

AN INVENTORY OF THE KAGER LAKE
INLET AND OUTLET STREAMS

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HATLEVIK, S.
INVENTORY OF THE KAGER
LAKE INLET AND OUTLET
BJFH c. 1 mm SMITHERS

BY

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SUMMARY

Kager Lake Outlet

An impassable beaver dam blocks access to the stream and severely restricts outlet flow. No fish were observed although the upper 130 meters contains fair spawning habitat and was reportedly used by spawning rainbow trout in the past. It is recommended that the beaver dam be removed and the stream monitored to assess the results.

Kager Lake Inlet

Twelve spawning rainbow trout were observed in a specific part of the lower 100 meters (reach 1) while the upper section (reach 2) contained no fish. Reach 1 was mainly a low-gradient, braided, unconfined, heavily vegetated and silted channel containing marginal spawning habitat. It could be improved by removing the in-stream willow vegetation and debris; creating a more defined, deeper entranced channel; and possibly by adding suitable spawning gravels. Perhaps this would be suitable for a local stream enhancement project.

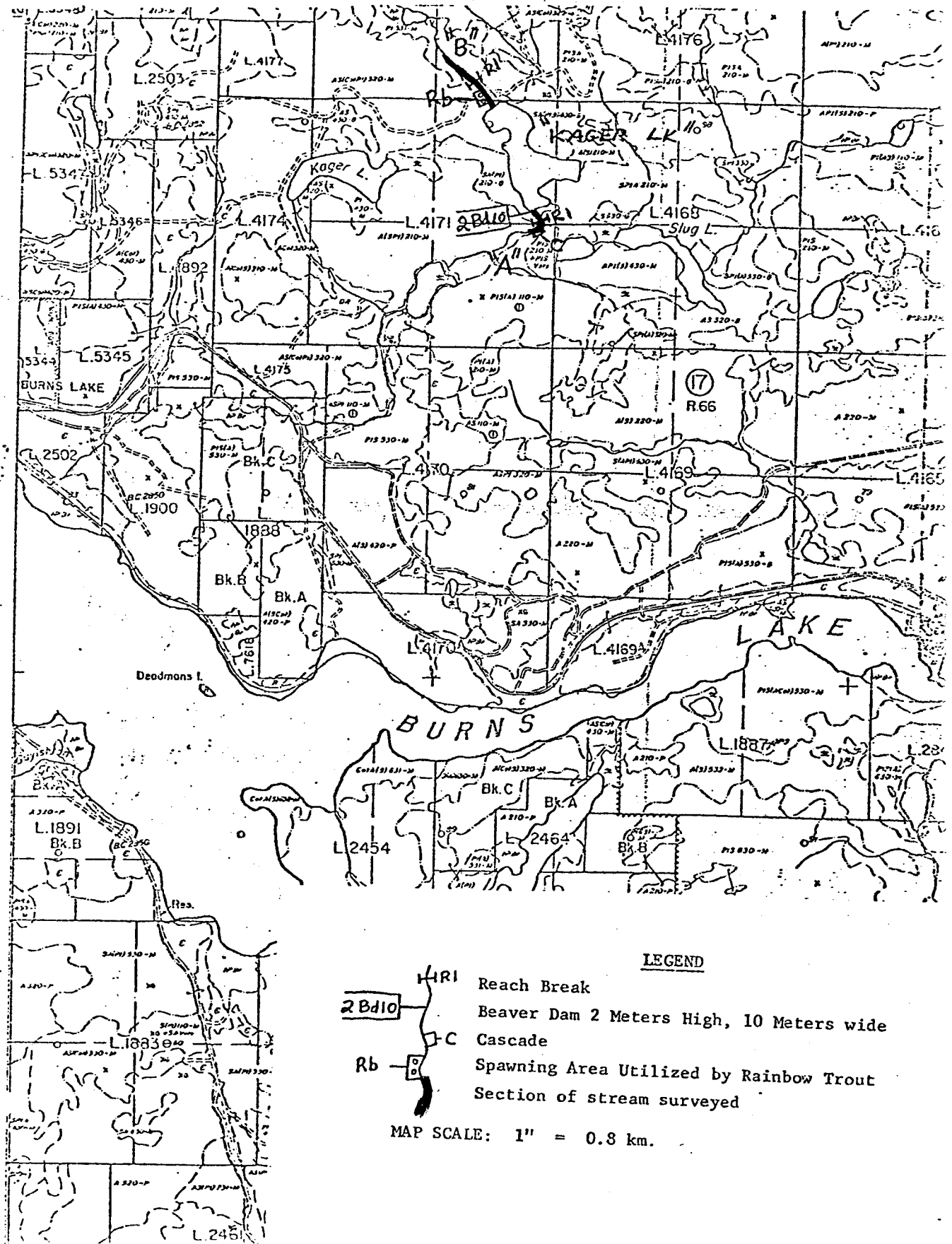
INTRODUCTION

The outlet and inlet streams to Kager Lake were inventoried on May 18, 1978 with the following objectives:

1. to locate and describe the important spawning areas utilized by rainbow trout (Salmo gairdneri)
2. to obtain additional data to augment the information gathered by Shepard and Algard in August, 1977
3. to assess any existent problems and provide recommendations for the management of the Kager Lake fisheries resource

There is some confusion regarding the naming and location of Kager Lake. According to the M.T.S. topographic map 93K/4E and the forest cover map 93-K-4-g, the lake located on the north-west section of lot 4171 and part of lot 4174 is denoted as Kager Lake (see map 1). However, the directory sign on the access road and the fishing regulations pertain to the lake location mainly in the north-east section of lot 4171. This report deals with the latter described lake.

Fig. 2 The location of Kager Lake and some physical stream features.



