FRESHWATER FISHERIES ADVISORY SERVICE

MARINE DEPARTMENT

INVESTIGATION REPORT

JOB NO. 42

ACCLIMATISATION SOCIETY DISTRICT: North Canterbury

TITLE OF JOB: An investigation into the fish and food supplies of Lakes Coleridge and Lyndon.

OBJECTIVES: To obtain -

(a) Information on the fish populations and their food supplies of Lakes Coleridge and Lyndon.

(b) Data on the composition of fish stocks and their availability to anglers in Lake Coleridge.

METHODS

Gill netting was carried out at Lakes Coleridge and Lyndon during April and May 1962 and using 1 inch and 2 inch mesh bottom nets.

During June and July 1962 bottom fauna samples were taken from the two lakes using a Petersen Grab.

Surber square foot sampling was also attempted in shallow inshore areas but was found to be impractical.

Stomach samples were taken from fish caught at each lake during the opening weekend of the 1964/65 angling season, i.e. November 1964.

Also included in this report are details of an angling census conducted on Lake Coleridge during the first six days of the 1960/61 angling season, i.e. directly after the 1960 spawning season when a major spawning population took place (see Investigation Report Job No. 27).

The work was carried out and the data analysed by members of the Technical Field Service, including J. Galloway, R. Bond, E. Cudby and E. Moore.

Mr C.J. Hardy, Fisheries Laboratory, Christchurch, also assisted, particularly with the creel census.

RESULTS

A. LAKE COLERIDGE

1. Description

Lake Coleridge and its tributary streams have been described in Investigation

Report Job Nos 15 and 27 and the physical conditions are unchanged.

2. Angling Census - November 1960

Records were obtained from anglers at Lake Coleridge at all access points. Anglers were asked for information on the number of hours spent fishing, method used, number, species and length of fish kept, number of fish returned alive to the water and whether or not these were undersized. The data regarding the angling catch has been compared with the trapping and diary records of other years (see Table 4, Table 8 and Figure 5).

3. Angling Effort

A total of 291 anglers were contacted; this represents a total recorded effort of 1496.5 hours. The effort recorded for individual anglers ranged from ¼ hour to 7 hours, but, as many anglers were interviewed while fishing, the complete effort would be more than that recorded. Table 1 summarises data collected during the survey. It shows the number of anglers at each locality, hours fished, and the number and species of fish caught together with the size of the sample measured, average length and the number marked during the 1960 spawning survey (Job No. 27). The most frequent angling method was spinning, using various artificial minnows, spoons and wobblers. 86% of the anglers interviewed used this method, accounting for over three-quarters of the angling time. Next most frequent methods used were fly (including dry, wet and lure) and trolling. It may be seen in Table 3 that fly caught over 30% of the rainbow and 75% of the brown trout while spinning took 64% of the rainbow and 95% of the salmon. Generally, the yield to anglers was low but catches of up to 11 fish per angler were recorded. Table 2 shows the rate of catch of each species at different localities. It may be seen that the rate of catch was highest for salmon in most localities and lowest for brown trout.

4. State of Fish Stocks

The bulk of the fish caught were of good size. The greatest number of salmon falling in the 17-19 inch group and ranging from 12-24 inches. This compares favourably with 1960 trapping records where the bulk of salmon were in the 20-21 inch group. The numbers of fish passing through the traps in the 17-19 inch group in 1960 were much lower than the numbers recorded during the angling survey, but the latter would be expected to spawn in 1961 or later years by which time their length would have increased.

Similarly, rainbow trout recorded during the angling survey showed a peak at a lower size group, i.e. 19-20 inches, compared with those recorded from the traps, where the peak was at 23-24 inches. Too few brown trout were caught for any comparison to be made with trapping records. The average length of the fish taken by anglers was:

Quinnat salmon	18.1 inches
Rainbow trout	19.75 inches
Brown trout	20.5 inches.

These figures are slightly lower than the average lengths in the 1960 trap records which were:

Quinnat salmon	20.5 inches
Rainbow trout	23.5 inches
Brown trout	21.25 inches.

There are two possible reasons to explain the disparity in size of fish caught by anglers and those trapped while moving upstream to spawn.

(1) The trap records, being taken after the summer growth period, are of larger, maturer fish.

(2) Possibly a cyclic fluctuation in size occurs, as is suggested in Technical Field Service Report No. 17, Fig. 14, and the continuation of that graph in Fig. 5 of this report.

5. Catch Size and Composition

881 fish of all species were caught. Of this number 256 or 29.0% were undersized making a total of 625 legal sized fish. Table 4 shows the composition of the catch in 1960 and 1964 and compares it with that of the spawning runs for other years. It will be seen that the greatest proportion of the catch consisted of salmon with rainbow lying a poor second. However, in all trapping records except 1956, these positions are reversed, the greatest proportion recorded being rainbow trout. In all cases the brown trout are in the minority and are very seldom caught by anglers.

