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Ministry of Energy

TROUT SPAWNING RUNS
IN THE MARY BURN
1980

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1. INTRODUCTION

The Mary Burn is a tributary of the Tekapo River, which in turn flows into Lake Benmore (Fig. 1). The river supports stocks of brown and rainbow trout and is highly rated as a trout fishery (Teirney, Richardson and Unwin 1982). In recent years, as a consequence of the upper Waitaki power development scheme, there has been considerable interest in the value of the Mary Burn as a trout spawning and rearing stream. This study was initiated in order to determine the size and characteristics of the trout spawning run.

During the winter of 1980 a fish trap was constructed in the lower reaches of the stream and information collected included the numbers of rainbow and brown trout moving upstream to spawn, their sex ratio, length and weight. All fish passing through the trap were tagged, allowing future movements and growth to be monitored.

This report presents the trapping results and can be used for future reference. The implications of these results are not discussed, as this will be done later in a comprehensive report prepared after completion of the 1982 spawning run.

2. THE MARY BURN

The Mary Burn rises to the east of Lake Pukaki, flows south through tussock covered country, and joins the Tekapo River at Simons Hill, 18 km above Lake Benmore (Fig. 1).

The upper reaches are steep and rocky and contain limited spawning gravels. Below Mary Hill Station the river gradient decreases and the stream contains a series of pool and riffle areas. The banks are undercut, providing ample cover for fish, and the bed is stable and covered with

