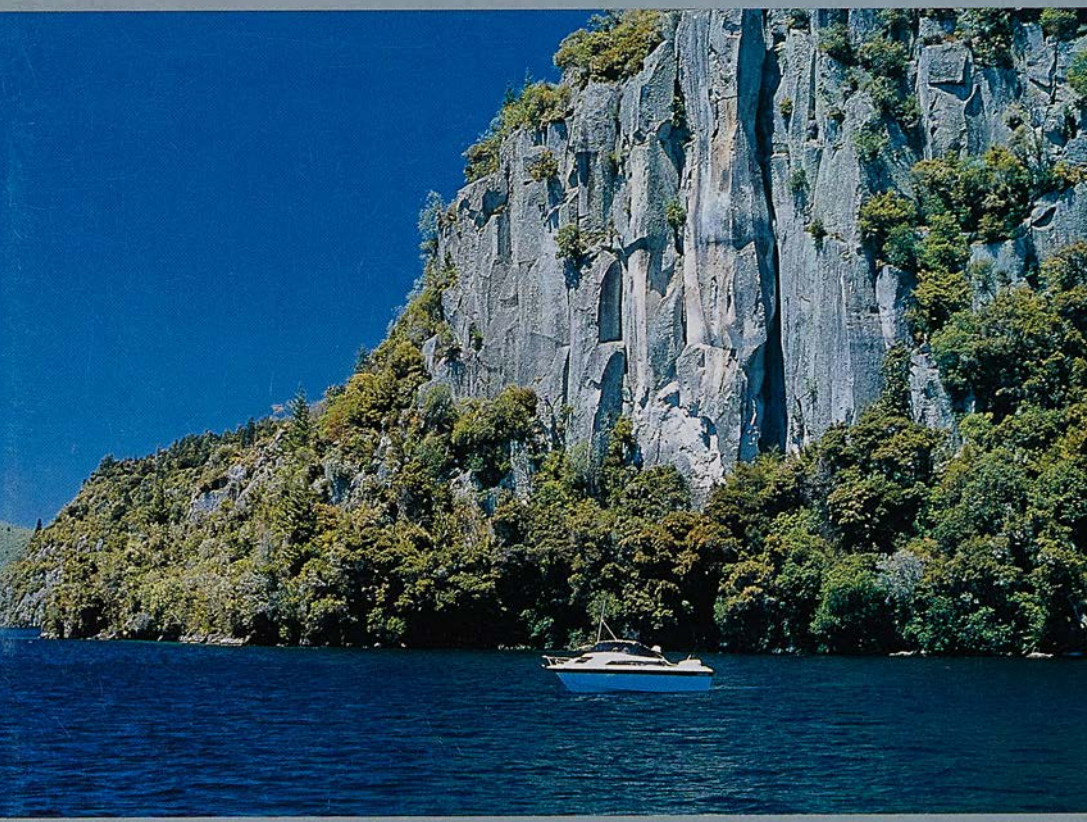
TARGET TAUPO

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

NOVEMBER 2003, ISSUE 44



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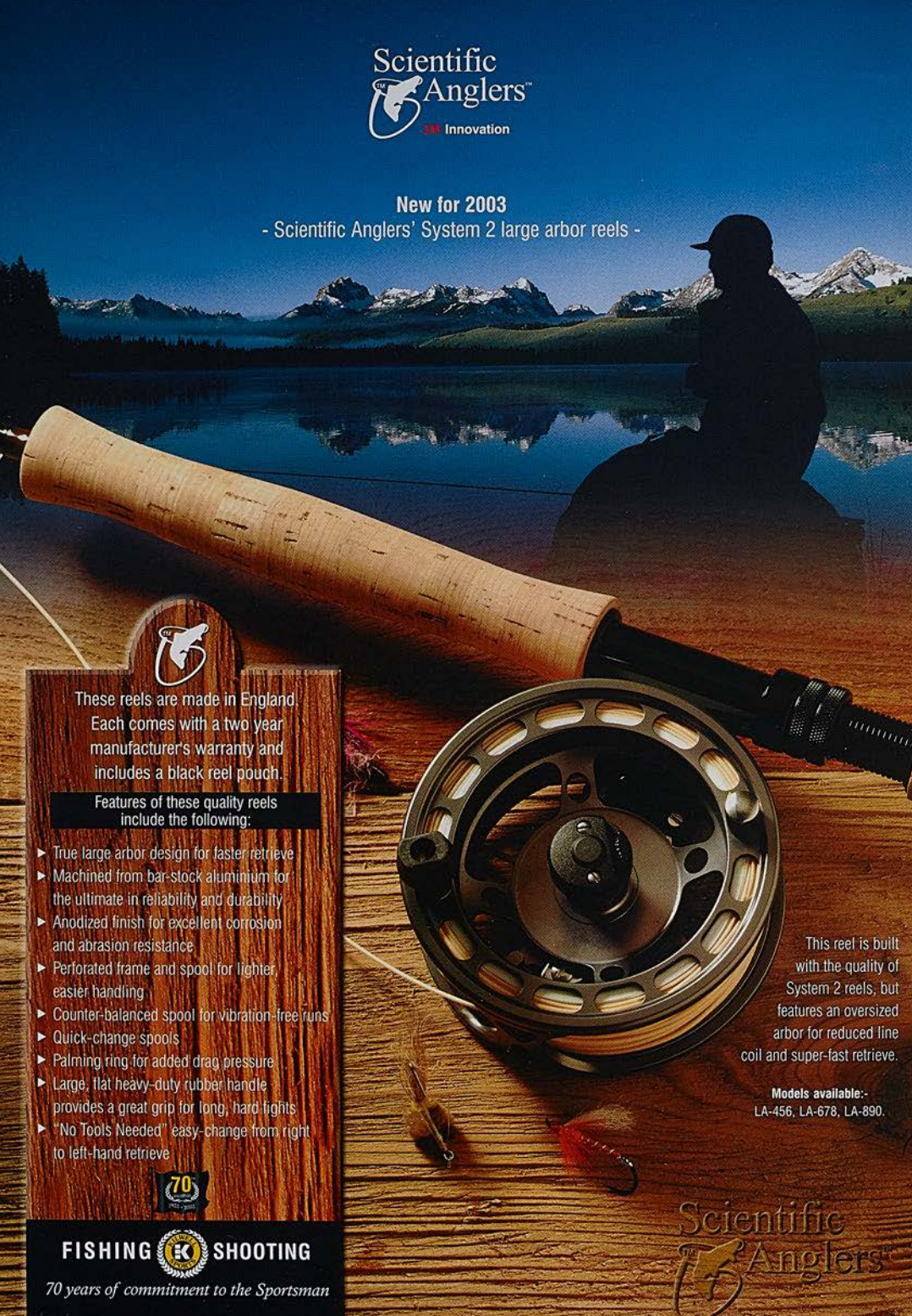
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Front cover: *Trolling beneath the cliffs at Whanganui Bay, Lake Taupo. Photo: Brendon Matthews.*

