

NOVEMBER 1991
Special Edition 1

TARGET TAUPO

A Newsletter for Hunters and Anglers in the
Tongariro / Taupo Conservancy



CONSERVATION
TE PAPA ATAWHAI

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HOW MANY FISH ARE CAUGHT AT TAUPO?

Department of Conservation fishery staff have completed a study of the annual catch of trout from the Taupo fishery. Recognizing the limitations of earlier methods, managers adopted new techniques to design a survey of New Zealand's largest trout fishery.

In recent years there has been a decline in angling satisfaction, particularly amongst anglers fishing for mature trout migrating up the tributaries during winter. Some anglers have become concerned that the perceived decline in the spawning runs would be reflected by fewer juveniles produced and this in turn would cause a further decline in the overall fishery. However evidence suggests sufficient trout still spawn each winter to produce enough fry to fully utilize the available juvenile rearing habitat. Once the juvenile rearing territories are full, any additional fry are unlikely to survive (figure 1). While there is no biological advantage in more fish spawning, at present too few are surviving to maturity to provide the traditionally accepted quality of angling.

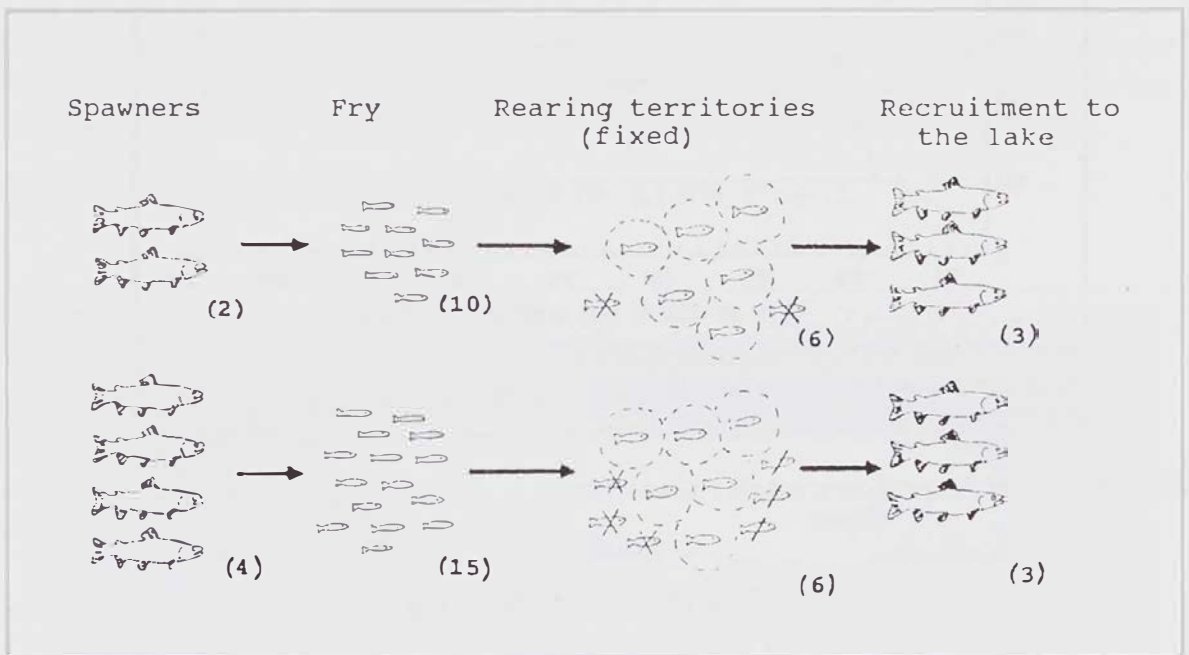


Figure 1: In Taupo rivers the potential juvenile production in any year is limited by the available juvenile rearing habitat.

A number of possible causes may have contributed to the decline in the trout population. The effects of many causes may be quite insidious, though there is no reason to suppose that they are any more significant than they were 20 years ago. It is likely the production of young trout was affected by the incidence of summer floods in the late 1980s; the weather

patterns responsible may well have affected the productivity in other ways too. Yet summer floods have occurred before without an associated prolonged downward trend in the trout population.