6. Netting

The gill nets were set at Lake Coleridge in positions marked on Figs. 1 and left for periods of from five hours to 16 hours, the usual period being around six hours to give greatest setting time with a minimum of mortalities. The sample obtained was not large and data obtained from it are included in Tables 4 and 8. Fish which died in the nets were examined for stomach contents, results detailed in Table 6. Too few were obtained from Lake Coleridge to give a true picture and the data is included with stomachs sampled in November 1964, in Table 6.

It is necessary to bear in mind, when comparing the two sets of data in Table 6, that each was taken during different seasons and in a different year from the other.

7. Bottom Fauna

The bottom fauna of Lake Coleridge was sampled at various depths using a Petersen Grab operated from a boat. Sampling positions are marked on Fig. 1 and the analysis of the samples is given in Table 5 for Lake Coleridge.

8. Stomach Samples

During the opening weekend of the angling season, November 1964, anglers were interviewed and stomachs obtained from most of the caught fish. This particular phase of work was publicised and most anglers co-operated very well and saved their fish whole. Their help is gratefully acknowledged. No attempt was made to gauge angling effort or success the whole purpose being to collect stomachs. Results of their analysis are set out in Table 6 and the length frequency of all fish sampled is given in Fig. 2. No brown trout were taken by any of the anglers interviewed.

Rainbow trout stomachs were generally full on examination while a large percentage of salmon stomachs were empty. Fish are known to disgorge their stomach contents in their struggles to free themselves while being caught by either hook or in gill nets, particularly if they have been feeding recently on large animals (Rounsefell and Everhart. Fishery Science; Its Methods and Applications, p. 356.).

B. LAKE LYNDON

1. Description

Lake Lyndon is situated in the foothills of the Southern Alps at an altitude of 2,730 ft with peaks rising to 5,000 ft on either side. It lies in a roughly north-south direction approximately 20 miles north of Lake Coleridge and is passed at its northern end by the Christchurch-West Coast (via Arthurs Pass) Road. It is 1-3/4 miles long by ¼ mile wide and has an approximate area of 275 acres. The lake is a deep bowl, shallow at either end with a maximum depth of 100 feet. There is one small inlet stream, at the northern end, which is usually dry over the latter part of its course, and one outlet stream, at the southern end, which joins the Acheron River. The outlet flows only in the early summer, when the lake level is high, as the lake level falls considerably during the summer.

It supports a population of rainbow trout which have reproduced themselves naturally, presumably by lake edge spawning as there are no spawning streams, since artificial stocking ceased in 1951.

2. Netting

The gill nets were set at Lake Lyndon in the positions marked on Figure 4.

The sample of fish taken from Lake Lyndon was larger than that from Lake Coleridge.

Figure 3 shows the length frequency of the Lake Lyndon fish.

3. Bottom Fauna

The bottom fauna of Lake Lyndon was sampled with the Petersen Grab and sampling positions are marked in Fig. 4, and the analysis of the samples is detailed in Table 7.

DISCUSSION

1. Angling

It is apparent that fish of good size are available to anglers in Lake Coleridge and that they are being caught in reasonable numbers. The New Zealand Angling Diary Scheme 1947-1952 gives the rate of catch for Lake Coleridge as 0.42 fish/hour, an investigation conducted during 1953-54 angling season records 0.59 fish/hour, the diary scheme of 1957/58 gives 0.31 fish/hour and, as may be seen in Table 2 of this report, the rate of catch during the opening period of the 1960/61 season was 0.59 fish/hour.

These figures are within the range recorded for other New Zealand waters, e.g.

Lake Alexandrina 0.36 fish/hour from 1947/52 diary scheme.
Rotorua Lakes 0.56 fish/hour from 1947/52 diary scheme.
Lake Manapouri 0.33 fish/hour from 1962/63 creel census. Investigation Report Job No. 47.
Lake Te Anau 0.61 fish/hour from 1962/63 creel census. Investigation Report Job No. 47.

At the time of the year that the survey was made the fish were slightly smaller than the majority of those recorded during the 1960 spawning run.

In Lake Coleridge angling methods are directed principally at the salmon and rainbow population, probably because these species are readily caught by simple angling methods. The brown trout population is virtually unexploited. This condition is being remedied in years subsequent to the angling census by removing brown trout spawning in certain tributaries and transferring them to Lake Selfe.

2. Food Supplies, Bottom Fauna and Netting

1. Bottom fauna

It may be seen on tables 5 and 7 that most animals in Lake Coleridge were found in depths of from 7.5 metres to 30 metres and in Lake Lyndon in depths of 2 to 6 metres. At the time of sampling Lake Lyndon was approximately 3 metres

below normal and Lake Coleridge was approximately 1 metre above normal.