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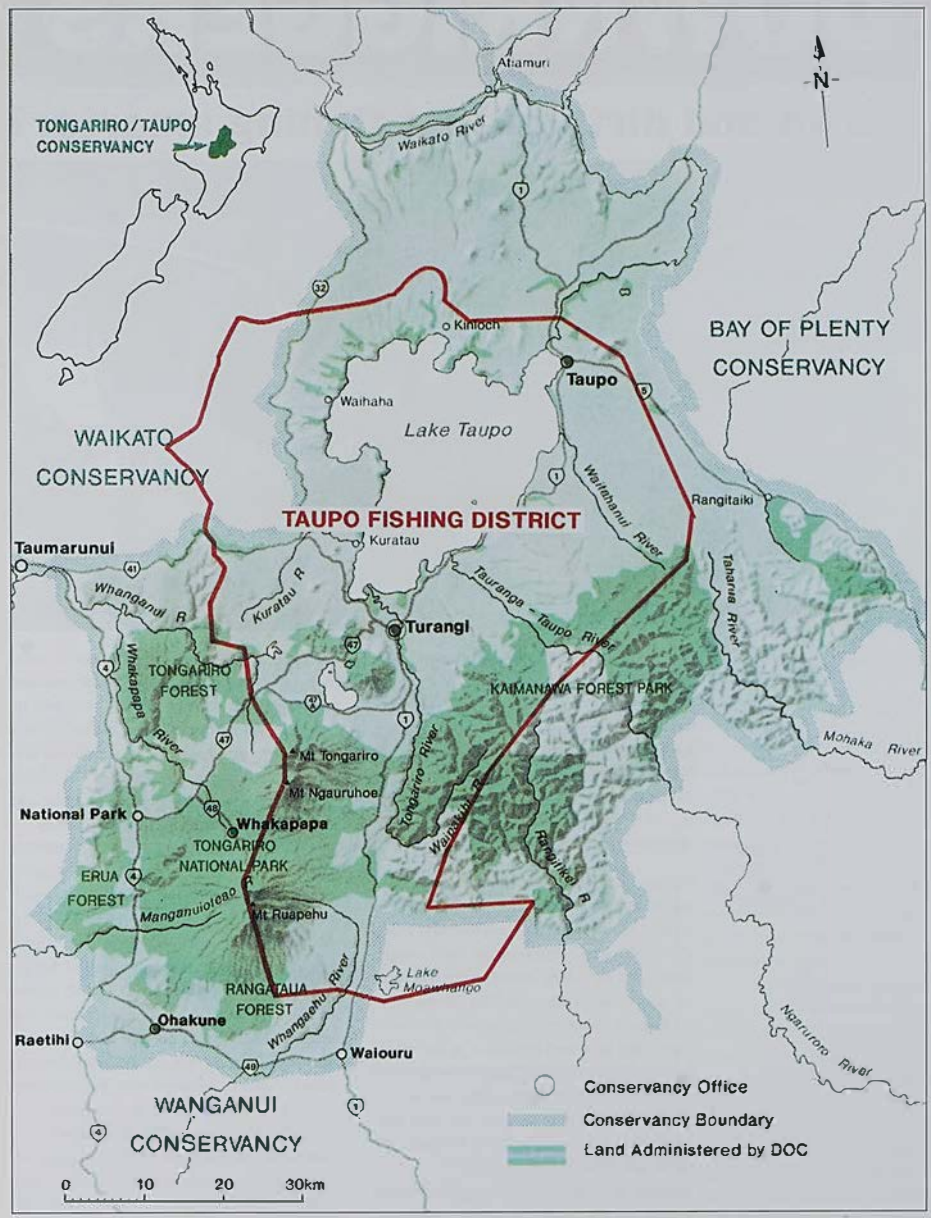


DOWNRIGGERS

- down and dirty or just fishing smarter?

Three typical downriggers. The first two are manually wound and the one on the right is electrically operated off the boat's 12V system

by John Gibbs

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

In July last year (*Target Taupo* issue 40) I wrote about various aspects of the technology of trolling for trout on Lake Taupo. I promised then to continue the series with articles on the specifics of different trolling techniques and in this one we will look at downrigger fishing.

Where it all started

Trolling, or towing a lure from a moving boat, has been part of the Taupo fishing scene as long as trout have been present and that's about 100 years. Much of the early writing focuses on fly fishing in the rivers and there are few accounts about trolling. However, in its various forms trolling is now the most commonly practised technique in the whole fishery. The 1995/1996 Taupo harvest survey showed that 53% of fishing effort and 61% of the harvest was by trolling on the lake, with most of the remainder being fly fishing in the rivers and around the lake shore.

Arguably, trolling is also the method that has undergone the most change over the years. Fly fishing techniques as practised at Taupo have changed little in the last century, apart from advances in the materials used in rods, lines and lures. Fly fishers still wade, cast and retrieve much as they always have and in much the same places. Boat fishing though has undergone a huge evolution from the oar propelled clinker dinghy with a silk or cotton line and large wet fly trailing behind, searching only the top few metres of the lake waters.

Nowadays kayaks, dinghies, runabouts and large launches built from all sorts of once-exotic materials ply the lake. With propulsion ranging from simple paddles to electronically-controlled petrol and diesel engines producing several hundred horse power, distances have shrunk and all points of the lake are within reach of most day anglers. These boats provide platforms that allow anglers the choice of using a wide range of gear to fish anywhere from the very surface down to 30 or 40 metres depth.

One disadvantage of this development is that until recently, an angler wanting to utilise all these opportunities had to have several different sets of gear, each one tailored to a specific depth range. Light harling rigs with limber rods fish the surface

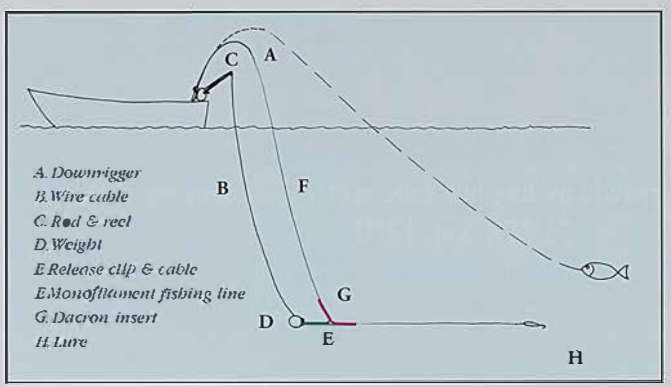


Figure 1: Diagram of a typical downrigger set up. The broken lines show what happens when a trout pulls the line from the release clip

five metres; leadlines and shorter, heavier rods get the lures down to 12-15 metres, and cumbersome wire lines mounted on real stump-pullers probe down to 30-40 metres.

