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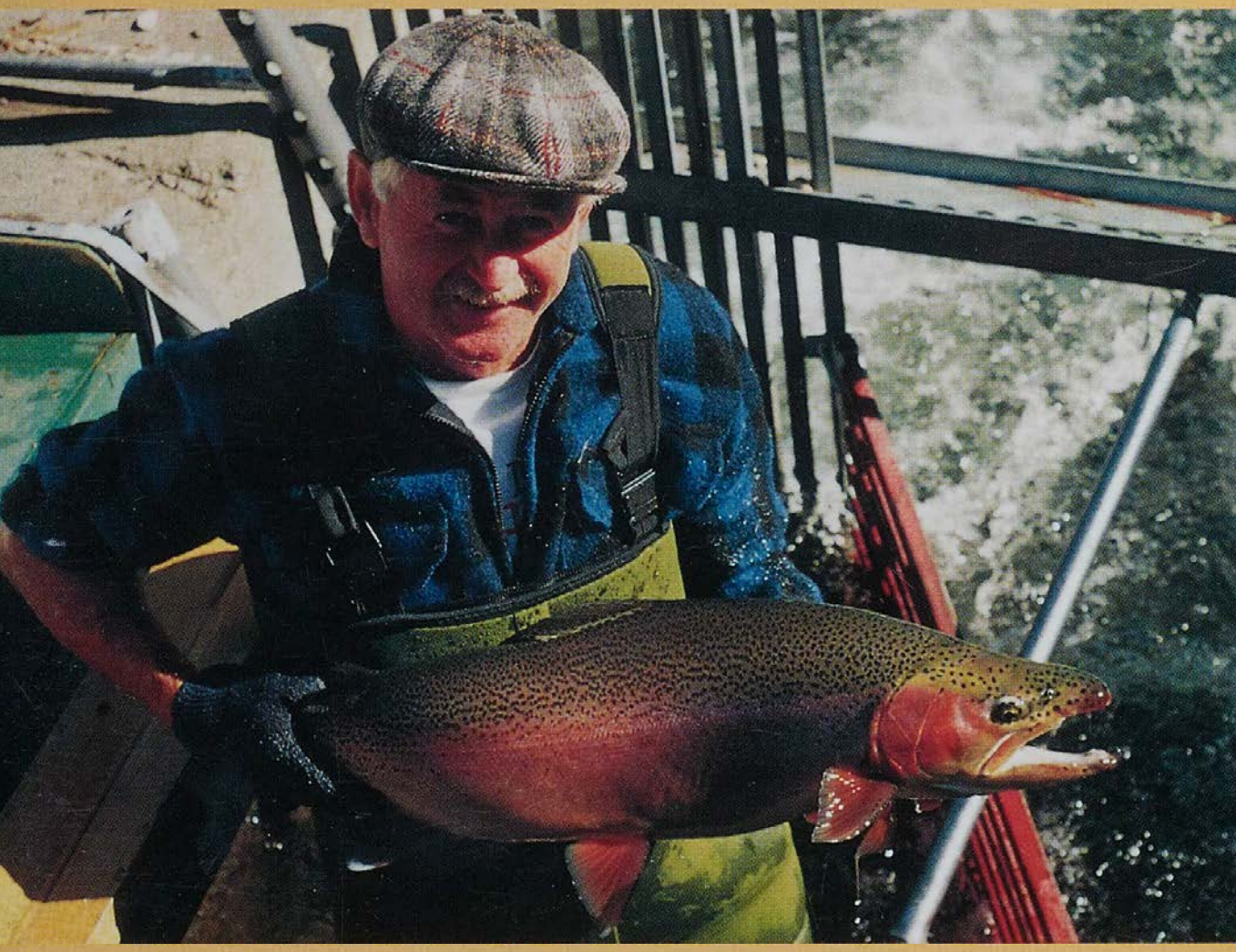
TARGET TAUPO

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

JULY 1996, ISSUE 22



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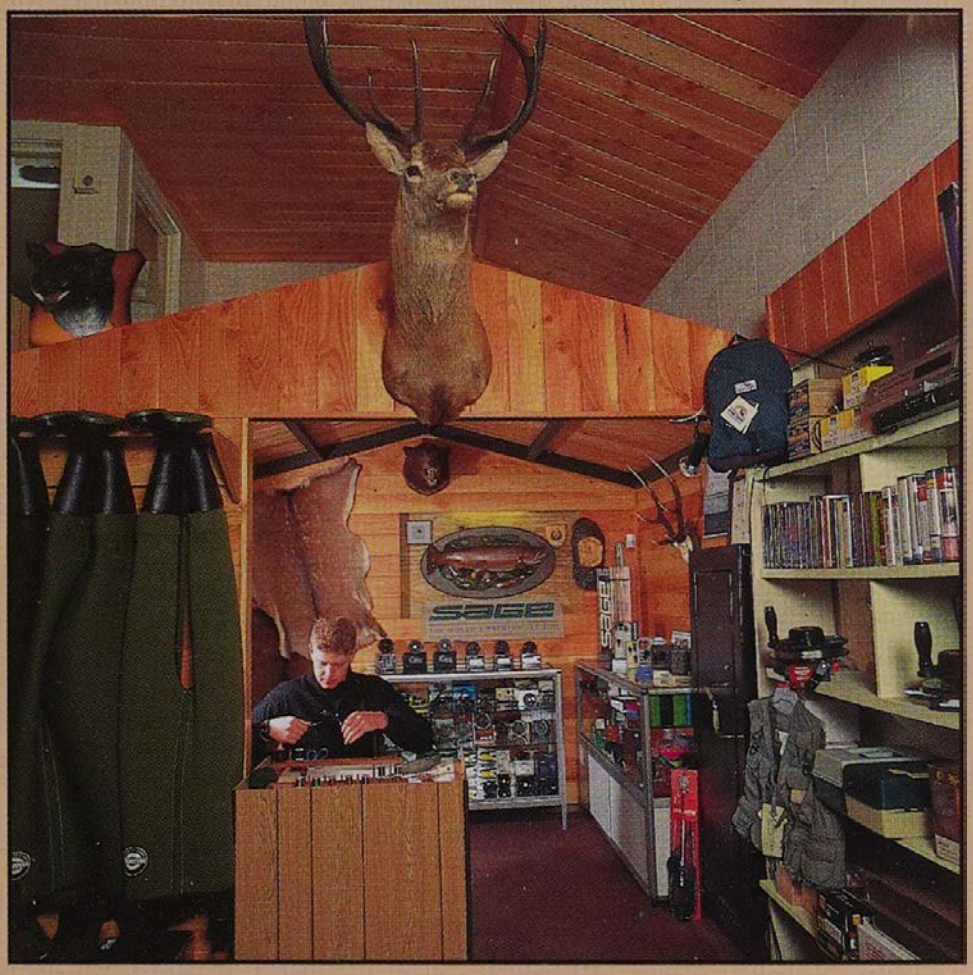

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TARGET TAUPO

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CONTENTS

Cover photo: Norrie Ewing holds a splendid 6.2kg rainbow male which passed through the Te Whaiau trap (Lake Otamangakau) in April this year.

Target Taupo available free

In the last issue we reported a change in the way we distribute this magazine.

Instead of supplying season licence holders with a complimentary issue of the July magazine and the remaining two issues (November and March) only to subscribers, all three issues will now be mailed free to our adult whole season licence holders.

This reflects our belief that Target Taupo provides a very successful forum with which to communicate to the users of the Taupo fishery. An important component of managing any fishery is to be able to get information to anglers so that they are well informed about the fishery and so can make best use of it. It is also essential that anglers are aware of current issues and so have the opportunity to make comment.

How will it work? When we receive the licence duplicates back from licence agents, the names and addresses of each adult whole season licence holder are put onto a computer database. This database becomes the address list for which to mail out three issues of Target Taupo over the following season. Therefore someone who purchased a whole season licence for the 1995/96 season just finished will get three copies of this magazine, starting with this issue and spread over the 1996/97 season. Similarly if you buy a whole season licence for this new season you will receive three copies of Target Taupo beginning July 1997.

Obviously it is very important that when you purchase your licence you fill out the details legibly and ensure the address is complete. Otherwise you may miss out!

For those people who do not hold a whole season licence and who wish to continue to receive this magazine our subscription service continues as before. If you are a current subscriber and also hold a whole season licence you should receive a voucher from us very shortly. The voucher will be to the amount you are in credit and will be redeemable against your new whole season licence.

There may be a few glitches in the system to start with, and if you have any queries or feel you should have received a voucher and haven't, by 30 June, please contact Shirley Oates at the Turangi office.

Catfish in Lake Taupo

by Grant Barnes, University of Waikato

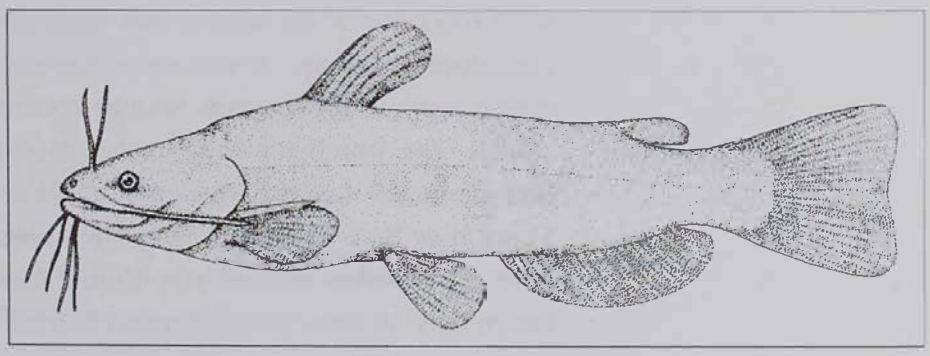
In 1995 the Department of Conservation funded a Masters student to undertake research into the basic ecology of catfish in Lake Taupo. The following is a brief summary of his findings.

Many anglers would now be well aware of the presence of an ugly fish that is found in large numbers around most parts of Lake Taupo. The brown bullhead catfish, also known by the Latin name *Ameiurus nebulosus*, originated from fresh and brackish water in North America and have been present in New Zealand since 1878. They were released into selected Auckland lakes as a sport fish and have since spread throughout the Auckland region and Waikato River basin. Catfish were released into Lake Taupo, intentionally or accidentally, sometime during the late 1970s or early 1980s.

Catfish are easily identified from other freshwater fish species in New Zealand by the presence of whiskers around the mouth and rigid spines in the dorsal and pectoral fins. The whiskers are used to sense prey from as far as 25 body lengths away, which allows catfish to feed successfully in dark or dirty water. Care should be taken when handling catfish as the spines are extremely sharp and can give the unwary a painful stab if handled incorrectly. Catfish are very robust animals able to withstand temperatures and oxygen levels that would kill many other fish including trout. They are able to survive long periods out of water so long as they remain moist, and have been known to be transported between different lakes by becoming trapped in boats, trailers and fishing gear.

In New Zealand, catfish normally reach a total length of 200-300mm, although they have been found to grow up to 500mm and weigh more than 3kg in the United States of America. Catfish generally live for about five years, but can reach up to eight years of age.

Catfish become sexually mature at about three years of age, and spawn during late spring and early summer. Catfish reproduction is different



Brown Bullhead Catfish *(Ameiurus nebulosus)* - Reprinted with permission, from New Zealand Freshwater Fishes, A Natural History and Guide, - R M McDowall, 1990

from many other fish in that the male exhibits parental care, resulting in high survival of offspring. A pair of catfish build a nest in sandy, weedy areas in water depths of between 15cm to 2m and eggs are laid and fertilised. The male then guards the nest during incubation and will look after the young once they have hatched, for up to three weeks.

The Department of Conservation is concerned at the possible impacts catfish could have on the ecology of Lake Taupo and more specifically, on the rainbow trout fishery. In 1995, DOC commissioned a study by the Department of Biological Sciences of the University of Waikato, which fulfilled the research requirements of my Master of Science degree. The purpose of the study was to investigate the diet, size, age, habitat preferences, spawning and how widespread and numerous catfish are in the lake.

Catfish were caught using fyke nets set in shallow water (<5m deep) in and around Waihi Bay and Motuoapa. Nets were set in weedy, rocky and sandy habitats late in the afternoon and left to fish overnight. Once captured the fish were immediately placed on ice and taken back to the laboratory to be weighed, measured and sexed. A proportion of fish had their stomachs and vertebrae removed for diet analysis and ageing.

A total of 6226 catfish were caught from 273 nets set between February and December 1995, giving an average catch rate of 23 fish per net per night. The greatest number of fish were caught in weedy areas at Waihi and Motuoapa Bays where it was not uncommon to catch over 100 fish per net per night. Amazingly, a single net set overnight in Waihi Bay during December captured over 600 fish.

The net was too heavy to haul into the boat and had to be tied to the bow and dragged to the nearest boat ramp to be emptied. Nets set at the rocky sites at Motuoapa headland and Pukawa yielded large numbers of catfish, although not as high as in the weedy areas. The high numbers of fish caught at both weedy and rocky sites contrasts with the very low numbers caught in sandy areas along Stump Bay and Pukawa. The average number of fish caught in these two areas each night was about three fish per net.

Most of the catfish captured during the study were two years of age and between 110-130mm long. Large numbers of fish greater than 200mm were also caught with fish up to 300mm quite common. The largest catfish caught was 370mm long and weighed about 500g. Fish smaller than 100mm were not easily caught as they were able to swim through the mesh of the nets.

Catfish were aged using a technique that looked at bands of different opacity found on the vertebrae of the fish. During cold periods the growth of most fish slows to the point that a clear zone is laid.