The variety of animals was not great in either lake and with the exception of the freshwater snail Potamopyrgus, which made up the bulk of the samples in Lake Lyndon but figures less prominently in Lake Coleridge, bottom fauna was not abundant. The grab was unsuccessful in various places in Lake Coleridge where the bottom consisted of stones and boulders and observations made while diving in some of thse areas have revealed that the species Pycnocentria of the caddis family is more abundant than Table 5 would lead one to believe. The most common animal found in the samples was the freshwater snail, potamopyrgus, which figured prominently at all depths. Next most common were the midge larvae, the chironomid larva (bloodworm) and third most common, the caddis larva pycnocentria. It will be seen in Table 6 that pycnocentria and the chironomid larvae were the form of bottom fauna most preferred by trout and salmon with mollusca being relatively low in order of popularity. Compare this with Lake Lyndon where mollusca comprised both the bulk of the stomach contents and the bulk of the bottom fauna samples and the chironomid larvae were most abundant in bottom samples and rarely found in trout stomachs.

Techniques employed did not sample forage fish, except by accident, and no samples were taken of these fish, although they play an important part as food of trout and salmon in Lake Coleridge.

2. Lake Coleridge

In tables 5 and 6 it may be seen that the range of bottom animals, in order of abundance was: Mollusca, (mostly the small snail Potamapyrgus), Chironomid larvae, caddis larvae, annelid worms, dragon-fly larvae, mayfly larvae and bullies. In 28 rainbow trout stomachs examined the contents in order of abundance, consisted of: forage fish, caddis larvae, chironomid and sandfly larvae, terrestial insects and aquatic weed, Mollusca, dragonfly larvae, and mayfly larvae. This order differs slightly in salmon and in 125 salmon stomachs examined the types of food found were as follows: terrestial insects (mostly brown beetles), forage fish, sandfly larvae, caddis larvae, dragonfly larvae, mayfly larvae, stonefly larvae, Dobsonfly larvae and Mollusca.

The gill nets were set in eight positions (see Fig. 1) and a sample of 70 fish was obtained. The average lengths of these were: salmon 51.2 cm (20.2 ins), rainbow trout 45.3 cm (17.9 ins), and brown trout 47.3 cm (18.6 ins). The average weights were 1983 g (4 lb 6 oz), 1776 g (3 lb 15 oz) and 1708 g (3 lb 12 oz) respectively and condition factors for the three species were above average. Although the sample is small the lengths tally with those given for other years (see Table 8) and can be considered representative.

Figure 5 shows fluctuations in average length 1949-64 and suggests a four yearly cycle of quinnat salmon. It shows that the rainbow trout have averaged a shorter length than for 1962 and is comparable to 1950-54 period. This could be part of a large cycle or due to factors as yet unknown. Brown trout are also shown to be decreasing in size but the size of the samples of these fish has decreased each year.

3. Lake Lyndon

The order of abundance of the different types of bottom fauna (see Table 7) are the same in Lake Lyndon as in Lake Coleridge but the density of individual species varies somewhat. The order again is: Mollusca (Potamapyrgus), Chironomid larvae, caddis larvae, mayfly larvae and Parnid larvae, annelid worms. Potamapyrgus, the mollusc, was many times more abundant in Lake Lyndon than in Lake Coleridge and caddis larvae were more abundant in Coleridge than in Lyndon.

The stomachs of 45 Lake Lyndon trout were examined (see Table 6) with the following results: In order of frequency - Potamapyrgus, caddis larvae and forage fish, mayfly larvae, terrestial insects. Quantitites of aquatic weed were also found in the stomachs and slightly over held the fish examined were found to be infested with a parasite, Eustrongy-lides (Sp), a type of nematode worm which spends one stage of its life cycle in the body cavity of trout.

General observations made from examination of 88 stomachs by Percival and Burnett during the years prior to the present survey (a study of the Lake Lyndon rainbow trout. N.Z. Journal of Science Vol. 6 No. 2, June 1963) revealed that "fish of up to 4 in (10.5 cm) feed mainly on zooplankton and chironomids while the larger fish were found to contain mollusca, dragonfly nymphs, aquatic weed and chironomid larvae and pupae".

Lake Lyndon supports a large population of small sized rainbow trout. The average length of 292 fish which were caught during four settings of the gill nets was 22.8 cm (9 inches), the average weight was 145 gm (5 oz) and the average condition factor at 105 on the gram/centimetre scale (38 on Corbett scale) was below normal.

Figures recorded the previous November (1961) by Burnett and tabled in the Literature Cited above give the average length of successive year classes as: 1st - 15 cm (5.9 ins) and 2nd - 24.2 cm (9.5 ins). Figure 3 length frequency graph shows two definite peaks at 20 cm and 24 cm, suggesting two-plus year classes. It seems probable that the two classes shown in Figure 3 are the same two as those netted in November 1961, the average

lengths of which are given above. The average lengths in May 1962 of these two classes, now six months older and almost at two years and three years old respectively were 1st 19.8 cm (7.8 ins) and 25.0 cm (9.9 ins). This growth rate is very slow and is slower than that recorded in the above report by Percival and Burnett.