Access to Kager Lake is by 2WD vehicle about seven km. north-east of Burns Lake. The outlet is marked "A" on map 1; the inlet marked "B" and the length of stream surveyed is coloured red. The main text of this report presents a brief description of the streams and discusses the prominent features and their importance. More detailed physical descriptions are in the appendix. Terminology and abbreviations are taken from "Aquatic System Inventory and Analysis" by the Resource Analysis Branch, March, 1977.

METHODS

Very briefly, the streams were walked from their junction with the lake as far as seemed necessary to meet the objectives of the survey. They were divided into "reaches" (relatively homogeneous sections of stream) and physical descriptions of each reach were noted. Measurements were made with a 30 meter tape, a suunto clinometer, a thermometer and a hand watch. Sampling was done by angling and visual observation. Photographs were taken to depict certain features and representative portions of streams.

Kager Lake Outlet

Access is by boat from the launching area at the north end of the lake. The outlet flows 0.8 km. into an unnamed lake and then another 4.0 km. into Burns Lake dropping about 120 meters in elevation. The stream length surveyed was about 0.23 km. and was divided into two reaches.

Reach I 0.13 km. .

A beaver dam 2 meters high by 10 meters wide located right at the lake outlet (see photo 1) prevents passage of migrant fish and severely restricts stream flow. The average wetted width was 2 meters, depth 13 cm., velocity of 0.4 m/sec. resulting in a calculated discharge of 0.1 m³/sec.

The stream flows through a very narrow V-shaped valley and is irregular in form, single thread and confined by about 60% vertical banks and 30% undercut banks. (see photos 2 and 3). Substrate composition was 20% fines, 40% gravels, and was rated as "fair to good" for spawning potential.

Average slope was 2% algae density high, debris load high and very stable. Overhanging vegetation shaded about 60% of the stream. Water temperature at 10:30 a.m. was 11⁰C. No fish were sampled or observed in this reach. A past local resident, Dan Simmons, claims that rainbow trout used to spawn in this portion of the outlet up until last year.

Photo 1.

Impassable beaver dam at outlet of Kager Lake.





Photo 2. Upper portion of reach 1 (looking downstream).

