT : N.R. = NOT RECORDED : N.N. = NOT NOTED

- | | |
|--------------------------------|---------------------------------------|
| 1. _____ GENERAL DESCRIPTION | 13. _____ BANK AND HILLSIDE STABILITY |
| 2. _____ OVERALL PRODUCTIVITY | 14. _____ GENERAL VEGETATION TYPE |
| 3. _____ GRADIENT-SUBSTRATE | 15. _____ TRIBUTARIES |
| 4. _____ CHANNEL TYPE | 16. _____ LAND USE |
| 5. _____ FLOW PATTERN | 17. _____ ACCESS |
| 6. _____ POOL-RUN-RIFFLE RATIO | 18. _____ POLLUTION SOURCES |
| 7. _____ OBSTRUCTIONS | 19. _____ RECREATIONAL POTENTIAL |
| 8. _____ STREAM COVER | 20. _____ IMPROVEMENT POTENTIAL |
| 9. _____ FISH | 21. _____ PROTECTION PROBLEMS |
| 10. _____ AQUATIC PLANTS | 22. _____ ADDITIONAL NOTES |
| 11. _____ INVERTEBRATES | 23. _____ HISTORICAL INFORMATION |
| 12. _____ BANK MATERIAL | |

* Note if parameters are measured (MEAS) or estimated (EST)

STREAM INVENTORY PARAMETERS

NAME Middlepass (Hair Brook) DATE Sept. 12, 197 REF. NO. _____
Mo. Day Year
TEAM Caw and Gunville
TRIBUTARY TO Flathead River
SURVEY; TYPE walking; QUALITY good MAP NO. 82G/SE
REACH Hair Brook Reach II REF. NO. _____
LOCATION LAT: _____ LONG _____ OTHER MAPPING 82G/1
Deg. Min. Sec. Deg. Min. Sec.
LENGTH (KM) 6.5 LENGTH ACCESSIBLE TO _____ AVG. DEPTH AT 20 cm.
MIGRANT FISH (KM) _____ AVG. WETTED WIDTH _____
ELEVATION RANGE _____ DRAINAGE AREA _____ T.D.S. (PPM) _____
WETTED WIDTH (AVG.) 7 m. ACTIVE BED WIDTH (AVG.) 9 ph _____
RANGE 5-10 RANGE 6-20 O₂ (PPM) _____
FLOOD PLAIN WIDTH 50-200 m. DISCHARGE ; ACTUAL .566 m³/sec; RANGE .3 2.0 m³/sec.
TIME/TEMP. °C AIR 1200/24 °C COLOUR clear
TIME/TEMP. °C WATER 1200/12 °C TURBIDITY none
WEATHER CONDITIONS sunny and clear

CHECK LIST: X = RECORDED IN REPORT : N.R.= NOT RECORDED : N.N.= NOT NOTED

- | | |
|--------------------------------|---------------------------------------|
| 1. _____ GENERAL DESCRIPTION | 13. _____ BANK AND HILLSIDE STABILITY |
| 2. _____ OVERALL PRODUCTIVITY | 14. _____ GENERAL VEGETATION TYPE |
| 3. _____ GRADIENT-SUBSTRATE | 15. _____ TRIBUTARIES |
| 4. _____ CHANNEL TYPE | 16. _____ LAND USE |
| 5. _____ FLOW PATTERN | 17. _____ ACCESS |
| 6. _____ POOL-RUN-RIFFLE RATIO | 18. _____ POLLUTION SOURCES |
| 7. _____ OBSTRUCTIONS | 19. _____ RECREATIONAL POTENTIAL |
| 8. _____ STREAM COVER | 20. _____ IMPROVEMENT POTENTIAL |
| 9. _____ FISH | 21. _____ PROTECTION PROBLEMS |
| 10. _____ AQUATIC PLANTS | 22. _____ ADDITIONAL NOTES |
| 11. _____ INVERTEBRATES | 23. _____ HISTORICAL INFORMATION |
| 12. _____ BANK MATERIAL | |

* Note if parameters are measured (MEAS) or estimated (EST) .

-150-
STREAM INVENTORY PARAMETERS

NAME Middlepass Creek DATE Sept. 12, 1975 REF. NO. _____
Mo. Day Year

TEAM Cav and Gunville

TRIBUTARY TO Flathead River

SURVEY; TYPE flying; QUALITY good MAP NO. 82C/SE

REACH 3.0 km. to 6.0 km. Reach III REF. NO. _____

LOCATION LAT: _____ LONG _____ OTHER MAPPING 82C/T
Deg. Min. Sec. Deg. Min. Sec.

LENGTH (KM) 3.0 km. LENGTH ACCESSIBLE TO _____ AVG. DEPTH AT _____
MIGRANT FISH (KM) _____ AVG. WETTED WIDTH _____

ELEVATION RANGE _____ DRAINAGE AREA _____ T.D.S. (PPM) _____

WETTED WIDTH (AVG.) 5 m. ACTIVE BED WIDTH (AVG.) 8 m. ph _____
RANGE 2-10 m. RANGE 6-15 m.

FLOOD PLAIN WIDTH 20-30 m. DISCHARGE ; ACTUAL 849 ; RANGE 566 → 2.8 m / sec
m / sec ³ O₂ (PPM) 3

TIME/TEMP, °C AIR _____ COLOUR none

TIME/TEMP, °C WATER _____ TURBIDITY none

WEATHER CONDITIONS sunny and clear

CHECK LIST: X = RECORDED IN REPORT : N.R. = NOT RECORDED : N.N. = NOT NOTED

- | | |
|--------------------------------|---------------------------------------|
| 1. _____ GENERAL DESCRIPTION | 13. _____ BANK AND HILLSIDE STABILITY |
| 2. _____ OVERALL PRODUCTIVITY | 14. _____ GENERAL VEGETATION TYPE |
| 3. _____ GRADIENT-SUBSTRATE | 15. _____ TRIBUTARIES |
| 4. _____ CHANNEL TYPE | 16. _____ LAND USE |
| 5. _____ FLOW PATTERN | 17. _____ ACCESS |
| 6. _____ POOL-RUN-RIFFLE RATIO | 18. _____ POLLUTION SOURCES |
| 7. _____ OBSTRUCTIONS | 19. _____ RECREATIONAL POTENTIAL |
| 8. _____ STREAM COVER | 20. _____ IMPROVEMENT POTENTIAL |
| 9. _____ FISH | 21. _____ PROTECTION PROBLEMS |
| 10. _____ AQUATIC PLANTS | 22. _____ ADDITIONAL NOTES |
| 11. _____ INVERTEBRATES | 23. _____ HISTORICAL INFORMATION |
| 12. _____ BANK MATERIAL | |

* Note if parameters are measured (MEAS) or estimated (EST)

STREAM INVENTORY PARAMETERS

NAME Middlepass Creek DATE Sept. 12, 1977 REF. NO. Mo. Day Year
TEAM Caw and Gunville
TRIBUTARY TO Flathead River
SURVEY; TYPE flying; QUALITY good MAP NO. 82G/SE
REACH 6.0 km. to end Reach IV REF. NO.
LOCATION LAT: LONG OTHER MAPPING 82G/I
Deg. Min. Sec. Deg. Min. Sec.
LENGTH (KM) 5.0 km. LENGTH ACCESSIBLE TO AVG. DEPTH AT .15 m.
MIGRANT FISH (100) AVG. WETTED WIDTH
ELEVATION RANGE DRAINAGE AREA T.D.S. (PPM)
WETTED WIDTH (AVG.) 3 m. ACTIVE BED WIDTH (AVG.) 5 m. ph
RANGE 2-5 m. RANGE 4-7 m.
O₂ (PPM)
FLOOD PLAIN WIDTH 10 m. DISCHARGE ; ACTUAL .28m³/sec ; RANGE .14 - .566m³/sec
TIME/TEMP. °C AIR 1200-2.5 °C COLOUR none
TIME/TEMP. °C WATER 1200 - 9°C TURBIDITY none
WEATHER CONDITIONS sunny and clear

CHECK LIST: X = RECORDED IN REPORT : N.R. = NOT RECORDED : N.N. = NOT NOTED

- | | |
|----------------------------------|---|
| 1. <u></u> GENERAL DESCRIPTION | 13. <u></u> BANK AND HILLSIDE STABILITY |
| 2. <u></u> OVERALL PRODUCTIVITY | 14. <u></u> GENERAL VEGETATION TYPE |
| 3. <u></u> GRADIENT-SUBSTRATE | 15. <u></u> TRIBUTARIES |
| 4. <u></u> CHANNEL TYPE | 16. <u></u> LAND USE |
| 5. <u></u> FLOW PATTERN | 17. <u></u> ACCESS |
| 6. <u></u> POOL-RUN-RIFFLE RATIO | 18. <u></u> POLLUTION SOURCES |
| 7. <u></u> OBSTRUCTIONS | 19. <u></u> RECREATIONAL POTENTIAL |
| 8. <u></u> STREAM COVER | 20. <u></u> IMPROVEMENT POTENTIAL |
| 9. <u></u> FISH | 21. <u></u> PROTECTION PROBLEMS |
| 10. <u></u> AQUATIC PLANTS | 22. <u></u> ADDITIONAL NOTES |
| 11. <u></u> INVERTEBRATES | 23. <u></u> HISTORICAL INFORMATION |
| 12. <u></u> BANK MATERIAL | |

* Note if parameters are measured (MEAS) or estimated (EST)

Middlepass Creek - refer to map XI

General Description - Overall Productivity

Middlepass creek is a clear fast flowing low-moderate sloped stream. Spawning potential appeared good in the lower sections. Rearing potential is low to fair, high potential being localized around the lower sections.

Overall productivity is rated as fair, on the basis of unsuccessful fish sampling, and on the paucity of rearing habitat. The stream goes underground 100 meters before the mouth but a dry stream bed continues indicating the existence of an open channel during high water.

Gradient - Substrate

Gradient averages 1% with a maximum of 20% over the first 3.0 km. Gradient slowly increases to 3% over the next 4 km. with isolated sections of 4-0% occurring around 6 km. from the mouth. The lower 3.0 km. averages:

20% small gravel
30% large gravel
30% small rubble
20% large rubble
5% boulder

becoming somewhat coarser and slightly angular above, averaging:

15% small gravel
20% large gravel
20% small rubble
30% large rubble
10% boulder
5% bedrock

with an increasing % boulder and degree of angularity into the headwaters.

Stream Channel

Middlepass Creek is slightly unconfined over the first 4-5 km. being characterized by frequent undercut banks and braided sections. Minor log jams are frequent in reach I and lower in reach II the remaining reaches are well confined with few side or back channels.

Flow Pattern - Pool-Run-Riffle Ratio

Flow is a consistent uniform swirl. Pool-Run-Riffle averages

10% pool

50% run

40% riffle

Percentage pool fluctuates from 5 to 15% in reach II and is maintained at 5% in the steeper reach III.

Obstructions

Lower 100 m. of stream (see map XI) is underground, constituting a total barrier, most likely on a seasonal basis (a dry stream bed leads to the Flathead). A 1-2 m. falls, 6-7 km. from the mouth may be a partial barrier. There are several minor chutes in this area as well.

Stream Cover

Lower Middlepass Creek is less than 10% covered by scrub and forest vegetation. Reach II is covered from 1% - 40% in the heavily forested sections. Reach III is in an open valley.

Fish

Fish sampling was unsuccessful. Stream unaccessible to fall spawning fish due to lower 100 m. underground. Extent of accessibility during spring uncertain.

Aquatic Plants

Some isolated green algae - no vascular plants.

Invertebrates

Moderate abundance noted.

Bank Material - Bank and Hillside Stability

Banks are largely glacial till (clay/gravel). Stability is quite low in reach I, but far from critically unstable. The grazzy rolling slopes of the upper drainage are quite stable, even in the canyons' extremely steep sections. This stability is related to a shallow soil depth over rock. It is over these steep sided walls that most of the tributaries flow.

General Vegetation Type

Willow, pine, spruce are predominant in the lower portion with a disappearance of much of the scrub vegetation in reach II. Reach III is quite barren.

Tributaries

The only significant tributary was Haig Brook. (see parameter sheet where Haig is treated as a reach of Middle Pass) It has a good spawning and rearing habitat over its first mile, similar to that of lower Middlepass. Although important, as it constitutes almost half the volume transport of Middlepass, time would not allow us to examine more than the first mile.

Gradient, substrate and flow pattern were not significantly different from lower Middlepass.

Topographic mapping indicates a similar situation in the headwaters of both streams as well.

Access

Old four wheel drive trail along Middlepass but must ford the Flathead River to use it.

Recreational Potential

Excellent hunting.

Additional Notes

6-8 Mountain goats site in area adjacent to headwaters.

STREAM INVENTORY PARAMETERS

NAME Cate Creek DATE Sept. 14, 1975 REF. NO. _____

Mo. Day Year

TEAM Caw and Gunville

TRIBUTARY TO Flathead River

SURVEY; TYPE flying; QUALITY baseline-good MAP NO. 82G/SE

REACH entire drainage REF. NO. _____

LOCATION LAT: 49 15 00 LONG 114 33 00 OTHER MAPPING 82G/7E
Deg. Min. Sec. Deg. Min. Sec.