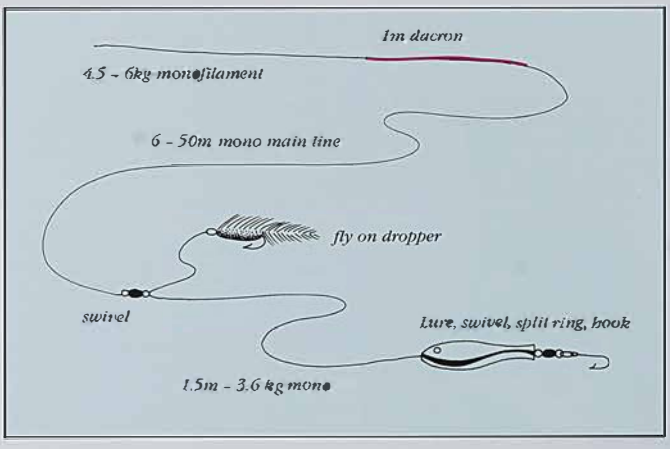
The genesis of a solution emerged on the Great Lakes of the US-Canadian border in the late 1960s. Enterprising anglers, seeking ways to harvest the native lake trout and expanding populations of introduced brown and rainbow trout and chinook salmon, developed a technique using a heavy weight on a separate cable to take a conventional monofilament fishing line and lure into the depths of the lakes.

Controlled depth fishing

The first downriggers have been refined into today's range of models and while they have different design features they all employ the same fundamental principles. Basically a downrigger is a winch mounted to the boat, spooled with a cable suspending a heavy weight with a line release clip attached. The monofilament line and lure from a light fishing rig is clipped into the release and the weight lowered to the desired fishing depth. When a fish strikes the lure the line pulls free from the clip and the fish is played and landed with the conventional gear (figure 1).

Originally (and often still today) downrigging was thought of as a deep trolling technique. However this only recognises one aspect of its abilities. In reality downriggers offer the facility for controlled depth fishing and this can just as readily be close to the lake's surface as down in the depths. They have the added advantage that only a single set of gear (rod, reel and line) is needed to fish all depths and this rig can be as light and fun to use as you wish.

Figure 2: A standard configuration for line, leader and lure



The gear

Downrigger

Downrigger designs are many and varied as the photos show. Almost all have some kind of boom and pulley arrangement to guide cable on and off the storage drum and keep it clear of the boat's gunwales. Drums may be vertically or horizontally aligned, hand-cranked or electrically driven, direct drive or geared. Some have swivelling bases with locking detents and most have some kind of counter to show the length of cable paid out as well as a braking mechanism to arrest the weight when the desired depth has been reached. The size, strength, cable capacity and user features are strongly correlated with price and you can pay anything from $400 for a simple hand-cranked dinghy model to $3000+ for the latest all-electronic, automatic depth compensating, full fruit and berries version. All that I have seen are made in the USA or Canada reflecting the origins of the technique.

Downriggers are best mounted well back on a vessel's gunwales within half a metre of the stern, or across the transom if there is sufficient clearance over outboard motors and

sternlegs. The main thing is to ensure the cable won't foul the boat's sides, duckboards or drive gear when turning. Likewise, it's best to allow at least 1.5m horizontally between downriggers to avoid adjacent cables tangling each other in turns. The longer the downrigger boom the more clearance can be created from obstructions but potentially the greater the difficulty in setting lines if its too far to reach the weight.

Cable

I have heard of home-made downriggers using heavyweight monofilament nylon to suspend the weight but for my money (and peace of mind) I wouldn't go past braided stainless steel cable of 55-68kg breaking strain. It has fine diameter, is reasonably flexible, readily joined and far more reliable than stretchy mono which can literally explode a storage drum if wound on under excessive tension. Always use correctly-sized metal sleeves and proper crimping pliers to connect terminal clips or join cable.

It pays to fit a shock absorbing buffer above the terminal clip to prevent the weight damaging the boom pulley if wound in too far or too fast. If you have an electric downrigger with an automatic shut-off you will need to crimp and/or superglue a small stopper to the cable to activate the switch before the weight hits the pulley.

Weights

Most downrigger weights are made of lead and are usually streamlined to some degree. Others may be steel or cast iron. While lead, especially in large lumps, is largely inert in Lake Taupo's neutral waters, as a matter of principle I prefer to use non-toxic materials if possible. Until recently, cylindrical steel weights were available locally but are apparently no longer made. We tested their performance against spherical lead weights, using depth sounders and underwater video and found no difference in efficiency between the two. So, given the choice, I'd go for steel every time. There's got to be an opening here for an entrepreneur with some basic engineering skills.

Regardless of streamlining, weights must have a stabilising fin or fins to prevent them spinning and twisting the cable while being drawn through the water. The attachment point for the suspension cable is usually on the top of the weight body and the release clip cable can attach to the fin giving better separation of the cable and fishing line.

Commercially produced weights are available from 1.8kg (4lb) to 6.8kg (15lb). Unless you have a very lightly-built downrigger I recommend 4.5kg (10lb) for all uses. There is a point at which increased bulk offsets much of the advantage of greater weight and drag-induced streaming reduces the extra depth attained for a given cable length.

Release clips

The variety of release clips is perhaps even greater than downriggers themselves. They nearly all employ a tensioned jaw principle, usually adjustable. I find simple is best and use one of three types. Two are commercially available and one I make myself with a plastic clothes peg and a rubber band (see photos). American anglers fishing for steelhead and salmon often use a release which relies on the impact of a large fish to break a rubber band attached to the fishing line. This used to be used as an outrigger release when trolling for tuna and marlin before the advent of roller trollers. I've had no luck with these for trout and don't recommend them.

I always attach the release clip to the downrigger weight with a short length (40-60cm) of 18kg (40lb) monofilament. This can be tied on at each end or better still, use snap swivels or small quick-release clips to prevent twisting and make for easy removal and clip replacement. The mono dropper helps maintain separation between the fishing line and the downrigger cable and prevent chafing and tangling of the line.

Stackers, used when fishing more than one rod per downrigger, also have a dropper of the same length with a standard release on

Lead (left) and steel (right) 4.5kg downrigger weights. Note the stabilising fins and attachment points for the cable and release clips. A selection of release clips is shown along the bottom. The black one has spring-loaded jaws, the red one a screw-tensioned clamp and the homemade green plastic clothes peg relies on the rubber band wrapped around the jaws for its tension. A stainless steel longline clip used for a stacker release is also shown on the right

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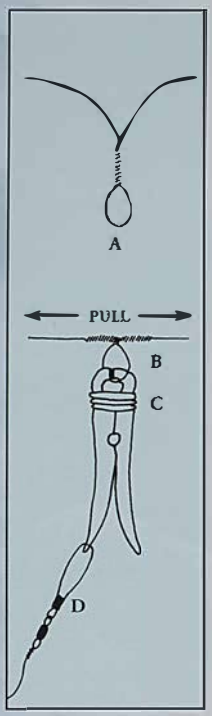


Figure 3: Attaching monofilament line to a clothes peg release. A: line doubled and twisted to form loop, B: loop slipped inside jaws of clothes peg, C: small rubber band wound around jaws to get correct tension, D: snap clip attachment to weight

one end and a long-line clip on the other. The long-line clip is attached to the downrigger cable about 3m above the weight.

