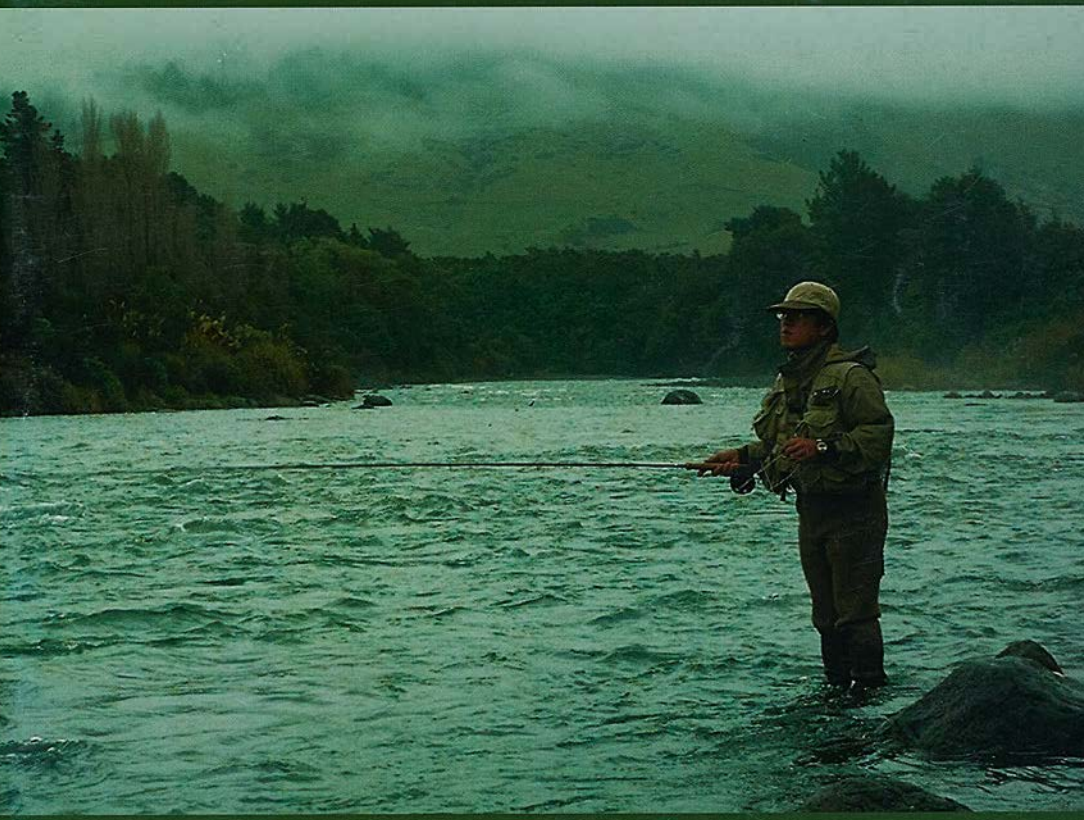
TARGET TAUPO

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

JULY 2002, ISSUE 40



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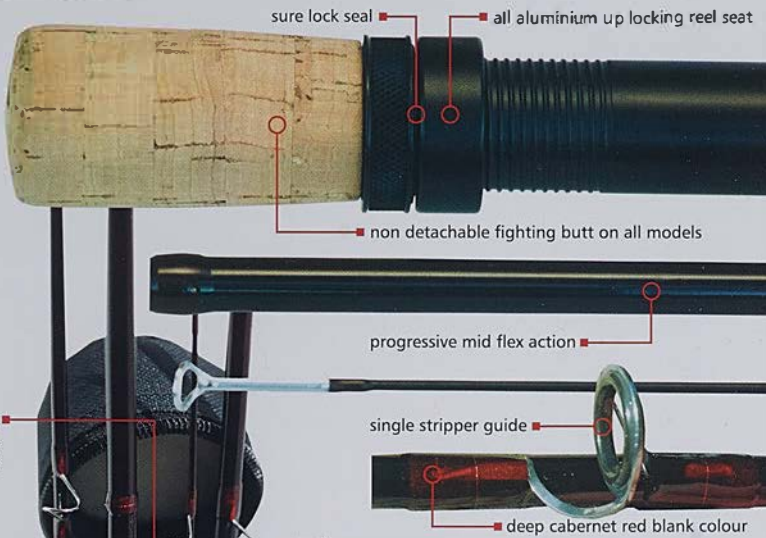

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Front cover: Hide from Japan fishing the Millrace on the Tongariro (downstream of the Cattle Rustlers Pool).
Photo Jared Goedhart.

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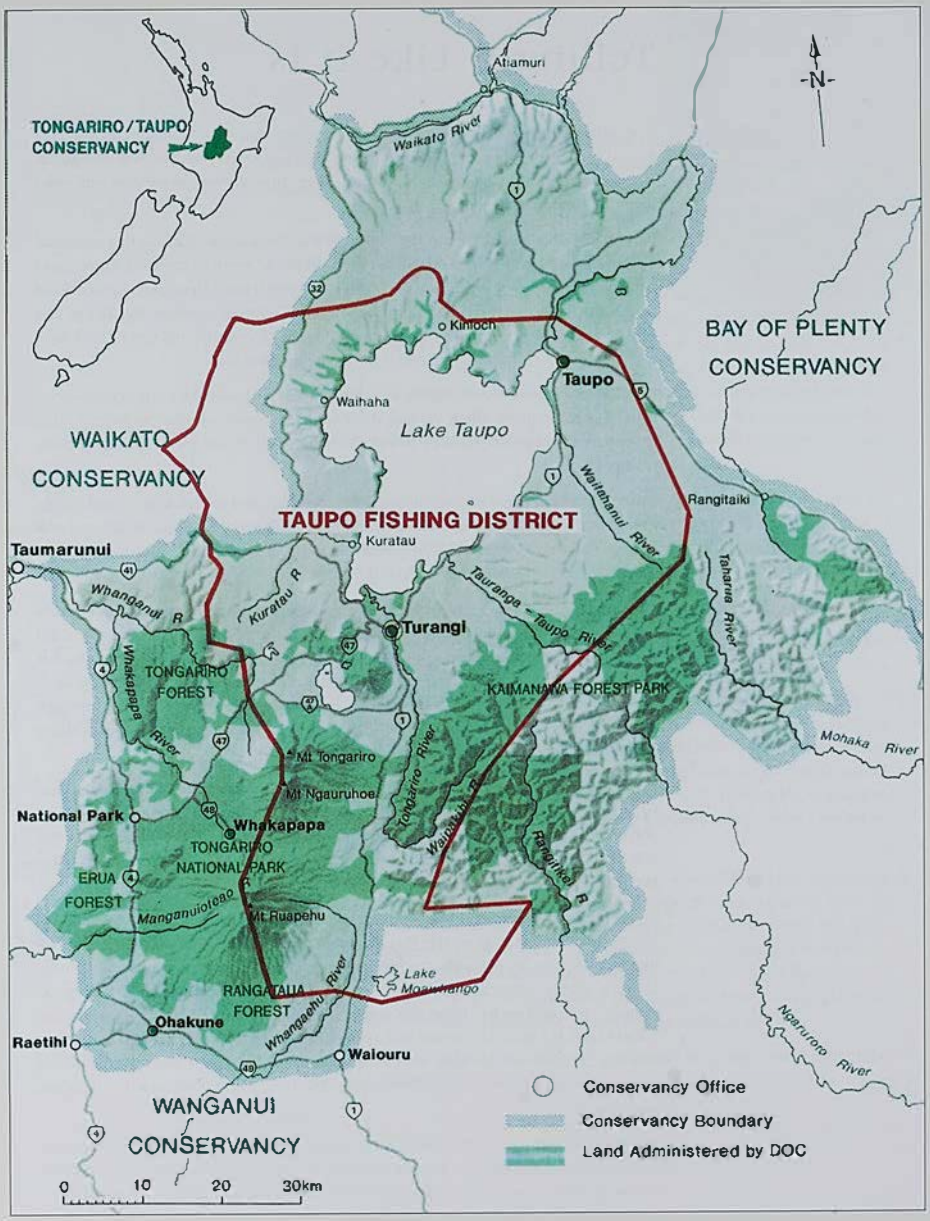


Editorial

Telling It Like It Is

One of the enduring characteristics of human nature that sometimes amazes and confounds me is our ability to forget or reinvent the past. Or put another way: our apparent predisposition to let the most recent events in our lives overwhelm our older memories and experiences.

I found myself dealing with this trait while writing the feature article in this edition of *Target Taupo*. I was forced to recollect the details of some of the Lake Tampo trout fishing experiences of my distant childhood. It was a serious struggle to separate fact from fancy; to recall the past without colouring it with my modern knowledge and perspective. If my brothers or cousins read this they'll probably tell you I didn't have a lot of success - but I know where they're coming from too!

It sometimes seems that as anglers we tend to over-emphasise the current state of the fishery in our minds without looking at the broader context of time. So when fishing is good by any objective measure, we think it's fantastic. When it's mediocre, we think it's the pits.

However imperfect my own recall of the Taupo fishery, it is at least lengthy and I often have the privileged advantage of being able to consult reports, technical data and official files, as well as the equally aberrant memories of peers and associates. This has reinforced to me the vagaries of even recent memory.

Over the last few years I have reviewed a huge amount of information about the fishery, particularly from the last half-century, in the course of preparing submissions and appeals for resource consent applications. Much of that information covers the last 38 years in which I have had an on-and-off professional involvement with the fishery. I've had the opportunity to compare the public utterances of anglers, fishery managers, engineers, politicians and other bureaucrats with the sometimes-hidden realities of the time and the certainties of subsequent events.

If there has been one compelling lesson, it is that exaggeration, prevarication and hype, in other words "spin", will eventually be revealed for what they are. Short-term attempts to hide uncertainties or unpalatable truths serve no one well. From that comes an underlying principle about the way we should handle information - tell it like it is.

Inevitably as managers of the fishery that we all cherish, our team has access to information and first-hand knowledge that few other anglers have. That is a privileged position and we have an obligation to impart that knowledge in a fair and accurate way. There is a huge temptation to think that good news is more important than good analysis. It makes us feel good and maybe even look good. Fortunately for me, the Fishery team is a bunch of realists who quickly cut me or their colleagues down if they detect a hint of irrational spin. And why not, too? They have to live with the consequences of rash or careless or indefensible predictions every bit as much as does the perpetrator.

So we encourage a culture of seeking to inform and explain that acknowledges the uncertainties where they are known, that analyses information as well as just transfers it, that provides historical perspective where it can and that tries to avoid the arrogance of being keepers of that information.

Especially, we try to emphasise the natural variability that occurs with a wild trout fishery, recognising the often-overwhelming dominance of nature over the intervention of humans, and encouraging anglers to accept and adapt to these influences. In the absence of long-term adverse environmental changes, it is realistic to expect that the conditions experienced in any one year will almost certainly come again in one angler's lifetime. The good and the bad.

So we are careful to remind people to make the most of good fishing opportunities while they are here because they inevitably won't last. Remember 1998, following the eruptions of Mount Ruapehu, when Taupo trout were so big and fat that few living anglers could recall a parallel? In the following two years there was a boom in trout numbers. Yet at the same time, fishing in Lake Otamangakau for trophy-sized trout was relatively poor. I think many anglers were deaf to the evidence and explanations which all pointed to short-term changes in the context of a stable management framework.

Funnily enough the tables are turned this year. The Taupo fishery is in a downward phase of its cycle. Trout numbers are average and size and condition are not great as the late-migrating spawners missed the feeding flush on smelt in the spring. But given relatively normal rain and flows over the next nine months we can look forward to a return to the quality of fishing we were used to, and for the most part happily accepted, before the recent boom years. What disappoints me a little are the comments from some anglers who didn't hear what we said two or three short years ago and who now can only see doom and gloom for the future.

At Lake Otamangakau on the other hand, the fishery is in a boom cycle. Numbers of spawning trout through the Te Whaiau trap to date are the second highest in the nine years of record. And the size and condition of fish are close to the best they have been. Even at this early stage of the season there have been more "double figure" (4.54kg+) rainbows trapped than for the whole of last year. Our advice to you is to make the most of these opportunities next season, but remember it won't always be like this.

All we ask is a fair hearing, an open mind, a willingness to consider all the information in context, and honest feedback. So please read the articles inside carefully. They are mostly written by avid fellow anglers who just happen to be experienced and qualified fishery management professionals. They understand trout fishing, but especially they understand and are committed to our Taupo fishery. They would be just as disappointed as you to be misled; to have raised false hopes or unwarranted gloom by poor analysis and unrealistic predictions. So we'll keep telling it like it is.

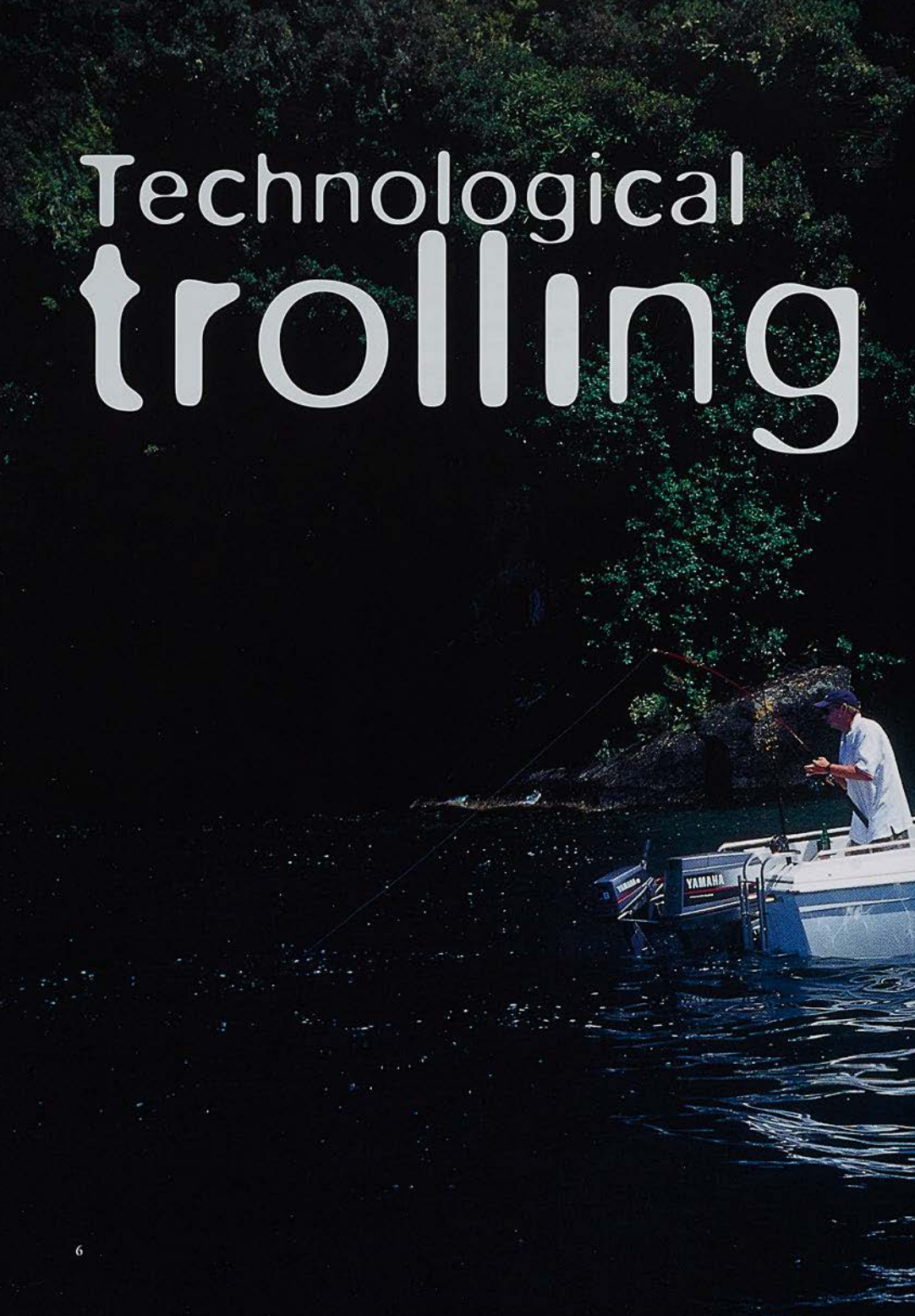
Enjoy your fishing as you find it. Nothing is more certain than that it will be different, for better and worse, in the future.

Tight lines

John Gibbs

Taupo Fishery Area Manager

Technological trolling



John is the Taupo Fishery Area Manager. He has fished Lake Taupo since the 1950s and his working involvement with the fishery goes back to 1964. John has a passion for the lake and its ecology, but especially its trout.

By John Gibbs

How it was

In the mid-1950s when I started fishing at Lake Taupo things were pretty simple. We used a 12 foot wooden clinker dinghy with a 2 horsepower British Seagull outboard motor, and that was about it.

Tackle was as basic. Short, stiff split cane rods with bakelite centrepin reels filled with monofilament line or heavy braid. This was the early days of deep trolling in Taupo and the rest of the gear was equally crude. The robust nylon trace was loaded with a 2 ounce (56g) lead sinker, preferably formed as a twist-on barrel weight, and terminal tackle was the trusty Penny spoon in red and copper, Mother of Pearl spoon, or a Norwich spoon, known further north as the Billy Hill.

Launched off the rocky Mission Bay beach where we camped in summer, the dinghy opened a new world to a Taihape farm boy. After the muddy creeks of my papa country home, Lake Taupo was like a liquid crystal. I would marvel at the rippled sand of the lake bed many metres below and spend hours following the private lives of bullies and smelt in water that, it seemed, you could see through for ever.

A prime Mission Bay rainbow from the 1950s
Photo: John Gibbs

How it was

The sights, sounds and smells of those summers probably mean little to anyone who hasn't experienced them. They are special places in the treasure store of my memory. Manuka smoke from a billy fire. Trout grilling on the embers. Heat and ringing cicadas. The snap of broom pods splitting in the afternoon. Kids sent off for a swim after lunch while Mum and Dad had "a lie down". The carefully carved little pumice butter cooler – a miniature chilly bin with a recessed lid that we had to remember to keep watered so evaporation would stop our favourite spread going rancid. Father's careful stacking of big brown bottles of home brew in rock pools that always seemed to be in the shade of a tree. Brumbies coming out from the pine trees behind the main road in the evenings. Shaggy bluey-green trees of uncertain provenance, still there today and, like most childhood icons, seemingly no bigger now than they were then.

The day Dad cranked the outboard off the back of the dinghy is engraved in my mind. No less than the next two days spent carefully rowing back and forth over the drop zone towing a grapnel, finally to take the catch down to Flight's garage at Oruanui. The experience and adaptability of a back-country mechanic and a bit of alchemy soon had the Seagull back in service.

In those days the daily bag limit on Taupo was eight trout. In 1960 it was removed altogether to reduce the numbers of poor-conditioned fish gathering in the lake after spawning. I don't remember huge catches then. As occasional visitors to "the lake" we considered ourselves lucky to go home with half a dozen smoked fish for our couple of weeks holiday.

So what now?

In the years since, there has been a huge evolution in trolling techniques and ancillary gear. We'll look at some of the changes and I'll offer comments on the technology now available to those anglers who choose to utilise it. I won't cover the actual fishing gear, rods, reels, lines, lures and downriggers, as these can be addressed in later articles.

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You'll probably recognize opportunities for integration of several of these techniques and equipment to get the most success and pleasure from your fishing efforts.

How can technology help decide where to go?

Where to go is the commonest question in the minds of the 80-odd percent of Taupo anglers who don't actually live here, and for a fair few locals as well. Where can we get good information to help us decide where to fish on the lake? Technology certainly helps here, even if some of it is as old as the printing press. I think there are two key questions we need to answer. Where are the hot spots, and what will the weather or our available time allow us to explore?

Starting with the first and apparently most difficult. The location of trout in the lake varies seasonally and is determined by amongst other things the location of their prey, water temperatures and their state of maturity. This was discussed in detail in 'The Art of Jigging' (*Target Taupo* issue 37). In general lake fishing doesn't change quickly. What's good this week will probably still be, albeit a little more or a little less, next week. Change is gradual. So a catch-up through published fishing reports in local papers and specialist fishing media is helpful. Don't forget the numerous books published on Taupo fishing for useful general seasonal guides. The newest technological tool has great potential for anglers – the world wide web. There are a good number of sites on the internet with detailed Taupo fishing information. Admittedly most are oriented to fly fishing on the rivers but there is a fair amount of useful stuff for the lake troller as well.

Another recent innovation is fishing maps on a CD ROM. At least one company sells a disk that shows maps with favoured fishing locations for the whole country, including Lake Taupo. You can use the GPS coordinates provided or enter your own through your PC. Taupo anglers probably won't find much use for the tide tables though.

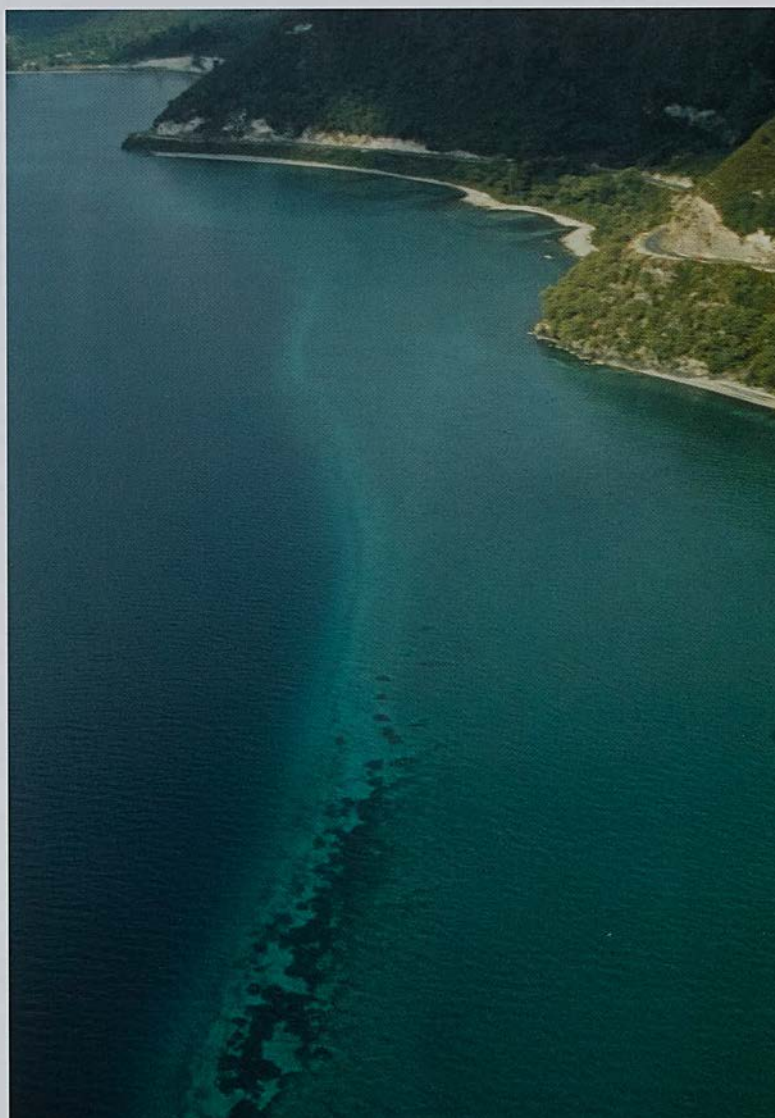
Now you've picked a few locations to target your quarry. What next? Undoubtedly the weather. At 616 square kilometres, Taupo is New Zealand's largest lake and is exposed to wind from all directions. Not only does the wind blow strong, it can rise from dead calm to gale force in 15 minutes and its no place to be stuck on a lee shore in a small runabout, or a decent sized launch for that matter. Even if its not a safety issue, you could be like me: with an inseparable crew member who loves the boat, loves the lake and loves fishing but suffers from seasickness. Rough weather can strain relationships! The simple lesson: never go out without getting a proper weather forecast.

