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FRESHWATER FISHERIES ADVISORY SERVICE

MARINE DEPARTMENT

INVESTIGATION REPORT

North Island JOB NO. 5

ACCLIMATISATION SOCIETY DISTRICT: Tauranga

TITLE OF JOB: A survey of the upper reaches of the Kaituna River.

OBJECTIVES: To assess the spawning potential of the river.

INTRODUCTION

The Kaituna River is the outlet for Lakes Rotorua and Rotoiti and is an extremely popular fishing water. Most concentrated effort takes place near the lake outlet within the Rotorua Acclimatisation Society District but it is still popular all the way to the sea.

The area is of special interest as it is likely to receive the increasing pollution load from the rapidly growing, and industrialised city of Rotorua. Even with sewage treatment the nutrient load is likely to increase greatly.

A major hydro-electric scheme has been proposed for a number of years, but appears to be set aside in the immediate future.

This survey was undertaken by the North Island Technical Field Service between June and September 1969.

METHODS

A physical survey, on foot and by boat, from the junction of Mangorewa River for a distance of approximately six miles upstream to where surveying was made impossible by a series of rapids and falls (see location map). Due to the depth and width of the river

electric fishing could not be utilised; water depth also ruled out successful bottom fauna sampling. Conventional angling from a boat was used to gather trout specimens and inspect them from an unbiased point of view.

Angling diaries issued over various years were analysed insofar as they related to this river. This data will be published separately but relevant bits are incorporated in this report.

## FINDINGS

### PHYSICAL FEATURES:

The Kaituna River commences at the north western end of Lake Rotoiti, and forms the main outlet to both Lakes Rotoiti and Lake Rotorua.

A series of waterfalls and rapids covering approximately the first two miles of river form a natural barrier to river fish wishing to migrate upstream into the lakes, though many lake fish survive the downstream journey and consequently become resident fish in the Kaituna River. That part of the river surveyed varied in depth from 2ft to 12ft deep, the shallows being mainly confined to where creeks enter the river and have built up small shingle fans. The gravel fans that exist are very loosely packed and heavily silted with sand. The river bed itself is composed mainly of loose pumice. Pumice rocks of six inches and more were observed moving along the bottom of the river, and large amounts of pumice was in suspension in the water.

Heavy weed growth (mainly oxygen weed, Lagarosiphon major) occurs along the river banks; this weed has formed beds at least six feet wide along the river's natural bank. After a fresh in the river these weed banks become covered with silt and give the impression of muddy shallows. This is causing considerable concern to local farmers as stock is inclined to walk out on these covered weed beds and consequently drown in the river. These weed beds are increasing and therefore slowly decreasing the original width of the river, so that during heavy rain the river now is inclined to higher flooding than in the past.

A large pumice quarry (now disused) sighted approximately 1½ miles away from the river has been creating a nuisance problem and during heavy rain, pumice and sand is washed down into the river. The planting of poplar trees and clover along the eroding quarry edge has at present been unsuccessful in holding the pumice (see Plate No. 1).

#### FISH AND ANGLING DIARIES:

Experimental fishing using wet fly and spoon was carried out during the survey, but only six fish were caught. These fish were taken by trolling with a spoon from a moving boat. (It was found that 50 yards of line was about the maximum length suitable and the most successful using a copper and red or "rainbow" coloured spoon.) The six fish taken were all fin clipped; three had their right pectoral fin removed, another the right pelvic and one the left pectoral fin (see Plate No. 2).

As the Tauranga Society has not so marked fish, these undoubtedly came from stocking carried out within the Rotorua Acclimatisation District. The contribution this makes to the quality of the fishing in the lower Kaituna is open to considerable speculation.

The fish were in poor condition; the average condition factor was 29.5. The lengths, weights and condition factor of the fish caught can be seen on Table No. 1.

From the returns of angling diaries it is interesting to see that little change has occurred in the size of fish taken over the years.

In 1957 and 1967 diaries record only rainbow trout. The 1962 diaries record that 10% of the fish caught were browns. Anglers in 1967 commented on these diary forms that insufficient restocking of rainbows had been done and that the brown trout was becoming predominant in the catch. This does not seem to apply in this watershed; at least it is not borne out by diary results.