CONCLUSIONS

A. LAKE COLERIDGE

1. Fish of good size and generally in good condition are available to anglers.

2. They are caught at a rate which compares favourably with other New Zealand lakes.

3. Bottom fauna is not abundant in Lake Coleridge and is fully utilised by the existing fish population.

4. Zooplankton and bullies, galaxiids, and their fry are important forms of food to trout and salmon (at various stages throughout their lives), but their density was not sampled during this survey.

B. LAKE LYNDON

1. Lake Lyndon supports a dense population of rainbow trout and competition for available food is severe.

2. A large percentage of the trout population in Lake Lyndon is parasite-infested.

RECOMMENDATIONS

A. LAKE COLERIDGE

The brown trout population should continue to be removed from Lake Coleridge. Further, a more intensive investigation of the fish population of Lake Coleridge is now in progress.

B. LAKE LYNDON

The annual report of the North Canterbury Acclimatisation Society for 1963-64 states that the removal of many fish by netting and new reguations enforced during the 1963-64 season in Lake Lyndon has resulted in considerable improvement in condition factor of fish and a lessening in worm infection and that the lake is showing signs of restoration to its original fishing potential.

It is recommended that further investigations be carried out, perhaps on an annual basis as the state of the fish population is changing, with a view

to gauging the degree of change and its effect on the food supplies of the lake.

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REFERENCES

K.R. Allen and B.T. Cunningham, New Zealand Angling 1947-1952 - results of the diary scheme. Marine Department Fisheries Bulletin No. 2, 1957.

Percival E. and A.M.R. Burnet: A study of the Lake Lyndon rainbow trout fishery. Journal of Science Vol. 6 No.2, June 1963.

Rounsefell, G.A. and W.H. Everhart. Fishery science, its methods and applciations.

North Canterbury Acclimatisation Society Annual Reports, 1964/64 report; Report in 1953/54 Lake Coleridge Investigation by C.J. Hardy and additional data on the 1947/52 and 1957/58 diary schemes by C.J. Hardy.

Marine Department Investigation Reports:

Job No. 15 Spawning of Lake Coleridge

Job No. 27 Comprehensive spanwing survey of Lake Coleridge streams.

Job No. 47 Creel census of Waiau River (Southland) and Lakes Manapouri and Te Anau (Southern Lakes).

TABLE 1 LAKE COLERIDGE Results of angling census 1st.—6th. November 1960

LOCALITY	NO. OF ANGLERS	HOURS FISHED	TOTAL FISH CAUGHT			MARKED	AVERAGE LENGTH (INS.)			NO. MEASURED		
			BROWN	RAINBOW	SALMON	RAINBOW	BROWN	RAINBOW	SALMON	B	R	S
OUTLET	125	623	2	35	527	6	19·5	21·25	19·5	2	28	246
RYTON BAY	64	306·5	1	35	72	5	18·0	16·7	18·9	1	30	55
INTAKE	44	197	—	10	54	1	—	18·8	19·8	—	9	42
TROLLING	14	101	—	6	17	—	—	17·6	17·75	—	6	14
DOUBLE BAY	19	92·5	1	21	1	3	24·0	21·0	—	1	3	—
OTHERS	25	176·5	—	27	72	2	—	22·5	18·9	—	4	16
TOTAL	291	1496·5	4	134	743	17	20·25	19·7	18·9	4	80	373

TABLE 2 LAKE COLERIDGE: Rate of catch

LOCALITY	NO. OF ANGLERS	HOURS FISHED	FISH PER HOUR			
			BROWN	RAINBOW	SALMON	
OUTLET	125	623	0·003	0·05	0·85	
RYTON BAY	64	306·5	0·003	0·11	0·23	
INTAKE	44	197	—	0·05	0·27	
DOUBLE BAY	19	92·5	0·01	0·23	0·01	
TROLLING	14	101	—	0·06	0·17	
OTHERS	25	176·5	—	0·15	0·41	
TOTAL	291	1496·5	0·003	0·09	0·496	= 0·589 FISH/HOUR

TABLE 3 LAKE COLERIDGE: Fishing methods.