By proper I mean a purpose compiled marine forecast available from commercial agencies (the Met Service MetPhone 0900 999 07, Metfax 0900 77 999), the North Island daily papers or, best of all, Taupo Coastguard Radio. This excellent volunteer service broadcasts up to date forecasts for the lake on VHF channel 61 at 0915, 1615, 1815 and 2015 hours every day. They run a continuous radio watch

Useful maps: Lake Taupo chart (left), bathymetry (centre) and topographical map (right). Photo John Gibbs

from 1800 to 2030 hours on weekdays and from 0900 to 2030 hours on weekends and public holidays. The operators are happy to log your trip reports so call them up when you leave the ramp or harbour, give your vessel's name, number of people on board (POB), intended destination and, most importantly, estimated time of arrival (ETA). Don't forget to log off at the end of your day, be it at an overnight anchorage or the finish of your trip. This will ensure that someone knows your intentions and will assist searchers if you are reported overdue. Note that channel 16, the international VHF calling and distress frequency, is not monitored on lake Taupo. If your budget only extends to a cellphone, remember that no one else nearby is monitoring your whereabouts so can't come to your aid as readily as if you're using a VHF radio. But if a cellphone is your recourse in an emergency don't hesitate to dial 111.

Your VHF radio can do much more than provide weather information and emergency communications. You can gain a lot of useful fishing information from monitoring channels 61 (the call-up repeater channel), 63 (the repeater "chat" channel) and channels 6 and



An aerial view of the deep water dropoff around the Lake Taupo shore
Photo DOC Turangi

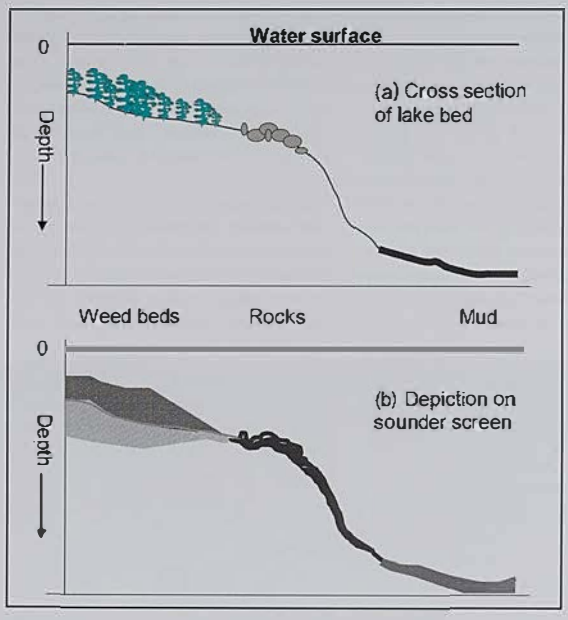


Figure 1:
With practice you can interpret the nature of the bottom from the appearance of the trace on the sounder screen.
Fig: Michel Dedual

71, the two main simplex shiptoship channels A local tackle shop broadcasts a fishing report on channel 63 at 1230 hours during the peak holiday periods At the very least you can call up your mates and share stories of success and failure, but at all times remember there are others listening and perhaps wanting to use the channels. So be brief and keep it clean.

How deep should we be?

The answer to this question could be a whole article on its own but 'The Art Of Jigging' provides some sound advice (*Target Taupo* issue 37). Suffice to say that having made the decision about how deep to fish you need to select the tools to get there. Regardless of how deep you are fishing, a good rule of thumb is to keep your lure as close to the bottom as possible, with the exception usually being when trolling. It helps immensely to have a reasonable idea of the depth of water you're fishing in. Not only will it improve your strike rate but you'll save a lot of expensive gear from the lurking rocks and logs.

How do we know how deep we are?

Talk depth and most people will think of echosounders. But there are other options.

Doubtless though, a well set-up echosounder is the most effective tool for determining water depth and for estimating fishing depth once you know the capabilities of your gear and boat. I'm not a technical expert but I've used scientific, commercial and recreational sounders extensively for the last 25 years; have read a few books on the subject and have taken a lot of notice of what I've seen. I'm happy to risk a bit of controversy and pass on my thoughts for the Taupo trout troller.

Echosounders come in all shapes and sizes from the cheap and basic to the hugely expensive versions, but they all do essentially the same thing. A transmitter/receiver (transducer) emits pulses of sound energy, roughly in the shape of a cone, which reflect off any objects they strike and bounce back as echoes. Because sound travels at a constant speed in water the receiver can calculate its distance from the object producing the echo by measuring the time taken for a single pulse of energy to be reflected. Successive electrical impulses are converted into a display which graphically depicts the pattern of received echoes.

Early sounders used a chart display with specially impregnated paper which was burned by successive rotations of a stylus electrode, thus drawing a picture as the paper passed between two drums. Later displays used LEDs against a scale bar. Most commonly now we use sounders with LCD displays, in colour or monochrome, or the more expensive and bulky TV-style CRT tubes (videos). Both the latter usually have digital and graphic readouts. The lake bed is the most prominent and consistent producer of echoes and so it shows as a solid line across the display and can provide a very accurate measure of depth under your boat. With practice, the nature of the lake bed material and other features such as weed beds can be readily determined from the appearance of the trace on the sounder screen . (Figure 1)

Recreational echo sounders come in a range of frequencies, usually between 35 and 450 kHz. The higher frequencies are attenuated faster in water so they don't penetrate as far as the lower frequencies. However, for the depths encountered in Lake Taupo the common 200 kHz sounders are more than adequate and have the bonus of giving better

definition of targets than lower frequency sounders. But more on that later.

Perhaps the most important features in setting up an echosounder are to ensure the transducer is properly mounted so that it is not obstructed by other objects on the boat hull; is always immersed in "solid" water that is not aerated by hull projections, propellors, etc; and is parallel to the water surface when being used. The biggest source of error in a sounder's depth reading is caused by the transducer being mounted at an angle to the water surface. Don't forget that the angle may be fine while the boat is at rest, but larger planing hulls in particular take on quite a steep attitude at cruising speed.

What if you don't have a sounder? Never mind. You've got other, less accurate but certainly cheaper options. One of the least known tools is a bathymetry. A bathymetry is simply an underwater contour map showing differences in water depth, exactly as a topographical map does for the terrestrial environment around us. And we're in luck for there is a published bathymetry for lake Taupo and others for lakes Rotoaira and Otamangakau. The Lake Taupo bathymetry is drawn at the same scale of 1:50,000 (2cm = 1km) as the familiar topographical maps. If you're a reasonable judge of distance you can estimate how far you are from a point ashore, scale it off on the map and get a surprisingly good idea of the water depth under you. For greater certainty you could invest in a laser rangefinder but these have limited range (usually less than 1km) and aren't cheap. Bathymetrys are also great for locating trolling runs, hidden reefs and holes, and structure for the best jigging spots. These maps are available from most local book stores and marine shops.

If you're fishing at 12-15 metres or less (10 colours of leadline), and the light is reasonable, you can usually identify the drop-off from the shallow shelf to deeper water, which is where many trout concentrate. A noticeable darkening of the water, from lighter green to darker blue, marks the edge of the shelf and allows you to navigate around surprisingly close to it. Using polaroid glasses which reduce glare and reflection, especially on overcast days, is a great aid in spotting the drop-off.

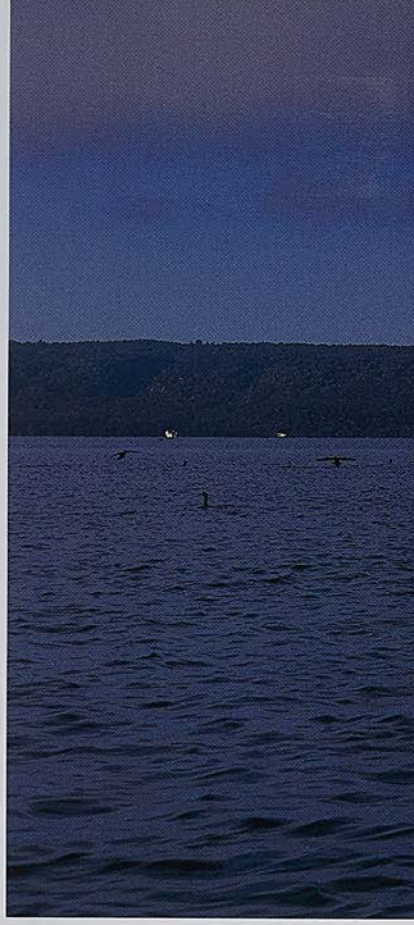
Finally, there's nature's depthsounder – the shag. Shags feed on smelt, bullies, catfish and koura by diving over the lake shallows. However they have a depth limit which is about the edge of the drop-off, say 10

metres. Watching for the groups of feeding shags is a good way of locating the shelf other methods aren't available, won't work, or leave you in doubt.

How fast should we go?

I hesitate to start this discussion because it will be contentious. But, for what its worth, these are my thoughts. If you're harling with fly or flies only, go slow: say 1-1.2 knots (1.8 - 2.2 km/h). Harling with a fly and small cobra combination about 1.2-1.3 kn (2.2 - 2.4 km/h). Deep trolling with cobra-style lures: try 1.4-1.9 kn (2.6 - 3.5 km/h). The break in this pattern is the very specialised technique of wireline a flatfish on the bottom when not only is a slow speed required - say 1-1.3 kn (1.8 - 2.4 km/h) - but also a lot of intermittent pulsing motion provided by the holder of the rod. One observation I have is that many deep trollers actually go too slow. Have a close look sometime at the speed of some of the big and successful commercial charter launches.

If you are not sure whether you are at the right speed hang the lure back on at least a couple of metres of line and observe the action at different boat speeds. Pick the speed that imparts the liveliest action to the lure, be it fly, spoon, cobra or flatfish. What you will notice is that for each type there is a break point above which the lure loses much of its erratic motion. I suggest you don't go there.



Feeding shags can be an indication of shallow water depth. Photo Glenn Maclean.

How fast are we going?

You've sorted out the ideal speed but how do you know when you're there? Again there's a range of aids from precise, direct measurement to broad rules of thumb. Many powerboats have pitot speedometers that use water pressure against a calibrated fixed orifice to give a readout of speed on a dial. While these are quite accurate when planing they are virtually useless at trolling speeds. Yacht logs are accurate at low speeds but the last thing you want to tow among your trolling lines is a propellor on a cable. Most modern depth sounders are available with a speed transducer, a small transom-mounted paddle wheel connected electronically to the display screen, which can give reasonably accurate readings. If you're looking at this option try and get one that gives readings in decimals of a knot or km/h rather than just whole numbers. If you're trying to hold your speed at 1.6 knots its not much use if you can only read one or two knots and nothing in between.

Another very accurate speed indicator is a global positioning system. I will cover the functioning of GPS later, but suffice to say it can give quite precise speeds when good satellite coverage is available. The crucial performance criterion is the update rate which determines how often the speed is checked and recorded. Ideally a minimum of one second update is preferable.

Among the less-effective, but still quite useful methods of measuring or estimating speed is to use the boat's tachometer. In calm conditions you should travel at essentially the same speed for a given engine rpm

To determine the correct trolling speed trail the lure close to the boat and set your speed to maximize the lure action
Photo Glenn Maclean

and this can be referenced back to the rpm recorded when your lures reached their sweet-spot. The three main variables which may affect boat speed are differences in load, engine trim and especially wind. For example one subtle way to alter your speed is to trim your outboard in or out without altering the throttle. In a fresh breeze a light dinghy may travel nearly twice as fast downwind as against it for a given engine speed, so you'll need to check and adjust the throttle as you round the point or start the reverse leg of your trolling run.

If none of the above are available, don't despair. If you can estimate a medium walking pace, that is as good a rule of thumb as any for setting your trolling speed. Simply imagine you are walking on the water (if only) beside your boat with your hand on the boat. If you are having to run to keep contact you are going too fast. You can even check your speed by tossing a couple of lumps of pumice or a small stick overboard as reference points and adjusting your speed accordingly. When all else fails try and keep your pace akin to other boats trolling around you and hope their skippers have either read this article or at least have a measure of their speed.

What fish are under us?

This is one area where technology, in the form of an echosounder, is about the only way of objectively answering the question. Despite that, it is the most contentious and misunderstood piece of equipment available to trout trollers. While sounders can be very useful aids to detecting trout (and other fish such as smelt and bullies) the ability to do this is dependent totally on the type of sounder and especially the experience and

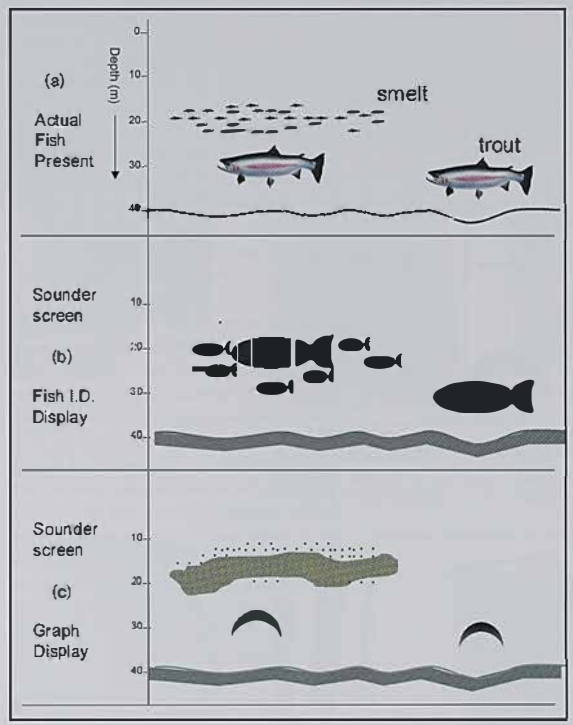


Figure 2: How the sounder displays the actual situation (a) in fish symbol mode (b) and graphical mode (c) Fig: Michel Dedual

interpretation of the user. If I had to rate one over the other I would go for the user skills every time. A good quality sounder using the right frequency can tell a novice a lot but, for fish finding, only experience will make much sense of the messages from most recreational sounders in use today.

The ability of a sounder to detect trout depends on its frequency, power output and transducer beam width. The higher the frequency the better the ability to separate and distinguish between objects, so generally 200kHz is better than 50kHz. The narrower the beam, the better separation but the smaller the area searched by the beam. Given the choice I'd go for a wider beam (say 20-45 degrees) every time. But be aware, different manufacturers use different criteria to describe their beam widths. One manufacturer's 10 degree beam may be another's 25 degrees - it all depends on the signal attenuation factor they use. A wide beam also increases the likelihood that you will be able to track your downrigger weights on the screen for precise depth selection.

Most recreational sounders and their transducers have the ability to detect and distinguish trout, but in transmitting that information to the user many are let down by their displays. This is often compounded by our inability to adjust and interpret what we see. An echosounder measures the strength of a returning echo and displays a signal accordingly. Your ability to distinguish between a school of thousands of smelt and a single trout, both objects which may have the same target strength, depends solely on the processing and display of your sounder.

I'll risk the ire of the country's marine electronics industry here and say that one of the world's most clever marketing ploys was the invention of the fish-shaped symbol used on nearly every recreational echosounder screen. It seems so simple: big symbol equals big fish, small symbol equals a small fish. Time and time again I have checked anglers on the lake who bemoan their empty bins but qualify it with the comment: "there are heaps of fish there but they're just not biting - we can see them on the sounder". Sure enough, when you look at their sounders you can see "heaps of fish". Well, heaps of fish symbols! The reality is that so often they are schools of smelt or bullies, or even algae blooms that return a signal that the sounder then converts into an appropriately-sized fish symbol. Not that it is bad for us as fishery managers because at least anglers blame their lack of success on the fish and not a lack of fish.

Well what to do? If you're lucky it can be as simple as just turning off the fish symbol, reverting to the graphic display and then practice with your sounder. In graphic mode the screen shows the actual received echoes and allows distinction between the typical scattered layer or cloud of a baitfish school and the classic crescent or inverted V of a single trout (Figure 2). In panel (b) depicting the fish symbol mode the display shows the school of smelt at 20 metres as being a small number of larger fish. The large trout below them at 30 metres is masked by the smelt echos and appears to be at 20 metres deep. By contrast, the graphic mode in panel (c) shows the school of smelt as a cloud of small targets and the locations of the two trout are correctly depicted by the characteristic "fish arch" marks.

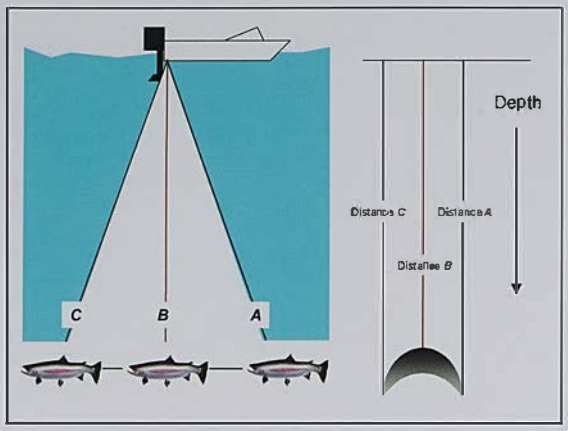


Figure 3: Explanation of why fish show as arches in graphical mode Fig: Michel Dedual

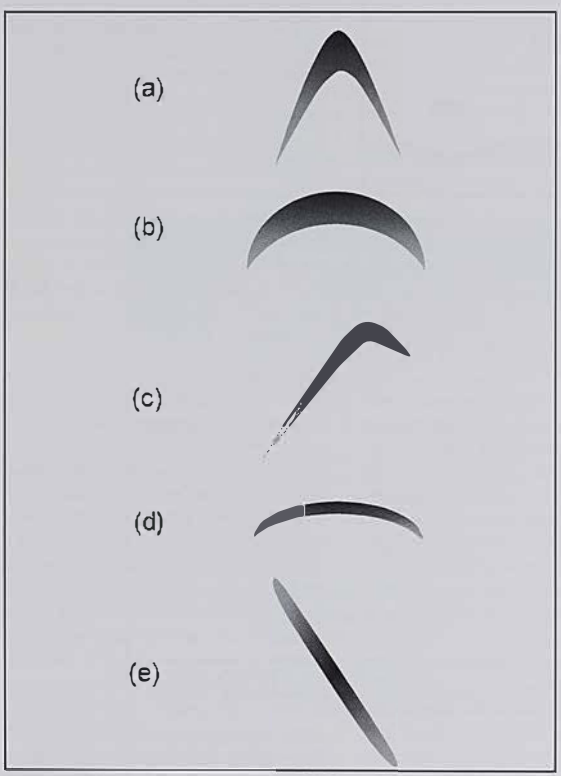


Figure 4: Fish may show as a variety of different shaped arches Fig: Michel Dedual

Figure 3 shows why individual fish appear as arches on the graphic screen. As the sounder passes, the fish first contacts the diagonal leading edge of the beam which is longer than the vertical line in the centre (remember our third form geometry) so the sound pulse takes longer to return an echo and thus registers distance A as being longer than distance B. Similarly distance C, the trailing edge of the beam, is registered as being longer and thus that part of the image appears to be deeper. In reality, a number of factors will determine the exact shape of the fish arch rendering it as a deep or shallow crescent, an inverted V or partial V, or even a diagonal slash (Figure 4). The chart advance speed, beam width, selected depth range (chart scale), boat speed, fish speed, angle and direction of travel relative to the transducer, proximity to the bottom and position of the fish within the beam are the main variables. Arch (a), the inverted V, is typical of a fish centered in the beam with a large vertical scale (narrow depth range shown over the whole screen). Arch (b), the crescent, is what we are more likely to see in the broader (small vertical scale) depth ranges usually selected for deep trolling. The asymmetric inverted V of arch (c) occurs when the fish moves relative to the beam and thus the second half is tracked for less time than the first half and is recorded by fewer successive pulses of sound. Arch (d) usually occurs with either a very small vertical scale or where the fish is close to the lake bed and difficult to separate from the bottom echo. Finally, arch (e) is where the fish has substantial vertical movement relative to the sounder beam and leaves it, either rising or descending, before the second half of the arch is able to be formed.

The main drawback with using the graph display occurs on a screen with low definition or small pixel count. Here a single pixel, or dot, covers a large area. For example, on a screen with a display 60 pixels high, one dot covers an area 1 metre deep when on the 60 metre scale, whereas one pixel on a 240 pixel screen covers only 0.25 metres. The first scale is nowhere near fine enough to distinguish a trout accurately. But all is not lost. I almost always use a manual depth range setting that places the lake bed echo close to the bottom of the screen, thus maximising the water coverage of the vertical scale and compressing the coverage of each vertical pixel. If your sounder has a zoom function,

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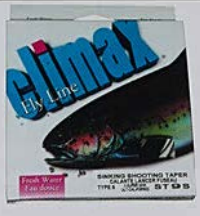

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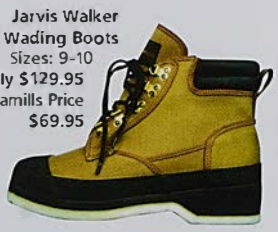

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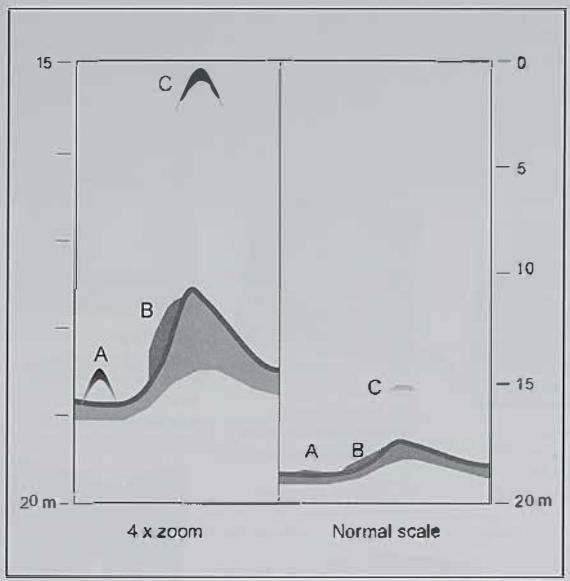


Figure 5: Using the zoom function will improve both bottom and fish definition Fig Michel Deduit

simply turn it on and set the zoom to the general depth range of interest. So if you are trolling at 15 metres and have your sounder set at the 0-20 metre range, turn on the zoom display to cover the 10-15 metre range, or the nearest option. That 5 metre layer will then show over the whole height of the screen and an individual pixel will cover a correspondingly smaller depth (0.12m), thus heightening the definition and distinction of separate objects. Using the split screen mode allows you to view the zoom image on one side of the screen simultaneously with the normal full-depth image on the other side. Figure 5 shows how this display distinguishes between a trout close to the bottom (A) and a weedbed (B) which otherwise appear similar in the normal display. A poorly defined trout arch (C) is also enhanced to an obvious inverted V as a result of the scale expansion by the zoom.

A greyline or whiteline function helps to distinguish objects that are close to, but separate from the bottom, as feeding trout so often are. Colour sounders provide more information at a greater cost. Target strength is displayed in different colours giving much better interpretation of the nature and integrity of an echo source. For all sounders, use the highest screen scroll setting to distinguish separate objects as this minimises cramming of echoes close together on the display; and use a high gain or sensitivity setting to get the most returned information. One exception to this last rule is when there are dense schools of smelt around in the late spring and summer. Turning the sensitivity down a bit can help prevent them dominating the display and will allow the stronger but perhaps deeper trout echoes to show through. Spend time practising with your sounder, try all the settings and play round in the simulator mode. By all means read the instructions!

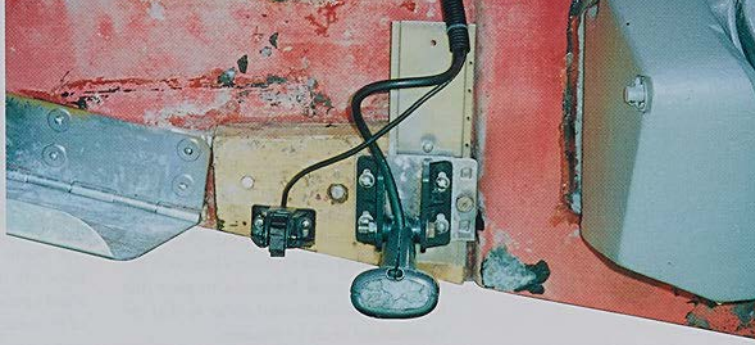
And does it matter?