In the last few years something must have changed significantly. Of the potential causes, it appears that the major change in the fishery was a much increased harvest. Fishing catch is largely dependant on the amount of angling effort expended. If we use total licence sales (figure 2) as a rough guide to angling effort, it is clear that the Taupo fishery has been subject to a steadily increasing harvest over a long period.

In 1991 Dr Martin Cryer completed a four year study into trout production in Lake Taupo. It was clear that the comprehensive assessment of the annual trout harvest, which could be compared to his estimates of production, should be obtained as soon as possible.

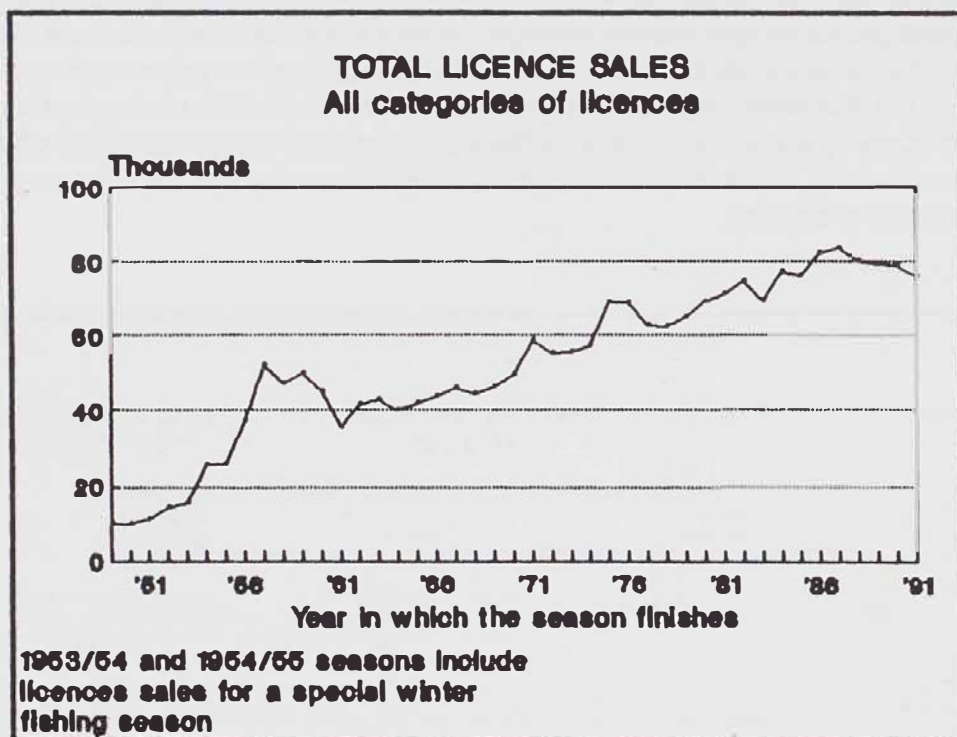


Figure 2: Total Taupo licence sales since 1949.

The Harvest Survey

The effort and catch associated with the troll fishery on Lake Taupo and the fly fishery on the Tongariro River and Delta were assessed for the 1990/91 trout fishing season.

Very briefly, the harvest was calculated by multiplying angler catch rates by the amount of angler effort expended. Estimates of total angler numbers were established from aerial counts of the numbers of rods in use. Harvest rates were assessed from data collected in onsite interviews with anglers as they returned to shore or stood on the river bank.

The results of the harvest survey

Lake Taupo

Boat-based anglers on Lake Taupo spent 340,000 hours fishing for a catch of 83,000 legal sized trout (35 cm or longer), of which they kept 70,000 fish. From the harvest (fish kept) of 64,000 fish taken trolling, 46,000 (72%) were taken by the 72.5% of anglers who used deep trolling methods.

Guided anglers comprised 11.6% of all trolling anglers and took 24.6% of the trolled harvest. The summer period accounted for 40% of the total harvest from the lake.

