

FRESHWATER FISHERIES ADVISORY SERVICE

MARINE DEPARTMENT

INVESTIGATION REPORT

JOB NO. 13

ACCLIMATISATION SOCIETY DISTRICT: Southland

TITLE OF JOB: A survey of the trout stock in the middle reaches of the Oreti River, Southland.

OBJECTIVES: To determine the effect of the present bag and size limits on the trout in the middle reaches of the Oreti River.

FINDINGS: The field work for this job was carried out between October and November 1959.

A. PHYSICAL FEATURES

The Oreti River rises in the Eyre Mountains, and follows a southerly course to the sea, a distance of approximately 120 miles. Throughout most of its length, the river flows swiftly through a wide shingle flood bed, with long rapid stretches and few deep pools usually known as the middle reaches.

The middle reaches more particularly refer to that part of the Oreti River flowing through the alluvial flats and the length of river between the main Invercargill-Riverton Highway Bridge and Rocky Point (approximately one mile from Mossburn on the main Mossburn-Te Anau Road). The river bed of the middle reaches is composed mainly of shingle and a few larger stones, and shifts frequently during flood periods. The vegetation on the stream banks is composed mainly of pasture grasses, willows and scrub. In the last few miles, however, the bed becomes narrower and more stable, and the river is deeper and slower flowing.

Several small streams flow into the Oreti and most of these, like the Oreti, provide good spawning gravel for trout.

B. BOTTOM FAUNA

No bottom fauna samples were taken as during November and December 1959 a trout food survey, arranged by the Southland Acclimatisation Society, was carried out in several rivers, including the Oreti, by I.A. McDonald a University student. According to his report "The Oreti River shows a very uniform

distribution of its bottom life and each station was well represented in the important forms of trout food".

Nine of the areas examined were in the middle reaches and the average density of the fauna was 160 animals/sq.ft. 57% of the fauna consisted of good trout food with mayflies (52%) being the dominant group. The rest of the fauna consisted of beetle larvae and adults which are not taken by trout. The density of the bottom fauna appears typical for rivers of this size, subject to periodic freshes and occasional severe flooding. In an earlier report Percival (1932) states that the fauna is scanty, consisting mainly of mayflies with a small proportion of caddis and beetle larvae.

C. TROUT STOCK

The Technical Field Officers sampled the trout population by seining individual pools and by angling.

1. Netting Techniques

The two seine nets were both thirty yards long but with different mesh sizes, one of one and one quarter ($1\frac{1}{4}$) inch stretched mesh and the other of two and one half ($2\frac{1}{2}$) inch stretch mesh.

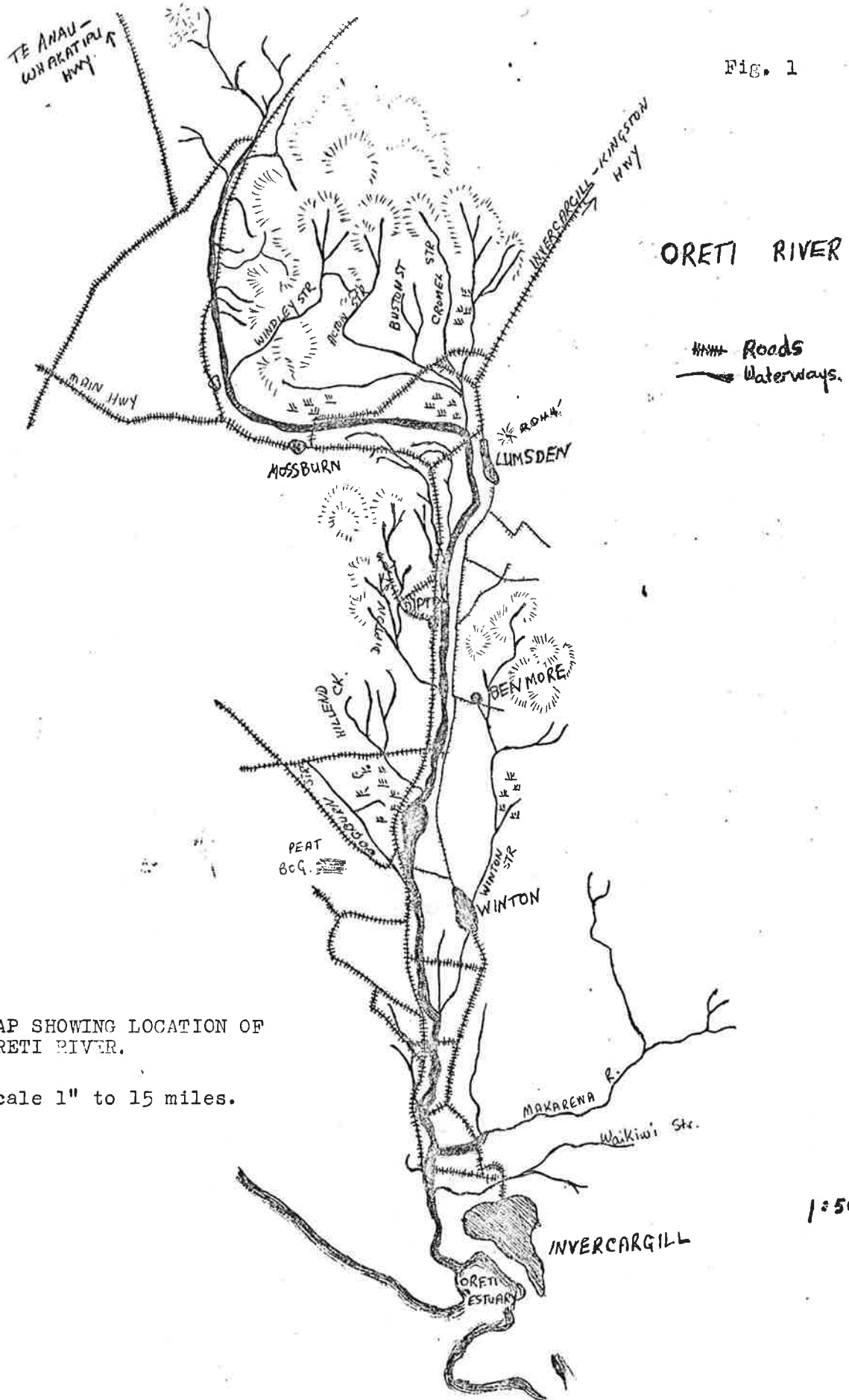
The technique used was to extend the net across the pool at an acute angle, the downstream side being in shallow water, for the purpose of reducing resistance to current. The net was then allowed to drift downstream driving the fish before it until the end in deep water was brought across to the shallow side ahead of the other end, thus forming a pocket. The pocket trapped the fish ahead of the net which were then brought ashore.

