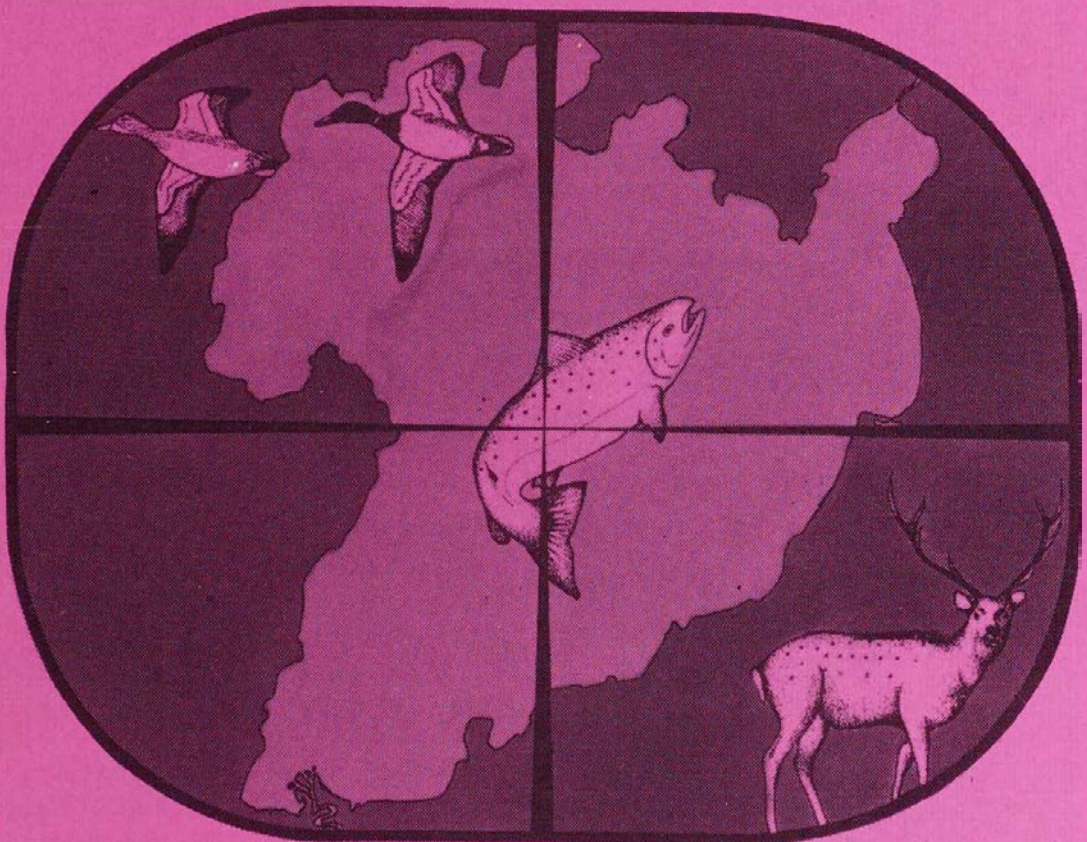


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ISSUE 15

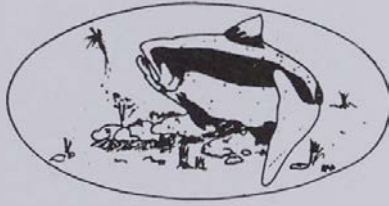
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A Newsletter for Hunters and Anglers in the
Tongariro / Taupo Conservancy



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

Published three times a year (March - July - November)

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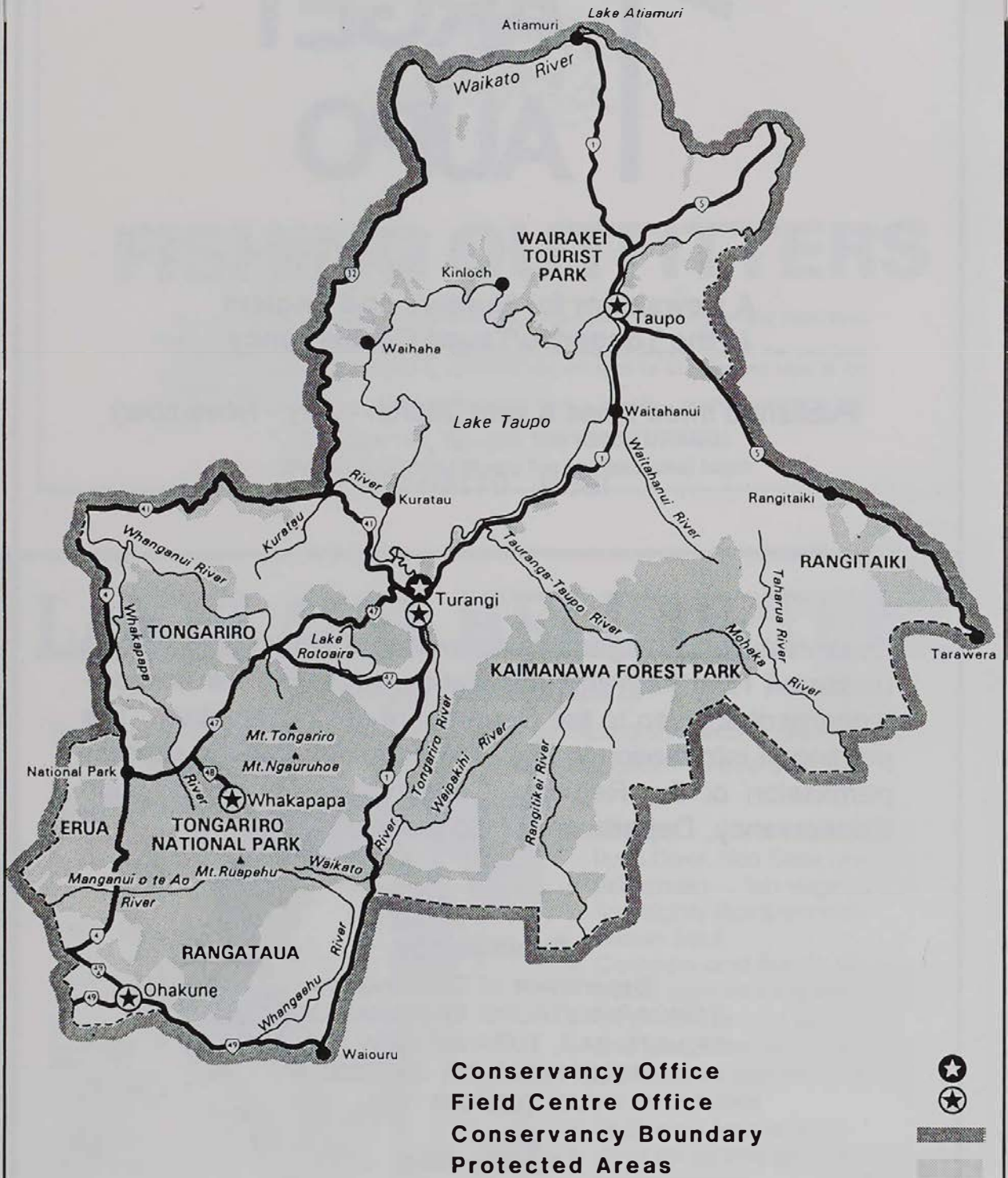
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MARCH 1994

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CONSERVATION
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DEAR ANGLERS AND HUNTERS,

When we first began Target Taupo in mid-1989 we were a little concerned that we might eventually run out of suitable material. However our fears have proved unfounded and as each new issue comes round and we sit down to plan its content we seem to have more and more information to publish.

The mix of feature articles on current issues, articles on the day-to-day management actions and tips on how to use the resource appear to be well received by the readers. However, we are always looking at ways of improving this magazine and if you have any ideas please let us know.

This winter sees the start of a major investigation aimed at ensuring the maintenance of the Lake Otamangakau fishery. A personal favourite of several of us, we are concerned by the increasing angling pressure it is coming under. Fortunately, from a management point of view, the cicada rise this summer was more typical of what occurs in most years. Many anglers expected the fabulous and easy fishing which occurred last year and were disappointed. The reality is such boom cicada years are the exception rather than the norm.

This year the central North Island has experienced a wonderful late summer with day after day of clear skies and little, if any, wind. Unfortunately, though, such weather doesn't help the fishing.

Anglers and hunters are waiting in anticipation for this weather pattern to break and the onset of the roar, the winter river fishing and game bird season.

Prospects appear excellent for all of these activities. Get out there and make the most of this winter.

Think safety, enjoy your sport and best of luck.

Glenn Maclean
Co-editor

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or Conservancy Duty Officer *Phone 386 8607 after hours.*

ANYTIME

RESOLUTION OF THE DOWNRIGGER ISSUE

In early February the Department began its consideration of whether downriggers should be permitted in the Taupo Fishery. It quickly became apparent to managers that the downrigger issue was quite secondary to the much more basic issue of what process should be used to make this and any similar decisions in the future. Managers, unable to resolve this philosophical debate, looked to the Taupo Fishery Advisory Committee for guidance. The following report was produced for their information.

SHOULD DOWNRIGGERS BE INTRODUCED INTO THE TAUPO FISHERY?

Special Report to the Taupo Fishery Advisory Committee from the Department of Conservation

1. The Issue

The background to this issue is given in Target Taupo Special Edition 2, published in June 1993.

In regard to the possible use of downriggers in the Taupo Fishery, two aspects need to be considered. The first is whether downriggers would impact on the trout population in such a way as to threaten the sustainability or the recreational quality of the overall fishery, including the winter river fishing. The second aspect is whether anglers actually want downriggers or not.

The report produced by the Department concentrated on the biological impacts of downriggers only. In summary the Department concluded that 'downriggers are unlikely to have any significant detrimental effect if limited to a fishing depth of 35 metres'. Depth can be easily limited by restricting the length of wire permitted on the downrigger spool and can be readily enforced. This recommendation is dependent on the assumption that limiting downriggers to 35 metres will result in harvest rates comparable with existing trolling methods. When we wrote the report we were confident of the validity of this assumption. However recent observations and some submissions received do not fully support such an assumption. A simple trial to test this assumption would be prudent.

2. Seeking Anglers' Views

Publication of the special report was the first step by fishery managers to get the issue in front of anglers. This publication was sent to all 1992/93 adult whole season licence holders, all New Zealand fishing clubs, and was distributed through local shops and licence agents. Many of the anglers interviewed on the rivers and lake between August and January 1994 were also given copies of the report. The report incorporated a questionnaire to enable anglers to respond with their views on downriggers if they so wished. This approach was favoured over a direct field survey because it gave anglers an opportunity to study the issue before making a response. The issue was widely reported in the local media, articles and letters appeared in the fishing press and Target Taupo, and staff gave talks to interested groups and answered any enquiries.

Such a degree of consultation has never been attempted before in the Taupo fishery and represents a very real desire on the part of the fishery managers to get angler input into this issue.

3. Anglers' Responses

Approximately 8,500 copies of the special report were sent to 1992/93 adult whole season licence holders. Some anglers, though, will not have received copies, either because addresses were not legible, or were insufficient, or because they had moved on. Another four to five hundred anglers have also been offered a copy of the report as part of contact with staff and several hundred copies have been handed out from local shops. Copies were sent to 25 angling clubs along with a letter asking for a club submission if they so chose. The number of responses received is given in table 1.

| | | |
|-------------|-----|--|
| Individuals | 742 | NB: Total Distribution approx. 9,000 Total written responses = 747 (8%) |
| Clubs | 5 | |

TABLE 1 *Angler Response, Downrigger Issue*

Staff have also received numerous verbal comments from anglers during contact in the field, the office, or after hours.

It is clear from table 1 that the vast majority of anglers who have had an opportunity to comment on this issue have chosen not to. This puts the issue in perspective: it is not very important to most anglers.

4. Anglers' Views

Seven hundred and forty-two written submissions were received from individual anglers and five submissions from angling clubs on the use of downriggers in the Taupo fishery. The responses are summarised in table 2.

| | Support | Oppose | Undecided | Total |
|---------------------|-------------|-------------|------------|-------|
| Clubs | 1 (20.0%) | 4 (80.0%) | 0 | 5 |
| Lake only anglers | 61 (43.9%) | 68 (48.9%) | 10 (7.2%) | 139 |
| River only anglers | 25 (17.9%) | 97 (69.3%) | 18 (12.8%) | 140 |
| Anglers who do both | 123 (28.5%) | 284 (65.7%) | 25 (5.8%) | 432 |
| Unspecified | 14 (50.0%) | 9 (32.1%) | 5 (17.9%) | 28 |
| All responses | 224 (30.1%) | 462 (62.1%) | 58 (7.8%) | 744 |

*Three responses invalid, not included

TABLE 2 *Views on the Introduction of Downriggers*

The written submission process makes it quite possible for these numbers to be manipulated. However the breakdown of views in table 2 is consistent with the impressions of fisheries staff based on numerous public contacts. Staff have developed a clear impression that where anglers have a view on the introduction of downriggers, the majority are opposed. The written submissions tell the same story.

