NEW ZEALAND FRESHWATER FISHERIES MISCELLANEOUS REPORT

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MATAHINA FISH SURVEY
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NEW ZEALAND FRESHWATER FISHERIES MISCELLANEOUS REPORTS

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SUMMARY

The fisheries of Lake Matahina were surveyed on 9-10 January 1989, when the lake had been refilled for approximately six months.

Common bullies, short-finned and long-finned eels, brown and rainbow trout and goldfish were caught.

Catch rates of common bullies were much higher than in previous surveys, owing to the successful recruitment of 0+ year class juveniles. The expansion in the common bully population suggests that the productivity of Lake Matahina has increased following reservoir refilling.

Catch rates of short-finned and long-finned eels were low. This provides further evidence that there are only small numbers of eels in the lake. As large numbers of elvers congregate at the power station's transformer cooling water outlet below the dam, the manual transfer of elvers to the lake would require little effort. Transfers should be carried out on a regular basis until an elver-pass is installed.

Brown and rainbow trout were abundant along the lake margins and several year classes were present. Trout larger than 12 cm fed mostly on common bullies, although several rainbow trout had consumed snails (Physa sp.). Trout condition factors had increased markedly since the November survey. Thus, it appears that lake drawdown and refilling will significantly enhance the fishery at least in the short-term.

Goldfish were more abundant than in previous surveys and the juveniles should provide an additional food source for eels and trout.

INTRODUCTION

This survey is the fifth in a series of investigations to determine the effects of lake drawdown on the fisheries of Lake Matahina. Previous surveys were carried out in January, April, August and November 1988. The current survey was conducted on the 9-10 January 1989, when the lake had been refilled for approximately 6 months.

METHODS

The same methods were employed as in previous surveys. Single and double-winged fyke nets, minnow traps, gill nets and seines were used to sample the lake over 24 hours. In addition, three single-winged fyke nets and a fine-meshed trap were set in the Rangitaiki River immediately downstream of the dam (Fig. 1).

Gill nets were checked at intervals during the day to minimise trout mortality. Released trout had their adipose fin clipped. The total length and/or weight of most individuals (except common bullies) were measured before release. A subsample of common bullies, brown and rainbow trout and goldfish were kept for stomach content analysis. The condition factor (K) of brown and rainbow trout was calculated using the formula $K = W.100/L^3$, where W = weight in g; L = total length in cm.

RESULTS

Lake Matahina

Three native and three introduced fish species were caught in the lake (Table 1). The common bully was by far the most abundant species, followed by rainbow trout, brown trout, goldfish and short-finned and long-finned eels (Table 2).

Common bullies occurred in very high densities along the shallow lake margins and an estimated 100,000 bullies were caught in a single seine taken near the boat ramp (Fig. 1). Length-frequency distributions (Fig. 2) showed that most bullies were small 0+ year class juveniles. Large adult bullies were also present in the lake (Fig. 3). Common bullies of all sizes fed mostly on midge larvae (Chironomus zealandicus) and cladocerans (Table 3).

Ten short-finned and three long-finned eels were caught in the lake. All were large (Table 1).

Brown and rainbow trout were abundant along the lake margins. Length-frequency distributions (Fig. 4) showed that several year classes were present, including small 0+ juveniles. The smallest rainbow trout (6-9 cm) fed mostly on larval C. zealandicus, while brown and rainbow trout larger than 12 cm fed predominantly on common bullies (Table 3). Several rainbow trout had also consumed large numbers of snails (Physa sp.). Trout condition factors had increased markedly since the previous surveys (Table 4).

Most goldfish were small 0+ year class juveniles (Table 1). Twenty individuals were caught in a minnow trap set from an island (Fig. 1). The single adult caught was a female that had recently spawned, but which had re-developing gonads. Goldfish fed mostly on algal detritus, although a few snails (Physa sp.) were also consumed (Table 3).

Aquatic Macrophytes in Lake Matahina

No established beds of aquatic macrophytes were seen in Lake Matahina, but fragments of three species (Elodea canadensis, Lagarosyphon major and Potamogeton ochreatus) were found when seining along the lake margins.

Rangitaiki River immediately below Matahina Dam

Twenty-three short-finned and 42 long-finned eels were caught in the 3 fyke nets set in the river below the dam. Most of the eels were large (Table 5). A single brown trout (46 cm) was also caught.

An inanga, a banded kokopu juvenile, 10 common bullies and 1,700 elvers were caught in the fine-meshed trap. The elvers were released into Lake Matahina.