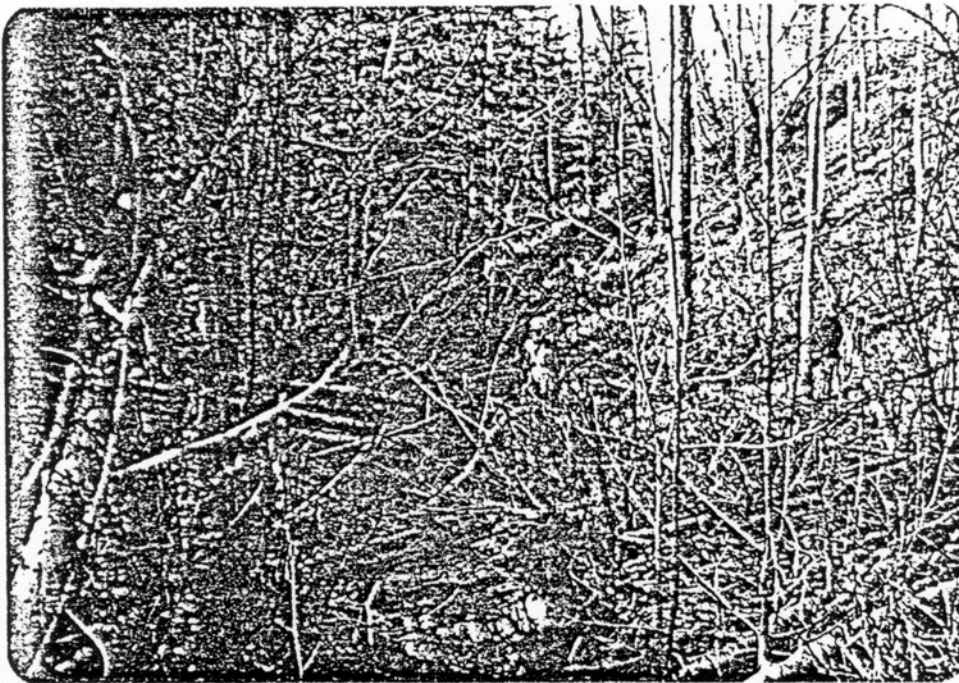


Photo 3. Lower portion of reach 1.

Reach 2 0.1 km.

This reach is mapped as a cascade. It is characterized by a very steep gradient (8 to 15%), stepped with many 0.5 meter to 1.5 meter falls with some relatively deep (50 Cm.) pools at the base of the falls providing fair rearing habitat. Spawning habitat was rated as poor. No fish were sampled or observed.

Kager Lake Inlet

This small stream was walked about 0.2 km. and was divided into two reaches.

Reach 1 0.1 km.

The lower portion of this creek is an unconfined, low gradient (0.5%) multiple channel flowing through willow vegetation (see photo 4) and containing a substrate of almost 100% fines. Then there is a 42 meter section traversing under the road crossing which contains a few patches of gravel suitable to spawning and has a more confined, slightly deeper entrenched channel (see photos 5, 6 and 7). About 12 rainbow trout, in spawning colours, were observed in this area. It seemed only "fair" for spawning as there were only a few patches of suitable gravel available and the rest was quite silty. Powerline clearing has removed streamside cover and resulted in an adjacent accumulation of debris. Upstream from this section, the stream channel becomes similar to the area near the mouth and is undefined and flows through willow vegetation containing numerous debris piles and a quite heavily silted bottom (see photo 8).



Photo 4. Mouth of inlet to Kager Lake (looking upstream).



Photo 5. Area below road crossing utilized by spawning rainbow trout (looking downstream).