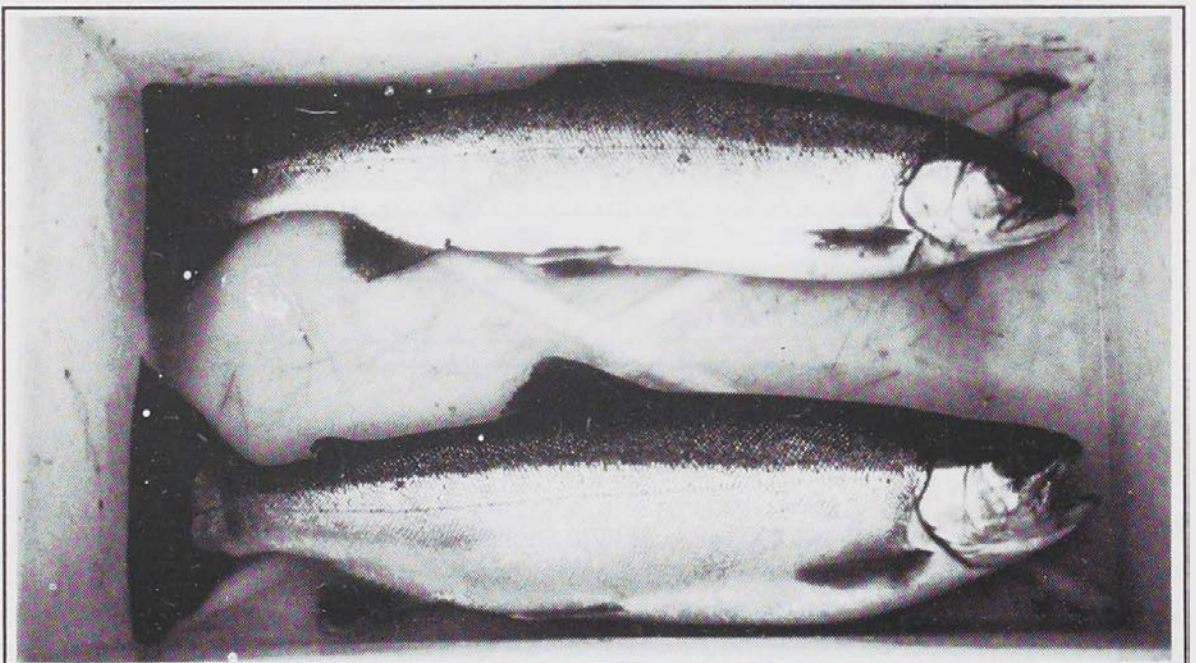
Tongariro River

Anglers on the Tongariro River caught 16,500 legal sized trout, keeping 12,500 for their 88,500 hours of effort. Seventy-three percent of the catch was taken over the winter period (June-August). Upstream nymph anglers comprised 57% of all anglers and took 69% of the river harvest.

The Whole Fishery

It is calculated that a total of 610,000 hours of angling effort was expended in the Taupo fishery and an estimated 140,000 legal size trout were caught over the 1990/91 fishing season. Of these trout, 113,000 were kept, a harvest of approximately 175 tonnes.

An additional 15,000 undersized trout were caught and released.



A fine bag of Taupo trout - two of the 140,000 caught over the 1990-91 season.

How does the harvest compare to the productivity?

An estimated harvest of 175 tonnes represents 30% and 50% of the total estimated trout production in 1988 and 1989 respectively. This is a considerable proportion of trout production and is significantly higher than the best estimates of the theoretical 'maximum constant catch'; that is, the catch estimated to be sustainable at all future levels of production.

Are there any indications that angling mortality is having an effect on the Taupo trout population?

Yes. The numbers of spawning trout through the Waihukahuka and Tokaanu traps since 1987 are the lowest on record (figure 3). Until 1988 much of the variation of the Waihukahuka (hatchery stream) trap runs could be explained by natural events, by perturbations due to the construction of the Tongariro power scheme, and by past hatchery practices. However variables in this model do not explain much of the recent decline.