LENGTH (KM) 10.0 km. LENGTH ACCESSIBLE TO 0.1 km. AVG. DEPTH AT _____
MIGRANT FISH (KM) _____ AVG. WETTED WIDTH _____

ELEVATION RANGE 4500-7000 DRAINAGE AREA 25 sq. km. T.D.S. (PPM) _____

WETTED WIDTH (AVG.) _____ ACTIVE BED WIDTH (AVG.) _____ ph _____
RANGE _____ RANGE _____
O₂ (PPM) _____

FLOOD PLAIN WIDTH _____ DISCHARGE ; ACTUAL _____ ; RANGE _____

TIME / TEMP. °C AIR _____ COLOUR _____

TIME / TEMP. °C WATER _____ TURBIDITY _____

WEATHER CONDITIONS _____

CHECK LIST: X = RECORDED IN REPORT : N.R. = NOT RECORDED : N.N. = NOT NOTED

- 1. X GENERAL DESCRIPTION
- 2. X OVERALL PRODUCTIVITY
- 3. X GRADIENT-SUBSTRATE
- 4. X CHANNEL TYPE
- 5. X FLOW PATTERN
- 6. X POOL-RUN-RIFFLE RATIO
- 7. X OBSTRUCTIONS
- 8. X STREAM COVER
- 9. X FISH
- 10. X AQUATIC PLANTS
- 11. NN INVERTEBRATES
- 12. X BANK MATERIAL
- 13. X BANK AND HILLSIDE STABILITY
- 14. X GENERAL VEGETATION TYPE
- 15. X TRIBUTARIES
- 16. X LAND USE
- 17. X ACCESS
- 18. NN POLLUTION SOURCES
- 19. NN RECREATIONAL POTENTIAL
- 20. X IMPROVEMENT POTENTIAL
- 21. NN PROTECTION PROBLEMS
- 22. NN ADDITIONAL NOTES
- 23. NN HISTORICAL INFORMATION

* Note if parameters are measured (MEAS) or estimated (EST)

STREAM INVENTORY PARAMETERS

NAME Cate Creek DATE Sept 11, 1973 REF. NO. _____
Mo. Day Year

TEAM Caw and Gunville

TRIBUTARY TO Flathead River

SURVEY; TYPE flying; QUALITY baseline-good MAP NO. 82G/SE

REACH mouth to 0.1 km. Reach I REF. NO. _____

LOCATION LAT: _____ LONG _____ OTHER MAPPING 82G/7E
Deg. Min. Sec. Deg. Min. Sec.

LENGTH (KM) 0.1 km. LENGTH ACCESSIBLE TO 0.1 km. AVG. DEPTH AT 15 cm.
MIGRANT FISH (KM) AVG. WETTED WIDTH

ELEVATION RANGE _____ DRAINAGE AREA _____ T.D.S. (PPM) _____

WETTED WIDTH (AVG.) 5 m. ACTIVE BED WIDTH (AVG.) 10 m. ph _____
RANGE 3-7 m. RANGE 8-12 m. O₂ (PPM) _____

FLOOD PLAIN WIDTH 100 m. DISCHARGE ; ACTUAL .28m³/sec ; RANGE .2-1.14 m³/sec

TIME/TEMP. °C AIR 1100 - 25°C COLOUR clear

TIME/TEMP. °C WATER 1100 - 9°C TURBIDITY clear

WEATHER CONDITIONS sunny 5/10 cloud cover

CHECK LIST: X = RECORDED IN REPORT : N.R. = NOT RECORDED : N.N. = NOT NOTED

- | | |
|--------------------------------|---------------------------------------|
| 1. _____ GENERAL DESCRIPTION | 13. _____ BANK AND HILLSIDE STABILITY |
| 2. _____ OVERALL PRODUCTIVITY | 14. _____ GENERAL VEGETATION TYPE |
| 3. _____ GRADIENT-SUBSTRATE | 15. _____ TRIBUTARIES |
| 4. _____ CHANNEL TYPE | 16. _____ LAND USE |
| 5. _____ FLOW PATTERN | 17. _____ ACCESS |
| 6. _____ POOL-RUN-RIFFLE RATIO | 18. _____ POLLUTION SOURCES |
| 7. _____ OBSTRUCTIONS | 19. _____ RECREATIONAL POTENTIAL |
| 8. _____ STREAM COVER | 20. _____ IMPROVEMENT POTENTIAL |
| 9. _____ FISH | 21. _____ PROTECTION PROBLEMS |
| 10. _____ AQUATIC PLANTS | 22. _____ ADDITIONAL NOTES |
| 11. _____ INVERTEBRATES | 23. _____ HISTORICAL INFORMATION |
| 12. _____ BANK MATERIAL | |

* Note if parameters are measured (MEAS) or estimated (EST)

STREAM INVENTORY PARAMETERS

NAME Cate Creek DATE Sept. 14/75 REF. NO. _____

TEAM Caw and Gunville

Mo. Day Year

TRIBUTARY TO Flathead River

SURVEY; TYPE flying; QUALITY baseline-good MAP NO. 82G/SE

REACH 0.1 km. to 1.0 km (underground) Reach II REF. NO. _____

LOCATION LAT: _____ LONG _____ OTHER MAPPING 82G/2E
Deg. Min. Sec. Deg. Min. Sec.

LENGTH (KM) 0.9 km. LENGTH ACCESSIBLE TO 0 AVG. DEPTH AT _____
MIGRANT FISH (KM) _____ AVG. WETTED WIDTH _____

ELEVATION RANGE _____ DRAINAGE AREA _____ T.D.S. (PPM) _____

WETTED WIDTH (AVG.) .0 ACTIVE BED WIDTH (AVG.) _____ ph _____
RANGE _____ RANGE _____
O₂ (PPM) _____

FLOOD PLAIN WIDTH _____ DISCHARGE ; ACTUAL _____ ; RANGE _____

TIME/TEMP. °C AIR _____ COLOUR _____

TIME/TEMP. °C WATER _____ TURBIDITY _____

WEATHER CONDITIONS _____

CHECK LIST: X = RECORDED IN REPORT ; N.R. = NOT RECORDED ; N.N. = NOT NOTED

- | | |
|--------------------------------|---------------------------------------|
| 1. _____ GENERAL DESCRIPTION | 13. _____ BANK AND HILLSIDE STABILITY |
| 2. _____ OVERALL PRODUCTIVITY | 14. _____ GENERAL VEGETATION TYPE |
| 3. _____ GRADIENT-SUBSTRATE | 15. _____ TRIBUTARIES |
| 4. _____ CHANNEL TYPE | 16. _____ LAND USE |
| 5. _____ FLOW PATTERN | 17. _____ ACCESS |
| 6. _____ POOL-RUN-RIFFLE RATIO | 18. _____ POLLUTION SOURCES |
| 7. _____ OBSTRUCTIONS | 19. _____ RECREATIONAL POTENTIAL |
| 8. _____ STREAM COVER | 20. _____ IMPROVEMENT POTENTIAL |
| 9. _____ FISH | 21. _____ PROTECTION PROBLEMS |
| 10. _____ AQUATIC PLANTS | 22. _____ ADDITIONAL NOTES |
| 11. _____ INVERTEBRATES | 23. _____ HISTORICAL INFORMATION |
| 12. _____ BANK MATERIAL | |

* Note if parameters are measured (MEAS) or estimated (EST)

STREAM INVENTORY PARAMETERS

NAME Cate Creek DATE Sept 14/75 REF. NO. _____
Mo. Day Year

TEAM Caw and Gunville

TRIBUTARY TO Flathead River

SURVEY; TYPE flying; QUALITY baseline-good MAP NO. 82G/SE

REACH 1.0 to 2.0 km. Reach III REF. NO. _____

LOCATION LAT: _____ LONG _____ OTHER MAPPING 82G/7E
Deg. Min. Sec. Deg. Min. Sec.

LENGTH (KM) 1.0 km. LENGTH ACCESSIBLE TO 0 AVG. DEPTH AT 15-20 cm.
MIGRANT FISH (KM) _____ AVG. WETTED WIDTH _____

ELEVATION RANGE _____ DRAINAGE AREA _____ T.D.S. (PPM) _____

WETTED WIDTH (AVG.) 5m. ACTIVE BED WIDTH (AVG.) 12 m. ph _____
RANGE 3-7 m. RANGE 8-15 m. O₂ (PPM) _____

FLOOD PLAIN WIDTH 50 m. DISCHARGE ; ACTUAL 28m³/sec ; RANGE 2 - 1 14 m³/sec

TIME/TEMP. °C AIR _____ COLOUR clear

TIME/TEMP. °C WATER _____ TURBIDITY clear

WEATHER CONDITIONS _____

CHECK LIST: X = RECORDED IN REPORT : N.R. = NOT RECORDED : N.N. = NOT NOTED

- | | |
|--------------------------------|---------------------------------------|
| 1. _____ GENERAL DESCRIPTION | 13. _____ BANK AND HILLSIDE STABILITY |
| 2. _____ OVERALL PRODUCTIVITY | 14. _____ GENERAL VEGETATION TYPE |
| 3. _____ GRADIENT-SUBSTRATE | 15. _____ TRIBUTARIES |
| 4. _____ CHANNEL TYPE | 16. _____ LAND USE |
| 5. _____ FLOW PATTERN | 17. _____ ACCESS |
| 6. _____ POOL-RUN-RIFFLE RATIO | 18. _____ POLLUTION SOURCES |
| 7. _____ OBSTRUCTIONS | 19. _____ RECREATIONAL POTENTIAL |
| 8. _____ STREAM COVER | 20. _____ IMPROVEMENT POTENTIAL |
| 9. _____ FISH | 21. _____ PROTECTION PROBLEMS |
| 10. _____ AQUATIC PLANTS | 22. _____ ADDITIONAL NOTES |
| 11. _____ INVERTEBRATES | 23. _____ HISTORICAL INFORMATION |
| 12. _____ BANK MATERIAL | |

* Note if parameters are measured (MEAS) or estimated (EST)

STREAM INVENTORY PARAMETERS

NAME Cate Creek DATE Sept 16/75 REF.NO. _____
Mo. Day Year

TEAM Caw and Gunville

TRIBUTARY TO Flathead River

SURVEY; TYPE flying; QUALITY baseline-good MAP NO. 82G/SE

REACH 2.0 - 8.0 km. (end) Reach IV REF.NO. _____

LOCATION LAT: _____ LONG _____ OTHER MAPPING 82G/2E
Deg. Min. Sec. Deg. Min. Sec.

LENGTH (KM) 6.0 km. LENGTH ACCESSIBLE TO _____ AVG. DEPTH AT 15 cth.
MIGRANT FISH(KM) _____ AVG. WETTED WIDTH _____

ELEVATION RANGE _____ DRAINAGE AREA _____ T.D.S.(PPM) _____

WETTED WIDTH(AVG.) 4 m. ACTIVE BED WIDTH(AVG.) 7m. ph _____
RANGE 2-5 m. RANGE 5-10 m. O₂ (PPM) _____

FLOOD PLAIN WIDTH 20 m. DISCHARGE ;ACTUAL .183m³/sec;RANGE .14 1.1 m³/sec.

TIME/TEMP.°C AIR 1100-25°C COLOUR clear

TIME/TEMP.°C WATER 1100 -°C. TURBIDITY clear

WEATHER CONDITIONS sunny - 5/10 cloud cover

CHECK LIST: X = RECORDED IN REPORT : N.R.= NOT RECORDED : N.N.= NOT NOTED

- | | |
|--------------------------------|---------------------------------------|
| 1. _____ GENERAL DESCRIPTION | 13. _____ BANK AND HILLSIDE STABILITY |
| 2. _____ OVERALL PRODUCTIVITY | 14. _____ GENERAL VEGETATION TYPE |
| 3. _____ GRADIENT-SUBSTRATE | 15. _____ TRIBUTARIES |
| 4. _____ CHANNEL TYPE | 16. _____ LAND USE |
| 5. _____ FLOW PATTERN | 17. _____ ACCESS |
| 6. _____ POOL-RUN-RIFFLE RATIO | 18. _____ POLLUTION SOURCES |
| 7. _____ OBSTRUCTIONS | 19. _____ RECREATIONAL POTENTIAL |
| 8. _____ STREAM COVER | 20. _____ IMPROVEMENT POTENTIAL |
| 9. _____ FISH | 21. _____ PROTECTION PROBLEMS |
| 10. _____ AQUATIC PLANTS | 22. _____ ADDITIONAL NOTES |
| 11. _____ INVERTEBRATES | 23. _____ HISTORICAL INFORMATION |
| 12. _____ BANK MATERIAL | |

* Note if parameters are measured (MEAS) or estimated (EST)

Cate Creek refer to map XI

General Description - Overall Productivity

Cate Creek is a clean, fast flowing, moderate gradient stream, which like many of the streams in this section, goes underground, approximately 100 m. from the mouth and rises again 1.0 km. later. There is a dry stream channel over this section, suggesting that the stream is passable to migratory fish during high water. Good spawning and rearing potential exist, but overall productivity is rated at low on the basis of the barrier caused by underground flow, and unsuccessful fish sampling.

The stream is 10.5 km. long, according to the map, but at the time of the survey it was dry above 8.0 km.

Gradient-Substrate

Gradient increases from 1% to 3% over the first 2.0 km. It is maintained at 2-3% through the transition into a steep sided valley and well up to the 6.0 km. point.