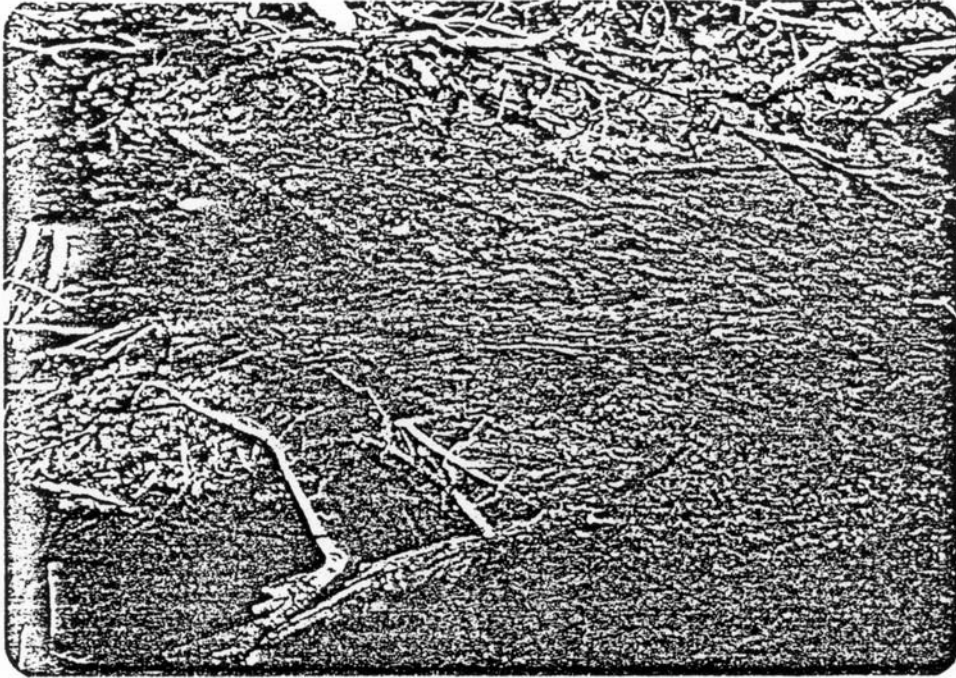


Photo 6. Substrate in area shown by photo 5.



Photo 7. Area above road crossing where a few rainbow trout were observed (looking upstream).

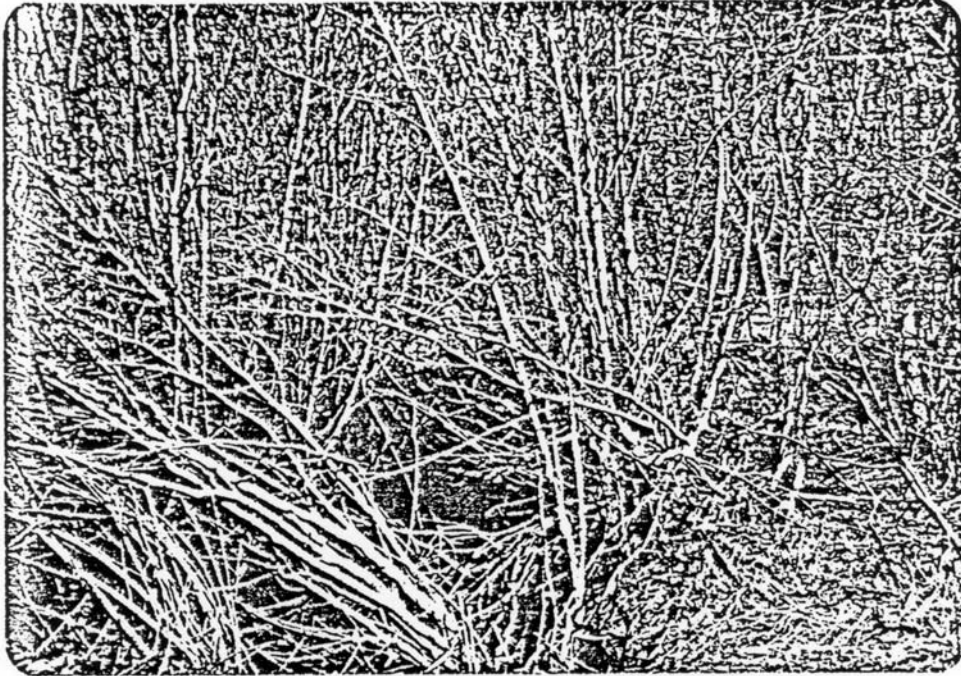


Photo 8. Upper portion of reach 1 (looking upstream).

Reach 2 0.1 km.

This section is characterized by a steeper gradient (5%) narrow V-shaped valley, single channel, confined with mainly vertical and undercut banks (see photo 9). There are many falls varying from 15 cm. to 45 cm.-some of them are barriers for a stream this small (wetted width averages 0.8 meters). There is fair rearing habitat in the pools and undercut banks, but probably not accessible to small fish due to the cascades. Spawning habitat is rated poor. No fish were observed in this reach.