METHOD	ANGLERS	HOURS FISHED	FISH CAUGHT		
			BROWN	RAINBOW	SALMON
TROLLING	4·8%	6·7%	—	4·6%	2·8%
FLY (WET, DRY, LURE)	9·6%	13·75%	75·0%	30·7%	2·0%
SPINNING	86·0%	79·9%	25·0%	64·5%	95·0%
TOTAL	291	1496	4	130	491

TABLE 4 : LAKE COLERIDGE

Percentage composition of samples of fish *

	1956 TRAP	1957 TRAP	1958 TRAP	1959 TRAP	1960 ANGLING	1960 TRAP	1962 GILLNETTING	1964 ANGLING
SALMON	75·7	19·7	13·1	14·2	78·8	38·2	21·4	81·7
RAINBOW	16·2	76·3	75·0	41·6	20·8	46·5	52·9	18·3
BROWN	8·1	4·4	11·8	39·0	0·6	15·1	25·7	-
LOCALITY	RYTON R.	SALMON, RYTON B&R, HENNAH	HENNAH	RYTON HENNAH TWIN CREEK SCAMMANDER	L. COLERIDGE	RYTON HENNAH TWIN CREEK SCAMMANDER	SEE MAP OF LAKE	L. COLERIDGE

* 1959 TRAPPING RECORDS — BEGUN WHEN SALMON RUN NEARLY OVER.

TABLE 5 LAKE COLERIDGE Bottom Samples 1964

Expressed as the percentage of animals present for each depth interval.

DEPTH IN METRES		0 - 3	3·5 - 7	7·5-15	15 - 30
Number of samples taken		59	31	53	42
Average No. of animals per sample at each depth interval		2	54	124	110
Mollusca (shellfish)					
Potamopyrgus	%	29·2	59·8	46·1	32·6
Isidora	%			>0·1	0·2
Limnaea	%		0·5	>0·1	>0·1
Corneocyclas	%		>0·1	0·3	>0·1
Amphipeplea	%		>0·1	0·1	
Diplodon	%		>0·1	0·2	0·4
Diptera (true flies)					
Chironomid	%	59·8	16·1	28·0	43·7
Trichoptera (caddis flies)					
Pycnocentria	%	10·2	22·0	24·2	22·9
Rhyacop	%	0·8			
Pseudonema	%		0·5	0·5	>0·1
Ephemeroptera (mayflies)					
Deleatidium	%				>0·1
Odonata (dragonflies)	%				
Somatachlora	%		>0·1	>0·1	
Annelida (worms)					
Oligochaeta	%		0·7	0·5	0·3
Gobiomorphus (bullies)	%		>0·1	>0·1	
Actual no. of animals found		127	1665	6593	4631
Bottom material. % Composition by volume					
Weed	%	2·5	21·4	39·7	26·2
Sand	%	13·0	9·4	3·1	7·9
Mud	%	11·5	30·2	45·4	41·3
Gravel	%	9·7	9·9	3·4	3·6
Stones	%	48·9	22·4	5·3	16·2
Rocks	%	11·0	6·8	3·1	4·8
Shingle	%	3·4			

Weed present — Hornwort, Milfoil, Quillfoil, Elodea, Stonewort.

TABLE 6

LAKE COLERIDGE Stomach Contents 1964

	NO. Fish	Av. Length & Range	Av. Weight & Range	Caddisfly Larvae Pyc.	Caddisfly Larvae Rhy. Hyd.	Mayfly Larvae Ata.	Mayfly Larvae Del.	True fly Dip.	Stonefly Ple.	Stonefly Som.	Dragonfly Zyg.	Dobsonfly Neu.	Beetles Col.	Moths	Mollusca Phy.	Mollusca Pot.	Spiders	Zooplankton	Bullies Gobio.	Eel	Unidentifiable Fish	Unidentifiable Bottom	Misc. Terr.	Weed	Algae	Stones
Rainbow Trout	28 (16f) (12m)	45·2cm. 33·3 - 62·6	1000g 200-1900																							
No. of stomachs found in				13	1	1		1	9	2		1		6	2	2	1		11	1	12			4	6	2	2
% of stomachs found in				46·4	3·6	3·6		3·6	22·2	7·4		3·6		21·4	7·4	7·4	3·6		39·3	3·6	42·9			14·3	21·4	7·4	7·4
Total %				53·6				3·6	22·2	7·4		3·6		21·4	7·4	11·0			39·3	3·6	42·9			14·3	21·4	7·4	7·4
Salmon	125 (60f) (65m)	44·5cm 32·2 - 50·5	900g 300 - 1500																							
No. of stomachs found in				5	2	1	1	1	11	2	3		2	44			2	1	6		17	7	16	3			17
% of stomachs found in				4·0	1·6	0·8	0·8	0·8	8·8	1·6	2·4		1·6	35·2			1·6	0·8	4·8		13·6	5·6	12·8	2·4			13·6
Total %				6·4			1·6		8·8	1·6	2·4		1·6	35·2			1·6	0·8	4·8		13·6	5·6	12·8	2·4			13·6

1962 LAKE LYNDON Stomach Contents

	NO. Fish	Av. Length & Range	Av. Weight & Range	Caddisfly Larvae Pyc.	Caddisfly Larvae Pseu.	Mayfly Larvae Del.	Mayfly Larvae Ata.	Grass hopper	Mollusca Pot.	Bullies Gobio.	Weed	Weed & Ova	Worm Infested
Rainbow Trout	45 (23f) (22m)	23·5cm. 18·4 - 33·0	1740g. 850-4540										
No. of stomachs found in				2	3	1	3	1	20	5	26	3	23
% of stomachs found in				4·4	6·7	2·2	6·7	2·2	44·4	11·1	57·8	6·7	51·1
Total %				11·1		8·9		2·2	44·4	11·1	57·8	6·7	51·1

TABLE 7 LAKE LYNDON Bottom Samples 1964

Expressed as the percentage of animals present for each depth interval.