This may be disappointing, but my answer is not particularly. I've had many days when good catches were made despite a paucity of trout echoes on the sounder. Conversely, but not nearly as commonly, I've had some hard days when a lot of trout were showing. I think it's far more important to have your gear fishing close to the bottom, at the right depth, in places where experience says that trout are likely to be found, than to be actually seeing the fish on the screen. Depth indication and trend is where the true worth of a sounder is to be found.

How do we know where we are and how can we get back here?

So you've come across a hotspot; how do you know where it actually is? Starting at the top, there's no doubt that GPS is the quickest and most accurate system for the recreational boatie to mark their position. This technology works from signals sent by a constellation of satellites in fixed orbits around the earth. A combination of triangulation and very precise time measurements allows an earthbound receiver to establish its position within about 20 metres. This precision can be degraded intentionally to about 100 metres by the US military, which owns the system, but this constraint has been lifted for the last 18 months. GPS receivers are now very affordable and range from simple handheld models that fit in a shirt pocket to super-sophisticated chart plotters integrated into echosounder, radar and PC systems. After an echosounder, I rate a GPS as the most useful piece of technology for Taupo troll and jig fishers.

A GPS can be used with the international latitude and longitude system, and thus you can quickly pinpoint your current position on the navigational chart provided it is a recent



Speed and depth transducers mounted on the vessel's transom well away from acoustic interference from the propellor.
Photo John Gibbs

version with a WGS 84 GPS grid. An alternative is to use the NZMS 260 series tobographical maps and the New Zealand map grid references. This gives your handheld GPS much more flexibility allowing it to be used for back-country navigation ashore, or for marking that top trolling run or jigging hole on the lake. A GPS has the added advantage that you can enter and store a location (waypoint) or a route (chain of waypoints) for future use, to allow you to either retrace your track home or find a great fishing spot on the next trip. And of course, it gives a good speed reading as well for refining your trolling beat. If you want to be sure (and you should) that you are outside the 300 metre trolling restriction zones around most of the Taupo stream mouths, simply cruise in before putting the rods out, take a GPS reading of the mouth location then move back out to your fishing possie using your plotter to keep in the free trolling or jigging area. But bear in mind the accuracy limitations described above.

For basic positioning performance it matters little whether you have a handheld or a state-of-the-art boat-mounted GPS these days. As long as it meets the industry standard of 12 parallel channels and the antenna has a reasonably clear view of the sky it will work fine. The refinements are in the navigation and plotting displays, the memory capacity for waypoints and routes, acceptance of plug-in electronic charts and its inter-connectability with other navigational equipment and your home PC for sharing and downloading information.

If you used traditional navigation equipment, such as chart, ruler, compass and sextant, you could find your position on the lake, but realistically few anglers will have the gear or the knowledge. The bathymetry map, used in conjunction with an echosounder and distance estimation can be very useful for locating your position, particularly where the bottom contours change fairly quickly. With experience or good refer-

ences, landmarks are surprisingly accurate in locating to a few metres of position providing you use good triangulation (spread between landmarks) and alignment, and of course have sufficient visibility to see shoreline features. Forget about most landmarks at night or in the fog! Michael Drake's excellent *Lake Taupo Boating and Cruising Handbook* has a number of good landmarks to allow the technologically-challenged troller to find the Horomatangi Reefs for instance.

While not normally used for finding trolling locations, there are a number of navigation lights around Lake Taupo that are essential for safe night boating. You'll do yourself a favour by getting a copy of the lake Taupo chart with up-to-date descriptions of these lights. Don't be tempted to use a GPS as your sole means of navigation at night. Those nice straight route lines it produces take no account of intervening land masses and certainly can't show other boats or lurking rocks in your path.

So take it away and try it

I have deliberately avoided specifying brands and suppliers except where absolutely necessary, or where there are monopoly providers, as the pitfalls of missing one or appearing to favour another are not worth the anguish. Other than that, these are my reasonably experienced personal opinions. They are part of a collection of information that has given me, my family and many friends huge enjoyment from chasing rainbows on the magnificent lake Taupo. I hope they help you understand some of the technology available to Taupo boat anglers today and, in choosing the equipment you want, make your lake fishing safer, more enjoyable and more successful. While the technology of fishing features in this article I hope you don't go away daunted because its too complicated or too expensive for you. Remember the smile on the face of the young fella at the front of this story.

A GPS maybe easier but the age old method of using landmarks. in this case lining the Cardinal marker in the foreground with the pine tree on the skyline, works just as well. Photo Glenn Maclean

Waitahanui River Access

by John Gibbs

Since the last story a gate was briefly and illegally erected on Hurae Road, a public road at Waitahanui, but subsequently removed at the request of the Taupo District Council. Trees were then felled over the river bank track above the Cliff Pool in Wharekawa scenic reserve in an apparent attempt to prevent public access in the reserve.

Over this period there have been a growing number of confrontations with anglers by local residents seeking to have them leave the river or its banks. Several vehicles have been deliberately damaged and recently an angler was allegedly assaulted and had his fly rod broken by a group of men who were demanding that he leave the river. One landowner has demanded that DOC cease maintaining walking tracks within the ROW.

Understandably, these events have caused a considerable amount of concern and uncertainty among anglers and the general public as to just what their access rights and responsibilities are on the Waitahanui River. Some, choosing to avoid the unpleasantness, either no longer fish the Waitahanui or have left the Taupo fishery altogether. This article seeks to explain the practical and legal issues governing the land and access to and over it.

Taupo rights-of-way

The ROWs applying to Lake Taupo and its tributary rivers are unique and, while often confused with the so-called Queen's Chain that sometimes applies elsewhere in New Zealand, are in fact significantly different (see separate article in this issue). The Taupo ROWs allow access over the specified strips (20m from the legal margins of the lake and specified portions of the rivers) but leave the underlying title in Maori ownership. Their purpose is more specific and constrained than a Queen's Chain.

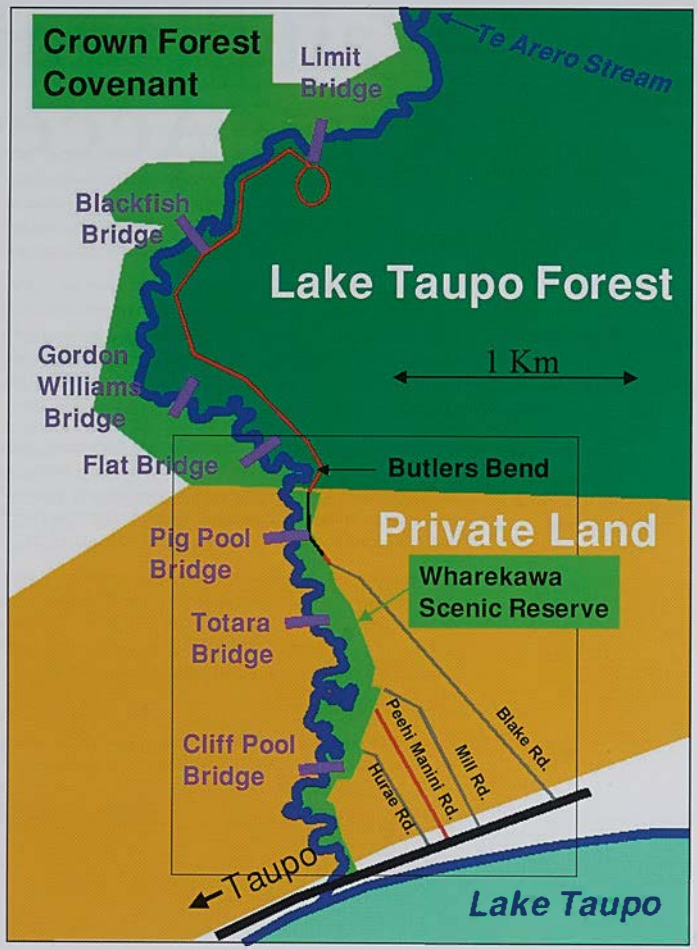
Over 75 years ago the Crown negotiated an arrangement with Ngati Tuwharetoa, the owners of the beds of Lake Taupo and its tributaries, to provide for public access to and use of the lake, and fishing access to specified parts of the rivers. In return for this access, the iwi, through the Tuwharetoa Maori Trust Board, receives an annual payment from the Crown equivalent to half the revenue received from fishing licences and boating fees. This agreement was cemented in the Maori Land Amendment and Maori Land Claims Adjustment Act of 1926.

The Waitahanui River is one of the most important elements of the Taupo trout fishery. It is the third most popular fishing river in the district. Public and angling access to the Waitahanui has been very much in the news for the last year or more. An article in Target Taupo issue 37 in July last year explained the situation around the gate that had been erected on Blake Road where it crossed private land. An earlier article (issue 32, November 1999) gave a detailed explanation of fishing access and rights-of-way (ROWs) in the Taupo fishery generally.

There are two types of ROW under the Act. The first is a 20m wide strip of land around the margin of Lake Taupo over all land that was Maori land at that time and allows for free public access and use providing the ROW is not obstructed. The second is ROW on foot for licensed anglers only over a 20m wide strip on each bank adjacent to the specified portions of the inflowing rivers. The ROW doesn't change the underlying ownership of the land (Maori land) but simply provides for access over it. Subsequent acquisitions may well have brought some of this land into public ownership, as at Wharekawa reserve, but this has occurred through other processes.

Figure 1

lower Waitahanui River catchment showing the boundaries of the different ownerships of the land. The area in light green is public land administered by the Department of Conservation, the area in ochre is private land, and the area in dark green is part of the Lake Taupo Forest. The roads in grey and the tracks in black are public accesses. The location and the name of the bridges on the river are indicated in blue. The area contained within the black square is shown in more detail in figure 2.



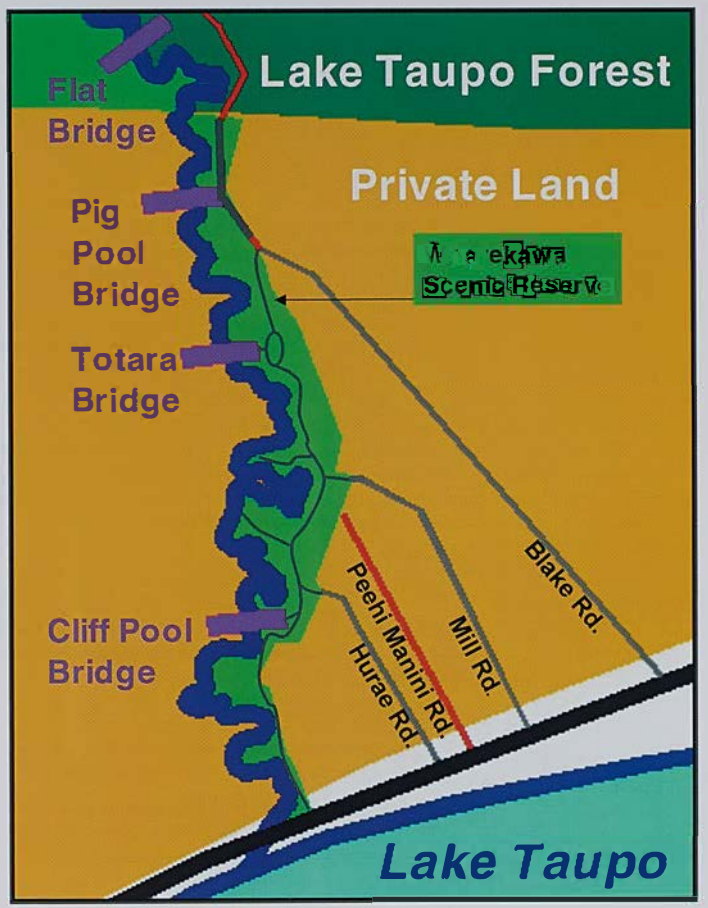
Waitahanui rights-of-way

Anglers' ROWs apply over four types of land tenure on the fishable section of the Waitahanui (figure 1):

- The Wharekawa scenic reserve (Crown land) follows the true left (southern) bank of the river from the State Highway 1 bridge up to Butlers Bend. This reserve varies in width from about 20m to about 150m and has general public access
- All the land on the true left bank from Butlers Bend upstream is Maori land incorporated into Lake Taupo Forest under the control of the Lake Taupo Forest Trust
- All the land on the true right (southern) bank from the State Highway 1 bridge up to Butlers Bend is Maori land
- All the land on the true right bank between the water's edge and the pine forest from Butlers

Figure 2

Lower Waitahanui River catchment showing the public accesses in grey and the private access in red. The location and name of the bridges are indicated in lilac. Note that there is no public access on the true right of the river.



Bend up to the old Wainui block (i.e. well above the extent of fishable water) is Crown land subject to a conservation covenant under the Crown forestry licence issued to the managers of Kaingaroa and Waimihia Forests.

In addition, figure 2 shows that there is public road access to the river from the State Highway 1 bridge, Hurae and Mill Roads and that part of Blake Road up to the private land sign. Note that Peehi Manini Road is not a public road. Both figures 1 and 2 are diagrammatic and intended to indicate the general location of the different land tenure types relative to familiar landmarks. They are not accurately scaled definitive topographical or cadastral maps.

DOC has made considerable efforts to discuss the fishery issues with landowner trustees, individual tangata whenua, the Taupo District Council, the Police, the Taupo Fishery Advisory Committee and anglers generally. We have responded to numerous media enquiries and letters from the public. We have also had informal contact in the field with individuals who are involved in the activism and have sought to exchange views and seek some understanding with them. These efforts are continuing and we are meeting with various parties as the opportunity arises.

Trespass

One of the concerns expressed to us was that the vehicle track along the river between Hurae Road and Blake Road actually crossed private property in three places. Once these sites were identified we erected barriers near the ends of Hurae, Peehi Manini, Mill and Blake Roads to prevent vehicle trespass This doesn't constrain foot access through the reserve or along the river bank ROWs.

Another significant issue is that the ROWs on Maori land are fixed against the margin of the river as it was in 1926 and there is no provision for them to move as the river moves. This has led to the strange situation where the ROW may be some distance from the present physical river bank, or alternatively, wholly or partly under water as a consequence of movement of the river channel over the last 75 years. We are currently identifying those areas where the formed access track lies outside the actual ROW and agreement will be sought from the landowners to reinstate the tracks fully within the legal ROW so anglers do not unwittingly trespass onto the private property. In all cases anglers should be very conscious that although they have legal access on the ROW it is still private property and they should treat the land and its owners with due respect. In particular, you should avoid the temptation to take shortcuts across the base of river bends which may result in trespass

If you are trespassing outside the Crown land or ROWs a trustee or their lawfully authorised agent may require you to leave and you commit a further offence if you refuse to comply. If you are uncertain as to the status of the land you are on you should politely request proof that the person is either a trustee or an authorised agent.

Summary

The true left or right side of a river is the left or right as you face downstream

In summary, the current state of anglers' access at Waitahanui is:

* The general public is entitled to free foot access throughout the Wharekawa scenic reserve which follows the true left (southern) bank of the river from the State Highway 1 bridge up to Butlers Bend

* All the rest of the river has a 20m wide ROW on foot for licensed anglers only on both banks

* The position of the ROW is as it was fixed in 1926 and in some cases it may be closer to or further from the present physical river bank than 20m

* Blake Road is a public road from State Highway 1 to the point where the gate was erected just past the Totara Bridge turn-off. It then crosses a short section (about 50m) of Maori land before entering Wharekawa reserve until crossing the upstream boundary of the reserve at Butlers Bend

* Anglers are legally entitled to walk on those parts of the private section of Blake Road (above Butlers Bend) wherever it lies within the 20m river bank ROW

* There is public road access to the Wharekawa reserve from State Highway 1 bridge, Hurae, Mill and Blake Roads

* The Totara Bridge carpark is on Wharekawa reserve and is legally accessible from the public part of Blake Road.

So anglers are legally entitled to fish the entire length of the Waitahanui River regardless of tenure and walk on its bed and traverse its banks on foot anywhere within the 20m ROW. Any anglers who are forced to leave either the river, the reserve, public road or the ROW by threats or physical force should report the matter immediately to the Taupo Police. With these rights are certain responsibilities and anglers should treat all private land with respect and only enter it where they are lawfully entitled to.

THE "QUEEN'S CHAIN"

By Nadine Storm

Nadine is part of the Community Relations Division of the Waikato Conservancy. Her role is to manage the land management and concessions team and provides specialist advice on the technical and statutory aspects of managing public land.

Many people assume there has always been an "automatic" "Queen's Chain" along all New Zealand rivers, around all lakes and beside the sea. In fact that isn't the case; there is no legal device called the "Queen's Chain". It is a popular term for a variety of land status types which provide public access and/or protect conservation values beside many, but certainly not all, water bodies in many different places and under varying circumstances. The term "Queen's Chain" has its origins in Queen Victoria's instructions to Governor Hobson in 1840. The instruction read:

"It is our will and pleasure, and we do strictly require and enjoin you, that you do not on any account, or on any pretence whatsoever, grant, convey or demise to any person or persons any of the land so specified as fit to be reserved as aforesaid, nor permit or suffer any such lands to be occupied by any private person or for any private purpose."

The chain was in fact the surveyor's actual measure of the day. It consisted of metal links each measuring 7.93 imperial inches, with 100 such links being the full chain or 22 yards. With metrification the current equivalent is 20m. Queen Victoria's instructions, however well respected, needed to be incorporated in practice and law to have effect. Early provincial surveyors adopted various practices and the earliest legislation requiring reservation of land adjacent to water goes back to the Land Act 1892 which applied solely to dispositions (sales) of Crown land. Many earlier dispositions failed to set aside the Queen's Chain so while there was significant provision for reservations, the popular concept of the Queen's Chain as a universal right is in fact mistaken.

There are many water bodies that do have public access. Some areas are known as "marginal strips". These areas are created under the Conservation Act 1987. The Act provides that whenever the Crown disposes of land, a 20m strip is to be created along side a river or stream (having an average width of 3m or more), and along and abutting a lake or foreshore. The legislation also provides the Minister of Conservation with authority to reduce or waive these requirements in certain circumstances. A marginal strip should not be confused with an "esplanade reserve" or an "esplanade strip" which are usually created at the time of subdivision under the Resource Management Act or the earlier Local Government Act.

Marginal strips are administered by DOC. Esplanade reserves are generally administered by local authorities. Esplanade strips are governed by a legal agreement between a local authority and an adjoining landowner. Such an agreement can limit rights of public access.

From time to time, the land adjoining waterways shifts or erodes. Marginal strips created prior to 1990 and esplanade reserves have fixed boundaries. Where the boundary of the foreshore, lake or river course alters on a marginal strip created after 1990, then a new marginal strip is formed adjoining the watercourse, and the old strip is extinguished.

Where there are no esplanade reserves, marginal strips or access agreements or where no other protective land status exists, and the land appears to adjoin the water's edge, it may well be that the private landowner has riparian rights.

To avoid any possible issues with private landowners, it always pays to check if public access is available to your favourite fishing spot and if not to ask the landowners permission.

The Ancient Art of HUNTING

By Cam Speedy

Cam co-ordinates animal pest and threatened species management for the Tongariro Taupo Conservancy. Cam and his team also oversee weed management and habitat monitoring

"Hunting is best learnt from regular visits to the same country. This will help you understand that game have different behaviours at different times of the year depending on specific seasonal needs. The Waipakihi Valley is a classic example – depending on the time of the year and the prevailing weather, deer can be found from the alpine tops to the river flats and everywhere in between. You can dramatically increase your encounter rate by knowing where to focus your hunting effort on any given hunt"

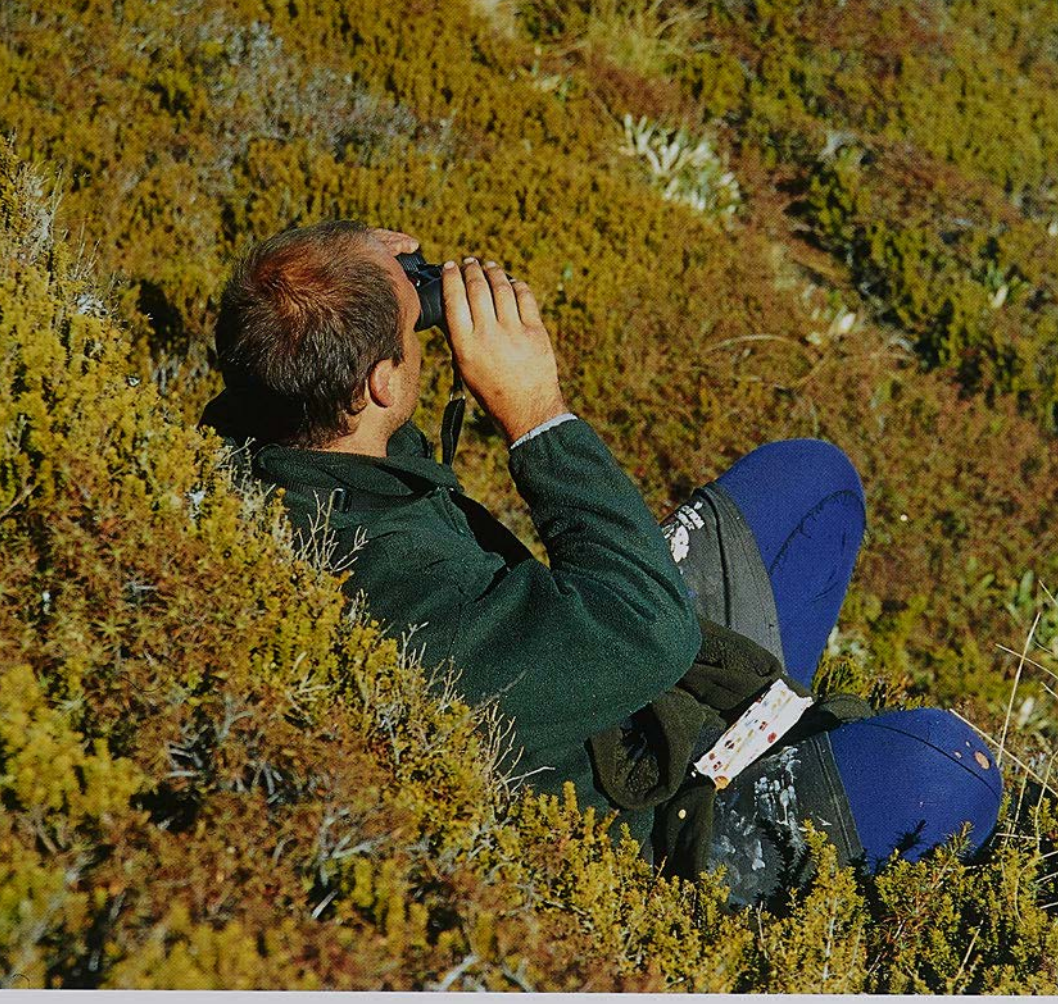
Photo DOC

One of the questions I am most often asked is "where can I go to get a deer?". It is as if there is some mystical place that I could recommend. New Zealand's extensive and wonderfully colourful hunting literature is perhaps at least partially to blame for maintaining such images in the minds of some. The reality these days is that deer are where you find them and it is the "how to hunt" which is more important than the "where to hunt". What may once have been deer shooting in this country has become deer hunting in recent times. Our deer herds are pursued with vigour on a number of fronts and the line between survival and death is, for most, a very fine one. Easy deer are rare these days unless one has the keys to an (increasing number of) locked gates. Yet I note that a large proportion of the wild deer shot on our public forest and mountain lands is taken by a relatively small proportion of hunters. Why? Often these hunters are locals, and while they have "local knowledge" to help them with the "where to go", I believe it is the "how to hunt" aspect that makes the difference. My evidence for this is that most of the regularly successful hunters with whom I have ongoing contact are invariably successful no matter where they go, or what species they hunt. They have learnt the ancient art of hunting.

