TARGET TAUPO

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

MARCH 2006, ISSUE 51

Department of Conservation
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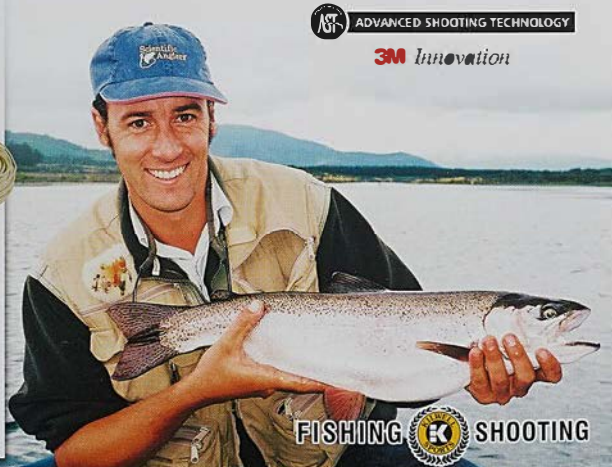

FISHING KILWELL SHOOTING

TARGET TAUPO

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Front cover: *Kim Turia and Saxon with a very nice rainbow caught (and subsequently released) on a wet December day wading the flooded edges of Lake Otamangakau. Photo: Dave Conley*

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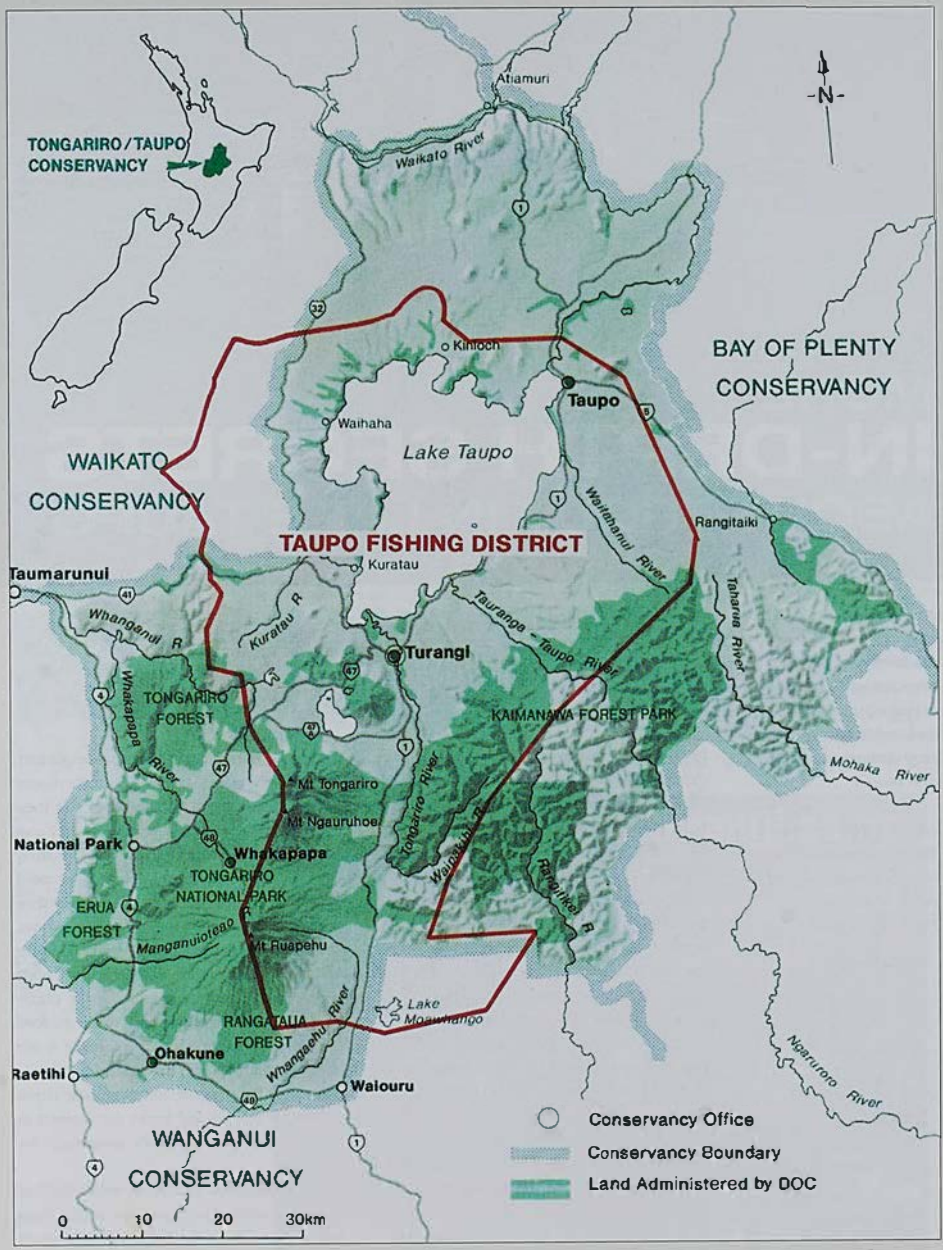

MORE IN-DEPTH SECRETS ABOUT TROUT IN LAKE TAUPO

by Dr Michel Dedual

Michel is our Fishery Area Scientist. Hailing originally from Switzerland, he is also a very enthusiastic angler and hunter.

(Above) How often are Taupo trout close to the surface where they are in reach of anglers? Photo: Dave Hart

IN THIS ARTICLE DR MICHEL DEDUAL EXPLAINS PART TWO OF THE FINDINGS FROM A GROUND-BREAKING STUDY TRACKING THE MOVEMENT AND BEHAVIOUR OF TROUT IN LAKE TAUPO. PART ONE OF THIS STUDY WAS EXPLAINED IN THE NOVEMBER 2005 ISSUE OF *TARGET TAUPO*.

In the last issue of *Target Taupo* we explained how we followed the horizontal movements of trout as they swam around Lake Taupo using acoustic transmitter tags. We saw that the main driving force of their movements was the search for food and that trout needed to cover large distances to find and catch smelt. In this issue we explore the vertical movements of these trout within the lake by analysing their swimming depth and body temperature. For lake anglers it is obvious that knowledge of the depth at which trout swim can be useful. However, you may wonder why the body temperature of trout is important?

Unlike us or other mammals and birds, fish have a body temperature that varies with the temperature of their surroundings. If the water is cold so will be their body. The water in Lake Taupo varies in temperature with season and depth. In lakes the largest variations of temperature occur vertically within the water column rather than horizontally. Within the range of available water temperatures fish will try to find water to suit their optimal body temperature where they can assimilate food most efficiently and ultimately grow at the fastest rate possible. If fish cannot find water of their preferred temperature they may move up and down in the water column. Similarly if their food (smelt) swim in water of different temperature to their optimal body temperature, trout may have to make excursions into colder or warmer water to feed prior to returning to more comfortable water. So water temperature that provides suitable trout body temperature and swimming depth are closely related, and hence our interest in having information on both parameters for each fish.

If the water is too cold trout won't die, but they will grow slower as their metabolism will go into idle mode. The situation is much worse however when the temperature is

too hot. As the temperature increases and the trout respiration rate increases, the fish become stressed and more susceptible to diseases and other disturbances. Furthermore, higher temperatures reduce the solubility of oxygen in water, resulting in even less oxygen to meet the higher metabolic demand. If the temperature increases to 21°C feeding (and growth) will stop, and if exposed to 23°C for even short periods trout will move to seek thermal refuge. If water temperatures increase even further death by asphyxia will occur.

These temperature preferences have important implications if global warming causes lakes to warm further. Climate-coupled lake warming may cause a loss of suitable habitat for fish like trout that favour cold water, affecting their geographic distribution. Trout are considered to be limited to lakes where substantial summer warming does not occur, or where thermal stratification isolates large volumes of cold-water habitat from summer warming. Studies in Canada have also shown that trout production (biomass) in lakes is dependant on the volume of water of a suitable temperature.

In regions colder than Taupo, fish typically slow or even stop growing during winter and resume rapid growth the next spring. However, in Taupo trout keep growing over winter so a fish in Taupo of a certain age will be bigger than a northern hemisphere counterpart of the same age. The lack of any obvious change in growth indicates that the water temperature of Lake Taupo is adequate throughout the year for rapid and continuous growth which in turn produces the large, young fish that anglers target. Having large fish at a young age is a very desirable feature of a wild fishery because if the fish grow quickly they will also spawn at a young age which creates a number of advantages.

Effect of temperature on Taupo trout

To start our exploration we first have to describe the thermal environment in Lake Taupo during this study. For the last few years water temperature profiles in the lake have been measured monthly in the Kuratau Basin, the Western Bays Basin, and in the middle of the lake by the National Institute of Water and Atmosphere (NIWA), commissioned by Environment Waikato. In 2003-2004 the water temperature profiles were much the same throughout the lake, except in autumn (March – April) in the Western Bays where the layer of warm water was slightly thinner than in the other parts of the lake (Figure 1). In summer the lake was "stratified" with a warm layer at the surface that reached 20 to 21°C. This layer heated by the sun is where most of us generally swim but it is very thin. Dive a few meters deeper and you will notice a sharp drop in the temperature. The layer of water where the temperature drops sharply is called the thermocline. The thermocline is a sort of barrier between the warm, less dense water above (epilimnion) and the cold heavy

water below (hypolimnion) that is not affected by the sun. In Lake Taupo the thermocline was present at between 20 and 40m depending on the season. As the lake is much deeper than 40 m (average depth 90m and 190m at its deepest) this indicates that the majority of the lake volume is within the hypolimnion where the water temperature remains stable at 11°C regardless of the season.

The hypolimnion in certain lakes can become completely depleted of oxygen because all the oxygen is consumed by bacteria feeding on organic material settling out of the surface waters. This can be an issue in lakes which have major algal blooms which, as the bloom dies and settles, creates a huge influx of organic material into the bottom waters. Trout need a lot of oxygen and cannot survive for long periods in such water, but fortunately in Lake Taupo the hypolimnion is usually still rich in oxygen. On the other hand, the water at the surface may be too hot for trout to use. Thus potentially trout may be squeezed between water too hot at the surface and water too poor in oxygen at the bottom.

In autumn 2004 the surface temperature of the lake started to drop with the onset of

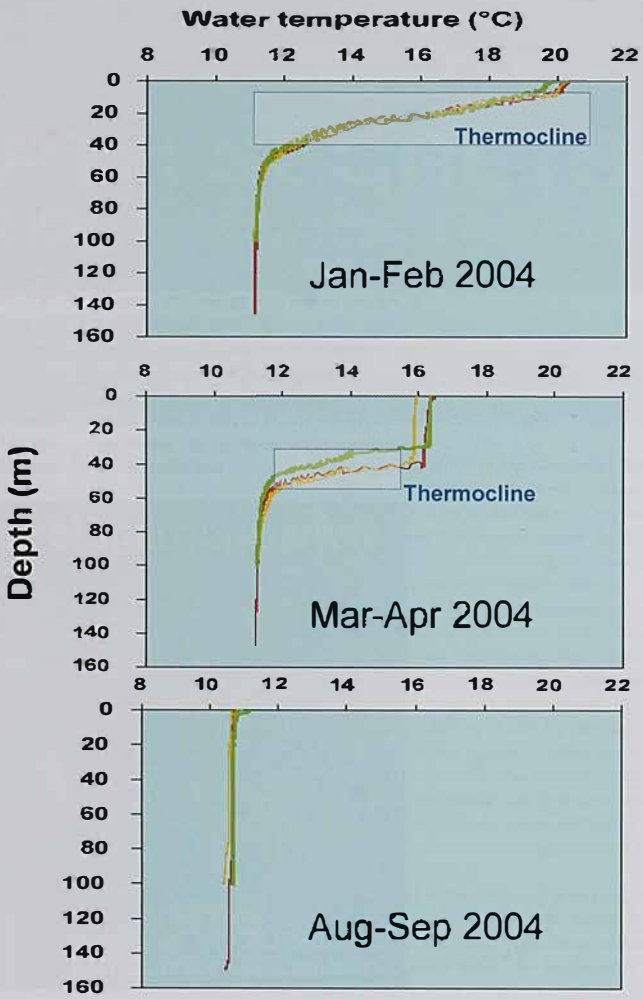

Figure 1: Water temperature profile in Lake Taupo in 2004. Data courtesy of Dr. Max Gibbs, NIWA. The green line represents temperature in the Western Bay and the red and yellow lines represent water temperature in the Kuratau Basin and middle of the lake


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shorter cooler days, falling to 16-17°C. This reduced the density difference between the surface layer and the bottom waters and caused the stratification to start to break down. Below the thermocline the temperature remained unaffected at 11°C. By winter a combination of strong winds and cool surface waters caused stratification to break down completely and the temperature was uniform (10-11°C) through the entire water column. In other words, the lake was mixed. Now let's see how the lake water temperature was reflected in the trout body temperature data. The data received throughout the experiment is presented in Figure 2 and indicates that trout in Lake Taupo had a body temperature ranging from a minimum of 8°C to a maximum of 22°C. However, more than 90% of the time trout swam in water resulting in body temperature ranging from 11 to 18°C. However, these body temperatures may not represent what trout prefer but what was available. As the water temperature changes with the season, trout have a choice of water