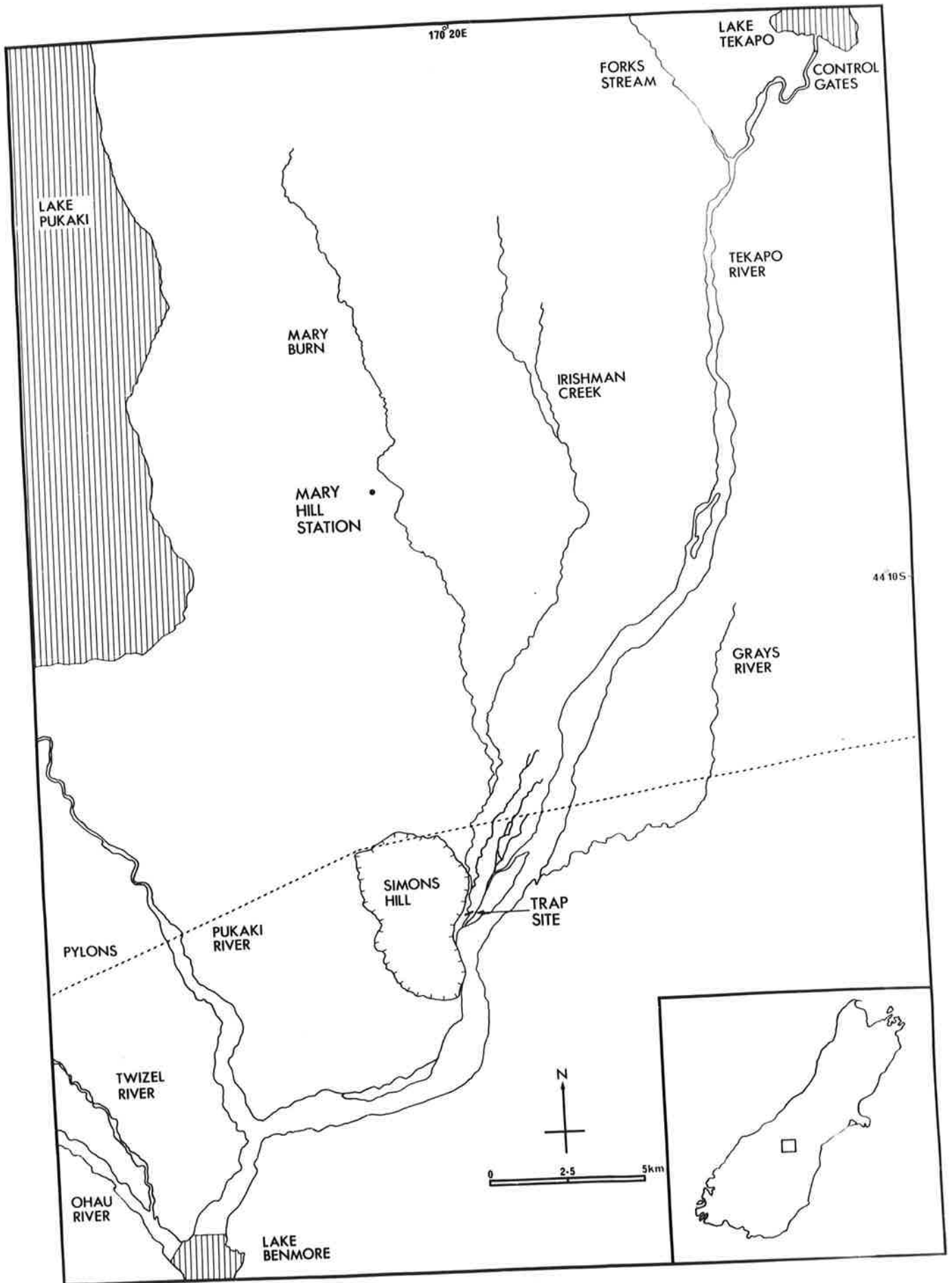


FIGURE 1. Location of the Mary Burn.

an abundant growth of diatoms and algae. The lower part of the stream flows through swampy flats with some inflows from spring areas. There is a good supply of spawning gravel in the lower reaches to about 3 km above the Simons Hill pylons. Some floods occur but they do not appear to have any serious effect on the fishery (for further information see Galloway and Wing 1965).

Above Simons Hill the Mary Burn is joined by Irishman Creek. The lower reaches of Irishman Creek are similar to those of the Mary Burn and also provide good spawning opportunities. However, only the lower 3 km are available to fish as the stream runs underground above this point.

Between the confluence with Irishman Creek and the Tekapo River, a number of small spring-fed creeks flow into the Mary Burn. These run through a series of ponds excavated as wild-fowl habitat. Some of the riffle areas between the ponds provide good spawning and fry rearing habitat.

3. METHODS

The fish trap was positioned approximately 250 m upstream of the Mary Burn-Tekapo River confluence (Fig. 1) in July 1980. A lead-in, or fence, of cyclone wire was anchored to a base of sunken bed logs positioned obliquely to the current. One end of the lead-in was secured to the bank to prevent passage of fish on that side and the other lead to a fish-holding pen of cyclone wire stretched over a galvanised tubular steel frame. The lead-in was kept upright with a taut cable which automatically lowered during floods to prevent water pressure on clogged debris from washing out the trap.