Increased growth in the following spring and summer lays down a concentric opaque zone. If each clear band is assumed to correspond with one winter, then counting the number of clear bands gives the age of the fish. The results showed that catfish appear to grow faster in Lake Taupo then in their native range in the United States. This is unusual, considering Lake Taupo is a reasonably unproductive lake when compared to high nutrient lakes in America. The high growth rate of catfish suggests there were large, unexploited food resources in Lake Taupo, or that some less competitive species had been displaced.

Catfish are opportunistic generalists, feeding nocturnally on or near the bottom. Though one can view catfish as the 'rubbish collectors' of lakes and rivers feeding on just about anything they find, they are also effective predators.

The diet of catfish in Lake Taupo, in order of importance, includes snails, insect larvae, koura, detritus, plant material and fish.

It is not clear whether catfish are having a negative impact on trout in Lake Taupo, and investigating this was not an objective of my study. However, one can speculate on the possible effects of catfish on trout from my results. There are four principal ways in which catfish could negatively impact on the number and size of trout in Lake Taupo. Firstly, catfish could be preying directly on trout. However no trout were found in any of the 283 stomachs analysed, therefore there is no evidence that this is occurring. Secondly, catfish could be competing with trout by consuming smelt, the primary food of trout in Lake Taupo. There is very limited evidence of this occurring (smelt were found in only three out of 283 catfish stomachs examined) and this competition is considered unimportant. Thirdly, catfish have been shown to eat significant numbers of koura, which are known to be an important part of the diet (about 30%) of large rainbow trout. Whilst most trout feed almost exclusively on smelt, large trout eat greater proportions of koura

Table 1: Percentage composition of food items by number in the diet of catfish of different size classes from both rocky and weedy habitats

Prey Item	Rocky		Weedy	
Catfish Length	50-149mm	>250mm	50-149mm	>250mm
Snails	13	12	27	25
Damselfly Larvae	0	4	0	13
Caddisfly Larvae	36	0	30	7
Zooplankton	0	0	15	0
Midge Larvae	23	4	24	8
Koura	4	64	0	15
Fish	0	8	3	9
Detritus	4	2	0	12
Plant Material	18	6	1	11

as they get larger and consequently large catfish could be in direct competition with large trout. However, the extent to which these two fish would affect one another is not considered very significant as large trout consume koura from deep in the lake and catfish are believed to be restricted to depths less than 30 metres. Fourthly, the diet of juvenile trout in Lake Taupo is not well known. If the littoral zone is important to juvenile trout at any stage, then they are likely to be in competition with catfish for the same food (e.g. invertebrates).

There is also a large potential for catfish from Lake Taupo to be processed and sold at commercial fish markets. Catfish caught as a by-catch of the eel fishery in the Waikato River basin are currently sold in the Auckland Asian food markets with 7500kg sold in 1993/94.

Catfish are extremely easy to catch, taking all types of bait. They are a great sport fish for young anglers and can be caught from about dusk until late in the night. Just remember to watch those spines. In contrast to popular opinion they make surprisingly good eating and are beautiful when smoked. Catfish are renowned as a Cajun delicacy in the southern United States of America and are now quite rare in those areas. Happy catfish fishing.

Ecology Stream exclosure plot

12 years after establishment

by Cam Speedy

An exclosure containing a standard 20m x 20m forest plot was established alongside an identical unfenced control plot on a forested river terrace in the Ecology Stream, a headwater tributary of the Rangitikei River catchment of Kaimanawa Forest Park, by New Zealand Forest Service in 1984. The plot was established to assess the impact of deer browse on forest understorey regeneration in an even age mountain beech stand on the terrace and was reassessed in 1986, 1991 and most recently on 12 March 1996. The recent reassessment was undertaken by Conservation Officers Dave Lumley and Cam Speedy of the Turangi office, who spent three days in the catchment looking at deer impact and forest regeneration patterns and trends in the wider catchment area. The following is a report of that assessment:

The Ecology Stream exclosure established March 1984

The Ecology Stream exclosure plot has been well maintained over its 12 year life and has effectively restricted deer access to the forest plot enclosed within it. The nature of the fence does not exclude possum access so any differences with the area outside can be directly linked to removal of deer impact. While possum sign was observed occasionally throughout the catchment, it appears possum numbers and impact are relatively low in this habitat type.

At the 1991 reassessment the two forest plots (fenced and control) were showing significant differences in understorey regeneration and composition and this trend has continued over the past five years. There is now a dense, 0.5-1.0 metre high swath of understorey regeneration within the fence consisting primarily of *Coprosma taylori,* and *Griselinia littoralis* seedlings, however, other palatable species such as *Pseudopanax simplex, Hebe stricta, Cordyline indivisor* and other *Coprosma* species are also prolific. Outside the fence on the control plot, the sparse understorey is dominated by mosses and herbs with scattered seedlings of most species, all of which are less than 15cm high. No palatable species get higher than 10cm, and the vigour of the seedlings is heavily reduced by animal

browse. *Myrsine divaricata* (an unpalatable understorey shrub) is the only species which occurs with any frequency in the browse tier. Overall species diversity on the exclosure plot totals 38 species, while on the control (unfenced) plot 29 different species are growing.

The dramatic difference in understories between the exclosure plot and the control plot due to the absence of deer on the exclosure plot over a twelve year period is clearly shown in the photos. Not only is species richness considerably higher inside the fence but understorey biomass is also significantly greater.

Stand dynamics of the canopy on both plots appears to be similar with overall stem density decreasing as individual stem diameter has increased in the stronger, faster growing trees. Total canopy basal area has decreased in twelve years with basal area now at around 45 square metres per hectare while canopy stem density has dropped from over 2100 to 1060 stems per hectare as the stand has naturally thinned. Deer do not appear to be having an impact on these processes and they appear to be following natural trends identified in other studies of mountain beech forest around New Zealand.

Beech regeneration, despite the intact canopy, is surprisingly high within the exclosure with 42,000 seedlings taller than 15cm per hectare. This reflects the canopy basal area dropping to a level that allows sufficient light to allow regeneration to begin. While there are beech seedlings present in the less than 15cm tier in 13 of 24 (54%) seedling plots on the control (unfenced) plot, no beech seedlings were present in the taller tier (>15cm) suggesting that beech regeneration is inhibited by deer at this site. However, given the healthy, intact nature of the canopy this is not a major concern at present. Of potentially more concern are areas in the catchment where canopy die-back or collapse has occurred and where canopy replacement may be inhibited. However, observations made around the catchment during the March 1996 visit suggest this is not the case, with adequate mountain beech seedling and sapling growth in most areas where light gaps occur as a result of snow break, canopy collapse, wind damage or on erosion scars. Canopy regeneration is not being seriously compromised by deer impact at these types of sites in the catchment.

A total of 15 deer were seen in the catchment in a total of 32 hours inspection and hunting. Many more were heard giving alarm calls but not seen. A small but healthy sika yearling was shot. Except for a single red deer hind and her fawn seen on the open alpine tops of the Makorako Range, all deer seen were sika and most were within 200

metres altitude of the creek beds. Sika deer seem to prefer the lower valley habitats within the catchment and it is these areas which are most heavily modified by selective browsing, particularly on north facing slopes. Upper altitude forested slopes (between approximately 1150 metres above sea level and the bushline at 1300 metres) appeared to have very low deer density and minimal impacts were apparent. It is the opinion of both staff present that deer numbers were down on the previous inspection period in February 1991 when 14 hours inspection and hunting (by the same staff) resulted in 12 deer seen and four shot. This is possibly as a result of two factors. Firstly, natural deer mortality - (two old, but complete, mature sika hind skeletons were found on this trip and numerous reports of have been received from hunters in the area over the past four years of dead deer in the catchment). Secondly, increased hunting effort following publicity about deer impact in the catchment after the 1991 assessment, combined with the facilitation of brief but well targeted annual helicopter access periods for recreational hunters to three separate sites in and around the area since March 1992. Hunting records show that a least 407 deer (125 sika and 282 red)

A dense understory of palatable species has developed inside the fence over the 12 year period that deer have been excluded

have been removed by recreational hunters from DOC administered land within the catchment over this period.

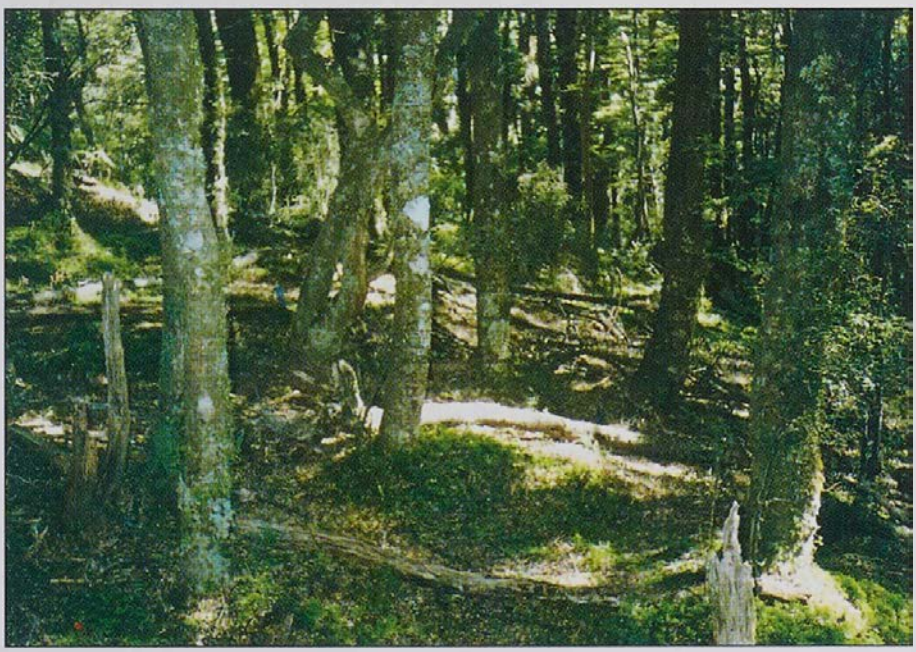
Erosion was regularly encountered on steeper slopes, often the result of tree fall, but also as a result of natural rock fall, water blow-outs in pumice terrace landforms and/or steep bed-rock scree slopes. While many of these erosion scars were still active, many older scars were observed, upon which, healing and stabilisation had begun. Mountain beech saplings and *Coprosma pseudocuneata* shrubs and *Rubus* species were the main stabilising plants at such sites. The riverbed in Ecology Stream gave the appearance of being very stable and carrying relatively small bed loads for such a large catchment. Despite recent heavy rain and obvious flooding, little riverbed movement had occurred as evidenced by the heavy build-up of algae on rocks.

The 1995/96 summer growing season appears to have been a good one with significant new growth on most trees and shrubs. Grass and herb growth on forest and riverflat clearings had kept ahead of deer (and to a lesser extent possum and hare) browse and small unutilised standing crops of feed were available in most places. This abundance of feed was reflected in the health of

the deer seen and shot in the catchment during the visit. Most mature hinds appeared to have fawns at foot.

It appears that the present deer harvest regime in the catchment is not seriously compromising catchment stability and is allowing satisfactory beech regeneration to ensure continuation of a mountain beech canopy below bush line. The closer one gets to bushline, the better the situation gets in terms of forest regeneration. However, the floristic diversity of forest understories continue to decline under selective browse pressure from mainly sika deer in the lower valley habitat. This situation continues despite a significant increase in the access opportunities for hunters in the past five years and an apparent (though unquantified) decline in deer density. It is unlikely that any other recreational harvest regime would increase understorey diversity because the nature of the vegetation and terrain restricts the success of foot hunting. Aerial harvest is an option but it is the opinion of the author that because of the small carcass size of the predominantly sika population (less than 25kg), the dense escape cover, and the distance from road ends, that legitimate aerial harvest is not commercially viable in this part of Kaimanawa Forest Park and would not improve the situation.

The Department of Conservation will therefore need to consider one of two options in light of these factors - accepting the decline in understorey floristic diversity and attempting to maintain a beech canopy with a deer modified understorey or providing additional resources to investigate and implement alternative control options.

