

FRESHWATER FISHERIES ADVISORY SERVICE

MARINE DEPARTMENT

INVESTIGATION REPORT

JOB NO. 24

ACCLIMATISATION SOCIETY DISTRICT: South Canterbury

TITLE OF JOB: Investigation of the Opihi River fishery.

OBJECTIVES: To determine the reasons for the decline of the Opihi River trout fishery.

FINDINGS: This investigation was carried out during March/April 1960.

A. PHYSICAL FEATURES

Opihi River

This river rises in the environs of Burkes Pass, and flows in an easterly direction to join the sea a few miles east of Temuka (see Fig. 1). During the first few miles the river has stable bed and banks and flows through hill country.

In the region of Cloudy Peaks the river becomes less stable and develops a flood bed. From Cloudy Peaks to a point east of Fairlie the stream lacks holding water, and becomes a series of fast runs and ripples, split in many areas into several channels. The flood bed is extensive, and supports much scrub growth, as do the banks. A few miles from Fairlie the Opihi enters a narrow gorge, the walls of which rise very steeply to over 1000 ft, and are composed of jagged rock which supports some form of gorse growth. The flow here is a series of short cataracts and short deep pools; there is no flood bed and the water reaches from wall to wall, varying in width from 25 to 45 ft.

The Opihi emerges from the gorge a few miles above Raincliff, and is joined there on the northern bank by the Opuha, which is in fact the larger river.

From Raincliff to its mouth the Opihi has a wide flood bed and ill formed banks, which have however, been worked on by the local Catchment Board in many places. Bank vegetation consists almost entirely of willows and scrub while the bed consists of large stones and shingle which are not generally consolidated; the stream averages approximately 120 ft - 140 ft in width.