It was perhaps not surprising that the majority of winter river anglers were not in favour. The need to consider how much weight to give the views of this group, who are not directly affected by the decision, is largely avoided because there was also a lack of support for downriggers by lake anglers. Less than 2.5% of all anglers who have had an opportunity to comment have come out actively in support of the introduction of downriggers.

On the questionnaire form anglers were given the opportunity to comment on their reasons for supporting or opposing the proposal. A summary of the responses is listed in table 3.

| Against | Number | % of replies |
|---|---------------|---------------------|
| Will increase the harvest | 49 | 6.6 |
| Too difficult to enforce the depth limit/depths no longer a sanctuary | 92 | 12.4 |
| Too expensive for the average angler/suit guides only | 84 | 11.3 |
| Current methods more than adequate/downriggers unnecessary | 293 | 39.4 |
| Too sophisticated, not sport, cannot hold the rod | 49 | 6.6 |
| Other | 32 | 4.3 |
| For | | |
| More sporting than existing trolling methods | 79 | 10.6 |
| More convenient to use | 21 | 2.8 |
| Support if introduced on a trial basis | 23 | 3.1 |
| Other | 14 | 1.9 |

TABLE 3 *Reasons Given for Anglers' Views*

5. Interpreting the Response

The Department made a conscious decision to remain neutral in this issue. When we put the proposal to the angling public we were looking for clear direction in the response. However a written response rate of only 8% has created a dilemma. Those views expressed both for and against are swamped by the huge majority who chose to make no response. We can only assume these people are comfortable with any decision.

The Taupo Fishery Management Plan should provide guidance on how to deal with such issues. Currently the plan is still in a draft stage. The draft plan contains the following direction:

Continue to provide opportunities to use all aspects of the fishery except where these are shown to be incompatible with sustainability or the general wishes of anglers.

This policy seemed straightforward. However it is dependant on determining the general wishes of anglers. The response to this issue has caused managers to realize that such clear direction is unlikely for perhaps all but the most contentious issues.

One option is to ignore the majority who express no view and make the decision solely on the basis of the submissions and comment received. It is likely this approach will favour the status quo. Managers accept that opponents to change will initially usually outnumber the supporters. However the draft plan also states:

When considering resistance to change, managers must have regard for evolutionary change as a natural driving force in the development of fishing.

It has become apparent to us that there is no easy answer. These two philosophical approaches which were both considered fundamental to the Taupo fishery are, in practice, not compatible.

The Taupo Fishery is managed on anglers' behalf to as much as possible provide the experiences they seek. We recognize that in order for the fishery to reflect their aspirations anglers must have an opportunity to influence the direction of the fishery.

If the majority of anglers approached respond with a definite view then we as managers can be confident of the direction anglers want the fishery to take. Such issues as the introduction or not of downriggers are then easily resolved. Unfortunately though, the reality is that when anglers are relatively satisfied with their fishing experience, they are unlikely to feel inclined to comment.

Managers then face the dilemma:

Do they accept that angler input is essential, even if it means the views of relatively few anglers will decide the issue (even though many other anglers had the same opportunity to comment)?

or

Do they make the decision in what they judge is the best interests of anglers having regard for the natural development or evolution of the

fishery and given that the issue is not significant to many anglers?

This question is much more fundamental than simply resolving the downrigger issue. The reality is that such a situation, where the majority of people contacted choose not to respond, is likely for perhaps all but the most contentious of issues, i.e., the Taupo Fishery Advisory Committee and the Department can expect to face this problem many times in the future. As such the TFAC needs to firstly resolve the above problem from a philosophical point of view, develop a policy and then apply it to the downrigger issue.

The Department looks towards the Taupo Fishery Advisory Committee for guidance on this issue.

The solution should then be included in the Fishery Management Plan to provide direction when similar issues arise in the future.

THE OUTCOME

A Mechanism For Decision Making

At the meeting of the 21 February the TFAC provided the Department with the following direction:

"As managers of the fishery the Department is expected to have an understanding and an overview of the issue that few if any anglers could have. As a consequence the fishery managers must make the final decision on the basis of what they understand is in the best interests of the fishery. Angler input may well influence the managers' thinking on an issue but will not necessarily decide it".

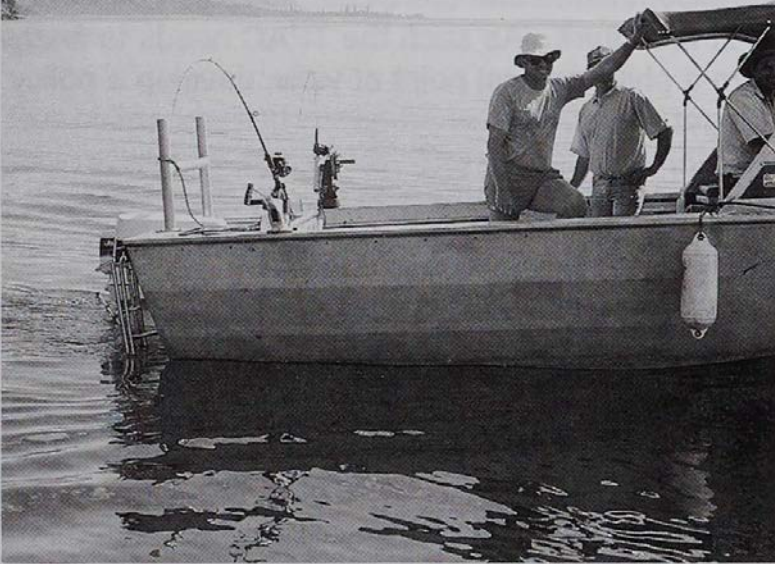
This approach will be incorporated into the fishery management plan and used as the mechanism to decide similar issues in the future.

The Decision

As managers of the fishery we are confident that downriggers will not threaten its sustainability if limited to a fishing depth of approximately 30 metres.

Given the lack of clear direction from anglers and in line with the philosophies in the management plan to provide for as wide a range of angling opportunities as possible and to allow for the natural development of fishing techniques, we propose to legalise downriggers.

Downriggers will provide an alternative to wire and lead lines.



The TFAC has put the following recommendation to the Department:

“That the TFAC support and recommend the introduction of downriggers subject to DOC establishing a monitoring programme to be sure that the sustainability of the fishery is not affected, that the cable length is restricted to 40 metres and that a review is undertaken within a period not exceeding 3 years”.

This motion was passed five votes to two.

The fishery managers agree with these conditions.

We will therefore seek amendments to the Taupo Fishing Regulations 1984 to legalise the use of downriggers in time for the 1994/95 season. These amendments will limit the length of wire cable permitted on the downrigger spool to 40 metres (a maximum fishing depth of approximately 30 metres) and prohibit the use of weighted lines or weights attached to lines used in conjunction with downriggers. The decision to make these changes to the regulations will be made by the Minister of Conservation on advice from the Department. In conjunction with the regulation changes the Department undertakes to monitor the use and impact of downriggers over the next three years. At this stage a review of the decision will occur after this period, though the review can occur at any stage should circumstances dictate. ■

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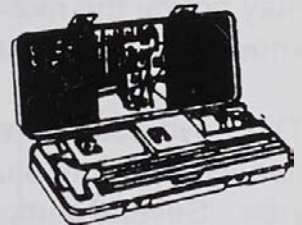
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SPRING/SUMMER HUNTING SUMMARY

Despite November being one of the coldest for 50 years, which delayed the onset of the growing season, the high temperatures and damp conditions that prevailed through December and January have produced some of the best growing conditions experienced in the central North Island for many years. Most habitats in the conservancy have put on a lot of new growth this season and this will have a significant influence on the condition of deer over much of the conservancy during 1994.

A total of 2180 hunters obtained permits to hunt within the conservancy over the October to January permit period. As at 25 February, over 500 hunting diaries had been received, detailing a good sample of the hunting effort expended by these hunters. The success rate of 40% (i.e., at least one deer, pig or goat kill recorded on a diary) is remarkably similar to previous years although the distribution of kills is a little different. The western and southern parts of the conservancy appeared to provide some of the better hunting while the Waipakahi Valley, usually one of the top spring hunting blocks, fell well short of its best this year. Perhaps the severe hunting pressure this area has received in recent years is starting to have an impact or maybe some other influence such as climate or extreme disturbance was operating?

Red deer numbers appeared to remain reasonably high in the Kaimanawa high country this year but the quality was still a concern. Many of the red deer in the high country remain small and emaciated. However sika deer quality in the lower altitude blocks continues to impress. Areas such as Clements Road, Kiko Road, the Desert Road accesses, the Tauranga-Taupo and the Oamaru may not be the most productive in the conservancy but for those with the local knowledge, the rewards are well-conditioned deer.

The Boyd Lodge area does not appear to have recovered from the high harvest by hunters using dogs last summer, with deer numbers well down this year. Several complaints about spotlighting in the Ngaruroro catchment were followed up in January with some offenders caught. Although high hunting pressure (both illegal and legitimate) has reduced numbers on this block over the past 12 months, the benefits of improved habitat should start to be felt within the next two years in terms of better quality stock. One sick deer harvested from this block was autopsied by MAF at Ruakura but no infectious micro-organisms were detected. The deer, a three-year-old sika hind, appeared to be suffering a stress-related skin disorder.

| Area | Block/Period | Days Hunted | Encounters | | | | Kills | | | | Kills/Day |
|---------------------------------------|---|-------------|------------|-----|-----|------|-------|-----|-----|------|-------------|
| | | | Sika | Red | Pig | Goat | Sika | Red | Pig | Goat | |
| Kaimanawa Recreational Hunting Area | All blocks this period Oct 1992 - Jan 1993 | 407.5 | 283 | 12 | 1 | - | 69 | 1 | 1 | - | 0.174 |
| | | 437.5 | 313 | 9 | 4 | - | 71 | 2 | 1 | - | 0.169 |
| Kaimanawa Forest Park (excluding RHA) | All blocks this period Oct 1992 - Jan 1993 | 866.0 | 356 | 219 | 2 | - | 85 | 93 | 1 | - | 0.207 |
| | | 431.5 | 265 | 143 | - | - | 86 | 62 | - | - | 0.343 |
| Tongariro National Park | All blocks this period Oct 1992 - Jan 1993 | 242.5 | 26 | 172 | 2 | - | 3 | 97 | - | - | 0.412 |
| | | 165.0 | 1 | 124 | 3 | - | - | 56 | 2 | - | 0.352 |
| Tongariro Forest | All blocks this period Oct 1992 - Jan 1993 | 121.0 | - | 90 | - | 70 | - | 34 | - | 25 | 0.488 |
| | | 203.5 | - | 148 | 5 | 140 | - | 51 | 1 | 49 | 0.496 |
| Erua Forest | All blocks this period Oct 1992 - Jan 1993 | 105.0 | - | 39 | - | 36 | - | 24 | - | 16 | 0.381 |
| | | 48.0 | - | 23 | - | 44 | - | 14 | - | 15 | 0.604 |
| Rangitaiki Forest | All blocks this period Oct 1992 - Jan 1993 | 24.0 | 7 | 9 | - | - | 2 | - | - | - | 0.083 |
| | | 32.5 | 14 | 5 | 1 | - | 3 | 1 | - | - | 0.124 |
| Lakeshore Reserves | All blocks this period | 5.0 | - | 3 | - | - | - | 2 | - | - | 0.400 |
| Unspecified Returns | Whole Conservancy | 96.5 | - | - | - | - | 6 | 13 | 6 | 5 | 0.311 |
| | | 1877.5 | - | - | - | - | 173 | 271 | 8 | 62 | 0.274 |
| Totals | Oct 1992 - Jan 1993 | 1487.5 | - | - | - | - | 167 | 207 | 8 | 98 | 0.327 |
| | | 48 hrs | - | - | - | - | 7 | 99 | - | - | 2.21 per/hr |
| Kaimanawa Helicopter Harvest | North-western this period | | | | | | | | | | |

TABLE 4 Tongariro/Taupo Conservancy Recreational Hunting Summary
October 1993 - January 1994