Rods

You need longer, softer and more supple rods for downrigger fishing than for any other trolling, except harling. I prefer 1.8-2.2m (6'-7') rods with long grips to hold an overhead reel clear when set in a holder. Plenty of guides are essential to hold the line clear of the rod blank and prevent it chafing when it is set. Some spinning rods are ideal but there are also a number of purpose-built rods available on the local market.

Reels

You can use a spinning reel for downrigging but an overhead free-spool or baitcasting reel is easier to use and avoids line twist. High gearing (4:1-6:1 ratios) is best and level wind mechanisms take a lot of the hassle out of retrieving. Because relatively light and thin mono lines are used reels don't need large spool capacity so they can be quite light and compact. A good clicker is essential to prevent over-runs and bird nests in free spool when letting the downrigger weights down.

Lines and leaders

One of the beauties of downrigger trolling is that relatively light monofilament lines can be used for fishing at all depths. I find that 200-300m of 4.5-5.5kg (10-12lb) breaking strain is plenty for the main line. If necessary use heavier mono or dacron backing to fill the reel spool. The only special feature is a 1m length of dacron backing spliced into the main line anywhere from 6 - 20m from the tip. This is to take the wear and tear of the release clip without sacrificing the integrity of the mono. Leader length isn't critical with mono main lines but I use a leader a little shorter than the rod so the joining swivel doesn't have to be wound into the tip ring when landing fish or hooking the lure onto the reel for storage. The diagram below shows my preferred leader design using 3.6kg (8lb) mono. Use only good quality line and change it regularly as it often gets chafed on the braided downrigger wire. I mostly tie my leaders with a 15-25cm dropper formed from the tag end of the knot at the swivel and use this dropper to attach a harling fly.

Attaching the fishing line to the release clip. Note the black Dacron line tied into the mono filament. Details of the attachment clip, cable crimps and rubber shock absorber for the downrigger weight are also obvious

Lures

Common lures are Cobra/Tasmanian Devil/Kiwi Lure type with the wire removed, threaded onto the leader and held in place with a swivel, split ring and hook. Spoon lures, especially the Toby type, and Flatfish are also effective. I use standard Taupo harling flies on the dropper and these are particularly productive early and late in the day.

The techniques

The photos below and on page 9 show the important parts of setting and fishing with downrigger gear. One of the drawbacks of this technique is that the angler doesn't actually hold the rod until a fish is hooked and thus misses the thrill of the strike. However, it does make it a more accessible and practical fishing method for the very young, the elderly or perhaps the disabled who may have trouble holding a rod for hours on end.

Setting the gear

First, lock the downrigger boom pointing somewhere from directly behind to 90 degrees outboard of the boat where the weight has a clear fall into the water. I prefer the boom about 45 degrees outboard but the best direction depends on the layout of your boat.

With the boat in gear, first run line off the reel until the dacron insert is about a metre outside the rod tip and put the rod into a holder. Leave the reel out of gear but engage the clicker, then slip the dacron insert into the release clip. I used to have at least 20-30m of line behind the boat before setting it in the clip, but in recent times have reduced this to about 6m for deep trolling and find it just as effective and it allows sharper turns without crossing lines. When shallow trolling (depth less than 5m) I still let out about 30-50m of line first. If you use a clip with a spring-loaded

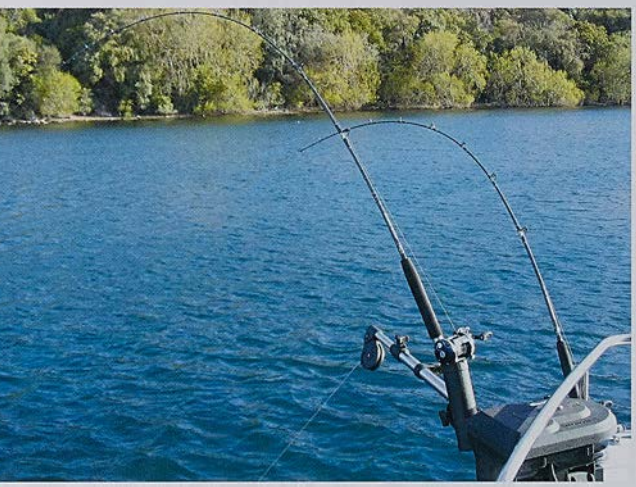
The first rod has been set and the weight lowered 3m into the water before the stacker clip is attached to the downrigger cable for the second rod

mechanism the amount of tension on the line is determined by how far back you set the line into its jaws. Jaw tension on the spring-less plastic clips and the spring loaded ball bearing type releases is adjusted with a screw.

The clothes peg release is a bit different as it doesn't rely on grasping the line in the jaws, but rather doubling the line, twisting it letting it spring back on itself so the loop doesn't untangle, then slipping the loop freely into the gap behind the peg jaws. The light rubber band around the peg provides the release tension and allows the line to slip out of the jaws when a fish strikes. It is important with both types of release that the line is held firmly enough to prevent water drag pulling it through the jaws so that the lure ends up hard against the clip.

Once the line is set properly in the clip, check the reel is still in free-spool but with the clicker engaged so it won't over-run and ease off the downrigger brake so the weight descends steadily and smoothly pulling the fishing line with it. Once the cable counter shows you have reached the desired depth engage the downrigger brake and the reel clutch so both stop running out. Be careful not to release the weight too suddenly or lower it too quickly or you will pull the line out of the clip.

Two rods set on one downrigger and nicely tensioned in their holders



Now the important part. You need to make sure you have a direct connection from the rod tip to the release clip by taking the belly out of the line. This also tensions the rod into a downward curve so you can see a strike and to help set the hook. Set the reel drag to the desired tension (I prefer it so a moderate effort is required to pull line off the spool), and wind slack line onto the reel until the clutch slips and the top third or more of the rod shows a pronounced curve, as in the photo. Once you've done this wait a few moments for the gear to settle then wind the reel handle quietly to get the final adjustment. Tensioning the gear against the weight like this is the reason it is not practical to hand-hold a downrigger rod and rodholders must be used. Keep the boat on a straight track during the whole setting process to avoid lines crossing and tangling before they are down.