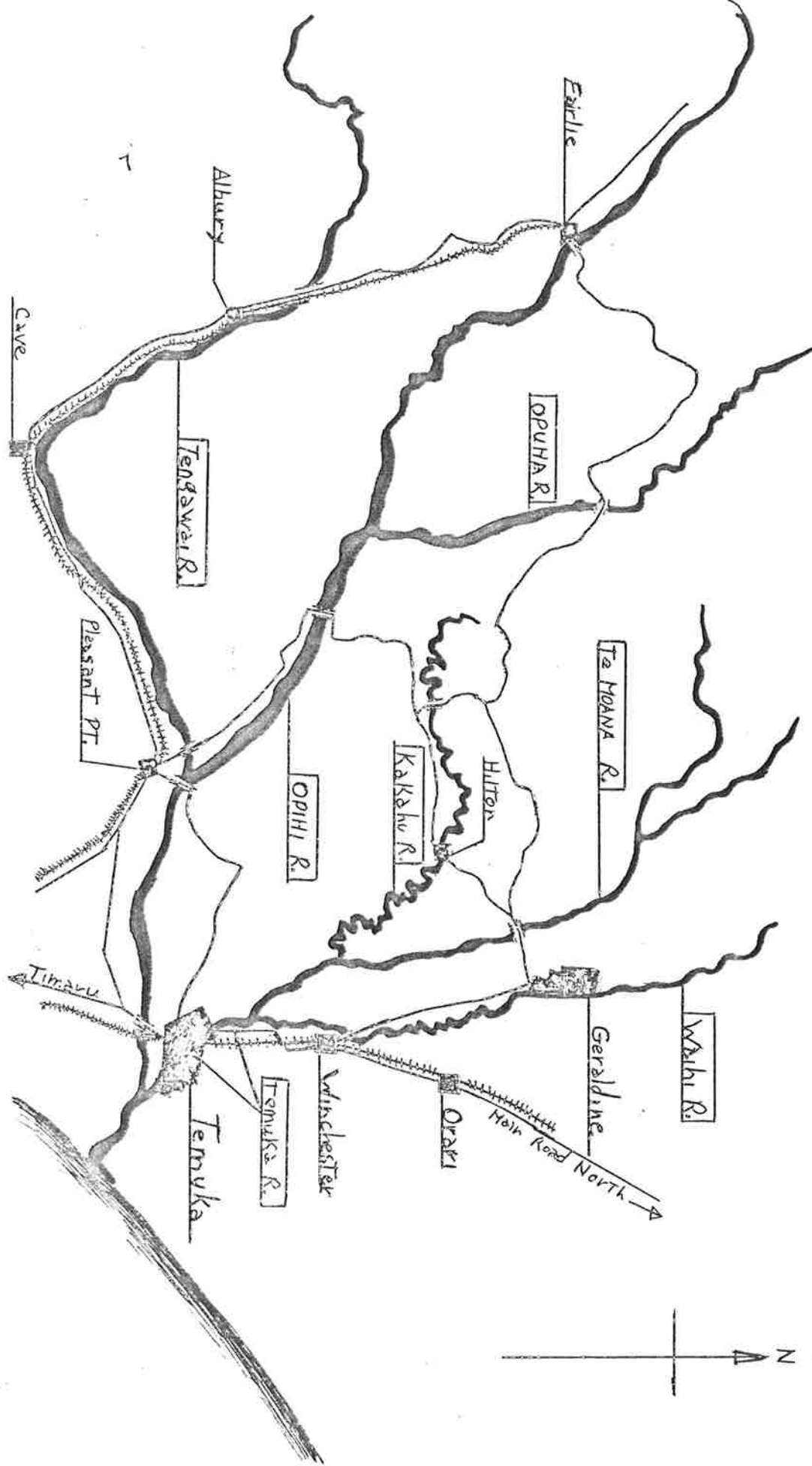


FIG. 1

Just above Pleasant Point the Opihi is joined by the Tengawai River on the south bank, but at Pleasant Point much of the water is drawn off for irrigation during the summer, and the flow has been known to stop from the irrigation intake to Temuka, where there is small irrigation outflow race.

Below Temuka, the final tributary, the Temuka River, enters from the north. This is a combination of waters from the Te Moana, Kakahu and Waihi Rivers. For the purposes of this investigation, the Opihi River has been divided into four sections.

Section 'A': From the mouth to the confluence of the Temuka River.

Section 'B': From the Temuka River to the irrigation intake.

Section 'C': From the irrigation intake to the confluence of the Opuha River.

Section 'D': From the Opuha upstream.

The Temuka River

The Temuka River is formed by three other rivers joining together. It is a far more placid water than the Opihi and comprises long flats of slow or moderate current, with short intermittent ripples. There is a flood bed which extends to over 100 yards in places, but this is generally overgrown with grasses and brambles. The banks are reasonably stable, and support willows, brambles and scrub.

The Temuka River is subject to a certain amount of pollution from sewage and wool washing establishments, and for the purposes of this investigation has been divided as follows:

(WW/J) From the junction to "Roonies" wool wash outflow, which is only a few hundred yards from the junction.

(S/WW) From the wool wash outflow to the sewage outflow below the railway bridge.

(W/S) From the sewage outflow to the Waihi River, into which flows the effluents of a second wool wash.

The Waihi River

The Waihi River was examined only from its junction with the Temuka River to as far as Geraldine. It is a fairly stable water consisting of alternate flats and ripples in about equal proportions. The bed is comprised of stones and much gravel, which is alternatively firm and loose. There is an alternate flood bed up to 60 yards in extent, but usually narrower than

the main stream itself which varies from about 15 to 40 ft across and is generally shallow.

There is frequently a narrow fringe of water cress along the margins of the stream which provides useful cover to small fish and the banks comprise willows and pasture, and have been dealt with by the Catchment Board in places.

The Waihi has been divided into two sections. Section 'Y' from the confluence to the wool wash outflow at Winchester, and Section 'Z' from the wool wash upstream.

Te Moana River

The Te Moana River is the centre stream of the three which comprise the Temuka River. It has unstable banks supporting willows and scrub, a flood bed extending to 70 yards in places, but generally narrower and a stream averaging about 25 feet across during the period of the survey. The Te Moana dries up for long stretches during the summer months.