Figure 2: Frequencies of trout body temperature signals

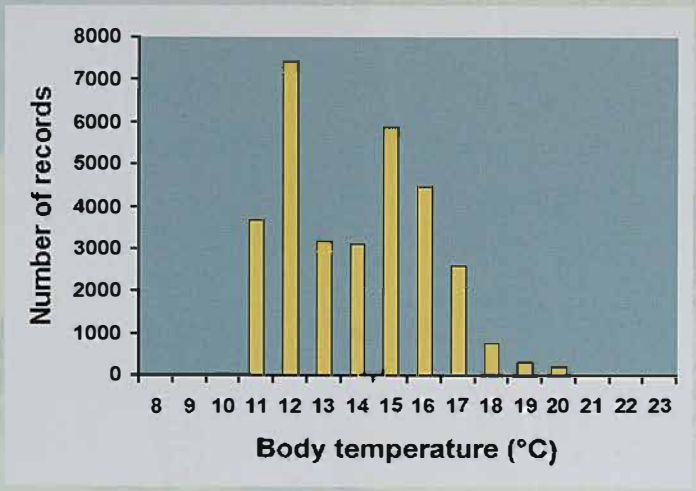
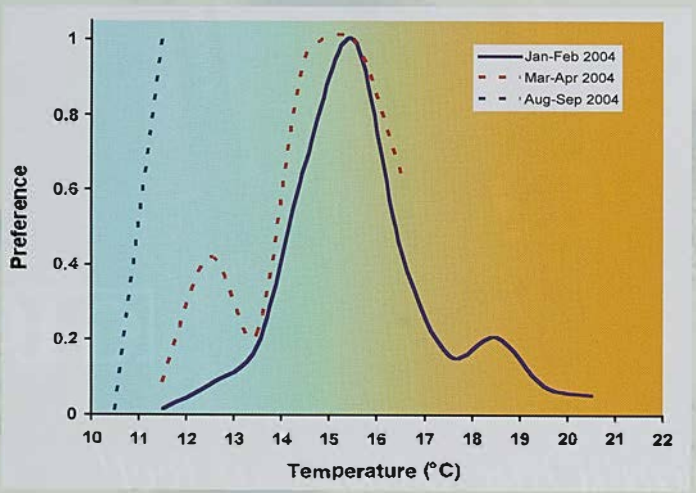


Figure 3: Trout preferred body temperature



temperatures and it is possible to determine if they have a body temperature that they particularly like. If both the most common and rarest body temperatures recorded correspond to the temperatures of the thickest and thinnest layers of the lake respectively then we could infer that trout don't have a preference. However, if this is not the case then we would conclude that trout have a definite temperature preference between 8 and 22°C To investigate this I compared the proportion of the total volume of the lake having a particular temperature with the proportion of the total records of trout with the corresponding body temperature. These ratios were then scaled from 0 to 1, 1 being the most preferred body and consequently the most preferred water temperature for trout in Lake Taupo. The best period to do this is when the lake provides a wide range of temperatures within the water column, which occurs during summer and autumn.

In summer 2004 (January-February) trout preferred having their body at a temperature of 15-16°C (Figure 3). Trout can have this body temperature by swimming most of the time in water at 15 to 16°C or they can move up and down in warmer or cooler water resulting in the same net body temperature. We will see later that it is a combination of these two swimming patterns that result in these body temperatures. Preference for temperatures cooler than 15°C falls quickly indicating that where trout have a choice of water temperature, they definitively chose the 15 to 16 °C mark. The preference for water temperatures warmer than 15°C also drops as well. However, the body temperature preference curve shows an irregularity at about 18-19°C. This slightly warmer body temperature may not represent a preference per se, but more a reflection of the time that trout have to spend hunting smelt close to the surface where the water is warmer.

The temperature preference in autumn (March-April 2004) was very similar to summer, reinforcing that trout prefer having their body at 15 to 16°C. The interesting difference is that in autumn trout have another irregularity in their temperature preference, but this time it is for cooler waters between 12 and 13°C. This doesn't mean that trout swim deeper though. Autumn is the time when the river water is much colder than the lake water and creates cold plumes at the river mouth. Trout start to swim in these waters possibly probing the water to decide if it is the time to go to spawn. They obviously swim long enough in this water to cool their body. This explains also why fishing at river mouths is particularly productive in autumn.

In winter the entire lake has a temperature between 10 and 11°C. It is difficult to speak about specific preferences with such a limited choice; however, trout definitively chose to swim in the warmest water.

On a daily basis trout body temperature varied very little, remaining within half a degree of their preferred temperature (Figure 4). Trout had a very slight tendency to have a cooler body during the day than

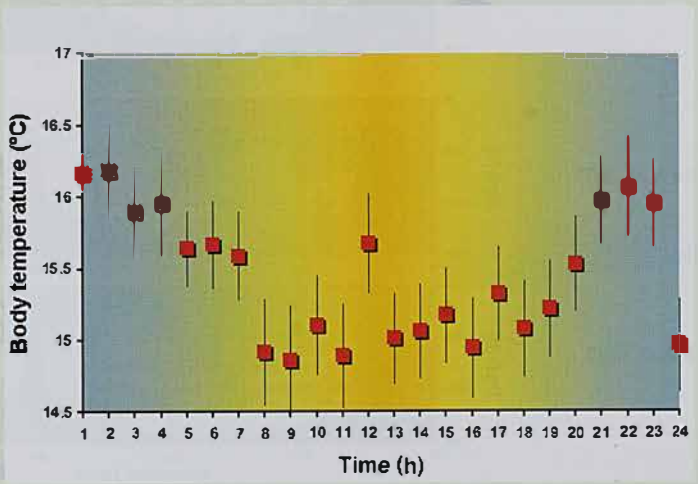
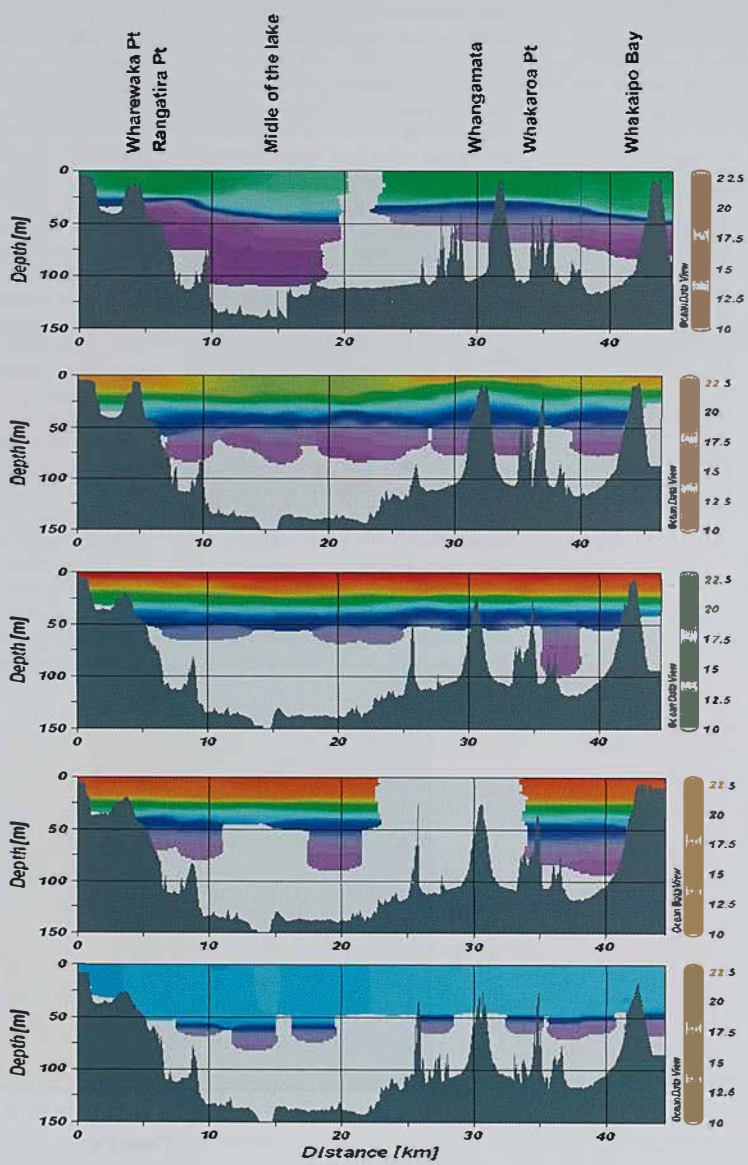


Figure 4: Daily trout average body temperature January - February 2004

Figure 5: Water temperature (°C) in Lake Taupo between Taupo and Kinloch. Data courtesy of Geological and Nuclear Sciences Ltd.



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– Julia

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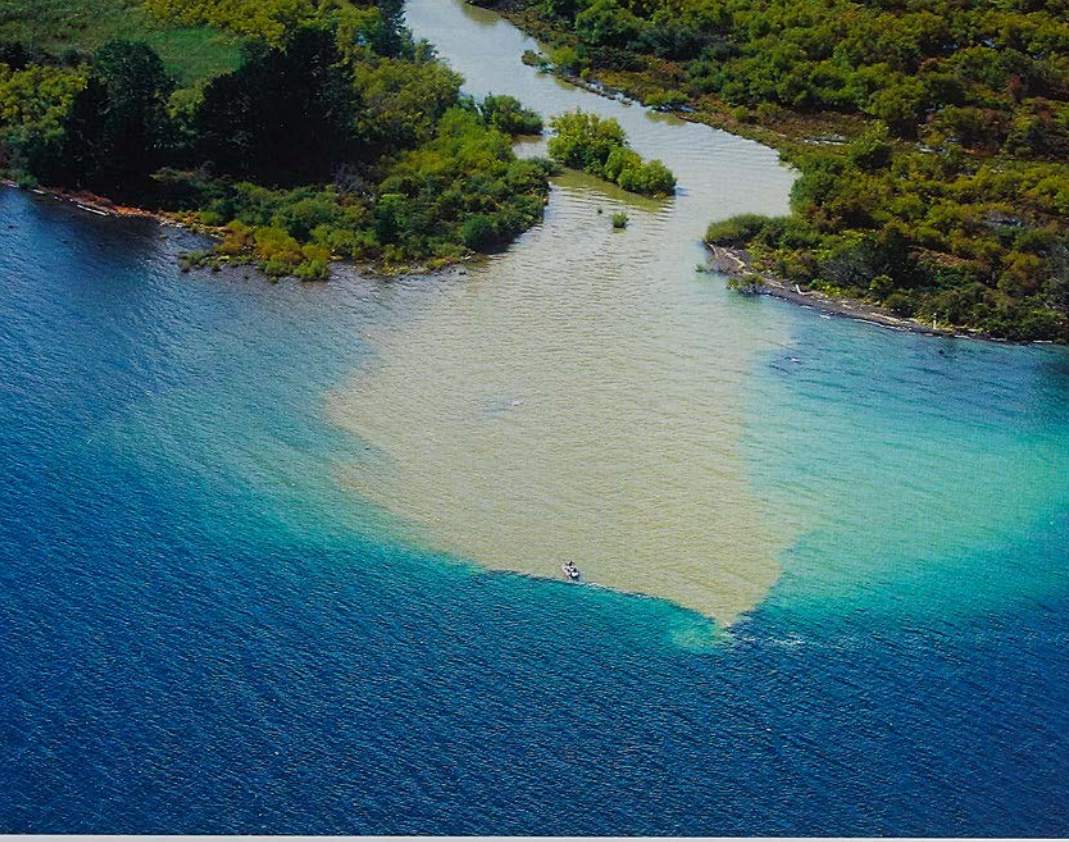


An example of thermal stratification in the lake. Cold flood waters from the first mouth of the Tongariro Delta plunge down under the warmer surface water of the lake (February 2006).
Photo: Gleun Maclean

during the night. The lack of large variations in daily body temperature tells us that trout in Lake Taupo can catch enough smelt to feed to satiety. Researchers overseas have found strong evidence that if food is restricted, then fish will show large variations in daily body temperature. Experiments with rainbow trout showed that during the day the fish were found in water 3-4°C colder where they could save their energy but migrated to the surface at dawn and dusk to feed. Rainbow trout in Lake Taupo also migrate up and down the water column swimming closer to the surface at night to chase smelt, however these vertical movements are not large enough to cause any significant change in trout body temperature.

Some valuable data about the thickness of the different water layers and the way these vary is provided by an exciting program run by the Geological and Nuclear Institute in Taupo, NIWA the University of Waikato, and the University of Western Australia., which monitors Lake Taupo physical and biological water parameters. The first measurements were made between December 2004 and June 2005 along a route from Taupo to almost the middle of the lake then back to Kinloch and Whakaipo Bay (Figure 5). The results indicate that on 16 December 2004 the layer of water providing the preferred trout body temperature (in dark green on the graph) was plentiful throughout the lake but thicker close to the shores than in the middle of the lake. However, just a month later (21 January 2005), this layer was much reduced with the middle of the lake providing most of the best habitat. Later in summer (February and March 2005) this layer of preferred habitat had shrunk to its thinnest, being only about 10 m thick. It is unlikely to be any coincidence that this is the time of the year when anglers need to use deep fishing methods and target a very narrow depth range to be successful, but equally once they find the right depth they may make excep-

tional catches. By June, water of the preferred temperature had disappeared as the lake was now completely mixed.

How do trout adjust their swimming depth to cope with their body temperature requirements?

The deepest depth we measured a trout swimming at was 123 m. However, in Lake Taupo trout swim most of the time in water close to the surface. The first 20 metres are used extensively and the most popular depths are 2 to 5 m (Figure 6). It is interesting to note that steelhead (rainbow trout that grow in the sea) in the northern Pacific have also been reported to swim most of the time between 0 and 20 m below the surface.

There are some seasonal differences in the distribution of swimming depth but these variations occur only within the first 20 m below the surface (Figure 7). During January and February 2004 fish were tracked swimming within 5 m of the surface more than 50% of the time. Later in the season in March and April, the fish were swimming a fraction deeper mainly between 5 and 10 m below the surface and in winter (August and

Figure 6: Proportion of swimming depth signals received.