Trapping was carried out for 73 days from 19 July until 29 September 1980, the trap being dismantled when the spawning run had obviously tailed off. This also coincided with the opening of the 1980/81 angling season.

A pen situated on the upstream side of the fence operated from 21 - 27 August 1980 and caught spent fish migrating downstream.

The trap was visited three to four times a week and captured fish were sexed, weighed, measured and tagged using a Dennison tagging gun and numbered Floy tags. Scales were taken from fish of various lengths to obtain age data. Water temperatures were recorded at the trap site using a maximum-minimum thermometer (Fig. 2).

4. RESULTS

4.1 RAINBOW TROUT

4.1.1 Numbers

A total of 62 male and 46 female rainbow trout entered the trap over the period 19 July to 29 September (Fig. 2). The total run was, however, larger than this as trapping did not cover the whole spawning season, and estimates range from 88-123 males and 66-91 females.

These estimates take into account:

- (i) Fish spawning before and after the trap was constructed. For example, 30 redds were counted in the riffle areas between the spring-fed ponds on 25 July 1980, when only three females had passed through the trap. It is believed that most of these redds were excavated by early-run rainbows, although a few may have been dug by either brown trout or, possibly, stream-resident rainbow trout.
- (ii) Fish spawning below the trap. A total of 20 rainbow trout redds were counted in this region.
- (iii) Fish migrating past the trap during freshes when the lead-in was down.

These estimates assume that each female constructs only one redd (Hobbs 1937) and that the sex ratio recorded at the trap of 1.35 males per female applies to the entire run.