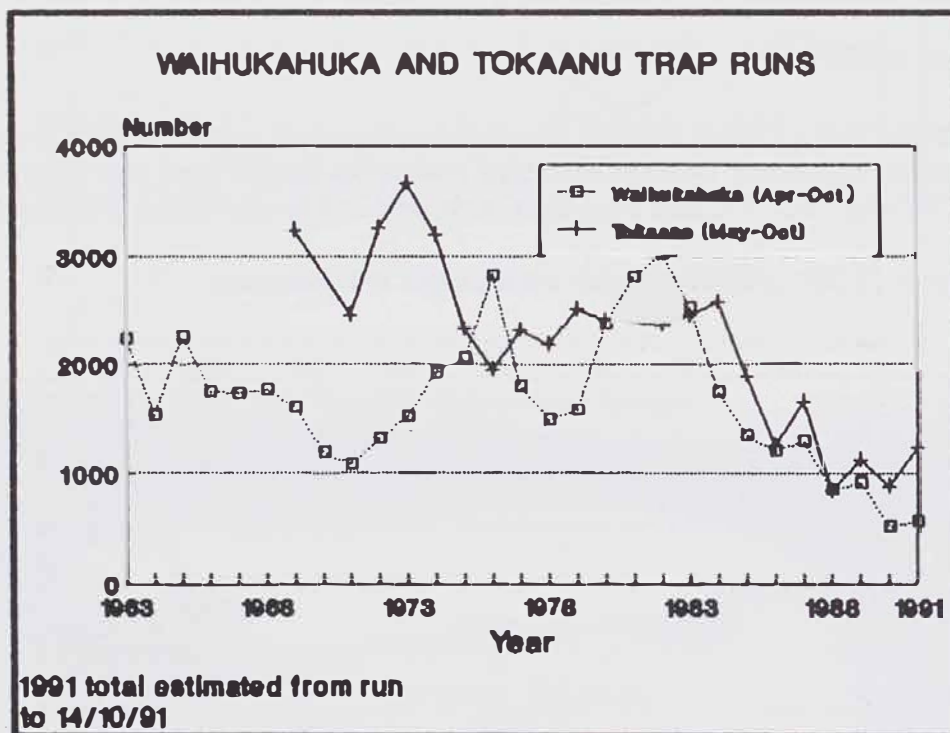


Figure 3: Fish numbers through the Tokaanu and Waihukahuka streams fish traps.

Angling is a selective cause of mortality. At high levels it causes the population structure to shift towards an increased relative abundance of young fish, simply because the chances of an individual fish surviving to old age are reduced. The change in population structure may be reflected by a decline in the average size of the fish. This pattern is apparent in the latest data from the two traps (table 1).

Year	<u>Waihukahuka Trap</u>		<u>Tokaanu Trap</u>	
	All Fish	Males	All Fish	Males
1984	52.7	52.5	53.1	53.0
1985	51.1	49.1	52.1	51.0
1986	51.2	50.5	52.4	52.2
1987	51.2	50.3	52.0	51.8
1988	51.3	50.5	52.5	52.1
1989	51.3	50.7	52.3	52.1
1990	51.7	51.3	52.6	50.9
1991	48.6	47.3	50.2	50.0

Table 1: Average length of trout through the Waihukahuka and Tokaanu traps.

Figure 4 shows that the number of fish spawning for the second time or more, as a proportion of the total run, has steadily fallen. This also suggests that adult mortality rates are increasing and that the chances of surviving to spawn a second time have decreased.