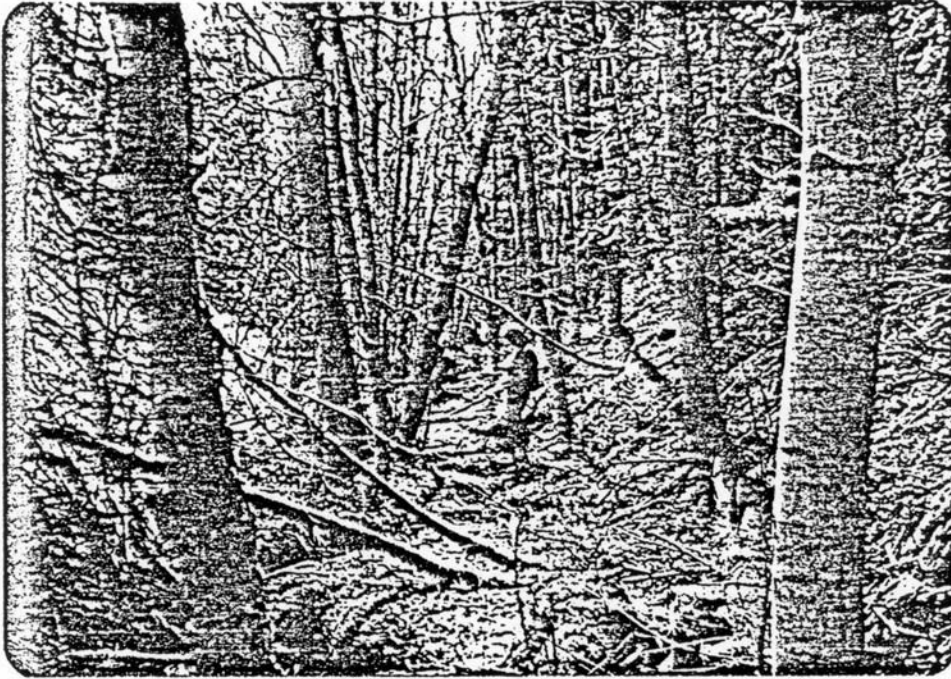


Photo 9. Lower portion of reach 2 (looking downstream)

CONCLUSIONS

Kager Lake Outlet

1. The beaver dam at the outlet prevents passage of fish and severely restricts stream flow.
2. Reach 1 contains some "fair to good" spawning habitat.
3. Local information (Dan Simmons) indicates reach 1. has been historically utilized by spawning rainbow trout.
4. Reach 2 has some rearing habitat but is unimportant for spawning.

Kager Lake Inlet

1. The 42 meter section of reach 1 was utilized by a few rainbow trout but was classed as only "fair" spawning habitat due to the small amount of suitable gravel and high degree of substrate siltation.
2. The remainder of reach 1, although it has a low gradient, is not presently suitable for spawning because of the abundant willow growth throughout the channel which has collected debris causing many small jams and resulting in heavy siltation.
3. Reach 2 is unsuitable for spawning rainbow trout because of steep gradient and lack of suitable gravel.

RECOMMENDATIONS

Kager Lake Outlet

1. The beaver dam should be completely removed about the end of April and should receive periodic monitoring to ensure it is not rebuilt.
2. Reach 1 should be observed about the middle of May to determine the extent to which it is being utilized by spawning rainbow trout.

Kager Lake Inlet

1. In reach 1, the scrub willows and accompanying debris should be removed and a definite stream channel created from the lake upstream for about 100 meters (start of steeper section).
2. It may be necessary to add suitable spawning gravel to this channel.
3. This may be suitable for a local stream enhancement project to improve spawning habitat for rainbow trout.

APPENDIX 1

Detailed Physical Stream Descriptions

Adapted from

Aquatic System Inventory and Analysis

by

Resource Analysis Branch

Ministry of Environment

March, 1977

REACH SHEET A

NAME Kager Lake Outlet "A"

REACH NO. 1 MAP NO. 93K/4E

SURVEY METHOD walking TEAM Hatlevik, Humphries, Morley

DATE May 18, 1978 LENGTH 0.13 KM.