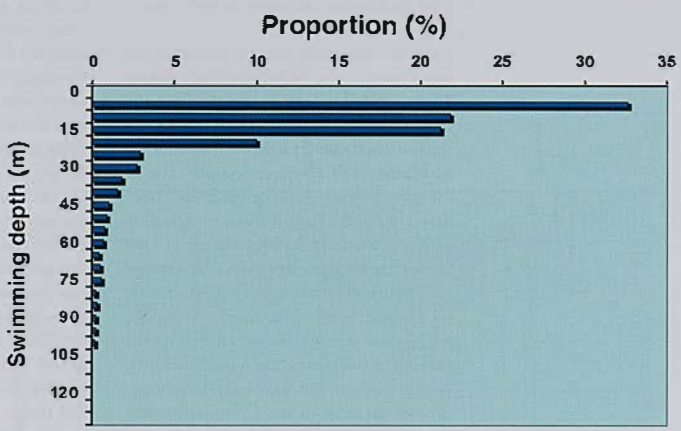
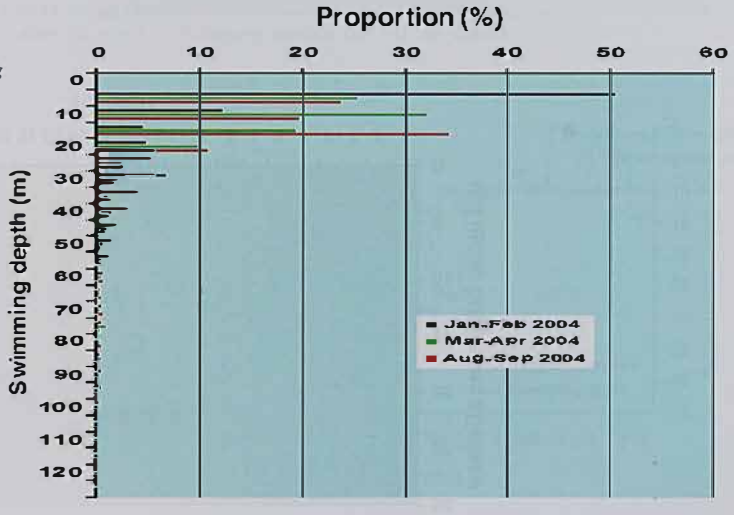


Figure 7: Seasonal variation of the proportion of swimming depth signals received.



September) the layer of water between 10 and 15 m deep was most used by trout.

There are several explanations why rainbow trout prefer to swim near the surface. Firstly trout are visual feeders and need to see their prey to catch them. The clarity of the lake will determine the depth where there is still enough light for trout to see smelt. Clarity is often measured with a 25 cm diameter black disk that is dropped into the water until it cannot be seen anymore. In Lake Taupo the disk can typically be seen down to about 20 m depending on the season. Smelt are dull in colour and difficult to spot and even though trout have very good eyesight it is probably hard for them to see smelt in water much deeper than 20 m.

A second reason why trout swim close to the water surface is to be found in their colour. There is more to their colour than just the fresh, appetising and healthy look that it gives the fish. Their colours indicate that trout are particularly well equipped to hunt close to the surface. When growing in the lake trout have a blue-green back that makes them difficult to be spotted from above where most of the natural dangers come from. Furthermore, their flanks are silver and it will be difficult for the smelt to see trout close to the surface where their silvery look will blend with the flashing of sun-rays on the water. Their belly is white and this will make it difficult for any prey or predator to see a trout swimming from underneath where the white colour will mix perfectly with the intense light at the surface.

Despite the fact that the vast proportion of detections are concentrated close to the surface, as anglers we know that in late summer/autumn methods which target depths of 30 to 40 metres like downriggers, wirelines or jigging are easily the most successful ways of fishing. How can this be? Working off the proportion of detections at each depth can be a little misleading. While individual fish spend a lot of time close to the surface there is significant variation in swimming depth over a day (Figure 8). This figure shows that an 'average' fish spends most of the night swimming at about 8 m below the surface, regardless of the season. At dawn it starts to swim deeper and by 10:00 it would be 20-25 m under the surface, staying at these depths until about 14 to 15:00 before returning back closer to the surface.

However, from time to time trout swim deeper than 25 m. I cannot present data for each fish but if we follow fish #25 during its 4300 km journey (*Target Taupo* Issue 50) we can see that it did some rapid dives and ascents although not regularly and not in a predictable way (Figure 9). The frequency of ascents was maximal in May 2004 when this fish often ascended toward the surface, but there was no clear period during which the frequency of dives was substantially different. If we look at the data in detail, for example for fish #25 from 21 to 23 April 2004 when it was in the area between Horomatangi Reef and Hatepe (Figure 10) we can see that it arrived on 21 April at 09:33 swimming 12 m below the surface. It started to "dive" at 10:02 and by 11:24 it was swimming 30.19 m below the surface. Then at 11:39 she made

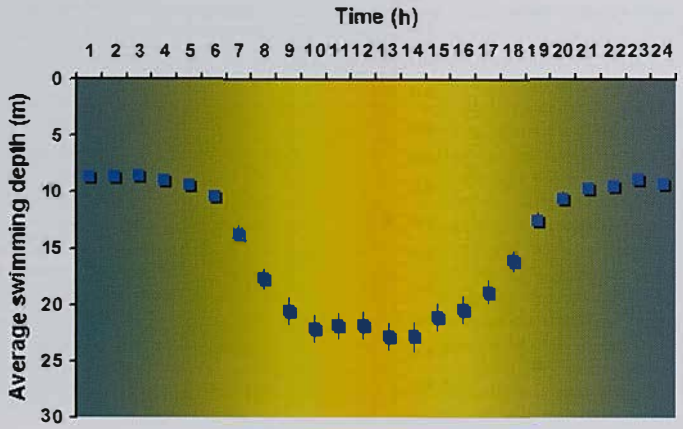


Figure 8: Average daily swimming depth

a quick ascent to the surface that lasted 3 minutes and then returned to deeper water. At 14:10 she ascended again but not right to the surface and swam at 4 to 5 m below the surface for most of the afternoon. At 18:00 she returned to deeper water swimming there until 20:30. She spent the whole night until 05:55 the next morning swimming at 7 m below the surface. At this time of the year we would expect a distinct band of smelt to be associated with the thermocline at around 30 to 40 metres so perhaps these deep dives were associated with periods of active feeding, while in between she rested at her optimum temperature closer to the surface.

We don't have the exact water temperature where this fish swam but from the data measured in the middle of the lake on 14 April 2004 we can estimate that during the first ascent this trout experienced a change of water temperature of about 0.2 °C. Now we can see that the body temperature during the same period didn't change immediately, but appears to have a time-lag. This indicates that it takes some time for the body temperature to adjust to ambient water temperature. This is important for the fish because as long as it doesn't have to make too long an excursion in water different from its optimum body temperature (15.5-16.5°C) this varia-

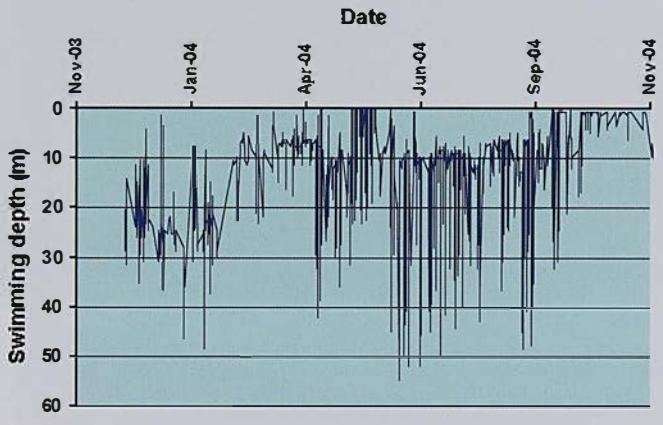


Figure 9: Swimming depth of Fish#25 (maiden female, 480mm) throughout the study

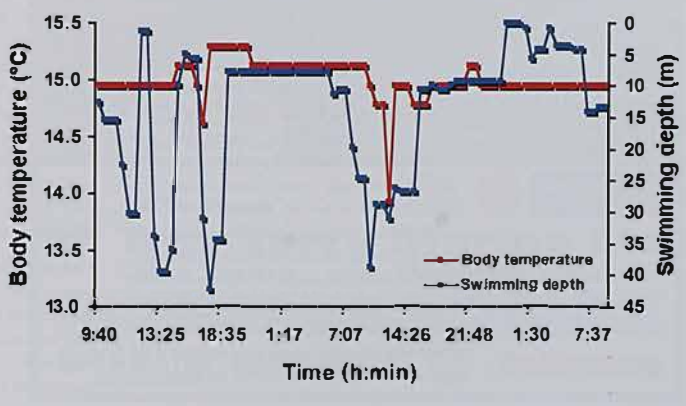


Figure 10: Swimming depth and body temperature of Fish#25 on 21-23 April 2004 between Horomatangi Reef and Hatepe.

The fact that trout are nearly always in reach of lake anglers emphasises the need to carefully manage the harvest of trout from Lake Taupo.
Photo: Glenn MacLean

tion in water temperature will not affect its metabolism. This is a fine balance that further explains why rainbow trout do so well in Taupo. However it also highlights that even a small change in the water temperature regime, perhaps as a consequence of global warming, could potentially have major impacts on trout production and the fishery.

In summary, trout in Lake Taupo chose as much as possible to have a body temperature ranging from 15 to 16°C. As a consequence the most valuable habitat to trout in the lake is the layer of water at that temperature, and the availability of such a zone during summer is likely to strongly contribute to the productivity of trout in the lake. However trout can move outside of these water temperatures for short periods without significantly impacting on their body temperature. Their depth distribution is also influenced by the distribution of smelt, their ability to feed efficiently and the instinct to avoid surface predators.

Within the top 30 metres or so there are clearly daily and seasonal variations in the depths favoured by trout which are exploited by anglers. For example, many anglers are aware of the daily vertical movements of trout and adjust the techniques accordingly, starting with harling in the morning and targeting fish deeper as the daylight intensifies. They also know that in the middle of the day the odds are that the fish will be at their deepest. However despite the common perception that way down in the depths there must be vast untapped fishing opportunities, fishing at any greater depth is probably not a good investment of our valuable fishing time. In this case deeper is not better.

Management implications

Understanding the depth distribution of trout in Lake Taupo provides some valuable information to help us further improve the way we manage the fishery. The most important implication of these results is that with the current legal fishing methods there is no

such thing as a sanctuary for trout in the lake. In the past it was always thought that fish living in the depths out of reach of current fishing methods provided a buffer against excessive angling harvest. What this study shows is that in reality there are no such fish. Effectively all the trout in the lake are vulnerable to capture throughout the legal fishing hours and across all the seasons. Therefore it is critical that the angling harvest in the lake is carefully monitored and controlled to ensure it is sustainable.

The second key implication relates to our annual monitoring of the size of the trout population by echo-sounding. As discussed in more detail in the article "Weather puts a damper on summer angling" on page 22, vertical echo-sounders are very efficient at detecting and counting fish in water deeper than 20 m but closer to the surface the estimate becomes less reliable. As we now know, Taupo trout spend most of their time within 20 metres of the surface, and so we are having to look at alternative methodologies to estimate the size of the lake population.

Mixed success for summer angling seminars

by Glenn Maclean

Glenn is our Programme Manager Technical Support and manages the research and monitoring work done in the area

Over the Christmas break we once again held two seminars designed to give visiting anglers and those new to the sport basic information to improve their chances of catching trout on Lake Taupo. The two hour seminars are packed full of interesting facts, tips and practical advice

We ran the first seminar slightly earlier than usual, holding it on the 28th December at Kinloch. The intent was to provide anglers with the information early in their holiday so they still had the majority of their break to put it to good use. However only 20 or so people attended the 2 hour session. Unfortunately it seems that many people were only arriving for their holiday at this time and even those already in residence had not had an opportunity to see the advertising and so were not aware of the seminar

The second seminar held on the 30th December at Omori was much more successful with approximately 80 people attending Glenn Maclean of the Taupo Fishery Area outlined where, when and what techniques to use and described how to set up and use the various trolling and jigging methods As Glenn says at the start of each seminar "For people new to fishing at Taupo it can be a bit of a lottery knowing where to start. However by applying some basic principles to determine where the trout are likely to be and using an appropriate method to target this zone, it's actually pretty straightforward – at least as much as fishing ever is!" Another two seminars will be held next summer - look our for the dates and locations in the November issue of *Target Taupo*.

Glenn Maclean explains how applying some basic principles can makeet big difference to your success on Lake Taupo Photo: Petrina Francis.

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Calculating the trout harvest continues

by Rob Hood

Rob is a Ranger and part of the team that carries out our field operations work

The fishery team have been kept very busy over the summer holidays as we continue our survey to estimate the total trout harvest from the lake and rivers over the current season.

On each of the lake survey days which are selected at random, the lake is flown 4 times, the flights spaced throughout the day. Each flight takes about an hour to cover the 193 kilometres of shoreline, and any boats fishing are counted. From these counts an estimate of the total angling effort on the lake is then calculated. Not surprisingly, the busiest days were during the Christmas to New Year period with the highest counts early in the morning (see "Has the lake got busier" on page 27 for a comparison of numbers over recent years). On a nice still evening it is a great job to be the observer in the plane, but it is not half so much fun when it's blowing 25 knots.

At the same time anglers are interviewed by staff as they return to the boat ramps after their day fishing on lake Taupo, providing information about their methods of fishing and success. During six survey days in December, over 600 (non-guided) angler interviews were completed and in January four survey days saw over 700 interviews (non-guided anglers) completed. That is a lot of talking for the staff involved! From these interviews we can determine an estimate of the average catch rate for that day, which when combined with the estimate of the total effort allows us to calculate the total number of fish likely to have been caught.