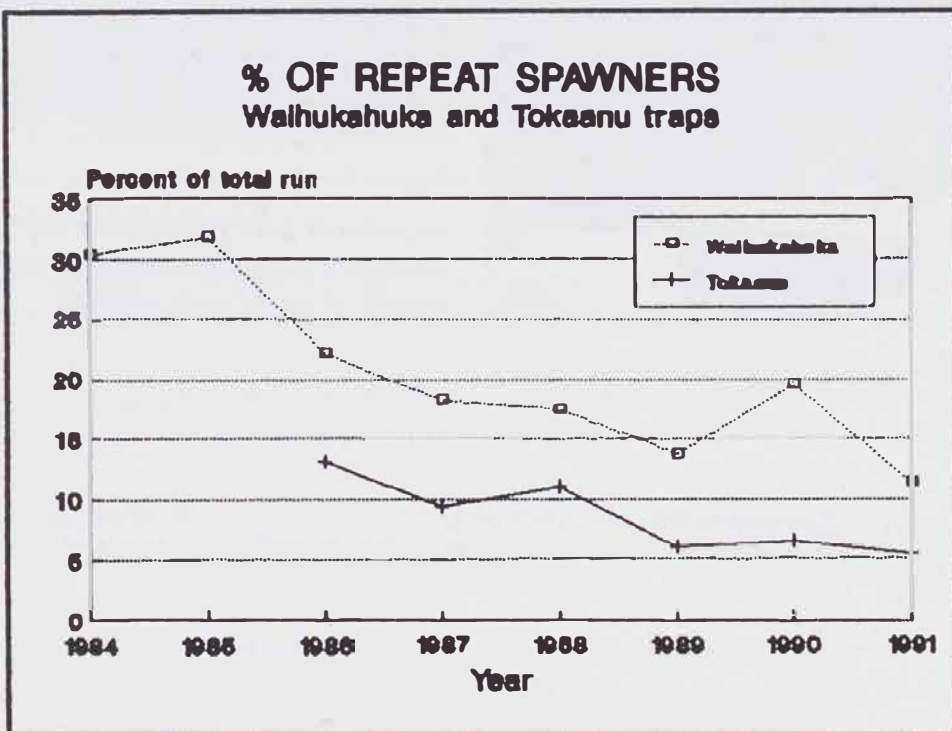
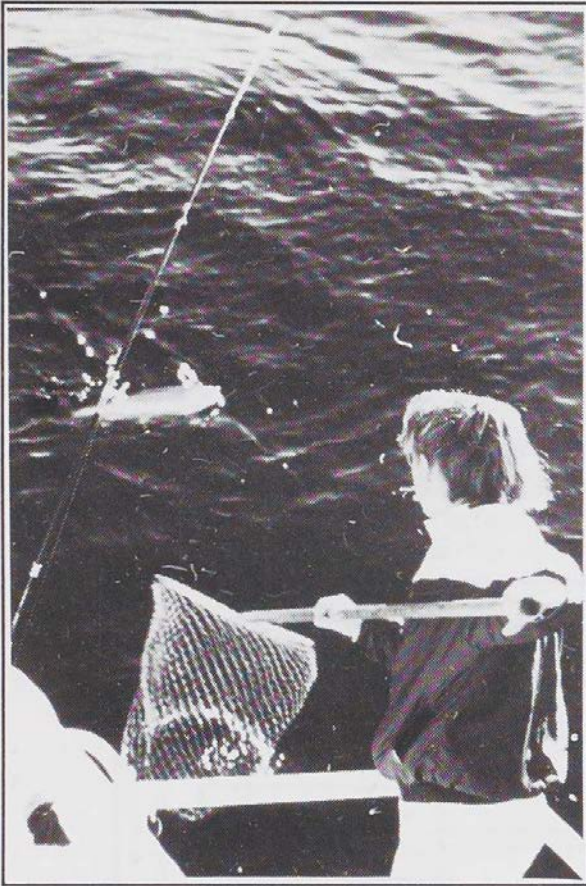


Figure 4: Proportion of previous spawned trout in the trap runs.

Other research shows that years in which the average length of male trout reaches its lowest levels indicates the first spawning of fish from a particularly strong year class. The average length of maiden male trout in 1991 (table 1) is at its lowest recorded level in both streams. This supports the perception that the population is currently dominated more than usual by the young year class.

This is a classic example of very high fishing mortality. Few fish can be expected to survive through to maturity, where they become available to the winter river angler.

What are the implications of the level of harvest?



Given the level of trout production estimated in 1988 and 1989, the harvest over the 1990/91 season was high enough to have a significant impact on the size and structure of the Taupo trout population (Figure 5).

This harvest occurred mainly in the lake over the summer months.

The high catch of immature fish had a detrimental impact on the quality of the subsequent winter river angling.

As already mentioned, there are still enough fish reaching the redds to ensure any limitations on juvenile production are not caused by insufficient spawning. However the reduction in the number of fish reaching maturity is reflected in the quality of the winter river angling.

In years of poor production the harvest of immature fish can affect the subsequent quality of winter river angling.