PHOTO NO. 1, 2, 3

STREAM WIDTHS

	AVERAGE		RANGE	
WETTED	<u>2</u>	M	<u>1 - 2.5</u>	M
ROOTED	<u>2</u>	M	<u>1 - 2.5</u>	M
FLOOD PLAIN	<u>3</u>	M	<u>2.5 - 4</u>	M

AVERAGE DEPTH 0.13 M AVE. VELOCITY 0.4 M/SEC.

CALCULATED DISCHARGE 0.1 M³/SEC.

TURBIDITY 30 CM. AVE. SLOPE 2 %

TEMP. AIR _____ °C. AT _____ TIME

WATER 11 °C. AT 10:30 a.m. TIME

AQUATIC VEGETATION _____

INVERTEBRATES Caddis flies, Mayflies, Stoneflies, Leeches

ALGAE DENSITY L M (H)

DEBRIS L M H 90 % S, 10 % U

REACH SHEET B

CHANNEL TYPE

FORM S (I) M
THREAD (S) M
CROSS SECTION (C) B U
ENTRENCHMENT L (M) H
FLOW CHARACTER (%) 10 P, 40 S, 30 R, 20 B, - T
FLOOD/SIDE NIL (L) M H
STAGE DRY (L) M H FLD.

SUBSTRATE

% COMPOSITION 20 F, 40 G, 40 L, - R
ANGULARITY CLASS R Rs (As) A
COMPACTION L (M) H
STABILITY (%) - BRD., - BAR, - ISLANDS

BANKS

TEXTURE Fines and gravels, some large rocks
SLOPE (%) 10 SLOPING, 60 VERTICAL, 30 UNDERCUT
STABILITY (%) 90 STABLE, 10 UNSTABLE

BANK VEGETATION/STREAM COVER

% COMPOSITION 30 CON, 30 DEC, 40 SHRUB, 20 GRASSES, - BARREN
CROWN CLOSURE 60 % OVERHANG CLOSURE 70 %

OBSTRUCTIONS

Beaver Dam 2 m. high by 10 m. long at lake outlet is a barrier and severely restricts outlet flow.

BEAVER ACTIVITY NIL (L) M H

REACH SHEET C

FISH SAMPLING

METHOD Observation
% REACH SAMPLED 100
DIFFICULTY (L) M H
SPECIES NIL
NO.
SIZE RANGE

HABITAT APPRAISAL

	POOR	LOW	FAIR	GOOD	EXCELLENT
SPAWING			X		
REARING		X			
HOLDING					

GENERAL COMMENTS

Some spawning potential but limiting factor is lack of access and very restricted flow caused by beaver dam.

REACH SHEET A

NAME Kager Lake Outlet "A"

REACH NO. 2 MAP NO. 93K/4E

SURVEY METHOD Walking TEAM Hatlevik, Humphries, Morley

DATE May 18, 1978 LENGTH 0.1 KM.
To end of survey

PHOTO NO. 3

STREAM WIDTHS

	AVERAGE		RANGE	
WETTED	<u>2</u>	M	<u>1 - 2.5</u>	M
ROOTED	<u>2</u>	M	<u>2 - 3</u>	M
FLOOD PLAIN	<u>3</u>	M	<u>2.5 - 4</u>	M

Deepest pool depth 50 cm.

AVERAGE DEPTH 0.12 M AVE. VELOCITY - M/SEC.

CALCULATED DISCHARGE - M³/SEC.

TURBIDITY 30 CM. AVE. SLOPE 8 - 15 %

TEMP. AIR _____ °C. AT _____ TIME

WATER 11 °C. AT 11:00 a.m. TIME

AQUATIC VEGETATION -

INVERTEBRATES Mayflies, Stoneflies, Caddisflies

ALGAE DENSITY L M (H)

DEBRIS L M H 90 % S, 10 % U

REACH SHEET B

CHANNEL TYPE

FORM S (I) M
THREAD (S) M
CROSS SECTION (C) B U
ENTRENCHMENT L (M) H
FLOW CHARACTER (%) _____ P, 30 S, 20 R, 40 B, 10 T
FLOOD/SIDE NIL (L) M H
STAGE DRY (L) M H FLD.