In general the fish size is very good. In 1957 it was 20.6 inches; 1962 22.4 inches and 1967 23.0 inches; there is no overall trend in size evident. In 1967, 15 small 12-14 inch trout were recorded on dry fly in the "Trout Pool" area, also many (40%) undersized fish were caught. These figures have not been included in the 1967 results. Besides these undersized fish, no other undersized fish were recorded in the diaries.

Catch rates:

1957	3.7 hours per fish
1962	4.7 hours per fish
1967	4.9 hours per fish (Dry Fly in Trout Pool. 1.0 hours per fish)

The 1967 results were not significantly different from the 1962 results. There seems to be a slight drop in rate of catch since 1957. In 1957 the most popular method was bait fishing with smelt, but currently minnow, spoon and dry fly seem to be the most popular. In 1962 all the brown trout were caught on dry fly and this method also realised a very good rate of catch of one fish every hour. These fish were slightly larger than those caught by other methods. Fishermen using minnows caught fish every 6.6 hours. Spoon fishing was very poor as only two fish were caught in 50.5 hours of recorded angling. It was noticeable that in 1957 this method also gave poorer results than any other. Probably the degree of angler skill is reflective more in these catches than the effectiveness of each method. The total bag of fish was estimated at -

140 fish in 1957 and  
800 fish in 1962.

All figures are approximate only.

SPAWNING:

No really suitable spawning areas in the Kaituna River were found. A survey of a small unnamed stream (see location map) which is known to hold trout during the spawning season; (although no trout were observed during the survey) revealed that successful spawning in the stream would be very doubtful. Suitable spawning gravels found in the stream were very heavily silted with sand. From discussions with the Internal Affairs Department staff in Rotorua successful trout spawning occurs in the upper reaches of the Mangorewa River, though this was not verified during the present survey. Areas of suitable gravel are to be found where small streams enter the river as these streams have brought down quantities of gravel and sand which are deposited in small fans at the river edge. Several pairs of trout were observed lying below these fans, and consequent visits to the area showed attempts at making redds, but on digging into them no eggs were found.

BOTTOM FAUNA:

Due to the depth of the river, bottom fauna sampling could not be carried out successfully. Only one sample was taken, the result of which is set out below.

Results of bottom fauna sample - Access through the Williams Farm - larvae only.

Ephemeroptera (Mayfly)	2
Trichoptera (Caddis)	23
Rhyacophilidae (free living caddis)	2
Plecopter (Stone Fly)	3
Coleoptera (Water beetle)	2
Diptera (Non-biting midge)	1

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 33
 

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N.B. This sample was taken on a flat, formed by a creek entering the river.

As can be seen from the single sample the total count of insects is very low. Although successful sampling (using a Surber Sampler) could not be carried out, observations indicated a reasonable supply of natural foods, e.g., caddis fly larvae, snails, koura and freshwater prawns in the weed beds also on the sides of the river, together with shoals of smelt. It appears that the fish are utilising this food source as is indicated by stomach analysis - see Table 3.

Although drift sampling was not undertaken it seems that terrestrial insects form a major supplement to the fishes diet, which would verify the success of dry-fly fishing as a method.

#### POLLUTION:

Another problem affecting the Kaituna River is the increasing amount of major nutrients entering the river from Lake Rotorua (via the Ohau channel) into Lake Rotoiti and then into the river, and also from the surrounding farms by way of runoff from aerial topdressing carried out in the river catchment. Much nutrient material also comes from thermal waters in the lakes catchment. This nutrient increase has caused the river to take on a green appearance due to algae as well as fostering growth of larger plants. This problem will be further increased if the proposed sewage discharge from Rotorua City into the Kaituna River is finalised.

#### DISCUSSION

The Kaituna River at present is a poor fishery, due primarily to the country through which the river flows.

The loose pumice river bed and suspended pumice severely limits the spawning potential of the river as well as providing a poor habitat for development of adequate food organisms.