A full netting programme was not completed owing to insufficient manpower being available for the volume and speed of the river, while a number of floods made netting completely impossible for a number of days. Assistance was obtained, however, from local angling clubs and the Acclimatisation Society staff, so that satisfactory results were obtained.

The $1\frac{1}{4}$ and $2\frac{1}{2}$ inch mesh nets were used separately or joined together to form one net. It was found that all fish under 9" were not retained by the $2\frac{1}{2}$ inch net. Whenever this net was used the percentage of fish under 9" caught was less than that present in the population. Fish above 5" were retained by the $1\frac{1}{4}$ mesh net, and where this net was used gave a truer indication of the actual population.

Two hundred and ninety eight trout (298) were taken with nets on six fishing days.

Fig. 1



MAP SHOWING LOCATION OF ORETI RIVER.

Scale 1" to 15 miles.

1:500,000

Fig. 2

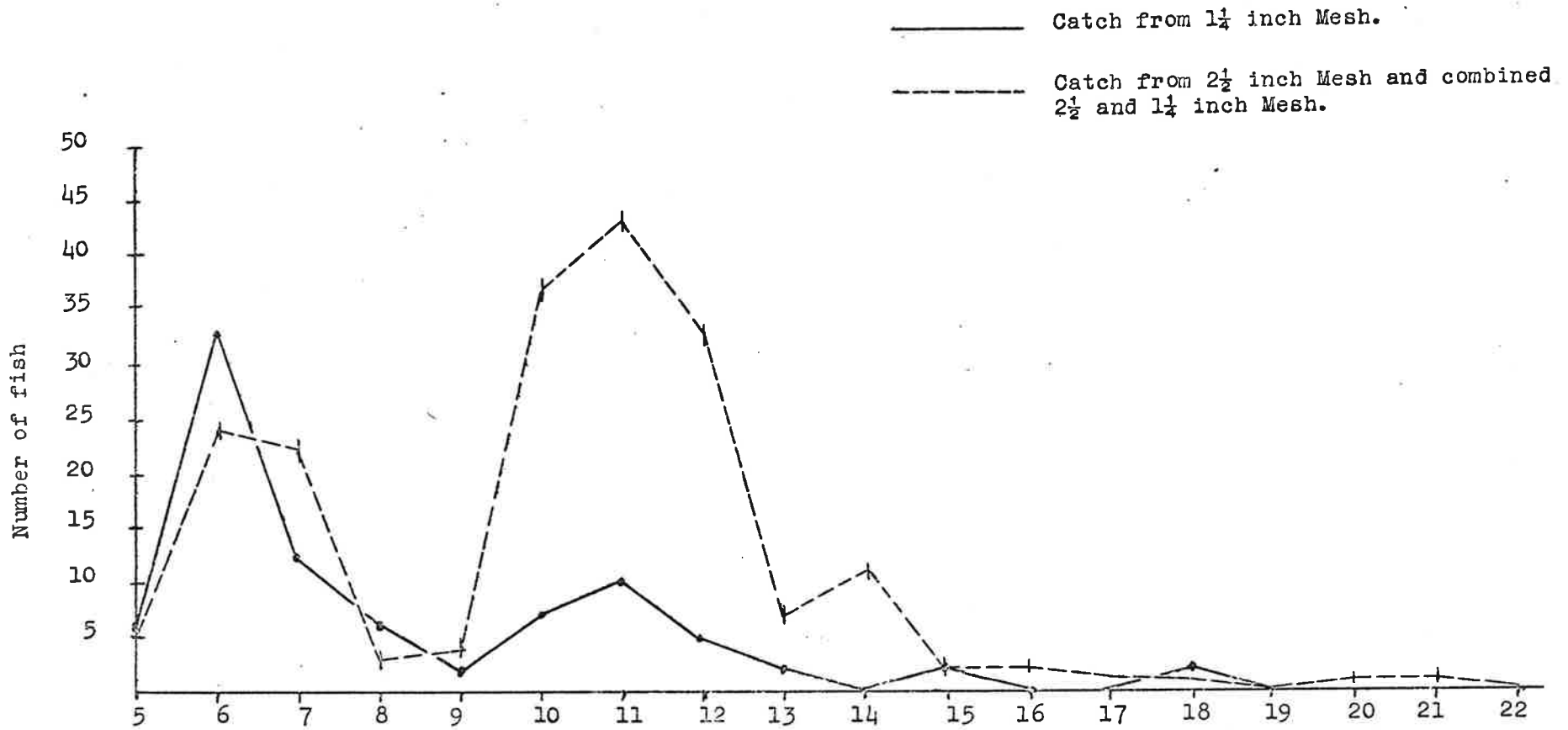
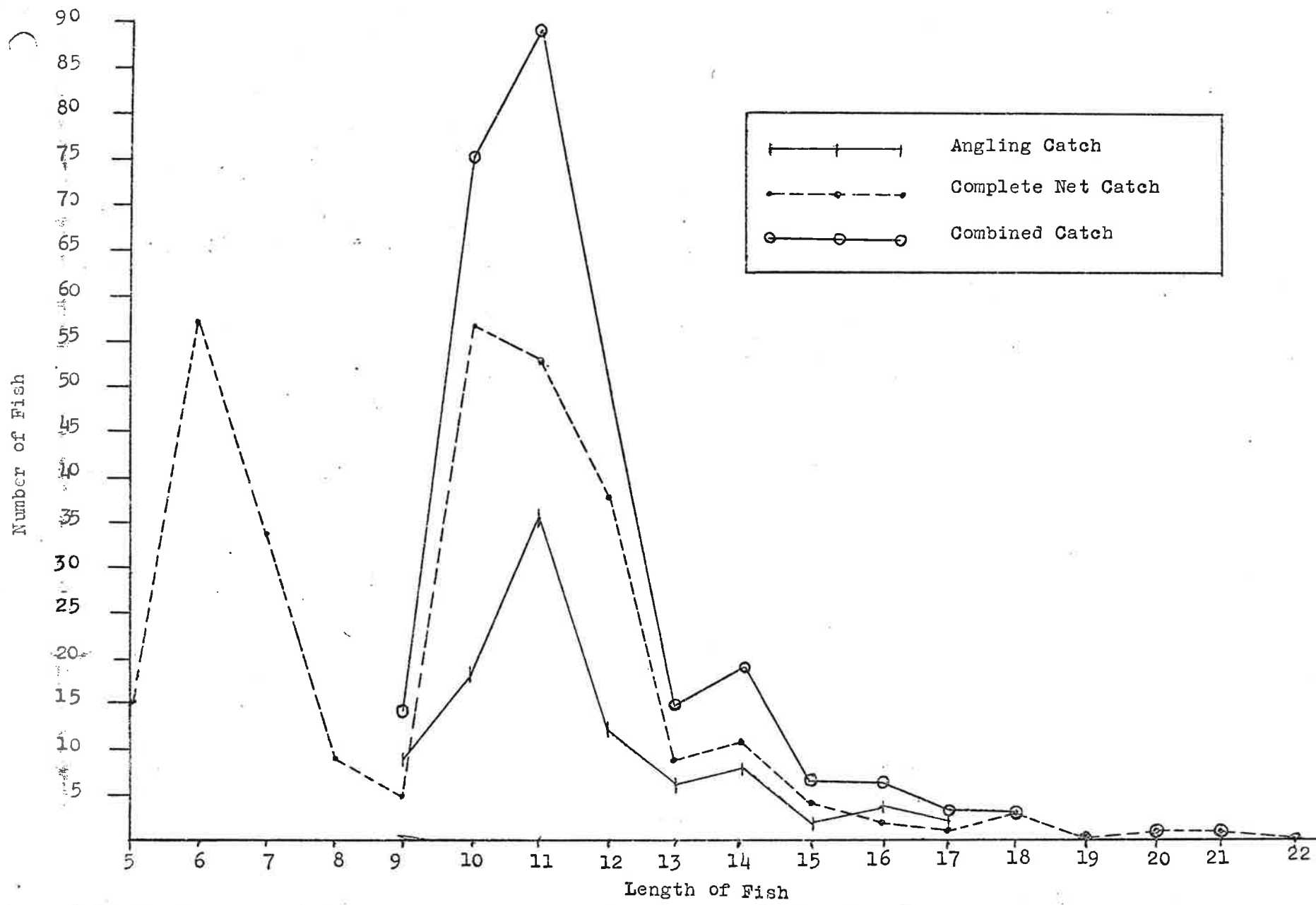


Fig. 3



2. Angling Survey

A total of one hundred and eleven (111) hours were fished by Marine Department personnel and other anglers, fishing especially for this survey, using normal angling methods practiced in this river. A total of ninety eight (98) fish were caught above the 9 inch limit specified by the fishing by the fishing regulations. The results are included in Fig. 2 along with the complete netting results.