Hunting is as much a skill which must be diligently studied and perfected over a period of time as any skill like accountancy, carpentry or law. Certainly many of the professional hunters I have had the privilege of meeting through my career can be regarded as scholars in their field. Every bit as technically sound on the hill as a successful lawyer might be in a court room. These "professionals", just like their modern urban counterparts, have learnt their trade well and deserve their success. In contrast to the books and tutors of accountancy and law though, a hunter's trade is learned from the university of nature through hours on the hill. It cannot be learned from books and it certainly can't be rushed. The payback for diligent study by a hunter is that they will know where to look for deer and why to look there - no matter where they are hunting. They will understand what their quarry is likely to do at a particular time in a certain habitat on a given day.

While there are numerous books about game and game hunting to inform on the basics, every hunter is different and each must develop a style of hunting which suits their personal level of fitness, mental strength, knowledge of the country and quarry. Successful formulae may be as varied as the hunters themselves but typically, successful hunters understand some particular weakness in their quarry's lifestyle which they exploit - good hunters will know many. Knowledge of particular weaknesses results in particular hunters taking certain sexes and year classes of game on a regular basis. You would be amazed at how consistent the composition of some individual hunters kill can be. Think about it. How often do you find that you successfully hunt an animal, say a young stag, so you utilise that same winning formula again, only to shoot another young stag? For me, as I grew up in a hunting sense, I went through runs of "no stags" or "only stags". It was uncanny, but I realised it was because success was motivating me to

This article is based on an article originally published in Fish and Game magazine issue 26



"Good powers of observation are an essential part of successful hunting - do more looking"

Photo Glenn Maclean

repeat what I had done the last time; it predisposed me to finding a similar animal. Not all deer are equal, they have very different needs through a full 12 month season depending on their age and sex. If you strike an animal in a particular location, try and work out why it was there and store the information away. If you are lucky enough to shoot an animal, have a look at what it has been eating and where this food is found on the hill. Under similar conditions at the same time next year there is no reason why there shouldn't be another deer in the same place. Learning about these needs and how to exploit them in a given situation is a key part of learning the ancient art.

While knowing your animal is a learning curve that will carry a hunter to success in the longer term, there are also a number of basic skills which can help increase encounter rates and hence the pace of the learning experience in the short term. One of the best pieces of advice anyone ever gave me was "do more looking". Good powers of observation are essential for any activity associated with wildlife and no matter how much looking you think you are doing, you could always do a little more. It is not much good covering half the Kaimanawas in an afternoon if you walk past every deer. As the old timer put it, "you got to see 'em to shoot' 'em boy". This was perhaps one of my great-

est frustrations as a young hunter. Always in a hurry to know what was in the next gully, around the next spur or over the next ridge. It was a major downfall leading to more than a few lost opportunities. Now that the body is starting to remind me of my hours on the hill I am forced to slow down. My brain naturally takes more in, and I see a greater proportion of the deer I get near to. It is good advice - do more looking!

Your ability to concentrate on what you are looking at on the hill is also important. When I first started hunting I was extremely fit, but I had a focused attention span of about 90 minutes, probably because I'd already covered at least 10kms by that stage! This is where looking after yourself in the bush really counts. You need to eat well (lots of carbohydrates like rice, pasta and potato), sleep well, and keep the alcohol intake under control if you are to be at your best. Hunting is hard, physical work and you need to be "in form" physically to be successful. Strong quads (those big muscles on the front of your thighs) are a vital part of being able to place each footstep rather than letting your boot simply hit the ground. Deer are very attuned to low-frequency sound and you may be amazed at how far a thump will carry through the ground. Strong muscles only work well when they are fuelled with large amounts of oxygen, so keep your cardio-vascular fitness up. Cycling is great for strengthening your heart and lungs and your quads at the same time but nothing beats "on the job" training. If you can, train for hunting by going hunting.

Keep your blood sugar levels up at all times while hunting too. Otherwise, just when you wished you hadn't, you'll unintentionally drop your foot and break a stick or thump the ground. A high energy treat like a Moro bar every half hour or so will ensure you stay sharper for longer. And watch for dehydration. My cousin once told me that a good hunter will drink at every opportunity, not just when he is thirsty because once you are thirsty, the damage is already done. I have come to really value those words. Stop at every creek for 30 seconds and take a couple of swallows of cold, clean water. If you are in such a hurry that you are not stopping to drink regularly, you are probably not doing enough looking. Eventually you will collapse into a creek totally parched, taking on so much water you get a guts ache and that

"Watch your wind! - a handy cigarette lighter will let you know where your scent is going when the breeze is too subtle to detect otherwise".

Photo Rob Marshall

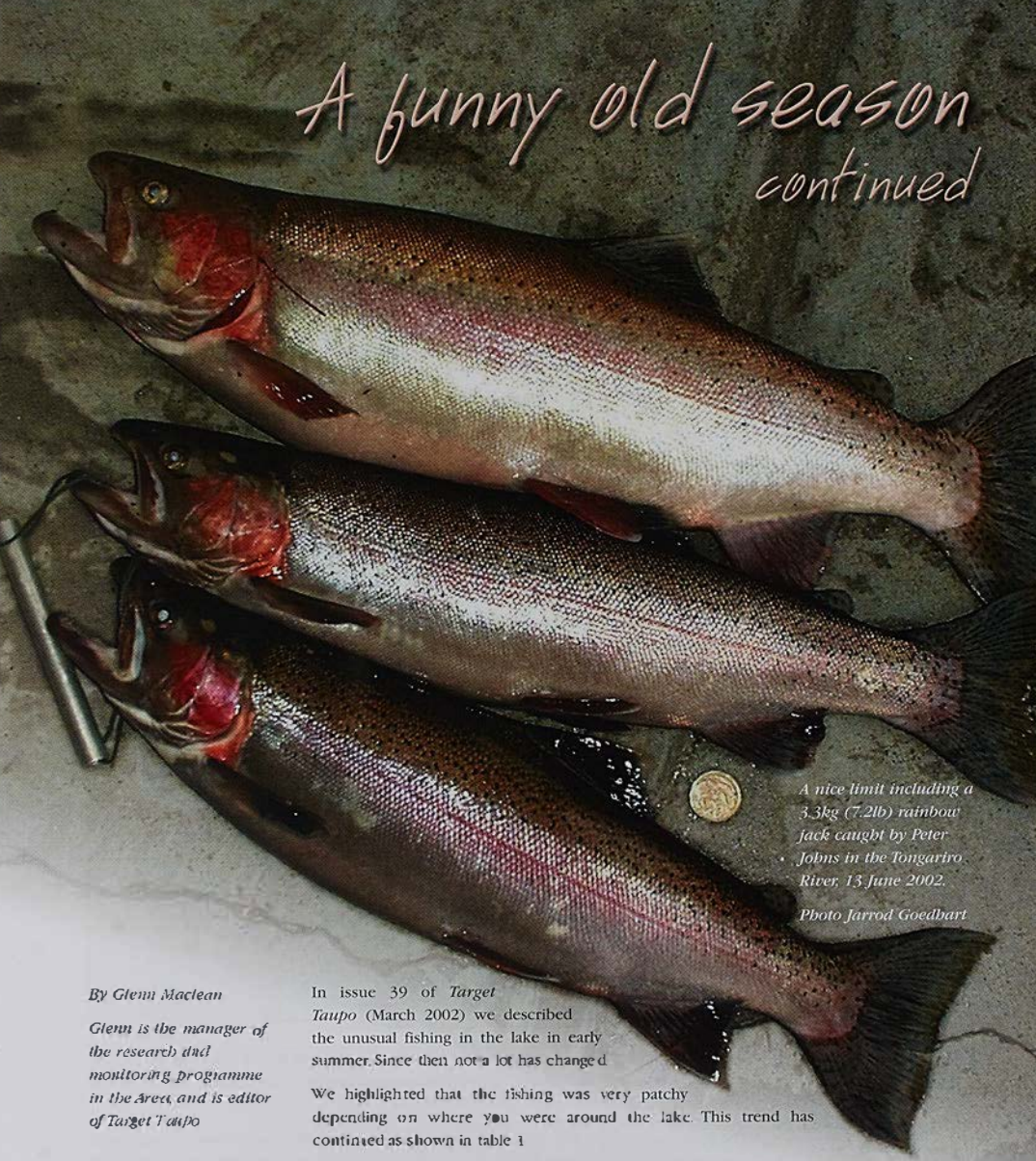
won't help your hunting either! Low blood sugar and dehydration are two physical conditions you will encounter on most hunts if you don't manage them well, and they will cost you more deer than you may realise. The running marks will let you know the score!

Another basic skill is one I should have picked up in science at school (but didn't). Instead I learnt it because as a younger man I smoked. While it is bad for your health, smoking can teach you much about atmospheric drift in the bush. Because a deer's nose is his secret weapon, scent is the hunter's greatest enemy, so you need to watch your wind. Better still, if you have a good dog, you can turn the odds around. However, be careful in your choice of dog, for while a good dog is a real asset, a bad dog is a major liability! Don't be tempted to take the family pet for a walk thinking he will get you a deer.

The basics of understanding atmospheric drift are straight forward enough: hot air rises and cool air sinks. The sun is what heats the air, so air rises during the day and sinks during the evening. The lesson? Hunt down the creek or hill during the day and up the creek or hill during the evening. I carry a cigarette lighter in a handy pocket to help me detect atmospheric drift: that is too subtle to feel on my face or the back of my neck. There's no point hunting country that has just had your scent through it! Over time, watching your wind will also teach you that different land forms create cruel twists and eddies in the breeze that ruin your chances without your knowing. Spring north-westers in the Kaimanawas are always a challenge!

Finally, putting it all together in the right spot at the right time is best learned by hunting a regular destination. This is the only way to really understand how the weather, season, time of day and moon phase all influence different age and sex classes of game. If you are always trying out different spots and never returning to regular country, you will have no benchmarks with which to compare these differences and it will take you that much longer to learn the lessons. My advice to new hunters is to find one or two spots in which they feel comfortable, spots which suit their fitness, equipment, ability and budget, and stick with them for a dozen or more hunts. If you are still unsuccessful, sure, move on and try a couple more, but return visits are important because eventually you will gain your own "local knowledge". The funny thing is, once you have mastered one spot, as long as you don't have an expectation that you will score on every hunt (for not even the best of hunters achieves this) you will start to find that you become more successful wherever you hunt. You will then be well on the way to mastering the ancient art.

A funny old season continued



A nice limit including a 3.3kg (7.2lb) rainbow jack caught by Peter Johns in the Tongariro River, 13 June 2002.

Photo Jarrod Goedhart

By Glenn Maclean

Glenn is the manager of the research and monitoring programme in the Area, and is editor of Target Taupo

In issue 39 of *Target Taupo* (March 2002) we described the unusual fishing in the lake in early summer. Since then not a lot has changed.

We highlighted that the fishing was very patchy depending on where you were around the lake. This trend has continued as shown in table 1.

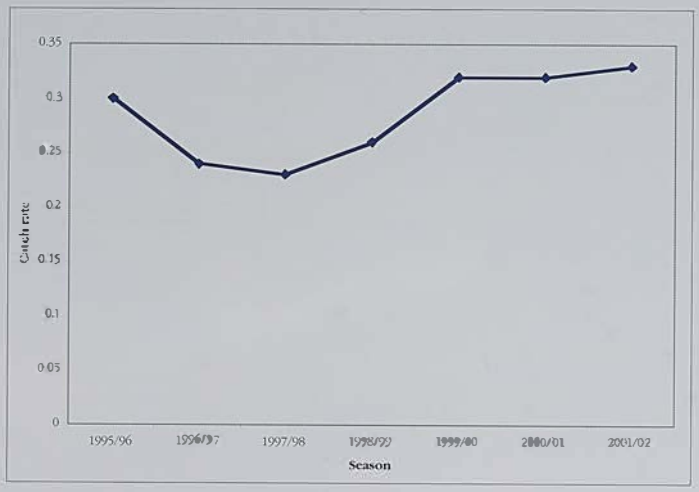
Table 1.

Monthly catch rate (fish per hour) by zone on Lake Taupo October 2001 to March 2002

Month	North	South
October		0.24
November	0.36	0.70
December	0.40	0.69
January	0.15	0.28
February	0.36	0.17
March	0.30	0.19
Overall	**0.28**	**0.37**

Graph 1.

Average catch rate (fish per hour) on Lake Taupo 1995/96 to 2001/02



Whereas the southern end of the lake was more productive up to and including January, by late summer anglers at the northern end were more successful. The overall catch rate of 0.33 fish per hour (one fish every three hours) compares very favourably with recent years (graph 1) yet we are well aware that anglers did not regard the fishing as particularly good.

In fact while the catch rate is similar to that of the last two years the fishing was quite different. Anglers catches in 1999/00 were dominated by prime maiden trout, but this summer the catch consisted of large numbers of poorly conditioned kelts. A good example of this is the data from the Lake Taupo International Fishing Competition held in late April each year. A summary of the rainbow trout weighed in from 1999 to 2002 is provided in table 2.

Table 2.

Characteristics of the rainbow trout weighed in the Lake Taupo International Fishing Competition 1999 to 2002

	1999	2000	2001	2002
Fish weighed in	1092	1531	1239	648
Fish per angler	3	4	4	3
Largest (kg)	3.91	3.71	4.35	3.36
Average weight (kg)	1.71	1.87	1.76	1.58
Average length (mm)	519	521	524	517
Average condition factor	44	48	44	41

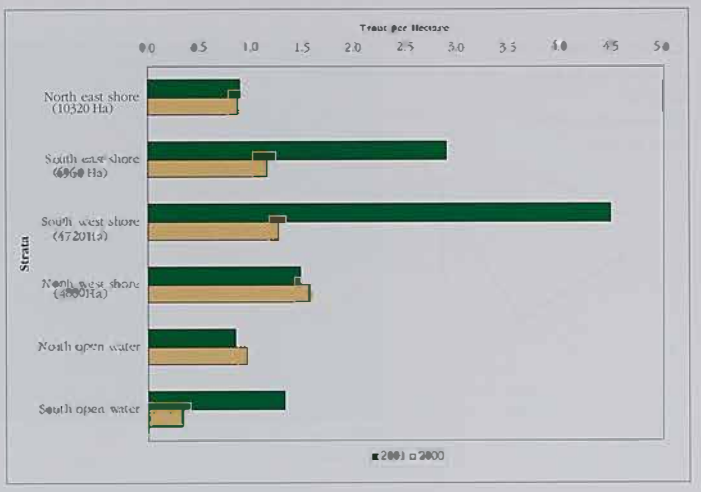
The average length of the fish weighed in was similar to that of recent years but the average weight was approximately 0.2kg lighter. As a consequence the average condition factor was lower than usual.

The poor quality of the fish caused comment among anglers but is not a reason for such great concern as might first appear. Firstly, the majority of spawning was unusually late last year, with half of the run through the Waipa trap occurring after 1 October. In other years approximately a third of the run occured after 1 October. This was not unexpected owing to the impact of the July 1998 floods which wiped out all of the early spawning that year. The offspring from 1998 were the bulk of the fish spawning in 2001 and were as a consequence all fish bred late in the year.

Secondly, once trout finish spawning they drop passively back to the lake. Normally during spring frequent small freshes occur to push them into the lake, coinciding with the movement

Graph 2.

Density of trout per hectare around the shore of Lake Taupo and out in the open waters recorded over the December 2001 acoustic survey



of the huge shoals of smelt into the shallow margins to spawn. With such a ready food source confined along the shore, many of the kelts are able to regain condition quickly so that when the influx of anglers arrives around Christmas these fish are difficult to tell from maidens (fish which have not spawned).

However, as you may remember, last winter brought an extended drought which did not break in the Taupo region until early December. Therefore not only was much of the spawning late but the flood flows necessary to carry the fish back to the lake were also absent. As a consequence large numbers of kelts didn't arrive in the lake until after the majority of the smelt spawning had occurred. Having missed the easy pickings, these fish probably won't fully recover condition, at least not this season. It is a vicious circle: they need to feed hard to regain condition but feeding on smelt in the open waters is a job for fit fish, not those weak and tired from spawning.

If that wasn't enough, the floods which eventually arrived in December probably had a negative impact on the success of smelt spawning as well, particularly in the western bays.

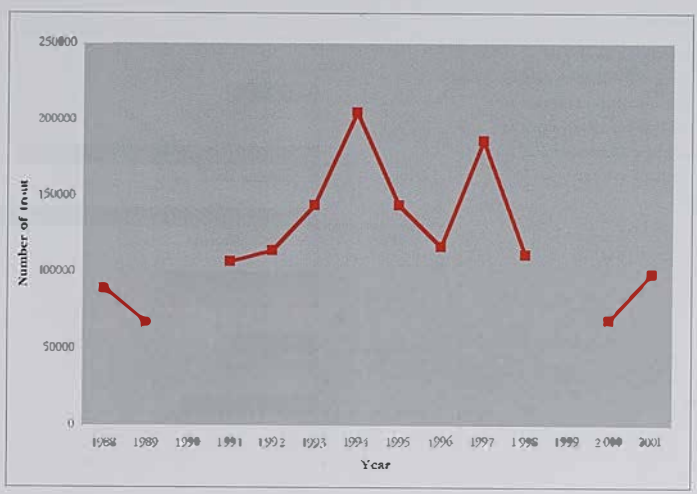
So the large numbers of poorly conditioned kelts are not a symptom of the food sources have collapsing in the lake. These fish are hungry though and favour the shallows and near-shore drop-offs, exactly the places anglers target. It isn't a surprise therefore that the catch rates of these kelts have been high.

Proof that food supplies are satisfactory in the lake is provided by the condition of the maiden trout which is in keeping with what we have seen in recent years. Amongst them are some exceptional fish: for example, a rainbow female of 570mm and 3.5kg (condition factor 68) was weighed during a routine survey on the Hinemaiaia in May.

The perception of poor trout quality has not been aided by the unusually patchy occurrence of maiden fish this summer. There have been long periods at different locations where they have completely disappeared only to suddenly appear again in large numbers. Graph 2, which compares the density of trout per hectare around the lake and out in the open waters in December 2000 and 2001, highlights the patchy distribution in 2001. The graph also indicates that in the south there were many more fish still out in the open waters where they live as juveniles.

Graph 3.

Estimates of the number of large trout in Lake Taupo in November/December 1988 to 2002



The survey estimated the population of large trout (fish larger than 35cm) at 100,000 (graph 3).

Based on our observations over the last 14 years, we use an estimate in excess of 100,000 large trout as an indication that the angling will be reasonable over the coming season. The catch data this summer bears this premise out, although as we have commemed, the quality of the fish caught was generally not high. We suspect the apparent reluctance of the maiden fish to move inshore reflects a subtle shift in the functioning of the lake ecosystem, probably as a consequence of the huge inflows into the lake in December.

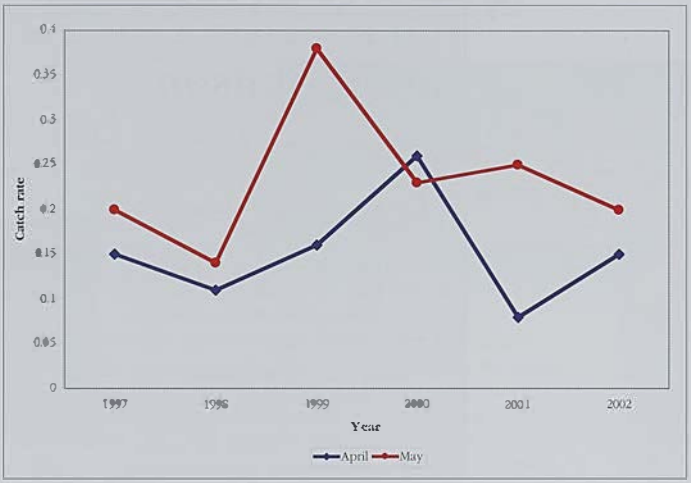
One consequence of this is that the large maiden fish were largely absent around the river mouths during autumn, unlike in recent years. Even now the fish do not appear to be concentrating around the river mouths in large numbers yet, since early May, several good runs have moved into the rivers when conditions have been favourable. It is as though they have come directly from a distance away rather than accumulating over the preceding weeks at the month.

Over the early part of the winter, characterised by very settled and mild weather, fishing in the rivers was bad. It improved with the wild weather which swept the country in May and has improved further in June. Graph 4 highlights that the catch rates were typical for this time of year.

Hinemaiaia River anglers had little success in April but we recorded an average catch rate of 0.31 fish per hour for the 83 anglers interviewed in May. The Tauranga Taupo remained hard with an average catch rate of 0.18 fish per hour in May though some anglers did very well when the river discoloured late in the month. Angling success is not helped by the temporary loss of some of the most easily fished water as a consequence of the river now flowing through the old quarry (see the article on page 72 regarding progress on this issue.)

Graph 4.

Comparison of the average catch rate for April and May on the Tongariro River 1997 to 2000



The quiet start in the spawning runs this season is also evident in the Waipa trap results. However, since mid June the run has picked up substantially with daily totals of 20 to 50 or more fish passing through regularly.

The other feature of the Waipa run to date is that the fish are slightly smaller than usual, with the rainbow males averaging 515mm and the females 522mm in length. This is still significantly larger than the minimum legal length of 450mm. As commented earlier, large maidens in prime condition have begun to appear in river anglers' catches and these fish are quite different from those caught early in the season.

So all in all we expect river fishing to be reasonable this winter. There are some great maiden fish to be caught although there will be some poorer conditioned previous spawners amongst them. Remember that over recent seasons the bulk of the spawning runs have occurred in August and September or even later when most anglers have given fishing away. Plan a visit later in the year: temperatures will be warmer, there will be many fewer anglers and you maybe surprised by the quality of the fishing.

Timing of the Spawning Runs

There has been some comment amongst anglers suggesting the spawning runs in the last three or four years have occurred much later. Certainly the run last year was exceptionally late as a consequence of the effects of the July 1998 floods and not helped by the unusually dry winter. However, over the last 15 years the major runs have typically begun with the first significant rain in mid to late June (or even July, if June remained dry). This year has proven no different.

Way back in the history of the fishery Easter traditionally signalled the start of the winter fishing and some anglers still religiously follow this pattern. The fact of the matter though, is that for many years now anglers have started too early and finished too soon.

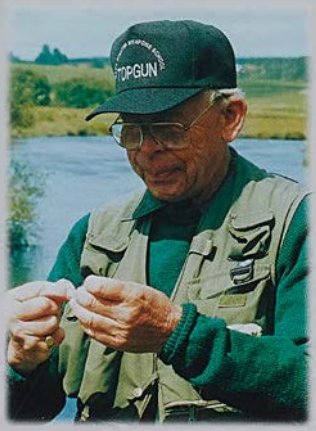
John Johnson

The Taupo fishery lost one of its strongest supporters in late April with the passing of Waitahanui identity and guide, John Johnson.

After arriving in New Zealand from England in 1975, John and his wife Joyce settled at Riverway Cottage at Waitahanui and set up a fly fishing guiding venture.

John's concern for and commitment to lake Taupo, its rivers and fishery were no better expressed than through his regular clean-ups of litter from the banks of his beloved Waitahanui. As a fishing guide earning his living from the river he wanted to put something back into the environment. After the closure of the Waitahanui refuse tip there was a growing amount of rubbish being dumped in the vicinity of the river. Starting in 1985, John began organising regular clean-ups of this waste, enlisting the support of other guides and anglers, the local school and any members of the public who wanted to help. Over the next 16 years this became a twice-yearly event with the support of Joyce and it is fitting that he was recognised with the Tongariro Taupo Conservancy's very first Conservation Award in 1993.

The Fishery team had a long association with John over the last 20 years through his dedication to the Taupo fishery as an angler, guide, administrator and guardian. We really became involved professionally in 1990 when he was appointed by the Minister of Conservation as one of the founder members of the Taupo Fishery Advisory Committee. His service in this role and his no-nonsense contributions helped sustain the committee in its formative years and weather many difficult and sometimes controversial issues facing it. This included the development of the first management plan for the Taupo fishery, and indeed the first such plan in the country. I certainly missed John's input after he passed on his mantle on behalf of the Waitahanui Angling Improvement Association in 1996.



Although he was a professional fishing guide, John would freely give advice and assistance to novice anglers and there are many among the ranks of the experienced fly fishers today who have benefited from this. Indeed within our Turangi office there are two staff who as teenagers were started along the angling path by John.