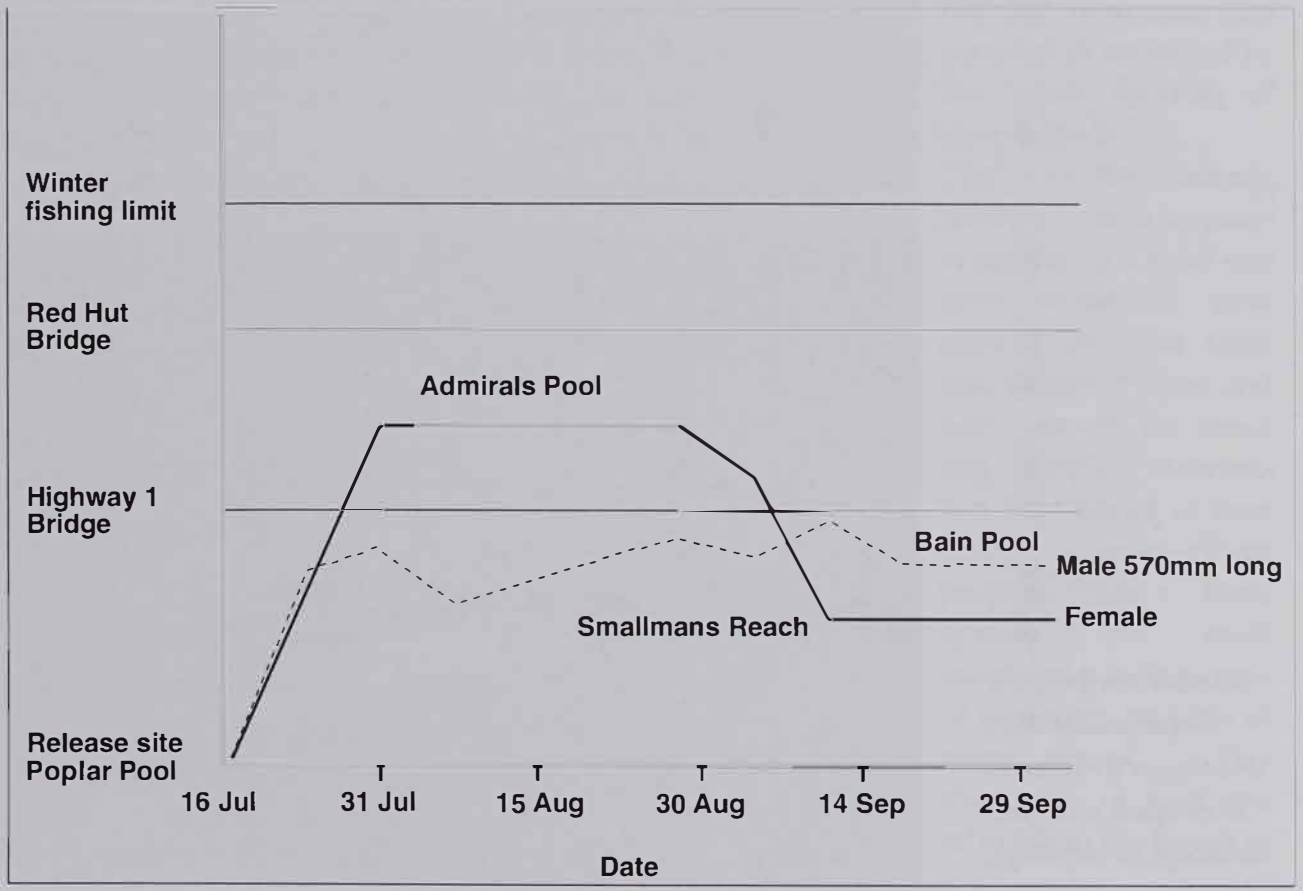


Outside the plot the forest understory continues to remain very open with few seedlings or saplings.

Trout spawning migration patterns in the Tongariro River

by Michel Dedual

In issue 21 of Target Taupo we summarized the results obtained from last winters' radio tracking experiment, building an overall picture of tagged rainbow trout behaviour in the Tongariro River. However, during the analysis of the data it became evident that all fish did not behave the same. In fact some huge differences existed in the way individual fish moved up the river. Regardless of what was happening in the river some fish would be moving upstream, others downstream, and some holding stationary. Even following the Ruapehu eruption fish showed different reactions. To illustrate the variability of fish behaviour during the spawning migration, we will describe the migration history of four pairs of radio tagged rainbow trout, each pair tagged and released on the same day between June



Graph 1 - Spawning migration of two radio tagged rainbow trout released on 16 July 1995

and August 1995.

The first pair of fish were both previous spawners (i.e. had spawned at least once before), a female (solid line on Graph 1) and a large male (dotted line). Both fish were released at the Poplar Pool in the lower river on 16 July.

The female travelled fast toward Admirals Pool where she arrived on 2 August (17 days later). She spent four weeks there spawning in the tail of the pool. Then she dropped slowly down to the Delatours Pool where she spent another three weeks before disappearing. Such a spawning migration pattern is typical of the female. Females generally have four stages in their spawning migration: upmigration to the part of the river where they were born, resting awaiting final egg maturation in this area, followed by egg deposition, and then a postspawning migration down. The downstream migration of fish has fueled lots of arguments among scientists, some of them saying that the fish swim actively downstream, others arguing that fish just drift passively down, helped along by floods. Our results from this study proved that some fish spent more time in the river after spawning than others prior to their return to the lake. This suggests that both explanations above may be partially correct but neither is completely right.

During the same period the male moved up and down between the Reed Pool and the Stones then swam back to the Jones Pool. Here he spent two days before he moved back up to the Swirl Pool. A flood pushed him back into the Bend Pool but he again moved up, this time to the Bain Pool from where he disappeared.

An obviously quite different pattern of movement between the male and female. Let's look closer at the male migration by following two more males up river (Graph 2).

The first male moved slowly up reaching the Reed Pool within two weeks from release in the Poplar Pool. He spent the next two months within the Reed occupying different parts of the pool. Then he slowly moved down and was tracked for the last time on 11 September in Delatours Pool.

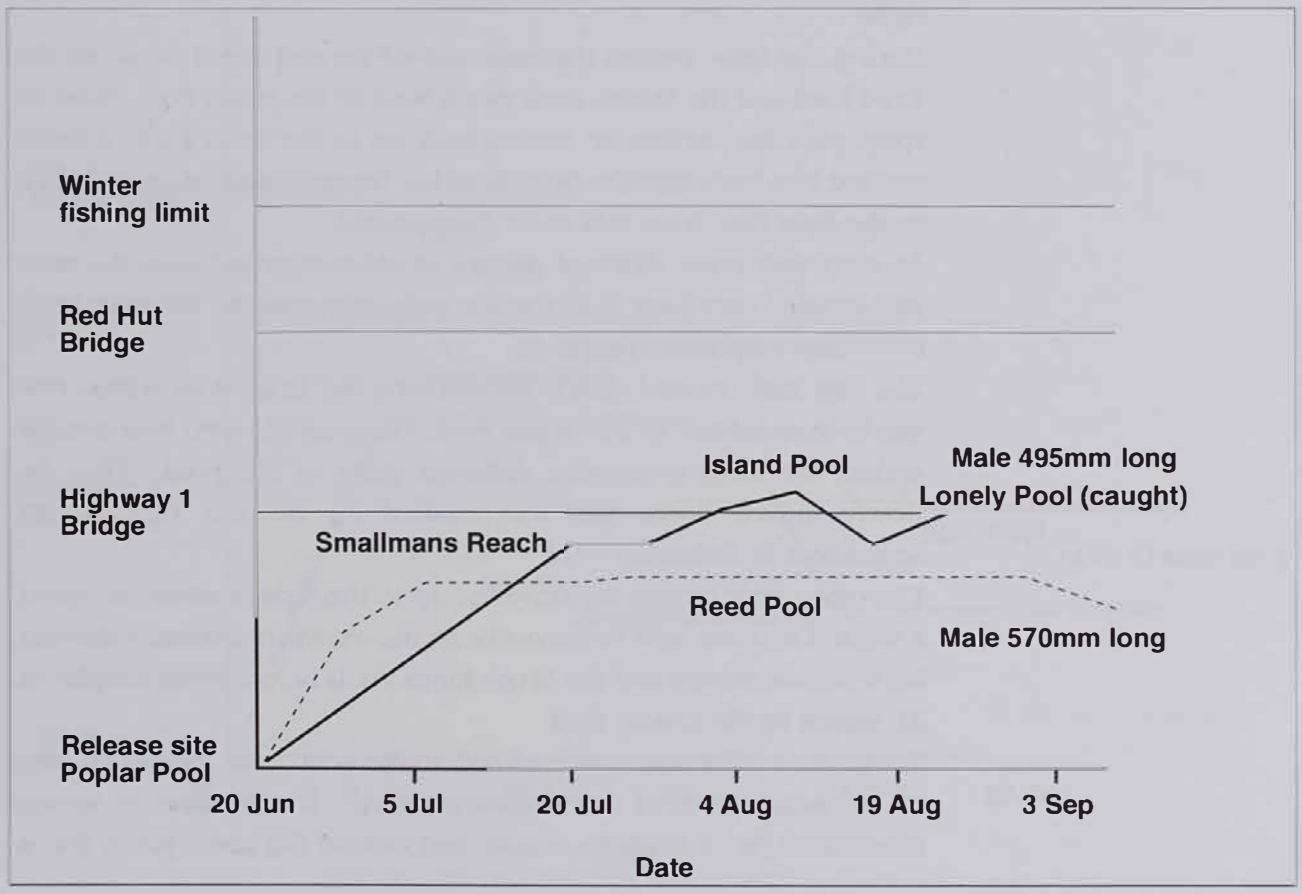
The other male in one day travelled up to the Stones where he spent a week. Over the next two months he moved short distances, moving between the Stones and the Major Jones Pools before being caught on 23 August in the Lonely Pool.

These two different patterns of movement may relate to the hierarchical status of the individual fish. If the male is strong (dominant), he is likely to remain and defend the same patch for as

long as he can, so long as there are spawning females around. This suggests that the first male was dominant. The two months that the male spent in the Reed Pool regularly fighting off other males and mating with suitable females gives an insight why the condition of fish and particularly that of males after spawning is so poor.

However, if the male is not the dominant male present he will have to move up or down until he can find a spot that he can occupy and defend. Dominance in males is related to the size of the fish. A larger male will compete more strongly than a small one for access to the female. It is interesting to note that the size of the female present will also affect the intensity of male competition. Males compete more for females of their size or larger than for smaller females. Furthermore, the larger the male is, the stronger this selection for females of its size or larger. This selection guarantees that the largest females will be courted by the largest male. There is also competition among females for the best nest site (redd) but the importance of size in females is unclear. Females which are not holding territories are largely unattractive to males. However, the presence or absence of males can affect competition amongst females. Females are more aggressive in the absence of males than when males are close by.

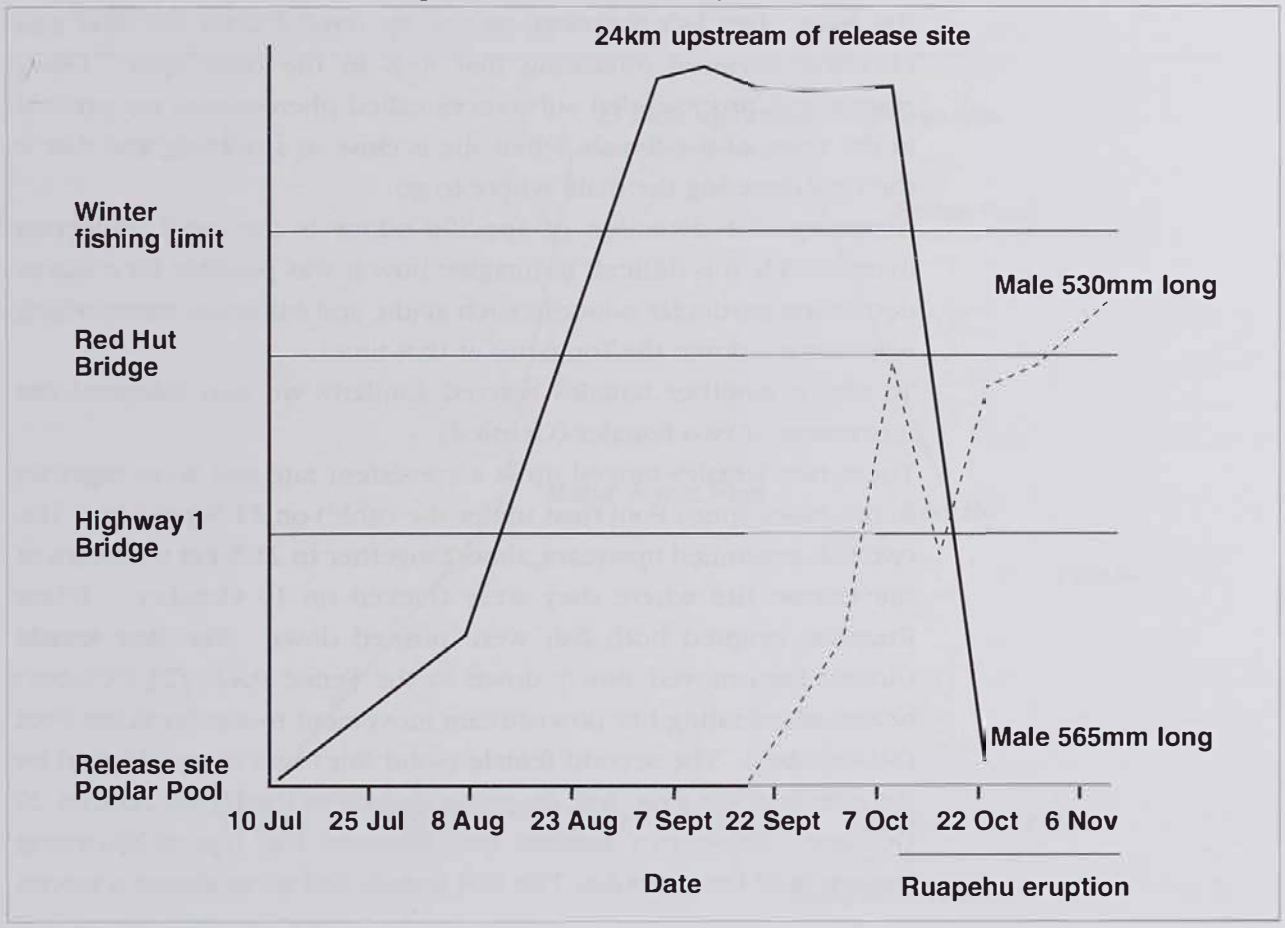
Graph 2 - Spawning migration of two males whose maturity was unknown. One 570mm long (solid line) and the other 495mm long (dotted line)



How did the Ruapehu eruption affect the spawning migration? Let's look firstly at the movements of two more males (Graph 3).