The increasing weed growth, though providing a more stable habitat for certain food organisms is causing serious concern as the natural channel of the river is yearly becoming smaller.

The most noticeable affect is that the river is now more susceptible to flooding and a higher intensity of flooding.

Little can be done to improve the angling in the river that is economically reasonable. Lake Rotoiti seems to play an important part in keeping the Kaituna River stocked, and the quantity and quality of fishing could well depend on the downstream migration of fish from that lake.

Stocking of the river should be kept to a low level in line with the carrying capacity of the water. When carried out it would be advisable to release fish of at least 4 to 8 inches so as to avoid that stage of a trout's life cycle when they are most dependent on small food organisms. Those organisms most effected by existing conditions in this river.

While the condition of the few fish caught was poor the food available does favour the larger fish. Therefore, to have any effect on the quality of angling the fish should be stocked as near "catchable" size as possible. Stocked at a really large size would not be practical as the cost would be high and angling pressure does not warrant the expenditure. Large fingerlings appear to be the only logical compromise.

As the condition of the fish will be the best measure of the adequacy of food for larger fish, this information should be solicited from anglers. Selected, trust worthy anglers should be able to furnish a year by year check on the size and weight of fish caught. From this information the fishery may be monitored.

#### CONCLUSIONS

1. Successful spawning in the Kaituna River is severely limited, with little that can be done to improve the present conditions. The planting of poplars or willows on seriously eroding bank areas could help alleviate the problem of excess pumice runoff, and lower the amount of suspended pumice in the river, which in turn would help preserve the present limited areas of spawning gravels. A massive bank stabilisation programme is, however, beyond the Societies resources.

2. The weed growth in the Kaituna River is increasing each year, causing a build-up of mud and silt and reducing the width of the river. An artificial method of weed control should be considered, bearing in mind that the weed does provide an environment for certain aquatic animals, and should not all be removed. The ultimate solution for this problem is also very complex and concerns land usage for the entire area. Much effect from many Government departments is now directed at this problem which if solved, will benefit the Kaituna River. Eventual introduction of a biological control agent may provide the eventual solution.
3. A check should be kept on the nutrient increase of the water, with particular regard to the proposed Rotorua sewage scheme. This scheme would not only have an adverse effect on the fisheries, but also on the present recreational attraction of the river as a whole.
4. If finance is available to carry out an artificial stocking programme it is recommended that it be limited in nature and utilise only "larger" fingerling trout, i.e., 1,000 to 2,000 fish 4 to 8 inches long. The larger the fish the better.
5. A data gathering scheme be instigated among selected anglers to give yearly information on the condition of the fish present.
6. The stocking programme be reassessed as further angling data comes to hand.

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Fisheries Scientists

#### ACKNOWLEDGEMENT

Mr E. Graynoth, Fisheries Scientist, for angling diary data used in this report.

TABLE NO.1

Sex, Length, Weight, Condition Factor and Stomach Contents of Rainbow Trout Caught in the Kaituna River.

	1	2	3	4	5	6	Mean Condition Factor	Mean Weight	Mean Length
SEX	HEN	HEN	HEN	HEN	HEN	JACK			
LENGTH	21.5"	20.25"	20.5"	21.5"	21.0"	19.0"	29.5	21b70z	20.0"
WEIGHT	31b1oz	21b1oz	21b10z	21b12oz	31b80z	11b14oz			
METHOD MARKED	Right Pelvic	Right Pectoral	Right Pectoral	Right Pectoral	No Marks	Left Pectoral			
							<u>TOTAL</u>		
MAYFLY LARVAE	4	2		1	2	3	14		
CADDIS FLY LARVAE					58	25	83		
ALDER-FLY LARVAE						1	1		
DIPTERA LARVAE		1					1		
OVA	4	4	EMPTY	2		1	11		
KOURA (CRAYFISH)	2	4					6		
PRAWN	1	1					2		
SMELT	2			1			3		
TERRESTRIAL INSECTS	6	2		2	1		11		
WEED TOPS	16						16		

# KAITUNA RIVER (survey area)

1 inch to 1 mile

○ → site of boat launching.

