

FRESHWATER FISHERIES ADVISORY SERVICE

MARINE DEPARTMENT

INVESTIGATION REPORT

JOB NO. 1

ACCLIMATISATION SOCIETY DISTRICT: Hawkes Bay.

TITLE OF JOB: Stream and spawning survey of Sandy Creek, Lake Tutira.
23-30.7.56.

OBJECTIVES:

- (1) To conduct a stream survey of Sandy Creek, Lake Tutira.
- (2) To measure the size of the spawning run, the efficiency of spawning and assess the spawning potential of this creek.

FINDINGS:

Physical Features

Sandy Creek rises in the foothills of the Mangaharuru Range and flows in a south-easterly direction until it empties into the northern end of Lake Tutira. The stream follows a meandering course, two-thirds of it through deep papa gorges. After leaving the gorge the stream flows through a comparatively wide valley until it reaches the swamp, which has now been almost completely reclaimed. It then follows a straighter course and the flow becomes sluggish, until it empties into the lake.

The stream was divided into five physical sections and, as the survey was done from the mouth upstream, the sections will be dealt with in that order.

Section 1

(Stream Survey Card No. 36).

This section of the stream extends from the mouth to the north end of the swamp - about $1\frac{1}{2}$ miles. The valley is from $\frac{1}{4}$ to 1 mile wide and is down in pasture. The valley sides have a moderate slope and are up to 200 feet in height.

The stream banks are from 1 to 2 feet in height and in places have fallen into the stream.

The bed consisted mainly of mud and sand, with occasional patches of fine shingle, too loose for spawning. No aquatic vegetation nor bottom fauna

were observed in this section and only a few bullies were seen. No trout were seen and it does not seem likely that they would linger in this part of the stream.

Section 2

(Stream Survey Card No. 31, Photo No. 1).

This section of the stream extends from the northern end of the swamp to the road bridge on the Napier-Wairoa Road, approximately 1 mile.

The stream follows a meandering course through a valley approximately 50-100 yards wide. The stream banks are between 10 and 15 feet in height and many large sods have fallen into the stream offering good cover to fish.

Stream bank vegetation consists mainly of niggerheads and pasture grasses, with occasional clumps of blackberry and willow. The stream bed is predominantly sand, with a few patches of fine gravel and lumps of papa, among which live a small population of caddis (*Hydropsyche*) and Mayfly larvae (*Deleatidium*). No aquatic vegetation was seen.

Only one trout was seen in this section but no native fish were observed. A black shag was disturbed in a clump of willows about 100 yards below the bridge.

At the time the survey was made there was recent flood debris to a height of 5-10 feet and signs that the stream had covered most of the valley floor. The stream was still high and slightly discoloured.

Section 3

(Stream Survey Card No. 32 - Photo No. 2).

This section extends from the road bridge to the railway bridge, about 1 mile. The valley itself is much the same as in the previous section, but the stream banks are much lower (1-5 feet). The vegetation is pasture grasses with a few clumps of rushes or niggerheads. The banks are moderately stable, and offer good cover in the form of fallen sods and undercut banks. The flow is fairly swift with few pools.

The stream bed consists of about equal quantities of shingle and sand, and is unsuitable for spawning because of the looseness of the shingle. Only a few trout were seen in this section and no native fish.

Bottom animals appeared to be absent and aquatic vegetation is very scarce.

Section 4

(Stream Survey Card No. 33 - Photo No. 3).

This section extends from the railway bridge to the first tributary entering on the left (see map). It is about $\frac{1}{4}$ of a mile long. The stream is in the lower section of the gorge, which is more open than the gorge section further upstream.

The valley floor is U-shaped and is about 30 to 40 yards across. The sides of the valley are steep, and in some places are sheer cliffs. Native bush, tutu, manuka, fern and blackberry overhang the stream, with occasional patches of pasture grasses on the flats.

The stream banks are low, stable and undercut in places. The stream averages 5-10 feet in width and about 6-10 inches in depth.

The bed consists of stones, shingle and a little sand and affords good spawning conditions.

Bottom insects are present in this section, but in low numbers. The dominant species appears to be caddis larvae (*Hydropsyche*).