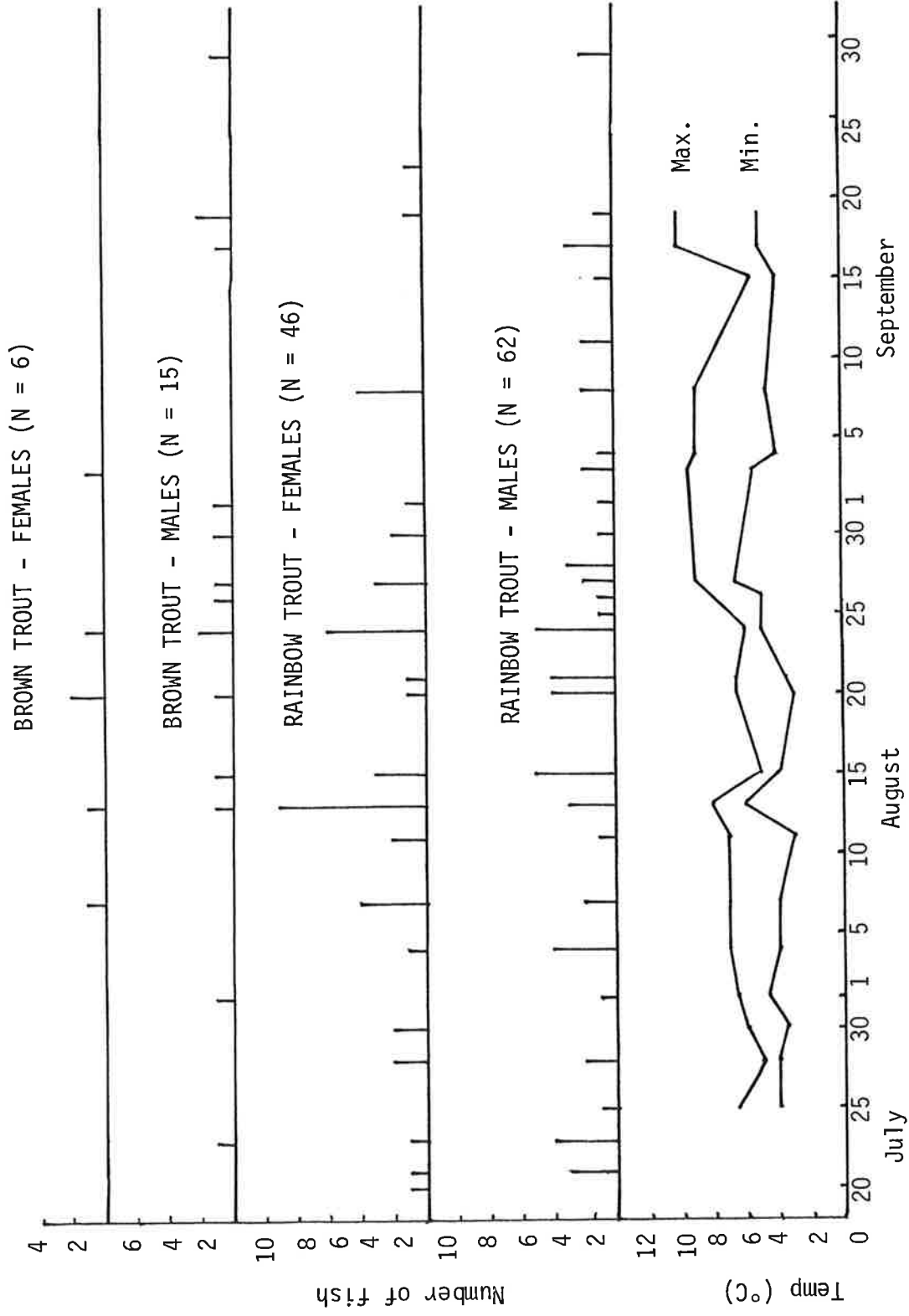


FIGURE 2. Records of water temperature and numbers of trout trapped in the Mary Burn, 1980.

The minimum estimate for the number of females was based on actual trap catches and redd counts below the trap. The maximum estimate was based on an end-of-season survey which showed that 91 redds had been constructed throughout the entire lower reaches of the Mary Burn and the riffle areas between the spring-fed ponds. Maximum and minimum numbers of males were estimated from the 1:1.35 sex ratio calculated from trap records.