A handy thing about this method is that you can fish two rods from each downrigger by using a stacker clip. This is a standard stainless steel clip normally used to fasten snoods to a long-line when fishing for snapper off the beach, but with a 60-80cm dropper and downrigger release clip attached. First, set one line into the release clip as already described and lower it 3m into the water. Now run a second fishing line out, attach the long-line clip to the cable and its release clip to the dacron insert and lower the whole rig to the desired fishing depth.

It's important to remember that the downrigger weight, cable and the attached fishing gear all create drag when moving through the water and this causes them to lie back at an angle from the vertical. This degree of drop back, or streaming, is a function of the weight and volume of the gear and the speed of the boat and may be as much as 45 degrees. So if you have 30m of cable out your lure is probably only fishing at about 20-25m depth. I have produced a graph which shows this variance for one particular set of gear in a particular boat at a given speed which will provide some guidance. The best way to test your own gear is to find a site with a gentle to moderate-sloping clean sand bottom and tow your gear at normal trolling speed up the slope until you see the rod tip and/or downrigger boom bobbing as the weight drags over the bottom. Note the cable length from the counter and the depth of water from your sounder and repeat the process with different cable lengths until you have a good idea of the relationship between the three factors (cable length, depth

The result - Glenn Muckean nets a fine Taupo rainbow caught by Petrina Francis using a downrigger.

and speed). Don't assume a directly linear relationship, as the degree of drop-back seems to increase the greater the length of cable used.

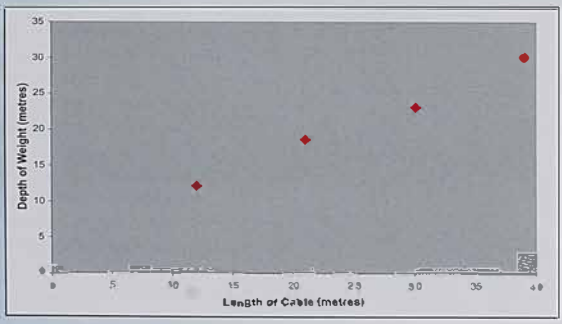
Fishing

Boat speed determines the action imparted by the fishing lure. As I discussed in the earlier article, too fast or too slow and the lure loses the erratic wobbling action that is most attractive to trout. For deep trolling I use a boat speed of 1.5-2 knots and this is best measured with a GPS.

If there is one essential item of equipment to be used in conjunction with downriggers it is an echosounder to accurately report the water depth under the boat. As with most trout trolling techniques, the closer your lure is to the bottom the greater are your chances of catching fish. That means the greater are your chances of getting hooked up on the bottom or worse, snagging the downrigger weight and breaking the cable. I prefer to use a wide beam sounder (20-45 degrees) with the transducer as far aft as possible, ideally on the transom. With this setup you can actually track your downrigger weight on the sounder screen at moderate fishing depths and know just where it is in relation to the bottom.

If you have used the more conventional trolling techniques, especially lead and wire lines, you will be used to turning your boat out to avoid shallow water when the sounder shows a change in depth. This is usually a fairly relaxed process as your lure is streaming out 100-200m behind allowing plenty of time to head into deeper water before risking a hook-up. Downriggers are a different story as the line is down at fishing depth almost immediately under the boat and you have much less time to make depth corrections. This is also an issue to bear in mind when crossing behind other boats as your downrigger cable will pick up ordinary trolling lines if you are too close.

Downrigger weights will get wedged if they are dragged over rocky uneven bottom. To minimise the damage don't set the brake so tight that it won't pay out cable if the weight does catch. If you do get snagged on the bottom, stop the boat immediately, and if necessary, back up to ease the strain on the cable. Release the fishing gear from the clips and wind it in. Once the rods are stowed and after making sure your downrigger and its base are firmly fixed to the boat, back the boat up and try and free the weight by pulling it out from the direction it became stuck. If this doesn't work you are left with little option but to cut or break off the cable. Fortunately the bottom over large areas of Lake Taupo is sandy, but any time you're trolling close to rocky cliffs it pays to take extra care.



The graph shows a typical relationship for the depth of a 4.5kg downrigger weight with different lengths of cable deployed at a trolling speed of 1.5 knots.

When a fish strikes

With the gear properly set and a nice bow in the rod you will readily spot when a fish strikes. As the line is pulled from the release the rod tip will spring up and then usually pulse with the movement of the fish. Stop the boat, grab the rod from the holder and play the fish in the normal way. Usually trout come to the surface quite quickly and this gives your crew time to release and wind in the other rods and wind up the downriggers. It is risky leaving the unoccupied lines in their clips when the boat is stopped as the lures (and possibly the weights) will settle to the bottom and catch up and you risk losing valuable gear. The best way to clear a rod from the release clip is to tighten the drag and tightly wind up all the slack line between the rod tip and the clip. It helps to point the rod tip down towards the weight.

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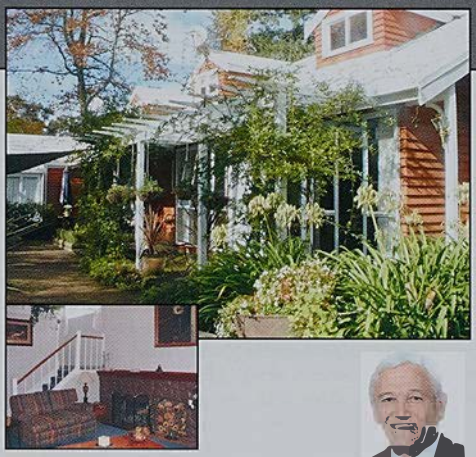

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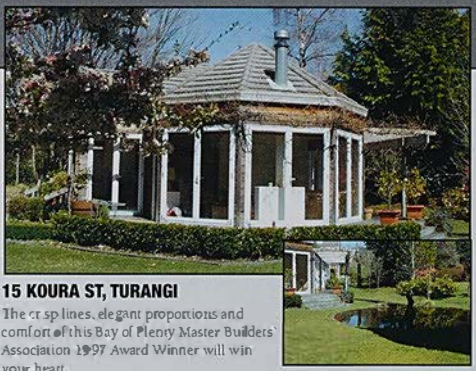

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while doing this. Then put your thumb on the reel spool to stop it unwinding and give the rod a sharp upwards or sideways jerk being careful not to strike any overhead obstructions such as canopy frames and rod racks. If the clip tension is set properly the line will pop out of the release and you can retrieve the lure. If you're using two rods in a stacker set up, retrieve the upper line first. Once the lines are cleared you can wind up the downrigger weights. But, you ask: "What if I'm fishing on my own, wouldn't it be a bit like the one armed paperhanger?" Well actually it's not nearly as difficult as it may seem to alternate between winding in the fish and winding up the downrigger weight. What I often do in these circumstances is just to wind up the weight enough so it is well clear of the bottom and leave it hanging there and concentrate on playing the fish. A bit of judicious side strain with the rod will keep the fish clear and prevent it from fouling the line on the cable once it gets close to the boat. Of course if you're fortunate enough to be using an electric downrigger you just flick a switch and it winds itself up.