SUBSTRATE

% COMPOSITION 20 F, 20 G, 60 L, - R
- ANGULARITY CLASS R Rs As (A)
COMPACTION L (M) H
STABILITY (%) - BRD., - BAR, - ISLANDS

Some huge angular boulders in stream bed and in banks.

BANKS

TEXTURE Fines, some gravels, large boulders interespersed
SLOPE (%) 10 SLOPING, 60 VERTICAL, 30 UNDERCUT
STABILITY (%) (90 STABLE, 10 UNSTABLE

BANK VEGETATION/STREAM COVER

% COMPOSITION 30 CON, 30 DEC, 40 SHRUB, 20 GRASSES, - BARREN
CROWN CLOSURE 60 % OVERHANG CLOSURE 70 %

OBSTRUCTIONS

Cascades with many 0.5 m to 1.5 m drops.

BEAVER ACTIVITY NIL (L) M H

REACH SHEET C

FISH SAMPLING

METHOD Observation and angling
% REACH SAMPLED 40
DIFFICULTY (L) M H
SPECIES NIL
NO.
SIZE RANGE

HABITAT APPRAISAL

	POOR	LOW	FAIR	GOOD	EXCELLENT
SPAWING	X				
REARING			X		
HOLDING					

GENERAL COMMENTS Possibly some rearing potential in pools below drops and in undercut banks. Limiting factors are lack of spawning gravel, steep gradient, very low flow, and many barriers. This reach is of little importance to spawning rainbow trout.

REACH SHEET A

NAME Kager Lake Outlet "B"

REACH NO. 1 MAP NO. 93K/4E

SURVEY METHOD Walking TEAM Hatlevik, Humphries, Morley

DATE May 18, 1978 LENGTH 0.1 KM.

PHOTO NO. 4, 5, 6, 7, and 8.

STREAM WIDTHS

	AVERAGE		RANGE	
WETTED	<u>1.5</u>	M	<u>1 - 3</u>	M
ROOTED	<u>1.5</u>	M	<u>1 - 3</u>	M
FLOOD PLAIN	<u>10</u>	M	<u>8 - 12</u>	M

AVERAGE DEPTH 0.25 M AVE. VELOCITY - M/SEC.

CALCULATED DISCHARGE - M³/SEC.

TURBIDITY 50+ CM. AVE. SLOPE 1 %

TEMP. AIR 13 °C. AT 12:30 p.m. TIME

WATER 5 °C. AT 12:30 p.m. TIME

AQUATIC VEGETATION -

INVERTEBRATES Stoneflies

ALGAE DENSITY L (M) H

DEBRIS L M H 90 % S, 10 % U

REACH SHEET B

CHANNEL TYPE

FORM S (I) M
THREAD S (M) - Mostly
CROSS SECTION C B (U) - Mostly
ENTRENCHMENT (L) M H
FLOW CHARACTER (%) 10 P, 40 S, 50 R, _____ B, _____ T
FLOOD/SIDE NIL (L) M H
STAGE DRY (L) M H FLD.

Channel flowing through willow vegetation

SUBSTRATE

% COMPOSITION 50 F, 40 G, 10 L, _____ R
ANGULARITY CLASS R (Rs) As A
COMPACTION (L) M H
STABILITY (%) _____ BRD., _____ BAR, _____ ISLANDS

BANKS

TEXTURE Sandy fines, some gravels
SLOPE (%) 10 SLOPING, 50 VERTICAL, 40 UNDERCUT
STABILITY (%) (80 STABLE, 20 UNSTABLE)

BANK VEGETATION/STREAM COVER

% COMPOSITION 10 CON, 10 DEC, 80 SHRUB, 10 GRASSES, _____ BARREN
CROWN CLOSURE 20 % OVERHANG CLOSURE 60 %

OBSTRUCTIONS Some small debris jams piled up behind willow vegetation. No barriers.