The first male (solid line) moved upstream fairly consistently to a pool 24km upstream of the trapping site (close to Poutu dam). He spent more than a month here before dropping down very quickly and disappearing. The second male (dotted line) started his migration later in the season and moved up fast, running from the release site to the Red Hut Pool in less than 10 days. When the eruption occurred this fish dropped back down and was tracked in the Stones Pool (four days after the eruption). He spent a week here then resumed his upstream migration and was located in the Boulder Pool 15 days later. The first male had the typical pattern of movement of a dominant male, spending about two months in the same spot. The eruption timing may have matched the natural end to his spawning or after two months he was too weak to withstand the eruption effects. However, the effects of the volcanic contamination in the Tongariro was more dramatic on the second male (dotted line). He was moving upstream like a torpedo when he was hit by the aftermath of the eruption. He immediately moved downstream to the Island Pool

Graph 3 - Illustration of two different reactions to the Ruapehu eruption from two males 565mm (solid line) and 530mm long (dotted line)



where he rested for a few days before resuming his upstream migration. Once he started moving he again travelled quickly to the Duchess Pool but then slowed. This behaviour may indicate the typical effect the eruption had on fresh, fast-running male fish. It also suggests that the river was more affected by the eruption in its upper part than lower down.

However this poses another question: what clue did the fish use to recognise that he had to go back upstream?

It is known that most trout and salmon return to spawn in the stream where they were born. Rainbow trout belong to the Pacific salmon family and some research suggests that rainbow trout do not only return to the stream but to the particular section of the stream where they were born. This may explain, at least partially, why some males migrate through the lower river without hesitation even though spawning is occurring there. The information regarding which part of the river they were born in is partially provided by odour clues. The knowledge about the type of clue that salmonids use is fragmentary though. Some research suggests that the soil of the surrounding catchment may leach a chemical specific to that part of the river. The fish therefore moves up until it does not find this chemical anymore indicating that it is in the right spot. Other researchers propose that substances called pheromones are present in the urine of the female when she is close to spawning and that is the clue directing the male where to go.

Assuming that detection of specific odour is the most important location clue it is difficult to imagine how it was possible for a fish to detect any particular odour in such acidic and sulfurous water which was flowing down the Tongariro at that time!

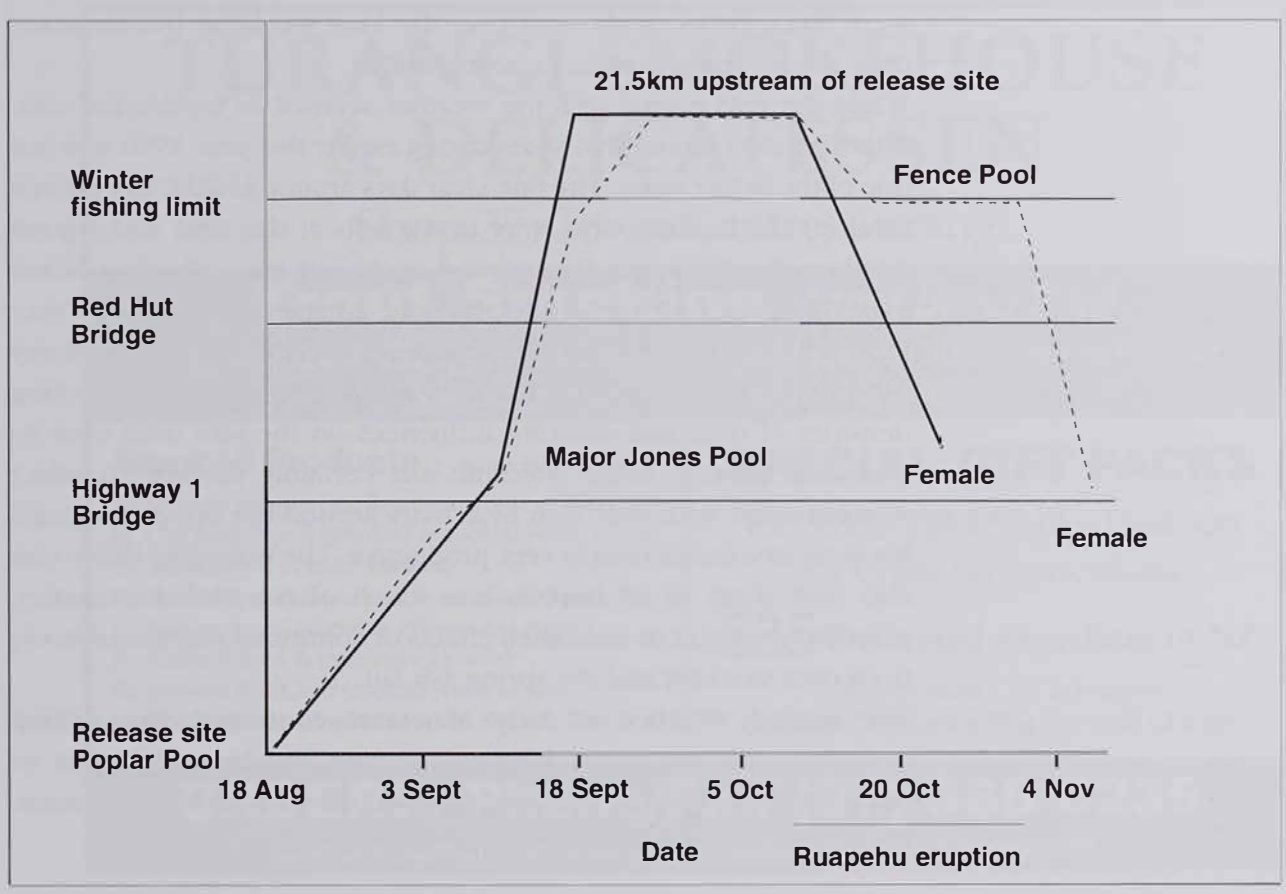
To check whether females reacted similarly we also followed the movement of two females (Graph 4).

These two females moved up at a consistent rate and were together in the Major Jones Pool (just under the cable) on 11 September. The two fish continued upstream, almost together to 21.5 km upstream of the release site where they were tracked on 10 October. When Ruapehu erupted both fish were pushed down. The first female (dotted line) moved slowly down to the Fence Pool (25 October) before accelerating her downstream movement to the Breakfast Pool (30 October). The second female (solid line) was more affected by the effects of the eruption, dropping quickly to the Hydro Pool on 20 October. These two females had followed the typical spawning pattern until the eruption. The first female had spent almost a month

on the spawning ground and so for her, the eruption may have coincided with the natural end of spawning. However, the other female (dotted line) had obviously not completed spawning and she tried to resist the eruption impacts for as long as possible before giving up. This example makes us wonder how determined to spawn these fish must be.

In summary, it is very apparent from these examples (and a lot we haven't shown here) that spawning fish in the Tongariro (and probably elsewhere) follow all sorts of patterns of movement up the river. However what is most revealing is that of the 27 fish which continued to move above the winter fishing limit, the average time to run from the release site in the lower river to this point was 41 days. The fastest fish reached the limit in 12 days and the slowest in 87 days. The common thought many anglers share that fish run the river in only few days and are quickly past the open fishing area has been proven well and truly wrong. During winter there are always fish in the river but under low clear conditions they do become unsettled by angling pressure and move to those areas of the river where they are out of reach.

Graph 4 - Illustration of the reactions of two females released on 18 and 23 August to the Mount Ruapehu eruption



Autumn Hunting Summary

by Cam Speedy

The rut of 1996 promised so much following a great growing season which allowed many deer to obtain prime condition through late summer but unfortunately for many hunters the wild, wet autumn weather had the final say.

The red stags started early as predicted and were going strong throughout much of the conservancy by 25 March. Settled weather until 30 March allowed for some good early rut hunting over most of the conservancy, including the central Kaimanawa Range which produced a red roar not bettered since 1989. Tongariro National Park was perhaps the exception with poor roaring early on although hunters reported taking some good stags from the southern slopes of the mountain and the roaring did continue into May.

Unfortunately heavy rains accompanied by gale force winds came with April fools and most of the first half of April was a wash out. Easter fell perfectly for the red roar this year and a number of stags were taken between showers over the long weekend, but for many their annual trip was rather uncomfortable.

While the reds roared well the weather seemed to trouble the sika. Although they seemed to start roaring earlier this year, 1996 was not one of the better years. The fine clear days around ANZAC day proved ideal for the hunters who were in the hills at this time and a good number of mature stag jaws turned up in our jaw collection boxes over the week but overall the sika roar appears to have been very localised. A select few hunters reported excellent activity but many others were disappointed at the poor show. This reflects the varying densities of deer and differing influences on the sika herd over its wide and diverse range. Volcanic ash certainly seemed to affect western areas with little sign or activity around the upper Tongariro River, an area that is usually very productive. The Waipakihi Valley was also well short of its best as was much of the Mohaka country, possibly as a result of combined effects of continued nutritional stress from over stocking and the spring ash fall.

The settled weather in early May saw continued sika rutting behaviour through duck shooting opening and beyond but as so often happens, hunting pressure dropped off through May and some of the best sika stag hunting opportunity was missed.

The high quality of the 80 or so heads entered in the 1996 Sika Trophy Competition suggest the growing season had a favourable impact on antler development this year. This year's competition had a slightly different focus which will hopefully start to help hunters to not only get the best from their sika resource, but will also allow them to make an increasing contribution to forest conservation in the future. The results of the competition are discussed in a separate article in this issue of Target Taupo.

A total of 3043 hunting permits was issued for the 1 February to 31 May 1996 permit period. This is similar to the average number of permits issued over the past five years (3022) and shows that hunting continues to be a major recreational focus in central North Island forests.

The high level of hunting interest has resulted in a number of hunting accidents in previous years but it is pleasing to note that this year no fatalities occurred in this conservancy. Oamaru Hut does however, have a .270 hole through the walls as a result of an unintentional discharge. This incident caused minor wounds to an incredibly lucky occupant who was in the kitchen at the time and highlights the need

for high levels of firearm safety on public land. Unfortunately there were a number of fatalities over the roar in other parts of the country. Most related to mis-identification of the target.

Less than 100 hunting diaries had been returned by the end of May when copy for this issue of Target Taupo was due to the printers so no analysis of hunting data is available for the period at this stage. However, a summary of the data obtained from diaries for the roar period will be available once the information starts rolling in during June and this will appear in the November issue along with the names of those who won prizes valued at over $1200 in the autumn diary prize draw.

The majority of the data from 1995 has now been processed and a summary of this, together with all hunting data collected in the current format since 1990 is shown in Table 2 The data gives a rough indication of trends in animal abundance on land administered by the conservancy over the past six years. The clearest trend is the decline in goat harvest since 1990 corresponding to severe reductions as a result of DOC control programmes. Deer trends, especially when combined with deer jaw data obtained through the same period, clearly indicate that hunting pressure is heavy and that the recreational harvest regime is restricting population growth. Many of the more accessible habitat areas continue to have low deer density and suffer from minimal deer impact. This is offset to some degree by the less accessible and more difficult to hunt areas where deer density tends to fluctuate around carrying capacity and be influenced by climate and/or other natural events (e.g. volcanic eruptions) as much as by hunting pressure. Overall though, deer numbers are stable at generally low to moderate density throughout the conservancy.

Another interesting aspect of the data is the comparison of deer kills in Tongariro Forest in 1995 to previous years. Despite the 1080 carrot poisoning operation in June 1995 over 13,000ha (60%) of the forest, deer harvest was not dramatically reduced, indicating that the poison operation was not as devastating as many hunters would prefer to believe.

The most disappointing aspect of the data is that it clearly shows hunter support for providing data has steadily declined since 1990. This is not unexpected since hunters as a group generally perceive the Department of Conservation as trying to eradicate the game animals they aspire to seeing well managed. Recent debate over issues like 1080 poisoning and continued hunter frustration over

helicopter game recovery are major contributors to that conflict. The decline in support in providing data is unfortunate since effective management is not possible without accurate information. While many hunters do not realise it yet, good deer management does depend on good forest management so there is considerable common ground between hunting aspirations and forest conservation. After all, without good habitat, no animal will thrive!

Perhaps the pending 'National Deer Plan' to be prepared by the Department of Conservation this year will be just the opportunity hunters need to voice their concerns and perspectives. We encourage you to use this opportunity wisely!!!

In the meantime, we hope the support for providing accurate recreational hunting data will improve.

Don't forget that winter hunting of sika is a challenge well worth pursuing, especially following the first big dumps of snow which bring what remains of summer in the canopy to the forest floor. Trophies will be available until mid- October and maybe, if you're lucky, you will find a big stag too busy trying to stay warm, dry and well fed, to notice your presence. Good luck!

Table 2

Recreational Hunting Statistics - Tongariro/Taupo Conservancy 1990-1995

Area Hunted	Year	Days of Hunting Reported	Proportion of total Specified Hunting 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
	1994	1580.0	31.0	210	18	5	-	0.148
	1995	1209.0	29.1	197	2	1	-	0.165
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
	1994	1679.5	32.9	169	126	2	-	0.177
	1995	1378.0	33.1	202	123	1	-	0.237
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	-	0.351
	1994	643.5	12.6	7	194	5	-	0.317
	1995	458.0	11.0	6	133	4	-	0.312
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
	1994	515.5	10.2	1	115	2	61	0.347
	1995	514.0	12.4	-	99	3	72	0.339
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
	1994	135.0	2.7	-	35	-	37	0.533
	1995	97.5	2.3	2	42	-	47	0.933
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
	1994	130.5	2.6	24	3	-	-	0.207
	1995	90.5	2.2	16	2	-	-	0.199
Unspecified Returns	1990	1107.0	-	85	135	11	85	0.288
	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
	1994	377.0	-	17	64	3	28	0.289
	1995	367.0	-	20	33	-	4	0.155
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
	1994	5099.0	-	439	556	17	143	0.227
	1995	4160.0	-	450	436	9	123	0.248
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	-
	1994	1000	-	87	109	4	28	-
	1995	1000	-	109	105	3	30	-

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

	1990	1991	1992	1993	1994	1995
No. of 4-month hunting permits issued	6865	7033	6668	6344	7237	6641
Average return rate (% of issues)	31.6%	30.8%	29.0%	26.5%	23.1%	19.8%
Proportion of successful hunters	38.4%	33.9%	33.9%	35.4%	31.8%	31.1%

Something Fishy

Summary of last summer's fishing

This summer, nearly 1200 anglers were stopped while fishing on Lake Taupo, their licences checked and details recorded of their angling success.