4.1.2 Movements

The upstream run probably commenced in early July, peaked in mid-August and ended in early October (Fig. 2).

During freshes (16-17 and 27 August, 14 and 25 September) the lead-in was lowered and an unknown number of fish avoided the trap and were not caught. However, extrapolating from spawning runs on other days, field observations and other information, it is believed that only a few fish were not captured.

During freshes fish apparently also moved downstream, as previously tagged fish were later recaptured moving back upstream. Figure 3 shows the original capture date and later recapture of some of these fish. Trout 2020, for example, a male rainbow, was recaptured after the fresh of 16-17 August on 20.8.80 and again after the fresh of 27 August on 30.8.80, meaning that this fish moved downstream during each of these freshes. Recaptured fish were excluded from the upstream trap counts.

Spent fish often moved downstream and resided in pools above the trap. Efforts to capture fish by seine netting proved impractical and many moved downstream during and after the freshes.

Angler interviews and tag returns showed that at least 23 rainbow trout were caught in the lower reaches of the Mary Burn from October 1980 to January 1981 (Figs. 4 and 5 give examples). This suggests that significant numbers of fish became resident in the Mary Burn after spawning.

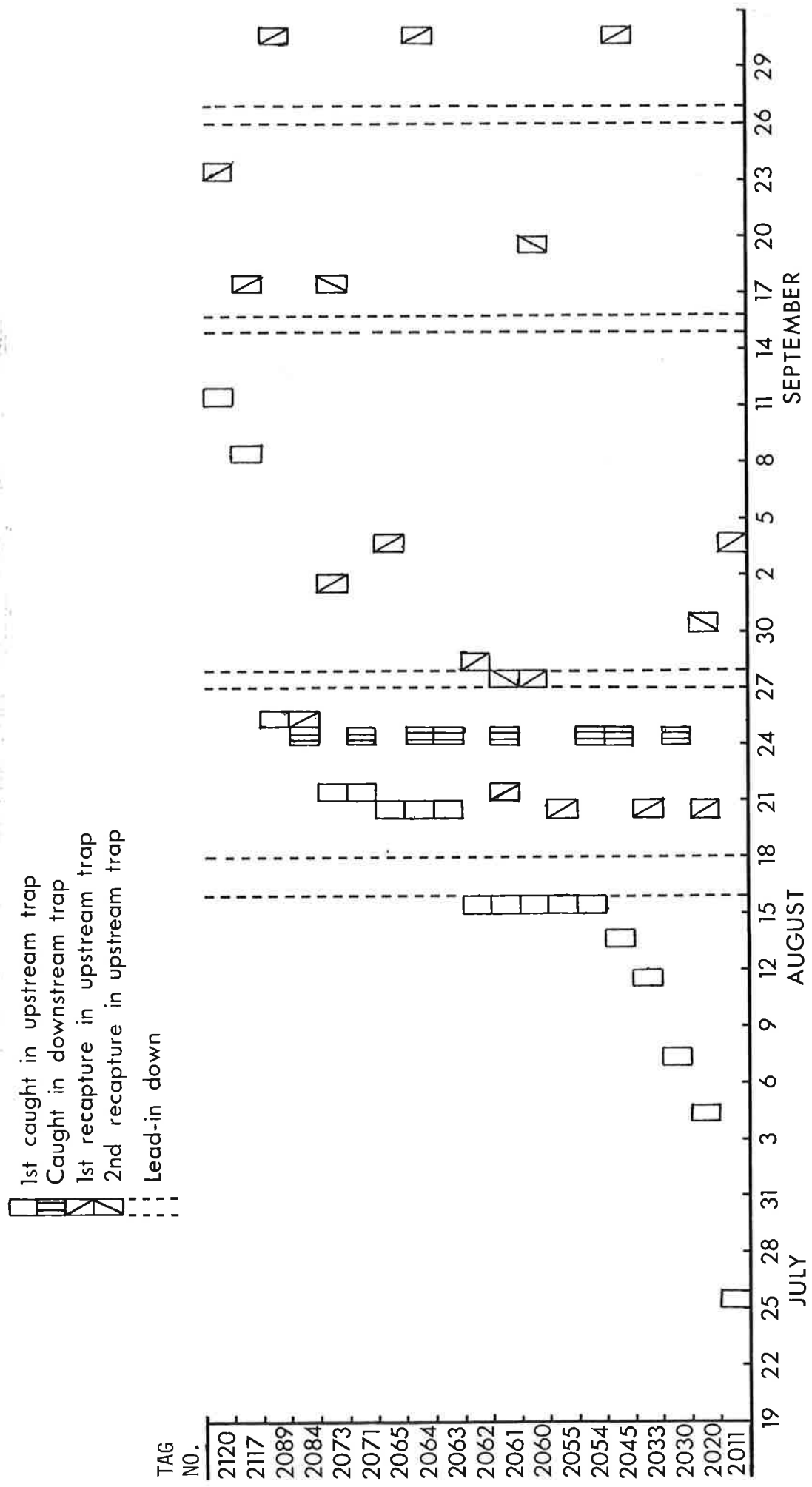


FIGURE 3. Movement of rainbow trout through Mary Burn trap, 1980.