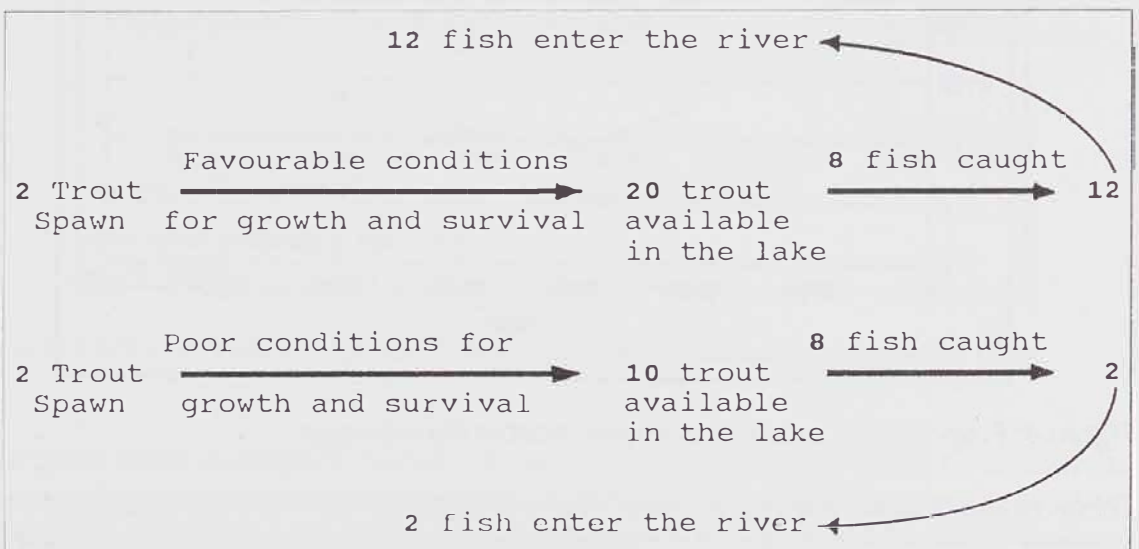


Figure 5: A hypothetical example of the effect of a high harvest on the number of trout in the river.

The current trend

The number of trout which enter the legal sized population each year can be expected to vary greatly, depending on how a whole host of natural variables affect the previous year's production.



A number of variables can affect juvenile trout production. For example, summer floods have a detrimental impact.

Angling mortality in the lake will then influence how many of these fish survive to maturity and contribute to the winter river fishery (figure 6).

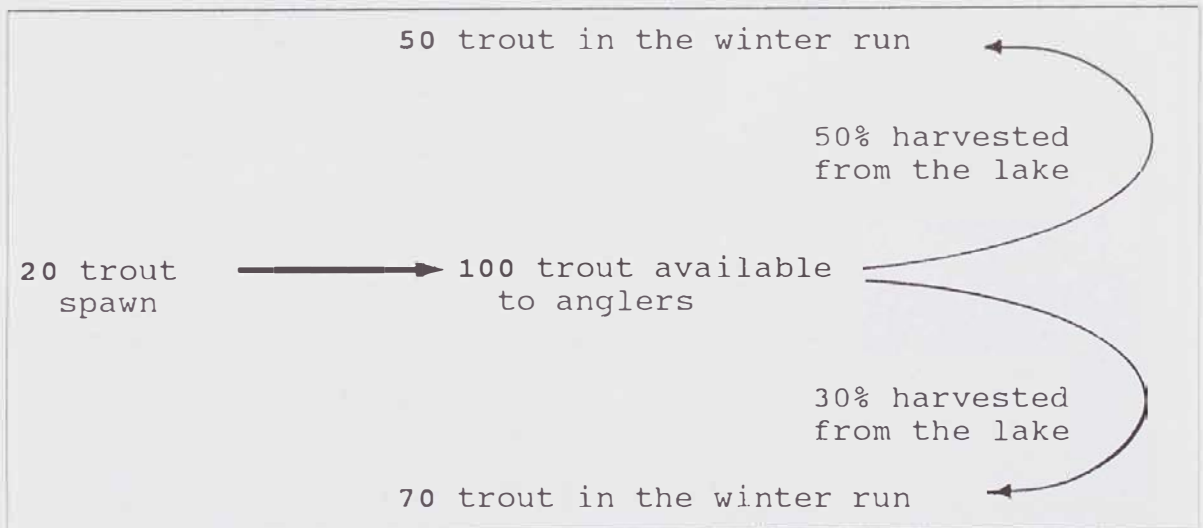


Figure 6: A hypothetical example to illustrate how lake harvest affects the number of trout available to the river angler.

Trout production was measured in 1988 and 1989 and harvest measured for the 1990/91 fishing season. We have a 'snapshot' of the fishery as it was then but we need also to be looking at what is happening now.

Managers have observed an increase in juvenile trout numbers in the streams and lake over recent months. Numbers of maiden fish through the fish traps in 1991 were approximately 20% greater than for 1990. The relative absence of summer floods in the last two years has provided improved river rearing conditions for juvenile trout and fish production is therefore likely to be above the levels measured in 1989.