From this data, catch rates for each fishing method can be calculated. In the past catch rates (usually expressed as the number of fish caught per hour) were calculated by taking the total of all fish caught, and dividing this by the total number of hours of effort expended by anglers. For example if a survey recorded 75 fish caught for 300 hours of effort the catch rate would be 75/300 = 0.25 fish/hour. This method of calculating catch rate is still considered the most suitable when using the catch rate to calculate the total harvest. However, recent work overseas suggests measuring anglers' success by calculating the catch rate for each individual angler and then taking the average of all these is a better approach. This is thought to provide a more accurate description of what the average angler experiences. It can make quite a difference as the following table illustrates. In Table 3, catch rates on Lake Taupo are broken down by method and month and are shown calculated by both methods. The figures in brackets are total fish/total hours and the other figures, the average of all the individual anglers' catch rates.

Table 3

Method	Month			
	December	January	February	March
Shallow trolling	0.28 (0.33)	0.16 (0.17)	0.14 (0.13)	0.17 (0.15)
Lead lines	0.29 (0.30)	0.14 (0.14)	0.16 (0.15)	0.15 (0.17)
Wire lines	0.67 (0.64)	0.16 (0.22)	0.18 (0.17)	0.63 (0.51)
Downriggers	0.31 (0.34)	0.37 (0.39)	0.40 (0.35)	0.65 (0.60)

Shallow trolling is what many anglers refer to as harling.

In future when we are using catch rates to describe angler success we will use the average of all the individual catch rates because this describes more closely what most anglers actually experience. From the previous table it is once again apparent that early in the summer all methods of trolling are equally effective, other than the success using wire lines which appears somewhat of an anomaly. Catch rates of around 0.3 fish per hour are regarded by managers as very good for Lake Taupo, bearing in mind these are the average for all anglers

stopped.

However, as the summer progressed and the fish moved deeper in response to the increased boating and swimming activity and higher water temperatures, those methods able to reach greater depths had correspondingly more success. We would have expected the catch rates for wire lines to be closer to downriggers given the similarity between the methods in terms of actual depth fished. The difference is likely to be an artefact of the small size of each database when broken down into monthly subgroups. Table 4 summarises the catch rate combining all the data collected for each method and compares 1994/95 and 1995/96. This does show a very similar level of success between wire lines and downriggers.

Table 4

	1994/95	1995/96
Shallow trolling	0.30	0.22
Lead lines	0.26	0.21
Wire lines	0.42	0.38
Downriggers	0.30	0.37

The 1995/96 data includes data for late February and March not collected in the previous summer. As discussed the catch rate for the methods involving trolling at shallow depths falls away after Christmas, and including this data, pushes down the average catch rate for these methods. Over the December and January period catch rates for the two years were very similar.

As part of checking each angler any fish in the bin were measured. Four hundred and forty two rainbows were measured which had an average length of 493mm. No brown trout were seen emphasising just how rare they are in the boat anglers' catch.

Of 1180 anglers checked, 59 (5%) were required to produce a current fishing licence within seven days and 16 (1.4%) face further action. In addition, several anglers face prosecution for exceeding the daily bag limit or for using two rods.

We are very pleased with the high degree of compliance and also the degree of co-operation from the vast proportion of anglers we approached.

Summer fishing - Lake Otamangakau

Regular surveys were also undertaken on Lake Otamangakau

involving more than 200 angler interviews. The average individual catch rate, broken down by method and month, is listed in Table 5 As a comparison, the catch rate obtained by dividing total fish/total hours is in brackets.

Table 5

	December	January	February	March
Fly fishing	0.06 (0.12)	0.11 (0.14)	0.12 (0.12)	0.22 (0.32)
Shallow trolling	0.29 (0.29)	0.10 (0.06)	0.20 (0.20)	0 (0)
Spinning	0 (0)	0 (0)	0.11 (0.11)	N/A

The difference in fly fishing catch rates calculated by the two methods for December and March highlights the effect of each method of calculation. In these months most anglers found it very hard though several experienced anglers or anglers who struck it right had very good fishing. The lower average individual catch rate reflects what most anglers actually experienced, that the fishing was difficult.

To assess the harvest though, we should still use the total fish/total hours. For fly fishing this gives an overall catch rate of 0.15 fish per hour, or exactly the same catch rate as measured last season. As a consequence of last year's harvest survey (*Target Taupo*, Issue 19), we identified that the potential harvest of trout could be critical to the ongoing maintenance of the Lake Otamangakau fishery. However, because 70% of the legal sized catch was released it did not have a serious impact. Little changed this season with anglers reporting they released 77% of their legal sized catch.

Whilst the catch rates were generally low, as predicted the size and quality of many of the fish taken was exceptional with numerous 'double figure' fish reported. However most were hard earned and the culmination of many hours spent on the lake.

Several long time Lake Otamangakau anglers, as well as fisheries staff, noticed an apparent increase in the number of juvenile trout showing around the lake this summer. Perhaps this will be reflected in increased catch rates in subsequent seasons. Surprisingly no juvenile trout bearing hatchery fin clips were reported. These fish, released in December 1994 at between 50 and 100mm long, will have reached legal size (35cm) by next opening day and are likely to start appearing in anglers catches. If you catch a fish with only a stub in place of one fin, please accurately record the length, species and which fin was missing, and pass the information on to the Department. This

information will provide valuable information on growth rates in the lake. Ultimately when these fish run the Te Whaiau Stream to spawn, their proportion in the spawning population will also indicate the size of juvenile trout recruitment into the lake.

Dredging in Lake Te Whaiau and the Otamangakau Canal

Visitors to the area this summer will be aware of the suction dredge operating above the road bridge in Lake Te Whaiau. ECNZ have contracted Heron Construction of Auckland to remove sediment which has largely filled Lake Te Whaiau and Otamangakau Canal and extended out as a delta into Lake Otamangakau. The sediment is removed by pumping it into one of two settling ponds adjacent to the area. The dredging of Lake Te Whaiau has been completed and the remaining work downstream will continue through into spring.
Very tight environmental constraints, particularly with respect to the discharge of dirty water, were imposed as part of the resource consent conditions. However, the operators have been able to work well within these and indeed on one occasion, the outfall from the settling pond was only half as dirty as the adjacent inflow from the Whakapapa tunnel. Operation of the dredge ceases every evening and has caused no apparent disruption to the migration of spawning fish through this area and into the Te Whaiau Stream.

End of an era

In mid-April, 32 years of trapping the spawning run in the Waihukahuka (hatchery) Stream came to an end. This followed a decision that much better information about the spawning runs was now obtained by other methods. In the past the hatchery stream run was used as an index of the run in the Tongariro system but in recent years it became apparent that it was no longer linked to what was occurring in the main river. A combination of changes in the stream arising from land development upstream of the highway and erosion to the entrance to the stream, which made it much more difficult for fish to find, has seen the run steadily decline over the last 10 years. When the fishery was in a period of decline in the late 1980s the run seemed to mirror the bigger picture but when things again improved, no such improvement occurred in the hatchery run.

Whilst as a management tool its days are over, in the longer term the trap will be installed as a working display as part of the development of the visitor facilities at the National Trout Centre.

Also at an end is the Tokaanu fish trap, this time after 26 years of operation. Installed in the headwaters of the spring fed Tokaanu Stream, this trap was the source of trout ova to supply the hatchery. Offspring from these fish were supplied all over New Zealand, as well as ova sent to Australia, South Africa, Kenya, United Kingdom, Sri Lanka and New Guinea. In later years as production from the hatchery was scaled down, the trap was operated more as a monitoring tool. One feature of the run in this stream is that in some years it is much later than in adjacent tributaries. For example, in 1992 41% of the annual run occurred between October and December.

Situated as it is near the source of the spring, the trap is not in an ideal position to be used as a monitoring tool. Many fish spawn below the trap and are never counted or measured. With the development of techniques to count trout in the lake using acoustic equipment, much better estimates of the population size can now be obtained. Given the lack of any need to collect large quantities of ova any more and the site lease expiring, it was decided to close this trap. This also brings to an end the long association with neighbouring land owners, both those on whose land the trap was sited and those whose land we had to cross every day. We have appreciated the goodwill shown towards us in our dealings over the past 26 years.

Licence sales for 1995/96

With only one month of the 1995/96 season to go, licence sales are down compared to the 1994/95 season. Sales figures to the end of May are:

Adult Season	11,359	Child Season	5,496
Adult Month	846	Adult Week	7,822
Adult Day	29,377	Child Day	5,297

A total of 60,197, which is a reduction of 4.5%. Fortunately adult season licence sales are almost exactly the same as last year, so that decline in expected revenue is not as great as the overall reduction in numbers might suggest.

1996/97 licences

Licences for the 1996/97 season should be available from licence sales outlets in the last week of June. Licence prices remain the same as the current season. Please remember when purchasing your new licence to print your name and full address (not your holiday home address), as the addresses are used for your complimentary copies of Target Taupo next year.

You may recall that last year those of you who subscribed to Target Taupo were put into a draw for an Adult Season complimentary licence for the 1996/97 season. The winners of this draw were:

C L Robertson, Thames

S Anderson, Palmerston North

A A Whitehead, Te Puke

Congratulations!! Your licence will be sent to you in the last week of June.

Update on the Hinemaiaia River

In recent years large areas of bank have regularly subsided along the Hinemaiaia River, particularly below the highway bridge. There has been much debate as to whether this is a natural process or exacerbated by the daily flow fluctuations as a consequence of power generation upstream, or the removal of willows, or both. An unusual feature of this erosion is that it occurs by undermining until the overhanging bank finally slumps in, rather than the whole face dropping off as tends to occur on other Taupo rivers.

The Department of Conservation has taken the view that until the underlying causes of the erosion are established, and remedied, that there is little point in 'band aid' attempts to stop the erosion. This view is not shared by all the involved parties and so the issue has not progressed in recent times. However, the bank hasn't stopped falling in and the lower river has become a mass of logs and debris. Adjacent landowners, the local community and anglers, are understandably all keen to see the situation improved. As a consequence, DOC, in discussion with these groups and the Taupo District Council, has agreed to take the lead role in overseeing some remedial work.

Working on the premise that at the end of the day the power of any river is such that the river will ultimately go where it wants to, DOC Landscape Architect Herwi Scheltus, in conjunction with fisheries staff, has developed a plan. This involves encouraging the river away from an old channel which would take it close to Hatepe Village, by removing several blockages from within the stream which are directing the flow into two critical erosion sites. Material from these blockages will be used to armour the bank at these points, and plants funded by the Taupo District Council and cared for by the local community used to stabilise the adjacent bank. At the same time selected debris from within the stream will be removed to increase angling opportunity. It is not envisaged to remove large amounts of timber, which can often provide bank protection and valuable juvenile trout habitat, but rather those pieces which foul up an otherwise good fishing spot. Work within the stream will be done by fisheries staff using chainsaws and turfer winches, to avoid any damage to the bankside vegetation which would occur if the more usual method of using the log skidder to pull the debris out was employed. The whole approach does not involve a lot of resources in line with the acceptance that the area is a flood plain, criss-crossed

with old river channels and that the river will change course occasionally.

This proposal, which also includes a watching brief in the longer term involving DOC staff and local residents, was put to the affected parties at Easter and received strong support.

To undertake work in the stream the Resource Management Act requires a resource consent be granted by Environment Waikato. The Department has applied for this and plans to undertake the work as soon as it is received.

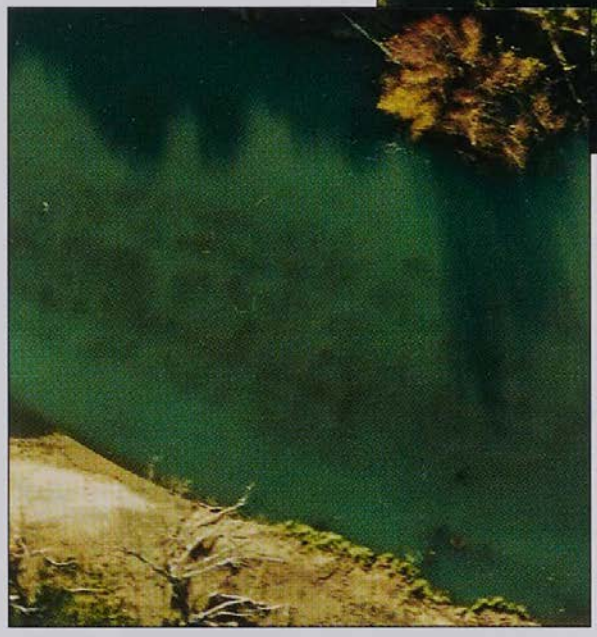
Prospects for the new fishing season

After recent seasons which have provided some very good angling, prospects are less bright for the new season as the impacts of last winter's eruption and large spring floods start to be felt in the fishery. These impacts may start to show next summer when the first of the juvenile fish which were in the rivers at the time, will appear in the lake fishery. These fish which were one year old when the events occurred may still have been large enough to survive and there may be little apparent effect on the fishery. However, prospects look much less promising for those fish which were recently hatched and which would normally enter the lake fishery in two summers' time. The Tongariro was easily the hardest hit by the eruption, the effects of which have been ongoing, but all the rivers suffered from the very large September and December floods. Juvenile trout suffer huge mortality in any year and it is difficult to quantify what additional mortality has occurred until the year class reaches legal size (at age 2+). Almost certainly trout numbers will be less, at least in the 1997/98 season but to what extent, at this stage, is unknown.