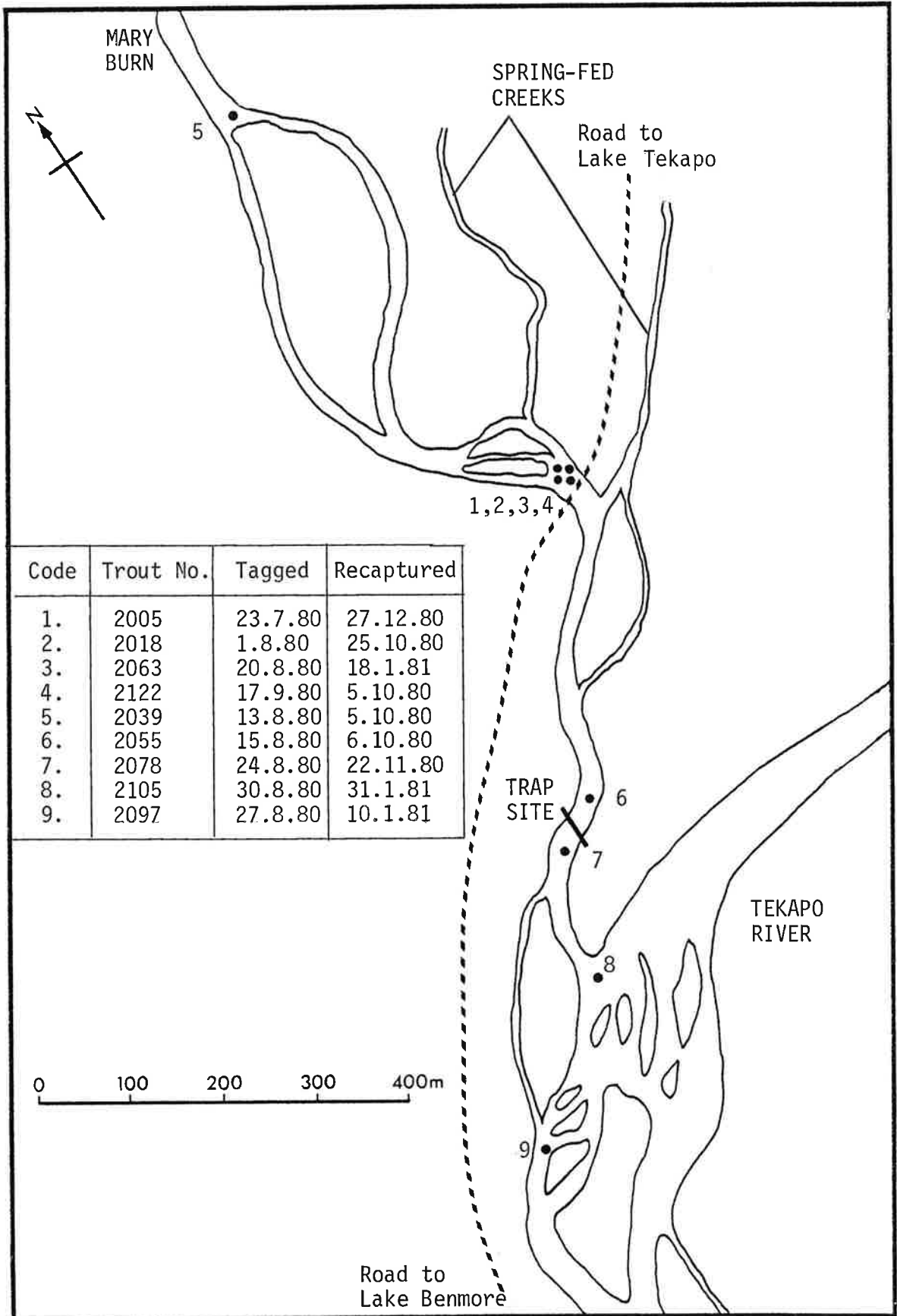


FIGURE 4. Location of tagged rainbow trout recaptured in the Mary Burn, 1980-1981.