Large numbers of elvers were found to congregate at the transformer cooling water outlet just below the station. Approximately 17,900 were caught with dip nets and transferred to the lake. Analysis of a subsample (n=96), indicated that 10.4 % of the catch consisted of long-finned elvers.

DISCUSSION

Common Bullies

The tremendous increase in catch rate between the November 1988 and January 1989 surveys (Table 6), and the small size of common bullies present in January, indicate that there was a very successful spring spawning with good survival of larval bullies. As spawning should continue until at least March, (with many bullies spawning twice, Stephens 1982), further increases in the population can be expected. The dramatic rise in the common bully population appears to have resulted from an increase in food supply following reservoir refilling.

Short-finned and Long-finned Eels

The catch rates of short-finned and long-finned eels were low, but similar to those obtained in the previous 3 surveys. Catch rates in the lake were much lower than in the river (2.5 and 0.5 compared to 7.7 and 14.0 for shortfins and longfins respectively). The data obtained in this and previous surveys confirms that there are only small numbers of eels in the lake, and that the short-finned eel population has declined since the lake level was lowered for dam repair.

As large numbers of elvers congregate at the power station's transformer cooling water outlet, the manual transfer of elvers from the river to the lake would require relatively little effort. Manual transfers, as suggested by Mitchell (1983), should be carried out on a regular basis until an elver-pass is installed at Matahina Dam.

Brown and Rainbow Trout

The catch rate of brown trout had more than doubled since the November survey (Table 6). This was due to an increase in the number of 25-40 cm trout in the lake. The Rangitaiki River and tributaries upstream of the lake must be the source of this continuing recruitment.

Although the catch rate of rainbow trout had decreased slightly since November (Table 6), the number of rainbows larger than 25 cm had increased (3 were caught in November compared to 19 in January). Adults up to 43 cm were caught for the first time since the surveys began. The slight decline in overall catch rate resulted from a decrease in the number of 0+ juveniles caught in seines (from 48 in November to 24 in January).

Stomach content analysis revealed that small juvenile rainbow trout (< 12 cm) consumed the same food items (larval *C. zealandicus*) as common bullies. Thus, the smallest size classes of trout in Lake Matahina may have to compete with common bullies for food. Larger trout of both species took advantage of the huge food supply that the common bully population provided. The presence of numerous snails in trout stomachs indicates that this food source is now also increasing.

Trout condition factors (and therefore growth rates) have increased markedly since the November survey. It appears that lake drawdown and refilling will significantly enhance the trout fishery, at least in the short term. Angler activity should increase on the lake once the presence of large well-conditioned trout becomes obvious.

Goldfish

Catch rates in January 1989 were higher than in any previous survey (Table 6) and, as goldfish in Lake Matahina are likely to spawn at least once more this year, further increases are likely. Juvenile goldfish should provide a small additional food source for eels and trout in the lake.

CONCLUSION

The large expansion in the common bully population, in conjunction with a rise in trout condition factors, suggest that the productivity of Lake Matahina has increased following the reservoir's refilling. It is not known how long the period of increased productivity will last.

LITERATURE CITED

Mitchell, C.P., 1983. Eel passage requirements for the upper Rangitaiki River. Internal Report MAFFish, Rotorua. 14p.

Stephens, R.T.T., 1982. Reproduction, growth and mortality of the common bully, Gobiomorphus cotidianus McDowall, in a eutrophic New Zealand lake. Journal of Fish Biology 20: 259-70.

TABLE 1: Mean total length and weight of fish caught in Lake Matahina, 9-10 January 1989.

	Species					
	Native fish			Introduced fish		
	Common bully	S.F eel	L.F eel	Brown trout	Rainbow trout	Gold fish
Total catch	112,879	10	3	35	44	22
Number measured	137	10	3	35	44	22
Total length (cm)						
Mean	2.85	——	——	27.6	20.0	5.2
Minimum	1.35	——	——	9.2	6.8	3.4
Maximum	7.70	——	——	49.0	42.5	19.2
Weight (g)						
Mean	——	572	1023	410	320	——
Minimum	——	380	830	14	3.5	0.6
Maximum	——	1130	1300	1500	980	230

S.F = short-finned, L.F = long-finned, —— = not calculated

TABLE 2: Catch per unit effort (CPUE) for nets set in Lake Matahina, 9-10 January 1989.