3. Population Structure

An analysis of the size distribution (Fig. 3) of the combined netting operations show two and possibly three peaks which occur at about 6½ inches, 11 inches and 14 inches. These peaks correspond to the one, two and possibly the three-year-old fish. These groups thus form the major components of the population. Older fish are represented in the netting returns by only a few individual fish and the bulk of the fish available to the angler is seen to lie in the two-year-old group with the present 9 inch size limit. There is a very sharp decline in the numbers of large fish, though it is possible that the sampling technique under the difficult climatic conditions prevented capture of greater numbers of large fish. Angler records indicate that most fish caught are in the 10 to 12 inch class but that many larger fish are caught so that the average falls above the 12 inch mark, which supports this contention. The anglers' records are influenced however, by the return of many fish that are legally takeable (Table 1).

The bulk of the anglers' catch during this period of investigation lay between 9 and 12 inches. Compared to the netting data this coincides with the two-year-old fish which therefore form the bulk of the catchable population.

Comparison of the angling and netting catches (Fig. 3) show that angling methods sample a representative portion of the population, taking fish over the whole range of those available.

4. Percentage of Undersized Fish Caught

A certain percentage of fish caught by the angler using normal angling methods will be illegally undersized. In a healthy population this is usually about one-third of the catch in New Zealand waters as is the case in the middle reaches of the Oreti. The percentage of undersized fish caught, and returned, has varied only slightly in the Oreti as can be seen in Table 1, which is a healthy sign.

5. Angling Records

Angling diary data has been collected for the Oreti River as a whole for some time. Records obtained in the 1947-1952 angling diary scheme showed that fish caught in the middle reaches of the Oreti River averaged 13.6 inches (Allen and

Cunningham, 1957). During this period the size limits were 11 inches until 1951 and 12 inches in 1952. Also a limited number of Angling Diaries were handed in by Southland anglers who fished the middle reaches of the Oreti River during the 1956-57 season, and during the period of the survey several anglers recorded details of their fishing in diaries.

Results are summarised in Table 1.

Simple analysis of this table shows that the fishery in this river is much more stable than is commonly believed and has not changed much in the last decade. Fishing quality, if not as good as the very early days, is fairly constant now with a high accessibility to anglers.

In 1947-1952 in conjunction with the angling diary scheme, the Rangers made checks, by personal contact with anglers, seeking information regarding fishing in the area to supplement the diary data.

It was found that there was considerable variation between the ratio of catch determined in the Rangers reports and the diary scheme. As the rangers would contact anglers before their fishing day was complete, their report of 1.31 fish per hour as compared to anglers' reports of 0.76 fish per hour for a complete day, shows a higher rate of success for the earlier part of the day.

The rate of catch for the 1957-58 season was low. Seasonal weather conditions may have been the cause of this low figure. The river was in flood or fresh much more often than normal during the angling season.

The average length of the fish caught by anglers during the 1947-52 seasons was about 1" greater than the average length of fish measured by rangers. The size distribution of the fish taken is given in Fig. 4, which shows a predominance of fish about 12"-13" in length.

It has been established that the fish of the middle stretches were smaller than those of either the upper or lower parts of the river and this feature is confirmed by recent records.

The results in the following table were taken from angling diary data held by the Department and show the average size of fish taken in the middle reaches may be 5-6" less than the average for the upper and lower areas.

The smaller average in the middle stretches is most likely due to the natural physical condition of the stream and the available food, rather than to extreme fishing pressure.

TABLE 1.

Method collected	Diaries	Diaries	Diaries	Diaries *
Data Collected in	1947	1956-57	1057-58	1959
Number of days fished	487	139	429	70
Number of hours fished	2203	465	1618.5	226
Hours per day fished	4.5	3.4	3.8	3.2
Undersized fish caught and returned	869	189	527	62
Oversized fish caught and returned	218	42	52	15
Total fish kept	1457	405	888	173
Fish caught per hour	0.8	0.9	0.6	1.3
Fish caught per day	2.9	2.9	2.1	2.5
Mean length of fish caught	15.2	12.4	14.0	11.8
% of undersized fish returned	34.2	29.7	35.9	24.8
% of oversized fish returned	8.6	6.6	3.5	6.0
% of fish kept	57.3	63.7	60.6	69.2

* The 1959 data is taken from very few diaries and relates to the middle stretches only, and so is not directly comparable to other columns.

TABLE 2. Mean length of fish caught.

Season	Middle Reaches	Upper River	Lower River
1947-1952	13.6"	18.8"	18.1"
1956-1957	12.0"	-	15.4"
1957-1958	13.9"	19.3"	15.5"
1959	11.8"	-	-

The result of an angling competition, mainly in the Oreti tributaries, is included in Fig. 7. These fish averaged nearly 16" but as only the largest fish were retained by the anglers, they cannot be considered indicative of the population.