The Kakahu River

This is a slow murky stream for the greater part of its length, consisting of long slow pools and short mild ripples. There is a considerable vegetable growth in certain areas composed of *Anachorus canadensis*, *Potamogeton cheesmanii*, and *Potamogeton pectinatus*.

The banks and bed are both stable, and the banks support many willows and much scrub. The stream is typical of many English "coarse" fish rivers and is reputed to have held perch at one time.

In the lower reaches of the Kakahu opens up and gains a wide flood bed, but stream bed and banks remain stable. In the topmost reaches there are some faster ripples with moderate gravel beds.

The Tengawai River

This is a fast water up to 90 ft wide in places and with a flood bed up to 150 yards, while the banks are often unstable and support willows, grass and scrub. There is very little cover over the water itself, and as with most of the Opihi rivers, there is no vegetation. The bed is comprised of boulders, stones and gravel with areas of fine gravel and grit in the upper reaches.

The Opuha River

The Opuha is the largest river of the system, and it is from this river that most of the shingle and rubble in the Opihi is derived.

The river is most unstable and has received a great deal of attention from

the Catchment Board, especially in the upper reaches, where both the north and south branches are unstable and have wide flood beds of boulders and stones.

In the lower reaches below the gorge the right bank is guarded by miniature limestone cliffs and is very stable, but the left bank has no such protection. The flow of water is rapid, and there are few holding pools. There was not sufficient time to examine the gorge section.

B. BOTTOM FAUNA

Bottom fauna samples were taken from all the above rivers with a Surber square foot stream sampler. A total of 72 samples were taken, as shown in Table 1.

In section 'D' of the Opihi River the number of animals was very low, at an average of 50 per sample. The predominant species were mayflies (*Deleatidium*) which formed 30% of the total (see Fig. 2(A)).

In section 'C' the average number of animals increased to 237 per sample, with *Deleatidium* forming 68% of the total, and the number of varieties of animals increased from 12 in section 'D' to 17 in section 'C'.

In section 'B' there was a further increase to 376 animals per sample, with *Deleatidium* forming 61% and the varieties increasing to 19.

In section 'A' below the confluence of the Temuka River, there is a considerable change in the bottom fauna. (This is not due to the influence of tides, as no samples were taken in tidal waters). The number of animals per sample dropped back to 213, with the F.W. snail, *Planorbis*, forming 31% of the total. This snail had been found in insignificant numbers in section 'B' and not at all in sections 'C' and 'D'. All mayfly larvae virtually disappear in section 'A' and only three species of *Deleatidium* were found there.

The number of varieties also dropped to twelve.

Temuka River, Te Moana

The Te Moana is included with the Temuka River here to demonstrate the difference in bottom fauna above and below the Waihi confluence.

The number of animals per sample in the Te Moana was only 175, but at least two of the four samples were taken at points where the river had been completely dry only five or six days before the sample was taken. These two samples held 71 and 104 animals respectively.

The predominant animal was *Deleatidium*, forming 43% of the total, with the caddisfly, *Hydropsyche*, forming 21%, see fig. 2(B).

In section 'Waihi/S' of the Temuka River, immediately below the confluence of the Waihi, the average number of animals per sample was 300 with *Planorbis* forming 42%, while *Deleatidium* disappeared completely and *Hydropsyche* appeared in only insignificant numbers.

Below the sewage outflow in section 'SWW' a further change took place, with the number of animals increasing to 832 per sample, 68% of which were another freshwater snail, *Potamopyrgus*, *Planorbis* dropping back to 9% and *Hydropsyche* not being found.

Below the second wool wash outflow in section 'WW/J' the number of animals fell back to 368 per sample with *Planorbis* forming 24% and *Potamopyrgus* 20%. Both species gave way to the caddis *Hydroptilid* which formed 30% of the population.

In the Waihi River, see Fig. 2(C), the fauna is modified by the entry of washings from the wool wash. In section 'Z' above the wool wash the average number of animals per sample was 444, with *Deleatidium* forming 68% and a caddis (*Olinga*) forming 13% of the fauna.