⋯ native bush

Clays Farm  
(Access farm track)

Trout caught in this section of river

Approx. location of rapids

MANGOREWA R.

Te Puke

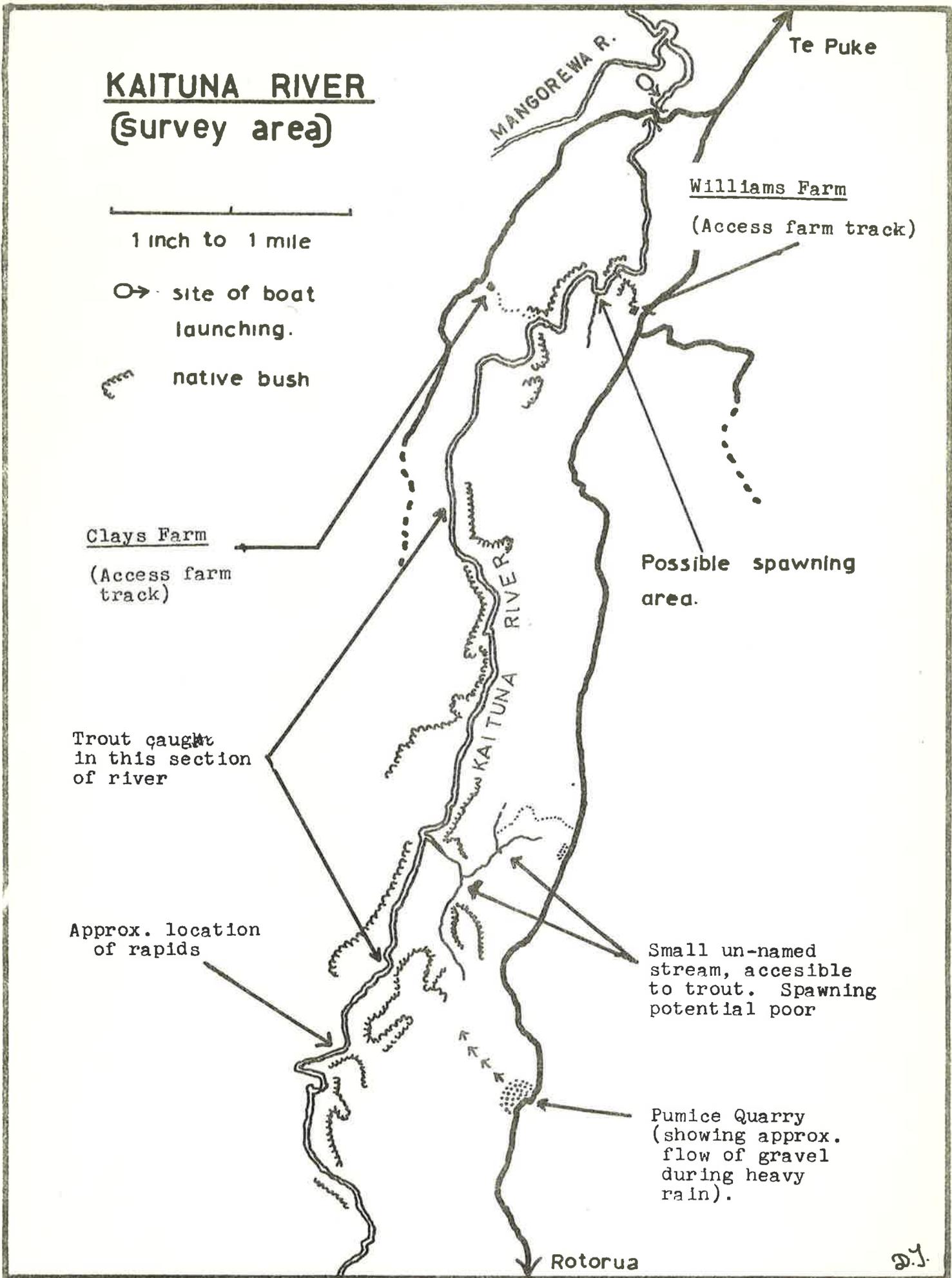
Williams Farm  
(Access farm track)

Possible spawning area.