Length distribution has been recorded for the middle stretches since 1947 and certain years are graphed in Fig. 5. From 1947 to 1952 an 11" limit, except for a 12" limit in 1951-52, was in force and from 1956 to 1959 a 9" limit was effected. For the purpose of comparison only the population about 11" is used for the 1956-59 period. As can be seen there is little difference between the two periods. There is no appreciable affect on the percentage of large fish caught with the small fish also being removed from the population. The lower size limit thus offers more fish to the angler while still leaving the same percentage of large fish available.

Percival (1932) arrived at the conclusion that there had been a considerable decline in the size of the fish caught in the Oreti River since the early days.

More recently, Allen (1957) in Fisheries Bulletin No. 12, found indications that the average size was rising slightly in the middle stretches over the period of 1947-1952. In light of the more recent findings, however, it appears that the size of the fish caught has levelled off and become relatively stable.

D. REGULATIONS

The Freshwater Fisheries Regulations in New Zealand prescribed the minimum size limit of trout to be nine inches and the maximum bag limit at 20 fish to the end of the 1959-60 season, allowing the local authority to raise the size or lower the bag limit to suit local conditions.

More recently analysis of angling diary data and other information has allowed the size and bag limits to be placed on a sound biological basis.

1. Size Limits

The regulations in force on the Oreti River have varied considerably since trout were originally acclimatised there. Until 1928 the limit was 9" but then was raised to 10"; in 1935 it was raised to 11", but then dropped again to 9" until 1941. At this time it was raised again to 11" and then to 12" in 1951 where it stayed until 1956. From 1956 to the present the 9" limit has been in force.

Records available for the 1947-52 season show a 13.6" average for the middle reaches, with a 12" limit in force, while in the 1956-57 season the average was 12.0" with a 9" limit. If only those fish of 12" and over are considered for the 1956-57 season the average would have been 13.72, almost identical with the 1947-52 season. Even with the inclusion of the extra 9, 10, and 11 inch fish in the catch data, the average length of all takeable fish caught in the middle reaches of the Oreti River is not greatly different.

If reference is made to Fig. 6 the effect of a 12" limit early in the season is seen. Under present regulations the undersized fish, or one-year-olds, represent 37.6% of the population, the 9-12" class represent 51.5% and the larger fish 11.1%; thus 62.6% of the population that was nettable is available to the angler.

Even more graphic are the results shown by the 1959 angler diary returns (Fig. 7), comprised of 250 fish, as these include only fish taken by normal sport fishing methods. In this case only 24.7% of the fish were undersized and returned, while 42.6% were in the 9-12" class, and 32.7% were over 12"; this difference of result due to the selective fishing methods of the angler compared to netting operations.

With a re-establishment of the 12" limit a considerable proportion of the population, about one-third, that is comprised of the 9-12" class, could not be expected to grow into catchable size until late in the season, further curtailing the angler's catch from that shown in Fig. 3.

With the present regulations the two-year-old fish are completely available to the angler instead of just a small proportion of them.

2. Bag Limits

Although the bag limits have varied considerably over the Oreti as a whole, they have been relatively consistent in the middle reaches. The limit was 15 fish from 1947 to 1951 when it was lowered to 10 where it remained until 1956. The bag limit was raised to 20 fish in 1956 where it has remained to the present.

Table 3 illustrates the number achieving limit bags in years where records are available.

TABLE 3. Oreti River

Season	Angler Days	Bag Limit	No reaching bag limit
1947-1948	111	15	0
1948-1949	139	15	0
1949-1950	39	15	0
1950-1951	13	15	0
1951-1952	115	10	5
1956-1957	139	20	0
1957-1958	439	20	0

It was not possible during this investigation to determine the effect of the present bag limit. However, data collected during the 1957/58 angling diary scheme gives useful information about the bag limit for the Oreti River. The bag limit of 20 was applied to give anglers the chance to exploit the middle reaches and the limit should not restrict anglers by conserving fish.

Analysis of the 1957-58 season data shows that there is no conservation of fish with the bag limit of 20. Even if the limit was reduced to 10 fish per day there would be a negligible saving of less than 10%.

CONCLUSIONS AND RECOMMENDATIONS

- (1) There are still large numbers of small fish present in the middle reaches of this river.
- (2) The present regulations have made a considerable proportion of these fish which were unavailable as undersized under the old 11" and 12" size limits, available to the angler.
- (3) Anglers catch fish which are typical of the population structure available to them.
- (4) It appears that the average size of fish caught by the angler has not changed significantly in recent season.