The catch of guided anglers is calculated separately because these anglers are likely to have a higher catch rate due to the expertise of their guide. So as to be able to identify a charter boat from the air, all charter boats are equipped with a distinctive bright orange sticker. At the end of the day we ring those guides we have seen during our flights and obtain their catch data in this way.

The willingness of anglers and guides to provide details of their fishing trips is greatly appreciated. Some anglers, and especially the busier guides, have had frequent contact with us, but without exception have been very willing to participate in the interviews. Ultimately this makes for a much more robust estimate of the harvest. The angling harvest can, and has in the past, had a very negative impact on the quality of the fishery, particularly the winter river fishing. However if we have reliable estimates of its magnitude, it is something we can manipulate through the angling regulations.

Ranger Julie Greaves collects catch details from two of the many hundreds of lake anglers spoken to this season. Photo: Petrina Francis

by Julie Greaves

Julie has recently started with us working as a ranger in our field operations programme.

An insight into the lifecycle of Taupo smelt

Photo: Theo Stephens

The Common Smelt *(Retropinna retropinna)* is naturally an anadromous species, that is, it lives most of its life in the sea but migrates into low gradient rivers to spawn. However when smelt were introduced into the Rotorua lakes from the Waikato River to provide a food resource for trout, they successfully established self-sustaining populations in these inland lakes. These introductions proved to be such a success that the smelt from Rotorua were then introduced into Lake Taupo in 1934 and releases continued yearly until 1940. Smelt are now the main food source for Taupo trout, providing approximately 90% of their diet in the lake.

Often seen by anglers in large shoals around Lake Taupo, smelt are silvery, slender fish that are translucent, very similar to whitebait. Their most visible characteristic is the silver eye, the black backbone running the length of the fish and the gut which looks silvery red. Smelt are commonly known as cucumber fish for their distinctive odour.

The lifecycle of the Taupo smelt starts as an egg deposited in clean, loose sand in water of one to three metres deep, around the lake edge or just inside the river mouths. Each adult female will lay between 200 and 1200 eggs. Depending on the temperature the eggs take 8-10 days to hatch into larvae three to six mm long. Immediately after hatching the larvae move out into the deeper waters of the lake where they commence to feed on phytoplankton (algae). As they grow their diet will also include larger zooplankton such as water fleas.

The juvenile smelt remain in the open waters of the lake and congregate in large shoals in areas were food is present. These shoals vary in depth daily and seasonally, typically in summer being close to the surface at night and deeper during the day. In winter they can be found in depths between 60m and the lake bottom. Shoaling is an effective way for individual smelt to avoid predators because it makes it difficult for trout or shags to single a specific smelt out.

Lake Taupo smelt usually mature at around 2 years of age and move into the shallows and stream mouths to spawn. This occurs between October to February and then occasionally a second time around March. This is why harling in the shallows is so effective at this time of year. Ripe females are generally between 38-48 mm long, while mature males are slightly larger, up to 60 mm. Most smelt die within a few days of spawning, many of these eaten by trout, bullies, herons, shags and fresh water crayfish. However often dead or dying post spawners are observed along the lake edge by members of the public, giving rise to concerns that some type of poisoning event may have occurred. However this is an entirely natural process.

Taupo smelt are slightly different to their sea run cousins in that their head and eyes are bigger but they do not grow as large. One of the theories as to why Lake Taupo smelt are smaller is that growth may be limited by food availability. Scientific studies have suggested that there are far more juvenile smelt produced in the lake than there is zooplankton food to support them.

The introduction of smelt as a sustainable food source for Taupo trout has proven to be extremely successful for this wild fishery. The management action back in the 1930's to release smelt was an inspired move and a key reason why the fishery enjoys its current reputation for producing large numbers of some of the world's best conditioned wild trout.

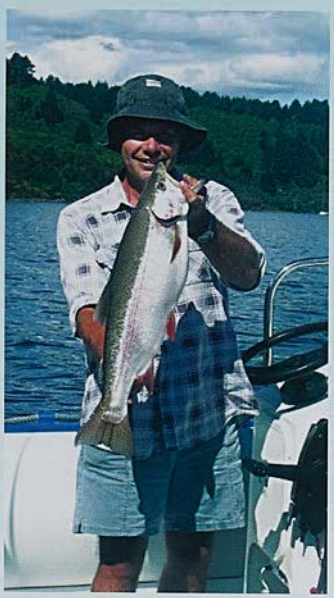
Juvenile and mature Taupo smelt. Photo: Julie Greaves

Weather puts damper on summer angling

by Glenn Maclean

All the indications were it should be good fishing on the lake this summer, and when the weather has allowed, so it has proved. However for many visitors the inclement weather has been a major obstacle which has severely restricted their fishing opportunity and success.

Our annual acoustic survey in mid December indicated a very strong trout population in the lake. It is a little difficult to be too emphatic as to what this count means because as the acoustic tracking project has demonstrated (see article on page 4), at any time a significant proportion of the trout population is swimming very close to the surface where it is unlikely to be detected by the narrow beam of the sounder. Unfortunately this proportion appears to vary widely over time so we can not be confident we are monitoring a similar proportion of the population each survey. For example, a low count could be due to a small trout population, or a high proportion of the trout close to the surface outside of the detection zone. Nevertheless the fact that the count was very high this time indicates that there were a lot of trout present.



Bryan Dalton with a prime rainbow of just over 7lb (3.2kg). Photo: Ngaire Dalton

The problem of detecting fish close to the surface is difficult to solve using a downward looking echosounder because even if we use a much wider beam which covers a greater area, it is likely that the boat passing close to the trout will cause them to move aside and outside of the beam. Alternatively the boat may attract the trout, much as marlin are attracted to the wash from a gamefishing boat. Either way the density of trout recorded will not reflect the real density. To overcome this, we are looking at a complex setup which uses both a downward looking echo sounder to detect trout at depth and a horizontal beam to scan the surface waters. Scanning horizontally is more difficult because there is no bottom signal to define the extent of the area surveyed. Similarly even a slight rocking of the boat will cause the horizontal beam to move up and down, potentially deflecting off the surface (or the bottom in shallow water) which causes other problems. However horizontal sonar is a technique which has developed significantly in recent years and we are exploring a potentially suitable setup.

The acoustic tracking project is yet another example of where innovative research, which greatly increases our knowledge, often also creates more issues. As frustrating as this may sometimes be, addressing these questions is a key way our management becomes more effective and sound over time.

The strong trout population was only partially reflected in the success experienced by anglers. The average catch rate recorded over December was 0.34 fish per hour (one fish every three hours) and over January was 0.28 fish per hour. These are good catch rates without being outstanding. However this data, which was collected from boat ramp interviews undertaken as part of the harvest survey, is likely to be overly influenced by the weather conditions which for so much of this period restricted where anglers could go. As the acoustic tracking shows, the fish move extensively around the lake and for much of the Christmas break prolific areas

Table 1: Average number of boats fishing as recorded by aerial survey over the 2005/06 Christmas period and the relative distribution of effort through the day

Time period	Boats fishing	Proportion of daily effort
Early morning	132	56.4%
Mid morning	46	19.4%
Mid afternoon	26	10.9%
Early evening	31	13.3%

like the Horomatangi Reef were out of reach of most anglers.

Anecdotally, it appears that the windy conditions also affect the distribution of spawning smelt, the smelt avoiding the turbulent shallows. Certainly the harling was only mediocre through December (by December standards) but improved in January coinciding with much greater numbers of smelt evident in the shallows. Large numbers of smelt remained along the beaches in February and not surprisingly there was a lot of surface action by feeding trout for this time of year. However generally by February the fish were deep and anglers using techniques like wirelines, downriggers or jigging and targeting depths of 30 plus metres were having very good success. This trend will continue now until the thermocline (the transition between the warm surface layer of the lake and the cooler, more dense bottom waters) breaks down and the lake remixes in mid to late winter.

The adverse fishing conditions were not reflected in our aerial counts of anglers made as part of the harvest survey. Comparing the dawn and mid morning counts for 4 days chosen at random over the Christmas break with previous counts indicates very similar numbers of boats on the lake to past years. However the effect of the wind blowing up most days was very apparent in the distribution of effort through the day (Table 1). More than half the total angling effort occurred at dawn this Christmas period.

It has also been very noticeable that the effort since mid January has fallen away considerably and on many flights only 15 to 20 boats have been counted, spread over the 193 km of Lake Taupo shoreline.

The other features of the fishing this summer has been the high incidence of fish less than the minimum legal length and the excellent condition of the larger maiden fish. Typically

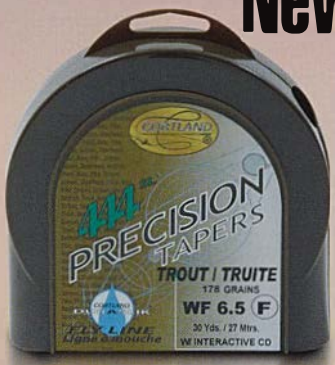
most fish reach the minimum legal length of 45cm around Christmas, indeed the length restriction is set so as to protect these fish over the spring period. However this January, as in the last couple of seasons, a significant proportion of the catch (25% of the catch of unguided anglers and 42% of the guided anglers catch) was recorded as undersized. This reflects that the fish are slightly younger than normal for this time of year, which is a consequence of the late spawning over recent winters.

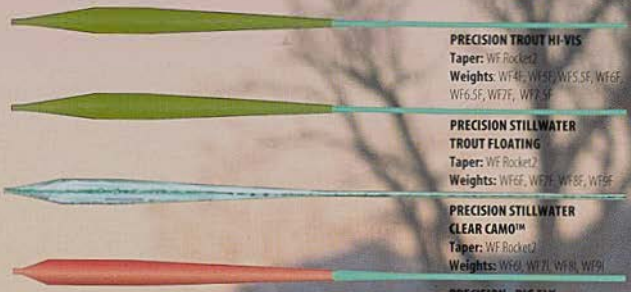
Despite the lack of smelt evident around the shore prior to Christmas there certainly does not appear to be any issue with the smelt population. The condition of some of the large maiden trout in the lake is superb as the accompanying photos highlight. Anglers have however commented that some of the large fish have been very silver but a bit skinny. These are trout which spawned late last year and only returned to the lake in December or January and so are yet to fully regain their condition. For example, during the low settled conditions which prevailed through October and November only small numbers of kelts passed downstream through the Waipa fish trap, on the Waipa Stream. However in the first 17 days of December more than 2000 kelts were trapped, coinciding with a series of small freshes.

The strong trout population, assisted by the limited harvest over summer, means there will be a lot of fish to make their spawning migration up the Taupo rivers over the coming winter months. This combined with the excellent condition of the maiden trout bodes very well for the river angling. The fact that there are once again a high proportion of relatively young fish in the population which are likely to mature late in the winter, suggests that as in recent years we should expect the runs to extend through to October and November.

A superb double limit caught jigging in 30 metres of water in Mine Bay.
Photo: Bryan Dalton

New Seasons Lines





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Weights: WF4F, WF5F, WF5.5F, WF6F, WF6.5F, WF7F, WF8F

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Weights: WF4F, WF5F, WF6F, WF7F

GRAVEL EXTRACTION
in the Tongariro River

Heavy machinery and up to 8 trucks working at a time have removed 25,000m³ of gravel in six weeks.
Photo: Julie Greaves

On the 5th of January this year Cashmere Contractors from Wanganui commenced gravel extraction works for Environment Waikato (EW) and Ngati Turangitukua as part of flood protection works in the vicinity of Tongariro Lodge, in the lower reaches of the Tongariro River. Initial operations involved temporarily diverting the Tongariro so that access roads, complete with bunds and culverts over the residual side channels, could be built to allow the transport of gravel away from the site without continually crossing the river. The resource consent issued for these works required that the gravel be abstracted only from dry areas and this approach to [illegible] of the gravel minimised disturbance to the river bed and water downstream.

The Department of Conservation were on hand during the diversion process to salvage trout stranded by the diverted and receding river channels. The salvage went well with fishery staff catching several large browns (up to 7lb), some recovering rainbow kelts and bucket loads of healthy juveniles. All indications are that the work will be completed by the time you read this, with 25,000m³ of gravel removed during the six week period. The consent allows for a total of 50,000m³ to be taken and the remaining work is planned for next summer.

ANGLING TRACK MAINTENANCE

by Errol Cudby

Good growing conditions in the area this summer have resulted in flourishing overgrowth, blackberries, bracken and brush on the angling tracks, but fear not they will be cleared by 21 April.

Each year the track clearing and roadside mowing work is tendered to contractors. Expressions of interest are sought by advertising in local newspapers and tender documents sent to those who respond. This year there were nine responses and tenders closed on 10 March. The successful contractor is expected to start shortly after this.

Last year the contractor took three days to complete the mowing and two and a half weeks to do all the tracks. It is a big job but the cleared tracks are certainly appreciated by anglers trying to make their way up the Taupo rivers over winter.

A significant programme of track maintenance is necessary to ensure winter anglers have access to their favourite pools.
Photo: Julie Greaves

Has the lake got busier?

by Mark Venman
Mark is our Technical Support Officer and part of the research and monitoring team

Flying around the lake in a small plane allows us to make an 'instantaneous' count of the number of boats fishing Photo: Ian Birch

We first began aerial counts of lake anglers from a fixed wing aircraft back in 1990 as part of our survey of the angling harvest over the 1990/91 season. The logistics and cost of this survey prevents us repeating it in full every year, and instead it is done at five yearly intervals (1995/96, 2000/01 and 2005/06). However between 1991 and 1994 and then again from 2001 we repeated the counts for the busy Christmas period. This report summarises the trend in boat numbers and in part answers the question often posed as to whether there are now more boats on the lake at this time.