The stream disappears underground before gradient increases much above 3%.

Substrate is typically fine in the lower 2.0 km. averaging :

20% small gravel

30% large gravel

30% small rubble

20% large rubble

5% boulder

The most noticeable difference between this section and that above is the increase in the coarse materials, particularly boulder.

The coarser substrate of the upper reach averages :

- 10% small gravel
- 20% large gravel
- 20% small rubble
- 30% large rubble
- 20% boulder

Compaction is moderate to hard with texture smooth.

Stream Channel Type

The stream channel is dry from 100 m. above the mouth to 1.0 km. upstream. Side channeling occurs in approximately 50% of section from 1.0 to 2.0 km. Most side and back channels are bar built. Channels caused by permanent islands were generally dry, but would certainly be active during high water. Cut banks were very rare because of the wide gravel/rubble active bed. Lower Cate Creek may be broadly referred to as braided.

The stream gradually becomes more confined moving upstream from 2.0 km. (approximately at the right fork), illustrated by a significant drop in the active bed width. This trend continues to the end.

Log jams and debris are rare above 1.5 km.

Flow Pattern - Pool-Run-Riffle Ratio

Flow is a uniform swirl. Pool/Run/Riffle averages :

- 25% pool
- 25% riffle
- 50% run

over the lower sections with this gradually changing to :

- 10% pool
- 20% riffle
- 70% run

over the upper 6.0 km.

Obstructions

Stream underground to 1.0 km. Most likely a seasonal barrier.

Stream Cover

The stream is less than 1/10 covered over the entire system.

Fish

Electroshocking in reach III was unsuccessful.

Aquatic Plants - none

Bank Material - Bank and Hillside Stability

Clay gravel banks in the lower sections become clay-rubble above 2.0 km. The banks are stable with only an occasional slumping situation.

General Vegetation Type

Pine-spruce forest.

Tributaries -

Most tributaries, including the right fork, were dry at the time of the survey.

Land Use - none

Access

4 wheel drive trail follows stream but the Flathead must be forded to gain access to this trail.

Improvement Possibilities

It would be an obvious improvement to the system if the underground flow could be diverted so as to keep it in the above ground channel. Since it is doubtful that fall spawners would use the stream to any great extent, this improvement possibility may be a waste of time in terms of the cost/benefit relationships.

STREAM INVENTORY PARAMETERS

NAME Pollock Creek DATE Sept. 11/75 REF.NO. _____
 Mo. Day Year

TEAM Caw and Gunville

TRIBUTARY TO Flathead River

SURVEY; TYPE walking; QUALITY good MAP NO. 82G/SE

REACH entire drainage REF.NO. _____

LOCATION LAT: 49 19 00 LONG 114 33 OTHER MAPPING 82G/7E
 Deg. Min. Sec. Deg. Min. Sec.

LENGTH (KM) 7.0 km. LENGTH ACCESSIBLE TO 3.0 km. AVG. DEPTH AT _____
 MIGRANT FISH(KM) _____ AVG. WETTED WIDTH _____

ELEVATION RANGE 4600' - 7000' DRAINAGE AREA 18 sq. km. T.D.S.(PPM) _____

WETTED WIDTH(AVG.) _____ ACTIVE BED WIDTH(AVG.) _____ ph _____
 RANGE _____ RANGE _____

FLOOD PLAIN WIDTH _____ DISCHARGE ;ACTUAL _____ ;RANGE _____

TIME/TEMP. °C AIR _____ COLOUR _____

TIME/TEMP. °C WATER _____ TURBIDITY _____

WEATHER CONDITIONS _____

CHECK LIST: X = RECORDED IN REPORT : N.R.= NOT RECORDED : N.N.= NOT NOTED

- | | |
|-----------------------------------|--|
| 1. <u>X</u> GENERAL DESCRIPTION | 13. <u>X</u> BANK AND HILLSIDE STABILITY |
| 2. <u>X</u> OVERALL PRODUCTIVITY | 14. <u>X</u> GENERAL VEGETATION TYPE |
| 3. <u>X</u> GRADIENT-SUBSTRATE | 15. <u>X</u> TRIBUTARIES |
| 4. <u>X</u> CHANNEL TYPE | 16. <u>X</u> LAND USE |
| 5. <u>X</u> FLOW PATTERN | 17. <u>X</u> ACCESS |
| 6. <u>X</u> POOL-RUN-RIFFLE RATIO | 18. <u>NN</u> POLLUTION SOURCES |
| 7. <u>X</u> OBSTRUCTIONS | 19. <u>X</u> RECREATIONAL POTENTIAL |
| 8. <u>X</u> STREAM COVER | 20. <u>NN</u> IMPROVEMENT POTENTIAL |
| 9. <u>X</u> FISH | 21. <u>NN</u> PROTECTION PROBLEMS |
| 10. <u>X</u> AQUATIC PLANTS | 22. <u>NN</u> ADDITIONAL NOTES |
| 11. <u>X</u> INVERTEBRATES | 23. <u>NN</u> HISTORICAL INFORMATION |
| 12. <u>X</u> BANK MATERIAL | |

* Note if parameters are measured (MEAS) or estimated (EST) .

STREAM INVENTORY PARAMETERS

NAME Pollock Creek DATE Sept. 11/75 REF.NO. _____
Mo. Day Year

TEAM Caw and Gunville

TRIBUTARY TO Flathead River

SURVEY; TYPE walking; QUALITY good-baseline MAP NO. 82G/SE

REACH mouth to 3.0 cm. Reach I REF.NO. _____

LOCATION LAT: _____ LONG _____ OTHER MAPPING 82G/7E
Deg. Min. Sec. Deg. Min. Sec.

LENGTH (KM) _____ LENGTH ACCESSIBLE TO _____ AVG. DEPTH AT _____
MIGRANT FISH(KM) _____ AVG. WETTED WIDTH _____

ELEVATION RANGE _____ DRAINAGE AREA _____ T.D.S.(PPM) _____

WETTED WIDTH(AVG.) 4 m. ACTIVE BED WIDTH(AVG.) 8 m. ph _____
RANGE 2-6 m. RANGE 5-15 m.
O₂ (PPM) _____

FLOOD PLAIN WIDTH 20-100 m. DISCHARGE ;ACTUAL 0.38 m³/sec; RANGE 0.15-1.13 m³/sec

TIME/TEMP. °C AIR 1200-28°C COLOUR none

TIME/TEMP. °C WATER 1200-9°C TURBIDITY none

WEATHER CONDITIONS sunny 2/10 cloud cover

CHECK LIST: X = RECORDED IN REPORT : N.R.= NOT RECORDED : N.N.= NOT NOTED

- | | |
|--------------------------------|---------------------------------------|
| 1. _____ GENERAL DESCRIPTION | 13. _____ BANK AND HILLSIDE STABILITY |
| 2. _____ OVERALL PRODUCTIVITY | 14. _____ GENERAL VEGETATION TYPE |
| 3. _____ GRADIENT-SUBSTRATE | 15. _____ TRIBUTARIES |
| 4. _____ CHANNEL TYPE | 16. _____ LAND USE |
| 5. _____ FLOW PATTERN | 17. _____ ACCESS |
| 6. _____ POOL-RUN-RIFFLE RATIO | 18. _____ POLLUTION SOURCES |
| 7. _____ OBSTRUCTIONS | 19. _____ RECREATIONAL POTENTIAL |
| 8. _____ STREAM COVER | 20. _____ IMPROVEMENT POTENTIAL |
| 9. _____ FISH | 21. _____ PROTECTION PROBLEMS |
| 10. _____ AQUATIC PLANTS | 22. _____ ADDITIONAL NOTES |
| 11. _____ INVERTEBRATES | 23. _____ HISTORICAL INFORMATION |
| 12. _____ BANK MATERIAL | |

* Note if parameters are measured (MEAS) or estimated (EST) .

STREAM INVENTORY PARAMETERS

NAME Pollock Creek DATE Sept. 11/75 REF. NO. _____
Mo. Day Year

TEAM Caw and Gunville

TRIBUTARY TO Flathead River

SURVEY; TYPE walking; QUALITY good-baseline MAP NO. 82G/SE

REACH 3.0 km. to end Reach II REF. NO. _____

LOCATION LAT: _____ LONG _____ OTHER MAPPING 82G/7E
Deg. Min. Sec. Deg. Min. Sec.

LENGTH (KM) 4.0 km. LENGTH ACCESSIBLE TO 0 AVG. DEPTH AT 20 cm.
MIGRANT FISH(KM) _____ AVG. WETTED WIDTH _____

ELEVATION RANGE _____ DRAINAGE AREA _____ T.D.S.(PPM) _____

WETTED WIDTH(AVG.) 3 m. ACTIVE BED WIDTH(AVG.) 5 m. ph _____
RANGE 2-5 m. RANGE 4-10 m.
O₂ (PPM) _____

FLOOD PLAIN WIDTH 10-50 m. DISCHARGE ;ACTUAL .38m³/sec;RANGE 0.15-1.13m³/sec

TIME/TEMP. °C AIR 1300 - 26 °C COLOUR none

TIME/TEMP. °C WATER 1300 - 9 °C TURBIDITY none

WEATHER CONDITIONS sunny - 2/10 cc

CHECK LIST: X = RECORDED IN REPORT : N.R.= NOT RECORDED : N.N.= NOT NOTED

- | | |
|--------------------------------|---------------------------------------|
| 1. _____ GENERAL DESCRIPTION | 13. _____ BANK AND HILLSIDE STABILITY |
| 2. _____ OVERALL PRODUCTIVITY | 14. _____ GENERAL VEGETATION TYPE |
| 3. _____ GRADIENT-SUBSTRATE | 15. _____ TRIBUTARIES |
| 4. _____ CHANNEL TYPE | 16. _____ LAND USE |
| 5. _____ FLOW PATTERN | 17. _____ ACCESS |
| 6. _____ POOL-RUN-RIFFLE RATIO | 18. _____ POLLUTION SOURCES |
| 7. _____ OBSTRUCTIONS | 19. _____ RECREATIONAL POTENTIAL |
| 8. _____ STREAM COVER | 20. _____ IMPROVEMENT POTENTIAL |
| 9. _____ FISH | 21. _____ PROTECTION PROBLEMS |
| 10. _____ AQUATIC PLANTS | 22. _____ ADDITIONAL NOTES |
| 11. _____ INVERTEBRATES | 23. _____ HISTORICAL INFORMATION |
| 12. _____ BANK MATERIAL | |

* Note if parameters are measured (MEAS) or estimated (EST) .

Pollock Creek

(refer to map XI and XII)

General Description

Pollock creek is a low to moderate gradient stream with high potential for both spawning and rearing of fish. The lower 3.0 km. is an area of shallow swirling flow, excellent spawning gravel and high % pools and undercut barriers. At least 4.0 km. is accessible to migratory fish, partial barrier in the form of a permanent 2 m. log jam falls existing at this 3.0 km. point.

Gradient - Substrate

Over the first 3.0 km. gradient averages $1\frac{1}{2}\%$ with a gradual increase up to $2\frac{1}{2}\%$ over the next 2-3 km. Substrate averages:

20% small gravel

30% large gravel

30% small rubble

10% large rubble

10% coarse sand

over the lower section, with occasional high % sand pockets. Percentage of rubble doubles in the upper portions. Compaction is loose and texture is consistantly smooth.

Stream Channel

Although the channel is a well confined single thread over the first 200 m., this character quickly changes over the the typical unconfined active bed with frequent undercutting of banks and multi thread sections. The multi thread, or braided sections are of two types throughout the lower 3.0 km. The most frequent is the type associated with a wide active bed

and a lot of exposed substrate. In some cases however, flow is diverted, creating distinct channels separated by large brush covered "islands". It is these small well covered channels that provide excellent rearing habitat throughout this reach.

The channel is much more confined above this section, with little channelization, although undercutting of banks and backwaters still allow for rearing fish.

Flow Pattern - Pool-Run-Riffle Ratio

Flow pattern, is a consistent uniform swirl. Throughout the accessible portion of the stream. Pool-Run-Riffle averages

25% pool

50% run

25% riffle

Percentage pool drops in the more confined upper reach to 10%.

Obstructions

Log jam - debris build up, approximately 4.0 km. from mouth, creating 2 meter falls.

Stream Cover

The stream is up to 3/10 covered by scrub vegetation and forest canopy over the lower 3-4 km. This figure drops as the banks get steeper above 4.0 km.

Fish

Electroshocking in lower .5 km. was not successful. Angling was also unsuccessful throughout the stream, but one cutthroat trout, approximately 20 cm. in length, was literally grabbed from a shallow rubble/gravel bar. Duration of captivity allowed only for a rough estimation of size.

Aquatic Plants

None.

Invertebrates

Moderate abundance in side channels.

Bank Material - Bank and Hillside Stability

Banks are low and very stable for most of the lower 4.0 km. Largely a rubble/gravel/clay mixture, they are generally well covered with vegetation.

The steeper banks above are relatively stable with a slumping rare, but present where slope and percentage clays are high. There is a short unstable section like this on the east bank; close to the mouth.

General Vegetation Type

Pine, spruce forest with a larger percentage of scrub vegetation in the lower portion.

Tributaries

All tributaries steep, and of no fisheries value.

Land Use

None.