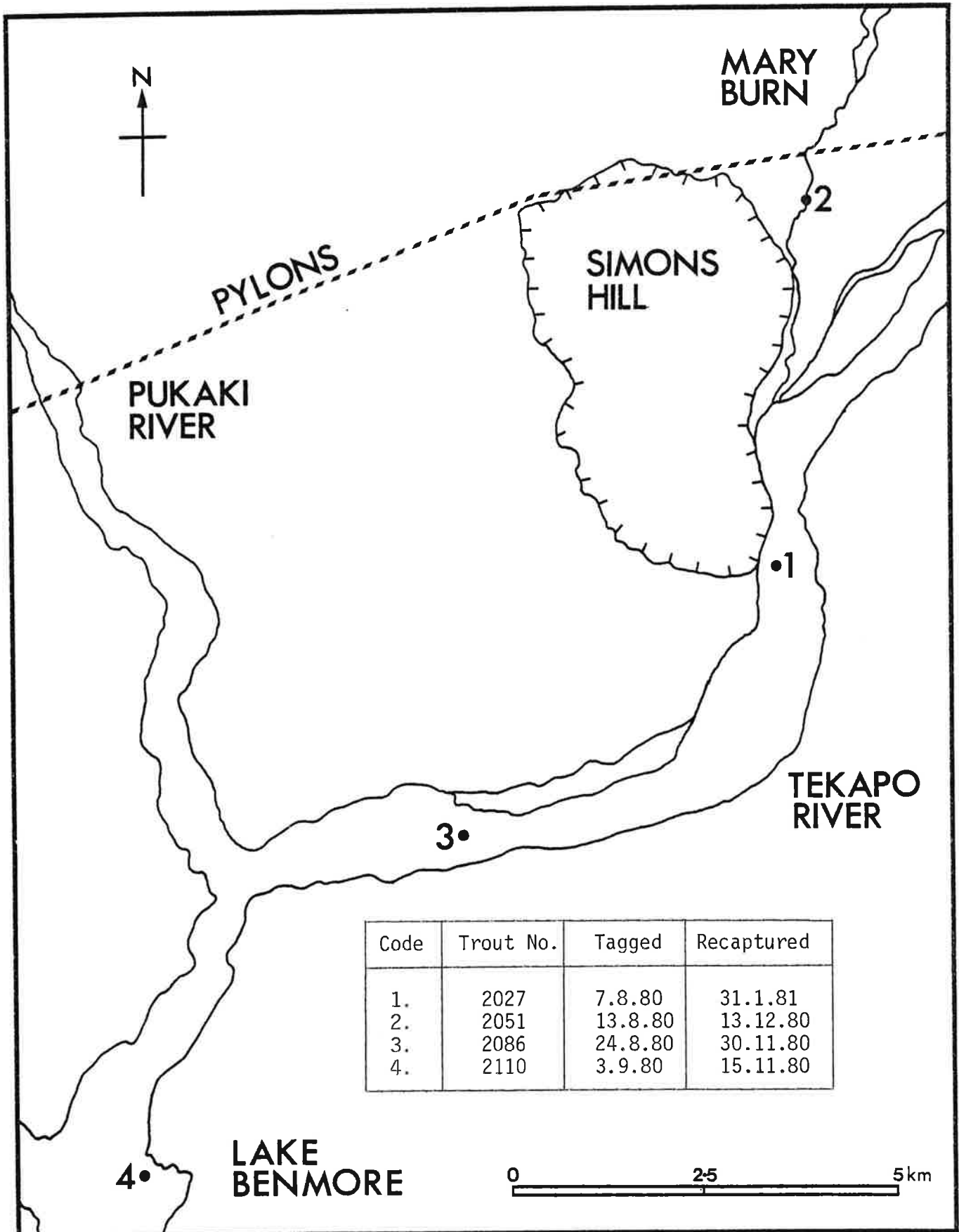


FIGURE 5. Location of tagged rainbow trout recaptured during 1980-1981.

4.1.3 Distribution of redds

From the results of spawning surveys, most of the rainbow trout were found to have spawned in the lower reaches of the Mary Burn and in the ponds area. However, surveys indicated that there is suitable spawning gravel further upstream which is poorly utilised by rainbow trout at present. Therefore a larger number of spawners could probably be accommodated without risk of redd superimposition. This might, however, result in the juvenile rearing area becoming limiting. In addition, no surveys of Irishman Creek were carried out during this study.

4.1.4 Size

Length and weight measurements for rainbow trout are shown in Table 1. Females were slightly longer, having a mean fork length of 499 mm, compared with 492 mm for males. Length frequency graphs for rainbow trout are given in Figure 6. Females averaged about 60 grams heavier than males but condition factors for the sexes were similar (Table 2).

TABLE 1. Length and weight measurements of male and female rainbow trout in the Mary Burn spawning run, 1980.

| Sex | Number | Mean Length (mm) | Length Range (mm) | Mean Weight (g) | Weight Range (g) |
|--------|--------|------------------|-------------------|-----------------|------------------|
| Male | 62 | 492 | 429-602 | 1364 | 900-2350 |
| Female | 46 | 499 | 314-575 | 1423 | 460-1950 |

TABLE 2. Condition factors for rainbow trout in the Mary Burn spawning run, 1980.

| Sex | Number | Condition Factor | Range |
|--------|--------|------------------|-----------|
| Male | 61 | 1.14 | 0.82-1.41 |
| Female | 46 | 1.15 | 0.83-1.49 |