	Sampling method						Sum of CPUE
	DF	FMF	F	GM	S	G	
No. of nets	2	4	6	7	3	5	
Common bully	0.0	463.0	0.0	3.9	37,000.0	0.0	37,466.9
Short-finned eel	0.5	1.3	0.7	0.0	0.0	0.0	2.5
Long-finned eel	0.0	0.0	0.5	0.0	0.0	0.0	0.5
Brown trout	0.5	0.0	0.0	0.0	3.0	5.0	8.5
Rainbow trout	0.0	0.8	0.0	0.0	8.3	3.6	12.7
Goldfish	0.0	0.0	0.2	3.0	0.0	0.0	3.2

DF = double-winged fyke
FMF = fine meshed single-winged fyke
F = single-winged fyke
GM = gee-minnow trap
S = seine
G = gill net

TABLE 3: Dominant food items found in the stomachs of fish from Lake Matahina, 9-10 January 1989.

Species	Number analysed	Dominant food items
Common bully	20	C. zealandicus larvae, cladocerans
Brown trout (0+ juveniles)	2	Common bullies, C. zealandicus larvae
Brown trout	10	Common bullies
Rainbow trout (0+ juveniles)	2	C. zealandicus larvae
Rainbow trout	10	Common bullies, Physa sp.
Goldfish	2	Algal detritus, Physa sp.

TABLE 4: Condition factor (K) of brown and rainbow trout caught in Lake Matahina, Jan. 1988 - Jan. 1989.

Fish length	Survey date	Condition Factor (K) Brown trout Mean	S.D.	N	Rainbow trout Mean	S.D.	N
>20 cm	Jan. 1988	1.03	0.15	15			
	Apr. 1988	0.81	—	1			
	Aug. 1988				1.01	0.06	4
	Nov. 1988	0.98	0.09	11	0.98	0.01	3
	Jan. 1989	1.30	0.13	26	1.26	0.14	18
<20 cm	Nov. 1988	1.17	—	1	1.15	0.10	14
	Jan. 1989	1.06	0.09	7	1.12	0.24	13

TABLE 5: The size of eels caught in 3 fyke nets set in the Rangitaiki River immediately below Matahina Dam.

	S.F. eel	L.F. eel
Total catch	23	42
Weight (g)		
Mean	523	789
Minimum	220	180
Maximum	1300	1790

TABLE 6: Comparison of catch rates obtained during the five fish surveys of Lake Matahina in 1988 and 1989.

	Total Catch Per Unit Effort (sum of all sampling methods)				
	Jan. 1988	Apr. 1988	Aug. 1988	Nov. 1988	Jan. 1989
Common bully	189.2	176.7	6.6	45.3	37,466.9
Short-finned eel	39.9	3.9	2.1	2.4	2.5
Long-finned eel	5.8	3.4	0.2	3.6	0.5
Banded kokopu	0.0	0.0	0.2	0.1	0.0
Brown trout	4.6	0.1	0.0	4.0	8.5
Rainbow trout	0.0	0.0	0.8	16.8	12.7
Goldfish	0.6	0.0	0.0	0.4	3.2