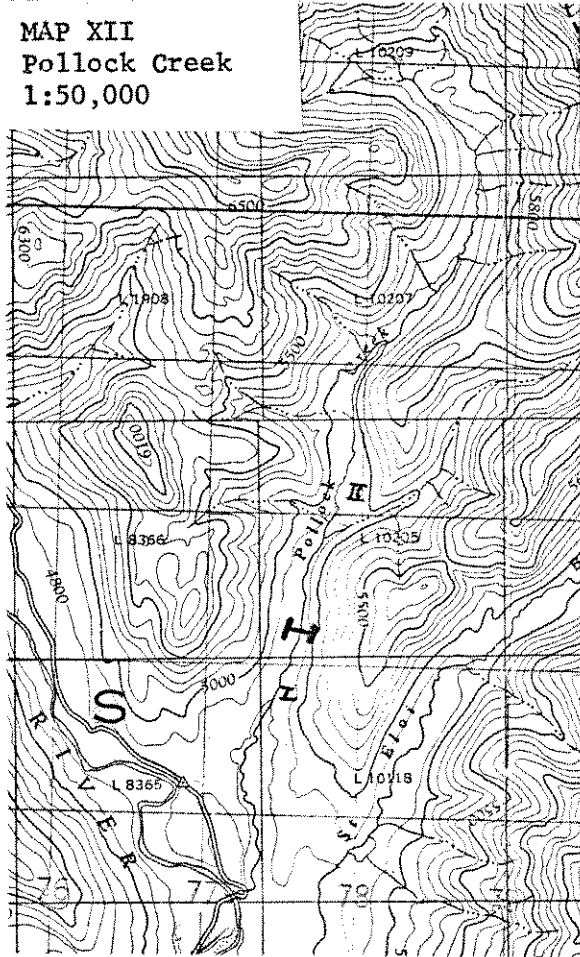
Access

Old road suitable for walking only.

Recreational Potential

Fishing potential low due to size of stream. Abundant game trails and easy walking make it a good hunting area. A campsite is located on the opposite bank of the Flathead.

MAP XII
Pollock Creek
1:50,000



STREAM INVENTORY PARAMETERS

NAME St. Eloi Brook DATE Sept. 7/75 REF.NO. _____
Mo. Day Year

TEAM Caw and Gunville

TRIBUTARY TO Flathead River

SURVEY; TYPE walking; QUALITY good MAP NO. 82G/SE

REACH entire drainage REF.NO. _____

LOCATION LAT: 49 20 00 LONG 114 36 00 OTHER MAPPING 82G/7E
Deg. Min. Sec. Deg. Min. Sec.

LENGTH (KM) 9.0 km. LENGTH ACCESSIBLE TO 0 AVG. DEPTH AT _____
MIGRANT FISH (KM) _____ AVG. WETTED WIDTH _____

ELEVATION RANGE to 6500' DRAINAGE AREA 30 sq. km. T.D.S. (PPM) _____

WETTED WIDTH (AVG.) _____ ACTIVE BED WIDTH (AVG.) _____ ph _____
RANGE _____ RANGE _____
O₂ (PPM) _____

FLOOD PLAIN WIDTH _____ DISCHARGE ;ACTUAL _____ ;RANGE _____

TIME/TEMP. °C AIR _____ COLOUR _____

TIME/TEMP. °C WATER _____ TURBIDITY _____

WEATHER CONDITIONS _____

CHECK LIST: X = RECORDED IN REPORT : N.R. = NOT RECORDED : N.N. = NOT NOTED

- | | |
|-----------------------------------|--|
| 1. <u>X</u> GENERAL DESCRIPTION | 13. <u>X</u> BANK AND HILLSIDE STABILITY |
| 2. <u>X</u> OVERALL PRODUCTIVITY | 14. <u>X</u> GENERAL VEGETATION TYPE |
| 3. <u>X</u> GRADIENT-SUBSTRATE | 15. <u>X</u> TRIBUTARIES |
| 4. <u>X</u> CHANNEL TYPE | 16. <u>X</u> LAND USE |
| 5. <u>X</u> FLOW PATTERN | 17. <u>X</u> ACCESS |
| 6. <u>X</u> POOL-RUN-RIFFLE RATIO | 18. <u>X</u> POLLUTION SOURCES |
| 7. <u>X</u> OBSTRUCTIONS | 19. <u>X</u> RECREATIONAL POTENTIAL |
| 8. <u>X</u> STREAM COVER | 20. <u>NN</u> IMPROVEMENT POTENTIAL |
| 9. <u>X</u> FISH | 21. <u>NN</u> PROTECTION PROBLEMS |
| 10. <u>X</u> AQUATIC PLANTS | 22. <u>NN</u> ADDITIONAL NOTES |
| 11. <u>X</u> INVERTEBRATES | 23. <u>NN</u> HISTORICAL INFORMATION |
| 12. <u>X</u> BANK MATERIAL | |

* Note if parameters are measured (MEAS) or estimated (EST) .

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STREAM INVENTORY PARAMETERS

NAME St. Eloi Brook DATE Sept 7/75 REF. NO. _____
Mo. Day Year

TEAM i Cav and Gunville

TRIBUTARY TO Flathead River

SURVEY; TYPE walking; QUALITY good MAP NO. 82G/SE

REACH mouth to 5.0 km. Reach I REF. NO. _____

LOCATION LAT: _____ LONG _____ OTHER MAPPING 82G/7E
Deg. Min. Sec. Deg. Min. Sec.

LENGTH (KM) 5.0 LENGTH ACCESSIBLE TO 0 AVG. DEPTH AT 0
MIGRANT FISH (KM) _____ AVG. WETTED WIDTH _____

ELEVATION RANGE _____ DRAINAGE AREA _____ T.D.S. (PPM) _____

WETTED WIDTH (AVG.) _____ ACTIVE BED WIDTH (AVG.) _____ ph _____
RANGE _____ RANGE _____

O₂ (PPM) _____

FLOOD PLAIN WIDTH 50-200 m. DISCHARGE ; ACTUAL 0; RANGE up to 100 possible

TIME/TEMP. °C AIR _____ COLOUR _____

TIME/TEMP. °C WATER _____ TURBIDITY _____

WEATHER CONDITIONS sunny and clear

CHECK LIST: X = RECORDED IN REPORT : N.R.= NOT RECORDED : N.N.= NOT NOTED

- | | |
|--------------------------------|---------------------------------------|
| 1. _____ GENERAL DESCRIPTION | 13. _____ BANK AND HILLSIDE STABILITY |
| 2. _____ OVERALL PRODUCTIVITY | 14. _____ GENERAL VEGETATION TYPE |
| 3. _____ GRADIENT-SUBSTRATE | 15. _____ TRIBUTARIES |
| 4. _____ CHANNEL TYPE | 16. _____ LAND USE |
| 5. _____ FLOW PATTERN | 17. _____ ACCESS |
| 6. _____ POOL-RUN-RIFFLE RATIO | 18. _____ POLLUTION SOURCES |
| 7. _____ OBSTRUCTIONS | 19. _____ RECREATIONAL POTENTIAL |
| 8. _____ STREAM COVER | 20. _____ IMPROVEMENT POTENTIAL |
| 9. _____ FISH | 21. _____ PROTECTION PROBLEMS |
| 10. _____ AQUATIC PLANTS | 22. _____ ADDITIONAL NOTES |
| 11. _____ INVERTEBRATES | 23. _____ HISTORICAL INFORMATION |
| 12. _____ BANK MATERIAL | |

* Note if parameters are measured (MEAS) or estimated (EST) .

STREAM INVENTORY PARAMETERS

NAME St. Eloi Brook DATE Sept. 7/75 REF.NO. _____
 Mo. Day Year

TEAM Caw and Gunville

TRIBUTARY TO Flathead River

SURVEY; TYPE walking; QUALITY good MAP NO. 82G/SE

REACH 5.0 m. - end Reach II REF.NO. _____

LOCATION LAT: _____ LONG _____ OTHER MAPPING 82G/7E
 Deg. Min. Sec. Deg. Min. Sec.

LENGTH (KM) 4.0 km. LENGTH ACCESSIBLE TO _____ AVG. DEPTH AT _____
 MIGRANT FISH(KM) _____ AVG. WETTED WIDTH _____

ELEVATION RANGE _____ DRAINAGE AREA _____ T.D.S.(PPM) _____

WETTED WIDTH(AVG.) 3 m. ACTIVE BED WIDTH(AVG.) 12 m. ph _____
 RANGE 1-5 m. RANGE 8-125 m.

FLOOD PLAIN WIDTH 50-200 m. DISCHARGE ;ACTUAL .28m³/sec ;RANGE .1 - 2.0m³/sec

TIME/TEMP.°C AIR 1400/26° COLOUR clear

TIME/TEMP.°C WATER 1400/8° TURBIDITY none

WEATHER CONDITIONS sunny and clear

CHECK LIST: X = RECORDED IN REPORT : N.R.= NOT RECORDED : N.N.= NOT NOTED

- | | |
|--------------------------------|---------------------------------------|
| 1. _____ GENERAL DESCRIPTION | 13. _____ BANK AND HILLSIDE STABILITY |
| 2. _____ OVERALL PRODUCTIVITY | 14. _____ GENERAL VEGETATION TYPE |
| 3. _____ GRADIENT-SUBSTRATE | 15. _____ TRIBUTARIES |
| 4. _____ CHANNEL TYPE | 16. _____ LAND USE |
| 5. _____ FLOW PATTERN | 17. _____ ACCESS |
| 6. _____ POOL-RUN-RIFFLE RATIO | 18. _____ POLLUTION SOURCES |
| 7. _____ OBSTRUCTIONS | 19. _____ RECREATIONAL POTENTIAL |
| 8. _____ STREAM COVER | 20. _____ IMPROVEMENT POTENTIAL |
| 9. _____ FISH | 21. _____ PROTECTION PROBLEMS |
| 10. _____ AQUATIC PLANTS | 22. _____ ADDITIONAL NOTES |
| 11. _____ INVERTEBRATES | 23. _____ HISTORICAL INFORMATION |
| 12. _____ BANK MATERIAL | |

* Note if parameters are measured (MEAS) or estimated (EST) .

St. Eloi Brook (refer to map XI)

General Description - Overall Productivity

At the time of the survey there was no water in the lower 5.0 km. of St. Eloi Brook. The upper 4.0 km. had moderate potential but went underground at the 5.0 km. point. An extremely wide active bed width range in the upper reach, plus a well defined stream bed in the lower 5.0 km. indicates a wide seasonal discharge variation.

The headwaters may be accessible to migrant fish during high flow, but because of the character observed during low flow overall productivity is rated as poor.

It was not determined where the underground flow was being channeled to.

Gradient - Substrate

Gradient is consistently low, varying between 1-2% over the entire stream..

Substrate is a high percentage fines, loosely compacted, and slightly angular in reach II % composition averages:

20%	small gravel
50%	large gravel
30%	small rubble

Silt was heavy in the upper portion.

Channel Type

The dry stream bed of reach I is a confined single thread. Reach II is an unconfined channel with a wide active bed. It is a multi-thread channel in many sections with a maximum depth of 5 cm. and channel widths averaging 1.0 meters.

Flow Pattern - Pool-Run Riffle

A constant uniform swirl with up to 60% pool. Pool Run Riffle ratio averages:

40% pool
30% run
30% riffle

Obstructions

No water in first 5.0 km.

Stream Cover

% stream cover varies but is 2/4/10 covered by alder and willow.

Some of the braided portions in reach II are up to 9/10 covered while some areas have no cover at all.

Fish

Sampling with mepps spinner and fly was unsuccessful. No fish were observed.

Invertebrates

None observed.

Aquatic Plants

None.

Bank Material - Bank and Hillside Stability

Banks are mainly a clay/gravel mixture, frequently cut and slumping. The upland areas are relatively unstable.

General Vegetation Type

Willow and alder predominate immediately adjacent to stream with up to 100% coniferous (mainly pine) forest in surrounding terrain.

Tributaries

Most tributaries in upper reach are spring fed. No significant habitat in any tributary.

Land Use

None

Access

Upper Flathead River Road gives access to the mouth. An old road follows St. Eloi but is not deviable.

Pollution Sources

Siltation from soil movement in headwaters.

Recreational Potential

Good hunting as indicated by abundant game trails. The old road makes walking easy.

STREAM INVENTORY PARAMETERS

NAME Harvey Creek DATE Sept. 10, 75 REF.NO. _____
 Mo. Day Year

TEAM Caw and Gunville

TRIBUTARY TO Flathead River

SURVEY; TYPE road*/walking; QUALITY good MAP NO. 82G/SE

REACH entire drainage REF.NO. _____

LOCATION LAT: _____ LONG _____ OTHER MAPPING 82G/7 (1:50,000)
 Deg. Min. Sec. Deg. Min. Sec.