In section 'Y' below the wool wash, the number of animals dropped to 357, *Deleatidium* forming a mere 1% and *Planorbis* 27%, while the predominant species was a small worm (*Tubificid*) which formed 33% of the total. These worms had formed only 1% of the population in section 'Z', and as they are inhabitants of the silt and mud, they are not generally available to trout as food.

Kakahu

The average number of animals per sample in the Kakahu River was 339, formed from a total of 18 varieties. *Planorbis* were predominant, forming 37% of the total, with *Potamopyrgus* comprising 19%, *Deleatidium* 15% and *Olingochaets* 6%.

Tengawai

Deleatidium formed 45% of the 504 animals in an average sample for this river, the second biggest count recorded in the system. Parnid larvae (small freshwater beetle) and *Hydropsyche* were second and third each with 19%. Nearly all the animals were very small, and came from recent hatches.

Opuha

The average of only 138 animals per sample was comprised mainly of *Hydropsyche* (33%) and *Deleatidium* (31%). The rough unstable condition of this river would account for this small number. Most of the animals counted were, as in the Tengawai, very small and were evidently new hatches.

C. EELS

Eels were taken by trapping from the Opihi, Temuka and Tengawai Rivers. The method used was to set a number of traps at 3 chain intervals for a period of three nights, thereby making an expected catch of 90% of the trappable eels (Burnet).

The Opihi River is estimated as holding 82 lbs of eels per acre, and the Tengawai 58 lbs per acre, both these populations being only moderate, as would be expected in fast, stony streams.

The Temuka River has an estimated population of 111 lbs per acre, which is not as great as was at first thought. The trap furthestest downstream was alone responsible for as many eels as the top three put together, but as it is not known for what distance this trap would have an effect upon the eels, its catch cannot be taken into consideration when calculating the poundage per acre.

Both longfinned and shortfinned eels were present in the Temuka River and in the lower Opihi reaches.

The stomach contents of most of the eels trapped were examined, and nearly all forms of bottom fauna in the locality were present. Trout, bullies and eels were also found in eel stomachs and in one Tengawai eel a large freshwater crayfish was found.

Many of these eels were heavily infested with nematodes.

D. OTHER NATIVE FISH

Bullies were present throughout the system, but were most plentiful in the Opihi itself; the common bully *Gobiomorphus basalis* occupying the lower reaches (sections 'A' and 'B') and the upland bully *Philypnodon breviceps* sections 'C' and 'D'. Both species overlapped in section B. The upland bully was also plentiful in the Tengawai, Waihi and Kakahu but was less common in the Te Moana and Opuha Rivers.

The common river galaxiid *Galaxias vulgaris* was also located in section 'C' of the Opihi River and was probably present in other areas. Galaxiids are very elusive fish and are often difficult to find, even when fairly plentiful.

No smelt were observed but local anglers report seeing smelt in the lower Opihi River and one angler reported having caught several trout which had been feeding on these fish. Torrentfish were also reported, but none have been seen in recent years, as far as could be ascertained.

Large shoals of yellow-eyed mullet were present for some distance up section

'A' of the Opihi. One of these fish was examined and found to be full of green algae, upon which it had been feeding. Flounders were netted at a point just below the Temuka River confluence, and appear to be fairly common in the quiet areas of section 'A' and possibly section 'B'.

E. THE TROUT STOCK

Brown trout are plentiful in the entire system with the exception of the Opuha River, where they are scarce. The rate of catch by anglers was generally poor but many of the people interviewed were strangers to the area and held licences from all parts of the South Island. Local anglers had far better results but most of them fished only in the hours of darkness.

Anglers interviewed on the Opihi River had fished for $49\frac{1}{2}$ hours for a total catch of 18 fish and four undersized fish returned. Some of these anglers were fishing for both trout and salmon and their equipment was more suited to the latter.

Details of 26 trout taken by net or by rod and line in the Opihi River show that these fish have an average condition factor, on the Corbet scale, of 47 which is extremely good. All fish were in good condition whether large or small and their sizes ranged from 6 inches to 26 inches x $7\frac{1}{4}$ lbs. It was not easy to ascertain whether all the large fish were searun but some of them appeared to be from an examination of scale samples.