On a much brighter note, this winter's river angling should be very good. Those fish running the rivers to spawn were already in the lake when the eruption occurred and so were completely unaffected by it. As our November acoustic counts indicated (see Target Taupo, Issue 21) the trout population was as large as in November 1993. Since counts began in 1988 only in November 1994 has a larger count been obtained. The large population was reflected in the high catch rates obtained in the lake in the early part of summer before the fish moved into deeper water.

While there will be a lot of trout, fishing success in the river will also be dependent on conditions in the river allowing anglers to catch

The continual movement of sediment in the lower river is very evident from the air.



them. There has been comment that the ash in the Tongariro River makes it unfishable but that is not our perception to date. Even in the murk immediately following the eruption some very good catches were made. This season random sampling of anglers as part of the harvest survey has indicated good fishing, particularly in the upper section, in recent weeks. It appears mature trout migrating up the river to spawn are not particularly worried by the ash.

The river is a lot different to 12 months ago with a permanent grey tinge and a very high sediment load, much of which is deposited in the slower parts of the river. However, the greatest changes have occurred as a consequence of the floods which have completely re-shaped large stretches.

The fish are there but perhaps not in the same places as last year. Be prepared to explore and prospect new water. One consequence of

the ash which is slowly moving through the system is that it does not provide suitable spawning conditions. However all of the unaffected side tributaries, including the Whitikau Stream, are looking very good. Given suitable weather conditions this spring, millions of fry will emerge from the gravels in these streams and many will be displaced into the main Tongariro. As a consequence the lack of spawning in the main river may not be very important but what will be crucial is whether conditions are then suitable for these fry to develop further. As we have seen before, once conditions are favourable, the trout population is able to rebound very quickly.

In the other eastern tributaries there is no lasting impact from the eruption and all the rivers look in good shape. Already though, angler numbers are very high, particularly on the Tauranga-Taupo. Large numbers of fish held around and just inside this mouth all summer providing some exceptional angling and it is shaping as another very good year on this river.

All in all, while prospects in a year to two's time may be somewhat uncertain, things look good for this winter. Get out there and make the most of it.

Lake Fishery Managers' Seminar, Queenstown

Late in March this year a group from the DOC fishery management team travelled to Queenstown to participate in a seminar run by the New Zealand Fish and Game Council. The theme of the week was 'To identify lake fisheries management goals, management information needs, deficiencies, remedies, and any associated research requirements' for lake fisheries.

The seminar was run over three days and all Taupo fishery staff contributed presentations.

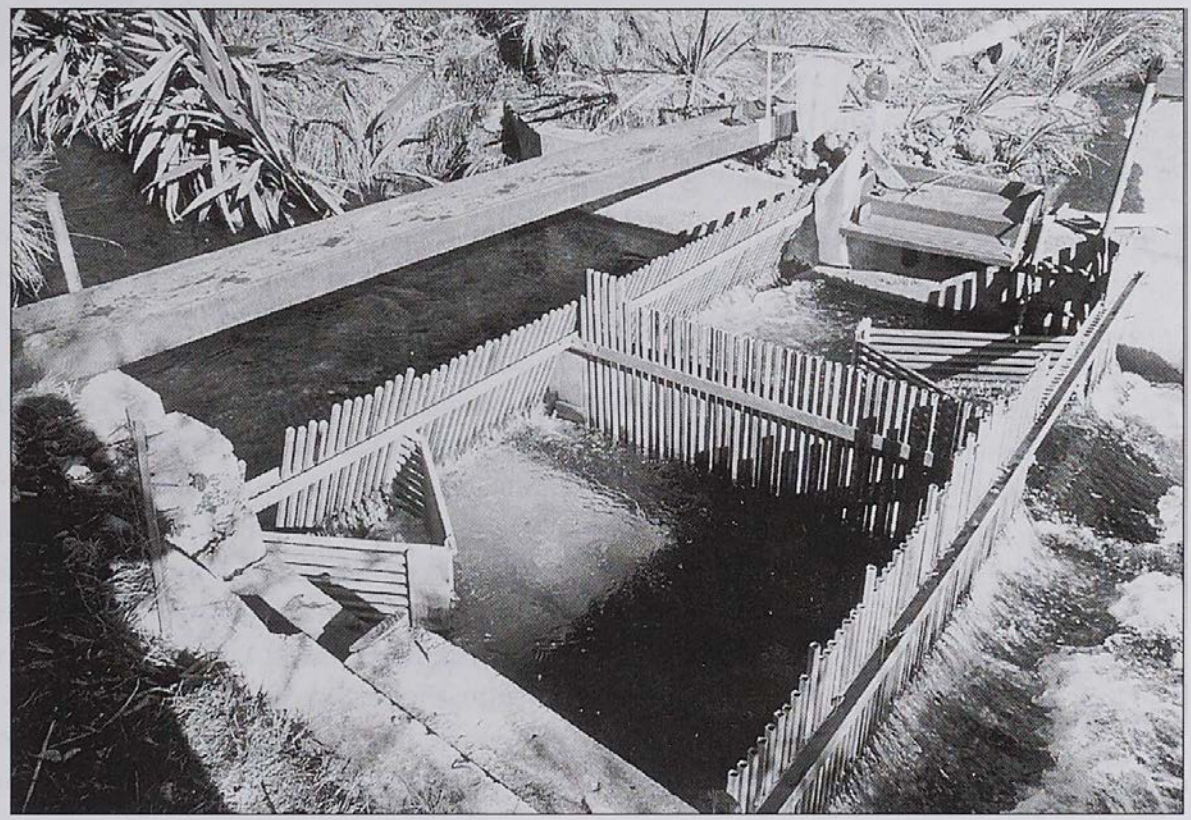
The seminar began with an overview from the regions so that common needs or deficiencies could be identified. A series of speakers from DOC, National Institute of Water and Atmosphere, Cawthron Institute and the Clutha Fisheries Trust gave presentations on a wide range of management techniques and theories. A focus of the seminar from DOC was a discussion of our current fishery monitoring and research projects. Many of the Fish and Game regions are looking at the methodology we currently use to see if it is applicable to their situation. The seminar was an ideal opportunity to discuss this and exchange information.

The seminar concluded with a group discussion to develop a draft lake research strategy for Fish and Game for the next 10 years. Special mention must be made of the enlightening and entertaining presentation Michel Dedual gave on our radio tracking work last year. Nice rainbow Michel!

Trapping the Lake Otamangakau spawning run

On 1 April we began trapping the Te Whaiau Stream for the third consecutive winter. This year we modified the trap, switching the upstream and downstream pens around. While the pen catching the fish moving upstream had worked well in previous years it was felt the pen which caught the spent fish returning to the lake would be much more efficient if sited on the true right of the stream. The other change has involved weighing all the fish in an enclosed sleeve hanging from the scales, rather than on the more usual table scales. Trout from Lake Otamangakau are of very large average size (over 3 kg) and by using the sleeve they are both well supported and lie quietly. When fish of this size thrash around they can very easily damage their internal organs.

The Te Whaiau trap. The upstream trap is on the far side and spent fish returning to the lake are recaptured in the near pen.



The Papakai Stream is very heavily overgrown and does not appear very suitable as a spawning stream.

As of 21 May, 282 brown trout and 60 rainbow trout had passed through the trap, compared to 293 and 45 respectively at this time last year.

It is noticeable that a number of very well conditioned trout bear trap clips from both the previous years and so are on, at least, their third spawning migration. This is quite different to Lake Taupo, where few fish survive to spawn for a third time.

So far the largest fish through the trap is a superbly conditioned rainbow male of 6.2kg. This fish features on the cover of this issue.

In mid-May we also installed a temporary trap in the Papakai Stream, a very small, heavily overgrown stream which enters the Te Whaiau, just above the road bridge. In past years we considered that few fish would be attracted into it, especially as they had to pass through a very shallow, almost stationary, backwater at the mouth. However this year cattle wandered into the stream and severely opened it up. Much of the area is swampy, but also revealed were some suitable spawning areas. There also appears to be a much larger flow than

However, once opened up by cattle grazing, its true character is much more apparent.

previously. Already we have trapped a handful of brown trout in the stream but we are most interested to see what numbers of rainbows we may get once their run begins in earnest in June.

This winter we also intend to radio tag 20 to 40 spent fish as they return downstream past the Te Whaiau trap. These fish will have radio tags, with a life of seven months, surgically inserted using the same techniques as we followed in our radio tagging study of the Tongariro River last year. The intention is to learn more about the movements of trout in Lake Otamangakau over next spring and summer.

Mount Ruapehu eruption 1995 - effects on the Taupo fishery

Whilst many of us were going about our normal daily routines in late

November 1994, Mount Ruapehu began building to an eruption. From November 1994 to August 1995 the crater lake went through a period of heating and then subsequent cooling. To many people the threat of a significant eruption was alleviated with cooling of the lake. However on 18 September 1995 an explosive eruption occurred sending a significant lahar down the Whangaehu River (this river is fed by the outlet of the crater lake), and a small lahar onto the Mangaturuturu glacier. Then on 20 September another large eruption produced more lahars and dropped scoria bombs on the crater lake margins.

At 16.57 on Saturday, 23 September 1995 a short-lived but spectacular explosive eruption occurred from Mount Ruapehu's crater lake. This was when most of the general public became aware that Ruapehu was in an eruptive stage. This eruption produced lahars down the Whangaehu, Whakapapaiti, and Mangaturuturu catchments, and threw a plume of steam up to 12km into the air.

From a freshwater perspective the lahars down the Whakapapaiti and Mangaturuturu valleys were of the greatest concern. A lahar is a wave of mud, water and volcanic debris that flows from a mountain (it can be ejected from the crater lake or slumped off the side of the volcano). Generally a lahar is high in suspended solids, rich in chemical compounds (aluminium, zinc, copper, sulphur, fluoride, iron, manganese, arsenic, lithium, barium, nickel, strontium, titanium) and has a very low pH (high acidity). When lahars enter the river systems they obviously contaminate the rivers. Salmonids (the family of fish that includes trout) are generally very adaptable to changes in water quality and do survive in waters that are high in suspended solids (such as occurs in many glacially fed rivers). However sudden changes that occur as the result of lahars are often fatal, and indeed in this case the lahar down the Mangaturuturu killed fish in that stream, and in the Manganui-a-te-ao which it feeds into.

Fortunately the lahar that flowed down the Whakapapaiti (this stream is diverted into Lake Otamangakau) was rapidly cooled as it passed over the ice pack on the mountain and ended up 'parked' or frozen on the mountain. Some of the lahar material did enter the stream but the diversion of water was ceased at 17:30 on 23 September by ECNZ as a precaution and so prevented any contaminated water entering Lake Otamangakau. To give an idea of the magnitude of water that flowed down these catchments as a result of the lahars, over a period of forty hours from the 24th to the 26th of September over 6.5

million cubic meters of lahar material passed down the Whangaehu valley.

At that point the Taupo fishery had escaped relatively unscathed. From 27 September to 10 October the mountain was continuously active and the crater lake was slowly drained of water. Monitoring of the affected waterways continued. From 21:00 on 11 October to 05:00 on 12 October the eruptive style changed. With the crater lake now nearly empty, volcanic ash (shards of fine volcanic rock) became more prevalent in the ejected material. On the night of 11 October between 0.01 and 0.05 cubic kilometres of ash was ejected. This material was carried to great heights (up to 11 000 metres) and spread over much of the eastern side of the central North Island.

On the morning of 12 October it was clear that many of the eastern tributaries of Lake Taupo, including the Tongariro River, had received a large volume of ash from this eruption. The streams were very grey, contained high levels of suspended solids (fine ash), and had low pH values. The ash was acidic as the result of coming into contact with droplets of very acidic crater lake water as it was ejected. ECNZ closed the Poutu intake on the Tongariro River to prevent contaminated water from entering Lake Rotoaira. At the time the Whitikau trap was operating and we were able observe the behaviour of trout in Whitikau Stream. Fish were seen struggling in the ash laden water and many fish were killed by the contamination. At this stage we removed the trap to allow those fish that were having difficulty to return to the lake to recover. We presume that this situation may have been repeated in some other southern rivers.

One week later when we reinstated the trap we found that trout were once again running the stream. It is most likely that the effects of the initial ash fall were so acute as to be impossible for many fish to adapt to, but those that did quickly resumed what it was they had set out to do.

By this time all of the eastern tributaries, except the Tongariro, had cleared. The Tongariro, as a result of its proximity to the mountain, had received far more ash than any other river. As a result of the way that the wind had spread the ash plume a lot of ash settled in the Mangatoetoenui Stream catchment. This stream drains from the north eastern side of Ruapehu and runs into the Tongariro River above the Rangipo dam. The Mangatoetoenui and, to a lesser extent, the Wahianoa River, is the source of most of the ash contamination in the Tongariro to date.

In consultation with Environment Waikato a regular monitoring programme for the affected rivers was established. This involved visiting 17 sites along the eastern side of Taupo (initially at weekly intervals, then fortnightly) field testing the water and collecting a bottled sample for analysis at Environment Waikato's laboratory. This program has been completed and measurements to date indicate that the only river still affected by ash contamination is the Tongariro. This contamination is a consequence of rainfall and melting snow releasing ash from the snow pack on the mountainside and washing it into the river. The pH levels are stable at around neutral but the river is still suffering from high levels of suspended solids.

The day after the ash fall bottled samples of water were collected which were analysed for evidence of heavy metal contamination. One theory that was conceived to explain why the trout were killed was that there was some type of heavy metal contamination. These samples were compared to samples taken four months after the ash fall, but no obvious trend could be detected.