DEPTH IN METRES		0 - 3	3·25 - 6	6·25 - 9	9 - 12	12 - 15
Number of samples taken.		10	17	5	none	4
Average no.of animals per sample at each depth interval.		422	194	43		10
Mollusca(shellfish)						
Potamopyrgus	%	90·7	72·2	46·4		4·9
Isidora	%	0·2	>0·1			
Amphipeplea	%		>0·1	0·5		
Diptera(true flies)						
Chironomid	%	8·6	25·8	47·4		90·2
Trichoptera(caddis flies)						
Pycnocentria	%	0·2	1·6	4·2		4·9
Pseudonema	%	0·1	0·3	0·5		
Olinga	%		>0·1			
Ephemeroptera(mayflies)						
Deleatidium	%			0·5		
Odonata(dragonflies)						
Somatachlora	%	0·1				
Coleoptera(beetles)						
Pamid	%			0·5		
Annelida(worms)						
Oligochaeta	%	0·1				
Actual no.of animals found.		4221	3294	213		41
Bottom material, % Composition by volume						
Weed	%	43·0	47·0	43·3		41·7
Mud	%	43·0	47·0	43·3		41·7
Gravel	%	14·0	6·0	13·4		16·6
Weed present		Elodea, Stonewort, Hornwort, Quillwort,				

TABLE 8 LAKE COLERIDGE Average Lengths (in inches)

METHOD	YEAR	NO. FISH	TYPE OF FISH		
			Q. SALMON	RAINBOW	BROWN
Diary Scheme	1949/50	32	20·70	-	-
" "	1950/51	142	20·47	21·30	-
" "	1951/52	46	20·60	18·76	-
Investigation	1953/54	638	18·40	18·10	21·20
Trapping	1954	87	18·75	19·80	-
"	1956	272	19·00	21·00	23·00
"	1957	274	21·00	21·20	22·50
Diary Scheme	1957/58	70	20·27	21·80	23·00
Trapping	1958	153	18·00	21·00	20·40
"	1957	389	19·00	22·54	22·91
Angling Census	1960	457	18·90	20·25	-
Trapping	1960	?	20·50	23 50	21·25
Gill Netting	1962	70	20·20	17·90	18·60
Angling Census	1964	154	17·50	17·80	-