Comparing these survey results with the results taken from the 1957/58 anglers diary scheme shows much the same picture. Most fish were below the average size caught elsewhere in this area but with a few fish, possibly searun, reaching a much larger size. There are a small number of large quinnat salmon caught, but these are excluded from this report.

In the Temuka, anglers questioned had fished for 111 hours for 56 takeable fish and nine undersized fish returned. This is one takeable fish for every two hours of fishing. Nearly all these fish were taken during 96 hours of dark or near darkness, however, and the only two fish observed taken during broad daylight were caught by an eleven year old boy who took $5\frac{1}{2}$ hours to do it.

One angler on the Tengawai had taken two fish in $1\frac{1}{2}$ hours and another angler on the Waihi had taken five fish in $2\frac{1}{2}$ hours.

Although few trout were seen in the Opuha River the only angler seen to fish it regularly had taken 11 fish during less than 11 hours fishing. These were all large specimens between 2 lbs and 7 lbs in weight.

A higher proportion of the fish caught in the Temuka, Tengawai and Waihi Rivers were of a larger size than those caught in the Opihi River itself without, however, the occasional really large fish as is taken in the Opihi River.

Taking into consideration the records from the 1957/58 angling diary scheme, a salvage operation in early 1959, and the present survey, it would appear that the anglers do take a sample of fish that is representative of the population as a whole. A large proportion of the population present and caught is around the minimum size of 10 inches. There is another large proportion of the population of a somewhat larger size, being approximately 11 inches early in the season and 13 inches towards the close, with some fish around the 14 inches mark.

The smaller streams present a similar picture. Several local people interviewed denied that large trout run up these small streams. The manager of the wool washing establishments at Winchester was in an excellent position to observe the Waihi Stream (not the Waihi River) and declared that only very occasional large trout appeared at the dam, which is passable to trout.

Of 131 trout netted in a single small pool of the Waihi River, only one was a "takeable" fish and measured a bare 10 inches.

Small trout were observed in the extreme upper reaches of the Opihi River and in the tiniest of tributary creeks, some of which are barely more than a trickle of water. A report of *Salvelinus fontinalis* in one of these creeks was followed up, but the fish observed were small brown trout.

From the foregoing it can be seen that there appears to be very little movement among the trout population of the smaller waters of the Opihi system. Although all the minor creeks and streams contain numerous small trout they all appear to be resident in their own creeks and not the progeny of larger migrating fish.

F. POLLUTION

The pollution which has been shown to affect the bottom fauna does not appear to have the same obvious effect on the fish stock. Both native and introduced fish were found in polluted areas but were all of a small size. Bottom forms that live in polluted waters tend to be mud burrowing animals that are largely unavailable to trout and then obtainable only by smaller fish. Thus conditions although not so severe as to completely eliminate trout, may definitely limit their size and numbers in polluted waters.

The wool washing establishment at Winchester takes precautions to prevent as much as possible the discharge of effluents into the Waihi River. Further

plans are being investigated by officers of the New Zealand Wool Institute to prevent pollution entirely. At the present time the outflow race from the works discharges 1,000 gallons a minute of water containing a proportion of sodium phosphate. The works are in operation for 20 hours a day, five days a week. Grease from the wool is retained in sludge pits and there is a possibility of the water being utilised for irrigation purposes in the future.

The other wool washing establishment at Temuka does not appear to take any action to prevent deposits of sludge and grease in the Temuka River, but details were not obtained.

G. IRRIGATION

The irrigation intake at Pleasant Point draws off about 90 cusecs during the summer months from the Opihi River and this loss of water in the river is far more important than the loss of fish. Trout and salmon smolts were observed in the main race of the irrigation system, but some of these fish would find their way out of the outflow at Temuka.