One other thing to be aware of is hitch-hikers. Small fish may become hooked but not release the line from the clip. This can happen even with larger legal-size trout if the clip tension is set too hard. The only sign of this is a vague, arhythmic pulsing of the rod tip but this is only visible if the line between the reel and release clip is properly tensioned. So keep a sharp eye on the rods to avoid unnecessarily stressing or even killing a small fish.

The rules

The use of downriggers on Lake Taupo has only been legal since 1997. This followed extensive testing by fishery staff from 1985, a three-year trial period and detailed research of the survival of trout caught and released by different trolling methods. There are a

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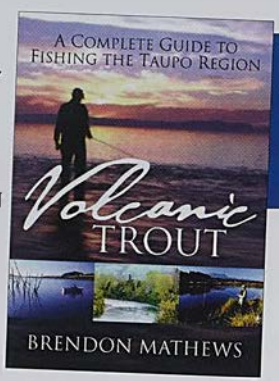
Volcanic TROUT

A COMPLETE GUIDE TO FISHING THE TAUPO REGION

by Brendon Mathews



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number of restrictions on downrigger fishing designed to ensure they don't threaten the sustainability of the fishery.

Firstly, you may only have a maximum of 40m of cable on your downrigger drum. This is to ensure that downriggers don't allow exploitation of greater depths than other deep trolling methods and provides a measure of sanctuary for trout in the deeper waters.

Secondly, no weight may be added to fishing lines when used with downriggers, so you can't use lead, wire or similar lines with them. This is consistent with the first control.

The use of downriggers requires the use of rodholders. Unless all people on board are licensed, rodholders can only be used if all those fishing are in physical contact with their rods. The skipper or person in charge of the vessel is legally liable for ensuring that this requirement is met. This ensures that the people actually fishing are identifiable and reduces the opportunity for unlicensed anglers to fish.

An unusual catch trolling deep with a downrigger - Melanie Gibbs landed this 3kg brown trout off Waitahanui

And are they effective?

When downriggers were first trialled in Lake Taupo in 1994 some anglers were concerned that they would be so efficient that they would lead to over-harvest and fishery collapse. Others expressed the view that excessive morrality of released trout would occur as a result of being brought up from the depths too quickly.

We have done much research and monitoring on both these issues and even before the first trial was approved we had established that the survival of trout caught and released with downriggers was very similar to that for wire lines fished at a similar depth (downriggers 85%, wire lines 88%).

Monitoring of catch rates has been carried our every year and the results from last summer (2002/2003) are fairly typical. This shows downriggers caught 0.40 fish per hour of effort, wire lines 0.38, lead lines 0.18 and harling caught 0.36 fish per hour. So yes, downriggers are a little more effective than other trolling techniques, but not markedly so. Last summer's survey showed 31% of anglers interviewed were harling, 48% used lead lines, 7% were wire lining and 15% used downriggers. Certainly, sustainability is not an issue in the presence of a low daily bag limit and good survival of released trout.

Just remember the key steps in ensuring released trout have the greatest chance of survival:

- Use a knotless mesh landing net
- Don't remove the fish from the water if possible
- If you must boat the fish, don't let it thrash about on the deck
- Hold the fish upside down with bare hands to calm it and avoid touching the gills
- Use long nose pliers to quickly remove the hook
- Return the fish gently to the water – don't throw it

There's little doubt that downriggers provide a valued addition to Taupo anglers' choices. For those that choose to use them they offer a relaxing and enjoyable trout fishing experience.

Winter fishing mirrors 2002

by Glenn Maclean. Glenn is the Programme Manager for the research and monitoring programme in the Area

Last winter the fishing peaked much later than normal with the majority of fish running from September through to November. This winter is shaping up to follow exactly the same pattern.

Graph 1 shows the monthly run of rainbow trout through the Waipa trap (on a tributary of the Tongariro River) over the last two years. Note that the 2003 data is not adjusted to account for fish which bypassed the trap during floods, though this is only a significant issue in early September. Similarly the September 2003 total is only for the first 17 days of the month.

The pattern is very similar, no doubt in part to the very dry July and August periods which occurred in both years.

Whereas the rainbow run is spread out over a number of months as is typical at Taupo, graph 2 indicates that the brown trout run is much more defined, peaking in June. However despite this narrow spawning peak these fish are available to anglers over many months as they first appear in the lower river in December and January, progressively moving upstream to finally reach the Waipa Stream in June.

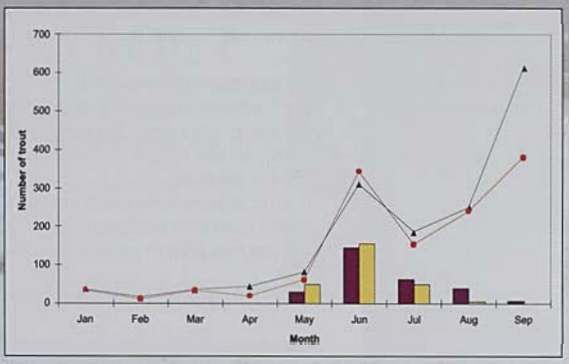
The significant increase in rainbow trout numbers in September is consistent with our foot and dive counts of fish in selected stretches of the other major eastern tributaries.

Despite the similar pattern of the spawning run over the last two years, anglers have generally experienced more success this year. Table 1 shows that catch rates have been consistently higher this winter.

An overall catch rate estimate this winter of 0.29 fish per hour (1 fish every 3.4 hours) is high by Tongariro standards and reflects that it has been a good winter for anglers, especially those who made the most of the fishing in early September. It has also been a good season on the Hinemaiaia (0.29 fish per hour) and Tauranga-Taupo rivers (0.31 fish per hour). As this article was written in late September the Tauranga-Taupo continued to fish very well and all the indications are that anglers can expect some very good fishing to continue through October and November, as occurred last year.