BEAVER ACTIVITY NIL (L) M H

REACH SHEET C

FISH SAMPLING

METHOD Observation

% REACH SAMPLED 80

DIFFICULTY L (M) H

SPECIES Rainbow trout

NO. 12

SIZE RANGE Est. 15 cm. to 30 cm. Rainbow trout observed in spawning colours up to 12 meters above road crossing and 30 meters below road crossing. Also observed one fish (suspect rainbow trout), about 5 cm. length, underneath bridge.

HABITAT APPRAISAL

	POOR	LOW	FAIR	GOOD	EXCELLENT
SPAWING			X		
REARING			X		
HOLDING					

The 42 meter section mentioned above contained some patches of suitable spawning gravel but was mainly quite heavily silted. The remainder of this reach was unsuitable for spawning.

GENERAL COMMENTS

Powerline clearing below bridge has removed streamside vegetation resulting in debris piles alongside (and in places - instream) stream banks and possibly contributed to increased substrate siltation.

REACH SHEET A

NAME Kager Lake Outlet "B"

REACH NO. 2 MAP NO. 93K/4E

SURVEY METHOD Walking TEAM Hatlevik, Humphries, Morley

DATE May 18, 1978 LENGTH 0.1 KM.
To end of survey

PHOTO NO. 9

STREAM WIDTHS

	AVERAGE		RANGE	
WETTED	<u>0.8</u>	M	<u>0.5 - 1.5</u>	M
ROOTED	<u>0.8</u>	M	<u>0.5 - 1.5</u>	M
FLOOD PLAIN	<u>1.5</u>	M	<u>1.0 - 3.0</u>	M

AVERAGE DEPTH 0.15 M AVE. VELOCITY 0.28 M/SEC.
Maximum depth 40 cm.

CALCULATED DISCHARGE 0.034 M³/SEC.

TURBIDITY 30 CM. AVE. SLOPE 5 %

TEMP. AIR 13 °C. AT 1:00 p.m. TIME

WATER 5 °C. AT 1:00 p.m. TIME

AQUATIC VEGETATION -

INVERTEBRATES Stoneflies, small segmented worms 5 cm. long.

ALGAE DENSITY L (M) H

DEBRIS L M H 90 % S, 10 % U

REACH SHEET B

CHANNEL TYPE

FORM S (I) M
THREAD (S) M
CROSS SECTION (C) B U
ENTRENCHMENT L (M) H
FLOW CHARACTER (%) - P, 60 S, 20 R, 20 B, - T
FLOOD/SIDE NIL (L) M H
STAGE DRY (L) M H FLD.

Stepped - many 15 cm. to 45 cm. drops.

SUBSTRATE

% COMPOSITION 30 F, 40 G, 30 L, - R
- ANGULARITY CLASS R (RS) As A
COMPACTION L (M) H
STABILITY (%) - BRD., - BAR, - ISLANDS

BANKS

TEXTURE Fines and gravels
SLOPE (%) 10 SLOPING, 50 VERTICAL, 40 UNDERCUT
STABILITY (%) (90 STABLE, 10 UNSTABLE
Moss covered banks

BANK VEGETATION/STREAM COVER

% COMPOSITION 30 CON, 60 DEC, 20 SHRUB, 80 GRASSES, 10 BARREN
CROWN CLOSURE 40 % OVERHANG CLOSURE 10 %

OBSTRUCTIONS Many 15 cm. to 45 cm. drops - some are barriers.

BEAVER ACTIVITY NIL (L) M H

REACH SHEET C

FISH SAMPLING

METHOD Observation
% REACH SAMPLED 100
DIFFICULTY (L) M H
SPECIES NIL
NO.
SIZE RANGE

HABITAT APPRAISAL

	POOR	LOW	FAIR	GOOD	EXCELLENT
SPAWING	X				
REARING		X			
HOLDING					

Holding rearing habitat for small fish in plunge pools and Undercut banks, no spawning habitat.

GENERAL COMMENTS

This reach is of little importance to spawning rainbow trout migrating from Kager Lake because of inaccessibility, lack of spawning habitat and steepness of gradient.