Aquatic vegetation is absent on the stream bed, but patches of watercress are present on the margins. About 190 trout, both brown and rainbow, were seen in this section.

Section 5

(Stream Survey Card No. 34 - Photo No. 4).

This section is from the tributary mentioned above to about 100 yards past the confluence of Sandy Creek and Withers' Creek, a distance of about half a mile. Here the stream is much more confined, the bed is rockier and the stream bank vegetation is denser. The gorge is about 10 yards wide, with sheer sides up to 100-200 feet. The vegetation consists of about equal amounts of native bush and scrub, with tangles of blackberry.

The banks of the stream are stable and are sufficiently undercut to give moderate cover.

The stream is about 8-10 feet wide, and is generally deeper than in the previous section - about 1-2 feet. The flow is alternating sections of rapids, flats and pools, with the pools reaching a depth of 3-5 feet. The bed consists mainly of boulders and bedrock, with patches of shingle and a small amount of sand.

Both aquatic insects and vegetation are moderately dense in this section.

The bottom fauna consists mainly of caddis larvae and Mayfly larvae - *Hydropsyche* and *Deleatidium* appear to be the dominant species.

No native fish were seen but about 96 trout were counted.

Unfortunately the depth of the water made it impossible to proceed more than 100 yards past the confluence of Sandy Creek and Withers Creek.

About a mile above the confluence there is a fall which seems to be an effective barrier to fish.

Because of the depth of the gorge and the steepness of its sides, it is impossible to get to the fall without the aid of ropes. According to information received from a local farmer, it is a sheer drop about 10 feet high. The creek could be reached in two places about a quarter of a mile above the fall. No fish were observed in this area and the stream bed conditions were unsuitable for spawning, being composed of approximately equal amounts of rock, sand and boulders.

Withers' Creek

(Stream Survey Card No. 35 - Photo. No. 5)

This is the only large tributary flowing into Sandy Creek from the left. Its course is roughly parallel to Sandy Creek and it gradually converges on it until it meets the main stream about one mile above the railway bridge.

The stream is confined in a deep, narrow gorge, about 3 to 5 yards wide. The bed consists principally of boulders and sand with small patches of gravel. Stream bank vegetation is the same as in the main gorge. After about three quarters of a mile the gorge widens out to a small winding valley, with the stream entrenched on the valley floor. The creek here is about 18 inches wide and 12 inches deep, with numerous falls varying from 1 to 3 feet in height. It is choked with dead scrub and the bottom consists mainly of sand and mud. No fish at all were seen in this tributary.

The bottom fauna seen in the section of the stream actually surveyed consisted of the following groups:

<i>Ephemeridae</i>	<i>Tricoptera</i>	<i>Neuroptera</i>	<i>Mollusca</i>
<i>Deleatidium</i>	<i>Hydropsyche</i>	<i>Archiacauliodes</i>	<i>Potamopyrgus</i>
<i>Ichthybotus</i>	<i>Pycnocentria</i>		
<i>Coloburiscus</i>	<i>Pseudonema</i>		
<i>Plecoptera</i>	<i>Coleoptera</i>		
<i>Leptoperlidae</i>	<i>Parnid</i>		

The dominant species in all sections where bottom fauna is present appear to be *Hydropsyche* and *Deleatidium*.

The Spawning Run

Of the five physical sections of the stream, only two - numbers 4 and 5, i.e., the gorge - are of any importance to spawning fish. Section 4 has a greater amount of available spawning bed, consequently superimposition does not take place to such a large extent as in the upper section.

At the time of the survey, the spawning fish were predominantly brown trout (approximately 75-80%) and the rainbow run appeared to be just commencing. Both brown and rainbow trout average about 4-5 lbs.

Owing to the rocky nature of the upper gorge section, suitable spawning gravel is not so plentiful, but every small patch of suitable bed had at least one redd. Approximately 50 yards downstream from the confluence with Withers' Stream, spawning conditions improved and the bed was well dug over. At least 12-15 redds were counted in this section.

Withers' Creek is not very important as a spawning tributary. In the first 50 yards only five redds were counted but no fish were seen. After the first 50 yards, conditions became unsuitable for spawning.