Small un-named stream, accessible to trout. Spawning potential poor

Pumice Quarry (showing approx. flow of gravel during heavy rain).

Rotorua



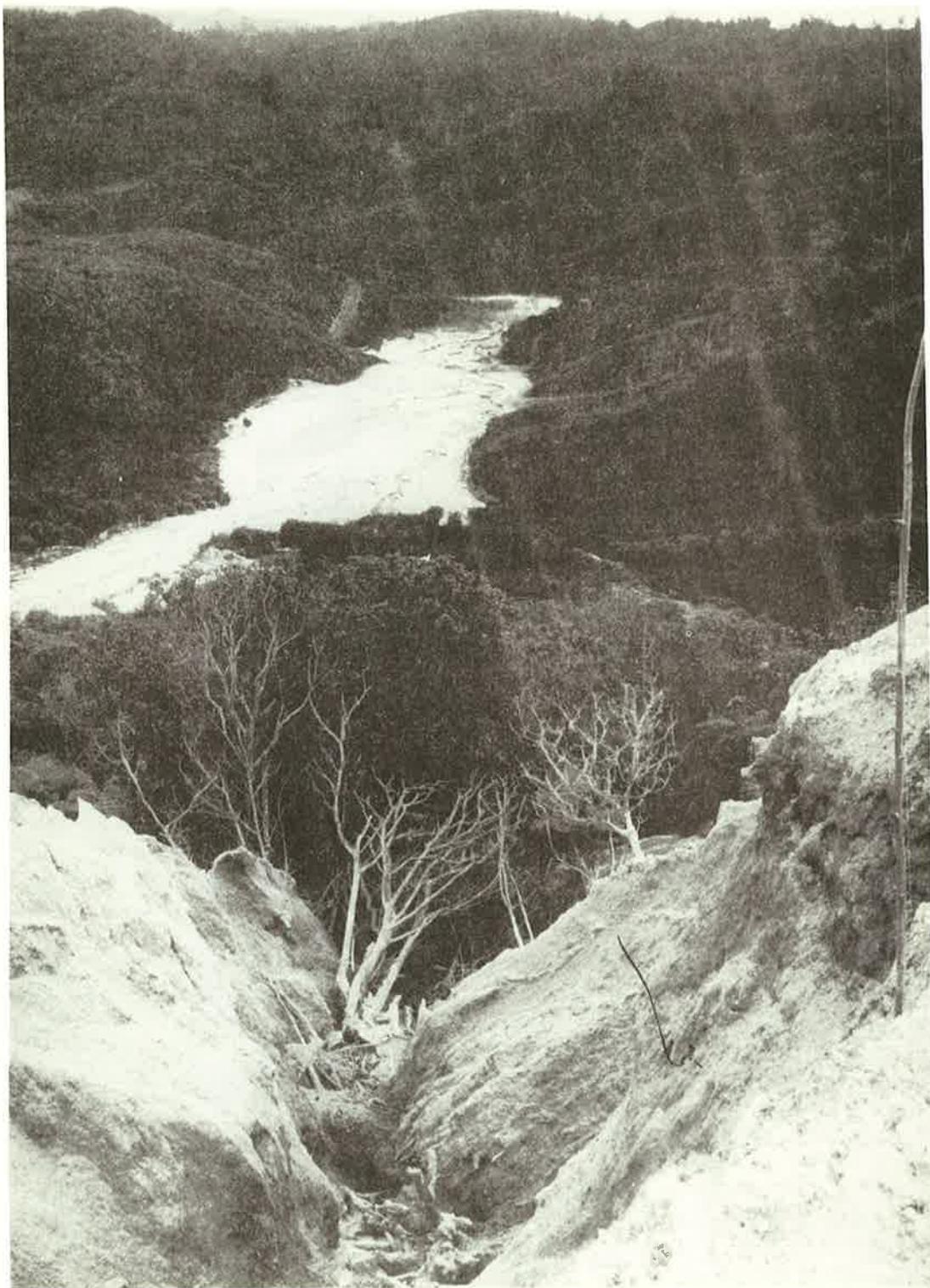


Plate 1

Showing pumice erosion  
caused by quarry.