Late in November another project was initiated by the National Institute of Water and Atmosphere (NIWA). This involves a long term program to monitor the recovery of freshwater life in streams affected by volcanic contamination. The results of this work will not be available for some time.

Although the eruption of Ruapehu is probably a distant memory for most people the flow on effects continue and we will be closely monitoring the impacts for some time yet.

DOC Fisheries Scientist Michel Dedual monitors water quality parameters in the Tongariro River, September 1995

28 April 1996 - Six months after the Ruapehu eruption, the Tongariro River continues to carry a huge sediment load following heavy rain.

National Trout Centre News

January to April has been a period of maintenance for the grounds and facilities with average numbers of visitors (about 16,500) and above-average rainfall.

The viewing chamber is still not completed. The roofers came and lifted part of the roof so that the electrician could replace the cable which had a nail through it. The roofers replaced the roof and put another nail through the new cable. We apprehensively await everybody's return to have another go. Meanwhile a leak has developed in the stairwell wall which will have to be found and sealed before the carpet is replaced.

The first children's fishout of the year was held on 5 May. Despite a beautiful day the turnout (134) was the lowest for May since the programme started in 1983.

The next days will be held on 2 June, 7 July, 18 August and 22

September. If any readers can help out on these days, Bill Colston (the organiser) would welcome a call on Turangi (07) 386 7484 even if you can only come for an hour or two.

Harvest Survey Update

As many anglers will have been aware, over the current season we have been repeating the intensive harvest survey which was last completed for the 1990/91 season. If you can recall from Target Taupo Special Report No 1, in that season an estimated 70,000 fish were kept from Lake Taupo with another 12,500 kept from the Tongariro River. In all we calculated the total harvest for the Taupo fishery to be around 113,000 fish or 175 tonnes of trout. Well, it looks like the lake harvest for the current season will be up by roughly 10-15%. We haven't completed all of the surveying from the lake yet but it appears that the summer harvest was up quite a bit from the last survey, yet the winter lake harvest is down.

It is still too early to see what's happened with the Tongariro River as half our sampling groups have yet to be completed. A quick look at the catch rates on the Tongariro this winter indicates fishing is fairly patchy with some obviously very good days, especially in the lower river. This is what we expect to see at this time of the year although the line ups of anglers around the Swirl pool look more like salmon fishers at a Canterbury river mouth. The survey will be completed by the end of June and the total harvest calculated soon after, with the results published in a popular format as well as a technical report. Once again, thank you to all the anglers who have given a few minutes of their time to answer our questions. It may seem to be a very small individual contribution but it adds up to a much better understanding of a crucially important part of the fishery.

Data from this survey will be used to provide the Taupo fishery contribution to the national angling survey being undertaken by NIWA for the NZ Fish and Game Council.

Ageing trout in Taupo using otoliths

To be able to age fish accurately is of great importance in order to understand their population dynamics and so be able to manage them. In many cases scales from fish provide a good indication of their age. As the fish grows so also do their scales through the

deposition of supplemental rings. In summer when the growth is fast the spaces between scale rings are larger but during winter when growth slows, the spaces between scale rings are narrower. The alternation of wide and narrow spaces can be used to count the number of summers and winters that the fish has lived through and its age determined. Unfortunately though, this technique is not applicable to Taupo trout because there is no clear change in the pattern of growth between summer and winter and so no visible changes in the pattern of scale rings.

However fish, like us, have within each ear three little bones called otoliths. If you cut through them you will see a series of rings very much like in an onion. These rings are deposited daily. By counting the number of rings it is possible to see the number of days that the fish has lived and so to calculate its age very accurately. The pattern of these daily rings will be dependent mainly on the temperature of the water in which the fish has been living. This is where this technique gets very exciting because if there are differences in water temperature between the different spawning streams, then each stream will have its own signature of daily ring deposition. So from the bone of an adult trout it may become possible to assess in which stream it reared. This gives us some information about the quality and importance of each spawning stream to the gross production of adult trout in the lake. During the last decade it has been more or less accepted that juvenile trout can not use Lake Taupo as a rearing habitat until they reach a certain size. The otolith aging technique should permit us to verify this assumption.

In future issues of Target Taupo we will keep you updated with the results obtained during the study of ageing Taupo trout using otoliths. This study will start this July.

Rob Pitkethley off to help out
Eastern Region Fish & Game Council

Rob, who has been employed on contract by Department of Conservation to undertake both the 1990/91 and 1995/96 harvest surveys has been appointed as the new fishery manager for Eastern Region Fish and Game Council.

Whilst we are very disappointed to lose someone of Rob's ability we wish him all the best in his new challenge. We are sure his years of thorough schooling in the management of the Taupo fishery will

mean he has much to offer the Rotorua region. We were not so successful, however, in our instruction on the arts of duck shooting, deer stalking and fly fishing - at least not judging by Rob's results.

Whitikau trapping

Readers of the last issue of Target Taupo will recall mention made of problems in operating the Whitikau trap caused by changes in the river, after a large flood over Christmas 1995. Well, another big flood through the stream on 21 April further damaged the trap. The river undermined the bedlog foundations and left them sitting high off the bottom. Debris that was on the move in the flood then piled up on the upstream side of the bedlogs and the weight, combined with the pressure of the flood waters pushed the bedlogs out of line. This in turn caused a large channel to scour upstream of the trap and immediately below it. The resulting change in the stream now means that the trap is in the middle of a swift, deep run, not an ideal place to have a fish trap. We attempted to repair the trap by blocking off the hole underneath the bedlog and hoped that the stream would

The Whitikau trap under settled conditions

The aftermath of a large flood

move gravel from upstream of the trap and so fill up the hole, in turn reducing the gradient and velocity. This worked to some extent but was really just delaying the inevitable.

We decided to re-evaluate the whole trapping operation. Should we continue to attempt to reinstate the existing trap, build a new trap or come up with something completely novel to gain the information we needed? Our decision was to pull the existing trap out of the stream completely. The aim is to allow the river to go wherever it wants to as it has been determinedly trying to over the last 18 months, and hopefully in the long term, provide us with somewhere to position a new trap.

In terms of the data we are missing, this is unfortunate but we can do without it this year. Last year was the peak of a natural fluctuation in the trout population and so we have a very good estimate of the maximum run likely in the river. What will be crucial is for us to be able to monitor the run next year and for a period after that, to detect the likely change in the population as a result of both the recent ash eruption of Mount Ruapehu and a summer of very large floods. These two events have the potential to reduce the recruitment of juvenile trout to the fishery from the Tongariro catchment.

1996 Heli-Sika Hunting Competition Results

by Cam Speedy

On Sunday, 2 June 1996, several thousand hunting and outdoor enthusiasts were treated to a display of outstanding sika trophies, trade exhibits and give-away prizes at the Spa Hotel in Taupo. This year's competition attracted 84 registered heads, which were taken from as far south as the Sparrowhawk Range in the Ruahines, to Stoney Creek in the northern Ahimanawa Range. A total of 71 of these heads were presented for measuring by the Taupo branch of the New Zealand Deerstalkersí Association (NZDA) at the Spa Hotel on the day.

While the number of heads was down a little on previous years, this was partly due to a stricter criteria for entry in that only heads carrying six points or more were eligible. Despite the slightly lower numbers, quality was well up on previous years with ten heads scoring over 170 on the Douglas Scoring system and qualifying for entry into the NZDA trophy register. In the past four years, no other year has seen as many heads qualify for the register, despite up to 136 heads being measured previously.

The top ten heads measured on the day are listed in Table 6 below.

The head taken by Glen McRae from the Sparrowhawk Range is the largest pure sika trophy to be measured in the four years that the competition has been running. In the past there has been one larger

Table 6 Top ten heads measured during the 1996 Heli-Sika hunting competition

Hunters Name	Home Town	Number of Points	Douglas Score	Location TrophyTaken
Glen McRae	Feilding	8	210 3/8	Sparrowhawk Range
Monroe Reweti*	Turangi	8	188	Waiotaka River
Brent Hazeldine	Auckland	8	181 6/8	Clements Road
Aaron Sloan*	Taupo	8	177	Kiko Road
Barry Gardiner	Hurunui	8	176 7/8	Waimatai - Kaweka
Ivan Pemberton	Taupo	8	176 6/8	Ngaruroro River
Kevin Quintal	Auckland	8	174 3/8	Southern Kaimanawa
Sandy Campbell	Tokoroa	8	173 6/8	Clements Road
Mike Te Wake	Taupo	8	173 1/8	Clements Road
Alan Howard	Wairoa	8	170	Clements Road

* Not eligible for top three position due to registration technicality.

head, however, this was disqualified as it was judged to be a red x sika hybrid. The field photo of Glenís impressive head clearly shows that it is a sika stag.

The high quality of heads this year is partly a reflection of the good growing season that started early last spring with a mild September allowing stags to increase body condition before casting their antlers and thereby allowing a more significant component of their spring nutrition to go into velvet production. However, the number of high quality stags that came from the Clements Road area also suggest that habitat quality has had an influence. The lower deer density in this area, achieved by intense recreational hunting pressure over the past ten years, has allowed a significant increase in habitat quality and therefore the amount of nutrition available to the deer that remain. While the trade-off of fewer deer may not suit all hunters, the increase in trophy production shows what can be achieved by keeping animal density down.

Also of note was the head shot by Monroe Reweti in the Motiti area of the Waiotaka catchment in the back of Lake Taupo Forest. This area was 1080 poisoned in August/September 1994 which resulted in a

Glen McRae of Feilding with his 210 3/8 Douglas score sika stag from the Sparrowhawk Range

major decline in deer numbers and a huge reduction in possum density. The last two growing seasons have seen significant improvement in forest condition in the poison area and this is now being reflected in the deer present. Monroe provided six hind jaws from the same area, four of which were less than four years old (i.e., still growing when the area was poisoned). All were 5-10 % larger than the herd average for their year class.

It is not known what effect the Ruapehu ash had on antler production, but it is possible an increase in trace elements and minerals as a result of the ash has also helped improve velvet production this season.

A total of 48 hind jaws were submitted for analysis by contestants in a special hind draw section of the competition and the results of these together with the ages of the 71 stag jaws submitted will be sent out to each hunter towards the end of July. The results of the age analysis will be presented in a separate article to appear in various hunting publications later in the year and in the November Issue of Target Taupo.

Thanks to all sponsors, especially Mark Bridgman and his team at Custom Cartridges who organised this year's event, and to the many hunters who participated for making the competition such a success. We look forward to next year.

Bitz 'n' Pieces

News from around the Conservancy

Dactylanthus taylori

Monitoring *Dactylanthus taylori* (the parasitic 'wood rose') is proving that the only plants with flowers surviving to seed are those that are caged. The plants produce huge quantities of nectar to attract their natural pollinator, the short-tailed bat, but they are so attractive to possums that even with a very low possum population they are still being browsed and the flowers destroyed. Survival of *Dactylanthus* plants also appears to be threatened by the death of the host trees. Several of these have died, or are in the stages of dying, this past year. The hosts appear to be dying from disease although the effect of the parasitic *Dactylanthus* itself cannot be discounted.

Bats and *Dactylanthus taylori*

Monitoring for the presence of short tailed bats at *Dactylanthus* sites (which have been linked ecologically to short-tailed bats) in two areas of Tongariro Forest proved unsuccessful during the autumn flowering of these plants. Bat monitoring in other areas showed a low presence of bats near Makatote which is assumed to be the extreme range of the Ohakune population. Hunters who think they may have seen bats are asked to contact the Department of Conservation or make a note in their hunting diaries.

Goats

The more remote areas of Tongariro Forest will be targeted for goat control over the coming summer. The inaccessible areas of Taurewa or Blue Hill will be worked by contract-hunters with dogs. At least two camps will be set up for the goat cullers to work from during the mid-summer period. All other areas of the forest will also be hunted again with the usual programme of dog hunting, foot hunting and helicopter shooting. There has been a significant drop in the goat population over most areas in the last five years and prolific regeneration of understory plants is very noticeable.

Mountain Beech Survey

In early 1995 a survey of mountain beech forest condition was carried

out in the Kaweka Forest Park. Landcare Research has now provided us with a final report on the results. The report is due to be publicly released in late May. Copies of the report will be sent to interested groups including hunting organisations. The report will also be available to view at the Napier Conservancy Office, and at each Field Centre. If you want your own copy of the report it can be ordered from the Napier Conservancy Office (PO Box 644, Napier) at a cost of $5.00. A summary of the results will be provided in the next issue of Target Taupo.

Winter 1080 Possum Control Operations

There will be three large scale poison programmes on lands administered by the Department of Conservation in the Tongariro/Taupo Conservancy this winter. These are being undertaken to control bovine tuberculosis and are funded by the Animal Health Board (AHB) and conducted by Regional Council staff.

1. In May, Environment Waikato began a large scale bovine Tb control programme north of Taupo, including parts of the Wairakei Tourist

Park and areas of forested country towards the Waikato River south of Whakamaru, including the Tirohanga scenic reserve and DOC administered lands along Lake Whakamaru. This operation involves 1080 carrot bait distributed by helicopter. The Department has required that part of the operation along Lake Whakamaru be delayed until the end of June to allow most of the duck shooting season to pass before toxins are laid where gun dogs could be at risk.

2. In June the Manawatu/Wanganui Regional Council will begin stage III of the Hauhangaroa bovine Tb control programme over some 16,000ha of the upper Wanganui River catchment, 9000ha of which lies within Tongariro Forest Conservation Area. This operation will involve 1080 pellet bait distributed by helicopter at a sowing rate of 5kg/ha.
3. Also in June the Manawatu/Wanganui Regional Council will be undertaking a large scale bovine Tb control operation in the southern Erua Forest Conservation Area. This operation involves 1080 pellet baits distributed over 5,000ha in the Manganuiateao and Mangaturuturu River catchments west of Horopito including 3,000ha of land administered by DOC.