LENGTH (KM) 12.9 km. LENGTH ACCESSIBLE TO 9.0 km. AVG. DEPTH AT _____
 MIGRANT FISH (KM) _____ AVG. WETTED WIDTH _____

ELEVATION RANGE 4400' - 5400' DRAINAGE AREA 84.5 km. T.D.S. (PPM) _____

WETTED WIDTH (AVG.) _____ ACTIVE BED WIDTH (AVG.) _____ ph _____
 RANGE _____ RANGE _____

FLOOD FLAIN WIDTH _____ DISCHARGE ; ACTUAL _____ ; RANGE _____

TIME/TEMP. °C AIR _____ COLOUR _____

TIME/TEMP. °C WATER _____ TURBIDITY _____

WEATHER CONDITIONS _____

CHECK LIST: X = RECORDED IN REPORT : N.R.= NOT RECORDED : N.N.= NOT NOTED

- | | |
|-----------------------------------|--|
| 1. <u>X</u> GENERAL DESCRIPTION | 13. <u>X</u> BANK AND HILLSIDE STABILITY |
| 2. <u>X</u> OVERALL PRODUCTIVITY | 14. <u>X</u> GENERAL VEGETATION TYPE |
| 3. <u>X</u> GRADIENT-SUBSTRATE | 15. <u>X</u> TRIBUTARIES |
| 4. <u>X</u> CHANNEL TYPE | 16. <u>X</u> LAND USE |
| 5. <u>X</u> FLOW PATTERN | 17. <u>X</u> ACCESS |
| 6. <u>X</u> POOL-RUN-RIFFLE RATIO | 18. <u>X</u> POLLUTION SOURCES |
| 7. <u>X</u> OBSTRUCTIONS | 19. <u>X</u> RECREATIONAL POTENTIAL |
| 8. <u>X</u> STREAM COVER | 20. <u>X</u> IMPROVEMENT POTENTIAL |
| 9. <u>X</u> FISH | 21. <u>NN</u> PROTECTION PROBLEMS |
| 10. <u>X</u> AQUATIC PLANTS | 22. <u>NN</u> ADDITIONAL NOTES |
| 11. <u>X</u> INVERTEBRATES | 23. <u>NN</u> HISTORICAL INFORMATION |
| 12. <u>X</u> BANK MATERIAL | |

* Note if parameters are measured (MEAS) or estimated (EST) .

STREAM INVENTORY PARAMETERS

NAME Harvey Creek DATE Sept. 10/75 REF.NO. _____
 Mo. Day Year

TEAM Caw and Gunville

TRIBUTARY TO Flathead River

SURVEY; TYPE walking; QUALITY good MAP NO. 82G/SE

REACH mouth to 1.0 km. Reach I REF.NO. _____

LOCATION LAT: _____ LONG _____ OTHER MAPPING 82G/7
 Deg. Min. Sec. Deg. Min. Sec.

LENGTH (KM) 1.0 LENGTH ACCESSIBLE TO 1.0 AVG. DEPTH AT _____
 MIGRANT FISH (KM) _____ AVG. WETTED WIDTH _____

ELEVATION RANGE 4400' DRAINAGE AREA _____ T.D.S.(PPM) _____

WETTED WIDTH(AVG.) 3.05 m. ACTIVE BED WIDTH(AVG.) 45 m. ph _____
 RANGE 2.44 - 4.5 m. RANGE 3.0 10.0 m.

FLOOD PLAIN WIDTH up to 100 m. DISCHARGE ; ACTUAL .34m³/sec.; RANGE .142 -> 708 m³/sec

TIME/TEMP. °C AIR 1200/27°C COLOUR brown in swamp at mouth
clear above

TIME/TEMP. °C WATER 1200/12°C TURBIDITY light

WEATHER CONDITIONS sunny and clear

CHECK LIST: X = RECORDED IN REPORT : N.R.= NOT RECORDED : N.N.= NOT NOTED

- | | |
|--------------------------------|---------------------------------------|
| 1. _____ GENERAL DESCRIPTION | 13. _____ BANK AND HILLSIDE STABILITY |
| 2. _____ OVERALL PRODUCTIVITY | 14. _____ GENERAL VEGETATION TYPE |
| 3. _____ GRADIENT-SUBSTRATE | 15. _____ TRIBUTARIES |
| 4. _____ CHANNEL TYPE | 16. _____ LAND USE |
| 5. _____ FLOW PATTERN | 17. _____ ACCESS |
| 6. _____ POOL-RUN-RIFFLE RATIO | 18. _____ POLLUTION SOURCES |
| 7. _____ OBSTRUCTIONS | 19. _____ RECREATIONAL POTENTIAL |
| 8. _____ STREAM COVER | 20. _____ IMPROVEMENT POTENTIAL |
| 9. _____ FISH | 21. _____ PROTECTION PROBLEMS |
| 10. _____ AQUATIC PLANTS | 22. _____ ADDITIONAL NOTES |
| 11. _____ INVERTEBRATES | 23. _____ HISTORICAL INFORMATION |
| 12. _____ BANK MATERIAL | |

* Note if parameters are measured (MEAS) or estimated (EST) .

STREAM INVENTORY PARAMETERS

NAME Harvey Creek DATE Sept. 10/75 REF. NO. _____
 Mo. Day Year

TEAM Caw and Gunville

TRIBUTARY TO Flathead

SURVEY; TYPE road*/walking ; QUALITY good MAP NO. 82G/SE

REACH 1.0 km. to 9.0 km. Reach II REF. NO. _____

LOCATION LAT: _____ LONG _____ OTHER MAPPING 82G/7
 Deg. Min. Sec. Deg. Min. Sec.

LENGTH (KM) 8.0 km. LENGTH ACCESSIBLE TO 8.0 km. AVG. DEPTH AT _____
 MIGRANT FISH (KM) _____ AVG. WETTED WIDTH _____

ELEVATION RANGE 4400 5000' DRAINAGE AREA _____ T.D.S. (PPM) _____

WETTED WIDTH (AVG.) 3.66 m. ACTIVE BED WIDTH (AVG.) 7.62 m. ph _____
 RANGE 1.8 6.1 m. RANGE 3.0 15.2 m.

O₂ (PPM) _____

FLOOD PLAIN WIDTH 10-50 m. DISCHARGE ; ACTUAL .34m³/sec; RANGE .142 → 708m³/sec

TIME/TEMP. °C AIR 1300/27° C COLOUR none

TIME/TEMP. °C WATER 1300/12° C TURBIDITY light

WEATHER CONDITIONS sunny and clear

CHECK LIST: X = RECORDED IN REPORT : N.R.= NOT RECORDED : N.N.= NOT NOTED

- | | |
|--------------------------------|---------------------------------------|
| 1. _____ GENERAL DESCRIPTION | 13. _____ BANK AND HILLSIDE STABILITY |
| 2. _____ OVERALL PRODUCTIVITY | 14. _____ GENERAL VEGETATION TYPE |
| 3. _____ GRADIENT-SUBSTRATE | 15. _____ TRIBUTARIES |
| 4. _____ CHANNEL TYPE | 16. _____ LAND USE |
| 5. _____ FLOW PATTERN | 17. _____ ACCESS |
| 6. _____ POOL-RUN-RIFFLE RATIO | 18. _____ POLLUTION SOURCES |
| 7. _____ OBSTRUCTIONS | 19. _____ RECREATIONAL POTENTIAL |
| 8. _____ STREAM COVER | 20. _____ IMPROVEMENT POTENTIAL |
| 9. _____ FISH | 21. _____ PROTECTION PROBLEMS |
| 10. _____ AQUATIC PLANTS | 22. _____ ADDITIONAL NOTES |
| 11. _____ INVERTEBRATES | 23. _____ HISTORICAL INFORMATION |
| 12. _____ BANK MATERIAL | |

* Note if parameters are measured (MEAS) or estimated (EST) .

-180-
STREAM INVENTORY PARAMETERS

NAME Harvey Creek DATE Sept. 10, 1976 REF. NO. _____
 Mo. Day Year

TEAM Caw and Gunville

TRIBUTARY TO Flathead River

SURVEY; TYPE road*/walking; QUALITY good MAP NO. 82G/SE

REACH 9.0 to 12.9 km. Reach III REF. NO. _____

LOCATION LAT: _____ LONG _____ OTHER MAPPING 82G/7 (1:50,000)
 Deg. Min. Sec. Deg. Min. Sec.

LENGTH (KM) 3.9 km. LENGTH ACCESSIBLE TO 0.0 AVG. DEPTH AT _____
 MIGRANT FISH (KM) _____ AVG. WETTED WIDTH _____

ELEVATION RANGE 5,000 → 5400 DRAINAGE AREA _____ T.D.S. (PPM) _____

WETTED WIDTH (AVG.) 2.0 m. ACTIVE BED WIDTH (AVG.) 5.5 m. ph _____
 RANGE 2.0 - 6.0 m. RANGE 3.0 - 15 m.

FLOOD PLAIN WIDTH up to 200 m. DISCHARGE ; ACTUAL 28m³/sec ; RANGE 14 → 7m³/sec

TIME/TEMP. °C AIR 1300/26°C COLOUR light tannic coloration in still water

TIME/TEMP. °C WATER 1300/13°C TURBIDITY light

WEATHER CONDITIONS sunny and clear

CHECK LIST: X = RECORDED IN REPORT : N.R. = NOT RECORDED : N.N. = NOT NOTED

- | | |
|--------------------------------|---------------------------------------|
| 1. _____ GENERAL DESCRIPTION | 13. _____ BANK AND HILLSIDE STABILITY |
| 2. _____ OVERALL PRODUCTIVITY | 14. _____ GENERAL VEGETATION TYPE |
| 3. _____ GRADIENT-SUBSTRATE | 15. _____ TRIBUTARIES |
| 4. _____ CHANNEL TYPE | 16. _____ LAND USE |
| 5. _____ FLOW PATTERN | 17. _____ ACCESS |
| 6. _____ POOL-RUN-RIFFLE RATIO | 18. _____ POLLUTION SOURCES |
| 7. _____ OBSTRUCTIONS | 19. _____ RECREATIONAL POTENTIAL |
| 8. _____ STREAM COVER | 20. _____ IMPROVEMENT POTENTIAL |
| 9. _____ FISH | 21. _____ PROTECTION PROBLEMS |
| 10. _____ AQUATIC PLANTS | 22. _____ ADDITIONAL NOTES |
| 11. _____ INVERTEBRATES | 23. _____ HISTORICAL INFORMATION |
| 12. _____ BANK MATERIAL | |

* Note if parameters are measured (MEAS) or estimated (EST) .

Harvey Creek

(refer to map XI and XIII)

General Description - Overall Productivity

Harvey Creek is a low gradient poorly defined stream over the first kilometer. There is not a mouth, but a wide swamp seeping into the Flathead River through numerous small channels. Flow is not distinguishable in most parts of this beaver dam-built "delta". This area is most likely a barrier to fish migration during the low discharge season. (see map XIII)

The moderate sloped upper section represents an excellent rearing and spawning stream but heavy land use (particularly logging and associated road building) seems to have had a negative influence on overall productivity. Pioneer plants are however, firmly settled (see picture 21) and the potential for a recovery seems reasonably high.

Gradient-Substrate

Gradient is consistantly moderate. In the diffuse region adjacent to the mouth it is less than 2% (1-5%) with an average of $2\frac{1}{2}$ over the rest of the stream.

The first km. is quite muddy. Above this we see :

10% small gravel

40% small rubble

30% large gravel

20% large rubble

20% large rubble

Composition is consistent with the exception of 3% boulder in some sections and pockets of very fine materials in quieter pools and runs.

Above the falls we see:

10% small gravel

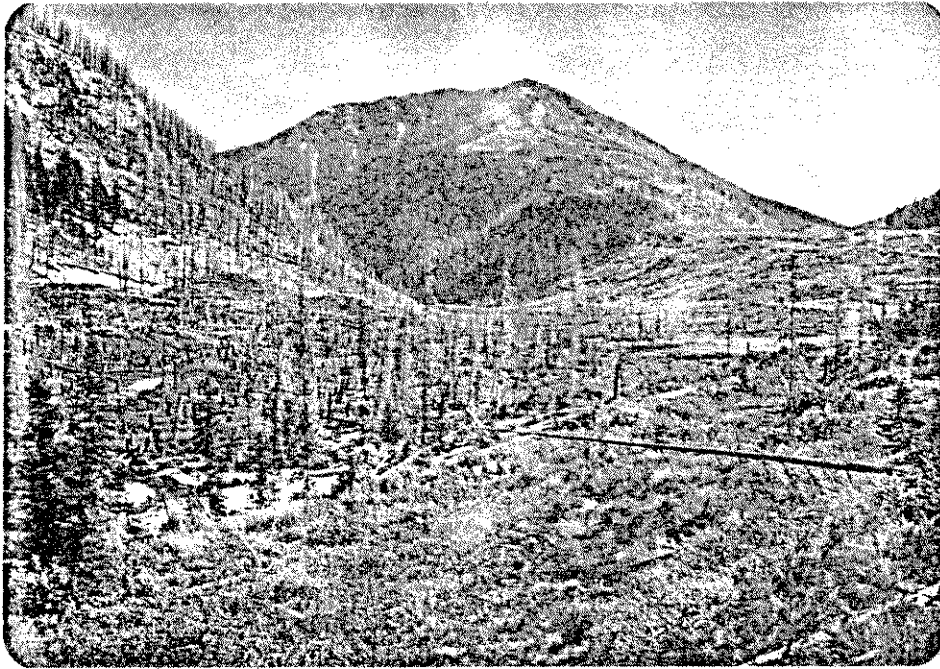
15% large gravel

30% small rubble

5% boulder

10% silt sand

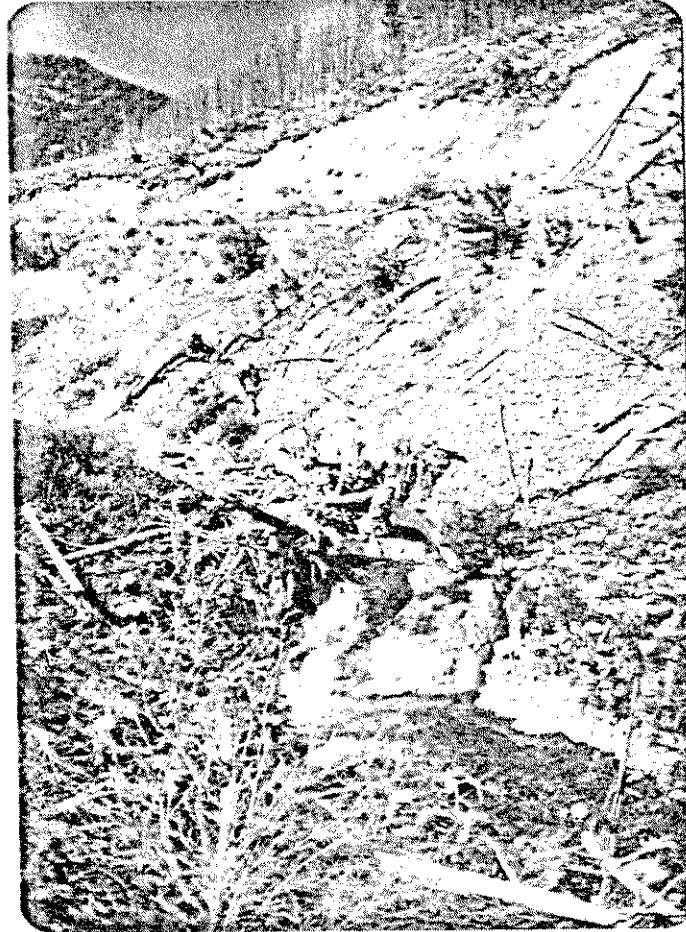
with a very high % of the rubble and gravel being angular.



Picture 21 - Harvey Creek Valley - looking down from 10.0 km. from mouth (reach II)



Picture 22 - Harvey Creek - chute - 9.0 km. from mouth.



Picture 23 - Harvey Creek chute (9.0 km.) showing unstable bank associated with old road above...

Stream Channel

Extreme unconfinement adjacent to the mouth is succeeded by a single thread channel 1 km. upstream. There are intermittent bars and undercut banks. Side and back channels are abundant from about 5.0 km. from the mouth to the headwaters. It is in this area where it is evident that the channel is moving considerably; and in a few cases a double thread channel exists. Wood debris and log jams are very abundant throughout this logged area.

Flow Pattern - Pool-Run-Riffle Ratio

From extremely diffuse at the mouth (reach I), to a consistent swirl above, (reaches II and III). Pool run riffle averages:

10% pool

60% run

30% riffle

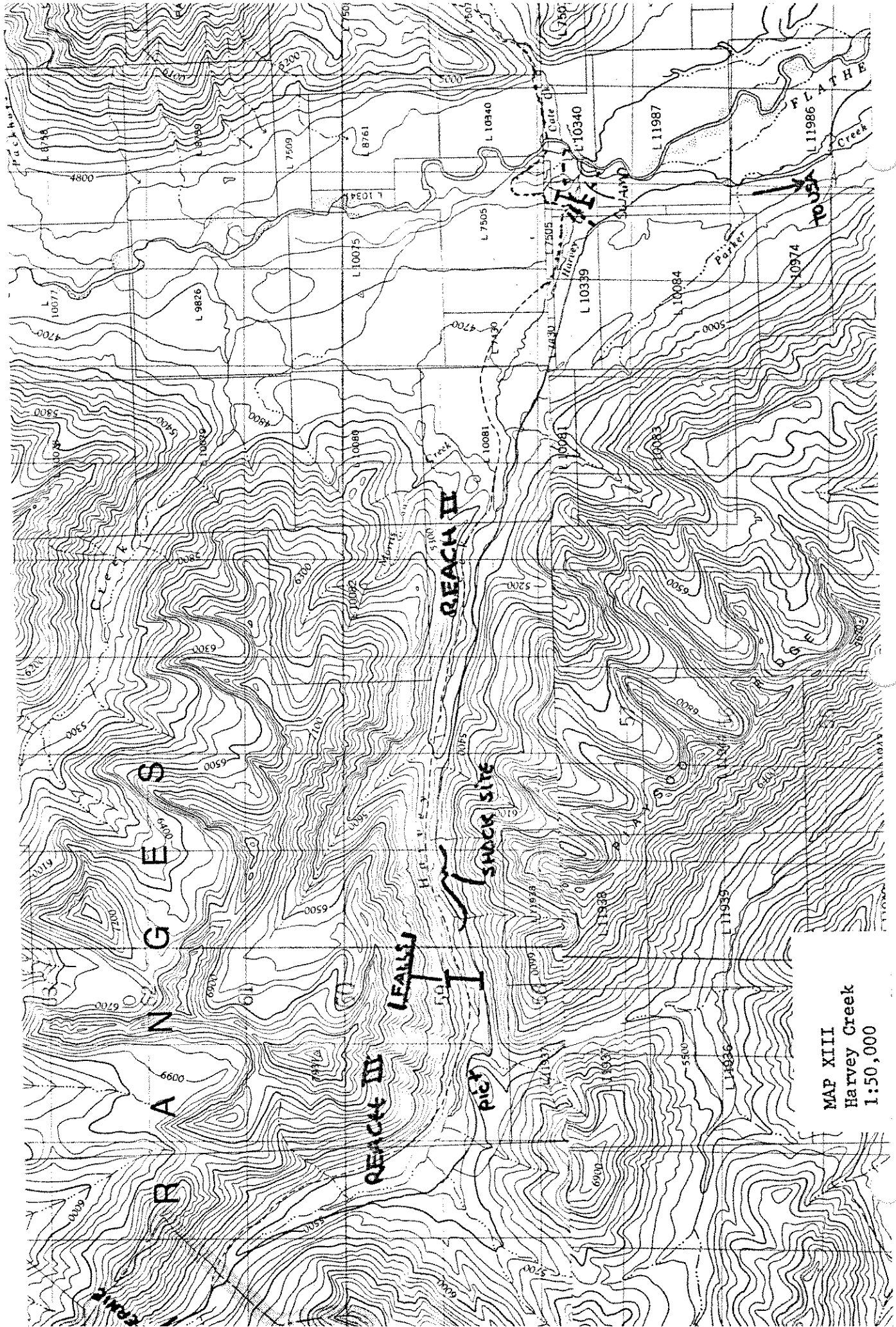
in reach II with pool gradually rising to 20% in upper reach II and continuing through most of reach III.

Obstructions

Beaver dam/swamp at mouth most likely a barrier during low water. 4 m. high X 6 m. long. Chute 9.0 km. from mouth a barrier all season. (see pictures 22 and 23 and map XIII)

Stream Cover

Cover is quite heavy in the lower reach, with scrub vegetation and forest cover approaching 10/10. Cover from streamside vegetation is less than 1/10 for more than 75% of reach II and 100% of reach III.



MAP XIII
Harvey Creek
1:50,000

Fish

No success was had in any angling sample. Electroshocking between 8-9 km. yielded 10 yellowstone cutthroat fry varying in size from 4.5 to 6.5 cm.

The fact that the creek is so readily accessible from a very well used road may be related to the absence of larger fish in our samples.

Aquatic Plants

None seen.

Invertebrates

None seen.

Bank Material - Bank and Hillside Stability

Banks were largely a glacial till type composition with sand gravel and rubble. Slumping banks are not common in below the falls, but above, they occur intermittently and are after associated with logging and old logging roads - see picture 23.

Bank slope is quite variable. Picture I illustrates a transition in bank type.

General Vegetation Type

Below the falls is generally heavily forested with 80% conifer. Picture I illustrates the typical logged section above the falls.

Tributaries

All tributaries into Harvey Creek were of no fisheries value. They are steep, low discharge creeks with very little spawning rearing habitat.

Land Use-Access

Main Flathead Road runs along side more of Harvey Creek. Upper section has been logged. (picture 21)

Pollution Sources

Some siltation from logged area.

Recreational Potential

Sports fishing potential poor due to lack of fish. It is reasonably good hunting area, with a campsite at Harvey Creek bridge.

Improvement Possibilities

Clearance of wood debris may be of some value.

-107-
STREAM INVENTORY PARAMETERS

NAME Shepp Creek DATE Sept. 5/75 REF.NO. _____
Mo. Day Year
TEAM Caw and Gunville
TRIBUTARY TO Flathead River
SURVEY; TYPE road/*walking; QUALITY good MAP NO. 82G/SE
REACH entire drainage REF.NO. _____
LOCATION LAT: 49 17 00 LONG 114 33 00 OTHER MAPPING 82G/1
Deg. Min. Sec. Deg. Min. Sec.
LENGTH (KM) 8.5 km. LENGTH ACCESSIBLE TO 5.0 km. AVG. DEPTH AT
MIGRANT FISH (KM) _____ AVG. WETTED WIDTH _____
ELEVATION RANGE 4400-6500 DRAINAGE AREA 36 sq. km. T.D.S. (PPM) _____
WETTED WIDTH (AVG.) 6 m. ACTIVE BED WIDTH (AVG.) 14 m. ph _____
RANGE 5-8 m. RANGE 14-25 m.
O₂ (PPM) _____
FLOOD PLAIN WIDTH 15-50 m. DISCHARGE ; ACTUAL 0.56m³/sec; RANGE 0.28 1.43 m³/sec
TIME/TEMP. °C AIR 1200/22°C COLOUR none
TIME/TEMP. °C WATER 1200/8°C TURBIDITY clear
WEATHER CONDITIONS sunny 4/10 cloud cover

CHECK LIST: X = RECORDED IN REPORT : N.R.= NOT RECORDED : N.N.= NOT NOTED

- | | |
|-----------------------------------|--|
| 1. <u>X</u> GENERAL DESCRIPTION | 13. <u>X</u> BANK AND HILLSIDE STABILITY |
| 2. <u>X</u> OVERALL PRODUCTIVITY | 14. <u>X</u> GENERAL VEGETATION TYPE |
| 3. <u>X</u> GRADIENT-SUBSTRATE | 15. <u>X</u> TRIBUTARIES |
| 4. <u>X</u> CHANNEL TYPE | 16. <u>X</u> LAND USE |
| 5. <u>X</u> FLOW PATTERN | 17. <u>X</u> ACCESS |
| 6. <u>X</u> POOL-RUN-RIFFLE RATIO | 18. <u>NN</u> POLLUTION SOURCES |
| 7. <u>X</u> OBSTRUCTIONS | 19. <u>X</u> RECREATIONAL POTENTIAL |
| 8. <u>X</u> STREAM COVER | 20. <u>NN</u> IMPROVEMENT POTENTIAL |
| 9. <u>X</u> FISH | 21. <u>NN</u> PROTECTION PROBLEMS |
| 10. <u>X</u> AQUATIC PLANTS | 22. <u>NN</u> ADDITIONAL NOTES |
| 11. <u>X</u> INVERTEBRATES | 23. <u>NN</u> HISTORICAL INFORMATION |
| 12. <u>X</u> BANK MATERIAL | |

* Note if parameters are measured (MEAS) or estimated (EST) .

Shepp Creek

(refer to map XI)

General Description - Overall Productivity

Shepp Creek is a moderate to high gradient stream which appears to be adversely effected by accumulations of wood debris in the lower kilometer. This region is most likely blocking fish migration during low water.

Gradient-Substrate

Gradient is approximately 2% over the 1st kilometer with a gradual increase to 3.5% (with variation $\pm .5\%$) over the next 2.0 km. Gradient may be limiting to fish above 4.0 km.

The smooth, loosely compacted substrate is general of a coarser texture, averaging :

20% small gravel

20% large gravel

10% small rubble

20% large rubble

20% boulder

5% sand

5% silt

for the stream. The lower kilometer has a high% silt/sand build up and debris accumulations.

The coarse nature of the substrate makes it quite suitable for rearing of Flathead trout and Dolly Varden.

Channel Type

The channel is a single regular thread with some intermittent braiding. Cut banks, side channels and back channels are rare above 1.0 km. from the mouth.

Flow Pattern - Pool-Run-Riffle

Flow is a uniform swirl. In places gradient and a high percentage boulder make the surface quite irregular, approaching broken.

The high-moderate gradient (3-4%) accounts for very little pooling, for the entire stream;

5% pool

20% riffle

70% run

Pooling is slightly higher in the first kilometer.

Obstructions

Debris jams in lower kilometer may be significant. Gradient/velocity is a barrier to the headwaters but it was not determined where this obstruction was most critical.

Stream Cover

Cover - up to 2.5% by overlogging scrub willow.

Fish

No fish obtained through angling or shocking attempts.

Aquatic Plants

None.

Invertebrates

Probable abundance low moderate.

Bank Material - Bank and Hillside Stability

Banks are a composite of coarse and fine materials averaging

20% boulder

20% large rubble

20% small rubble

30% large gravel

10% small gravel

with upland soils being an unstable clay/gravel mixture. Banks are moderately stable until reaching the steep sided section where rainfall is creating large scale soil movement.