Fig 4

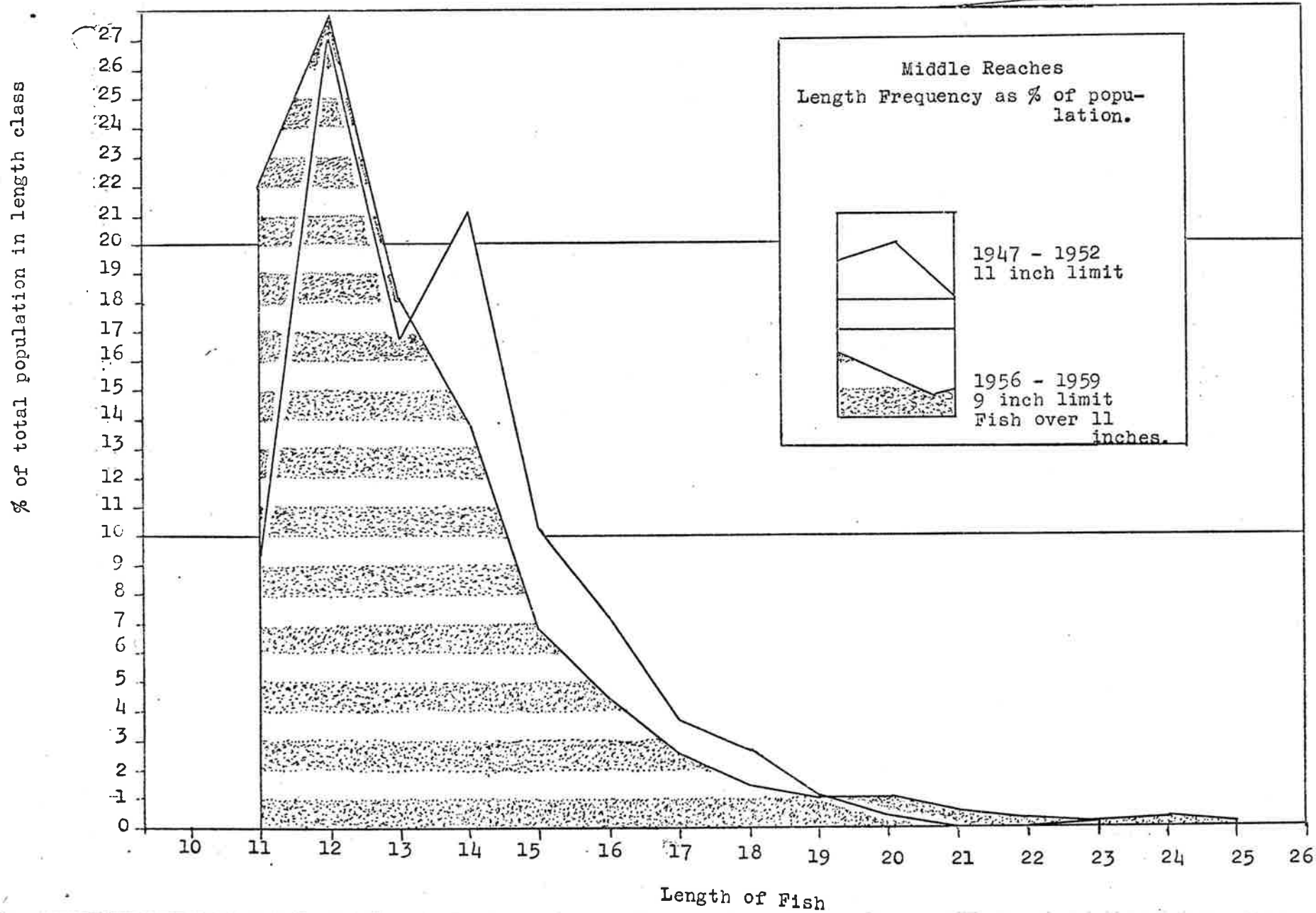


Fig 5

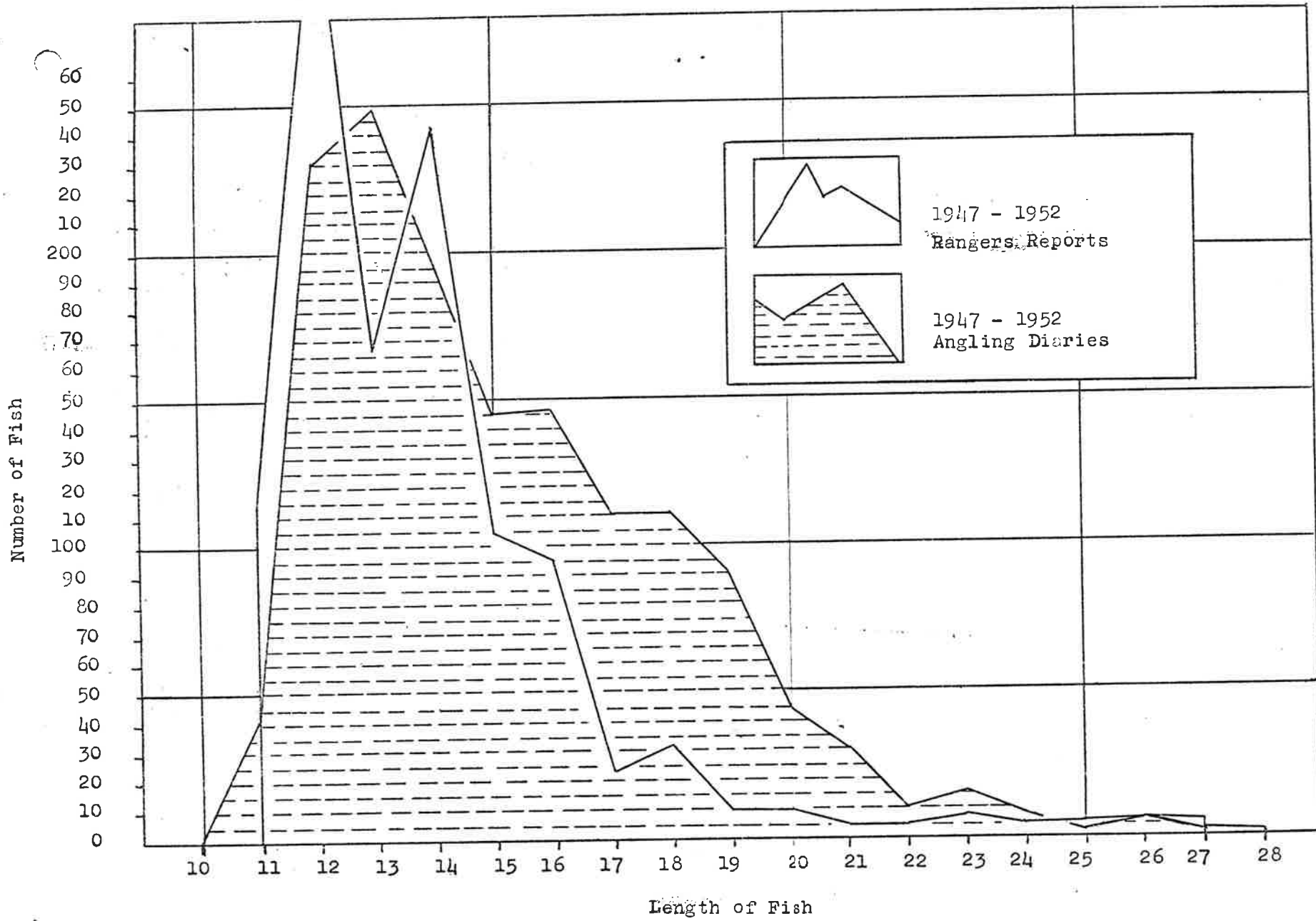


Fig. 6

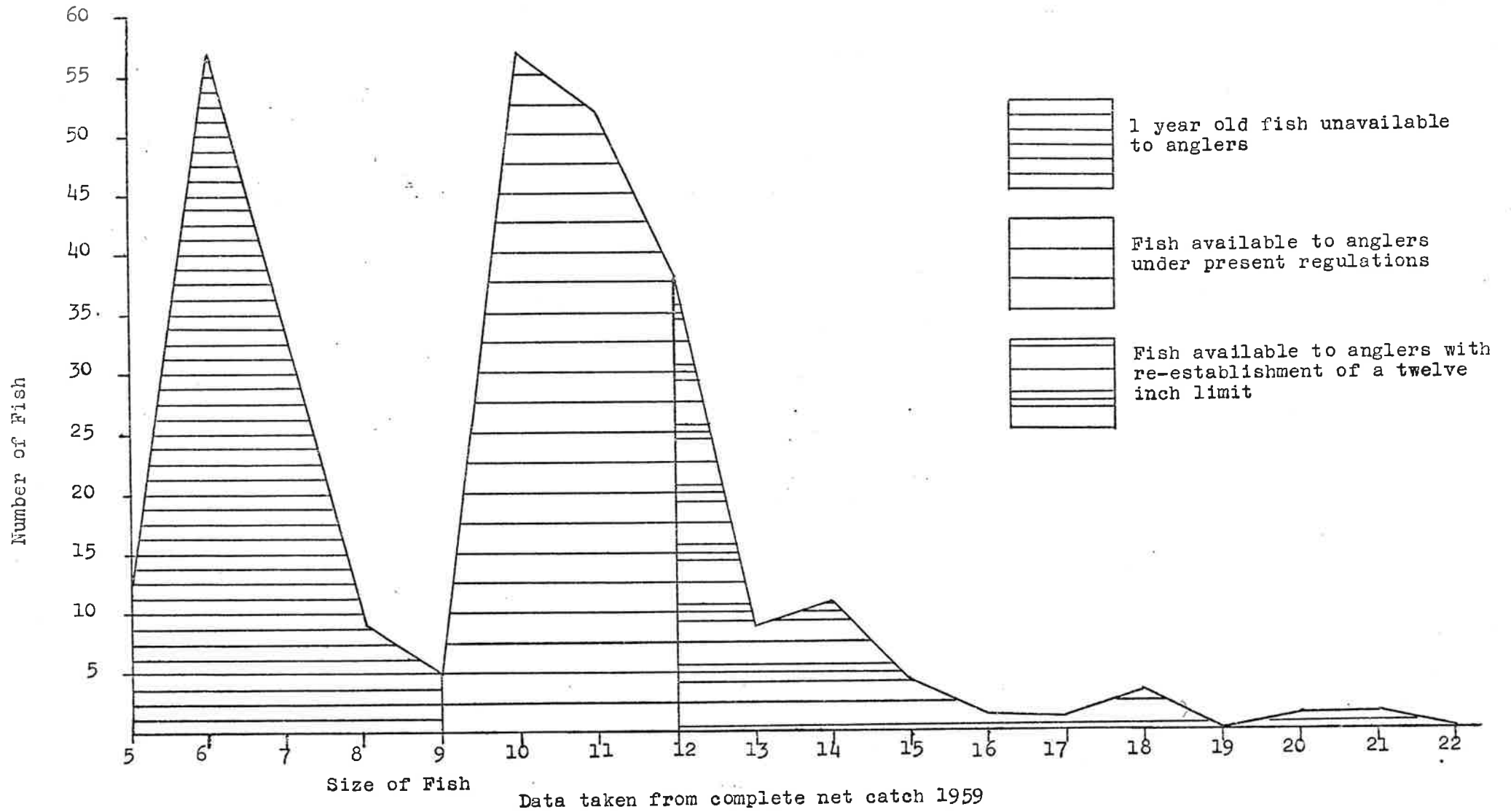
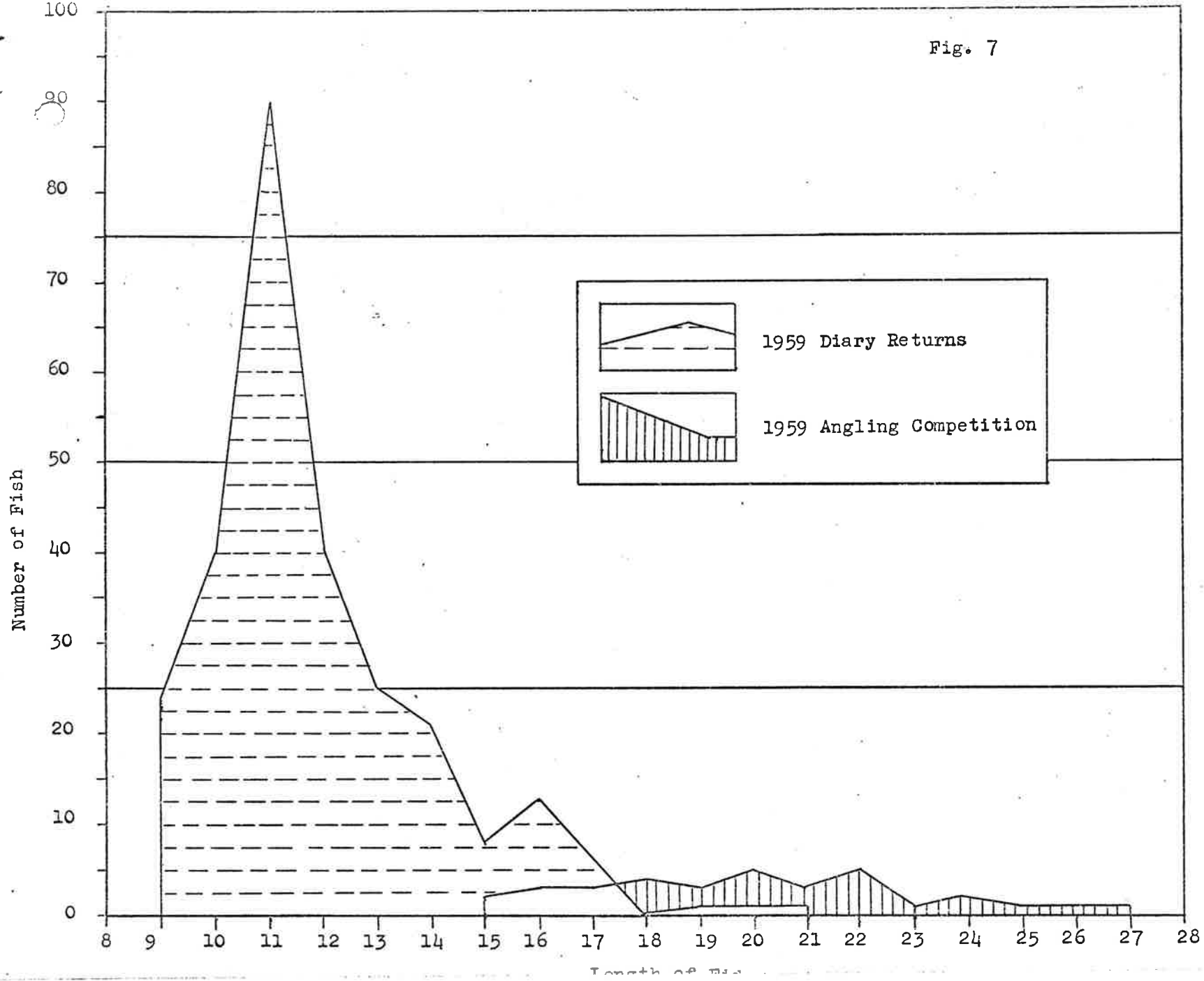


Fig. 7



It is considered that there should be no change in the present bag or size limit on the middle reaches of the Oreti River.

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The collation of angling diary data presented in the report, and the preparation of the report for publication, has been completed by Mr R.W. Little, Fishery Officer.

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