For the purposes of our monitoring, lake Taupo was divided into two separate zones; North & South. This was done using an imaginary line running from Tangingatahi Point (Motuwhara Island) to Hatepe, which allows us to compare boat numbers at each end of the lake. Only boats involved in fishing were counted but counts include those anchored at river mouths.

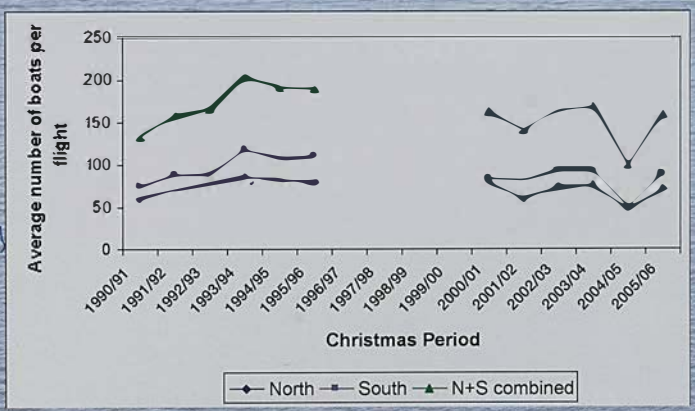
The numbers presented below represent the average of counts undertaken shortly after dawn and at mid morning on five different days chosen at random over the Christmas break each year.

Fishing from an anchored boat is more popular in the southern end of the lake simply because of the presence of the Tongariro and Tauranga-Taupo river mouths in this zone. Notwithstanding this, the average number of boats fishing on the lake over each Christmas period has always been higher at the southern end of the lake (Figure 1) despite the two zones being of a similar size.

The pattern for each zone mirrors each other over time and it is obvious that weather plays a significant role in determining boating use over the holiday period. The best example occurred over Christmas 2004/05 which was 3°C colder than the 40 year average and the windiest December for 20 years. Approximately 50 boats were counted on average in each zone compared to almost twice that number in some other years.

Over the 12 year period that flights were conducted, there has been a slight decline in boats fishing on lake Taupo. Boat numbers peaked in 1993/94, when on average of 204 boats were counted. Over recent years the counts have been well below these levels though there may well have been an increase in the number of non fishing boats like kayaks and jet skis. Obviously the weather plays an important role in determining the number of boats, but the comment we hear most years - that there are more boats on the lake each Christmas - isn't borne out by our data, at least for boats fishing.

Figure 1 Average number of boats per flight over the Christmas periods between 1990 and 2005



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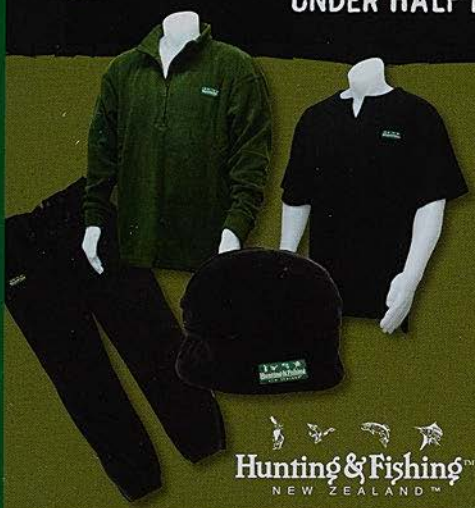

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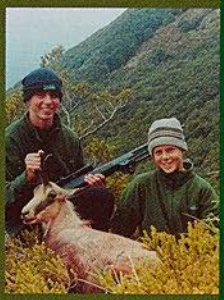

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TROUT PROVIDE MEM

by Thea DePetris

Students from St Patricks School in Taupo were the first class to use the new Taupo for Tomorrow learning centre. Photo: Jason Dixon

Thea is the educator at the Tongariro National Trout Centre, with a background in secondary teaching. Passionate about the outdoors she has also been a leading multi sport athlete.

As the *Taupo for Tomorrow* educator, I often hear parents remark how school has changed since they were kids and how great it is that their children get to visit places like the Tongariro National Trout Centre (TNTC). But what do students actually do when they visit the trout centre for an education programme?

Firstly, I think it's important to understand the main teaching philosophy behind the programme. It is essential that participating in *Taupo for Tomorrow* results in a memorable experience for the students. In twenty years time I hope they still have a vivid memory of the day they spent at TNTC and the lessons they learnt. It is lucky for me that it's such a magic place in its own right with the roaring Tongariro River on one boundary, trout-filled sparkling waters of the Waihukahuka Stream on the other side and luxurious bush alive with pigeons and tui all around. But the next step to make a lasting impression on the students is to ensure that the day is packed with challenging and enjoyable learning experiences. For school aged children this means hands-on activities galore.

First of all, each programme starts with a brief tour around the centre to familiarize students with its setting and facilities. While crossing the bridge over the Waihukahuka Stream many students get to see their first ever wild trout. At this point it is easy to see the magic of the place seeping into them. It often seems that they would stand on the bridge and

ORABLE MESSAGES

ponder over the trout forever if I did not move them on. Our next stop is at the stripping pens where I explain that Taupo is a wild fishery and not stocked. This is when queries from the adults of 'oh really?' and 'wow, you really don't stock?' make it clear that much of the non-fishing public (and quite a few anglers) believe that sustaining the Taupo trout population is done by simply breeding a few hundred thousand fish and throwing them into our waterways. Examples like this have made me a firm believer that *Taupo for Tomorrow* must increase public awareness about the value of our fishery as an important natural resource, and that it needs to be carefully managed in order to preserve it.

After having raced around the rest of the trout centre, we end up at the education centre which overlooks the children's fishing pond. Once again, a sense of awe seems to fall over the group as they enter the classroom and look out over the pond. Having settled the students in we begin the first activity which gives them an insight into fishery management. This activity uses photos of monitoring and research projects that the fishery team undertakes on a regular basis. The photos are projected onto a large screen and the children work together to try and determine what the picture is about. It's a bit of a guessing game for most, as many have never seen, for example, a fish trap or Rangers using an electric fishing machine along a river's edge. This activity is useful for two key reasons. One is that students gain an appreciation that trout are an important resource and a lot of time and effort goes into managing the population. Secondly, it shows students real science happening in the real world.

Year 6 pupil Jack Scott lifts pollution down the pipe while his class mates wait to see the results.
Photo: Joshua Carter

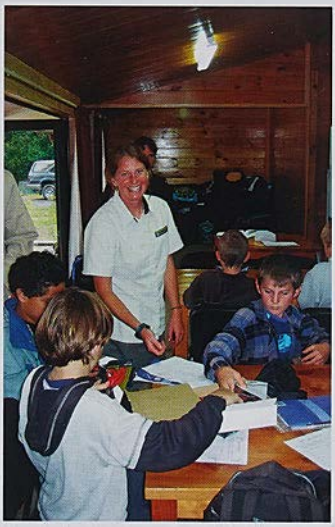
The next activity gives students a look into the habitat of trout. Teams of students are given a box that includes many colourful cards with words like insects, algae, and river bed material printed on them. Also included in the box are objects like pieces of plant and rock matter. The teams then compete against one another by putting all the words and objects together into the correct order. By the end of the exercise, students understand what the major components of healthy trout habitat are and a visit to the underwater viewing chamber enables them to see these things up close in the living world.

Having gained an appreciation for what is good trout habitat, it is time to rate how our local stream at the centre compares. Students are given a range of equipment used to test water quality. The challenging aspect about this activity is that the students must figure out how to assemble all the equipment and how to use it correctly to collect the necessary data. Another great thing is that this activity gets students into the outdoors. Feet and hands get muddy and wet as they search for invertebrates and measure the thickness of algae on stream bed material. It is here, alongside the Waihukahuka Stream, that I often just stand back and watch the trout centre working its magic upon each and every student.

The day up until now has been largely spent introducing the students to freshwater environments and their inhabitants. At this point, I give the students a cartoon that illustrates different types of human activity. The students circle all the drawings that show humans damaging the freshwater environment. This works well to get discussion started. We then move back outside to our last hands-on activity called *Stormwater Goulash*. Each team of students is given a different scenario involving a human activity that turns clean rainwater into polluted stormwater runoff. The teams must then match their scenario to the correct container of pollution, and pour this into the model of a stormwater drain and Lake Taupo. The students' reactions are something to see as the oil and soap suds go flowing into the model's beautiful, clear waters. The reactions are so intense and enthusiastic that it is very difficult to imagine any of these students ever carelessly littering the street or dumping paint and oil down a stormwater drain. Presently in Taupo there are over 90 stormwater outlets that discharge directly into the lake. These children are the local residents, town planners and scientists of the future, and education programmes like *Taupo for Tomorrow* are vital to help them understand the importance of minimising human impact on the environment.

After students determine how to properly dispose of the different types of wastes that were used in this activity, it is time to start wrapping up the day. After one more look at the trout in the viewing chamber, the students head back up the hill to their waiting bus. I am once again confident that the magic of trout centre has done its trick to help form many ever-lasting memories and hopefully well learnt lessons. Having completed a few of these programmes this year, I can safely say that *Taupo for Tomorrow* is going to have a positive effect on tomorrow's world.

"In the end we will conserve only what we love; we will love only what we understand; and we will understand only what we have been taught" (Baba Dioum, 2006).



Thea DePetris, Educator inside the new learning centre with children from the Fath Academy, as they learn about sustainability of the trout fishery and other natural resources.
Photo: Herwi Schelhas

Taupo for Tomorrow Update

genesis ENERGY

Tongariro National Trout Centre Society

Department of Conservation
Te Papa Atawhai

- Mangawhero lodge was moved from Ohakune to the Tongariro National Trout Centre last winter and refurbishment of the building has been completed. The building is now the official learning centre for the *Taupo for Tomorrow* education programme. An official naming and opening ceremony is scheduled to take place in April 2006.
- Option 2 education programmes are up and running. These programmes cater for primary and intermediate students, using a range of hands-on activities to explore trout ecology and the conservation of high quality, freshwater environments.
- Ten primary schools in the district have taken advantage of the *Taupo for Tomorrow* stormwater education programme which is being funded by the Taupo District Council. The programme consists of teacher education about the Taupo fishery and the impacts of stormwater pollution on the lake, a resource kit for schools, and a fully paid field trip to the trout centre.
- Option 3 education programmes are currently being developed for the 2007 school year. This option aims to introduce secondary school students to topics such as fishery management, water quality issues in the Taupo region and the need for balanced and sustainable use of natural resources. Students will gain NCEA achievement standards in geography and/or science through Option 3.
- The *Taupo for Tomorrow* website is currently being designed. The website will enable teachers to download all teaching materials related to the programme. A local guide containing information about the region's facilities and services will also be provided in order to aid schools with their field trip planning.

Taupo for Tomorrow is a joint initiative between the Department of Conservation, Tongariro National Trout Centre Society and Genesis Energy, with the following aims:

1. *To raise awareness of the importance, value and management of the Taupo Fishery*
2. *To encourage freshwater conservation*
3. *To examine the concept of sustainability in reference to some of the region's renewable resources.*

TAUPO FISHERY EXPERTISE *lends a hand in Rotorua*

by Dr Michel Dedual

Over recent summers the algal blooms occurring in Lake Rotoiti in the Rotorua district have received extensive coverage by the media. The problem of algal blooms is ongoing and is largely due to eutrophication. Eutrophication is a severe pollution process caused by excessive inputs of nutrients which stimulate algal growth, much like adding fertiliser to grass. The increased nutrients, like nitrogen and phosphorus, originate mainly from intensive farming practices and urban development.

Ironically the eutrophication problem in Lake Rotoiti is largely due to what happened decades ago in the Lake Rotorua catchment. The water quality of Lake Rotorua is poor (nutrient rich) and this water flows into Lake Rotoiti via the Ohau Channel. Therefore to see a substantial improvement in the water quality of Lake Rotoiti, radical treatments are required in the Lake Rotorua catchment.

There are a number of different routes by which nitrogen enters Lake Rotorua but one of the most significant is the Hamurana Stream at the northern end of the lake. Therefore it is proposed to divert the outflow of this stream along the lake edge, through the Ohau Channel and into the Kaituna River, so that this nutrient rich water does not enter Lake Rotorua and subsequently Lake Rotoiti.

This plan may be appealing to some but from a fishery perspective it may have some serious consequences. Lake Rotorua, unlike Lake Taupo, is shallow and as a result the water in summer can reach more than 21°C throughout the entire water column. The only significant areas of the lake that provide cooler water are the plumes of cold clear spring water from the Hamurana and Awahou Streams entering Lake Rotorua along the north western shore. In this issue we explained that Taupo trout prefer water temperatures that keep their body at around 16°C and that they strongly avoid higher temperatures. The diversion of the Hamurana Stream would mean that there was less water of 16°C available during summer, which potentially could have a major impact on the trout population.

In order to explore the importance of these inflows of cold water for rainbow trout in Lake Rotorua, Environment Bay of Plenty commissioned the National Institute of Water and Atmosphere (NIWA) to carry out a study. It was decided to research the movement of trout, their swimming depth and their body temperature in Lake Rotorua over summer, with an acoustic tracking experiment similar to what we did in Lake Taupo in 2003-2004. The same acoustic transmitters that were developed for the Taupo acoustic study (*Target Taupo* Issue 50) were selected. Local fishing guides caught the fish. Fish and Game Eastern Region provided logistic support and Dr Michel Dedual of the Taupo Fishery Area shared his experience with NIWA assisting with the tagging and other technical aspects of the experiment.

Michel spent three days in Rotorua in November helping insert transmitters into 30 fish. For Michel it was good to be able to pass on some of his hard earned expertise but it was also a great opportunity to look at the behaviour of rainbow trout in lakes quite different to Taupo. The movement of these fish will be monitored throughout the summer until the transmitter batteries go flat. It will be very interesting to determine how important the availability of cool water is for the survival of trout in Lake Rotorua and to compare the biology and behaviour of trout in this lake with their counterparts in Lake Taupo.