General Vegetation Type

Scrub vegetation dominant with some large deciduous/coniferous in lower end. Large coniferous dominant in upper portion.

Tributaries

All tributaries steep and low discharge. No fisheries value.

Land Use

None at present.

Access

Upper Flathead Road crosses over Shepp Creek about 1 km. from the mouth.

Recreational Potential

Hunting area, but little sport fisherie value. Close proximity of road to Flathead River is somewhat of an attraction to fishermen.

V TRIBUTARIES TO THE UPPER FLATHEAD

(refer to map XIV)

Pincer
Squaw
McLatchie
McEvoy



STREAM INVENTORY PARAMETERS

NAME Pincer Creek DATE Sept. 15, 1975 REF.NO. _____

TEAM Caw and Gunville

Mo. Day Year

TRIBUTARY TO Flathead

SURVEY; TYPE road; QUALITY baseline-good MAP NO. 826/5F

REACH mouth to 1.5km. REF.NO. _____

LOCATION LAT: 49 22 LONG 114 38 00 OTHER MAPPING 826/7
Deg. Min. Sec. Deg. Min. Sec.

LENGTH (KM) 7km. LENGTH ACCESSIBLE TO 0 AVG. DEPTH AT
MIGRANT FISH (KM) _____ AVG. WETTED WIDTH _____

ELEVATION RANGE 4400' 6000' DRAINAGE AREA 950 km. T.D.S.(PPM) _____

WETTED WIDTH(AVG.) _____ ACTIVE BED WIDTH(AVG.) _____ ph _____
RANGE _____ RANGE _____

O₂ (PPM) _____

FLOOD PLAIN WIDTH 100 m. DISCHARGE ;ACTUAL .28m³/sec; RANGE 0.0 - 714m³/sec
KFS

TIME/TEMP. °C AIR 1300 - 24 °C COLOUR light brown

TIME/TEMP. °C WATER 1300-9.5 °C TURBIDITY moderate

WEATHER CONDITIONS 8/10 overcast

CHECK LIST: X = RECORDED IN REPORT : N.R.= NOT RECORDED : N.N.= NOT NOTED

- | | |
|------------------------------------|---|
| 1. <u>X</u> GENERAL DESCRIPTION | 13. <u>NN</u> BANK AND HILLSIDE STABILITY |
| 2. <u>X</u> OVERALL PRODUCTIVITY | 14. <u>NN</u> GENERAL VEGETATION TYPE |
| 3. <u>NN</u> GRADIENT-SUBSTRATE | 15. <u>NN</u> TRIBUTARIES |
| 4. <u>NN</u> CHANNEL TYPE | 16. <u>X</u> LAND USE |
| 5. <u>NN</u> FLOW PATTERN | 17. <u>X</u> ACCESS |
| 6. <u>NN</u> POOL-RUN-RIFFLE RATIO | 18. <u>X</u> POLLUTION SOURCES |
| 7. <u>X</u> OBSTRUCTIONS | 19. <u>X</u> RECREATIONAL POTENTIAL |
| 8. <u>NN</u> STREAM COVER | 20. <u>X</u> IMPROVEMENT POTENTIAL |
| 9. <u>X</u> FISH | 21. <u>NN</u> PROTECTION PROBLEMS |
| 10. <u>NN</u> AQUATIC PLANTS | 22. <u>NN</u> ADDITIONAL NOTES |
| 11. <u>NN</u> INVERTEBRATES | 23. <u>NN</u> HISTORICAL INFORMATION |
| 12. <u>NN</u> BANK MATERIAL | |

* Note if parameters are measured (MEAS) or estimated (EST)

Pincer Creek

refer to map XIV

General Description - Overall Productivity

Pincer creek is a severely debris clogged stream in the area above the mouth, and on either side of where the road crosses it. (i.e., lower 1.0 km.)

This section is a very unconfined swamp, flooding out a flat logged area.

Overall productivity is rated as poor on the basis of poor water quality and total barriers associated with the swamps, poor spawning and rearing potential, and low discharge.

Obstructions

Swamp at mouth is total barrier

Fish None

Land Use Logging

Access Road

Pollution Sources - Siltation and debris from logged area and road.

Recreational Potential None

Improvement Potential Low

STREAM INVENTORY PARAMETERS

NAME Squaw Creek DATE Sept. 15, 1975 REF. NO. _____
Mo. Day Year

TEAM Caw and Gunville

TRIBUTARY TO Flathead River

SURVEY; TYPE Road; QUALITY Baseline-fair MAP NO. 82G/SE

REACH entire drainage REF. NO. _____

LOCATION LAT: 49 22 00 LONG 14 39 00 OTHER MAPPING 826/7
Deg. Min. Sec. Deg. Min. Sec.

LENGTH (KM) 11.0 km. LENGTH ACCESSIBLE TO 9.0km. AVG. DEPTH AT 20cm.
MIGRANT FISH (KM) _____ AVG. WETTED WIDTH _____

ELEVATION RANGE 4400' - 7400' DRAINAGE AREA 25sq. km. T.D.S. (PPM) _____

WETTED WIDTH (AVG.) 5 m. ACTIVE BED WIDTH (AVG.) 7m. ph _____
RANGE 1-7 m. RANGE 3-12 m. O₂ (PPM) _____

FLOOD PLAIN WIDTH 10m. - 50m. DISCHARGE ; ACTUAL .28m³/sec ; RANGE 22-.56m³/sec

TIME/TEMP. °C AIR 1400-22°C. COLOUR greenish (very slight)

TIME/TEMP. °C WATER 1400 - 6°C TURBIDITY clear

WEATHER CONDITIONS 8/10 overcast

CHECK LIST: X = RECORDED IN REPORT : N.R. = NOT RECORDED : N.N. = NOT NOTED

- | | |
|--------------------------------|---------------------------------------|
| 1. _____ GENERAL DESCRIPTION | 13. _____ BANK AND HILLSIDE STABILITY |
| 2. _____ OVERALL PRODUCTIVITY | 14. _____ GENERAL VEGETATION TYPE |
| 3. _____ GRADIENT-SUBSTRATE | 15. _____ TRIBUTARIES |
| 4. _____ CHANNEL TYPE | 16. _____ LAND USE |
| 5. _____ FLOW PATTERN | 17. _____ ACCESS |
| 6. _____ POOL-RUN-RIFFLE RATIO | 18. _____ POLLUTION SOURCES |
| 7. _____ OBSTRUCTIONS | 19. _____ RECREATIONAL POTENTIAL |
| 8. _____ STREAM COVER | 20. _____ IMPROVEMENT POTENTIAL |
| 9. _____ FISH | 21. _____ PROTECTION PROBLEMS |
| 10. _____ AQUATIC PLANTS | 22. _____ ADDITIONAL NOTES |
| 11. _____ INVERTEBRATES | 23. _____ HISTORICAL INFORMATION |
| 12. _____ BANK MATERIAL | |

* Note if parameters are measured (MEAS) or estimated (EST)

SQUAW CREEK

General Description - Overall Productivity

Squaw Creek is a clean, cold, slightly tannic stream with most of the stream (9 - 10 km.) accessible to migratory fish. Water quality, as indicated by a greenish color, suggests that it is of glacial origin. No fish were found in Squaw creek. Spawning potential is low. Overall productivity is rated as low on the basis of cold water temperature, poor spawning potential, and the lack of invertebrates.

Gradient Substrate

Gradient averages 2% over the first 2.0 km. increasing to 3.0% average over the next 5 km. Substrate averages

10% small gravel

15% large gravel

30% small rubble

30% large rubble

5% boulder

10% coarse sand

over the first 8.0 km. with irregularities in the form of pockets of coarse sand or large gravel.

Above 8.0 km. % boulder increases to 15%, gradient to 4-9%.

Stream Channel Type

An unconfined, often braided channel over the first 2.5 km. with a short section between 2.5 and 3.0 being very narrow and confined by a 25 m. high bank on one side.

Above 3.0 km. the stream reverses its relatively unconfined nature. Relative confinement increases with gradient going upstream, with braiding being minimal above 7 - 8 km. from the mouth.

Flow Pattern - Pool-Run-Riffle Ratio

Typically a uniform swirl with some surface breaks in the steeper high % boulder sections near the headwaters.

Pool-Run-Riffle average; 20% pool
60% run
30% riffle

over the lower 10 km.

Obstructions-none

Stream Cover Overall 1/10 cover

Fish Electroshocking of two 100 m. sections of stream yielded no fish.

Aquatic Plants None observed.

Invertebrates None observed - probable abundance very low.

Bank Material - Bank and Hillside Stability

Banks are a clay gravel rubble composite. The overall stable character is interpreted by several steep exposed banks. The potentially unstable sections are not adding significant amounts of material to the stream due to the generally hard compaction.

General Vegetation Type

Pine Spruce Fir Forest

Tributaries

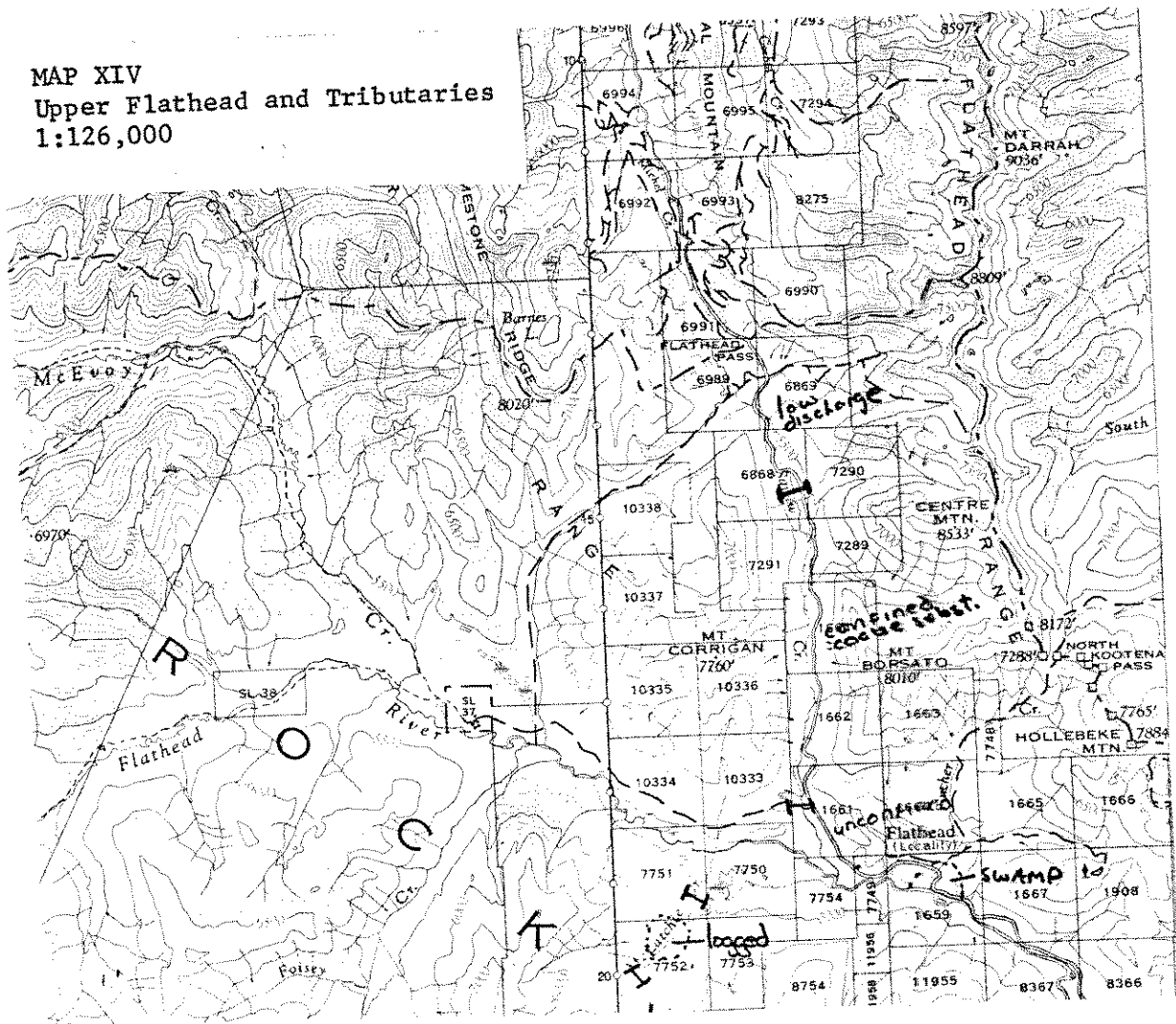
All tributaries are low flow and steepen drastically above the first 0.5 km. from their mouths. Little or no fisheries value.

Land Use Some logging in area near mouth.

Access Road

Recreational Potential Low due to rough terrain and poor fishing potential.

MAP XIV
Upper Flathead and Tributaries
1:126,000



STREAM INVENTORY PARAMETERS

NAME McLatchie DATE Sept 15, 1979 REF. NO. _____
Mo. Day Year

TEAM Caw and Gunville

TRIBUTARY TO Flathead River

SURVEY; TYPE *road/air photo; QUALITY overview MAP NO. 82G/SE

REACH entire drainage REF. NO. _____

LOCATION LAT: 49 22 00 LONG 114 40 30 OTHER MAPPING 826/7
Deg. Min. Sec. Deg. Min. Sec.