The wider Taupo community, but especially the anglers and managers of the Taupo trout fishery, fondly remember John. We will all miss the sight of his black van proudly bearing the plate TROUT1 around the local rivers.

-John Gibbs

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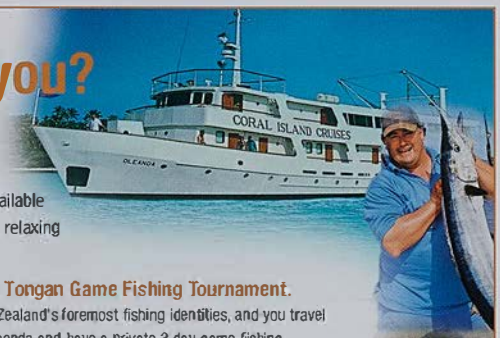

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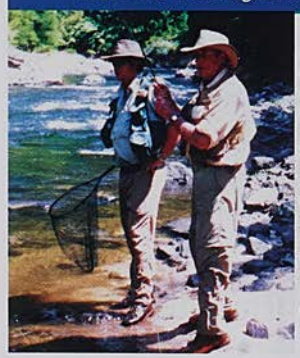

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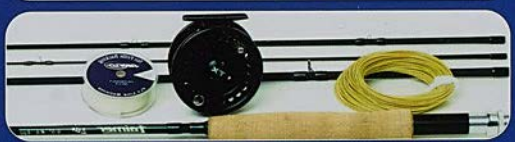

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Taupo Fishing Regulations Review Update

In the last issue of *Target Taupo* (issue 39) we put forward for debate suggested changes to the Taupo Fishing Regulations (1984). Eighty submissions were received from anglers covering the whole gamut of regulations and expressing a wide range of views. The submissions were generally of a very high quality and you will notice changes in the suggested regulations as a consequence of some of the points made.

Many anglers felt that allowing anglers to continue fishing after having kept 3 fish would increase crowding on Taupo Rivers

Photo: Glenn Maclean

The submissions were considered by the Department and the Taupo Fishery Advisory Committee at a meeting in early June. When suggesting changes it was decided to keep the regulations as simple as possible so they could be easily understood and enforced. Where possible the regulations should be consistent with comparable Fish and Game regulations applying to the rest of New Zealand to avoid confusion. The subsequently amended proposals were then discussed with the Tuwharetoa Maori Trust Board. The following is a summary of the more significant changes agreed at those meetings.

Fly fishing

A definition of fly fishing is proposed which will prevent the use of spin fishing equipment within fly fishing only waters. There would be no restriction on the amount of weight which could be added to sink the flies and the weight could be added either within the flies or as an additional attachment. The restriction on the maximum size of hook to which weight could be added would be removed although the maximum hook size which can be used (whether weighted or unweighted) would remain. The current strike indicator restriction would

remain but the maximum number of flies which could be used would be increased to three. Unlike our earlier suggestion, the use of natural flies would continue to be permitted in fly-only waters.

Rationale

Many of the concerns over the amount of weight which can be used relate to anglers being able to use spin-fishing equipment to fish in fly-only waters. Inserting a definition of fly fishing will prevent this. The amount of weight which can be added to fly fishing equipment is self limiting owing to the difficulties in casting large weights and, as many anglers have realised, using more weight than necessary to get to the bottom does not improve angling success. Weight can still be added to flies but some anglers may prefer to use a smaller weight attached to the leader, which is easier to cast and less likely to snag. If weight can be added to the leader there is no justification for the restriction on the maximum size of hook which can be weighted, and removing this allows the use of larger weighted patterns.

The current strike indicators are effective and the regulation is simple and easily enforced. The use of up to three flies allows alternative angling methods and the suggested changes are generally consistent with Fish and Game regulations applying to the rest of New Zealand.

Boat fishing

There would no longer be a requirement for everyone on board to be licensed when set rods were used and it would be okay to have any number of assembled rods in the boat. Paravanes would be allowed subject to the same cable-length and weighted line restrictions as downriggers.

The suggestion to reduce the no-trolling zone from 300m to 200m around the river mouths was not supported. Instead a new proposal was suggested whereby the 300m restriction would remain around the major fly fishing mouths but an increased number of the very small stream mouths around the lake would have no boat fishing restriction. These are the Waipahihi, Rotongaio, Waitotara, Tokaanu, Rotomoho (Slip Creek), Te Awaroa, Otaiunga, Tutaewaeroa, Kotukutuku, Tutaeuaua, Otutira, Omoho, Te Mapu and Okaia Streams.

There would be no restriction on boat fishing in the vicinity of the Tokaanu wharf. It is suggested the use of unanchored boats in the Waikato River between the Control Gates and Huka Falls be permitted.

Rationale

Requiring everybody on board a boat to be

It is proposed to close Lake Te Whaiau (below) a month earlier to protect trout which are congregating prior to running up the Te Whaiau Steam to spawn (below right).

Photos: Glenn Tudeau

licensed when set rods are in use is a major inconvenience for groups which include people who have no intention of fishing. Similarly the restriction on the number of assembled rods in a boat is viewed as an unnecessary constraint when an individual may only fish with one rod at a time. Paravanes provide a similar fishing opportunity to downriggers and providing the maximum depth to which they can effectively be used is controlled in the same way, there is no good reason to prohibit them.

There are a number of river mouths where the 300m restriction is valued by shore-based anglers. However, there are also many small streams scattered around the lake which offer little or no fly fishing opportunity and which indeed many people don't even know exist. A 300m exclusion zone around these serves no purpose and imposes an unnecessary constraint on anglers trolling.

Much of the upper Waikato River is inaccessible to shore-based anglers and provides a suitable opportunity for boat-based drift fishing.

Restrictions on fishing

As most submissions emphasised, there was no support for extending the fishing hours. Similarly the suggestion to allow anglers to continue fishing after having killed three trout was strongly rejected as was the proposal to allow the use of lures with two or more single hooks attached. As a consequence it is suggested these regulations remain as they currently are.

The removal of the bag and size limits on Lake Moawhango, the Waipakihi River and the children's pond at the Tongariro National Trout Centre is recommended. The removal of the size limit but not the bag limit on Lake Kuratau was also supported as was the proposal to allow the Department to authorise bona fide disabled people to fish for trout by means that would otherwise be illegal, subject to any conditions that may be necessary.

The legal length of trout would be measured from the tip of the snout to the V or fork of the tail, rather than to the tip of the tail as at present.

Spin fishing would be permitted in the Tokaanu Tailrace upstream of the highway bridge.

Note that the use of three flies or lures would be permitted as discussed in the section on fly fishing. The use of artificial lures imitating molluscs, insects, bugs, worms and fish roe would no longer be prohibited.

Rationale

The changes to legal fishing hours and the point at which an angler must stop fishing

were suggested as ways of increasing fishing opportunity. However, it was clear there was little support from anglers and several submissions made strong cases that the effect of the bag limit change might actually be to reduce opportunity by encouraging pool hogging and the 'high grading' of fish (discarding a trout kept earlier for a better specimen caught later).

The removal of the bag and size limits in the waters proposed will have no biological impact on those fisheries but will create additional opportunities. The ability to exempt disabled people from certain provisions of the regulations may allow them to fish when otherwise they would have been excluded. Note that this approval is on a case-by-case basis and the impact of whatever is proposed on other anglers would be taken into account. This is consistent with the existing national approach under the Freshwater Fisheries Regulations.

Measuring trout from the snout to the fork of the tail is the national standard for recreational fishing in fresh and salt water, and also for scientific and technical data collection.

There are relatively few flowing water areas where spin fishing is currently permitted. One such area is downstream of the highway bridge on the Tokaanu Tailrace and there appears no good reason not to allow this opportunity above the bridge as well.

Allowing the use of up to three flies or lures is intended principally for the fishing. It is unlikely to result in many anglers trolling multiple lures as few troll more than one lure per rod now, even though they can legally use two. Allowing the use across the whole fishery makes for a much simpler and more easily understood regulation. The use of artificial lures imitating molluscs, worms, insects and fish roe is already standard practice in the Taupo fishery (e.g. red-setter and globug flies, bloodworm nymphs, snail flies, etc). These changes are consistent with Fish and Game nationally.

Season lengths

It is suggested that the season for the upper Tongariro River (above Pouakani Intake) and the Waihaha River (above Tickell Falls) be 1 October to 30 June rather than 1 December to 31 May as at present. It is also recommended the season be shortened one month at Lakes Otamangakau and Te Whaiau, including the Wairehu and Te Whaiau canals, so that fishing ends on 31 May rather than 30 June.

Rationale

There is no biological reason for not extending the season for the resident fisheries of the upper Tongariro and Waihaha Rivers.

In May and June spawning trout from Lake

Otamangakau collect in Lake Te Whaiau and canal prior to running up the Te Whaiau Stream. Here they are targeted by a small group of anglers, many of whom use angling techniques, such as heave and leave, which make it difficult to release any fish alive. The key to the trophy fishery over the summer in Lake Otamangakau is that the fish live to old age, continuing to grow after each spawning. Our data indicates the odds are that every trophy fish in the lake will have been caught at least once previously, highlighting the importance of successful catch and release in this fishery. In June trout are especially vulnerable and their chances of surviving repeated spawnings to reach trophy size are much reduced. It is suggested that fishing for these trout on their spawning migration is not consistent with the management of the lake as a trophy fishery.

Licences

In keeping with the recommendations in the licence review carried out in May 1999 it is proposed to change the one-day category to a 24-hour licence. This is consistent with Fish and Game nationally and may lead to a small increase in sales of these short-term licences.

Administrative

There are a number of administrative and management changes proposed. These include:

- The redefinition of a commercial vessel under the Maritime Transport Act, the provisions of which are about to replace the Lake Taupo Regulations relating to boating.
- Replacing the term artificial minnow with the term artificial lure.
- Removing the fee for replacing a lost or damaged whole-season fishing licence.
- Allowing the use of non-fish attracting electronic devices, e.g. depth sounders, GPS, radar etc. While these have not been explicitly prohibited in the past the wording of the regulation was ambiguous.
- Removing the prohibition on fishing with a lure made of the feathers of an absolutely protected bird. Possession of these feathers without a permit is already prohibited under the Wildlife Act and repeating the restriction adds no benefit.
- Removing the legal compulsion for anglers to report the capture of tagged trout as this is virtually impossible to enforce and we much prefer to rely on goodwill.
- Replacing the present restriction on having a maximum deposit of 23kg of trout in a commercial freezer or smokehouse with a limit of 12 fish. The prohibition on depositing more than the daily bag limit on any one day is removed.
- Deleting the entire section controlling the canning of trout (regulations 2537) as it is unnecessary and outdated. Preserving fish in this way is conceptually no different from freezing or smoking them.
- Deleting the prohibition on releasing fish without authority as it is already fully controlled through the Conservation and Biosecurity Acts and the Freshwater Fisheries Regulations.
- Strengthening the regulations governing the permitting of fishing competitions to bring them in to line with the rest of the country.
- Offering the Motuoapa Fishing and Boating Club and the Tongariro National Trout Centre Society membership of the Taupo Fishery Advisory Committee.
- Allowing organisations represented on the Taupo Fishery Advisory Committee to nominate a proxy delegate with full voting powers in the event that the body's appointed representative is unable to attend a meeting.

The next steps

Now that there is direction from anglers and their representatives and the Tuwharetoa Maori Trust Board, a set of recommendations will be sent to the Minister of Conservation. Depending on the Minister's decision, approval to draft the legislation will then be sought from the Cabinet Finance and Infrastructure Committee. Draft regulations would then be sent for consultation with other government agencies, and the Cabinet Legislation Committee asked to submit these to the Executive Council and Cabinet for final approval.

If all these hurdles are cleared it is hoped that the new Taupo Fishing Regulations will be in place for the start of the new season in July 2003.

Changes in the Lake Otamangakau Fishery

By Rob Marshall

Rob is the Fishery Area Ecologist and is responsible for the fishery monitoring programmes. He is also a keen angler.

Lake Otamangakau was created in 1972 as part of the Western Diversion of the Tongariro Power Development (TPD). Since then the lake has become well known for the quality of trout it produces, in particular the opportunity to catch very big trophy rainbow or brown trout.

In the past few years the fishery has undergone several changes. Unfortunately the odds of catching a trophy fish have been much lower than they were in the boom times of the 1980s and mid 1990s. While the fishery struggled to produce the same number of trophy trout (>4.54kg or 10lb), it nevertheless remained healthy with strong year classes of fish entering the population each year (*Target Taupo*, issue 35).

Since 1994 we have been monitoring the Lake Otamangakau fishery with the aim of identifying changes in the trout populations and increasing our understanding of the fishery so we can make informed management decisions that optimise the trophy potential. Different tools have been used at different times to monitor components of the fishery including:

- Surveys to monitor angler catch rates (the average number of fish caught per hour) and compliance levels. Every summer we interview between 250 and 300 anglers on the lake
- Surveys of the total catch and harvest by anglers over a season
- The Te Whaiau stream fish trap. Te Whaiau is the only spawning tributary of Lake Otamangakau, so by trapping the fish that run it every year we learn a great deal about their size and numbers present. The trap has been operating since 1994
- interviews of expert anglers. Every year a number of expert anglers are interviewed at the end of the season and asked to rate their perceptions of the state of the fishery and their satisfaction with various aspects of the fishing.

This article discusses the results of the expert angler interviews and compares the perceptions and predictions of these anglers with what we observed through the Te Whaiau trap.

Initially angler satisfaction was monitored by asking every angler interviewed as part of the creel surveys to rate their satisfaction with various aspects of the fishing. However the demographics of Lake Otamangakau

5.6kg of trophy rainbow

Norrie Laing holds a big brown made June 2002

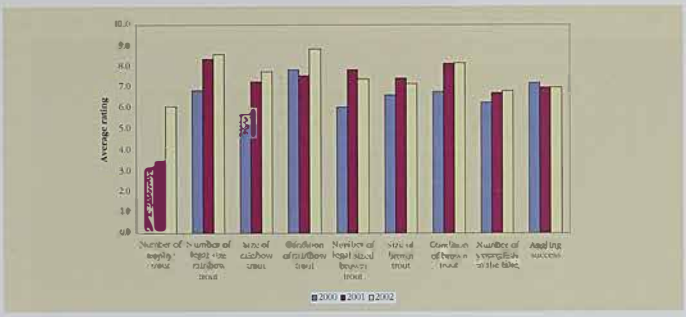
anglers are very different from those of anglers on Lake Taupo and using this approach we found that we continually interviewed the same people throughout the season. Of the other anglers many were visitors fishing the lake for the first time with nothing to compare their experience with. It became obvious that we needed another way to monitor angler perceptions and satisfaction with this fishery more accurately. A new survey methodology was designed and adopted three years ago (see *Target Taupo* issue 34 for details). At the end of each season a small group of experienced anglers who fish the lake regularly are asked for their perceptions about aspects of the fishery and to rate their satisfaction with the season's fishing. A group of nine anglers with a combined experience on the lake of more than 130 years was initially invited to take part in the survey. After three years of monitoring we are now in a position to assess the results.

Over the years we have learnt a great deal about the fishery from the Te Whaiau trap. For example, the number of trophy fish present peaked in 1996 with 35 rainbows trapped over 4.54kg (10lb) or 4% of the total adult population (as well as 7 brown trout over 4.54kg). Since then, numbers have

declined to a low in 2000, when only one rainbow and one brown trout of this size were trapped. The trap data not only identified the decline but also indicated an absence of older fish in the run. The older fish tend to be the trophy fish and their absence we believe was caused by the loss of kelts migrating downstream after spawning in 1998. Normally these fish return to the lake to continue growing but in 1998 the unusually high flows which existed for long periods over winter swept many of the kelts over the Te Whaiau spillway instead and into the Whanganui River. This low point in the fishery in terms of trophy trout (but not total fish numbers) coincided with the commencement of our new satisfaction survey in 1999/2000. It was quite revealing to find that the anglers selected to take part in the survey have very similar perceptions to ours as managers and made similar predictions about the future of the fishery and in particular the improvement in the trophy population.

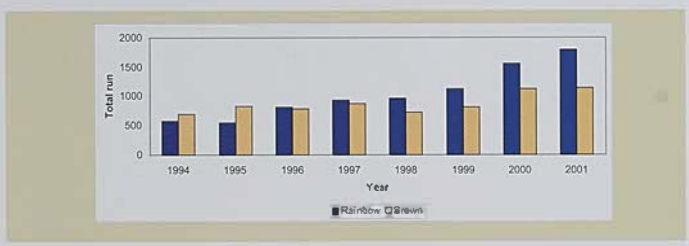
As part of the interview each angler is asked to answer a series of questions by picking the number between 1 and 10 which best reflects their view (where 1 = terrible and 10 = excellent). The average of all the responses to each question for each of the last three summers is presented in graph 1.

Graph 1. Average of all the responses to Lake Otamangakau fishery questions for 1999/2000 to 2001/02



From graph 1 it is apparent that anglers perceptions over the summer of 1999/2000 were that there were reasonable numbers of rainbow trout but only of average size and very few trophy-sized fish. As it turned out the trap run through the Te Whaiau trap the following winter was the largest recorded since trapping began in 1994 but as commented only one trophy-sized rainbow was recorded. (Graph 2)

Graph 2. Total run of rainbow and brown trout through the Te Whaiau trap 1994 to 2001



The following summer (2000/01) our expert anglers noted a continued absence of trophy fish (only four rainbows over 4.54kg were subsequently trapped) but that another strong year class was evident and the average size of the fish was increasing. The condition of both the rainbow and brown trout continued to be rated as high and these anglers all agreed that they expected to see the fishery further improve.

The results for this last summer bear out the prediction. The angler rating of the number of trophy trout present has almost doubled and the number of legal sized rainbow trout is rated very highly as is the overall size of these fish. The brown trout fishery continues to rate highly and fish of both species were considered to be in very good condition.

The trap data this winter reflects these perceptions, with rainbows trapped so far this year averaging 3.10kg for females and 2.96kg for males. These are the heaviest average weights recorded since 1996. There have been a number of fish with four trap clips (have spawned at least four times) which we would never have picked as old fish if it were not for the clips, such was their condition. Similarly in the first three months of this year's trapping operation, 16 rainbow and one brown trout over 4.54kg have been trapped. This is three times the total number of large fish trapped in 2000 and 2001 combined, and unequalled since the 1996 peak of 42 fish trapped between 1 April and 31 August.

What does this data tell us about the likely fishing next summer? Half of the anglers surveyed this year expect the fishery to be very similar next season, the other half expect to see another increase in the number of trophy fish caught. Time will tell.

However, before you all rush off to catch your trophy don't forget the lessons already learnt. The 1996/97 harvest survey measured an average catch rate of 0.11 fish per hour or one fish for every 10 hours of effort. Lake Otamangakau is generally not kind to the casual visitor and even in the good years most trophy fish represent many hours of effort and learning on the part of the successful angler. The harvest survey also indicated that most large fish in the lake were likely to be caught over the course of a single season. We have already highlighted that the key to the trophy fishery in Lake Otamangakau is that the fish survive a number of years, continuing to grow each year. It is therefore very likely that most trophy fish have been caught at least once previously. Fortunately, in recent years more than 70% of the catch has been released alive, but if anglers kill large numbers of fish or follow poor catch and release techniques it will have a major impact on this fishery.

Like all wild trout fisheries, Taupo included, lake Otamangakau cycles through good and bad years. At the moment it is in an upward phase. Enjoy the opportunities this offers but please look after it. It is fragile.

Thanks to Ron Burgin, Ken Drummond, Ralph Young, Fred Barnowich, Mark Etheridge, Tim McCarthy, Pete Mitchell, Graham Dean and Peter Deakin for their ongoing participation in this project.

Tongariro Angling Book

The Tongariro River and its fishery are the subject of a book currently in preparation. Auckland angler and legal editor Grant Henderson has spent several years researching the fishery and the many people who have been drawn to it by the great trout fishing.

Grant first fished the river as a boy in the early 1960s, when Turangi was a comparatively small settlement. The construction of the Tongariro hydro-electric power scheme changed both the river and the township forever. He notes:

"The great thing about the Tongariro is that it has provided a special angling experience for all kinds of people, from kings to commoners. Despite all the changes, it continues to be the big drawcard for anglers, especially those from overseas."

Grant Henderson would like to hear from anyone who has historical information about the fishery in the form of angling diaries or good quality photographs (prints or transparencies) or even a good story from times long past.

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FLOOD DAMAGE

By Rob Marshall

Rob is the Fishery Area Ecologist and is responsible for the fishery monitoring programmes. He is also a keen angler.

Background

In December 2001 Taupo and Turangi experienced a significant storm that spanned four days. A rain gauge located at the Tongariro National Trout Centre, approximately 5km south of Turangi, recorded the rainfall during the storm (table 1). A total of 204mm of rain fell between 6 and 9 of December, which was more than the total monthly rainfall every month prior except May and November. Ten days after the initial event another intense storm hit the area, delivering 25mm of rain in 15 minutes at Rangiatea Station under the Hauhungaroa Ranges.

One of the many culverts washed out on the Whareroa

There was flooding in many areas around the district between 7- 9 December. State Highway 1 between Taupo and Turangi was closed when the Waiotaka and Tauranga-Taupo Rivers broke their banks on the evening of the 7 December. The Tauranga-Taupo River suffered significant channel change, which was discussed in *Target Taupo*, issue 39. Most of the lake's other tributaries suffered flooding to varying degrees though none more so than the Whareroa River, on the south-western shore of Lake Taupo.

The Whareroa River has its source on the eastern slopes of the Hauhungaroa Ranges. A small proportion of the catchment consists of cutover native forest while the predominant land use, especially in the lower two-thirds of the catchment is pastoral farming. A large portion of the river and its main tributary, the Otarua Stream, flow through Rangiatea Station on State Highway 32. The rainfall figures provided in table 1 were collected approximately 30km from the headwaters of the Whareroa, but substantially more rain fell in the Hauhungaroa Ranges than in Turangi. The local farm manager doesn't recall experiencing rainfall like it before. The river suffered serious erosion throughout the catchment, the evidence of which was obvious in Lake Taupo, with huge plumes of dirty water and rafts of pumice spilling into Te

on the Whareroa River

Hape Bay. The damage was caused by a combination of the increased volume and velocity of water associated with the high rainfall, but also from a series of massive slugs of water and debris sent down the river by the collapse of a number of dammed culverts in the headwaters

The Whareroa River brown trout fishery

A feature of the Taupo fishery is that it is "wild" or self-sustaining. In other words, no hatchery-reared fish are released into the population. The fishery is sustained by natural spawning in the 20 or so tributaries accessible to trout. As a consequence, an important part of our role as fishery managers is to protect the natural spawning and rearing habitat of trout to enable them to reproduce successfully and therefore sustain the fishery.

Table 1

Rainfall recorded at Tongariro National Trout Centre 5-9 December 2001

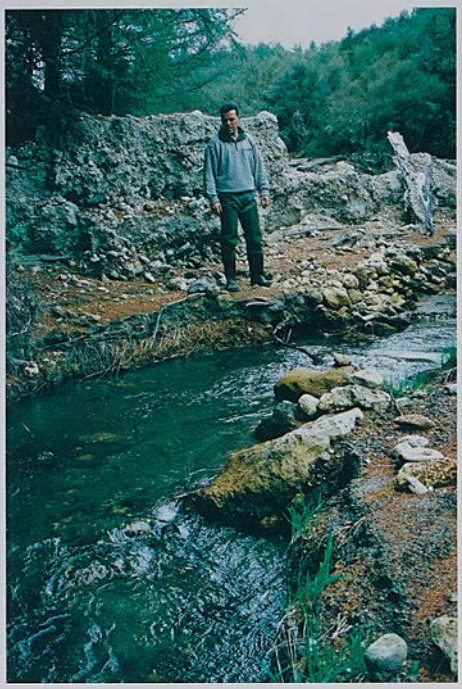
December	5	6	7	8	9
Rainfall (mm)	8.5	61.4	9.1	93.6	40.1

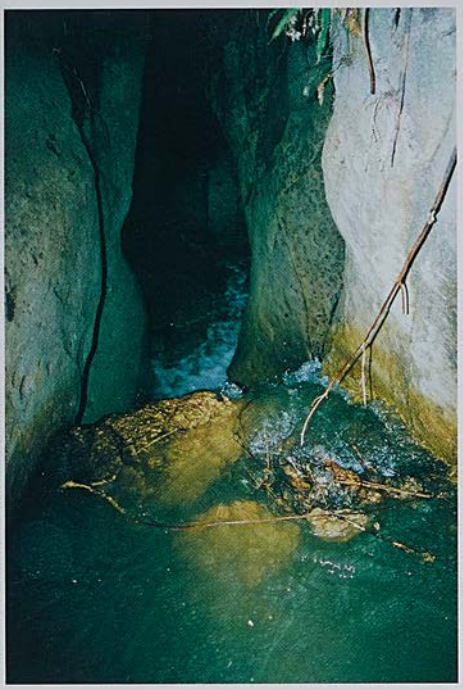
Rainbow trout are the dominant species in the Taupo fishery, making up between 85-90% of the population and anglers' catch. Brown trout are notoriously difficult to catch unless actually targeted and therefore offer the Taupo angler an additional challenge and opportunity. However, for many anglers the true appeal of Taupo brown trout is their size. Most trophy-sized trout (greater than 4.54kg) caught in the fishery are browns so it is understandable that they hold a special place for Taupo anglers.