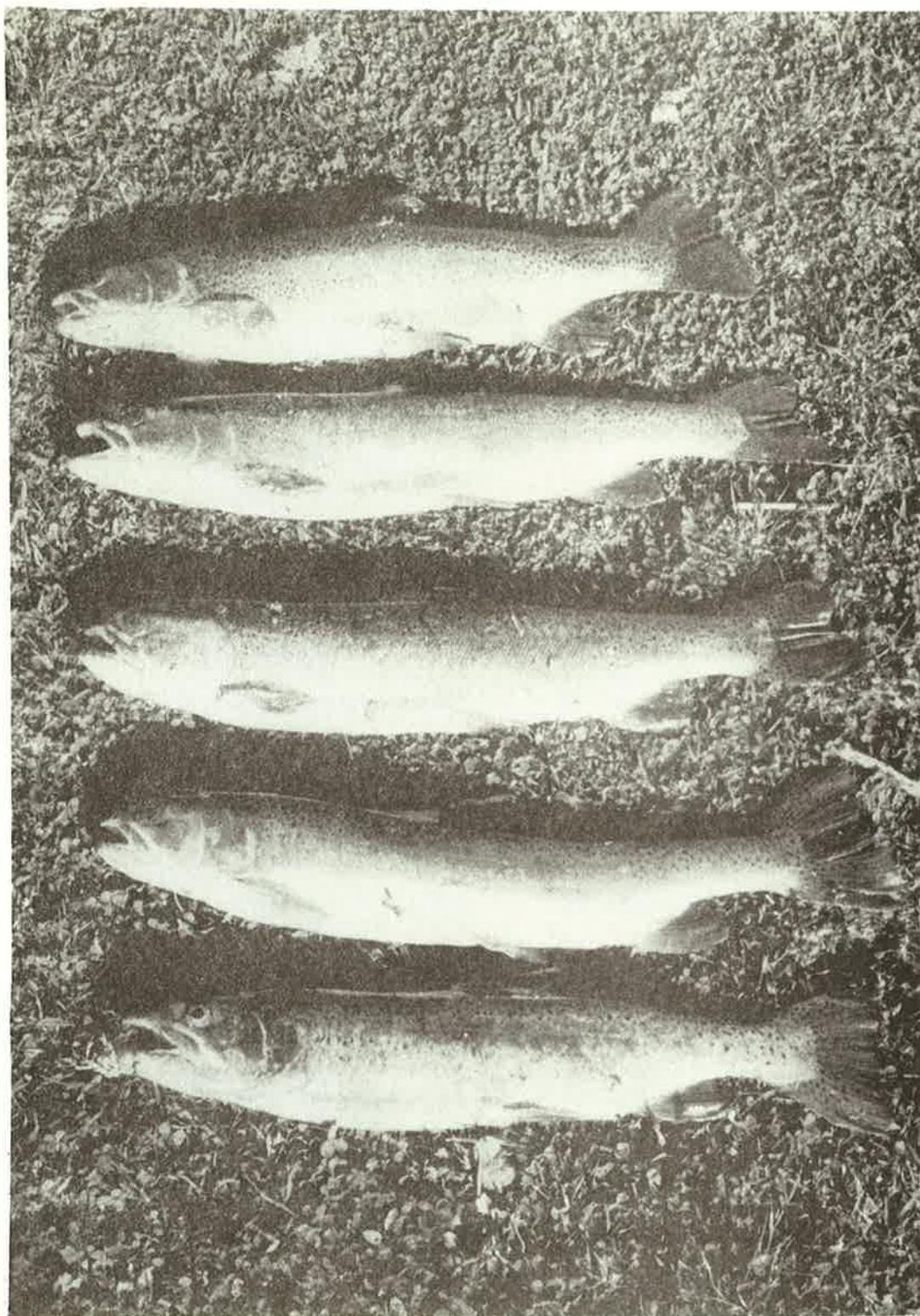


Plate 2

Rainbow trout caught  
on survey of Kaituna  
River