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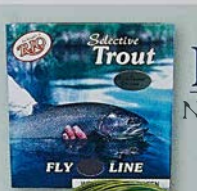

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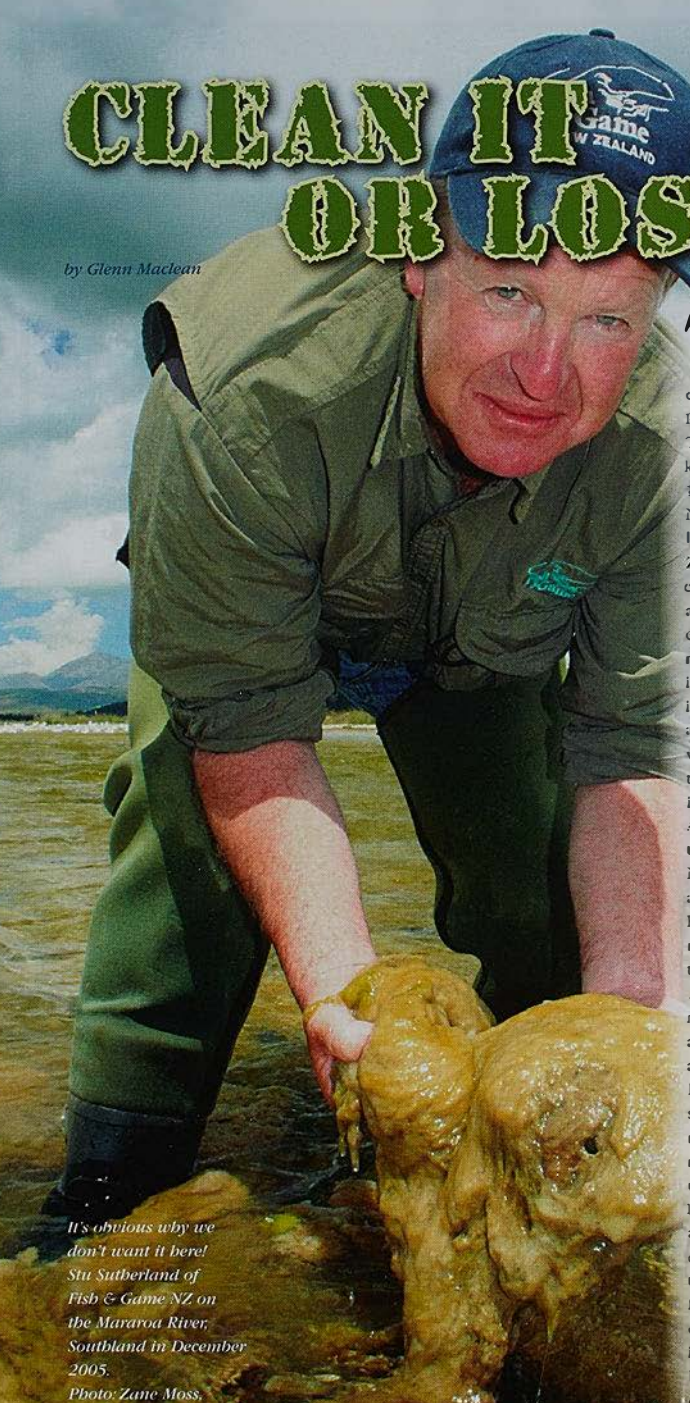
CLEAN IT OR LOSE IT!

by Glenn Maclean



It's obvious why we don't want it here! Stu Sutherland of Fish & Game NZ on the Mararoa River, Southland in December 2005. Photo: Zane Moss, Fish & Game NZ.

The invasive alga *Didymosphenia geminata* or didymo has recently been confirmed in the Waitaki and Ahuriri Rivers by Biosecurity New Zealand. This brings the number of rivers known to be infected by didymo to 10, spread between Southland, Otago, Nelson and now Canterbury.

In December Biosecurity New Zealand strengthened control efforts with the implementation of a South Island-wide Controlled Area, enhanced public awareness and a one million dollar research programme to investigate potential control tools. It is now a legal requirement to clean any items that have been in contact with lakes and rivers when leaving the South Island or before using them in another waterway.

A number of agencies and organisations including DOC, Fish and Game New Zealand, power companies and Regional Councils have assisted Biosecurity New Zealand to spread the message that it is up to every one of us to take responsibility to ensure we do not inadvertently spread didymo to a new catchment. Information packs and posters have been spread far and wide including to fishing licence holders, DOC concessionaires, multi sport athletes and others. In addition, new river signage, radio advertisements and personal contact with river users has occurred.

In the Taupo and Rotorua areas we are taking the campaign further. If didymo arrives and forms big blooms then you will simply not be able to fish rivers like the Tongariro. You certainly would not want to swim in them, kayaking and rafting would be much less appealing and the ecology of the rivers will be seriously

affected. The bottom line is the pleasure many New Zealanders derive from this area and the local economy would take a very big hit. Think about what it would mean to you personally if didymo arrived - many of us have an awful lot to lose. However it's not all doom and gloom. We are lucky, as didymo hasn't been detected here and it is still business as usual. But we must do our level best to ensure it does not arrive.

It's not an impossible battle, there are very practical ways to clean our gear to avoid transporting the cells but each of us need to be proactive to ensure we, and the people around us clean their gear. For example, motelliers must provide a detergent bath and insist that guests decontaminate their gear in

Cleaning your gear with detergent is essential, and simple to do
Photo: Glenn Maclean

it, local sports shop staff must show every licence buyer how simple it is to wash their gear and why it is essential, anglers must quiz their fellow anglers and so on. To assist with this, local stakeholders recently met to identify the various pathways that didymo might enter the central North Island and practical measures to address each of the threats. The group is in the middle of putting together packages to highlight the threat, identifying and organising practical solutions and ensuring personal contact is made with the hundreds of fishing guides, accommodation providers, rafting and kayaking companies, sports shops, outdoor educators, air transport operators – the list seems endless. However if we are serious about keeping didymo out, then all these people have key roles to play.

This approach recognises that ultimately all freshwater users must do the right thing. People need to clean between waterways anywhere in New Zealand – everyone, everywhere, everytime. Simply because didymo has not been detected in the North Island does not guarantee that it has not crossed Cook Strait. It is essential trout anglers and other river users adopt CHECK, CLEAN and DRY as a matter of routine, much as saltwater anglers wash down their equipment at the end of the day to protect it from the ravages of salt. Didymo is likely to be a long term threat and cleaning our gear whenever we move from one river to another must become an integral part of any trip.

It's not hard

Saturate your rod and reel, felt soles of your wading boots and the mesh of your landing net with a 5% solution of dishwashing detergent (50ml and 950 ml of water) from a squeegee bottle. Open your fly box up and allow this and other gear to dry completely (at least 2 days). Why not keep the squeegee bottle in the boot of your car so it is always on hand.

If you are kayaking or rafting wash down your clothing, spray skirts and the like in a bin with 750 ml of detergent and 15 litres of water. Throw a litre of this solution into the bottom of your kayak and leave to slop around. That's a single refill of detergent at $3.50 - cheap to protect the environment you treasure.

If you are planning a duck shooting trip this May then make sure your gear is clean or dry before you go to another location. Don't forget about your dog, as damp fur is a perfect vector to transport didymo. Similarly don't give your dog a swim to cool down in some stream you cross on the way home, in case he is still damp.

Its simple stuff, just think about what you are doing and take the appropriate action. Keeping didymo out will require conscientious effort from all of us but it's well worth it!

Keep Didymo a South Island problem!

If you're coming fishing at Tmpo this winter, pull out your gear a week before and give it a good clean as above. Not only are you being responsible but it will help build the anticipation for your upcoming trip, much as touching up your decoys and replacing their strings prior to opening day of the duck shooting season.

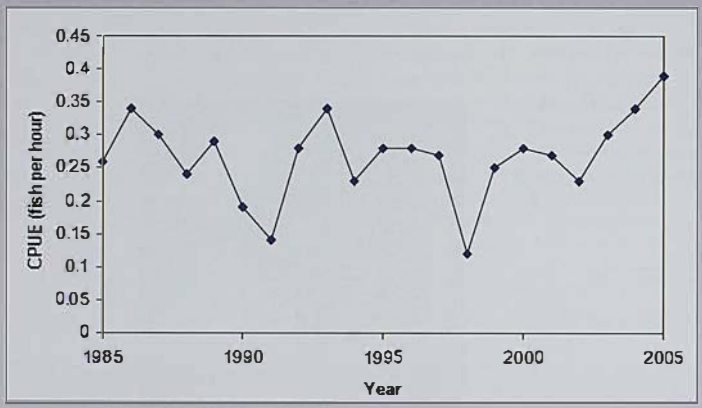
Hot and cold on the Tongariro River

by Mark Veinman

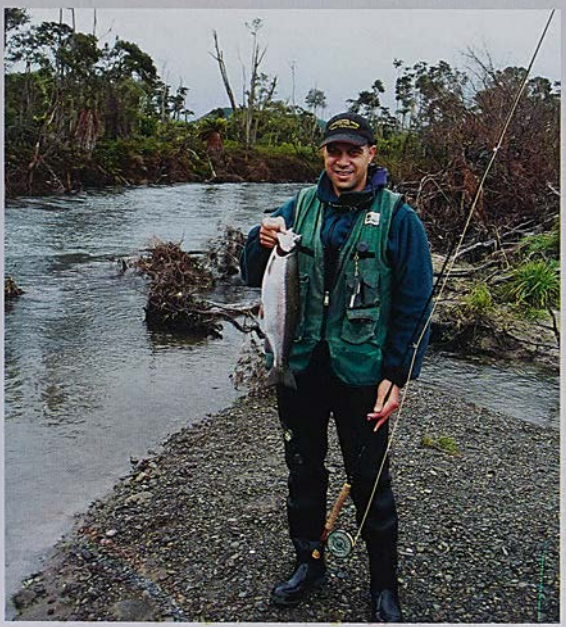
Overall last winter was an excellent season on the Tongariro River with an estimated catch rate of 0.39 fish per hour (1 fish every 2.6 hours). This is slightly higher than 2004 and the highest recorded over the last 20 years (Figure 1).

However success was not consistent through the season. Catch rates during May were considerably higher than the previous five years at 1 fish every 2.7 hours but there was a lull between June and August. When the rain finally arrived in September there was some exceptional angling with an estimated catch rate of 1 fish every 1.3 hours! So while the average catch rate estimate reflects some outstanding fishing as those who experienced it can testify, it doesn't represent a consistently good season.

Figure 1 Estimated catch rate (per angler) from the Tongariro River since 1985



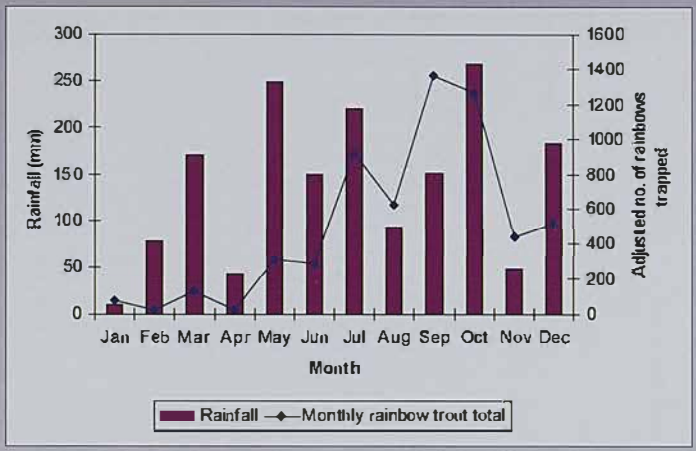
Success on the Tauranga-Taupo River. Photo: Norrie Ewing



By October the fishing was largely over with anglers catching on average just 1 fish every 4.2 hours, despite more than 1,100 fish passing through the Waipa Stream fish trap near Rangipo. Clearly these were some of the fish responsible for the exceptional fishing in September, before they moved into the Waipa Stream.

The fact that it takes many fish some months to migrate up the Tongariro River, especially early in the season, is reflected in the monthly trap totals. The main run of rainbow trout in the Waipa Stream really only got underway during July with almost 1,000 fish trapped, likely related to the 220mm of rainfall recorded at the trap site. August received half as much rain and the runs reflected this with just over 600 fish being recorded. The rainbow trout run peaked over September and October with more than 2,600 fish trapped.

Figure 2 Monthly rainfall (mm) versus the adjusted number of rainbow trout trapped in the Waipa Stream during 2005



Just 49mm of rainfall in November kept the runs to a minimum before the wet weather returned in December to encourage more than 500 fish through the trap (Figure 2). In total, approximately 6,000 rainbow trout were trapped during 2005, which is on par with 2003 but down on the peak of 8,470 trapped during 2004.

The rainbows trapped averaged 535mm and 1.8kg and were significantly longer and

heavier than recent years. By contrast, fish kept by anglers and weighed and measured by fishery staff undertaking routine creel surveys on the Tongariro averaged 538mm and 1.9kg. This is on a par with the previous year, the difference with the map average reflecting that anglers tend to select the better fish to keep. The fish kept by anglers during 2005 had an average condition factor of 43.7 which is very similar to the last two years.

On the Tauranga-Taupo River, the average catch rate over the season was estimated at 0.32 fish per hour (1 fish every 3.1 hours) which was well below the peak of 2004 (0.45 fish per hour) but similar to that estimated for 2003. Catch rates typically vary widely from year to year on this river and these estimates reflect an average winter. In keeping with this, drift dives completed above the winter fishing limit indicated a solid spawning run with numbers peaking over October and November. Rainbows kept by anglers were longer than the previous three years averaging 545mm and 1.9kg, with a similar condition factor to recent years.