The most important brown trout spawning tributary in the fishery is the Tongariro River, followed closely by the Whareroa River. Why these two rivers are favoured much more strongly by brown trout than other Taupo tributaries is unknown. A measure of the importance of the Whareroa River is that the New Zealand Wildlife Service (now DOC) built and operated a fish trap on the river for many years. Fish were trapped intermittently from 1951 to 1977, providing information on the size of the spawning run and structure of the population at that time. In these years spawning runs of up to 2500 brown trout were recorded.

Effects of the flood on the Whareroa River

The impacts of the storm on 9 December can be seen along the entire length of the Whareroa River. The extreme rainfall caused an increase in discharge and water velocity that eroded the bed and pumice banks of the river and its tributaries. In addition to the typical erosion processes associated with flooding, the Whareroa was subjected to additional damage caused by the damming and subsequent collapse of culverts in the upper catchment. During storms culverts are required to allow larger than normal volumes of water. Unfortunately this doesn't always happen, and if they are too small, poorly constructed, or not maintained and kept clear, they can block with branches and other debris washed down. The resulting build-up of water and debris essentially creates a lake, until such time that it either over-tops or completely undermines the culvert and washes it away. In either case, the effect is often similar to a dam breaking and sending a slug of water and debris downstream. This may sweep everything in front of it, including downstream culverts and bridges. Such events are also known to occur naturally in the Taupo catchment when logs and pumice block the path of a river until such time as it bursts. For example, a few years ago this happened near the mouth of the Waihora River in the western bays. Anglers fishing the mouth at the time were treated to a show when a huge wall of water suddenly poured over the cliff beside them. The resulting waterfall flowed for a few minutes and then stopped as suddenly as it had started. Another potentially more serious incident occurred when a wall of water came down the gully at Cherry Bay just as local school children who had been camped there were departing. The erosional force of such events can be huge and can cause irreparable damage to a river and its inhabitants.





Dave Hart surveys the damage. Note the height of the pumice debris deposited on the banks. Photos: Rob Marshall

A series of waterfalls has been created by large blocks of pumice lodging in the gorge

Eight culverts were washed out in the upper reaches of the Whareroa River during the storm of December 2001. On the night of 9 December the Rangiatea Station manager recalls hearing an incredible thunderous noise, when the largest of the culverts blew out not too far from his house. Some of the wash-outs caused very little damage but others had a much greater impact on the biological and physical features of the river.

As part of the initial assessment of the flood effects on the Taupo fishery, the entire length of the Whareroa was surveyed from the air to assess the amount of damage. There were also ground assessments completed of the upper reaches from downstream of the Otarua Stream confluence up to the Whareroa waterfall. The effects observed can be broken into two groups: physical and biological.

Physical

As the photos illustrate, the river was subjected to major physical damage. The banks were severely eroded in many places, causing numerous large pumice slips. The eroded material from such slips and other erosion sites was deposited along the banks and in the channel, forming large, exposed accumulations of pumice and sand and in some cases buried flax and other shrubs. Much of the riparian vegetation was completely removed, buried or washed into the river.

Numerous small obstructions to fish passage exist where trees have been washed across the river, trapping pumice and other debris in their branches and new shoots. This debris interrupt the flow of the river and over time may create impenetrable barriers to the upstream movement of spawning trout. The debris can also form dams similar to those formed by blocked culverts, with inevitable consequences. Downstream of State Highway 32 the river enters a number of narrow gorges, some only 1-2m wide. There are three major obstacles to fish passage in one of these narrow gorges. The first is a 3m high waterfall created by the accumulation of large blocks of pumice and branches. Downstream of this are two smaller waterfalls, both

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The debris and pumice have created numerous obstacles to the passage of fish.

approximately 2m high. Trout, especially brown trout, have no chance of overcoming these obstacles and are therefore now excluded from the spawning grounds upstream.

The entire substrate of the river bed has changed from gravel and cobbles that are ideal for spawning to pumice, silt and mud. Even a month after the event, when the flow had returned to normal, the bed of the river was still in continual motion as pumice and sand washed downstream. Five months later the composition of the bed has improved but still contains large areas of mud and silt.

Biological

The biological effects of this degree of physical damage are likely to be significant. It is probable that all trout, including juveniles, adults and unhatched eggs in the river at the time of the flood would have been killed. Trout are a relatively hardy fish and capable of surviving quite significant floods, but an event like this, compounded by the catastrophic collapse of culverts, would have certainly been too much for them. The same can be said for the invertebrate population in the stream that would have been washed away by the force of the water or suffocated by the huge inputs of pumice and silt. During our assessments, no juvenile trout or stream insects were seen in or around the river.

Unfortunately the problem doesn't stop there. Imagine fish returning to the river this winter or even in three years' time to spawn. They would arrive at the mouth of the river and begin to slowly make their way upstream. The further upstream they get the greater the difficulties they will encounter. First, they have to negotiate numerous obstacles to their upstream movement caused by the tress and pumice blocks lying across the river. Some of these are passable but others will stop all but the strongest fish. If they manage to negotiate these and reach the headwater spawning beds they will begin to pair up and dig redds (nests) in the river bed where they'll lay their eggs. If there has been any amount of rain in the preceding few weeks the bed of the river will be covered in pumice and silt, washed off the banks. Some fish will succeed in digging through the silt and lay their eggs. Unfortunately, with the riverbed in continual motion, another layer of silt and pumice will almost certainly cover those eggs before they hatch, starving them of oxygen and ultimately killing them. Even if the eggs do successfully hatch there will be few insects for the young fish to eat.

It is possible that there are too many factors stacked against these fish to allow successful spawning during the next three to five years. Time will tell but the effects of this single event on the Whareroa River brown trout population are likely to be significant in the short term.

Where to from here?

The options available to us as managers of the fishery in this case are unfortunately few as nature must take its course. However, there are some things that can be done to improve the chances of successful spawning in the future.

Firstly it is critical that we learn from what has happened and do everything possible to prevent it happening again. We obviously can't control the weather, and it is natural for streams to flood. But the damage caused by culverts collapsing is not natural and must be minimised. By working with landowners and regional councils we hope to have significant input into what work occurs and what maintenance programmes are instituted in the future. In the case of the Whareroa River, the farm manager and Environment Waikato already have plans to retire and plant 5km of the Whareroa River and its tributaries on Rangiatea Station.

The blockages to fish passage need to be cleared as soon as possible. Some can be removed relatively easily but others, including the waterfalls, will be much more difficult, and a monitoring plan is being developed to ensure that the huge amount of debris in the area doesn't simply create more blockages once the old ones are cleared.

In the medium to long term, with some human help and prudent catchment management the Whareroa will heal itself and the brown trout will return. However it will take a few years.

The Importance of Variety

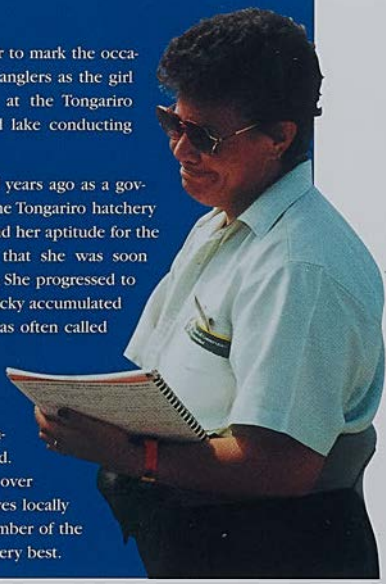
The articles "Flood Damage in the Whareroa" and "Habitat Restoration and Protection in the Whanganiata Stream" in this issue highlight the large variation amongst spawning tributaries in the Taupo fishery and some of the different threats faced. In fact spawning tributaries range from the Tongariro River to streams we can step over, from stable spring-fed streams to flashy, surface fed torrents. Under any particular set of conditions trout production in some types of stream will be favoured over other streams. But no matter what mother nature deals up, some streams will be suitable. This resilience in the Taupo fishery is often overlooked but is a key factor in the continued sustainability of the fishery.

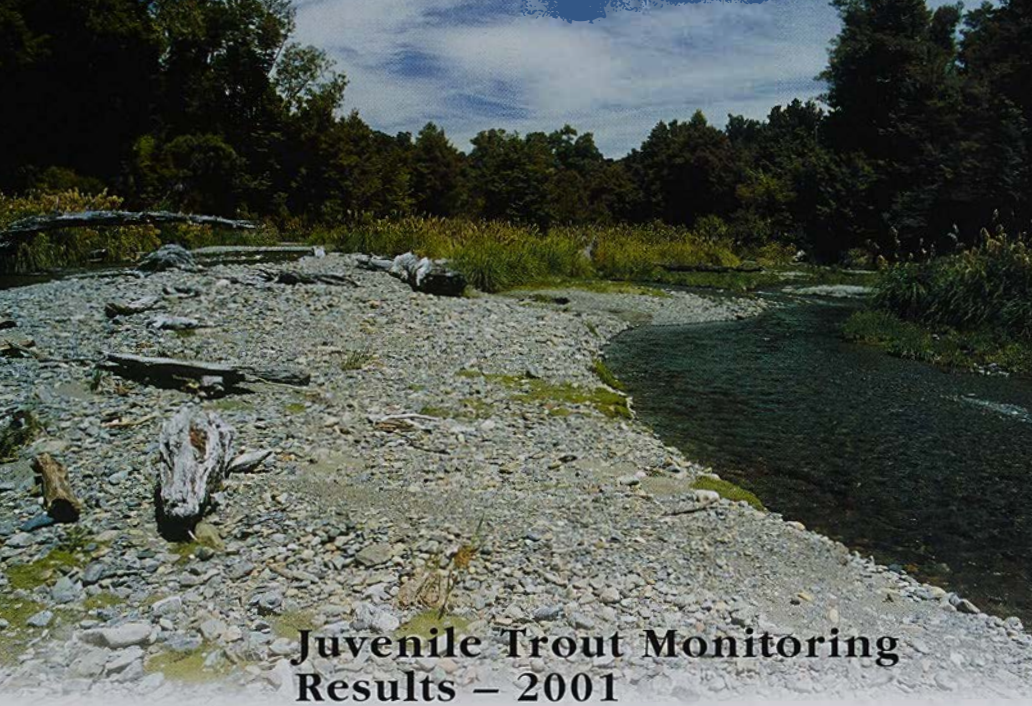
Vicky Maclean

Recently, fishery staff farewelled Vicky at a dinner to mark the occasion of her retirement. Vicky is known to many anglers as the girl with the big smile most usually encountered at the Tongariro National Trout Centre or out on the rivers and lake conducting angler surveys.

Vicky commenced her work with the fishery 19 years ago as a government employment scheme worker (PEP) at the Tongariro hatchery as it was then known. Her interest in the work and her aptitude for the various hatchery management tasks was such that she was soon appointed to a permanent position at the facility. She progressed to the role of assistant manager and over the years Vicky accumulated a wealth of experience and knowledge which was often called on in the training and development of new staff.

In recent years, Vicky expanded her horizons and worked across the full range of fishery projects. Highly regarded by her colleagues and managers alike, her presence in the team will be missed. However, the close association that developed over years of working together will continue. Vicky lives locally and her brother Harry is also a long standing member of the fishery management team. We wish Vicky all the very best.





Juvenile Trout Monitoring Results – 2001

One of the keys to the Taupo fishery is the exceptional spawning and rearing habitat in the tributary streams, in this case the Whitikau Stream

Photo Glenn Maclean

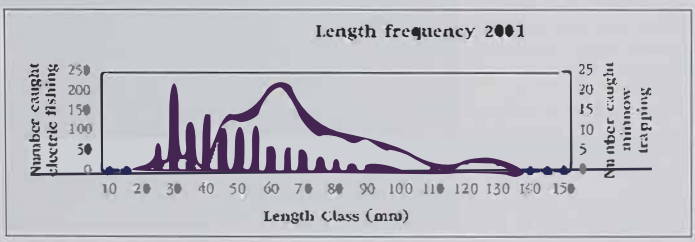
The juvenile trout monitoring programme was initially designed to assess the impacts of the 1995/96 eruptions of Mount Ruapehu on trout spawning and recruitment in the Tongariro river and has now been running for seven years.

The programme utilises two different sampling methods, one to assess the number of fry and the other to assess the number of fingerlings in the population. Newly hatched fry inhabit different areas of a stream from the older and larger fingerlings. An electric fishing machine is used to sample the shallow riffles for fry and baited minnow traps are used to catch fingerlings in deeper water with in-stream and overhead cover. Graph 1 shows the number of fish split into 5mm length classes caught by each method in 2001. Most fish caught electric fishing tend to be less than 50mm long while those caught in the minnow traps are between 50 and 90mm long.

When we take a closer look at the number of fry caught throughout any year we see a fairly consistent pattern of abundance that not surprisingly fits with the known lifecycle of Taupo trout. Graph 2 shows that the peak in fry numbers occurs during spring and early summer a few months after the main adult spawning migration. This varies subtly from year to year but the basic pattern is consistent.

Graph 1.

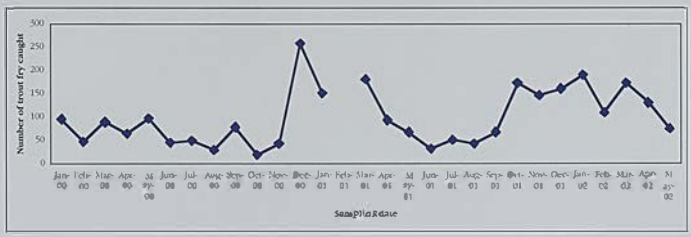
Length frequency analysis of juvenile trout caught in the Tongariro and Whitikau Rivers 2001



Many factors can influence the number of fry in the population including the timing and magnitude of floods. The floods in July 1998 peaked at 814 and 838 cumecs and were the third and fourth largest recorded since 1957. Our monitoring indicated a drop in the population of fry in the Tongariro River in the months immediately after the flood, but we also noticed that the river bed had been "cleaned" by the flood waters, which would hopefully improve spawning success later in the year. At the time we predicted that the success of spawning late in the year would counteract the loss of early spawning and the monitoring appeared to confirm this. However the overall impact of the flood could only truly be assessed three years later when the juvenile trout were expected to return to the Tongariro River to spawn themselves. The

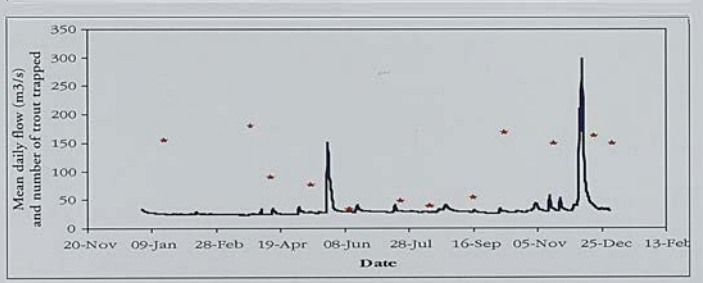
Graph 2.

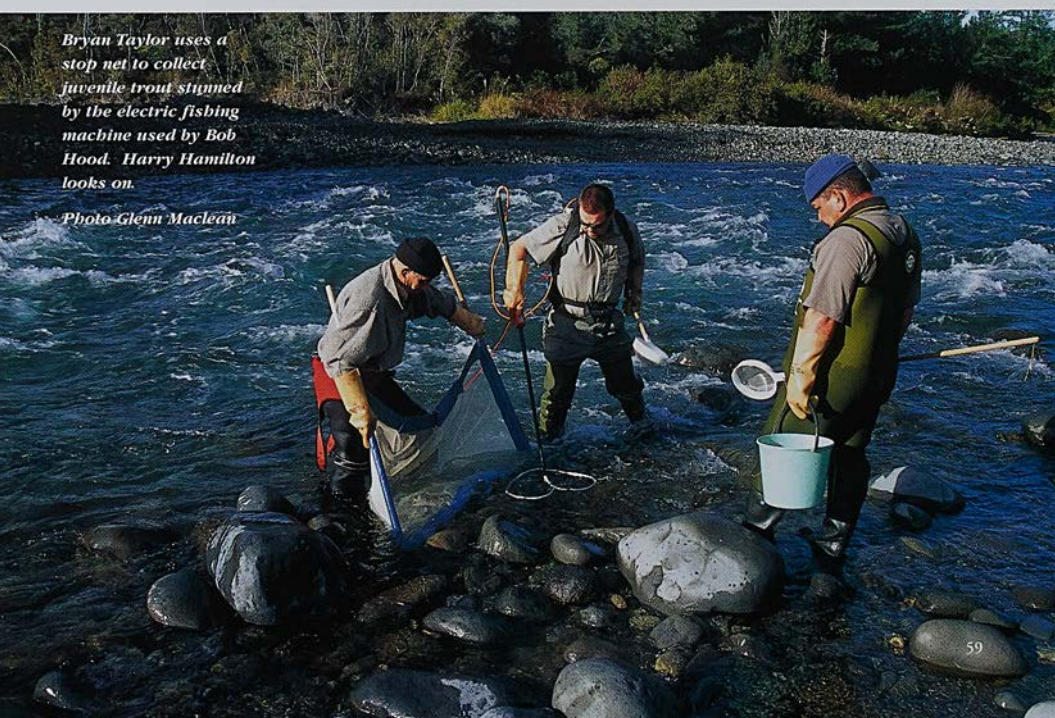
Number of trout fry caught electric fishing from January 2000 to May 2002. No data for February 2001



Graph 3.

Mean daily flow in the Tongariro River at Turangi and the number of juvenile trout caught.





Bryan Taylor uses a stop net to collect juvenile trout stunned by the electric fishing machine used by Bob Hood. Harry Hamilton looks on.

Photo Glenn Maclean

Harry Hamilton sets a Gee Minnow trap in prime juvenile habitat in the Tongariro River

Photo Glenn Maclean

large size of the run through the Waipa trap last winter and the success of the river angling, albeit later in the year than normal, (*Target Taupo* issue 39) confirmed that the fishery bounced back well.

The monitoring also provides an insight into the likely impact of the flood experienced in early December last year. After an unusually dry spring, the Tongariro catchment experienced a period of consistent rain and on 7 December flooded to a peak discharge of approximately 500 cumecs. This is a reasonable flood for the Tongariro but the most concerning feature was its timing. As shown in graph 2, peak fry abundance occurs at this time of year and it was feared that the newly hatched fish would be very susceptible to being either stranded or swept away by the large flows. However our monitoring indicates the flood didn't have a significant impact on the fry as shown in the results in graph 3. The small stars on the graph indicate the number of fry captured each month and it appears that the flood did not significantly affect the number caught in December or January. Results early in 2002, shown in graph 2, suggest that the flood also had very little impact on those fry incubating in the bed of the river at the time. Based on the number of juveniles caught this year (graph 2) we look forward to a strong maiden trout population in the Tongariro River in two to three years' time when these fry mature and return to the river to spawn.

Habitat Restoration and Protection in the Whangamata Stream

By Dave Hart

Dave is the Taupo Fishery Area Ranger based in Taupo

Each year the winter spawning runs of rainbow trout at Taupo attract a pilgrimage of anglers in pursuit of their share of these healthy, well-conditioned fish. With their attention focused on the larger rivers legally open to fishing, many anglers are unaware that the numerous smaller streams located around the lake also play an important part in providing spawning and rearing habitat necessary to ensure the future of the fishery.

Flowing into the northern bay with which it shares its name, the Whangamata Stream near Kinloch is a classic example of the good spawning habitat found in many of the smaller streams. The factors which combine to make the stream well-situated include high water quality with a consistently cold temperature, seasonable gravel beds suitable for spawning redds, and stable flow which is not prone to dramatic flooding.

An important element of managing the Taupo fishery is the protection of such spawning habitat, and the Whangamata Stream has been work-in-progress for the fishery over the past 25 years to ensure exactly this.

Students from Tiboi Venture School at Mangakino hard at work raking out musk weed

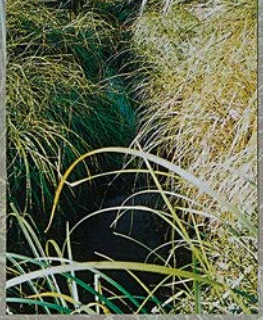
This old waterwheel structure was discovered during habitat protection work on the stream and features a fish passage channel to the true left of the raceway.

Photos: Dave Hart

Following agricultural development of the catchment the stream flowed through open farmland. Stock grazing its margins caused severe bank erosion and trampled the spawning redds, and effluent and run-off affected water quality. By 1975 Trevor Thompson a Wildlife Ranger, noted that the spawning run was probably only a few tens of fish.

Work on the restoration of the stream began with the margins being retired from grazing and fenced off in 1976 and a long-term planting programme being established. Being such a large project the work was carried out in stages with much of the early planting occurring between Whangamata Road downstream to Holyoake's crossing and undertaken by Wildlife Service rangers. Some of the planting was carried out by staff operating a fish trap on the stream in 1979 but restoration of the stream was a pet project of Trevor Thompson and the many oaks along the stream are a legacy of his attempts to provide food for game birds. The planting programme was structured to use native wetland species in the floodplain area and exotic production forestry species on the terraces. Immediately adjacent to the stream public native species were selected which would provide both shade to prevent noxious weed growth and in-stream cover for fish. An unforeseen problem was the emergence of musk (*Mimulus*), a perennial herb native to North America. Musk grows profusely in the presence of bright sunlight and left unchecked will rapidly form a dense mat of vegetation, burying spawning gravels and completely preventing passage to fish.

Some mistakes in planting were also made, such as the use of flax at the water's edge. After becoming established it was found that the flax actually grew into the stream, the rigid leaves causing blockages to water flow or when large clumps collapsed into the stream. Two species of sedge grass were found to be ideal in place of flax: *Carex virgata* which occurred naturally at the site, and *Carex secta* which was planted. These grassy, clump-growing species proved ideal in providing bankside stability, cover over the stream and shade to prevent growth of monkey musk weed while not interfering with water flow.