FIGURE 1 LAKE COLERIDGE

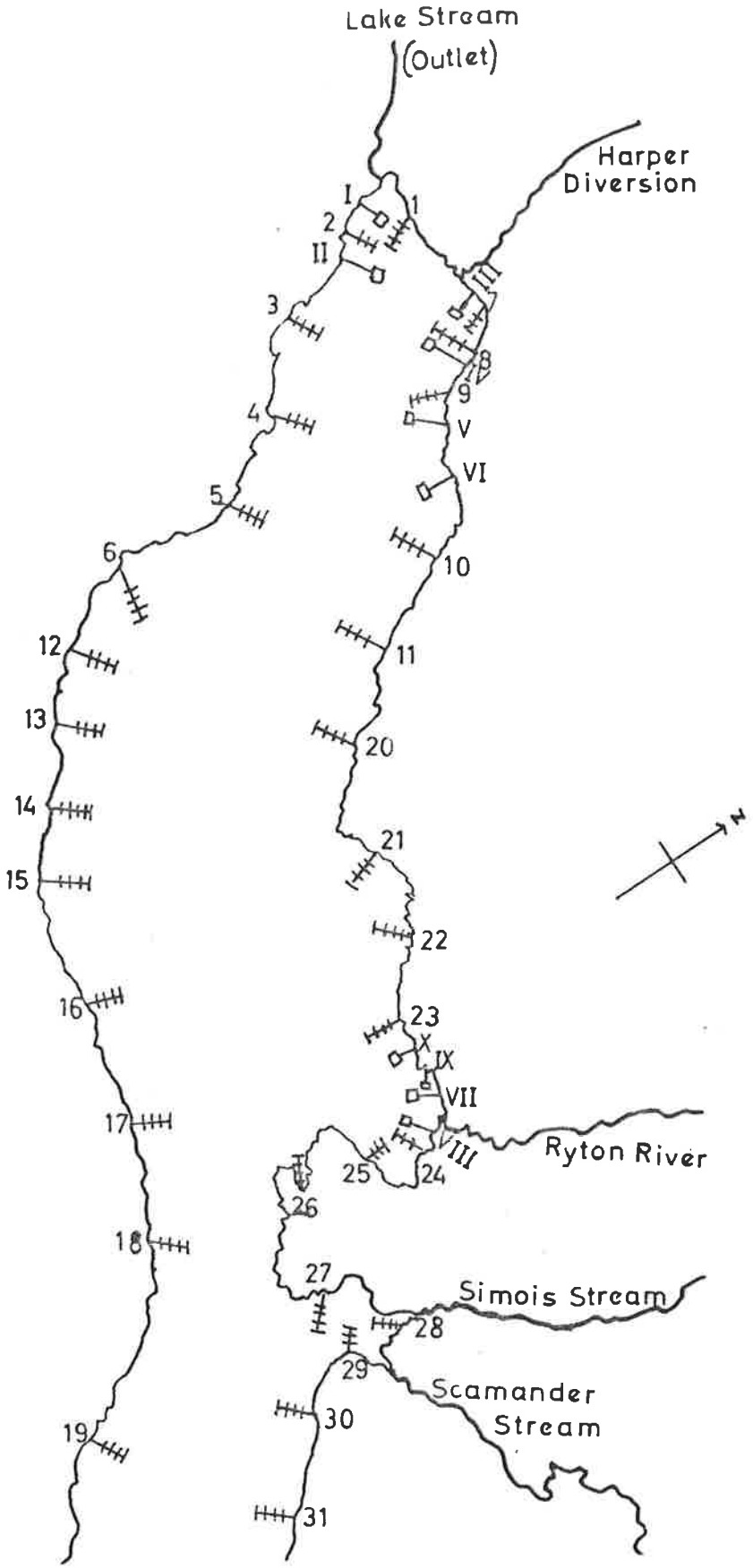

FIGURE 2 LAKE COLERIDGE Opening Weekend Nov. 1964

Length Frequency — Anglers Catch — Quinnat Salmon