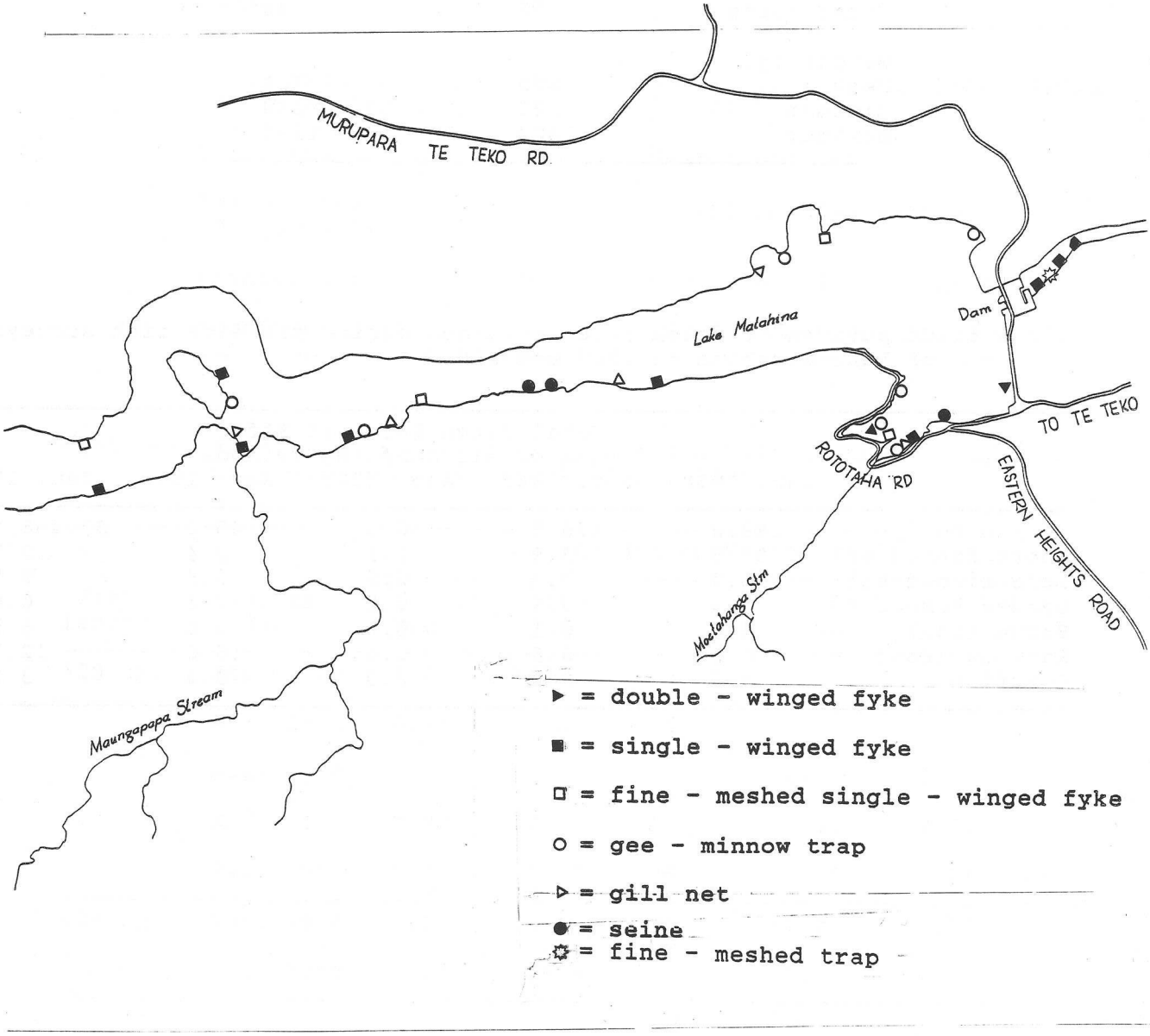

FIGURE 1: Location of sampling sites in Lake Matahina, 9–10 January 1989.