Some anglers have commented that the fish are smaller this year and graph 3 indicates that they were indeed slightly smaller than in 1998, 2000 and 2001. However the size of the fish this year is consistent with the norm

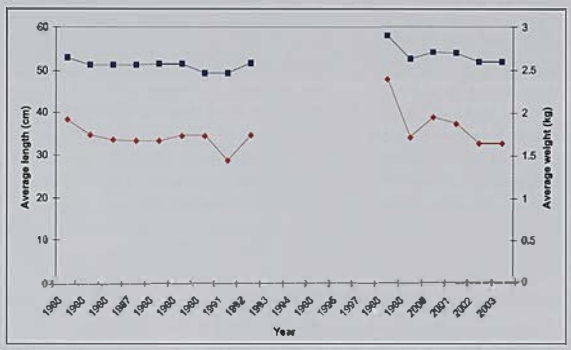
Graph 1: Rainbow trout run through the Waipa trap by month, 2002 - 2003



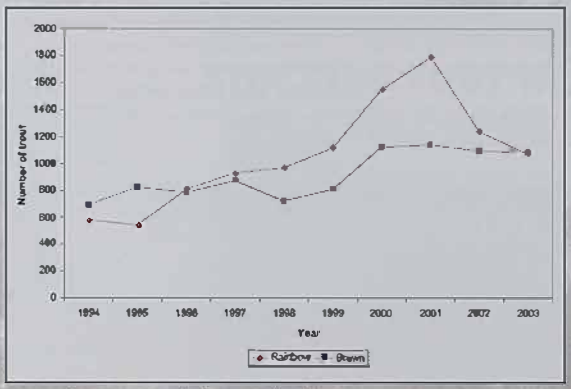
Graph 2: Breakdown of the 2003 monthly spawning run through the Waipa trap by species and sex

Year	April	May	June	July	August	September
2002	0.14	0.20	0.29	0.21	0.22	0.29
2003	0.19	0.24	0.27	0.27	0.30	0.47

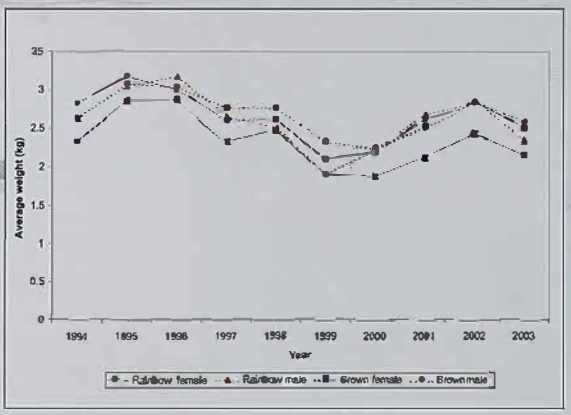
Table 1: Monthly catch rate estimates (fish caught per hour - per angler) for the Tongariro River 2002 and 2003



Graph 3:The average length (cm) and weight (kg) of rainbow trout trapped in the Waihnkahnka Stream 1984 to 1992 and Waipa Stream 1998to 2003



Graph 1: The total spawning run by species through the Te Whaiau trap 1994 to 2003



Graph 2: Average weight by species and sex of trout through the Te Whaiau trap 1994 to 2003

for the fishery over the last 40 years or more.

Out on the lake a large number of young fish are showing up in anglers' catches but we won't know just how strong the population is until we complete the acoustic survey in November. However, given the excellent rearing conditions which occurred over the last two summers in the rivers, we expect good fishing on the lake over the next few months. Many years ago when our knowledge and monitoring was much less developed, former Conservator of Wildlife, the late Pat Burstall, would make his predictions on the coming summer's fishing on the basis of the condition of the maiden fish he caught in spring. He had an uncanny feel for what was happening. On this basis Pat would be predicting good fishing this summer. Let's hope it still holds.

Otamangakau spawning run summary

This winter we completed the tenth consecutive trapping season on the Te Whaiau and Papakai streams. These streams which run into Lake Te Whaiau are the only significant spawning tributaries of lake Otamangakau. The traps operated smoothly from 1 April to 2 September due to the low rainfall through this period. The Te Whaiau trap was only overtopped on two occasions compared to 10 to 15 times during a wet winter. As a consequence more than 95% of fish running the stream were captured and weighed and measured.

The rainbow run this winter was estimated to be 1079 trout and the brown run to be 1085 fish. The rainbow run is slightly down on 2002 when 1242 rainbows used the river but the brown run is almost identical.

Graph 1 highlights that the rainbow run this winter is down on recent years but still considerably larger than in the mid 1990s. On the other hand the brown run is as large as at any time since trapping began in 1994.

The average size of the fish has also declined slightly compared to last winter (graph 2). Only one brown trout and two rainbows in excess of 4.54kg (10 lb) were recorded though there were 62 rainbows and 18 browns which exceeded 3.6kg (8 lb) in weight.

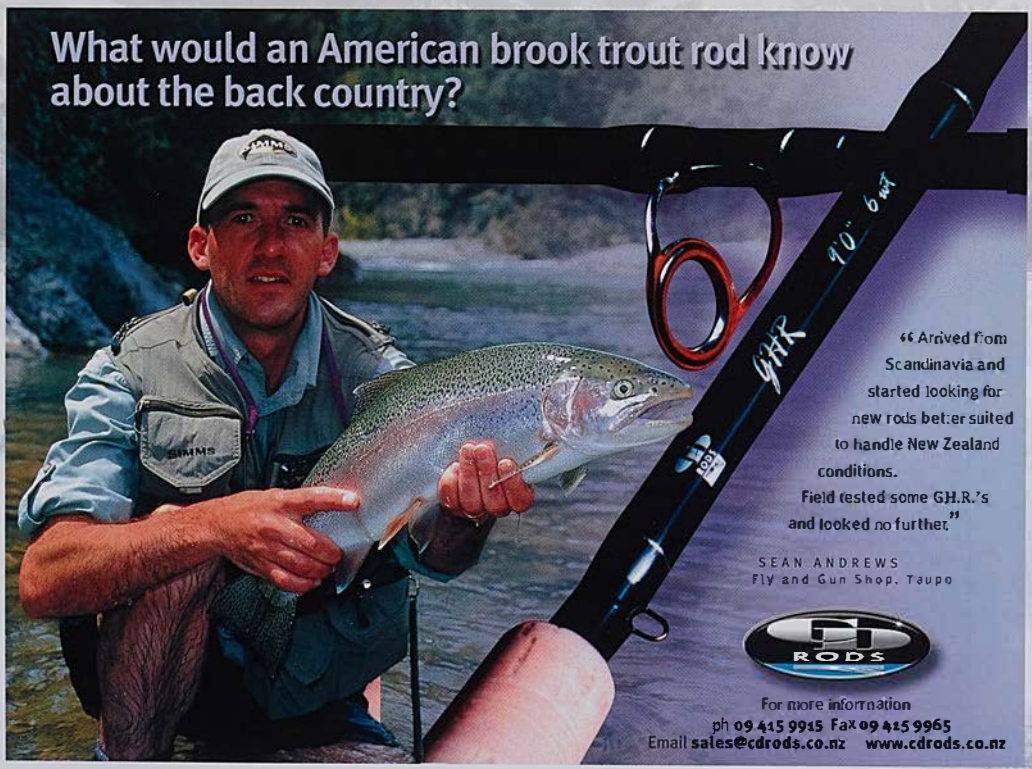
This pattern of a large number of big fish but few in excess of the magical ten pound mark, is consistent with recent years. Typically lake Otamangakau trout reach large size not by growing rapidly but by living to an old age

and continuing to grow after each spawning. A high proportion of older fish is again evident in the run this winter. Just under 15% of rainbow trout and 27% of brown trout spawned for at least the third time. In fact one brown female was spawning for the sixth time and another for the seventh time. This continued presence of older fish in the population suggests that the lack of trophy fish is due to slower growth rather than a lack of fish surviving long enough to grow to trophy size. However good numbers of very well conditioned fish just under trophy size suggest that reduction in growth compared to the heyday for trophy fish in the mid-1990s is principally amongst the older trout. Whether this reflects changes in the lake ecology or is a consequence of competition from the much larger number of trout present in recent years is unclear at this stage. Both theories are quite plausible.