Coinciding with an apparent increase in production is a decrease in angling effort. Figure 2 shows that licence sales have declined steadily since 1988. Given the current economic climate it seems likely that angling effort will further diminish in the short term. The level of angling effort is the most important influence on the size of the harvest. The 1991/92 season is also the first full season under the reduced daily bag limit, a measure designed to reduce the harvest by approximately 10%. Indeed the 3 fish daily bag limit would have saved 9.3% of the harvest measured prior to its introduction on 20 December 1990.

An improvement in the quality of the fishery, in particular the winter river fishery can be expected. Indeed many anglers are already commenting on an apparent upturn.

Where to now?

A 'quick fix' solution is neither necessary nor possible to protect the sustainability of the fishery at this time. However, we recommend that no measures which will cause an increase in the proportion of the trout production harvested be considered at present. For example, no new methods should be allowed, nor should the daily bag limit of three fish per angler be relaxed.

We have a 'Catch 22' situation, for as the fishery recovers word will spread, more anglers will be attracted to the fishery and effort will again increase. We don't know all of the reasons for the depressed numbers in the late 1980s but it appears to have been a natural fluctuation and so is likely to occur again. At some time we are likely to again face an increasing level of harvest on top of a declining production.

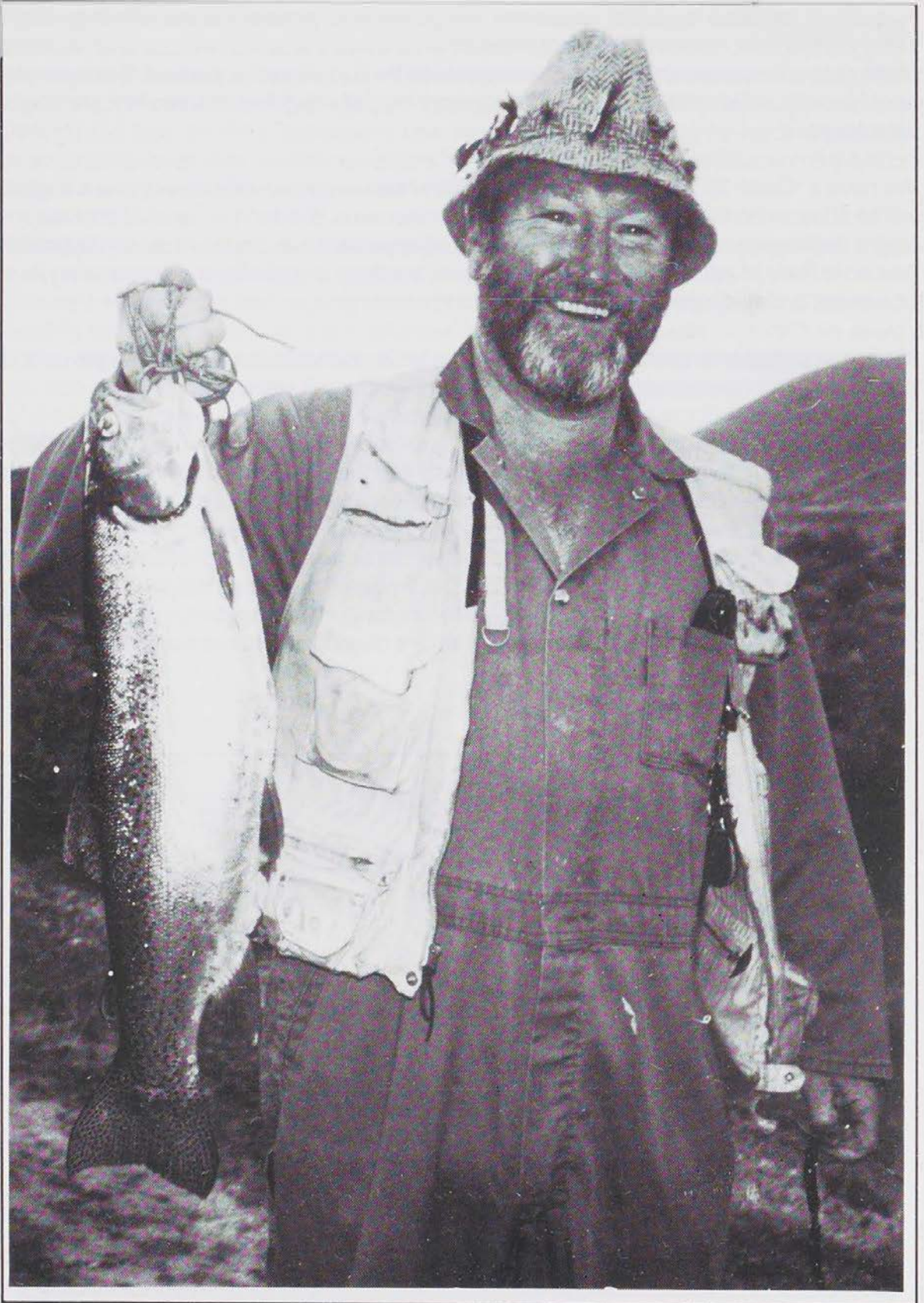
It is essential that an annual monitoring program be implemented to detect changes in trout production and harvest and planning for this is already well advanced.