(Note: Much of the 1993 data is still coming in. The information presented is as at the end of February 1994)

| Area Hunted | Year | Days of Hunting Reported | Proportion of total Specified Effort % | KILLS | | | | CPUE* |
|---|------|--------------------------|---|-----------|----------|-----|------|-----------|
| | | | | Sika Deer | Red Deer | Pig | Goat | Kills/Day |
| Kaimanawa RHA | 1990 | 2376.5 | 34.3 | 388 | 23 | 3 | - | 0.174 |
| | 1991 | 2431.0 | 37.8 | 404 | 27 | 4 | - | 0.179 |
| | 1992 | 1923.5 | 35.0 | 318 | 27 | 10 | - | 0.184 |
| | 1993 | 1886.5 | 35.9 | 300 | 8 | 5 | - | 0.166 |
| Kaimanawa Forest Park (excluding RHA) | 1990 | 2212.0 | 31.9 | 304 | 250 | 21 | - | 0.260 |
| | 1991 | 1999.5 | 31.1 | 306 | 211 | 15 | - | 0.266 |
| | 1992 | 1860.0 | 33.9 | 300 | 210 | 5 | - | 0.277 |
| | 1993 | 2016.5 | 38.4 | 350 | 200 | 11 | - | 0.278 |
| Tongariro National Park | 1990 | 1251.0 | 18.0 | 16 | 313 | 6 | 16 | 0.281 |
| | 1991 | 980.0 | 15.2 | 18 | 275 | 6 | 8 | 0.305 |
| | 1992 | 731.0 | 13.3 | 14 | 192 | 5 | 1 | 0.290 |
| | 1993 | 741.0 | 14.1 | 12 | 244 | 4 | 0 | 0.351 |
| Tongariro Forest (Including Pukepoto) | 1990 | 764.0 | 11.0 | 3 | 190 | 31 | 245 | 0.614 |
| | 1991 | 702.0 | 10.9 | - | 145 | 11 | 153 | 0.440 |
| | 1992 | 718.5 | 13.1 | - | 146 | 4 | 88 | 0.331 |
| | 1993 | 663.0 | 12.6 | - | 143 | 5 | 95 | 0.367 |
| Erua Forest | 1990 | 166.5 | 2.4 | - | 48 | 4 | 172 | 1.345 |
| | 1991 | 167.5 | 2.2 | - | 38 | 2 | 76 | 0.705 |
| | 1992 | 147.0 | 2.7 | - | 35 | - | 65 | 0.680 |
| | 1993 | 185.0 | 3.5 | - | 42 | 1 | 73 | 0.627 |
| Rangitaiki Forest | 1990 | 166.5 | 2.4 | 25 | 9 | - | - | 0.205 |
| | 1991 | 141.0 | 2.0 | 31 | 9 | 3 | - | 0.305 |
| | 1992 | 84.5 | 1.5 | 17 | 4 | - | - | 0.248 |
| | 1993 | 120.0 | 2.3 | 19 | 7 | 1 | - | 0.225 |
| Unspecified Returns | 1990 | 1107.0 | - | 85 | 135 | 11 | 85 | 0.285 |
| | 1991 | 747.0 | - | 53 | 102 | 7 | 95 | 0.344 |
| | 1992 | 640.5 | - | 21 | 91 | 19 | 35 | 0.259 |
| | 1993 | 446.0 | - | 25 | 65 | 15 | 7 | 0.252 |
| TOTALS | 1990 | 8042.5 | - | 821 | 968 | 76 | 518 | 0.261 |
| | 1991 | 7180.0 | - | 812 | 811 | 48 | 325 | 0.344 |
| | 1992 | 6131.5 | - | 672 | 710 | 43 | 189 | 0.263 |
| | 1993 | 5698.0 | - | 682 | 679 | 43 | 162 | 0.275 |
| Conservancy Totals Corrected per 1000 days hunting effort | 1990 | 1000 | - | 102 | 121 | 10 | 65 | - |
| | 1991 | 1000 | - | 113 | 113 | 7 | 46 | - |
| | 1992 | 1000 | - | 110 | 116 | 7 | 31 | - |
| | 1993 | 1000 | - | 120 | 120 | 8 | 28 | - |

* CPUE = Catch per unit effort (that is, kills per day hunted)

| | 1990 | 1991 | 1992 | 1993 |
|---|-------|--------|-------|-------|
| Number of four-month hunting permits issued to recreational hunters | 6,865 | 7,033 | 6,668 | 6,344 |
| Average return rate (% of issues) | 31.6% | 30.75% | 29.0% | 26.5% |
| Proportion of successful hunters (those who obtain at least one kill - deer, pig or goat) | 38.4% | 33.9% | 33.9% | 35.4% |

TABLE 5 *Recreational Hunting Statistics, Tongariro/Taupo Conservancy 1990 - 1993*

A series of aerial sampling surveys were undertaken in the north-western Kaimanawas to assess the Tb status of the Kaimanawa deer herds in December, January and February. The results of these are detailed in the "Bitz 'n' Pieces" section, page 57.

A summary of data received this period is presented in table 4, page 15.

The winners of the prize draw from the hunting diaries upon which this data is based were as follows:

AIR TRANSPORT WITH HELISIKA: Wayne McCook, Tirau

AIR TRANSPORT WITH LAKELAND HELICOPTERS: Mal Tonks, Wanganui

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Thanks to all hunters who provided data. As our database grows, so too does our understanding of the resource. Table 5, opposite, summarises all hunting data obtained from the present hunting administration system since 1990. As you can see, this is becoming a very comprehensive database.

We wish you a happy, safe and productive "roar" and look forward to receiving your hunting diaries, deer jaws and sika trophies later in the year. ■

UNCERTAINTY: THE ONLY CERTAIN THING ABOUT FISHING

Every winter thousands of adult trout in Lake Taupo feel an urge to leave the lake that has been their home for the last year or two. An instinctive drive guides them into one of Taupo's tributary streams, past the gauntlet of the fly-fishing anglers and on into the undisturbed headwaters. Here, in only a few centimetres of water, each fish looks for a mate and as a pair they spawn amongst the gravel and cobbles in the stream bottom. Worn out after spawning they slowly make their way back to the lake, but for many the effort will be too much.

Several months later the gravels begin to stir and tiny trout or alevins emerge. Initially each alevin shares the stream with hundreds of thousands of its fellows but life is tough and many fewer survive to become parr. Over the next year or so the young trout grow into fingerlings as they slowly move down the river and out into the lake.

Amongst the clean waters of the lake life can be good. Food in the way of tiny smelt is everywhere and the young fish grow quickly to maturity before the cycle starts again. Only the strongest, best fish will reach maturity, a tiny fraction of those alevins which emerged from the gravel three years previously. Not surprisingly these prime fish are highly regarded by Taupo anglers for their fighting ability, their unblemished form and their eating qualities.

Every aspect of the fishery is inextricably linked with the surrounding environment. When conditions are ideal the trout population will thrive. However it may take only a slight change to greatly reduce survival. For example, river conditions over recent summers have proved excellent for trout growth and rearing which is reflected by the much improved angling. A large flood in January, though, might have been all it took to significantly affect the survival of the whole year class.

The trout population available to anglers is largely made up of two year classes. If the next year class is weak it will have a noticeable effect on the angling. With such high mortality rates among the young fish it only takes a very slight change in the survival rate to make a very real difference to the number of fish available to anglers. For example if 5% of 2,000,000 fry survive to maturity there will 100,000 fish. An increase in the survival rate of only 1% will result in an extra 20,000 adult fish (20% more).

The major influences on the Taupo fishery are natural. As such they are out of anyone's control. The only thing certain about them is that they will constantly be changing.

So we can and indeed should expect the trout population to fluctuate through wide extremes. Anglers need to appreciate this. When things are good make the most of it in the knowledge that occasionally it will be much harder going. It is all part of the challenge and attraction of a wild fishery.



Spawning fish in the Whitikau Stream last winter. It takes only a slight change in the survival rate amongst the young fish to cause a marked difference in the subsequent number of adult fish returning to spawn.

The environment will influence not only the size of the trout population but also the ease with which anglers can catch the trout. For example, many anglers realise that heavy rain in the middle of winter which discolours the rivers will often stimulate another run of spawning trout into the river. However if the rain persists for a week the fish may pass through the river without the water ever clearing sufficiently to allow anglers to fish for them. In the lake, warm water temperatures and bright sunny days in the middle of summer will cause the trout to seek the sanctuary of the cooler depths, out of reach of all but those anglers who deep troll. Very straightforward, but it is surprising how many anglers overlook the effect of different weather or other

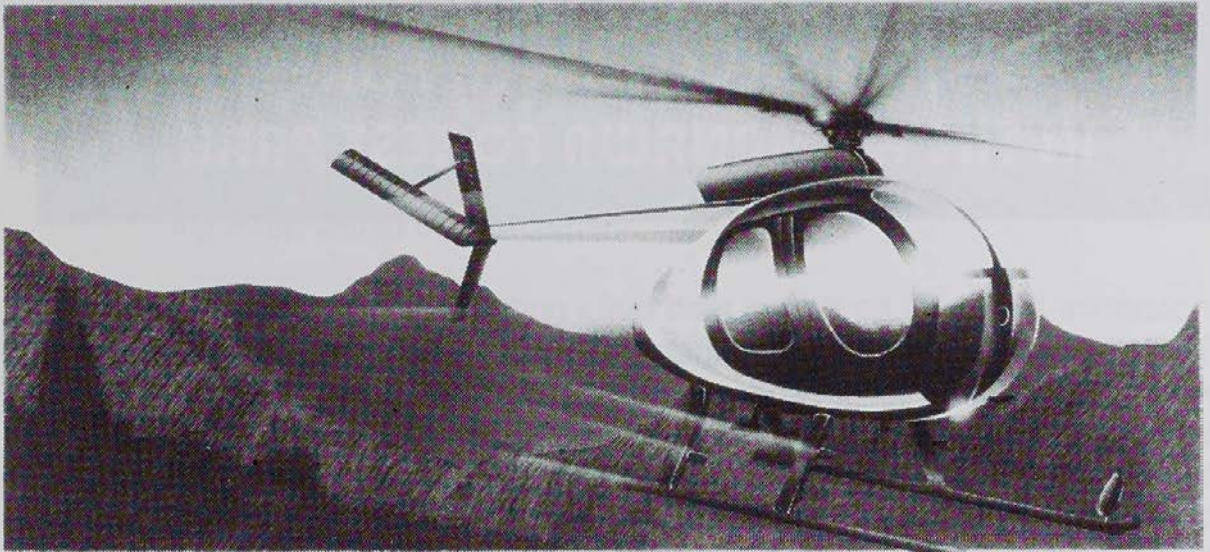
environmental conditions. How many of you commented about the lack of major runs in the rivers in the early part of last winter? Given the obvious drought conditions it was difficult to expect anything else. Conversely the fishing was always going to be good when the rains finally came.



When the weather is hot and calm try to plan your lake fishing trips for dawn or dusk.

There will always be periods when the environmental conditions are not conducive to fishing. Such is fishing. Instead of seeking artificial solutions accept that it is part of a wild fishery. It is not always possible to pick and choose when you will go fishing but always consider how the weather might be influencing the fish and alter your techniques accordingly. There will be days when you struggle but equally there will be other days when everything comes together. Such uncertainty has much to do with the anticipation associated with each trip and the enjoyment when you do have a red letter day.

In the next issue of Target Taupo we will discuss how particular environmental conditions and the weather affect Taupo trout and the way you fish for them. ■



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THE EFFECTS OF DEER ON RED/SILVER BEECH FOREST IN THE KAIMANAWA FOREST PARK

The ecological cost of deer in Kaimanawa beech forest may not be immediately obvious to the casual observer, but if the influence of deer is removed the habitat response can often be dramatic. In this article, Cam Speedy looks at the results of two enclosure plots which have removed deer influence from forest areas in favoured deer habitat within the Tiraki Ecological Area in northern Kaimanawa Forest Park. After eight years the results are most enlightening.

Two enclosure plots were established in the Tiraki Ecological Area, Kaimanawa Forest Park by New Zealand Forest Service in March 1985.

The objectives of establishing these plots were to assess the effects of deer browse on:

- (a) Red beech/silver beech/kamahi forest (plot WN.410);
- (b) Forest regeneration following major canopy collapse as a result of wind damage to red beech/silver beech/kamahi forest (plot WN.339).

The ecological area at that time had a moderately high deer population (mostly sika deer with a small proportion of red deer). Sites were selected subjectively, in areas where deer modification appeared significant (i.e., sites favoured by deer).

Both plots are maintained through a six-monthly inspection/maintenance programme to ensure fences function to exclude deer. Possums are not excluded by the fence.