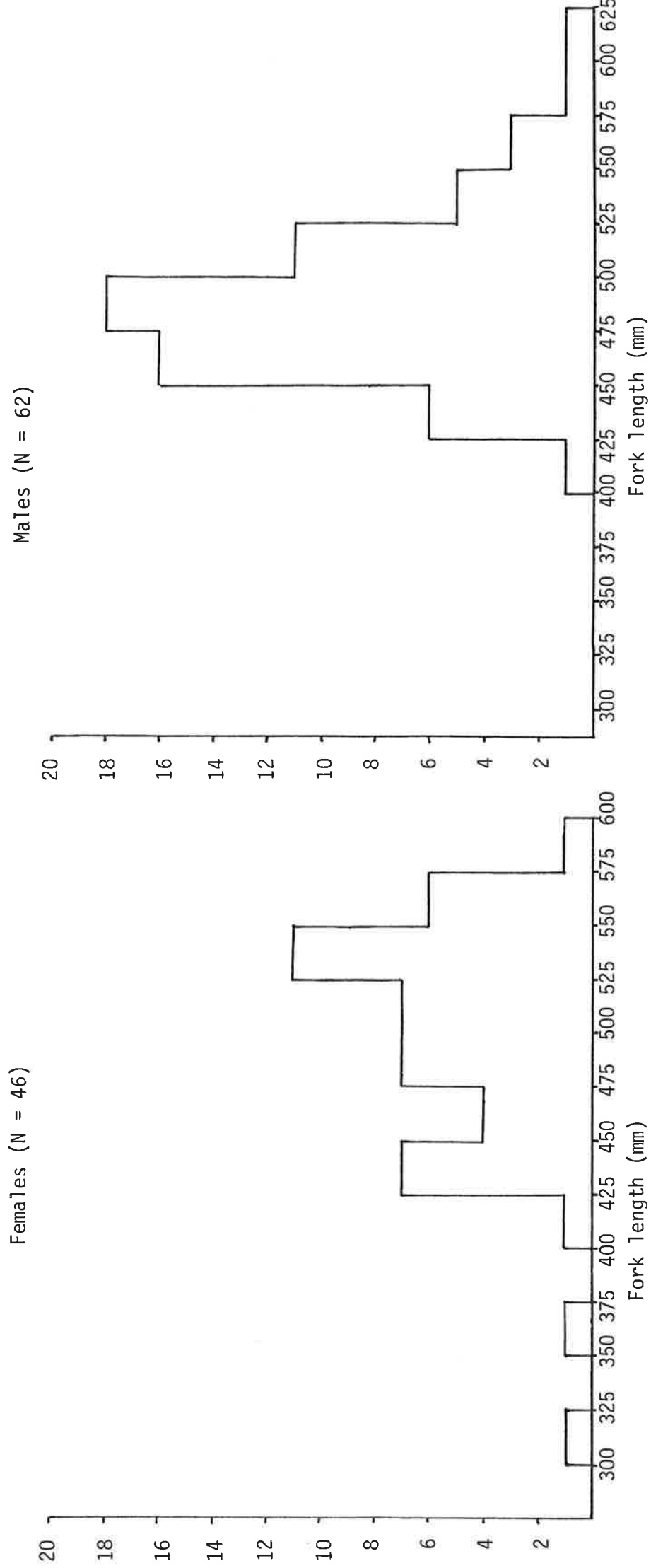


FIGURE 6. Length frequency of female and male rainbow trout in the Mary Bunn spawning run 1980.

4.1.5 Length-weight relationships

Length-weight relationships were plotted for males and females separately. The calculated regression equations were not significantly different, being:

$$\text{Log } W = 2.50 \text{ Log } L - 2.53 \text{ for females, and}$$

$$\text{Log } W = 2.49 \text{ Log } L - 2.49 \text{ for males,}$$

where Log W is the natural log of the weight in grams and L is the length in centimetres.

There was a good positive correlation between length and weight with $r = 0.94$ for females ($N = 46$), and $r = 0.90$ for males ($N = 62$). Condition of rainbow trout in the Mary Burn can be compared in successive years using these relationships.

4.2 BROWN TROUT

The brown trout spawning run was virtually over by the time the trap was constructed and only 21 fish were trapped (Fig. 2). Information on the sex, length, weight and condition of these fish is given in Tables 3 and 4.

TABLE 3. Length and weight measurements of male and female brown trout in the Mary Burn spawning run, 1980.

| Sex | Number | Mean Length (mm) | Length Range (mm) | Mean Weight (g) | Weight Range (g) |
|--------|--------|------------------|-------------------|-----------------|------------------|
| Male | 15 | 531 | 318-602 | 1588 | 350-2150 |
| Female | 6 | 385 | 314-465 | 559 | 350-850 |

TABLE 4. Condition factors for brown trout in the Mary Burn spawning run, 1980.

| Sex | Number | Condition Factor | Range |
|--------|--------|------------------|-----------|
| Male | 15 | 1.02 | 0.83-1.26 |
| Female | 6 | 0.96 | 0.77-1.13 |

5. SUMMARY

The winter 1980 spawning run of rainbow trout in the Mary Burn, a tributary of the Tekapo River, was monitored. The trap was in operation for 73 days, from 19 July to 29 September 1980. Trout were sexed, weighed, measured and tagged with numbered Floy tags. Scale samples were taken from fish of various lengths for ageing purposes.

Of the 129 trout trapped, 108 were rainbows comprising 46 females and 62 males. There were 21 brown trout. Female rainbows were slightly larger than males, having a mean fork length of 499 mm compared with 492 mm for males, and averaged about 60 g heavier. Movements of post-spawned fish were traced from angler returns of tagged trout. The rainbow trout spawning run in the Mary Burn was estimated to be between 154 and 214 trout. This estimate may be low as no surveys were made in Irishman Creek, which is known to contain suitable spawning gravel.

6. ACKNOWLEDGEMENTS

Our thanks to Jim Galloway for his advice and assistance in trap construction.

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