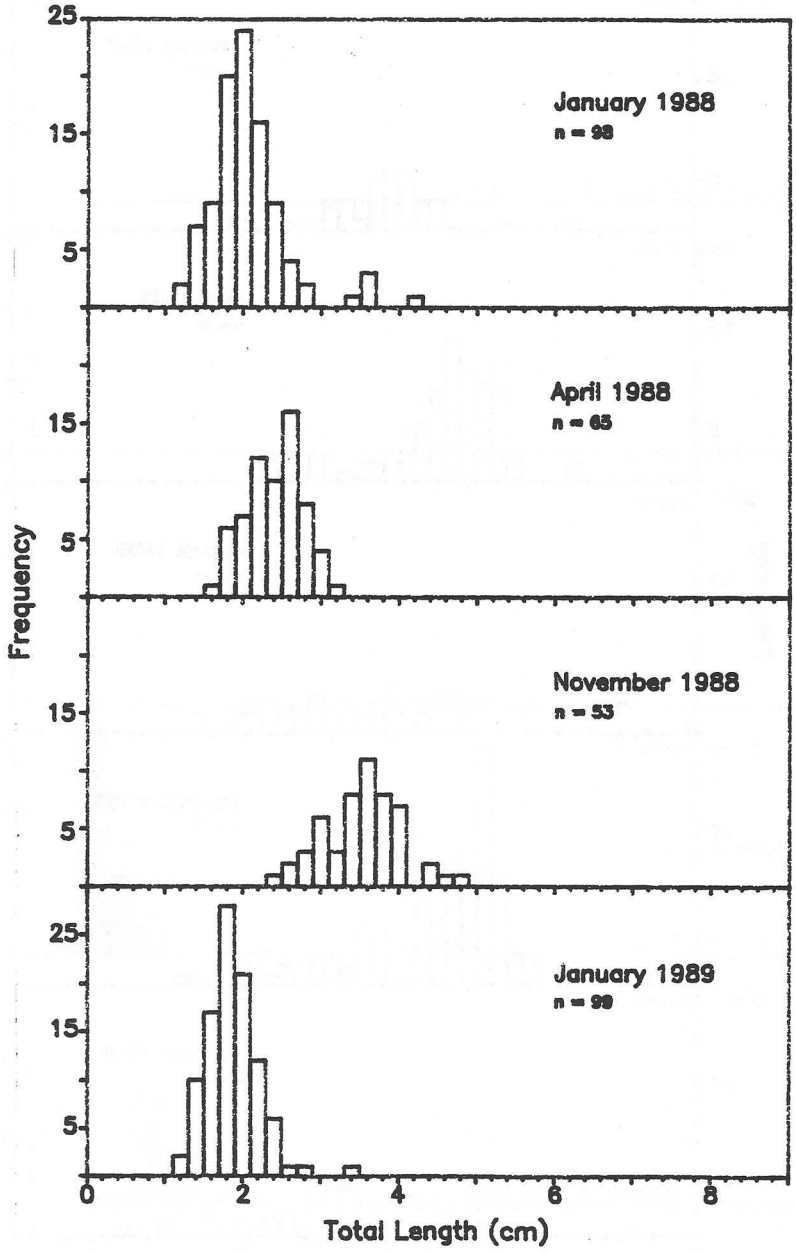

FIGURE 2: Length–frequencies of common bullies caught in seines in Lake Matahina, January 1988 to January 1989. No data was obtained in August because of floating debris along the lake margins.

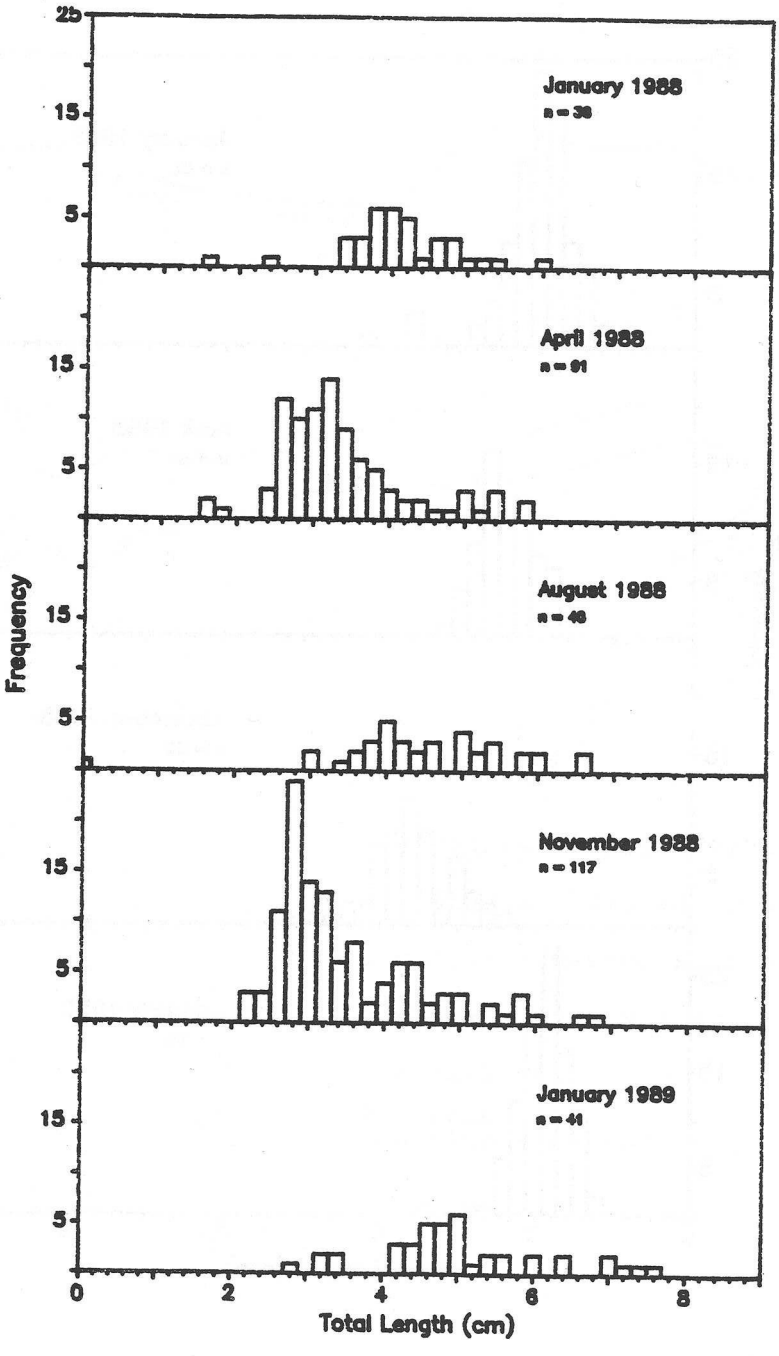

FIGURE 3: Length–frequencies of common bullies caught in fyke nets and in minnow traps set in Lake Matahina, January 1988 to January 1989.