These plots have been assessed numerous times since their establishment, the latest measurements being in November 1993. Both enclosures are now showing significant differences from their control (unfenced) plots. These changes can be attributed to the presence (unfenced plot) or absence (fenced plot) of deer.

(A) PLOT WN.410 - RED BEECH/SILVER BEECH/KAMAHI FOREST

This plot is located on a river terrace just above river level at the major forks within the central area of the Tiraki Ecological Area. Since April 1990 helicopter access for recreational hunters has been authorised to the clearing approximately 200 metres west of the plot for two months each autumn. This has considerably increased hunting effort within the catchment.

Despite increased hunting effort deer impact on the forest understorey at this site has remained significant, maintaining the habitat in a highly modified state.

Species diversity is 50% greater within the enclosure plot with 37 species inside the fence compared to 25 species outside. Highly palatable species such as the larger leaf *Coprosma* species (*Coprosma grandifolia*, *Coprosma lucida*, *Coprosma tenuifolia*, *Coprosma robusta*, *Coprosma foetidissima*) all reach heights of up to one metre inside the enclosure. They are absent from the unfenced control plot. Several species of ferns also occur within the enclosure but not outside (e.g., *Dicksonia lanata*, *Dicksonia squarrosa*, *Leptopteris hymenophylloides*). The mountain cabbage tree *Cordyline indivisa* only occurs inside the enclosure.

The shrub tier (30 centimetres to two metres) is relatively open in the control plot with scattered shrubs of the unpalatable *Neomyrtus pedunculata* common while patches of moss and leaf litter cover the forest floor.

In the fenced plot a moderately dense growth of regenerating seedlings, saplings and shrubs fills the 30 centimetre to two metre tier.

Regeneration of canopy species (red beech, *Nothofagus fusca*, and silver beech, *Nothofagus menziesii*) in the fenced plot is in the vicinity of 150 saplings greater than 1.4 metres in height per hectare, while the unfenced plot does not have beech seedlings or saplings over 15 centimetres. While regeneration of canopy species is unlikely to be great under such a healthy and intact canopy, this data suggests some impact on canopy seedling and sapling growth as a result of deer browse. This could have significant effects on forest regeneration should canopy collapse occur (e.g., as a result of wind or snow damage or through natural canopy senescence).

(B) WN.339 - WIND-DAMAGED FOREST

This plot is located at the northern end of a large area of wind-throw in the head of the valley. Up to 90% of the canopy over some 30-40 hectares of forest has been flattened as a result of Cyclone Bernie (April 1982) in this part of the catchment.

A combination of sunlight, shelter, difficult hunting access and good feed makes this site very favourable for deer. Numbers remain moderately high and this is reflected in the differences between fenced and unfenced plots.

Species diversity is 40% greater inside the enclosure with 44 species present compared to 31 in the control plot. (The greater diversity of plant species generally in the windfall area is likely related to higher light conditions as a result of the collapse of the canopy). Mahoe (*Meliccytus lanceolata*), toetoe, mountain cabbage tree and the large leaf *Coprosma* species are all abundant and vigorous inside the fenced plot, although possum browse appears to have subsequently killed most of the mahoe specimens. These species are absent outside the fence.

The ground tier within the enclosure is lush with herbs and grasses up to 30 centimetres high, including *Luzula sp*, *Ranunculus sp*, *Uncinia sp*, *Poa sp* and seedlings of woody plant species. Outside the fence the ground tier, in contrast, is a closely cropped turf of *Hydrocotyle sp*, liverworts and *Poa sp* grasses. Very few woody plants are present at all.

The water fern *Histiopteris incisa* appears to be a significant feature of both plots in the growing season.

Regeneration of canopy species (red beech/silver beech) is around 1200 saplings (over 1.4 metres high) per hectare within the fenced plot. This compares to 450 saplings per hectare in the control, although 12 of the 18 saplings present on the control plot are growing out of the browse tier on the buttress of a single fallen beech tree. The true ground sapling density is closer to 150 saplings per hectare, only an eighth of the density inside the enclosure.

While the sapling regeneration is eightfold greater in the enclosure, the density is still very low for beech regeneration in a collapsed canopy situation. Some studies in similar forest types within Kaimanawa Forest Park have recorded regenerating beech seedling



Tiraki windfall enclosure site.

densities of 17,000 saplings per hectare in similar habitat. The low densities recorded at this site could be related to:

- (i) a lack of beech seeding since the storm responsible for canopy collapse; or
- (ii) the dense growth of grasses, particularly toetoe and other woody species, shading the ground tier making it difficult for beech seedlings to establish (inside the fence).

The very low beech seedling and sapling densities on the control (unfenced) plot appear more related to deer browse.

The canopy that remains in the wind-damaged forest, both within and outside the enclosure, is typically sparse, with an average height of eight metres and an average stem diameter of 17.2 centimetres. These are young beech trees which appear to have grown since the wind damage occurred 11 years ago. Basal area of the plots is low at 5.65m² per hectare, however, the stem density of 250 stems per hectare is likely to form a complete canopy once the trees reach diameters of 70-80 centimetres, provided that there is no further mortality from other causes.



Cam Speedy looks at the heavily-grazed turf community in the Tiraki windfall.



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We hope you will show your continuing support in helping us understand the central North Island sika resource by entering your sika trophies in the competition!!

CONCLUSIONS

Deer continue to have a significant impact on understorey species diversity within the Tiraki Ecological Area, despite an increase in recreational hunting effort as a result of helicopter access to the central catchment area.

Areas where wind damage has occurred are favoured by deer. The visual difference between fenced and unfenced plots in these areas is dramatic.

It appears that canopy replacement is occurring in wind-damaged red beech/silver beech forest despite heavy deer use, albeit via a different process. The process of a dense seedling stage, thinning down naturally to pole stands of saplings and then young trees eventually resulting in a final canopy of larger diameter trees, has been replaced by a new pathway by which a few trees which have already passed through the deer browse range under the original canopy and which occur at a density similar to final canopy stem density continue to grow to eventually complete a beech canopy.

In this sense the forest appears to have been able to 'adapt' to the pressure of deer in terms of canopy replacement.

Loss of understorey diversity is a somewhat more complex and difficult issue, as even moderately low deer densities will maintain the forest in a less diverse state.

To achieve maximum understorey plant diversity deer numbers would need to be extremely low or even nil. Achieving this would be expensive, difficult (if not impossible) and undesirable for many users of the park.

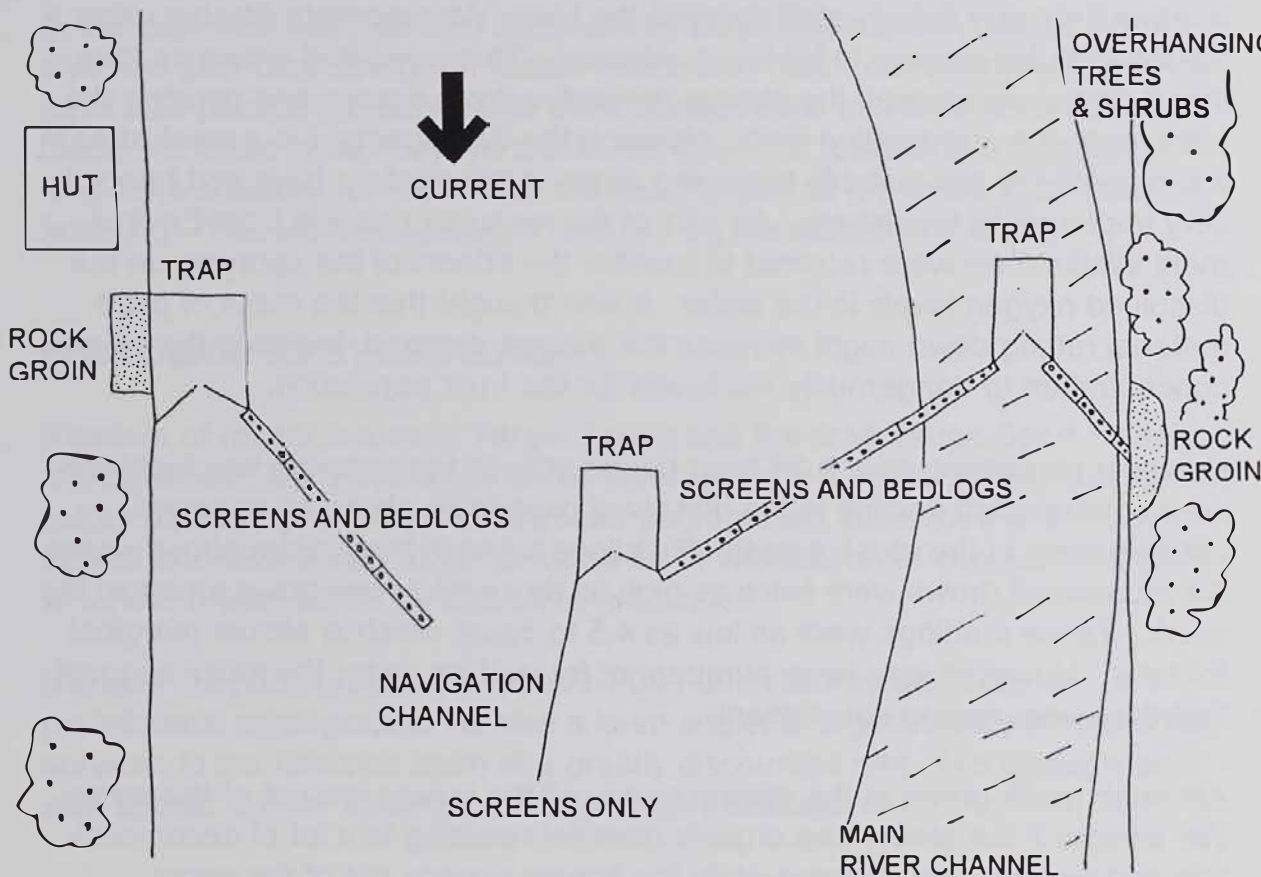
It appears that maintenance of a forest cover (i.e., a beech canopy) is currently being achieved by the present deer management regime in the Tiraki Ecological Area.

However species diversity is less than would occur if deer were absent. If floristic diversity is to be maintained new techniques for deer control will need to be looked at - techniques that will eliminate all or most of the deer on a sustained basis. Currently such techniques are not available for forest areas that have an intact canopy and consideration may need to be given to more intense management of representative 'islands' of vegetation where diversity could be maintained at a higher level (e.g., enlarged enclosure plot type situations or similar) rather than whole forests. ■

SOMETHING FISHY

TONGARIRO RIVER RESEARCH

Work is currently underway to repair minor damage incurred to the lower Tongariro trap at the end of last year. The true left trap has been strengthened and the gabions repaired and a new length of bed log added. This trap has now become somewhat of a giant with about 30 screens in use. The bulk of the run seems to use the true left side of the river at this point, but further trials will confirm this. This trap will be run at times where it seems that rain and/or other weather conditions would encourage a run of trout into the river. However, one of the aspects to come out of our trials last year was that the fish in the lower river may not behave quite as we first thought. It is envisaged the first pulse will be tagged in April so keep an eye out for those tagged fish.



Layout of the lower Tongariro trap.

January 7th saw the start of this year's part of the Tongariro river runs investigation with the installation of the Whitikau trap. It is planned that this trap will be run for 12 months to gain an estimate of the size of the run into the Whitikau stream. The trap that is currently operating was built last winter to replace the one that was damaged in May 1993 (See Target Taupo, issue 13).

In January, 202 fish were trapped with an average length of 557mm.

Additionally, each month a sample of ten fish from this trap are Floy-tagged so that we can gauge how long they hold up in the river to spawn and where they go. These tagged fish will reappear as kelts at the trap later in the year and will also hopefully be observed by staff on our regular escapement counts over the winter. Some may eventually turn up in anglers' bags. The tags, which are approximately 50mm long and like a piece of spaghetti, are anchored just below the dorsal fin and are a variety of colours which are easy to see.