Ova Production

Unfortunately, none of the eggs dug had reached the eyed stage, so that some of them were killed during the redd digging. This would have the effect of making losses seem higher than was actually the case, but this would probably be balanced by normal losses if the redds had not been disturbed.

The greatest amount of spawning is done in the lower gorge (Section 4). In this part of the stream 190 fish and 78 redds were counted, as against 96 fish and 66 redds in section 5. This makes a total of 280 fish and 144 redds. Altogether six redds were dug. The gravel was well dug over and all precautions were taken to ensure that none of the ova escaped round the sides of the trap. Therefore it is probable that almost all the ova in each redd have been accounted for.

The results are as follows:

<u>Lower Gorge</u>		<u>Upper Gorge</u>	
Alive	Dead	Alive	Dead
pre-eyed	153	133	10
	444	253	76
<u>Withers' Creek</u>		<u>Superimposed</u>	
pre-eyed	15	pre-eyed	73
fry	2	alevins	102
		fry	7
			10
			26
			1

This gives a total of 1346 specimens, of which 1182 were alive and 164 dead, or a survival rate of 87% to this stage. Disregarding the Withers' Creek sample, which is abnormally small, the above figures give an average of 233 live specimens and 32 dead per redd. By multiplying the average number of live specimens (233) by the number of redds seen (143) the potential fry production is approximately 33,500, if each pair only made one redd. Assuming a 5% survival rate, 1700 of these fish could reach the yearling stage. It has been shown that female trout often make two or three redds, so that the fry production is more likely to be between 67,000 and 100,000, and approximately 3,500 to 5,000 will survive as yearlings.

However, the actual potential fry production of the stream would be much greater, as these figures apply only to the brown trout. Unfortunately, because insufficient spawning beds are available, the rainbows would dig up many brown trout ova. Late spawning rainbows would destroy the ova of those earlier in the run. This means that only the early spawning browns and the late spawning rainbows would be completely successful in spawning each year.

CONCLUSIONS AND RECOMMENDATIONS

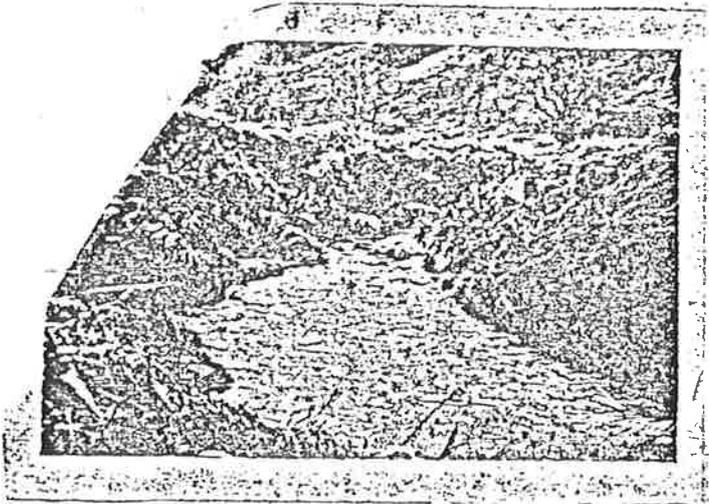
From the above information, the following conclusions can be drawn:

- (a) The amount of suitable spawning bed available is not sufficient for the size of the run.
- (b) Further checks are necessary to find out if more spawning water can be made available.
- (c) More fish could be taken from the lake without seriously depleting the stock, and
- (d) It is probable that the stock is self-supporting.

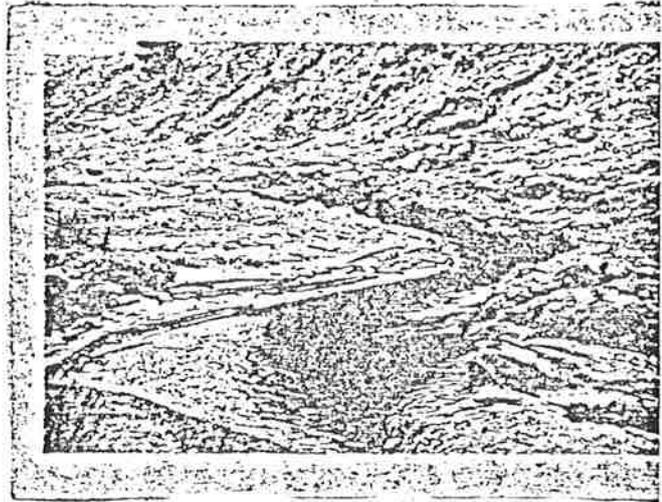
It is recommended that no further liberations be made in Lake Tutira for a test period (say three years). It is also recommended that an official letter of thanks be sent to Mr W.A. Gunn for his invaluable assistance.