An example of added stream restoration planting. Established Carex sedge providing shade and in-stream cover while permitting normal unobstructed flo

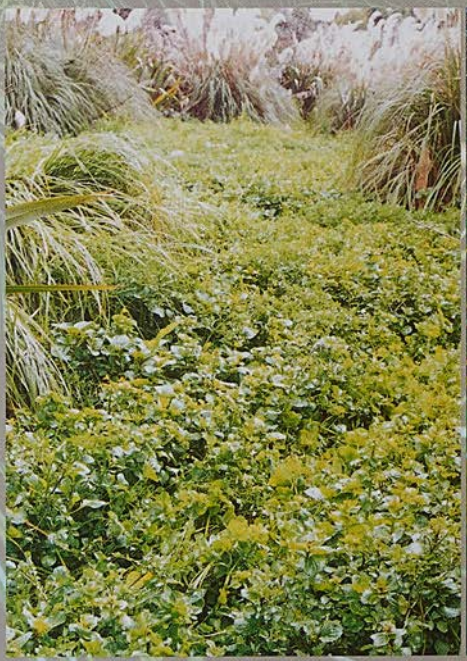
Two views of the Whangamata Stream totally choked with Monkey musk weed and after spraying and weed removal with normal flow and fish passage restored

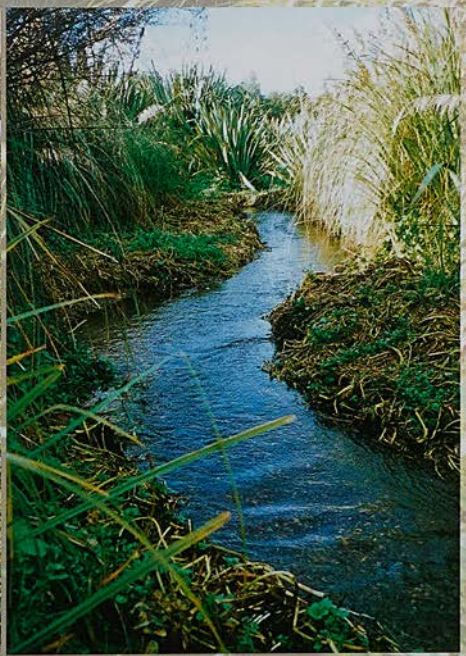
The changes in vegetation and water quality have been monitored since 1976 by Dr Clive Howard-Williams and Stuart Pickmere of NIWA. They have found the stream channel and margins have undergone a continuous successional change in vegetation. The early stages were characterised by rapid growth of the stream bank plants, which stabilised banks and improved trout spawning and water quality. Later changes caused blockages to fish movement but acted as a nutrient filter further improving water quality. More recent years have been characterised by shading of the channel, better fish passage but decreasing nutrient filtration ability.

The positive results of the planting project, now many years on, can be clearly seen in many parts of the stream. In the areas where the Carex grasses or large overhanging trees have not become established, musk weed continues to be an annual problem, growing in profusion over the spring and summer months to choke the stream and prevent fish passage. The weed is sprayed and then removed by raking - a slow and backbreaking job. Removal of the weed from the stream rather than allowing it to rot away is important to prevent fixed nitrogen being re-released into the stream and lake, where it would promote further growth of weed and algae.

During the weed removal work undertaken earlier this year fishery staff were given some graphic illustrations of the impact of musk on fish passage. Several adult fish in emaciated condition were located in the upper reaches of the stream, unable to return to the lake after spawning last season. Fishery staff and volunteers enjoyed the experience of working upstream and raking out weed with a horde of boisterous fresh-run fish splashing at their heels, clearly unimpressed with the speed of progress and impatient to be getting on with the business of reproducing!

The protection and long-term restoration of the Whangamata Stream continue to provide both fishery and land managers with valuable insights into the effects of stream restoration through vegetation establishment, as well as its present-day status as important spawning habitat for trout.





Lake Otamangakau Light Monitoring

By Rob Marshall

Rob is the Fishery Area Ecologist and is responsible for the fishery monitoring programmes. He is also a keen angler.

Lake Otamangakau is a man-made lake near the base of Mount Tongariro. It was formed in 1972 by the construction of the Western Diversion of the Tongariro Power Development (TPD). The lake now supports a very important fishery that is well known for the superb quality and size of rainbow and brown trout it produces.

Genesis Power Ltd owns and operates TPD and is required to dredge the inlet canal of lake Otamangakau to remove accumulated sediment. During such desilting operations if not managed correctly, there is the potential for increased turbidity in the lake, which might impact on the feeding ability of trout and the availability of light for plant growth.

This summer Genesis dredged the canal under a resource consent issued by Environment Waikato. The consent contained a number of operating conditions which past experience indicated would prevent any adverse impacts on the lake. However, the opportunity was also taken to institute a joint study between DOC and Genesis to monitor any effects on the euphotic depth at various sites in lake Otamangakau during and after dredging. The euphotic zone of a lake can be defined as the upper sunlit waters extending from the lake surface down to where light dims to 1% of that at the surface. The euphotic depth is simply the depth at which this 1% threshold is reached. Below this point light levels are considered too low for photosynthesis and plant growth. A significant reduction in euphotic depth would be cause for concern, as the extensive weed beds in the lake could die back and the insects that rely on these weed beds for food and shelter suffer. Ultimately this would affect the trout that rely totally on the insects in Lake Otamangakau for food.

Dredging involved the use of a cutter suction dredge to pick up sediment, which was then pumped ashore into settling ponds and stockpiled. Dredging commenced in September 2001 but it took a few days to get established and discharges from the settling pond didn't commence until 13 September 2001. Therefore this is considered the effective start date. Dredging continued for approximately four months until 17 January 2002. The euphotic depth was measured using an electronic light meter at 0.5m depth intervals from the surface to the bed of the lake. Five sites around the lake were monitored at fortnightly intervals from 14 September 2001 to 20 February 2002. These included:

- Inlet - directly opposite the inlet of the Te Whaiau canal
- island - approximately 60m southeast of the small island
- Outlet - in the middle of the outlet arm approximately 1km from Wairehu canal boat ramp
- Northern Arm - halfway up the northern arm

Table 1. Euphotic depth (m) at five sites in lake Otamangakau 14 September 2001 to 20 February 2002

	Inlet	Island	Outlet	Northern Arm	Dam
14 Sept	8.5	6.3	4.4	4.7	8.2
02 Oct	7.5	5.8	4.5	5.5	8.6
26 Oct	9.1	6.8	5.1	4.8	9.5
12 Nov	10.5	7.6	4.3	6.5	10.0
29 Nov	9.9	7.1	6.1	4.7	10.7
21 Dec	7.7	6.6	5.1	4.8	10.1
08 Jan	8.1	6.8	6.0	4.5	6.9
24 Jan	8.5	5.9	4.1	5.5	13.9
07 Feb	6.5*	5.9	3.1*	3.0*	4.6*
20 Feb	8.3	4*	3.7	3	7.6

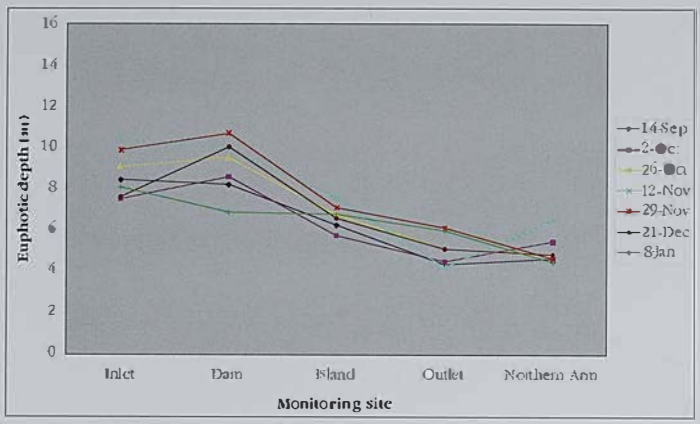
The extent of the weed beds in Lake Otamangakau is apparent as the darker areas in this 1996 photo
Photo: Glenn Maclean

• Otamangakau Dam - approximately 50m from the face of the dam.

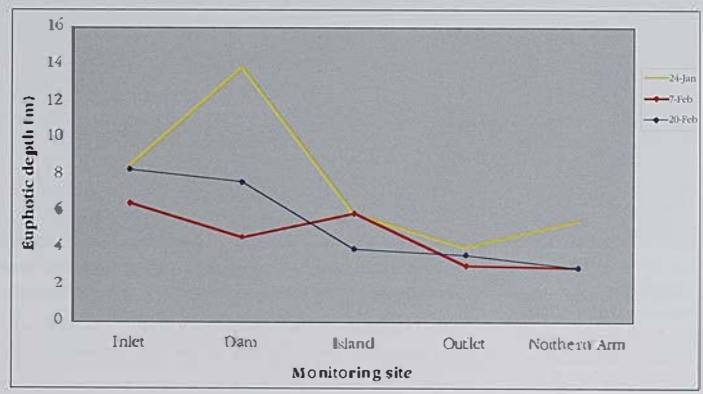
Table 1 shows the euphotic depth (m) at each site throughout the monitoring period. The asterisk identifies times when the euphotic depth was less than the actual lake depth

At most sites the euphotic depth fluctuated within a range of 1-3 metres over the monitor-

Graph 1 Variability in euphotic depths measured during dredging



Graph 2 Variability in euphotic depths measured after dredging



ing period, as shown in graph 1, and remained relatively stable while dredging was underway. Had there been a drop in the euphotic depth during dredging there would have been cause for concern. In fact the opposite occurred and the euphotic depth both reduced and fluctuated more widely after the dredging finished (graph 2). For example, a fortnight after dredging finished the euphotic depth dropped from almost 14m to 5m at the dam site. At the northern arm it dropped from 6m to 3m during the same period.

At all sites during dredging the predicted euphotic depth was greater than the measured depth of the lake. In other words, sufficient light for photosynthesis was reaching the lake bed during dredging. It wasn't until the dredging finished that the euphotic depths dropped, in some cases to significantly low levels. For example, at the dam site the euphotic depth dropped to 4.6m on 7 February. The depth of the lake was 7m, so for the first time during the monitoring programme there was insufficient light in the lower zones of the lake for plants to photosynthesise. This occurred at all but the island site on 7 February. By the time the monitoring was repeated a fortnight later, the euphotic depths had increased and sufficient light was penetrating to the lake bed.

Dredging the Otamangakau canal had no measurable effect on light levels in Lake Otamangakau. However, once the operation was completed factors unrelated to the dredging operation caused temporary changes in the euphotic depth. Given that when we have dived in the lake we have observed that the weed beds are limited to those areas shallower than 4-5m, these temporary periods of reduced light penetration are likely to constrain the extent of the weed beds. The cause is unknown but maybe linked to increased phytoplankton concentrations and/or the influx of dirty water during floods. All in all, the dredging is a successful operation that appears to have had no negative effect on either trout or angling.

Tongariro National Trout Centre Society

Work starts on Interpretive Displays

By Graham Hamilton and Scott Lee

With work on the Visitor Centre building almost complete, the Interpretive Display Committee has started work on the interior fit-out.

Months of planning, some healthy debate and expert advice have culminated in a design that is informative, attractive and representative of the many facets of the Taupo fishery, its ecology and trout in general.

The displays have been broken down into 11 distinct and interesting topics:

1. A profile of the society; our aims and aspirations.

2. A description of the Taupo fishery. The Taupo fishery is anchored on the relationship between the Crown and Ngati Tuwharetoa as enshrined in the 1926 Act. From this stems the geographical boundaries, the management and administration, the licence and even the existence of the Tongariro National Trout Centre.

3. The lifestyle of a Taupo trout. From the swish of its mother's tail through the survival of infancy to adulthood, the life of a trout shown in computer graphics, taxidermy models and photos.

4. Angling techniques. This display will cover lake and river fishing and the various techniques involved. Trolling, harling, jigging, nymphing, wetfly and dryfly – it will all be covered.

5. Museum: Reels, rods, flies and other fishing paraphernalia from the past attractively displayed. The society has been very fortunate to have received many donated items that will make up the majority of this display.

6. Freshwater ecology: How a stream works, what grows in it and what trout eat.

7. The history of angling: From greenheart rods and chalk streams to carbon graphite rods on the mighty Tongariro, it'll all be shown as the sport evolved.

8. Fly tying set-up: A replica of an old fishing cabin with fireplace and oak table set up as a fly tying studio. Just as it would have been in the 1930s.

9. Management techniques: What DOC gets upto to ensure we have trout to catch. Covering such techniques as electric fishing, blowing up log jams, counting fish by acoustic survey, drift diving and catching poachers.

10. Fishery research: What happens behind the scenes. Those special projects DOC takes on like radio tracking trout in the Tongariro River.

11. Current issues and information for the public.

In addition to these subjects the Trout Centre includes a 40-seat auditorium. This will be used for educational presentations to school groups and bus tour groups. We envisage producing three educational/informative videos for screening. One will be on the Taupo fishery, a second will focus on the "how to" of popular fishing techniques; and the third will cover the attraction of fishing (i.e. the love we all feel for the sport).

We are fortunate to have attracted tremendous support from local business houses and generous folk throughout the country who have donated at least $100 as benefactors. These now total 57 and there is no closing date!

Substantial recent funding has also been provided by the following Taupo businesses:

Kazbar and Casino	$5,000
Lucky Lizard Bar and Grill	$10,000
Cobb & Co (Easy Street)	$2,000
Taupo Superbowl	$5,000

In addition the Bay of Plenty Community Trust has provided the joinery by donating $13,000 and Taupo District Council has confirmed funding of $20,000. We are most grateful to them.

While fundraising remains a high priority, we are thrilled with this community support as it allows us to make the auditorium operative by putting in place the audio visual equipment and carpeting the complex, thus completing the Visitor Centre building – debt free – in our first year of operation. At the recent Annual General Meeting, the Executive Committee was re-elected, which not only provides continuity but also the enthusiasm to see the whole project through to completion before moving on to other worthwhile developments.

RADIO TRACKING

By Michel Deduat

Michel is the Fishery Area Scientist Hailing originally from Switzerland. he is also a very enthusiastic angler

In the last issue of *Target Taupo* we indicated that this winter we plan to assess the size of the Tongariro River trout spawning run by using radio-tracking technology to index the run through the Waipa Stream trap with the total Tongariro run. In this article we explain in more detail how we are going to do it.

The experiment is similar to a project undertaken in 1995 and 1996 when we attempted to index the Tongariro run to the run in the Whitikau Stream. This was successful but it subsequently proved impossible to maintain the Whitikau trap on an ongoing basis, hence we switched to the smaller and more easy-to-trap Waipa Stream. The trap on this stream has now been in operation since 1998.

We know from the first project and our routine trapping operations that the runs through the Tongariro numbered 60,000 in 1995 and approximately 5000 trout pass through the Waipa each year (a tributary of the Tongariro). This means that approximately one out of 12 trout entering the Tongariro is likely to pass through the Waipa trap to spawn. However we need to have a much more precise estimate of the relationship so as to be able to estimate the annual Tongariro run from the Waipa trap results.

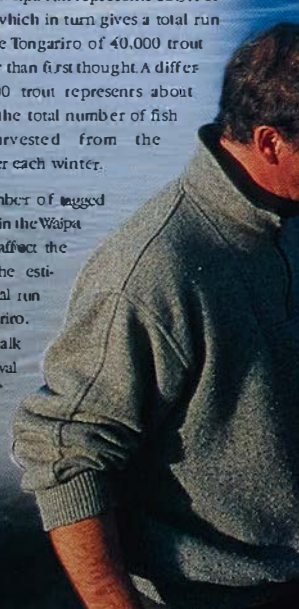
As part of the first radio-tracking experiment we observed that not all the fish we tagged and released in the lower river moved further upstream. We know that two fish died following the tagging and that several others dropped downstream to lake Taupo and did not return into the Tongariro, despite having been caught in the lower river initially. Overall we could track 80% of the fish that we tagged. An accurate estimation of the number of fish that will actually move upstream is critical to obtain a reasonable estimation of the total size of the fish population running the Tongariro. This is why we'll use radio tracking and not any other simpler, more traditional tagging method.

For example we could use floy tags, which are spaghetti-like plastic tubes attached to the body of the fish. Floy tags are cheap and very obvious. However, as with the radio-tagging, some of the tags may be lost, some fish may die and others may return to the lake. This is where the big advantage of radio tagging lies. Because the radio tags transmit a radio signal which we can locate and follow, we can ascertain where the fish is and whether it is dead or alive. As a consequence we know exactly how many of the tagged fish actually made the spawning migration up the Tongariro River and therefore need to be included in the calculation.

To illustrate the importance of knowing the exact number of tagged fish moving upstream, let's take the following example.

We tag 100 fish in the lower river and 10 of these are recaptured as they pass through the Waipa trap. The total number of fish caught in the Waipa trap over the year is, say, 5000 fish. We would conclude from the tagging that one fish in 10 running the Tongariro passes through the Waipa trap and so the total run in the Waipa of 5000 trout represents one-tenth of the total Tongariro run (50,000 trout). However, the radio tracking tells us that in fact only 80 of the 100 tagged fish actually ran the Tongariro river. Therefore the Waipa run represents 12.5% of the total run, which in turn gives a total run estimate in the Tongariro of 40,000 trout or 20% smaller than first thought. A difference of 10,000 trout represents about two thirds of the total number of fish that are harvested from the Tongariro River each winter.

The actual number of tagged fish recaptured in the Waipa trap will also affect the accuracy of the estimate of the total run in the Tongariro. Statisticians talk about the "interval of confidence" around the estimate.



Michel Deduat (left) guides Rob Marshall (centre) and Dave Hart through the tagging procedure

Photos Glenn Maclean

in the Tongariro River

The fish are caught by anglers fishing at the Delta

Inset: The fish are held in floating bags prior to tagging and again afterwards while they recover

The narrower this interval of confidence the more accurate and therefore the more useful is the estimate.

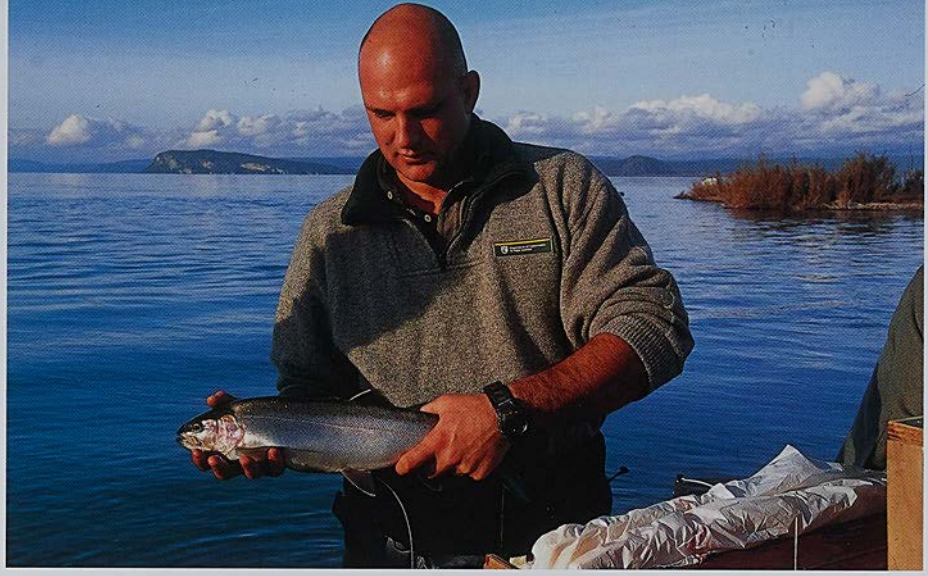
To maximise the number of tagged fish returning through the Waipa trap, we intend to split the experiment into two phases. First we will tag 65 trout in the lower river and from these calculate the proportion which run as far as the Fence Pool (close to the winter limit). Secondly we will tag another 35 trout at this point, of which a significant proportion is likely to use the Waipa Stream. Using this approach will give a more accurate estimation of the total run through the Tongariro than if we tag all 100 trout in the lower river.

The capture of the fish required for the tagging operation in the lower river involves the assistance of several local guides and other regulars at the Delta who have kindly offered their help. We will set up a camp close to the Delta beginning in mid-June and collect fish caught by these guides and their clients. The fish will be held in floating bags before being tagged. The tagging involves anaesthetising the trout, surgically implanting the radio tag and then stitching the fish up. As we found in the 1995 experiment, the fish from this procedure recover quickly and within a few weeks even the scar from the surgery will have disappeared. The tagged fish will be held overnight just to make sure that they are okay, tagged with a yellow floy (spaghetti) tag so they are obvious to anglers, and then released and followed as they move upstream. Two trackers with radio aerials, one on each bank, will be working together to pinpoint the location of the fish and monitor their behaviour on a regular basis over this winter.

When the tagged fish start to pass upstream of the Fence Pool we'll tag the remaining 35 fish at a point just upstream and follow them until they are hopefully recaptured in the Waipa trap.

Because the battery life of the transmitters is 7.1 months we can also monitor the downstream movements of these fish as they return to the lake to recover after spawning. We know from our trapping operations that freshes push trout downstream in the Tongariro but we are not sure about much of their daily routine particularly during more settled periods. This knowledge will be a useful sideline from this study.

As with the radio-tracking experiment of 1995/1996, we anticipate that some of the tagged fish will be caught by anglers, not only in the Tongariro but also in Lake Taupo. If you catch one of these fish and decide to release it you can provide us with some valuable information by recording the date, the



Rob Marshall holds a tagged trout prior to release. Note the yellow floy tag near the dorsal fin and the wire aerial protruding from close to the vent.

exact area where it was caught (we won't tell anyone!), the colour of the bead on the flexible wire aerial which pokes out close to the vent of the fish and most importantly the number on the yellow coloured plastic tag. This is a four digit number preceded by the letter "A".

If you decide to keep the fish we would really appreciate having a look at it before you gut it.

Every angler who returns a transmitter or the details of a trout they have released will go into a draw for one of 10 free 2003/04 season fishing licences. At the same time we will provide you with a "history" of the fish as it swam up the river. Good luck.

We will of course keep you updated with the experiment and provide a final report on the results in future issues of *Target Taupo*. If you fish the Tongariro regularly this winter you will likely see our staff tracking the whereabouts of these fish. If you ask nicely they might just tell you where the fish are.

STOP PRESS

At the end of July we decided to delay this project until April 2003. The inclement weather and high lake level make it difficult to be certain of successfully tagging the required number of fish by the end of August. The major cost of the project is the radio tags at $300 each. Rather than tag a large number of fish but not sufficient to complete the project and lose all of these tags we will wait until 2003.

Tauranga Taupo River

By Michel Dedual and Errol Cudby

The December 2001 flood in the Tauranga Taupo River was the largest on record, peaking at 283 cumecs at the Te Kono gauge site. This was only a little short of the estimated 50-year peak of 300 cumecs and caused significant damage as outlined in the March issue of *Target Taupo*.

Following the flood a public meeting in December 2001 agreed to set up a working group with representatives of all stakeholders to examine and select the best option for coping with future floods while protecting the interests of each group. It was agreed that safeguarding lives and properties was the first priority. The Department's interests were represented by Dr Michel Dedual and Errol Cudby.

Consultants Tonkin and Taylor were engaged to scope possible options for consideration by the group. These options were:

1. To do nothing and let the river find its own course.
2. To confine the river within the quarry.
3. To re-divert the river into its old bed.

From a fishery viewpoint the first option is undesirable because there is little to keep the river from continually changing course and flowing through a maze of channels across the quarried floodplain, stranding fish in the dry river bed, providing unsuitable juvenile habitat and creating potential access difficulties.

Confining the river to a channel within the quarry may be viable but this course is about 2km shorter than the old river channel. The reduced length of fishable river decreases angling opportunities, and also increases the energy within the river and hence its propensity to further erode the banks. The new river bed would also lie outside of the 1926 rights of way and so anglers would require the consent of the landowners to access this part of the river.

Re-direction of the river into its former bed would appear the best option: a view shared by the majority of stakeholders. From a fishery perspective it would restore the lost angling opportunities as well as address the issues of fish and angling access. However, it is dependent on being able to divert the river successfully back into its old channel on a permanent basis.

During the past summer the riverbed was cleared of instream debris between the Crescent and the State Highway 1 bridge in order to enhance the channel and remove obstructions to future flood flows. This work would be continued along the dry channel, along with the removal of some of the gravel that has built up in it.

While the channel clean up is not beneficial for trout, anglers will benefit from the added fishing opportunities and the return of their traditional access routes upriver. Trout production in the affected area should return to normal within two to four years providing there is not continual disturbance.