Typically every year one river stands out above the others. In 2005 this was the Hinemaiaia. During May and June an overall catch rate of 0.46 fish per hour (1 fish every 2.17 hours) was recorded. Fish caught by anglers were also of very good size averaging 557mm and 2.2kg, heavier than the previous three winters. Drift dives conducted below the HB dam produced peak counts during September and October and point towards another good spawning season on this river.

Overall, the winter of 2005, while failing to reach the notable peaks observed during 2004, was generally a very good spawning season on most of the main rivers and very similar to 2003. Fish caught were generally larger than recent years. While there was a significant run early in the winter into the Tongariro, in general the fish ran during September and October, the timing probably influenced by the weather.

This winter it will be interesting to see if the separation into an autumn and spring run is evident again or whether this was simply an artefact of the prevailing weather conditions. The high November acoustic count of legal-sized fish in the lake combined with a relatively low summer harvest should result in another good spawning run during 2006. Runs are expected to again peak during September and October – weather dependant!

When the runs come in September the fishing was exceptional on the Tongariro River. Photo: Norrie Ewing

Whangamata Stream weed control update

by Errol Cudby

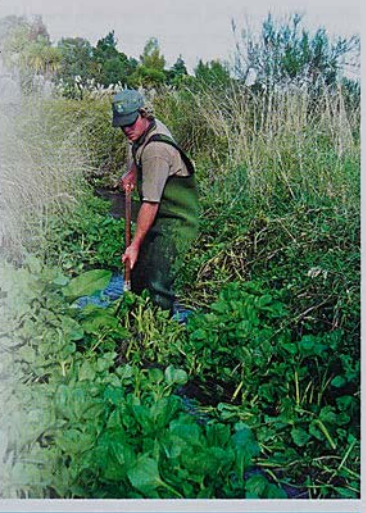
Errol is our Programme Manager Visitor Assets, responsible for angler facilities

The Whangamata is a small, spring fed stream which flows through the settlement of Kinloch and into the northern bay of the same name. There are few tributaries in the north and west of Lake Taupo which are accessible for spawning trout, so every single, suitable square metre of streambed is as important – and as sought after as every bunk in an overcrowded tramping hut. When we ran a fish trap on this stream in the past, over 2,500 trout were trapped in the peak months of the spawning season.

The stream has been protected for the past 30 years by gazetting the lower reaches as a scenic reserve and fencing out riparian strips. However this has also required management of emergent aquatic vegetation which otherwise chokes the stream and prevents trout access.

Initially the plants (mainly monkeymusk, *Mimulus luteus*) were cut and raked out. To undertake this over the length of the stream was a big task and physically demanding, so in 1993 a consent was obtained to spray with a suitable herbicide at the beginning and the end of the growing season. This simplified control and took much of the physical requirement out of the equation.

However in 2003 the consent expired and we had to revert to the old methods while a new consent was sorted out. A new consent has now been granted and we will resume chemical control of pest weeds in the Whangamata Stream in the autumn.



Ranger Callum Bourke clears the Whangamata Stream the hard way. Photo: Norrie Ewing

REARING TROUT

AT THE TONGARIRO NATIONAL TROUT CENTRE

by Callum Bourke

Callum was previously employed as a fish trap operator and is now a ranger involved in all our field operations. He is an enthusiastic angler with a very strong affinity for Lake Taupo.

The Taupo fishery is totally sustained by natural spawning, but every year we raise approximately 5,000 rainbow trout at the Tongariro National Trout Centre (TNTC) to supply our childrens' fishing pond. The children's fishing days are immensely popular and a great way for kids to experience the thrill of catching a trout, while receiving expert tuition from the experienced and dedicated volunteers of the Tongariro National Trout Centre Society.

While it may seem reasonably straightforward to put some fish in the pond, in reality these fish are the culmination of an extensive 18 month rearing program within the confines of the centre. The first step of the process is to capture 3 rainbow hens and 3 jacks which are fully mature and ready to spawn (ripe), from the Waihukahuka (Hatchery) Stream. The hens have approximately 3,000 eggs per fish, so 3 ripe adults are a sufficient number to ensure that ultimately there are at least 5,000 fingerlings for release into the childrens' fishing pond.

The eggs are extracted from the hens by quietly stroking their belly causing the hen to eject the eggs into a wok. They are then fertilised by mixing them with the milt from the jacks which is extracted the same way. Once the nucleus of the sperm pushes through the soft membrane and in contact with water, the eggs swell and the membrane hardens. This effectively isolates the embryo from the outside world, although oxygen can still pass into the egg. The eggs are left in a bucket undisturbed for at least 20 minutes before being carefully placed in incubator trays that are covered and stacked in the hatchery building. The eggs can be handled for up to 12 hours but after this they are very sensitive to mechanical shock. This is why in nature it is very important that eggs laid in the gravels are not disturbed by wading anglers and the like.

A constant supply of oxygenated water is filtered through the eggs, as would similarly be the case had they been submerged in the gravels of a stream bed. During this 18 day period of incubation, the eggs visibly develop two small eyes. Not surprisingly, this is called the "eyed stage", and once this is complete it is time for what we call the "shock treatment". This involves siphoning the eggs from the trays and dropping them into a basket on the floor. This is a simple and effective way to identify the weak and deformed eggs as the outer membrane of such eggs will break upon impact. This causes a distinctive white

The first half of the equation – eggs are quietly stroked from a ripe rainbow hen.
Photo: Glenn Maclean

The second half – the eggs are fertilised with the milt of a jack fish.
Photo: Glenn Maclean

colouration with a bright orange/red spot, similar to some of the globug fly patterns you might use while nymphing the rivers over winter. After the shock treatment, the dead eggs are discarded and the surviving eggs left in a basket placed in a trough through which cool, oxygenated water flows at all times. Within 30 days these eggs hatch into alevins that then swim through the gaps in the basket and settle on the bottom of the trough, feeding off the yolk-sac attached to their body. Alevins look basically like eggs with a small head and tail, not too dissimilar to the tadpoles you might find in a swamp.

A further 30 days later after the food reserves in the yolk-sac have been exhausted, the alevins have now become fry approximately 25mm long, and swim to the surface. From this point, the fry have to be regularly fed. Their diet consists of small grain comprising a mixture of fish oils, fish meals, milk powder, dried blood, vitamins and trace minerals.

As the fry grow over the ensuing three months in the troughs, the size and quantity of the feed grain progressively increases. They develop into 50mm long parr with distinctive oval markings on the sides of their bodies, and it is now necessary to transport them into a larger tank where they can move and grow more freely. Here they spend another three months before, as fingerlings 70 to 90 mm long, they are ready to leave the confines of the hatchery and enter the large rearing ponds. The ponds, also called Burrows Raceways after their designer, simulate a natural stream flow using metal baffles or screens to divert the current evenly throughout the tanks so there are no areas of dead water. At the trout centre we have five rearing ponds that can potentially hold 20,000 fingerlings each. The fingerlings spend 6 months in these tanks, growing rapidly and constantly needing more food. By the time they are ready to be released into the children's fishing pond, the fingerlings are consuming approximately 3kg of 3mm diameter pellets per day. The feed ratio is worked out each month by weighing a random sample of fingerlings, from which we can establish the total biomass of the 5,000 fish present. The amount of food fed each day is the equivalent to approximately 1% of the biomass.

With our fish now 18 months old and meas-

Petrina Francis inspects eggs rearing in the incubators. Photo: John Gibbs

uring around 100mm, they are ready to be released into the childrens' fishing pond. This is generally the size and age juvenile trout in the Taupo tributaries are when they migrate to the lake and start actively feeding on smelt. The fingerlings spend a further 4-6 months in the childrens' pond, feeding on as much as 6kg a day of large 5mm diameter pellets. At this point they grow very rapidly, effectively doubling their size over this period. By April as rising two year old fish our trout are ready to bite at an unsuspecting young angler's fly.

The shocked eggs are placed in baskets within the rearing troughs to complete hatching.
Photo: John Gibbs

At the conclusion of the year's fishing days at the centre, it is necessary to empty the pond and restock with next year's fish. We are often asked why we don't keep the fish another year longer so they get that much bigger. This would certainly substantially increase the feed costs but the biggest problem is that with all the feeding these fish get, a number of males in particular, mature early. This causes the males to become particularly feisty and territorial and all the pheromones swirling around in the water further unsettles the other fish making them difficult to catch.

As a consequence we are often left with a surplus of fish in December. However these fish still have a role to play. late last year 1,000 of our fish were transported in a tanker and released in Lake Wiritoa, near Wanganui by Fish and Game Taranaki. In conjunction with the Wanganui Freshwater Angling Club, they held two successful "Take a Kid Trout Fishing" days. An area was netted off by Scoutlands Beach in the lake to keep the fish congregated in a manageable area, allowing the children a better chance of catching their prized trophy. At the conclusion of these "Take a Kid Trout Fishing" days, the nets are removed and the fish free to roam the lake where they are available for all licensed anglers.

Nine months old and time for Greg Robinson to transfer these fingerlings into the Burrows Raceways outside.
Photo: Julie Greaves

Similar events were also held at lake Ngangana, Waitara, where 230 fish were released and the Patea River near Stratford, where 390 fish were released. Seven hundred fish also went to the Wellington Capital Trout Centre where a number of successful childrens' fishing days took place. Reports suggest that these were extremely popular and many good sized rainbows were caught, satisfying the budding young anglers. Finally, the remaining 300 fish found homes in the Bay of Plenty and Hawkes Bay regions. As you can see, our young Turangi offspring certainly get around a fair bit and provide many angling opportunities around the country for everyone to enjoy.

In 1983, when my grandparents took me along to catch my first trout at the Tongariro National Trout Centre, I instantly became

hooked on fly-fishing. The thrill of that first catch has not diminished over time and I'm sure that many children have experienced the same feelings. Every year the fishing days at the centre prove to be really popular and are often booked out in advance. If you haven't already done so, be sure to take your children along to a great day this year and enjoy the all the awesome facilities we have at the Tongariro National Trout Centre.

The childrens' fishing days are run by volunteers of the Tongariro National Trout Centre Society. The dates these will be held in 2006 can be found on the next page, or have a look at their website: www.troutcentre.org.nz. For more information and bookings, comact the Society on (07) 386 8085.

A memorable moment for this young boy as Tongariro National Trout Centre Society volunteer, Bob Appleton, nets his fish from the childrens' fishing pond.
Photo: Glenn Maclean

Department of Conservation
Te Papa Atawhai

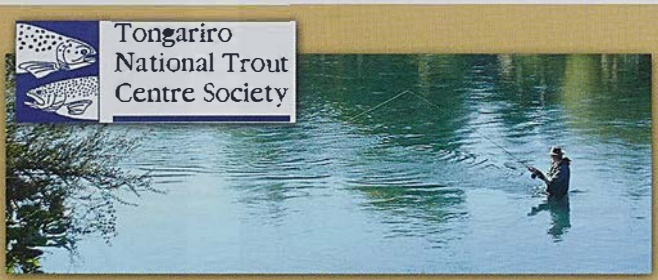
Tongariro National Trout Centre Society

Children's Fishing Pond Dates 2006

The fishing pond at the Tongariro National Trout Centre will be open on the following days for the remainder of 2006:

Sunday, 23 April (School Holidays)
Sunday, 14 May
Sunday, 04 June (Queen's Birthday)
Sunday, 09 July (School Holidays)
Sunday, 20 August
Sunday, 24 September (School Holidays)
Sunday, 22 October (Labour Weekend)

Bookings can be made by telephoning the trout centre volunteers at the River Walk visitor centre on (07) 386 8085 between 10am and 3pm daily.
by email: *troutcentre@reap.org.nz*,
by website: www.troutcentre.org.nz
or by fax: (07) 386 8490



The Society encourages and promotes public interest in trout fishing, an understanding of the Taupo fishery and trout habitat. 'The River Walk' Visitor Centre has been developed to provide a modern learning experience about trout for visitors of all ages. Throughout the year Society volunteers publicise and conduct children's fishing days at the Centre to teach children to fish for trout and to encourage respect for our environment.

To join the Society please fill in the form and include the annual subscription of $25

Name:

Address:

Post to: Tongariro National Trout Centre Society, P.O. Box 73, Turangi

by Callum Bourke

A friend of the fishery

In case you are wondering there are 102 flies in this photo
Photo: Julie Greaves

Fed up with losing gear while fishing the rivers? Well local angler Bob Rosemergy is. Since the February 2004 flood, Bob has been free-diving the popular Judges pool on the Tongariro River, clearing those annoying snags our flies seem so attracted to. Bob reckons that he free-dives the "Judges" 3 to 4 times a year and this collection of lines and flies are just some of the many he has collected over recent dives.

Well qualified to undertake this challenging task, Bob has been free-diving for a number of years and is currently Chairperson of Free-Diving New Zealand, a branch of the New Zealand Underwater Association. Bob has a strong affinity for the area having lived in Hatepe during the Second World War, attending Tauranga-Taupo school. Now retired with a holiday home in Turangi, he goes fishing as much as possible, just as he has done for the past 50 years. So thanks for your good work Bob which is no doubt appreciated by many of your fellow anglers.

by Rob McLay

Rob is our Programme Manager Field Operations and a very experienced angler.

Keeping an eye on compliance and law enforcement

One of the better known functions of our rangers is that of monitoring compliance with, and where necessary enforcement of, the fishery laws by anglers and the public at large. This activity is conducted in two ways. On one hand we may be very visible, approaching anglers openly and in full uniform with boats or vehicles emblazoned with the Department colours. However we also conduct operations covertly where we observe activity without anglers or potential offenders being aware of our presence. This latter approach is normally adopted when targeting a specific activity such as netting in the lake or poaching in spawning streams.