Executed by (sgd) R. Boud
Technical Trainee

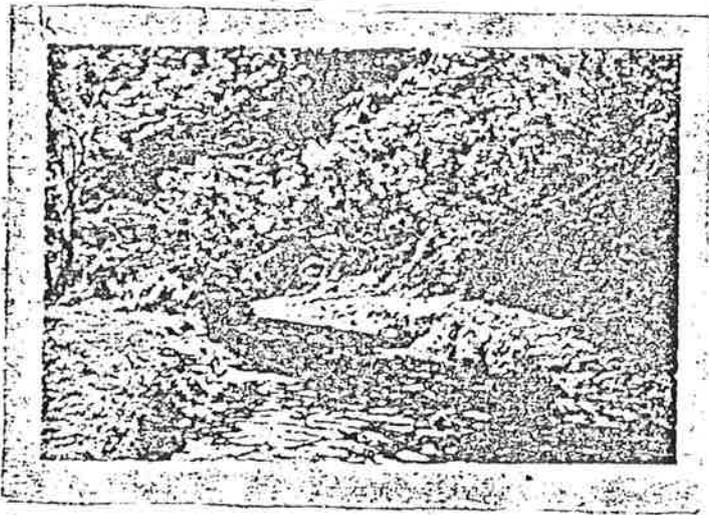
Supervised by (sgd) B.T. Cunningham
Fishery Officer