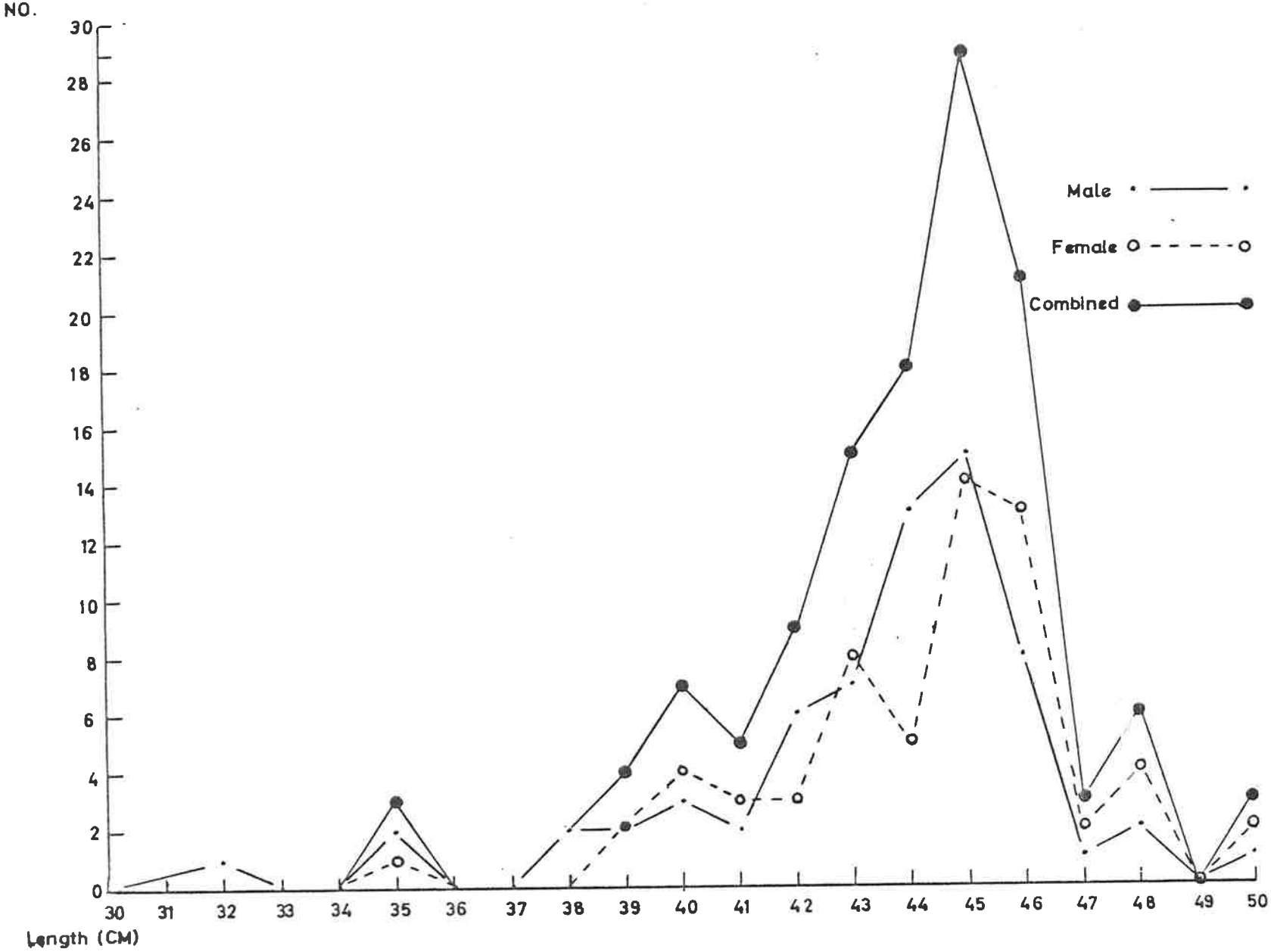

Fig 3 LAKE LYNDON Gill Netting May 1962

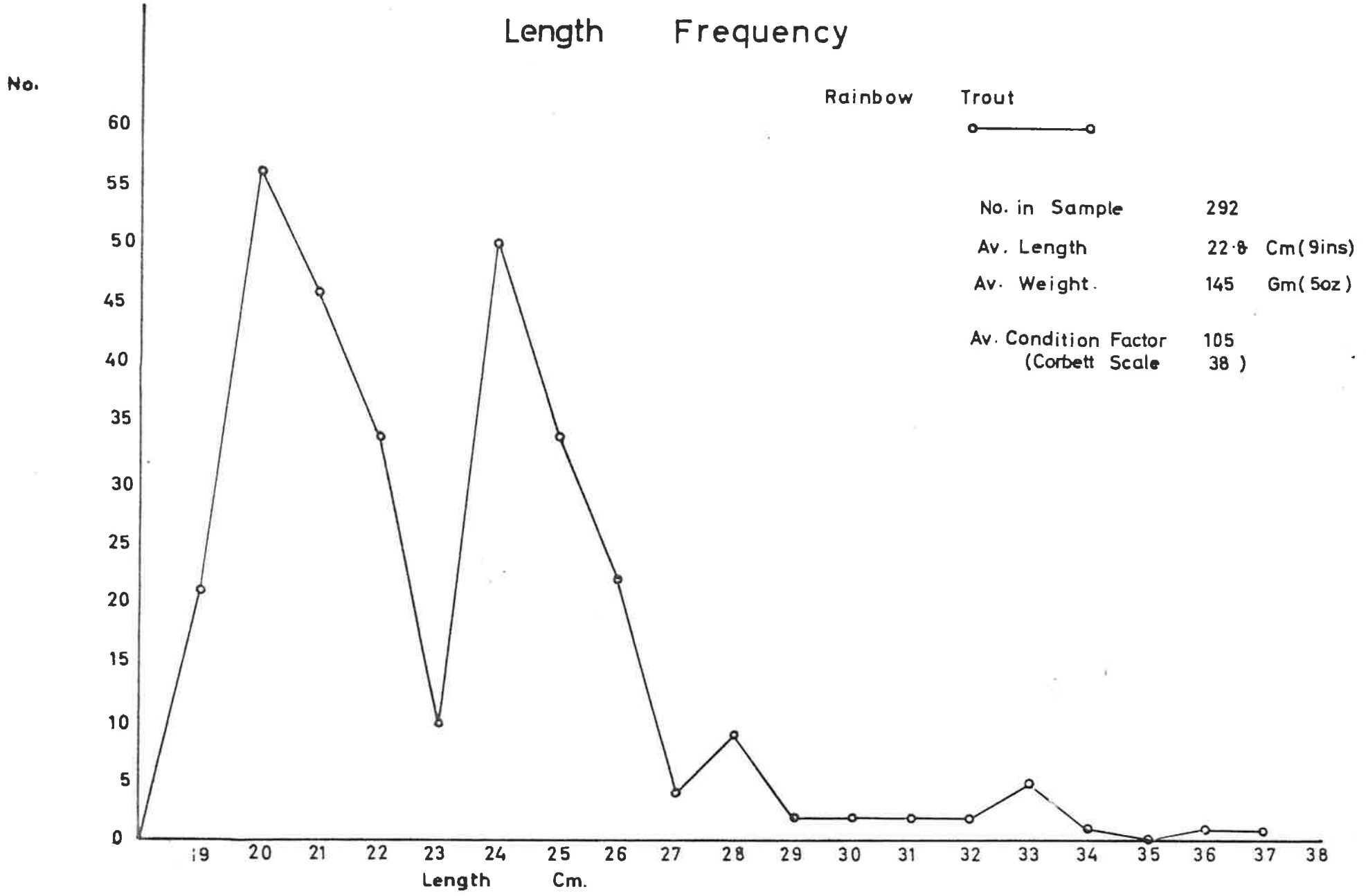

FIGURE 4 LAKE LYNDON