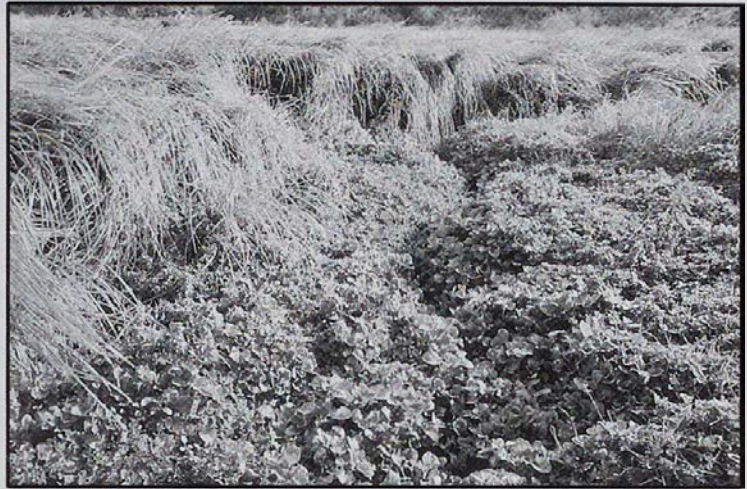
SPRAYING OF MUSKWEED IN THE WHANGAMATA STREAM

In early February fishery staff sprayed the lower Whangamata Stream using a Roundup/Pulse mixture to kill the muskweed. This weed had grown so thick that it physically blocked the stream preventing trout access and ponding the water onto the surrounding land. Although the Whangamata is a small stream it is one of very few suitable spawning areas in the western bays and hence is very important to the fishery. As part of the resource consent from Environment Waikato we were required to monitor the effects of the spraying on the dissolved oxygen levels in the water. It was thought that the mass of plant material rotting down might increase the oxygen demand, lowering the oxygen concentration to dangerously low levels for the trout population.

However monitoring over a 24-hour period prior to the spraying has highlighted an unexpected decline in the dissolved oxygen levels as an apparent consequence of the musk growth. Readings taken in the stream above where the muskweed grows were twice as high as those taken low down amongst the musk. These readings were as low as 4.5 to 5ppm which is almost marginal for trout. However very large numbers of fry evident under the musk suggest that they were coping satisfactorily.

Although musk grows in the stream nearly all the leaves are out of the water. We wonder if the stems trap organic material resulting in a lot of decomposition and high oxygen demand while the leaves already out of the water contribute very little oxygen back into the water. The stems also negate any turbulence which otherwise would increase oxygen diffusion into the water.

Muskweed conceals the Whangamata Stream.



The plants have started to die back within 10 days of spraying with, as yet, no decline in dissolved oxygen levels. Spraying was carefully done with a knapsack so as to avoid damage to more desirable plant species such as carex and flax.

In the past staff have cleared the musk by hand which is very labour intensive and time consuming. In recent years, with help from volunteers, we have also planted the banks with plant species such as flax and carex and toitoi. As these grow, they will shade the musk out, providing a cost-free long-term solution. Until then we will need to control the musk, preferably by spraying. This will be dependent, though, on the results of this trial.

PHOTOGRAPHS BY LEN BIRCH

Readers of recent issues of Target Taupo and the draft Taupo Sport Fishery Management Plan have commented favourably on the use of high quality colour photographs. The use of colour photographs has added to the visual appeal and also allows us to convey a lot of information of interest to anglers which otherwise would be difficult to get across.

Many of the photographs are taken by Len Birch of Hatepe. Len, who is a professional photographer, is also a keen angler and generously provides his services to the fisheries team at a greatly discounted rate. His photographs also appear on the 'soon to be ready' fishery displays.

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TRAPPING LAKE OTAMANGAKAU

Work is underway to build a fish trap in the Te Whaiau Stream, the major spawning tributary of Lake Otamangakau. The trap is in the vicinity of the Whanganui diversion outfall. It consists of a novel swinging barrier across the Te Whaiau Stream to deflect the trout into a cage trap situated on the apron of the outfall. Fish in the trap will be finclipped and released back into the Te Whaiau Stream upstream of the barrier. The trap will also serve to resolve the problem of spawning fish collecting in the outfall where they are unable to go any further. Historically these fish have been subject to regular poaching.

Important information will be provided on several different aspects of the Lake Otamangakau fishery through operation of this fish trap.

We will get some appreciation of just how many trophy size fish are in the lake. By finclipping and operating the trap in future years we will be able to assess mortality rates of these large fish. There certainly is potential for an over-harvest to occur in this fishery given the increasing levels of use.

Over recent summers staff have tried a variety of techniques in order to capture and individually tag a large number of the wild juveniles in the lake, but without a great deal of success. Instead we will collect eggs from ripe fish passing through the trap and rear the juveniles in the hatchery for six months. These fish, at approximately 50mm, will be released back into the lake in October. By recovering these fish from anglers' bags, and as they pass through the trap when they finally mature, we should get valuable information on their growth, survival and harvest rates.

A second, complementary study into the life history of Lake Otamangakau trout, including sources of juvenile recruitment, patterns of distribution, diet preferences and so on, will be undertaken as part of the research for the TPD resource consents process and is due to get underway shortly.

FISHERY DISPLAYS AND BROCHURES

New displays designed to inform anglers about different aspects of the fishery are nearly complete. Topics covered range from the life cycle of Taupo trout to activities involved in the management of the fishery, the correct way to release trout and angling etiquette. It is intended that these displays will be used at such occasions as trade fairs, fishing competitions, public talks and for display at the National Trout Centre.

A new 24-page colour brochure describing the fishery, techniques and equipment to use and a guide to additional information and supporting services is nearly ready to go to the printer. This brochure is designed to provide visitors to Taupo with sufficient information to have a realistic chance of catching a trout. It will be available from local sports shops, information centres, motels and DOC offices.

Fisheries staff are also working on an annotated version of the Taupo Fishing Regulations which should be easier for anglers to understand. This version includes all the subsequent amendments and has comments in the right hand margin to clarify particular points. Comments are designed to answer those questions most often asked of staff and often involve bringing together two or three different regulations which can otherwise be quite confusing. This photocopied brochure is available from the Department's office in Turangi, (attention Shirley Oates), at \$2.50 a copy.

DETERMINING THE AGE OF TAUPO TROUT

This year a project has been initiated to investigate an accurate and efficient method of ageing trout from Lake Taupo.

Using scales to age Taupo trout has not been very successful. The scales and other bony structures in trout form circuli (rings of a type of protein). These circuli are laid down at regular intervals and tend to vary in spacing depending on the rate of growth of the fish. In winter growth normally slows and the circuli are laid down closer together. The closely spaced rings appear as dark bands when examined. Each dark band signifies a year of growth so that by counting the dark bands an age can be assigned to the fish (much as is done with tree rings).

Unfortunately in Lake Taupo trout the growth rate varies so little that the circuli appear to be uniform and so the 'dark band' is not easily detected.

Faced with this problem a project is underway to assess the use of other parts of the fish such as otoliths (ear bones) and fin rays as tools for ageing Taupo trout. A more detailed report will be published when the work is completed.

ANGLERS FIND THERE'S A CATCH TO HAVING FUN!

The following note is reprinted from an overseas newspaper article. It describes obtaining a fishing licence in Germany.

"In Germany, unless you are a diplomat, serving with the army, or a tourist, to obtain the hallowed "Fischerschein" you have to attend three months of evening school once a week in preparation for a test consisting of 60 multiple-choice questions, of which 45 have to be answered correctly.

Without the lessons it is impossible to pass the exam, which embraces theoretical questions in five categories, including "general fish knowledge, specialised fish knowledge, hydrography and conservation, equipment and law".

At least seven questions in each category have to be answered correctly.

If German were not your native language you would spend a lot of time looking up not only the names of very unusual salt and plain water fish, but the translation of a raft of technical terms. A Frenchman who tried sitting the exam with a dictionary was disqualified because he could have been cheating.

When you have finished the written exam you take a practical test which involves assembling a range of rods suited to catching 10 different types of fish.

You have to choose the correct rod for the task suggested (two-handed, single-handed, length, flexibility, etc.). You have to know what size line to use by looking at a rod, what weights and floats to use and where to place them on the line. "If you appear nervous during the practical you will be asked to do more," cautions Herr Peter Brulin, who teaches an evening class.

"When you are actually fishing it will be different," he told a student wading in piles of monofilament that had cascaded off his reel while he tried to demonstrate how to set up a rod. "I am just trying to teach you how to pass the test."

Out of 100 applicants who took the most recent of the two annual exams, 20 failed.

Getting a hunting licence involves an even more rigorous set of written, oral and practical tests."

WHITIKAU TAGGING

Along similar lines to the Lake Otamangakau study, staff spent three days electrofishing the upper Whitikau Stream this summer. Juvenile trout caught were finclipped and, if large enough, also tagged with a plastic oval disc behind the dorsal fin (see photographs overleaf). Two years ago young fish were similarly marked and we expect the first of these to show up through the Whitikau trap this winter. This will provide information on growth rates and on the life history of these fish. Obviously there is an ever increasing number of tagged and marked fish in the Taupo fishery. Please check the fins of all the fish you catch. If a fin is missing please provide us with the details of the size of the fish, the sort of mark or tag and where and when it was caught. If the adipose fin is missing (the small fleshy fin just forward of the tail) check just behind the dorsal fin for a small plastic tag as well.

TAUPO SPORT FISHERY MANAGEMENT PLAN

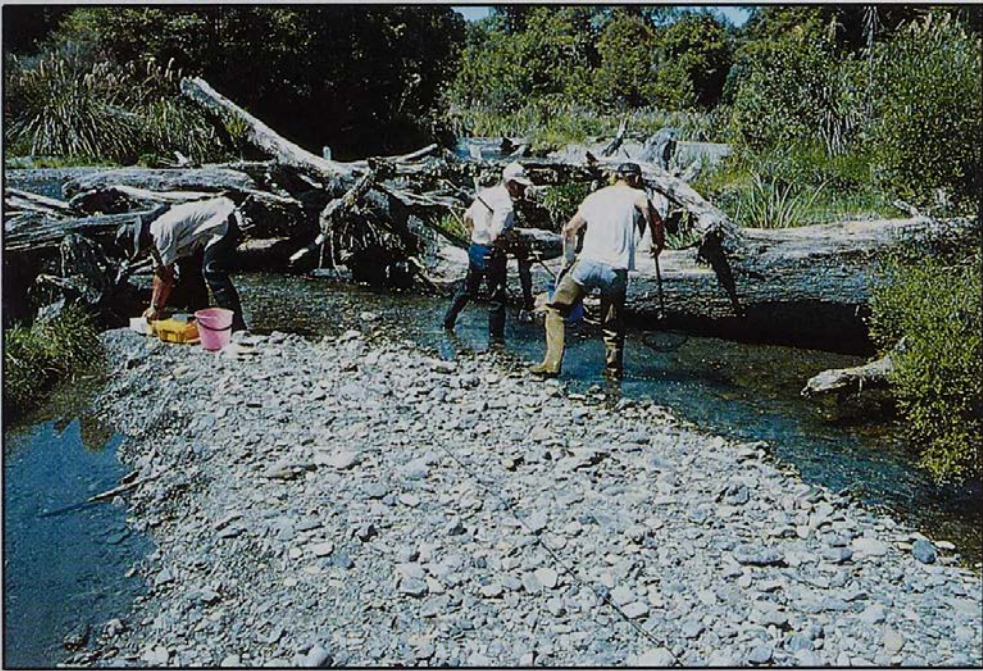
The draft management plan for the Taupo trout fishery has been released for public comment by the Department. The draft plan spells out goals and objectives to guide management activity over the next 10 years.

The development of the draft to this stage has been a lengthy process involving a high degree of consultation with iwi, anglers and other interested parties. The Taupo Fishery Advisory Committee, established by the Minister to advise the Department on behalf of anglers, has also had significant input.

The Taupo fishery sustains about 40% of the country's trout fishing effort and 82% of this use is by visitors to the district. The release of the draft provides a formal opportunity for all anglers to comment on its provisions.

The public have until the 6th of May 1994 to provide comment. Following this, the Minister of Conservation will approve or amend the draft plan in the light of public submissions received.

Copies of the draft management plan can be obtained by calling into the Department of Conservation offices in Turangi or Taupo, or writing to the Department, attention Rob McLay, Fishery Planner.



Staff electrofishing juvenile trout from the upper Whitikau Stream as part of an investigation into their life history. This sort of habitat is typical of the Whitikau Stream and other headwater tributaries and provides ideal spawning and rearing conditions.



A tagged juvenile rainbow about to be released. Note the yellow plastic oval tag just behind the dorsal fin. It is expected that some of these fish will return through the Whitikau trap in several years time.



Common patterns used on the Tongariro from early this century to the present. Evolutionary change, one of the many issues discussed in the Taupo Sport Fishery Draft Management Plan, is, and has always been, a factor affecting the Taupo fishery.