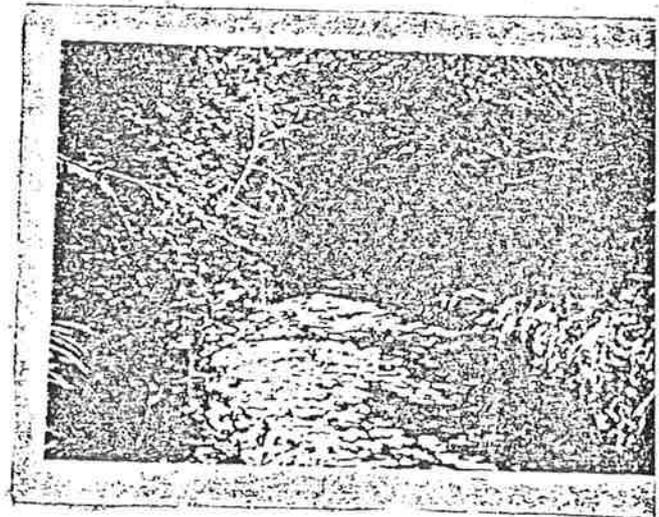
Section 2



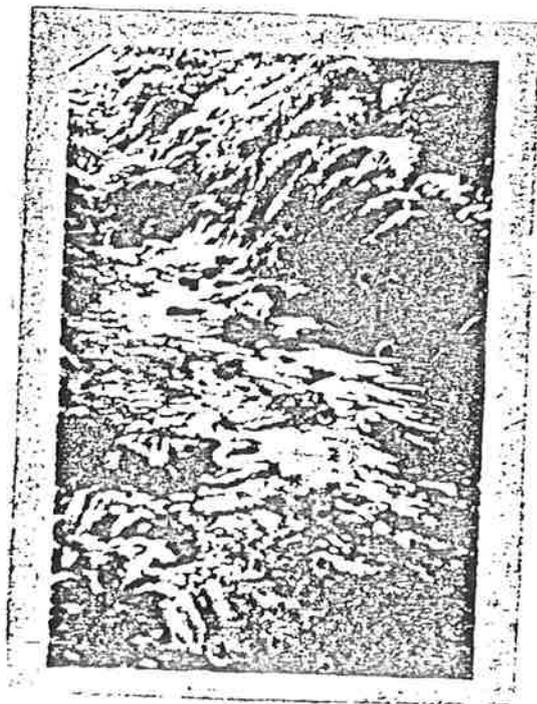
Section 3



Section 4

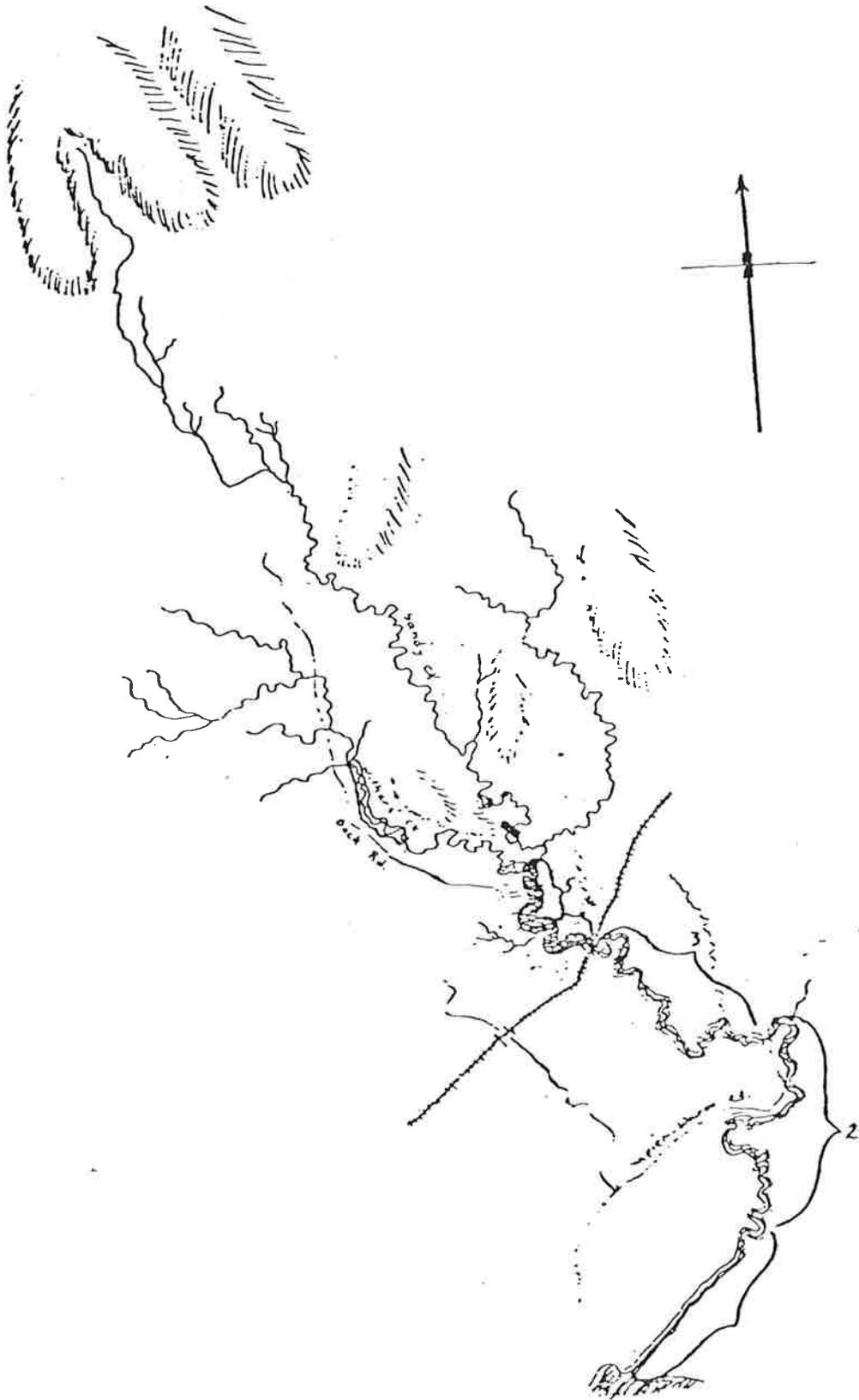


Section 5



Withers Creek

Sandy Creek



1/2 inches : 1 mile

- Spawning Beds 
- Falls 
- Area Surveyed 