Any additional impacts on the fishery are dependent upon the structures required to return the river to its old course and provide some control over future floods. These are shown on figure 1 and include:

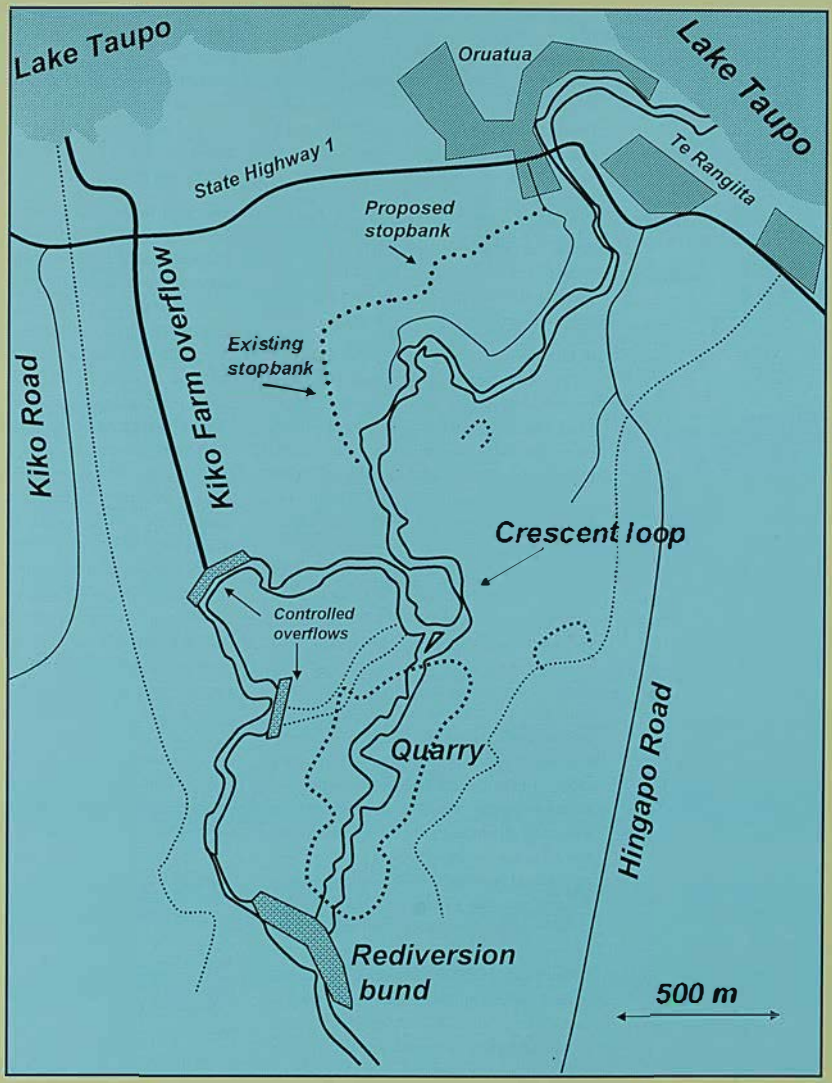
- A 90m long bund across the breakout area with controlled overflow into the quarry
- Controlled overflows on the true right bank from Parkes Reach into the existing secondary flow channel and on the left bank from the vicinity of Maniapoto's Pool into the Kiko culvert
- Upgrading and extending stopbanks
- Improving and maintaining drainage outlets

The last meeting of the working group

favoured a proposal to excavate the existing course through the Kiko culvert to take the bulk of floodwater on a more direct course to the lake. This appears the best option for protecting the residential areas and is also a preferable choice for the fishery as it would lessen the possibility of stranding and speed the return of fish to the lake after spawning. It is however essential with any of the structures that divert water out of the main channel that they are designed in such a way that trout are not stranded as the flows recede.

Once the preferred option is decided, the next steps are for Environment Waikato to produce an environmental assessment and apply for resource consents. Given that there are numerous details which need to be worked through yet to ensure the success of any works, at this stage it appears unlikely that major works will occur before next summer.

A possible option to control flooding in the Waiunga Taupo River



Images of the Taupo Fishery

Keith Draper

By Rob Marshall

Keith Draper was one of the most influential and recognisable characters to be associated with the Taupo fishery. Sadly Keith passed away on 22 February 2000 at age 67 after a long illness, but his presence remains through his books which continue to introduce many New Zealanders to trout fishing.

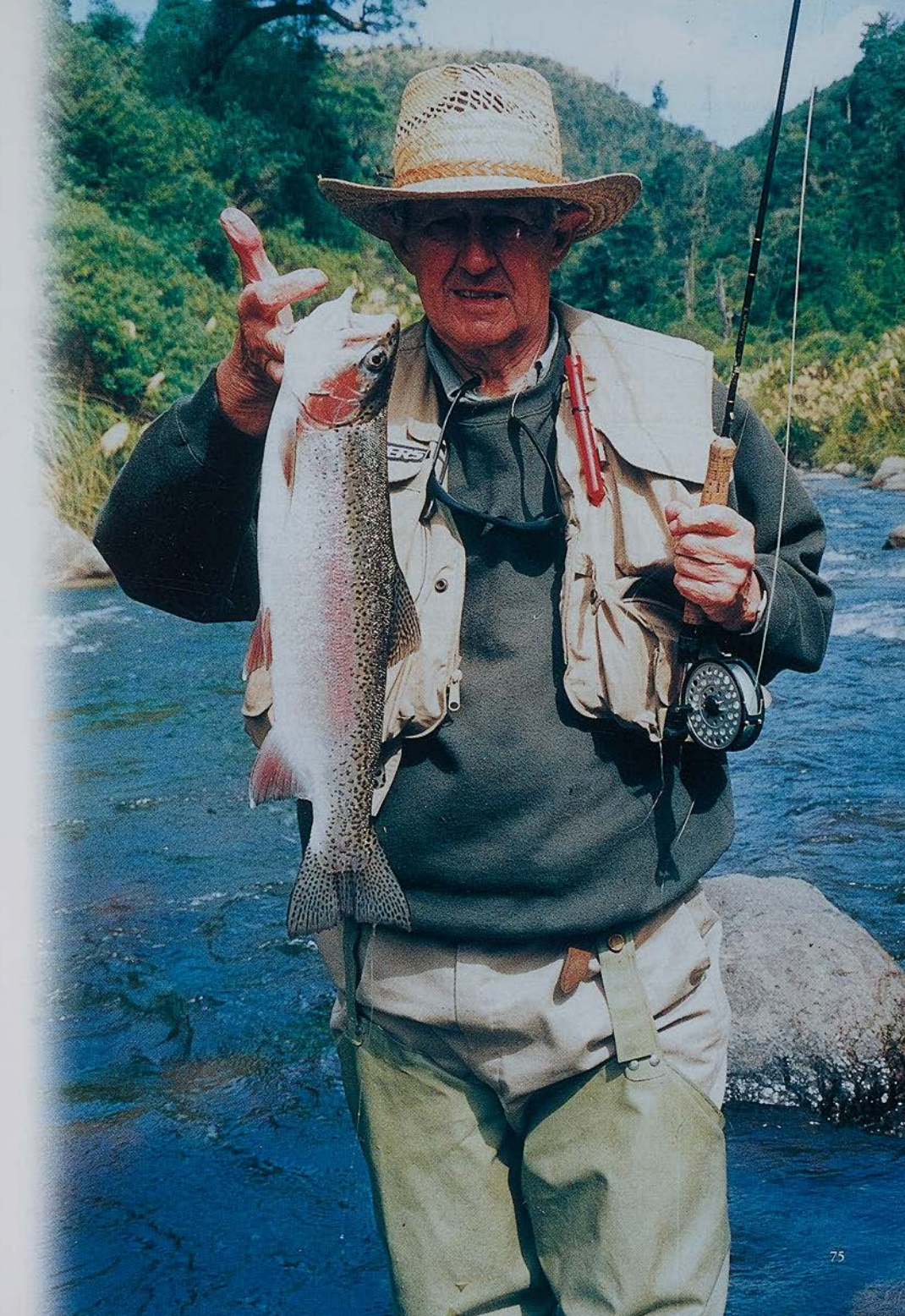
Keith's association with the Taupo fishery stems back to 1958 when he moved here from Hawkes Bay at the age of 26. He enjoyed over 40 years of fishing at Taupo, and worked in the fishing tackle trade for more than 30 years. He was a member of many clubs, associations and management boards and published numerous fishing books. Any one of these things would have made Keith a memorable figure in the Taupo district but the fact that he did all of them reflects his true love of trout fishing and hunting and is testament to his belief that "you only get out what you put in".

Keith was born in Hastings in 1932, and like a lot of young New Zealanders was very keen on fishing from an early age. According to Mark Draper, Keith's son, not many of his immediate family or friends were interested in fishing so Keith was essentially left to his own devices. Teaching himself to fly fish was very much a case of trial and error, as it is for many newcomers to the sport. Mark fondly recalls one story about his father's early fishing days on the Tukituki River in Hawkes Bay, where as a 14-year old starting out in fishing, Keith was happy catching lots of small trout until years later he realised they were actually inanga (adult whitebait). Owing to his somewhat lonely introduction to fly fishing Keith was always a firm believer in hard learnt lessons and Mark, who is now a renowned Bay of Plenty fishing guide, recalls one such lesson his father taught him. "The first fotays I ever had in dry fly fishing were up the Hinemaiaia River. On the first evening, Dad went one way and I went another. There was a great rise where I was, but I only managed to hook a couple of fish. Meeting up with Dad later, he informed me that he had landed seven. He asked me if I'd drifted my dries to which I replied yes. So, he proceeded to tell me the fish were feeding on caddis, which move, hence the loud splashy rises we were getting. "In future", he said, "try to drag the fly past the fish."

"Next time we were up the river for the evening, we both went to our chosen pools and upon meeting up together come night's end, the results were similar, me a couple and heaps for dad. He asked me if I had been dragging my fly, which of course I had after the previous lesson. Well apparently, that was where I went wrong. All the rises were gentle sips that evening, which indicated a mayfly hatch. I should have been drifting my fly. This happened 25 or more years ago. And they are two fishing lessons I have never forgotten."

Soon after Keith arrived in Taupo in 1958 he met Margaret, who later became his wife of 40 years. Together they established a fly tying business called Keith Draper's Fly Shop. In 1973 it was the largest fly tying business in the country. The business employed eight local ladies including Margaret, who under Keith's watchful eye tied hundreds of thousands of flies a year and in the early days struggled to keep up with demand. The flies were sold and distributed across New Zealand and throughout the world. In four months in 1972 Keith sold 48,000 flies in Tasmania and Victoria alone. At the time flies were retailing for anywhere between 25 cents for a small mayfly imitation to 30 cents for a Taupo Tiger as big as your little finger. Along the way Keith invented a unique hook design for nymphs which was sold to Partridge, an English tackle house and hook manufacturer. Keith and Margaret then opened a fishing tackle store in Heuheu Street, called Draper's Tackle House. During this time Keith ran guided fishing trips and a fly fishing school. The shop was sold in 1983 and subsequently moved across the street. Mike Stent, a member of the New Zealand fly fishing team, now owns it, trading as the Fly and Gun Shop. The wholesale side of the business continued trading until it was finally sold in 1994.

The first trout Keith ever caught at Taupo was an impressive eight and a half-pound rainbow. Very surprisingly this was to be the biggest fish he would catch in lake Taupo for the next 30 years. Keith was a very good angler and caught a lot of fish over the years, as attested by Mark who remembers his



father bringing home beautifully conditioned fish caught after dark at local river mouths night after night. "Dad was always something of a pot hunter with his fishing and where sustainable, like Taupo, he felt that trout were there to be eaten. I must admit to eating an awful lot of trout in my younger years. Smoked, fried and, when time allowed, beautifully bottled by Mum."

A true measure of Keith in many people's minds is the contribution he made to the management and protection of the district's fishing and hunting resources. Few people put as much back into their livelihood and their passion as Keith did. For instance, he was a founding member of the Taupo Fly Fishers' Club which over time became the Taupo Fishing Club. Prior to this in 1974, an informal gathering of friends had begun meeting at 5:30 every Friday afternoon for a few beers and a chat at the Lake Hotel (now Cobb and Co). The group was known as the "Anglers Recreational, Social and Educational Union of Practitioners", a name which became much less of a mouthful when reduced to the acronym. Among the group were other well known Taupo anglers including John Parsons, Peter Gould, Gary Kemsley, Mike Fletcher, Bill MacBlayne and OS (Budge) Hintz who all shared a love of trout fishing at Taupo. To the displeasure of some who enjoyed the informality of Friday afternoons in the hotel, the group became a properly constituted club in 1975. Keith was the first President of the new club and served for the mandatory term of two years until 1977. His involvement continued and he was club patron at the time of his death.

Another founding member and very well known Taupo angler and writer, John Parsons, remembers the old days of the club well, when politics was avoided like the plague and fishing dominated conversation. John remembers one of the first times the club was forced into angling politics when in 1985 they disagreed with the fishery managers over the use of globugs. Months of public discussion and debate thrashed out the legalities of the use of a supposed imitation of fish eggs and Keith and John were at the forefront of many of them. Keith's input into his sport didn't end there. He spent time on the national executive of the New Zealand Deerstalkers' Association and was a founding member of the Hastings branch of Deerstalkers. He gave his time as a member of the Kaimanawa and Kaweka Forest Park Advisory Committee. He was an early member of the Federation of Lake Taupo Fishing and Boating Clubs, later to become the

Central North Island Wildlife Conservancy Council and now the Taupo Fishery Advisory Committee, which provided user representation in the management of the fishery in those days. And only a few years ago Keith realised something of a dream and co-founded the Wildfowlers' Association, which still works hard for the interests of game bird hunters in the Taupo region and nationally.

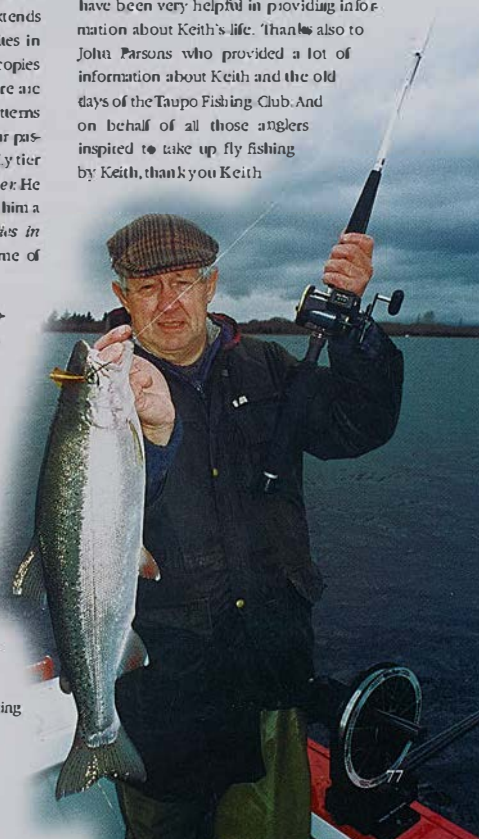
However, perhaps Keith Draper's biggest contribution to his sport was his writing. Over the space of 25 years he wrote and published 10 books, many of which were responsible for capturing the imagination of thousands of Kiwis, encouraging them to try fly fishing. Many keen trout anglers own at least one of Keith's books and credit them with their early interest in the sport. Through his 1985 book *Fly Fishing for Beginners* he taught many of us how to cast, mend, knit line and land fish without ever being there. Thousands of anglers tied their first fly crouched over a copy of the 1973 book *Tie a Fly*, which reputedly sold 20,000 copies worldwide. His 1978 publication of *Angling in New Zealand* remains one of the most useful and comprehensive books on trout fishing in the country; its interest extends around the world with many Internet sites in the United States trading second-hand copies of the book for as much as NZ$88. There are other sites on the internet discussing patterns featured in his books with one particular passage from a keen American angler and fly tier titled *Tying a few flies from downunder*. He thanks a New Zealand friend for sending him a copy of the "wonderful" book *Trout Flies in New Zealand* and goes on to detail some of the patterns in it.

Keith's first book was a collection of stories about a colourful figure who ran a fishing lodge in Waitahanui, Fred Fletcher. Fascinated Keith with his endless story telling and after a while, with Keith's encouragement, Fred put pen to paper and wrote some of them down. Keith took the stories and turned them into a book called *Mr Hundred Percent - Fred Fletcher's Taupo Tales*. Other titles by Keith include *Nymphs for all Seasons*, *Hooked on Fly Tying*, *New Zealand Trout Flies - Traditional and Modern* and *Choose the Right Fly*, some of which were beautifully illustrated by Keith.

Keith obviously had a very good working knowledge of stream entomology, and as Mark puts it, "basically knew what went on in rivers". And although he wrote extensively about fly tying and tied many and varied patterns he was a firm believer in not getting bogged down by the supposed need to perfectly represent a natural. "As long as it looks like what the trout wants, and they eat it, why bother trying to improve it", was a lesson Mark remembers well.

Mark also says, "Dad was always quite outspoken with what he believed and though everybody did not always share his opinions I think they were probably shared by most." The introduction to one of Keith's books published in 1971 highlights this, where he writes about his selection of flies and dressings in *Trout Flies in New Zealand*. "Some people will disagree with a number of the dressings. This will not surprise me as I have disagreed myself. That is how it is. What I have written here is honestly recorded in an attempt to catalogue the history of our country's trout flies and lures, their dressings and their use."

Thanks to Margaret and Mark Draper who have been very helpful in providing information about Keith's life. Thanks also to John Parsons who provided a lot of information about Keith and the old days of the Taupo Fishing Club. And on behalf of all those anglers inspired to take up fly fishing by Keith, thank you Keith.



N.I. Pest Fish Survey Completed

Liz Keys with a koi carp

Over the last year DOC has undertaken a nation wide survey to assess the extent of pest fish distribution throughout New Zealand. The North Island results have been generated by five months of fieldwork, surveying selected sites in each of the eight conservancies.

The primary aim of the survey was to observe and confirm the presence of koi carp, *gambusia*, (mosquito fish), rudd and catfish. Koi and *gambusia* are classified as Unwanted Organisms under the Biosecurity Act 1993 and rudd as a noxious fish under the Freshwater Fisheries Regulations 1983 (excluding the Auckland/Waikato Fish and Game region). Although catfish have no legal status at present, they were also included in the survey.

The four member pest fish team has now hung up its fishing gear for the season. However Liz Keys, the survey co-ordinator, has been busy writing the final report.

We had both good and bad news at Tongariro Taupo. The good news is that no koi carp were detected in any of the waters surveyed and most of our prime water is still free of species classified as Unwanted Organisms. Obviously catfish are our most abundant pest fish, however no new locations were recorded from the survey, which is encouraging. The one bit of bad news is that *gambusia* were found at Rawhiti and Hardcastles lagoons on the Waikato River. This is as high as this species has been recorded on the Waikato river to date. It's not comforting to know these beasties are knocking on the doorstep of Lake Taupo.

The next steps are to undertake surveys at a few other key sites within the Tongariro Taupo Conservancy, increase our public awareness about the issue and develop a pest fish response plan. This will help us in our endeavours to ensure no movement of pest fish occurs between water bodies, but also identify options for control in the future if necessary.

Remember, if you see people releasing fish (but not including anglers putting their catch back) contact your local Fish and Game office or DOC as soon as possible. Take details of the person, vehicle registration, location and what they were doing. Likewise check your boat for weed and fish eggs if you shift to a new lake or river, that way you can minimise any unintentional movement of pest fish between sites.

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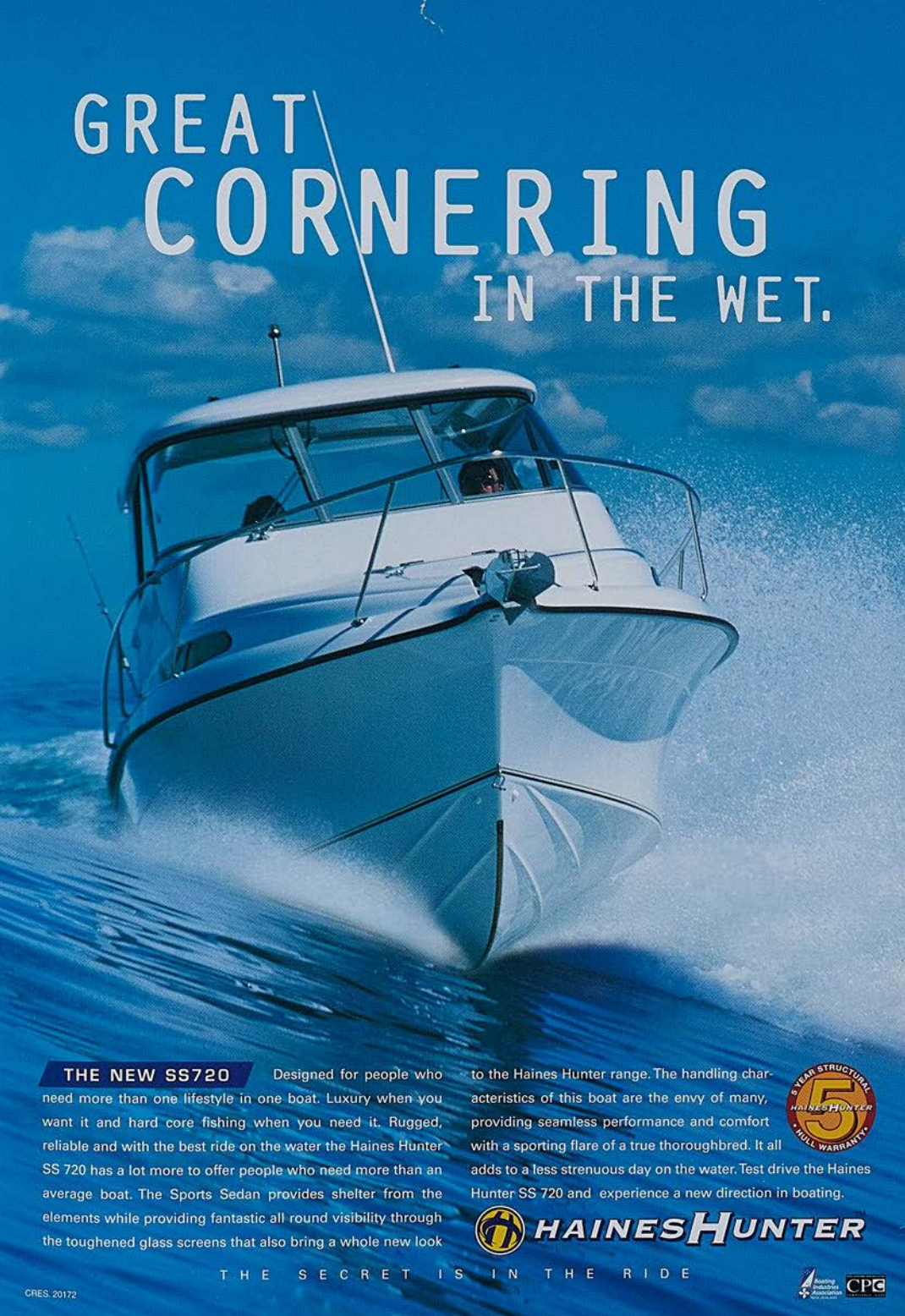

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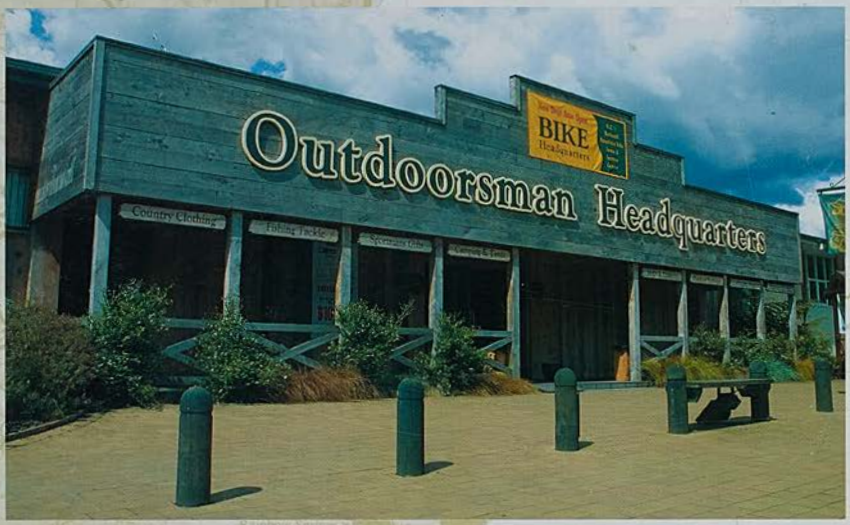

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