NOVEMBER ACOUSTIC SURVEY RESULTS

The annual acoustic survey of the trout population in the lake was repeated last November. Carried out over three days and involving 42 one-kilometre transects the survey estimates the size of the population using sophisticated echosounding equipment. The final count of 139,000 legal size trout is compared with previous November counts in table 6.

| Year | No.of legal size trout counted |
|------|--------------------------------|
| 1988 | 90,000 |
| 1989 | 68,000 |
| 1991 | 108,000 |
| 1992 | 115,000 |
| 1993 | 139,000 |

TABLE 6 *Acoustic Surveys of Lake Taupo Trout Population, 1988 -1993*

This count is the number of catchable sized trout present at the time of the survey. It does not represent the total number of fish available to anglers over the course of a year, which is much greater because there are continually young fish entering the population to replace those dying or being caught. From the results it would seem anglers have good reason to be optimistic about the summer fishing and this winter's spawning runs. The increased counts in 1991 and 1992 were reflected in the improved river fishing over recent winters.

One interesting aspect of the survey was the very dense smelt layer which occurred at 100 metres, 10 metres deeper than in previous years. Not surprisingly, many of the trout were associated with this layer, well out of the reach of anglers. The density of the smelt layer made it difficult to distinguish juvenile trout traces associated with the band and we were unable to make an

accurate count for small trout. However, as part of an agreement with MAF Fisheries who are borrowing our acoustic equipment for a research project in Dunedin, they are going to work on the target differentiation and resolution of juvenile trout which should assist our counts in future years.

SUMMER FISHING UPDATE

The spring harling was limited by unsettled weather but when conditions allowed some very good fishing was experienced, particularly at the northern end of the lake and in the western bays. Large numbers of smelt appeared in the Tokaanu tailrace early in spring though overall there seemed to be fewer smelt in Stump Bay. Conversely smelt were much more evident than in recent years in places like Five Mile Bay and Waitahanui. Fishing was excellent over Christmas and into the first few days of the new year. A feature of the fish caught was the large number of just-legal fish of 35 to 40cm long. This suggests a strong year class which will form the basis of the winter spawning runs in the next two years.

Numbers of anglers counted by aerial survey over the period were 30% up on last spring and 22% up on Christmas 1992. Noticeable were greater numbers of anglers fishing during the middle of the day though the maximum single count was down on 1992/93 (596 on 28 December 1993 c.f. 704 on 2 January 1993).

The average counts of the total anglers on Lake Taupo just after dawn for each survey period over the last four seasons is given in the following table.

| Season | Spring | Christmas |
|---------|--------|-----------|
| 1990/91 | 195 | 353 |
| 1991/92 | | 435 |
| 1992/93 | 139 | 454 |
| 1993/94 | 205 | 507 |

TABLE 7 *Angler numbers, as described above.*

This increase in the number of anglers and consequent angling pressure is consistent with observations of staff in the field.

Since early January the fishing has become much more difficult. This is normal at this time of year though the very settled conditions which have prevailed and the associated boats, waterskiers and jetskiers will have further encouraged the trout to seek the depths. Those anglers using wire lines have continued to have reasonable success though this method does not appeal to many. High lake levels in January, which prevented the formation of defined rips, restricted river mouth angling.

Lake levels have since fallen and stream mouth angling, particularly in the early morning, has improved, though at the time of writing the delta has remained patchy.

Those anglers who have fished the Tongariro this summer have had some enjoyable and reasonably successful angling. At this time of year there are very few other anglers on the river and while many of the fish taken are mending kelts there are a number of fresh run fish amongst them (see comment on the January run through the Whiti kau trap). Fishing the river at this time of year is a very different experience to that of the middle of winter.

As usual large numbers of brown trout have entered the lower Tongariro. These fish are relatively easy to see lying still on the bottom but are characterised by their stubbornness to avoid taking a fly. Persistent anglers can occasionally get an odd fish to respond but many find it very frustrating. The only way these fish are consistently caught is fishing downstream using a fast sinking flyline in the Hydro Pool. Given that many of these fish will migrate all the way up the Tongariro River to enter the Whiti kau Stream there must be scope to develop techniques to catch these fish while they are in the upper Tongariro.

OFFENCES AND PROSECUTIONS

Since the last publication of Target Taupo several serious offences have been dealt with by the courts. In a recent case in Taupo an offender was convicted and fined a total of \$1,100 on two charges of shooting trout with a rifle and fishing prohibited waters. His rifle and fish were also forfeited to the Crown. At the same court another offender was convicted and fined a total of \$1,100 on two charges of fishing prohibited waters and disturbing spawning grounds. This offender was also disqualified from driving for two months and the fish ordered forfeit to the Crown. Yet another person was sentenced to two months imprisonment on each of two offences against the Conservation Act relating to the netting of spawning fish. A fourth person received fines of \$1,500 after being found guilty of obstruction and the possession of speared spawning trout.

These penalties highlight the seriousness with which the court views poaching and related offences.



Offenders apprehended for poaching offences are now receiving hefty fines or imprisonment.

A reminder to all anglers that information on the licence is a guide. Anglers requiring detailed information should write to the Department or obtain a copy of the Taupo Fishing Regulations 1984, the Conservation Act 1987 and their amendments.

HINEMAIAIA RESEARCH

The study into the effects of flow management in the Hinemaiaia River on juvenile trout is progressing well. During this summer an emphasis has been put on the temperature of the water in relation to the flow regime. The maximum water temperature measured so far was 21°C which is close to the maximum tolerable for trout survival. The habitat chosen by the juvenile trout is also assessed monthly to determine their preferences. In one week every month a trap is also set in the bypass downstream of the HB dam to collect drifting fry. Shortly after emergence from the gravels the fry drift for a few hours and are easily caught. The monitoring will be done for a year and the results will be presented in a future issue of Target Taupo.

HINEMAIAIA LAKE DREDGING

Taupo Electricity Ltd has been granted resource consents to dredge the HA or top Hinemaiaia hydro dam.

Over the 40-odd years since the dam was built, the lake has gradually filled up with pumice silt. Water storage and consequently generating ability have been affected.

Dredging was considered in the early 1980s but storage was increased by raising the dam wall instead. However, the increase has been lost by a further build-up of sediment.

The HA lake contains one of only two brook char populations in the Taupo district. This fishery has steadily declined as the lake silted up.

TEL liaised closely with DOC and the Taupo Fishery Advisory Committee in the lead-up to their consent application. An environmental impact assessment was produced and all parties agreed on conditions necessary to safeguard fish, game and wildlife values in the lake, as well as the downstream rainbow trout fishery.

These conditions include restrictions on the timing of dredging, the disposal of dredged sediment to settling ponds, and upper limits to suspended sediment concentrations in the lower Hinemaiaia River. It is expected that conditions for the brook char fishery in HA lake should improve due to the increased habitat provided.

Suction dredging began at the beginning of March and will be finished by the end of April. Both TEL contractors and DOC fishery staff are closely monitoring progress.

LAKE OTAMANGAKAU LEVELS

Agreement was reached with Electricity Corporation in December last year for management of the levels of Lake Otamangakau over this summer.

Because of the Whanganui River minimum flows ruling less water was able to be diverted to the lake in the drier part of the year. Anglers had expressed concern at the low level of the lake last summer and sought to have it held higher.

ECNZ wished to retain enough storage room in the lake to allow the capture of water from summer thunderstorms and freshes. This was hampered to some extent by silt buildup in the inflow canal.

As a result of negotiations, ECNZ agreed to try to maintain the lake level at between 610.75 and 610.80 metres and to try and minimise the rate of drawdown. This has been done very successfully over the summer despite severe water shortages at times preventing any diversion into the power scheme.

Anglers have expressed their appreciation of ECNZ's efforts to voluntarily meet this agreement under difficult circumstances.

TONGARIRO NATIONAL TROUT CENTRE UPDATE

The January visitor count at the Tongariro National Trout Centre was 8% up on the same period last year. Six thousand, six hundred and fifty people passed through the viewing chamber during the month, an average of 222 a day, auguring well for the coming year and a return to the highs of 1992 when counts over 10 months gave an estimated annual total of 48,160 visitors. The count dropped 11% in 1993 to 43,370. However February has come and swiftly gone and the total was almost the same as last year, down 25% on February 1992. So, who knows.

TONGARIRO POWER SCHEME OPERATIONS

Generally dry conditions prevailed over most of the summer and caused difficulties in the operation of the Tongariro Power Scheme.

For perhaps the first time since the scheme was built virtually all water diversions ceased for a period. This led to the rare situation of most rivers in the scheme running at their natural flows for various periods.

Due to the need to meet the new statutory minimum flow in the Whanganui River the Whakapapa intake was closed. The Whanganui River and the minor tributaries in the western part of the scheme were still diverted to Lake Otamangakau for logistical reasons but their flows were then returned to the Whanganui channel. This led to the closure of the Wairehu Canal.

In the east, the Moawhango diversion to the upper Tongariro was closed for a period, along with the Rangipo power station and the Poutu Intake. This meant that the Tongariro River ran at its natural flow below Rangipo Dam and the Poutu Intake.

Perhaps the biggest beneficiaries were rafters and canoeists, who took advantage of the increase in flows from 11.2 to about 19 cumecs below Poutu Intake.

Although flows in the upper Tongariro increased the flow at Turangi decreased as a result of the return to natural levels. This apparent contradiction results from the removal of supplementary water from the eastern and western diversions which normally enters the lower Tongariro via the Poutu River.

During this period the flow at Turangi dropped below the normal daily minimum of 27.3 cumecs to the natural flow of about 24 cumecs. This is in conformity with the power scheme flow rules which allow a minimum of 27.3 cumecs except where the natural flow would have been less.

Since late February moderate amounts of rain have fallen in the catchment which has allowed resumption of normal, if limited, diversions.

Meanwhile progress continues with the consultative process leading up to the power scheme resource consent applications. Tenders have now been received for the first batch of research projects including those addressing impacts on the Tongariro and Lake Otamangakau fisheries.

Decisions on the successful tenderers are expected shortly. ■

HELICOPTER ACCESS FOR HUNTERS INTO THE RANGITIKEI November/December 1993

BACKGROUND

In 1991 vegetation assessments in the Rangitikei Remote Experience Zone of the Kaimanawa Forest Park showed deer populations were having significant impact on mountain beech forest habitat within parts of the upper Rangitikei River Catchment (Speedy - 1991).

A report on the findings of this investigation recommended increased access for recreational hunters in an attempt to increase deer harvest from the area and specifically access via helicopter which is restricted by a publicly approved conservation management plan for the area. A trial period of eight weeks helicopter access for recreational hunters was approved by the Tongariro/Taupo Conservation Board to four sites within the Rangitikei Catchment in March/April/May 1992 under sections 5.9(d), 6.4.1(e) and 7.2.1(c) of the Kaimanawa Forest Park Conservation Management Plan. This trial resulted in some 103 hunters visiting the catchment - three times the number hunting the catchment during the whole of 1990 or 1991. Of the 103 hunters less than half (39) provided details of their hunting. The data provided suggested a high success rate with 72 deer kills reported from the 39 hunters in 248 hunter days. These kills included 15 sika stags, five sika hinds, 38 red stags and 14 red hinds.

The high harvest was pleasing but the fact that some 75% of the harvest was male was cause for concern. It is the number of females that determines the reproductive strength of the herd and hence the herd's ability to sustain harvest.

Achieving a high female harvest during autumn will always be difficult given the vocal and more vulnerable nature of stags at this time of year and a hunter's innate preference for shooting stags over hinds during autumn.

A recommendation was put to the Tongariro/Taupo Conservation Board to undertake a second trial in spring when the hunting effort was more likely to target hinds in an attempt to attain a significant harvest of the breeding

(female) population. Problems with a lack of data provision, rubbish, toilet waste, campsite clearance and abuse of the fishery were also highlighted in the first trial and attempts were made to remedy these in the second trial.

SPRING 1993 TRIAL

Helicopter access for recreational hunters was approved to three sites in the upper Rangitikei Catchment between 30 October and 12 December 1993. The Otamateanui site used in the first trial was abandoned as a result of the poor success achieved here. A single hunting party was permitted at each site at any one time. This resulted in 71 hunters visiting the catchment. All parties were fully briefed regarding the trial including the issues of rubbish, campsites and abuse of the fishery. Toilets were provided at all sites. Follow-up telephone calls were made to each party leader to ensure all hunting data was available for analysis.