Over the current summer staff have, as usual, been engaged in ranging activities throughout the fishing district. The emphasis has been on Lake Taupo as this is where most of the fishing effort occurs at this time of the year. It is pleasing to report that non compliance with the regulations appears to have been less than we might have expected based on our experiences from previous summers. In particular netting at stream mouths and night time fishing after hours has been much reduced from the levels we have traditionally encountered. The most common offences detected have been unlicensed anglers and boat anglers either trolling or jigging in fly fishing-only areas adjacent to stream mouths and the Kuratau Spit. From November last year to February this year, 10 people have been apprehended for a range of offences and a number of these have already been dealt with through the District Court. This is a tiny fraction of the anglers we have checked, indicating that the vast majority understand the importance of sticking to the rules to help ensure good sport for everyone in the future.

The Taupo fishery team run a 24 hour 7 day a week duty officer so anglers and the public can report, directly to a ranger, any activity that appears suspicious. As always, our duty officer received many calls over the summer, particularly during the Christmas/New Year holiday period. Most of these were from people seeking information of some kind but some were also from anglers or members of the public who had observed an activity they believed to be illegal. We appreciate these calls, because if we can respond to an event while it is still in progress there is a very good chance of making a successful apprehension. The number to call is 027 290 7758. This is printed on the licence form and is also on the after hours answer phone message of the Department's Turangi office. Better still - program it into your mobile phone so it is close at hand. If you see something you are not sure about, don't hesitate to give us a ring. We would much prefer to have the occasional call that turns out to be something innocuous than to miss vital information on other occasions.

The number to call is 027 290 7758

The same or different?

Comparing Taupo and Otamangakau rainbow trout

by Dr Michel Dedual & Pascal Voutanthen

Pascal studied fish evolution at the University of Bern in Switzerland. He is also a keen and skilled angler who pursued trout all over New Zealand last January.

Understanding the genetic composition of fish populations is a key factor in the management of many salmonids, and surveys of genetic characteristics have been carried out extensively for several species. However, only one study of genetics in New Zealand trout has been conducted. In the 1990's the genetic variation between American rainbow trout and their descendants in New Zealand was examined. However, the analysis available at the time was too coarse to allow the detection of any significant differences.

More recently, the development of an analysis procedure called microsatellite-DNA has allowed detection of much smaller differences in genetic composition between populations. Microsatellite-DNA are small sequences of DNA that are repeated all along the DNA chains. The number of times the sequence is repeated varies between individuals, within populations, and/or between species allowing the construction of "fingerprints". These fingerprints can then be compared to assess if the organisms are genetically different or not. Microsatellite analysis is a very versatile tool and can be used to estimate the influence of trout of different origins on the current stock composition, to assess the effective size of natural populations when both natural and stocked fish are present, to estimate inbreeding levels, to investigate population structure and gene flow, and to assess the impact of stocking. Microsatellite analysis can also be used as a tool for forensic investigations to determine fish origin.

The Taupo fishery is totally wild and self sustaining. Maintaining this situation is a key goal of the Taupo Sport Fishery Management Plan. As such there is no routine stocking but the plan acknowledges that volcanic eruptions in particular, could severely affect or even completely eradicate trout in some streams and rivers. In the wake of such a catastrophe the plan recognises that it would be necessary to kick start the fishery off again. This is why we maintain the hatchery at the Tongariro National Trout Centre at Turangi in a state of readiness. However it raises the question – are all Taupo trout similar genetically or is the population spawning in each stream uniquely adapted to that particular river? Should we restock with fish sourced from Lake Otamangakau, from anywhere around Lake Taupo or do we need to determine which sub populations are most alike and use these?

To answer these questions we decided in the first instance to test whether there was any detectable difference between Lake Otamangakau and Taupo rainbow trout populations. These trout are from the same original stock, but have been separated for about 12 generations. If there were differences then it would be valuable to look at more closely linked populations but equally if there were not, there would be no point in taking the investigation any further.

A total of 60 spawning rainbow trout were

Waipa rainbows, like this one held by Ranger Julie Greaves, are genetically different to Lake Otamangakau rainbows. Photos: Norrie Ewing and Petrina Francis

sampled in winter 2003 as they passed through the Waipa (Tongariro River) and Te Whaiau (Lake Otamangakau) fish traps. Approximately 1 cm² of fin was used for analysis. The samples were stored and sent to the University of Bern in Switzerland where the DNA was extracted and analyzed.

This study was the first in New Zealand to compare the genetics of closely related rainbow trout populations. The results were remarkable showing that the genetics of the two populations are significantly different after only 35 years (about 12 generations) of relative isolation. This small number of generations has been sufficient for generic drift and/or local adaptation through natural selection to occur, despite occasional small releases of Taupo strain juveniles for research and monitoring purposes.

The genetic differences between Taupo and Otamangakau rainbow trout populations imply that they should be treated as distinct management units in future management plans. For example, any future releases of trout into Lake Otamangakau should be sourced from Otamangakau parents.

This study also shows that testing for genetic differences between two rainbow trout populations in the Taupo area can be done at low cost. The next step will be to explore genetic differences between rainbow trout from different tributaries of the Taupo catchment. The differences in spawning migration timing, size, and appearance of adult fish in the different Taupo tributaries are interesting indices for possible reproductive isolation between populations. Genetic differences between trout from different tributaries would reinforce the management implications explained above. Perhaps just as interesting will be to test whether there are differences between early and late run spawning fish in the same stream. If there are and we need to treat these populations separately then that could have implications for such things as the timing of closed seasons.

UNLOCKING ONE OF THE LAST SECRETS OF TAUPO TROUT

by Mark Venman

Although more than 30 years of research has greatly advanced our understanding of many aspects of the lifecycle of rainbow trout in the Taupo catchment, we still have limited knowledge of the ecology and behaviour of juvenile trout when they leave the river and enter Lake Taupo.

Previous research using scale samples has indicated that 90mm is the minimum length that juvenile trout must be to survive entry into the lake. It is hypothesised that this is the size trout need to be, to be able to catch and feed upon smelt. However we are not totally convinced smaller trout cannot survive, indeed we have witnessed schools of much smaller trout feeding on aquatic insects around the lake edge. All we know for certain is that the migration of juveniles into the lake is a time of major mortality in the trout population, but which individuals survive and why?

This particular phase of the life cycle is the most difficult to investigate as it covers two separate environments. However, it is vital because it constitutes the last large bottleneck on trout production in the catchment and is one of the key pieces of information we need to properly understand the dynamics of Taupo trout.

As a consequence it is an extremely large project to tackle both practically and financially, and we need to break it down into a series of steps. Ideally we need to be able to follow the progress of a large number of juveniles through to maturity several years later, so we can determine what the common characteristics are of the juvenile fish which ultimately survive. A possible solution is to use Passive Integrated Transponder tags (PIT tags) which are tiny identification chips injected into fish for permanent identification. The chip is read by a reader when the fish passes through or over an aerial in the river and the unique number of the tag recorded. In this way the progress of an individual fish out into the lake and then when it returns to spawn can be followed. Hand-held scanners could also be used to check trout caught by anglers.

The advantage of PIT tags is they are very cheap and so it is feasible to tag a large number of young trout. However, to answer all of our questions it would be necessary to be able to detect the PIT-tagged fish as they pass out of the Tongariro River at the Delta. This requires stretching an aerial across the entire riverbed and depending on the conditions under which the fish migrate, may require holding the aerial through major floods. Clearly this part of the project constitutes a major challenge.

Another solution is to use automated acoustic tags such as those used in adult fish to track their movements around Lake Taupo (*Target Taupo*, Issues 50 & 51). These tags send out a signal which is detected by any automatic loggers nearby (within a few hundred metres) and have proven to be an excellent way to follow fish around the lake. Recent developments reducing the size of acoustic transmitters now makes it possible to tag juvenile fish as small as 85mm in length. Receivers could easily be deployed throughout the Tongariro, around the Delta and along the southern shores of Lake Taupo to help track their progress throughout the river and into the lake. However, the downside of these acoustic tags is that they are expensive, retailing at US$290 each and have a limited battery life (a few months).

To test which is the best methodology we are initially undertaking two trials. These will also provide additional information to allow us to better assess which approach is best suited to a major project to track and determine juvenile trout migration and subsequent survival in the lake.

In the first trial PIT tags will be inserted into juvenile trout in the Waipa Stream, upstream of our fish trap. As these fish migrate downstream they will be detected by an aerial attached to the trap structure and again as

The PIT tag aerial (inside the white tube) is attached to the back barrier of the Waitpa trap. Any tagged fish swimming through the aerial or over the top in floods should be detected. Photo: Michel Dedual

they return as spawning adults. We envisage continuing this project for a number of years and in itself it will provide a lot of useful information, linking the production of juvenile trout in the stream to the subsequent spawning run. In the short term, it is also a good test of how effective this setup is in a smaller stream before attempting a similar setup in the mighty Tongariro!

At the same time we are undertaking a second trial tracking 20 juvenile fish for a period of 8 months through the lower river, using acoustic tags and a series of automatic loggers. The data collected will provide information on the timing of migration and their behaviour in the lower river. For example, it should provide information on whether the downstream migration of smolts occurs at certain times of the year or only when the river is in flood. If floods are important for transporting juveniles into the lake, the PIT-tagging approach and necessary aerial setup at the Delta is unlikely to be achievable given the flow and debris issues associated with big floods, and the limited detection range of the PIT-tags. However, if the downstream passage of juveniles occurs under more stable conditions possibly related to fish size or body chemistry, then the use of the cheaper PIT-tags could be a feasible option.

Ultimately for the main project to be successful, either approach requires tagging large numbers of juvenile fish, because in reality most fish will not survive the transition to life in the lake. This is inherently expensive and in many situations the cost might be prohibitive. However we are very fortunate that this work can be funded by the Tongariro Enhancement Group set up as part of an agreement between DOC and Genesis Energy over the Tongariro Power Development consents. The group has a major objective of researching and monitoring the function of the lower Tongariro River fishery and its contribution to the Taupo fishery. This project obviously fits very well with this objective and the $40,000 available each year from Genesis Energy, on top of our contribution, provides the opportunity to undertake the research on the necessary scale.

Ultimately the results may well have a major influence on how the fishery is managed so as to maximise the production of juvenile trout which have the best chance of survival. Time will tell, but this is an exciting time for both anglers and the fishery team as we attempt to unlock one of the trout's last secrets!

Recent fishery team changes

Photo: John Gibbs

Petrina Francis

The Fishery Area team were sad to farewell Petrina Francis at the end of November. Petrina had only been with us for two and a half years, but in that time made a huge contribution to the fishery. She started as Ranger Service, managing our fishing licence system but was soon appointed as our first full-time Programme Manager Community Relations.

In this role Petrina undertook all our public awareness work, including production of publications, editing *Target Taupo*, media liaison, production of the fishery pages of the DOC website, providing administrative support for the Taupo Fishery Advisory Committee, liasing with community groups and volunteers and coordinating our development of the visitor facilities at the Tongariro National Trout Centre.

Petrina had a wide skill set but she was particularly talented in website and publications design and production, and will be especially remembered for her ability to relate in a positive and productive way to the diverse range of people and organisations we work with.

Among many achievements, Petrina will be most remembered by us for the quality of *Target Taupo* and our website, the implementation of the education programme *Taupo for Tomorrow* at the trout centre, the four outstanding fishery information brochures she produced, her cheery manner and great work ethic.

Petrina and her husband Perry originally made the move south from the Auckland corporate world for lifestyle reasons. They are now fulfilling their dream to start their own business together and are building a café in Owhango. So if you are passing through on SH 4 from about July onwards, stop in at the *Out of the Fog Café* for coffee and a chat.

Photo: Glenn Maclean

Tania Greaves

Also leaving the fishery, but still in the conservancy, is Tania Greaves. Tania was Ranger Service responsible for managing the fishing licence system. In this role she did a great job in establishing positive relationships with our large network of licence agents and quickly earned their respect for her productive and professional approach. Tania has accepted a promotion to Ranger Biodiversity with the Turangi/Taupo Area Office, where she will be able to apply the skills and knowledge from her BSc

New faces in the fishery team

Michael Hill

Of Ngati Tuwharetoa, Michael was born in Murupara and raised in Taupo attending Waipahihi Primary and Taupo Nui a Tia College. He recently joined the Taupo Fishery Area team as a ranger in the Field Operations programme.

Photo: Tapia Rameka

"Growing up in Taupo made me appreciate our resources and I soon became an enthusiastic angler" says Michael who has a background in tourism including launch charters and river rafting. He has also worked at Environment Waikato, Taupo Bungy, Fletcher Challenge Forestry and the Wairakei International Golf Course.

Michael has travelled to the United States, Mexico and Australia, the highlight watching the 2004 Rugby World Cup in Sydney despite the unfortunate outcome. Another memorable experience was visiting Uluru (Ayers Rock).

Michael's interests are fishing, more fishing, coaching rugby, tourism and filming. "I am very pleased to be working for the Department of Conservation in an area where I can be part of the team helping to ensure the sustainability of our beautiful lakes and rivers" he says.

Greg Robinson

Greg grew up in the Waimarino District and upon leaving school started working as a bushman. Following his dream of combining his occupation with a lifetime interest in fishing, Greg moved his family to Coromandel and spent the next 8 years commercially fishing. However long hours at sea eventually led him back to shore, to spend more time with his wife, son and daughter. After a stint logging at Raetihi Greg in 2000 became the first skipper of the restored river boat, *Waimarie* on the Whanganui River.

In his new role Greg is responsible for the day to day management of the trout centre. As he says "it is right up my alley with fishy things, the outdoors and working with the public. Turangi will be a great base for me and my family". Greg is keen to enjoy the region's trail biking and boating opportunities, as well as spending plenty of time on the riverbanks improving his flyfishing skills.

Photo: Thea DePetris

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