It is also necessary, in consultation with anglers, to resolve the issue of what, if any, balance is required between allowable harvest in the lake and the resulting quality of angling in the rivers.

The Conservation Act requires a management plan to be prepared for the fishery. An issues paper will be released for public comment in December. This will summarise and integrate all existing information and provide the initial forum for public consultation. A draft plan will then be produced, which when finalised, will set the direction for future management of the fishery.



The Tongariro Delta - anglers are already reporting an improvement in the fishery.



Editor's note:

Much of the information regarding the productivity of the fishery and the trout life history has been drawn from the following detailed reports:

Cryer, M. 1991. Lake Taupo Trout Production: A four year study of the rainbow trout fishery of Lake Taupo, New Zealand. Department of Conservation Science & Research Series No.26. Department of Conservation, Wellington. 191pp.

Stephens, R.T.T. 1989. Flow management in the Tongariro River. Department of Conservation Science & Research Series No.16. Department of Conservation, Wellington. 115pp.

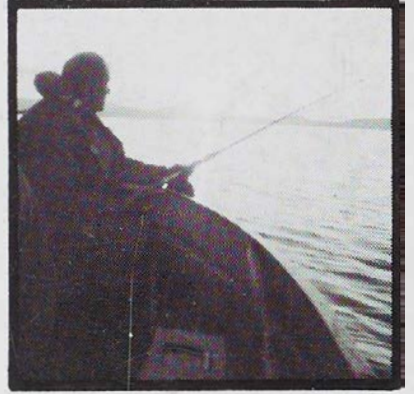
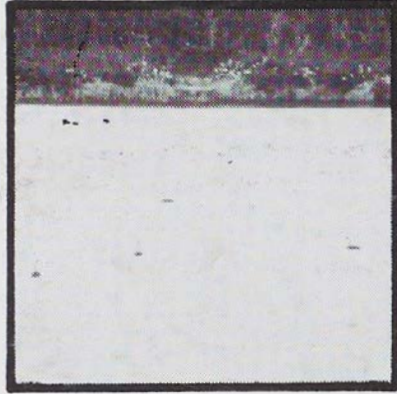
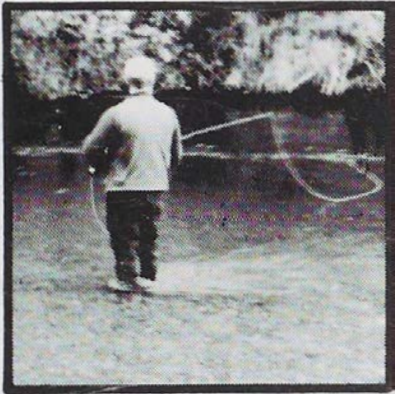
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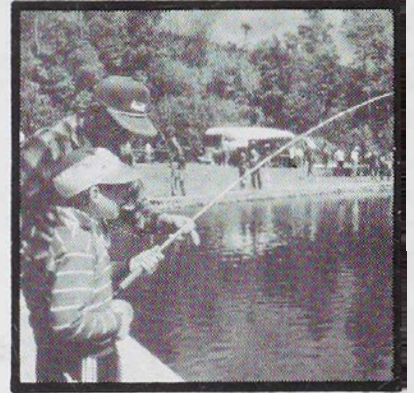
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