RESULTS

The following results were obtained from data provided by the 18 hunting parties utilising the access opportunity.

| Landing Site | No. of Parties | No. of Hunters | Days Hunted | Deer Seen | | Sika Deer Harvested | | Red Deer Harvested | | Jaws Provided |
|---------------------------------|----------------|----------------|-------------|-----------|-----------|---------------------|----------|--------------------|-----------|---------------|
| | | | | Sika | Red | Male | Female | Male | Female | |
| Ecology Stream Enclosure | 6 | 24 | 102 | 31 | 7 | 2 | 2 | | 2 | 3 |
| Ecology/Rangitikei Junction | 6 | 24 | 84 | 13 | 28 | 1 | 2 | 2 | 5 | 0 |
| Trick Creek/Rangitikei Junction | 6 | 23 | 87 | 27 | 34 | 4 | 4 | 3 | 13 | 8 |
| Totals | 18 | 71 | 273 | 71 | 69 | 7 | 8 | 5 | 20 | 11 |

TABLE 8 *Recreational Hunting Statistics, Rangitikei Remote Experience Zone, November/December 1993.*

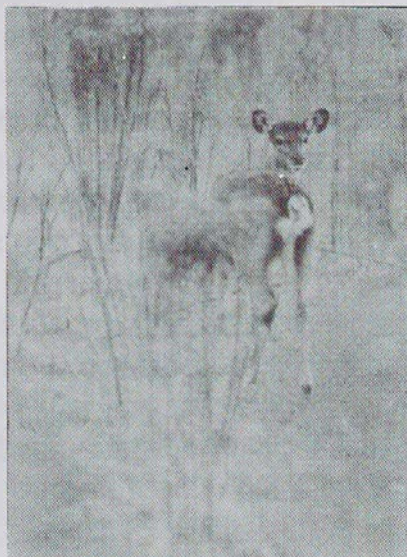
The earlier parties appeared to have the least success, possibly as a result of a cooler than usual November and a consequent delay in the growing season. By late November parties were seeing plenty of deer resulting in much improved harvests.

The significant increase in the proportion of hinds in the harvest is encouraging. The jaw data supplied (11 jaws) suggests the majority of hinds harvested were breeding age but this is difficult to confirm from just seven hind jaws. A greater jaw sample would have helped better assess the age profile of the harvest. Despite all parties formally being asked to supply jaws, only four of the 16 parties who secured kills were able to do so.

Generally hunters commented that animals were in fairly good condition and that most hinds were in fawn. Four parties reported finding dead deer which appeared to have died during winter (i.e., the hunters felt the animals had not been shot). One party reported finding eight such carcasses around the Ecology enclosure site. This suggests the herds in the upper Rangitikei Catchment continue to be regulated more by habitat constraints than

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hunting pressure and this may account for the generally poor success obtained at the Ecology enclosure site.

Inspection of the main Rangitikei River valley following the access period produced only two sacks of rubbish, mostly from small campsites away from the three designated helicopter landing sites. Evidence from some of the camps cleaned up suggests helicopters are continuing to drop hunters into the area without authorisation. Comments from the first party to visit the Ecology enclosure site suggest a party had been dropped at this site just prior to this trial - much to their disappointment! While this activity is hard to police, hunters are encouraged to forward the relevant details of any such activity that they see.

The impacts of helicopter access to remote areas can be kept to a minimum if carefully managed. Unauthorised activity often results in unsightly and undesirable impacts which threaten to undermine future opportunity in such areas.

In addition to hunting data, data relating to fishing activity by many parties was obtained and forwarded to the Wellington Fish and Game Council. It appeared that most hunting parties at the Ecology/Rangitikei junction and Trick Creek/Rangitikei junction sites fished for trout while in the catchment.

It is pleasing to note that most fish caught were released. Many parties commented that trout were numerous but were difficult to catch.

Despite a tagging operation in the headwaters over the past 12 months, which resulted in a significant number of tagged fish, no tags were recorded by anglers in this trial.

DISCUSSION

Recreational hunters are able to target the productive sector (i.e., breeding females) of the deer herds in the Rangitikei Remote Experience Zone of Kaimanawa Forest Park more effectively in the spring/summer than in the autumn.

The timing appears critical in that the deer are difficult to find before the growing season starts, usually sometime in November. Once the deer begin to utilise the new spring growth they become more obvious and are more easily harvested. In this respect, a helicopter access period later in spring or early summer may be better, to account for seasonal fluctuations in the onset of the growing season.

To achieve a general and lasting improvement in habitat condition in the beech forests of the upper Rangitikei catchment a regular harvest targeting the productive sector of the herd (i.e., breeding females) is required.

The trials of the last two years have identified a means of allowing recreational hunters to achieve such a harvest by permitting carefully controlled helicopter access to selected sites within the catchment.

Such a system could be seriously compromised by unauthorised and uncontrolled helicopter access. The current incidence of such activity must be reduced.

**RECOMMENDATIONS
TO THE TONGARIRO/TAUPO CONSERVATION BOARD**

1. That helicopter access for recreational hunters be authorised for eight weeks over the period December/January for the next three years to assess what impact such a harvest regime has on mountain beech forest habitat condition in the Rangitikei Remote Experience Zone.
2. That this helicopter access be strictly controlled to ensure the wilderness values of this part of the park are retained.
3. That some effort be made to stop the present incidence of unauthorised helicopter access to the Rangitikei Remote Experience Zone.
4. That liaison with the Wellington Fish and Game Council continue to ensure the Rangitikei headwater trophy trout fishery is not put at risk by overexploitation as a result of helicopter access to the catchment for recreational hunters.
5. That habitat monitoring continue as a means of assessing the effects of the recommended deer harvest regime on habitat condition. The habitat will show an improvement within 3-5 years if the increase in hunting effort is sufficient to reduce deer impacts. ■

TIPS TO IMPROVE YOUR WINTER FISHING

For an indicator use approximately half a strand of glowbug yarn and attach to a loop in the end of your fly line using a single overhand knot. Such an indicator will pass readily in and out through the rod rings and makes it much easier to land large fish when using long leaders.

Many strikes are very subtle. Often experienced anglers cannot even remember why they struck. Try to develop your sixth sense and strike whenever something doesn't quite seem right. You may be pleasantly surprised.

Use a long enough leader to ensure your nymphs can easily sink to the bottom. However, try to avoid unnecessarily long leaders which make casting, detecting the strike and subsequent setting of the hook more difficult. In general a leader length of about four metres - the length of your rod and a little bit - is most suitable for the Tongariro and smaller rivers.

A very successful nymph fishing rig is a heavily weighted fly with a smaller (size 12 or 14) unweighted nymph on a dropper. This dropper should be about 50cm long and tied directly to the bend of the large nymph. Not only is this rig effective, it is much easier to cast than two heavily weighted flies.

Finesse, both in technique and equipment, will help increase catch rates in the smaller streams, particularly during conditions of low flow.



While in the river, Taupo trout do not usually move far to take a fly. When fishing a pool fan your casts so as to cover as much water as possible. Include several casts into the shallow margins. It is essential your flies are very close to the bottom but try to use only the bare minimum of weight to achieve this. Particularly in the smaller rivers and streams, rigs utilising excessively weighted nymphs do not appear to be as successful as more lightly weighted rigs.

Try dropping your weighted nymphs in a glass of water. You may well find many of your very heavy but very bulky nymphs do not sink any quicker than much more lightly but more sparsely dressed flies.

Large size 10 globugs and the like worked well when initially introduced in the mid-1980s but these days small versions tend to be much more effective.

When fishing the wet fly it is just as essential to get the fly close to the bottom. In the Tongariro an ultra high density sinking line is almost a necessity. However on the smaller streams a fast sinking fly line is usually sufficient.

Monofilament does not sink very quickly. If you use a long leader with a sinking line, even though the fly line may be near the bottom the fly may still be quite high in the water column. A leader of two metres is usually sufficient.

The longer you can let the fly line drift before the weight of the current causes it to swing the deeper it will fish. The easiest way is to let extra slack line go immediately after the cast.

Keeping in mind that the whole aim is to get your fly as close to the bottom as possible, watch where experienced anglers cast, how they hold their rods and work the line in different pools to achieve this.

More important than the actual lure pattern used is how it is fished. If you are not having success experiment with your rates of retrieve and how you let the fly swing in the current.

Under low clear conditions use smaller lures down to sizes 8 and 10.

Trout do not lie in equal numbers everywhere through the river. Normally as a fresh recedes a run will enter the river and over the next few days make its way up the river. This run may well be spread out over several kilometres and provide very good fishing, while elsewhere in the river it is quiet. Try to predict where a run is likely to be. For example, if the weather has been fine and settled for a few days it is likely any run is well past and initially you should try high up the river. Similarly, if a front is moving in it can be worth

getting as low downstream as possible to try and intercept the next run. Not all runs enter the river at night and a wet grey afternoon may well stimulate the start of another run and provide fishing in pools below the main road bridges of the eastern tributaries. Unlike other Taupo tributaries, a stiff westerly or south-westerly is often sufficient to send another run of fish into the Waitahanui.

Runs will occasionally enter the rivers under the most unlikely of conditions. If the fishing is slow try a completely different part of the river on the off chance.

Taupo anglers tend to concentrate on the runs entering the river between April and early August. However in recent years few freshes have occurred in April and May and the major runs have not showed until well into June. Conversely, good numbers of fish are still running into October.

The first angler through the pool is always likely to have success whether it is at dawn or late afternoon. Under crowded conditions it is unlikely, especially on the Tongariro, that a major pool will be left untouched that long. If you like to rise late you will not always have the same degree of success as earlier anglers. For many that is not important anyway.

Don't overlook fishing the 'pocket water' in the Tongariro River. This is found in those long stretches of fast flowing broken water which most people walk past. However in amongst the boulders and along the banks are quieter areas or pockets. Walking quietly up the edge tossing a nymph into all the likely spots can yield some very rewarding fishing.

It takes only a subtle change in conditions for a pool to no longer appeal to trout as a resting spot. Particularly after major floods be prepared to explore.

On the smaller streams examine the little runs in under the overhanging vegetation. If the opportunity exists explore the stream when it is low and clear, noting the location of the various runs and hollows and any troublesome snags. These streams often fish best while still a little discoloured but the lies are difficult to detect under such conditions.

If the fish are undisturbed they may lie in water only a few centimetres deep. If you are first through a pool it is best to fish from the bank and carefully cover the water at your feet.

Many of the pools on the smaller streams are created around logs and other debris. These can be difficult to fish with a nymph but anglers should not overlook the more traditional wet fly swum downstream into these corners.

Fishing tackle and techniques which work on the Tongariro are not necessarily suitable on the smaller streams. Particularly during low clear conditions use small nymphs or wet flies, small indicators (if any), avoid brightly coloured fluorescent fly lines and refrain from false casting on the water. If you can, use a lighter rod and line - it's much more enjoyable.

Often under such conditions the fish are visible if you look carefully, sometimes just as shadows moving on the bottom. If they refuse to take be prepared to try different techniques. Try different casts such as hook casts so that the nymph drops downstream of your indicator. Your apparently drag-free drifts may not have appeared quite that way to the fish.

One problem with these casts is that the fish may take your nymph without it ever registering back at your indicator. However often you will see the white flash as the fish opens its mouth or the fish will move sideways then back to its original position. If you think your fly is in the general vicinity quietly strike. Better still, teach yourself to fish without an indicator. It does wonders for your strike perception.

Large numbers of fish will often hold on the bottom of deep slowly moving pools and such water seems to attract the less experienced anglers. However catching these fish often requires long casts with very heavily weighted nymphs, skilled line mending and detection of the subtle strikes. If you are starting out you may find it much easier to fish those pools and runs which are only a metre or two deep with a reasonable current flowing through. This will assist your line mending and often emphasise any strikes.

A BIG HINT

At the time of writing (early March) the central North Island is extremely dry. Many rivers are as low as we have ever seen them. It is very unlikely there will be any large winter runs until significant rain occurs. In recent years this has not occurred until late May or into June. If you are planning a trip early in the winter we suggest you contact the Department or one of the local sports shops for an update. Regularly, visitors are disappointed to arrive to find continuing sunny skies and low river conditions while at home they have had days of heavy rain.

BITZ 'N' PIECES

POSSUM CONTROL OPERATIONS - WINTER 1994

This year Environment Waikato, with the support of the Department of Conservation, will be undertaking three major Animal Health Board-sponsored possum control operations in the Tongariro/Taupo Conservancy. These operations are aimed primarily at controlling Bovine Tuberculosis (Tb) in domestic cattle and deer herds by reducing the densities of feral animals such as possums, deer, pigs and mustelids, which act as vectors for transmission of the disease. However, they will also have significant benefits in terms of native forest conservation. The three operations are as follows:

- 1. April 1994** Lake Taupo lakeshore reserves (approximately 8,000 hectares) from Rangatira Point to Waikino on the western bays. This operation will be undertaken with 1080-impregnated carrot bait sown by helicopter.
- 2. July 1994** Kuharua/Pihanga Range (approximately 11,000 hectares) from the western edge of the range adjoining Moerangi Station in the head of the Kuratau River to the lower eastern slopes of Mt Pihanga including the whole of the Kakaramea/Tihia massif. This operation will be undertaken with 1080-impregnated carrot bait sown by helicopter.
- 3. August 1994** Waiotaka/Whitikau Catchments of Kaimanawa Forest Park (approximately 10,000 hectares) from Kaimanawa Road to the Waimarino River below the 1000-metre contour on the northern slopes of the Umukarikari Range. This operation will be undertaken with 1080-impregnated carrot bait sown by helicopter.