Owing to the comparatively short course of the Opihi system, rain which causes the river to rise usually affects the irrigation area as well. This means that during a fresh when most migrating fish could be expected to be on the move, the irrigation system is shut off, and therefore fish could pass the intake quite safely. Also, in the event of the Opihi running dry below the intake, the Works Department are able to allow enough water down to replenish the remaining pools when requested to do so.

H. SPAWNING CONDITIONS

There are adequate spawning areas in the Opihi system generally, with the exception of the Opuha. Spawning areas are not extensive, but frequent, and many small streams provide excellent gravel. The Waihi River in particular is a good spawning water, as are the extreme upper reaches of the Opihi River.

CONCLUSIONS AND RECOMMENDATIONS

1. The Opihi River system contains a large population of well-conditioned but small brown trout. Occasional larger sea-run trout are taken also.
2. Spawning facilities are adequate for the present population.
3. The drawing-off of water for irrigation reduces the carrying capacity of the Opihi River below the intake.
4. The Opuha is too unstable to support a trout population.

5. Bottom fauna over the Opihi River system is adequate except where rivers become dry or are subject to pollution. In polluted areas the bottom fauna has been modified from a fauna of mayflies and caddisflies to one dominated by worms which reduces the food available to the trout present.

It is recommended that pollution be reduced or abolished.

Executed by: G.A. Eldon, Technical Field Officer

Supervised by: B.T. Cunningham, Senior Fishery Officer
R.W. Little, Fishery Officer

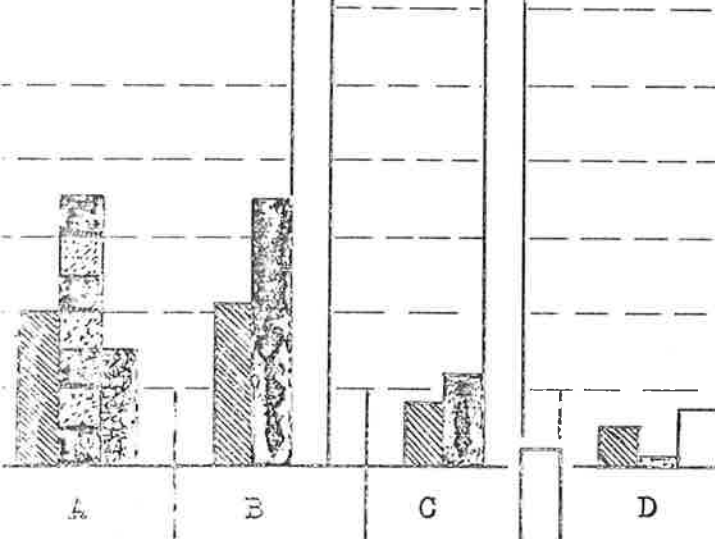
References




Burnet, A.M.R. 1952. Studies on the Ecology of the New Zealand longfinned eel (*Anguilla dieffenbachii* - Grey). Australian Journal of Marine and Freshwater Research 10(1): 32-63.

FIG. 2.

Fluctuations of Average Numbers of predominant Bottom Fauna in various Rivers.