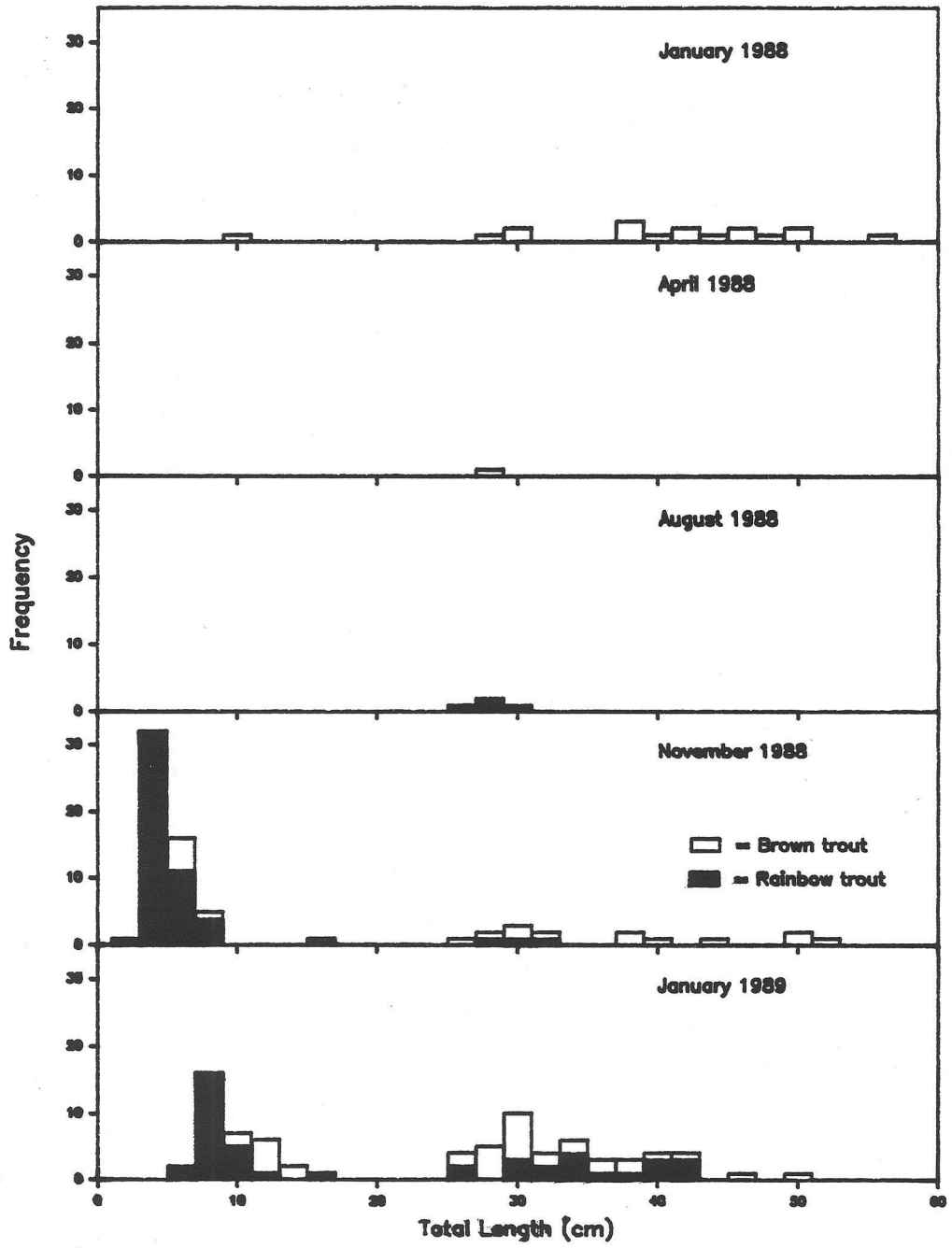

FIGURE 4: Length-frequencies of brown and rainbow trout caught in Lake Matahina, January 1988 to January 1989.