The areas of these three operations is shown on the map of the Tongariro-Taupo Conservancy.

In addition to these major operations, a large number of small scale ground-based possum control operations will be ongoing around the conservancy through the year, funded by the AHB, DOC, farmer co-operatives and by ratepayers. These mostly involve trapping in areas of high public use. In areas which are less publicly accessible, cyanide poison and/or bait stations with 1080, Campaign or Talon pellets are used.

All operations involving toxins require the approval of the Medical Officer of Health and all areas where toxins are laid are clearly signposted as per the Pesticide (Vertebrate Pest Control) Regulations. For your dog's sake, please take note of any poison signs in areas where you are hunting or fishing this winter and please, DO NOT remove any signs!

Hauhangatahi Wild Animal Recovery Operation

Plans to allow helicopter recovery of deer from 14,000ha of Tongariro National Park over the May/June 1996 period have been postponed. Increased recreational hunting effort together with problems in

selecting a single operator and representations from hunting groups and recreation groups opposed to commercial helicopter work within the park have prompted the Department to review the exercise.

Further forest health and deer impact data will be collected from the area during the 1996/97 summer to clarify the problem and to more accurately determine the role of red deer on forest changes in the area.

Bats

Our thanks go to a hunter who took the trouble to report to a DOC office a possible sighting of a bat flying about face height in the Hinemaiaia catchment in Kaimanawa Forest Park. He was also able to give us a grid reference.

As a result of this information and two night excursions by staff using bat boxes, we located what we believe is a colony of short-tailed bats. The bat box is a small hand held electronic device which picks up the echo-location sounds emitted by a flying bat. Generally short-tailed and long-tailed bats operate on difference frequencies. From the information we gained we believe these are short-tailed bats which are on our rare and endangered species list, so the find is very significant. More work will be done this coming spring to confirm the species, size of colony and population health. We will keep you posted about the results.

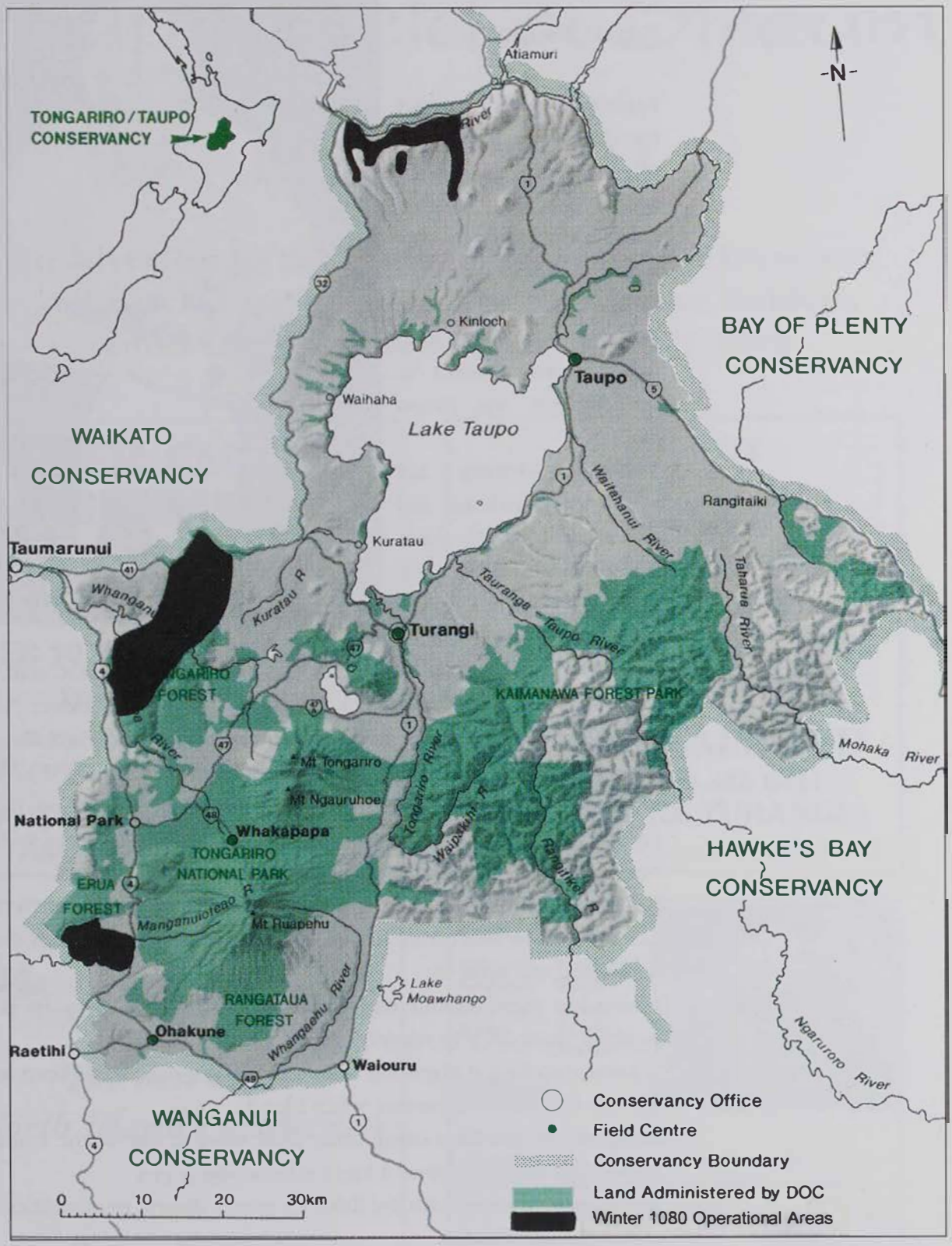
We would like to again thank all those people who send in reports such as these. We've just received another report, with grid reference, of kiwi sign which we will be checking out.

Rubbish

A recent clean-up of rubbish from campsites in the upper Kaipo by staff resulted in numerous large sacks of tins, bottles, cans, polythene and other filthy junk being collected - not good enough people!

Our thanks go to Shamus at Helisika who offered to fly out this rubbish at their expense.

Tongariro/Taupo Conservancy



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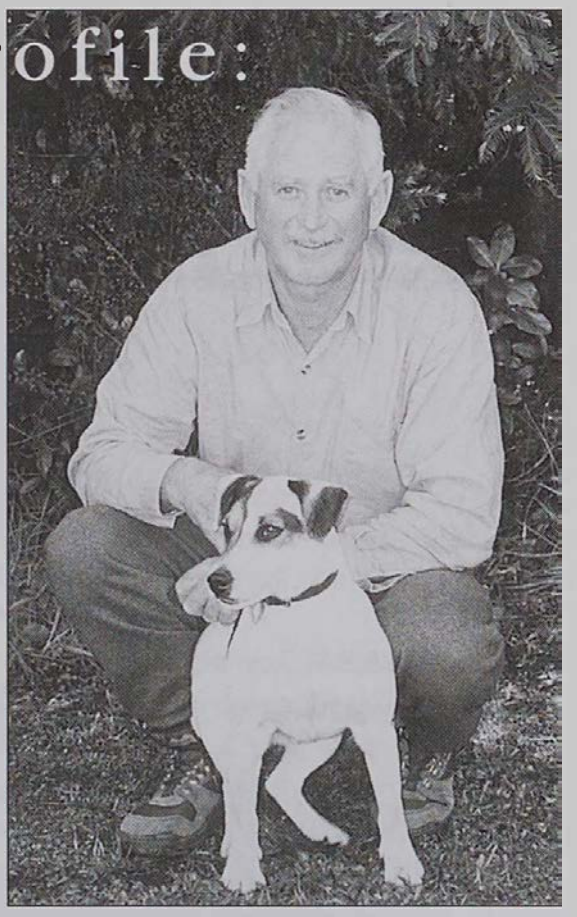

Norrie Ewing

Returning under contract (or duress - editor) for a third winter, many readers will be aware of Norrie's background, through past articles in Target Taupo or through personal contact during his career with fisheries management in the Rotorua and Taupo regions.

Willingly sharing his wealth of knowledge and experience with the team, he is often called 'Dad' (amongst other nick-names) by his younger superiors, drawing some askance looks from unknowing DOC staff. The wheel has gone a full circle, for during his professional career Norrie supervised and instructed many of the current fishery staff including the fishery manager. In recent years though Norrie has indulged in semi-retirement, an arrangement which has benefited the Taupo fishery considerably. Having designed and maintained many fish traps he has a big input to our trapping programme and the training of staff.

Still an active outdoors man, fishing and hunting whilst here, he retreats to his Pukehina beachfront home in the summer for 'the SCUBA diving, sea fishing and good life'

Norrie has three reasons which spring to mind as to why he is still working waist deep in wintery waters:

"I guess matching it physically with the younger ones helps keep me fit and the briny is a lot warmer when I hit it;

being part of the team doing some great work in one of the country's golden egg resources gives a lot of satisfaction;

and human relations with the fisheries team's diverse personalities sure makes life interesting".

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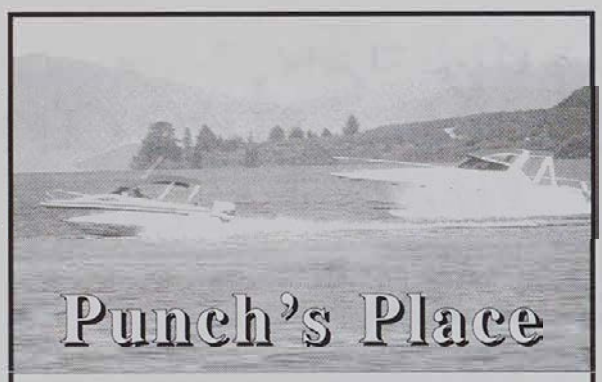

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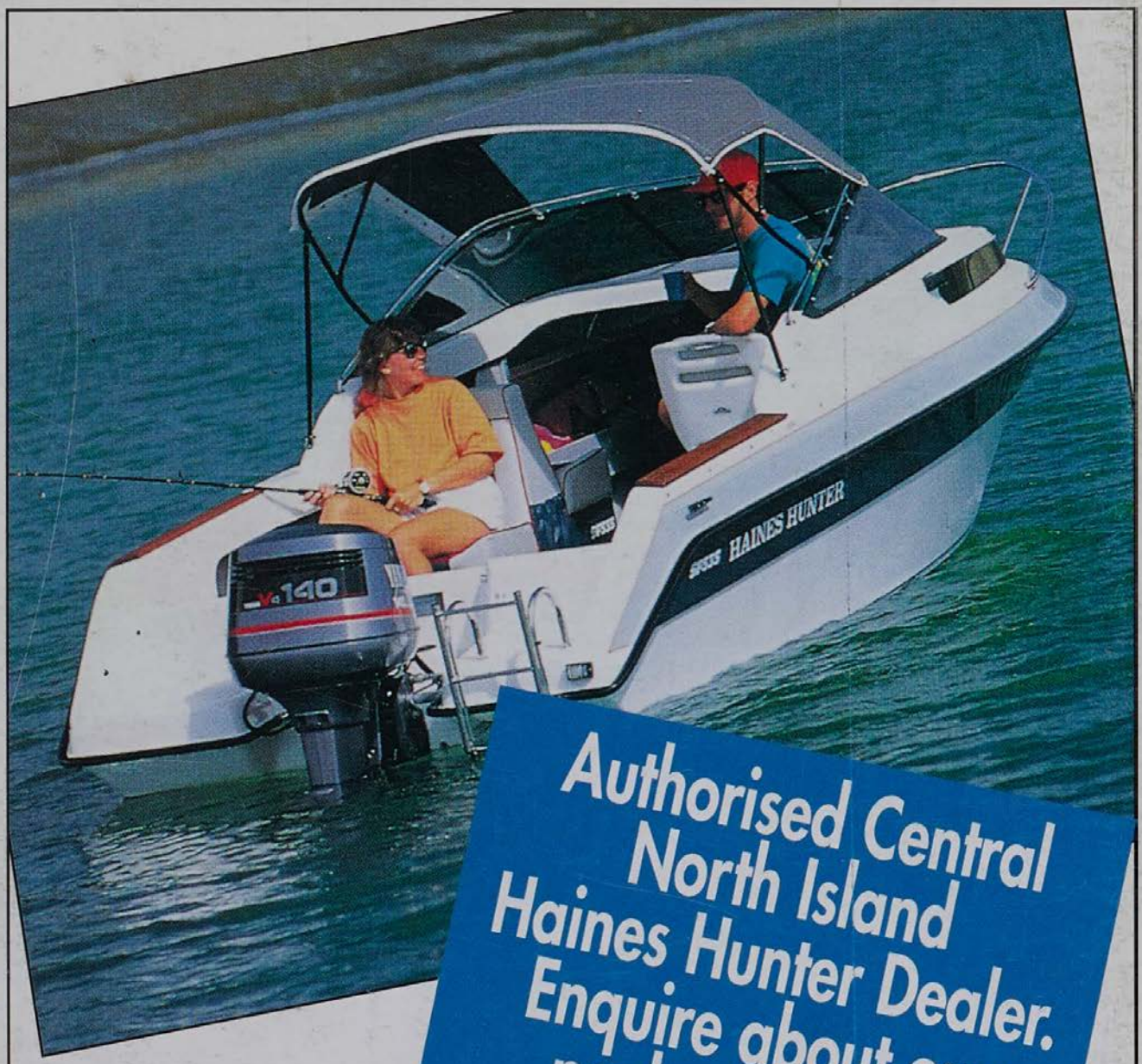

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