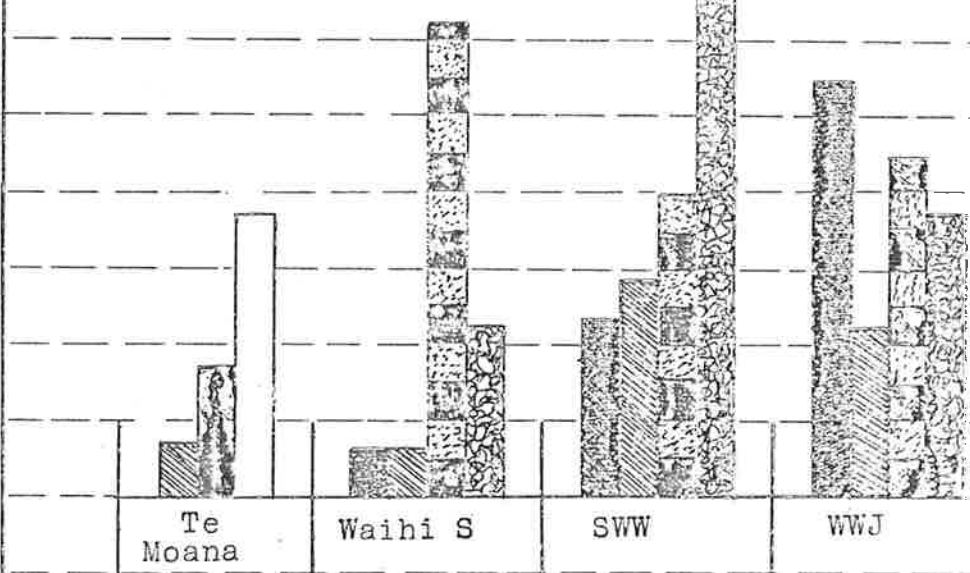
A
OPIHI RIVER



-  Parnid
-  Planurbis
-  Potamopyrgus
-  Hydroptila
-  Deleatidium
-  Hydroptila
-  Olinga
-  Ogliochaeta

Each Horizontal
line Represents
20 individuals.

B
TE MOANA AND
TEMUKA RIVERS



C
WAIMI RIVER

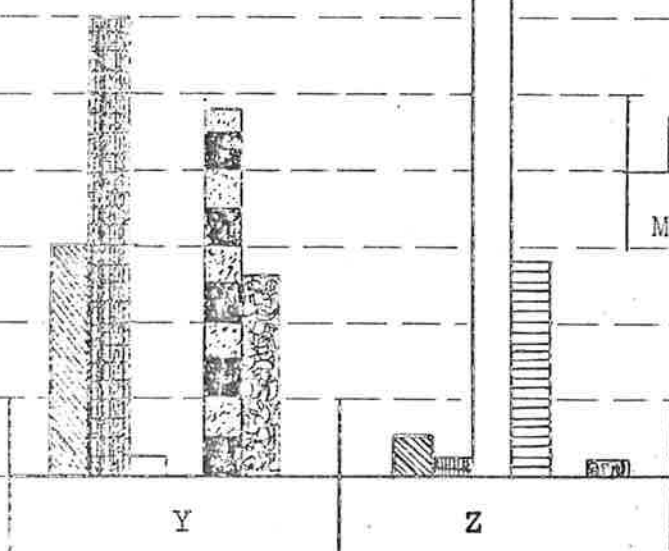


TABLE 1. Density as percentage composition of bottom fauna in various waters. Density is expressed in numbers per square foot.

River	Section	No. of samples	Average no. in section	Average no. in river	EPHEMEROPTERA	TRICHOPTERA	PLECOPTERA	COLEOPTERA	CHIRONOMIDS	MOLLUSCA	Others
Opihi	A	6	212.8	218.5	42%	12.2%	0.2%	14.8%	11.3%	12.5%	6.9%
	B	10	375.5		(97% Deleatidium)	(83.5% Hydro-psyche)					
	C	8	236.5								
	D	4	49.5								
Temuka	S/WW	5	832	500.1	-	1.4% (70.9% Hydroptilid)	-	8.1%	9.3%	61.9%	19.5%
	WW/J	2	367.5								
	W/S	5	300.8								
Waihi	Y	4	356.5	400.0	36% (96% Deleatidium)	8.8% (70% Olinga)	0.1%	9.5%	2.3%	21.5%	21.8%
	Z	5	443.5								
Te Moana	-	4	-	174.5	43% (99% Deleatidium)	29% (69% Hydro-psyche)	1.0%	9%	5%	-	13%
Opuha	-	6	-	138.0	43% (73% Deleatidium)	39% (83% Hydro-psyche)	0.1%	14.5%	-	-	3.4%
Tengawai	-	8	-	503.7	47% (96% Deleatidium)	29% (64% Hydro-psyche)	0.1%	19.7%	0.4%	1.3%	2.5%
Kakahu	-	5	-	338.5	14.2% (97% Deleatidium)	9.7% (47% Olinga)	-	1.0%	0.7%	66.2%	8.2%