LENGTH (KM) 10.0 LENGTH ACCESSIBLE TO 7.0 km. AVG. DEPTH AT 20 cm.
MIGRANT FISH (KM) _____ AVG. WETTED WIDTH _____

ELEVATION RANGE 4400-6500' DRAINAGE AREA 15 sq. km. T.D.S. (PPM) _____

WETTED WIDTH (AVG.) 5 m. ACTIVE BED WIDTH (AVG.) 8 m. ph _____
RANGE 3 - 6 m. RANGE 6 - 10 m. O₂ (PPM) _____

FLOOD PLAIN WIDTH 20 m. DISCHARGE ; ACTUAL .28m³/sec ; RANGE _____

TIME/TEMP. °C AIR _____ COLOUR clear

TIME/TEMP. °C WATER _____ TURBIDITY clear

WEATHER CONDITIONS 10/10 overcast - scattered snow flurries

CHECK LIST: X = RECORDED IN REPORT : N.R.= NOT RECORDED : N.N.= NOT NOTED

- 1. X GENERAL DESCRIPTION
- 2. X OVERALL PRODUCTIVITY
- 3. NR GRADIENT-SUBSTRATE
- 4. NR CHANNEL TYPE
- 5. NR FLOW PATTERN
- 6. NR POOL-RUN-RIFFLE RATIO
- 7. NR OBSTRUCTIONS
- 8. NR STREAM COVER
- 9. NR FISH
- 10. NR AQUATIC PLANTS
- 11. NR INVERTEBRATES
- 12. NR BANK MATERIAL
- 13. NR BANK AND HILLSIDE STABILITY
- 14. NR GENERAL VEGETATION TYPE
- 15. NR TRIBUTARIES
- 16. NR LAND USE
- 17. NR ACCESS
- 18. NR POLLUTION SOURCES
- 19. NR RECREATIONAL POTENTIAL
- 20. NR IMPROVEMENT POTENTIAL
- 21. NR PROTECTION PROBLEMS
- 22. NR ADDITIONAL NOTES
- 23. NR HISTORICAL INFORMATION

* Note if parameters are measured (MEAS) or estimated (EST)

McLatchie Creek

(refer to map XIV)

General Description - Overall Productivity

Much data is lacking on McLatchie Creek due to problems encountered at the time of survey.

The first 2.5 km. from the mouth is an unconfined highly braided section. There are a number of permanent islands. A thick forest on either side of the channels provides an estimated 3-5/10 stream cover. The section between 2.5 and 3.5 km. is heavily logged with a network of skidder trails.

Overall productivity is rated as low. The first 2.5 km. provides good fish habitat but this deteriorates at the logged section. Above this slash the creek enters a steep side canyon. The creek is subjected to large scale soil movement throughout this upper reach. Substrate is coarse and flow (volume discharge) diminishes quickly. Gradient (2% in lower 2.5 km.) is estimated at 3% above the slash, increasing to 5-6% est. over 6 km.

STREAM INVENTORY PARAMETERS

NAME McEvoy DATE Sept. 14/75 REF. NO. _____
 Mo. Day Year

TEAM Caw and Gunville

TRIBUTARY TO Flathead

SURVEY; TYPE flying; QUALITY overview MAP NO. 82G/SE

REACH entire drainage REF. NO. _____

LOCATION LAT: 49 LONG 114 OTHER MAPPING 82G/7
 Deg. Min. Sec. Deg. Min. Sec.

LENGTH (KM) 17.† LENGTH ACCESSIBLE TO 10.0 AVG. DEPTH AT 30 cm.
 MIGRANT FISH (KM) AVG. WETTED WIDTH

ELEVATION RANGE 5400-6500' DRAINAGE AREA 10 sq. km. T.D.S. (PPM) _____

WETTED WIDTH (AVG.) 4 m. ACTIVE BED WIDTH (AVG.) 6 m. ph _____
 RANGE 2-6 m. RANGE 4-8 m. O₂ (PPM) _____

FLOOD PLAIN WIDTH _____ DISCHARGE ; ACTUAL _____ ; RANGE _____

TIME/TEMP. °C AIR _____ COLOUR clear

TIME/TEMP. °C WATER _____ TURBIDITY clear

WEATHER CONDITIONS _____

CHECK LIST: X = RECORDED IN REPORT : N.R.= NOT RECORDED : N.N.= NOT NOTED

- | | |
|---|---------------------------------------|
| 1. <input checked="" type="checkbox"/> GENERAL DESCRIPTION | 13. _____ BANK AND HILLSIDE STABILITY |
| 2. <input checked="" type="checkbox"/> OVERALL PRODUCTIVITY | 14. _____ GENERAL VEGETATION TYPE |
| 3. _____ GRADIENT-SUBSTRATE | 15. _____ TRIBUTARIES |
| 4. _____ CHANNEL TYPE | 16. _____ LAND USE |
| 5. _____ FLOW PATTERN | 17. _____ ACCESS |
| 6. _____ POOL-RUN-RIFFLE RATIO | 18. _____ POLLUTION SOURCES |
| 7. _____ OBSTRUCTIONS | 19. _____ RECREATIONAL POTENTIAL |
| 8. _____ STREAM COVER | 20. _____ IMPROVEMENT POTENTIAL |
| 9. _____ FISH | 21. _____ PROTECTION PROBLEMS |
| 10. _____ AQUATIC PLANTS | 22. _____ ADDITIONAL NOTES |
| 11. _____ INVERTEBRATES | 23. _____ HISTORICAL INFORMATION |
| 12. _____ BANK MATERIAL | |

* Note if parameters are measured (MEAS) or estimated (EST) .

McEvoy Creek (refer to map XIV)

McEvoy Creek was passed over quickly during flying reconnaissance.

Basic channel form etc. was observed. Substrate was 80% rubble with an average gradient of 2%. There was frequent exposed substrate bars.

The surrounding areas was quite flat throughout most of the stream. The stream is fed by many swampy sections.

The course was a gentle meander with abundant cut banks, some steep.

Pool/Run/Riffle averaged:	20% pool
	30% riffle
	50% run

Flow is a consistant uniform swirl.

Rearing potential was good while spawning is limited.

DEFINITIONS OF STREAM PARAMETERS

- NAME: Gazetted name of the stream and other names.
- DATE: Month, day, year. Month must be written out.
- REF. NO.: Refers to the stream reference number in the computer data storage system.
- TEAM: The people who did the inventory, initials and last names.
- TRIBUTARY TO: Note the major drainage system (e.g. Pacific Ocean, Fraser R.) Note drainage sequence (Ck. A to Ck. B to Thompson to Fraser)
- SURVEY TYPE: Map, airphoto, flying, boating, road, walking, combination of, or others. (*for major method)
- SURVEY QUALITY: Either intensive, baseline, or overview inventory and rate as good, fair, or poor.
- MAP. NO.: Use National Topographic Series notation.
- REACH: Denote the whole stream as one reach or note the distance (km.) from the mouth of the stream to the bottom and top of the reach.
- LOCATION: Give the lat. and long. of the mouth of the stream or the lower end of the reach.
- OTHER MAPPING: Note when special scale mapping is available and where to obtain it.
- LENGTH: Main stem only (kilometers)
- LENGTH ACCESSIBLE TO MIGRANT FISH: The furthest distance upstream from the mouth any fish species could migrate, before it came to an impassable barrier.
- AVERAGE DEPTH: Average depth at the average wetted width. (meters)
- ELEVATION: Elevation (meters) at the bottom and top of the stream system.
- DRAINAGE AREA: In sq. kilometers (a map measurement)
- WETTED WIDTH: Width (average and range) of the water covered channel. (meters)
- ACTIVE BED WIDTH: Average and range of the width of the river bed. River bed is the section of stream which has no vegetation on it.
- FLOOD PLAIN WIDTH: Range of the max. width water can cover in a flood.
- ACTUAL DISCHARGE: Discharge at the time of survey in meters³/sec. Describe the flow as high, normal or low.
- DISCHARGE RANGE: Estimated or actual discharge range in meters³/sec. (1 cfs. = .0283 m³/sec.)
- TEMPERATURE: In degrees centigrade (°C.)
- COLOUR: Colour is defined as material in solution with the water. Define as 1) clear, tannic, brown etc. 2) Degree: slightly, very 3) Period: all year, seasonal, occasional.
- TURBIDITY: Turbidity is defined as material in suspension in the water. Define as 1) Type: clear, muddy, glacial etc. 2) Degree: slightly, very 3) Period: all year, seasonal, occasional.
- WEATHER CONDITIONS: Cloud cover in over cast (O.C.) estimated as so many tenths O.C., also wind, rain, etc.

DEFINITIONS OF STREAM PARAMETERS

1. GENERAL DESCRIPTION
A summary of the major parameters, in paragraph form, to give a short concise picture of the stream.
2. OVERALL PRODUCTIVITY
A subjective rating of the ability of a system to spawn and rear fish, or it's potential to do so.
3. GRADIENT - SUBSTRATE
Gradient in % slope

<u>Substrate</u> Bedrock Boulder 30 cm. Large Rubble 15-30 cm. Small Rubble 7-15 cm. Large Gravel 2-7 cm. Small Gravel .5-2 cm. Sand Silt Mud Clay	<u>Substrate</u> A. <u>Compaction</u> Loose Moderate Solid B. <u>Texture</u> Smooth Angular C. <u>Suitability</u> For Spawning Rearing
--	---
4. STREAM CHANNEL TYPE
Confined or unconfined
Straight, curving, meandering
Islands, bars
Side channels, back channels
Logjams
Cross section type (cutbanks)**
5. FLOW PATTERN
- uniform (no turbulence)
- uniform (rapids and boils)
- pool riffle sequence
- tumbling flow
- cascading flow
6. POOL-RUN-RIFFLE RATIO
A percentage comparison of the three.
7. OBSTRUCTIONS
Type of obstruction size, number of obstructions. Partial, selective or total barrier.
8. STREAM COVER
Type of streamside vegetation, and % of stream covered.
9. FISH
- fish species present,
- use (spawning rearing, holding)
- size ranges (lengths, weights)
- estimate of abundance
- timing of runs
- maturation stage of fish
10. AQUATIC PLANTS
Relative abundance
Rooted or floating
11. INVERTEBRATES (insects)
Relative abundance
Aquatic terrestrial
12. BANK MATERIAL (est. % of each)

Bedrock Boulder Glacial till Sand gravel Silt sand Clay silt Organic	<u>UPLAND SOILS**</u> Glacial till Colluvium Outwash Alluvium Marine Lacustrine Organic <u>TEXTURE OF SOIL</u> Fine, Medium, Coarse
--	--
13. BANK AND HILLSIDE STABILITY
Upland soil type and depth, texture
Slumping banks and hillsides
Slope (%) of hillsides; Banks
Terracing
Erosion
Windfall
14. GENERAL VEGETATION TYPE
Type of forest and understory.
15. TRIBUTARIES
Indicate minor and non productive streams and explain why they are considered so.
Do a complete report on major tributary streams.
16. LAND USE
Indicate present land use, logging, farming, residential parks etc.
17. ACCESS
Type of access public, private, road, air, boat, on foot.
18. POLLUTION SOURCES
Thermal, chemical, soil disturbance expand if possible
19. RECREATIONAL POTENTIAL
Must evaluate fishing pot. as well as other types.
20. IMPROVEMENT POSSIBILITIES
Fish ladders, stream clearance. Enhancement of spawning or rearing etc.
21. PROTECTION PROBLEMS
Should attempt to point out problems associated with logging, road construction, or any type of development.
22. ADDITIONAL NOTES
Problems in doing the survey, personal axe grinding, opinions, additional information on the headings on the top of the parameter sheet.
23. HISTORICAL INFORMATION
Local knowledge of the area, fishing, access etc.

** See last page for additional information

UPLAND SOIL TYPES

1. GLACIAL TILL

Unsorted and unstratified drift generally unconsolidated; deposited by glacial ice. Consists of a heterogeneous mixture of clay, sand, gravel and boulders varying widely in size and shape--predominantly angular.

5. MARINE

Predominantly silts and clays deposited in a marine environment. These deposits would be well sorted, compact and lack the varving (fine layering) seen in lacustrine deposits. These materials may contain shell fragments.

2. COLLUVIUM

Materials are generally loose and incoherent drifts deposited chiefly by mass-wasting at the foot of a steep slope or bedrock exposure. These materials are non-stratified, not sorted of textures ranging from boulders to clay.

6. LACUSTRINE

Blankets of stratified silt, clay and sand of various degrees of thickness and continuity that has been deposited in a standing body of water--exemplified by varving (fine layering).

3. OUTWASH

Chiefly sand and gravel removed and deposited by glacial melt-water streams--predominantly rounded.

7. ORGANIC

Deposits of peat, muck or other decomposing organic materials.

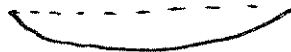
4. ALLUVIUM

Clay, silt, gravel or similar unconsolidated detrital material deposited during comparatively recent geology. Better sorted than outwash.

CROSS SECTION TYPE

Definition: The typical cross section or the whole reach in run and riffle areas.

Not cut, regular



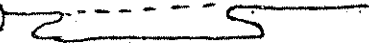
Not cut, Irregular



Cut one side (May be irregular)



Cut both sides (May be irregular)



Channelized