Full Environment Impact Assessments (EIAs) are being prepared for all operations. These will be available from Environment Waikato in draft form in April 1994.

In addition to these programmes, both Environment Waikato and the Manawatu/Wanganui Regional Council will be involved in maintenance control operations along bush/pasture margins around the conservancy.

Hunters should enquire at our Turangi office if they require further information relating to 1080 poison in conservation areas and they should take heed of any warning signs found on hunting blocks.

THE TB STATUS OF THE KAIMANAWA DEER HERDS

In October 1993, a permit to recover deer from some 5,000 hectares of steep wind-damaged forest on the northern slopes of the Umukarakari Range of Kaimanawa Forest Park (figure 1) was issued to a local helicopter operator. The permit was for a three month period and was issued with the following objectives:

1. To reduce the density of deer which are restricting forest recovery following major canopy collapse in this area of the park.
2. To provide demographic information on a sub-population of the Kaimanawa deer herds which are subject to only light hunting pressure and which are limited more by habitat quality than hunting.
3. To determine the level of Bovine Tb infection in the Kaimanawa deer herds in this part of the park. (Note: Bovine Tb has been known in feral deer and pig populations in the lower Whiti kau and Waitotaka Catchments for over 20 years. A recent outbreak of Tb at Timahanga on the Napier-Taihape Road was speculated by MAF to be caused by deer dispersing through the Kaimanawa Range from this source of infection).

The operator to whom the permit was issued took 62 deer from the block in a total of 23 aerial hunting hours. These included 60 red deer and two sika deer. Generally the deer were in terrible condition and very small, the average red deer carcass weighing just 31kg. The largest carcass was that of a 52kg red stag. Jaws taken from a sample of 25 of these deer suggest little breeding is occurring in this area. Only three of these jaws were from animals younger than four years old, the majority being barren mature hinds in the 5-8 year age group.

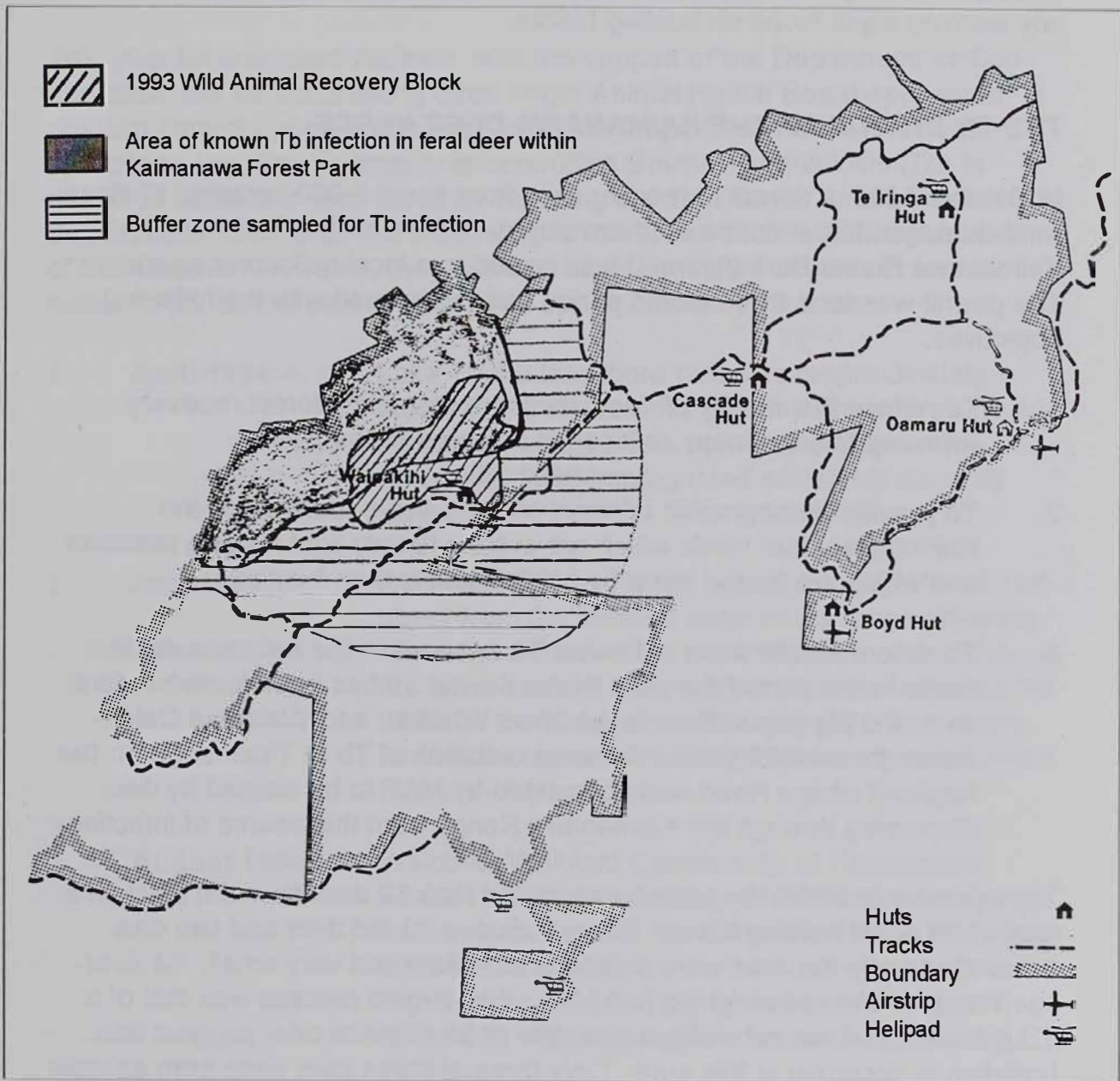


FIGURE 1 Wild Animal Recovery Operational Areas
Kaimanawa Forest Park, October 1993 - February 1994

As well as the small carcass weights, a number of deer were found to have Bovine Tb. It became apparent that the recovery operation was not an economic proposition and that if the objectives were to be achieved, some form of financial subsidy would be required. Discussion with Landcare Research NZ Ltd resulted in a research proposal being put to the Animal Health Board, the agency charged with the control of Bovine Tb in New Zealand, to recover carcasses for autopsy to help establish the true distribution and status of Tb in the Kaimanawa deer herds.

Initially 11 carcasses were recovered for autopsy from the original wild animal recovery area. Three of these deer had Tb while two others were condemned because of their poor condition.

Past records of deer and pig with Tb were collected and a 5km buffer area around the furthest outlying infection was identified. A further 32 animals were recovered from this buffer zone for full autopsy. These included 27 red deer and five sika. No infection was detected in these animals although carcass weights were low and animal condition ranged from poor to only fair.

In addition, further sampling effort was undertaken inside the area of known infection. A total of 12 red deer were recovered for autopsy. Autopsy revealed infection in six of these animals. A summary of results is presented in table 9.

| Sampling area | Hours Flown | Sika Deer autopsied | Red Deer autopsied | Sika with Bovine Tb | Red Deer with Bovine Tb | % deer infected |
|--------------------------|-------------|---------------------|--------------------|---------------------|-------------------------|-----------------|
| Buffer Area | 16 | 5 | 27 | 0 | 0 | 0% |
| Area of known infections | 15 | 1 | 22 | 1 | 8 | 41% |

TABLE 9 *Results of Bovine Tb sampling in deer from the north-western Kaimanawa Range - December-February 1993/94.*

The results of this survey suggest that although Bovine Tb has been present in the feral animal populations of the lower catchments of the north-western Kaimanawas for over 20 years, the disease does not seem to be spreading beyond the Waipa, Whiti-kau and Waiotaka catchments. This situation requires constant monitoring and hunters visiting the Kaimanawa Range are urged to report any deer they harvest which shows any sign of disease. ■

TAUPO, NEW ZEALAND



Situated right on the boundary of Kaimanawa Recreational Hunting Area and Kaimanawa State Forest Park, Sika Lodge provides budget accomodation with hot showers, full toilet facilities and well equipped communal cooking area. Your own sleeping bag will be necessary. Vehicle security services can be offered.

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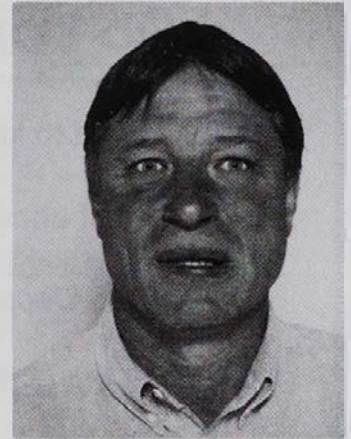
Phone Brent or Val Keightley Taupo (07) 378 4728
for Reservations (please book early)

MANAGER PROFILE

HERWI SCHELTUS

Based in Turangi, but known to regularly skip the nest to the Hawke's Bay and Wellington.

Herwi is a landscape architect with responsibility for the design and planning of facilities within both Tongariro-Taupo and Hawke's Bay conservancies. He has a major input into the signs in the conservancy and the design and construction of many of the amenities such as the angling tracks along the Waitahanui River.



His forte is landscape and habitat restoration and he wrote the series "Creating Ponds and Wetlands" in earlier Target Taupo editions.

His inability to say 'no' often leads Herwi down unexpected roads such as the development of the Department's new corporate image and its uniforms.

Herwi's creative past reappears whenever office work allows and sees him dabbling in woodwork and cabinet-making or on his own little bit of dirt. ■

TAUPO

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NOTES...

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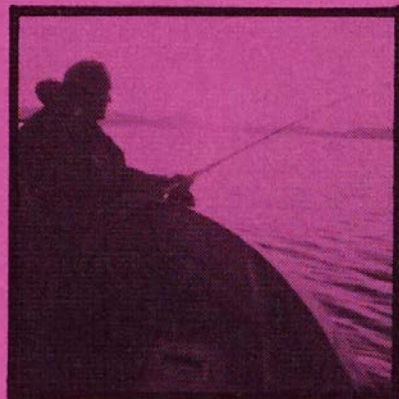
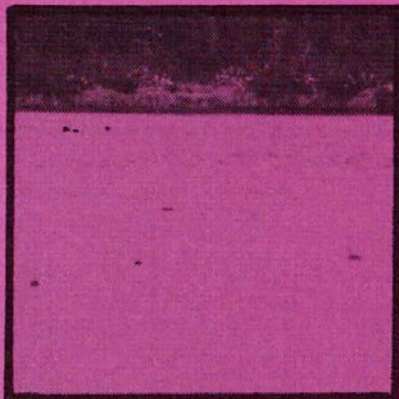
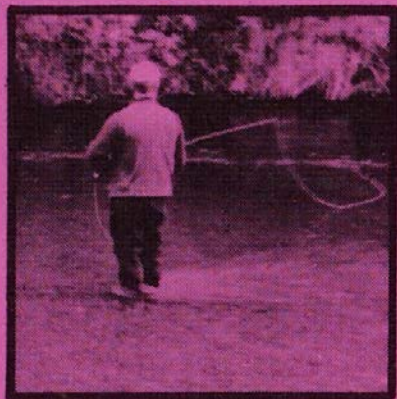
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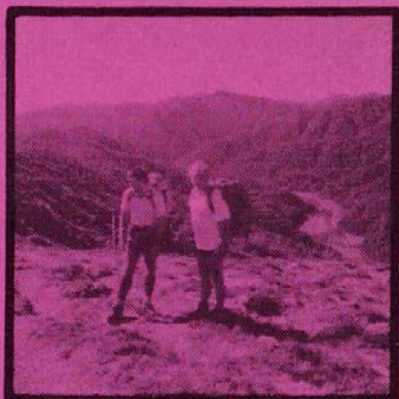
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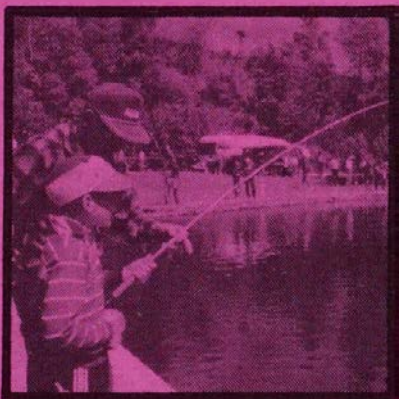
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