Seasonal weather patterns will clearly affect small shallow lakes like Otamangakau and we are all aware of how atypical the weather has been over recent years. Similarly, we had previously assumed that because the cicada hatch was so short in duration that this was not particularly important to the fishery. However, it may be no coincidence that the last peak in trophy fish numbers in the mid-1990s was also the last time large numbers of cicadas were consistently blown onto the lake. Perhaps this flush of large, easy to catch food is the catalyst for older fish to grow just that bit more?

If growth is inversely related to fish numbers then we should expect to see increased numbers of trophy fish over the next season or two in response to the downward trend in the current population size. Results over this period may well clarify what constrains trophy trout production. There is probably not a lot we can do about the climate but there are options to address some of the other potential factors.

Nevertheless the fishery is still in a pretty healthy state, and an average rainbow trout size of 2.5kg (5.5 lb) reflects just how good it still is.



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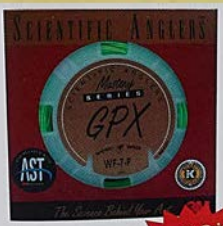

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Tongariro River radio tagging update

by Mark Venman and Rob Hood

Mark Venman is our Technical Support Officer and Rob Hood is a Ranger involved with field operations

We are currently undertaking a major experiment to estimate the size of the Tongariro River trout run which involves following the progress of radio tagged trout as they migrate upstream to spawn (see *Target Taupo* issue 43). This experiment is split into two stages, the first stage involved tagging 69 rainbow trout at the Tongariro Delta, the second stage tagging a further 31 rainbows upstream of the Whitikau Stream confluence at the Fence Pool. By following these fish we should gain an accurate estimation of the proportion of Tongariro trout that use the Waipa Stream (which we trap) to spawn. Only two tagged trout have passed through the Waipa trap since the tagging programme began in April although we suspect that approximately half of those fish tagged at the Fence Pool will end up in the Waipa Stream later this year. The first fish took just 16 days to go from the Delta to the Waipa trap, a distance of approximately 23 kilometres. Many of the others have not moved so quickly, though the results from the tracking will also provide useful information on trout movement, timing of the runs, preferred spawning sites and how fast trout move through the river amongst other things.

In all 62 of the trout (90%) tagged at the Tongariro Delta have been successfully tracked. The results show that rainbow trout continued to move through the Tongariro River even when it was low and clear as a consequence of August 2003 being the driest August in Turangi since records began. The data indicated that the trout moved several kilometres every few days until they reached their spawning location.

Several of the fish tagged at the end of April have already travelled up the river, spawned

Michel Dedual inserts a radio tag in a trout at the fence pool assisted by Mark Venman (left)

and returned back to Lake Taupo. One male rainbow trout took approximately 20 days to find a suitable spawning site after being tagged and remained at this site for 41 days where it most probably spawned. This fish then travelled downstream in just four days and is now back in the lake, a combined total time of 65 days. Similarly, one rainbow female took 27 days to find a suitable spawning site and remained there for 28 days. This fish then took 20 days to return slowly back to the lake. In total, it took 75 days for her to complete the spawning run. Thus the results already indicate that some fish have taken more than two months to complete their spawning runs, which is contrary to the belief of many anglers that rainbow trout travel upstream, spawn and return to the lake in a matter of days or weeks.

While most fish tagged at the Delta subsequently run into the Tongariro, a handful of fish never showed up, so during the middle of August we used a light plane fitted with tracking aerials to try and locate these strays. One female rainbow was found in the upper section of the Tauranga-Taupo River while another rainbow male was located in the upper reaches of the Kuratau River and yet another fish was in the Tokaanu Stream. Several others were found in the lower Tongariro River and had yet to reach Delatour's Pool, the lowermost part of the river that is routinely tracked.

So far 16% of tagged fish have been caught by anglers and we have also had a couple of reports of anglers catching and releasing tagged trout. One tagged trout was even caught by Geoff Thomas while fishing in the Silly Pool during August and was featured on his television show during September. All of these fish were either caught between the Swirl Pool and the Bridge Pool or between the Stag Pool and the Duchess Pool. All of the tagged fish caught so far by anglers have been in reasonable condition despite the surgical tag implants. DOC would like to thank all the anglers who returned radio tags and they will go into the draw for one of ten 2004/2005 free Adult Season fishing licences. A brief history of the fish since it was tagged will also be provided.

This project will be completed later this year and a more comprehensive summary of the results and the implications of these for anglers will be presented in the March 2004 issue of *Target Taupo*.

Finally, would the person who has a tag in Kinloch Village, please return it along with details of when and where the fish was caught, so you can go in the draw for a free licence.

Tongariro River rescue

by Petrina Francis

Petrina is Programme Manager; Community Relations for the Taupo Fishery Area

It was a cold Wednesday in late July when Peter Grange, a visitor to the Turangi area, decided to try his luck fishing the Tongariro River. Around midday, Peter was fly-fishing just above the Silly Pool, when he decided to wade deeper into the river than usual. Suddenly, he lost his footing and was swept into the current and downstream through the rapids. At some point, he bumped his head on a rock and started to lose consciousness. This, combined with the icy cold temperatures and his waders filling with water, meant that Peter was in grave danger of losing his life.

Roy Baker, a ranger with the fishery team, was at the Tongariro National Trout Centre at this time. While walking alongside the river he noticed some anglers pointing upstream and saw Peter rolling and tumbling through a pool. Roy called on the radio for assistance and without hesitating, waded into the river, boots and all, to rescue him. Rob Hood, another fishery ranger had heard the radio call and organised an ambulance. He then came to the river to assist and the two men pulled Peter over to the side of the river bank. Completely exhausted and extremely cold, Peter initially didn't respond. However, after about 30 seconds, he regained consciousness and by the time the ambulance arrived and checked his medical condition he had improved and was able to sit up and talk. It is estimated that he was swept approximately half a kilometre downstream through the swift current.

This incident highlights the very real situation anglers put themselves in, when wading into the lake, rivers or streams. The strong current of our major rivers should never be underestimated.

Our fishery team recently underwent training on the effectiveness of wearing a wading belt, highlighted in the "Wading Safely" article in the last issue of *Target Taupo*. At the time of the incident, Peter Grange was not wearing a wading belt. The fact, is that if he had, he may have been able to save himself before the situation was out of his control. Wading belts are usually made of polyester webbing with a quick release dive belt buckle and are worn tightly around the angler's midriff or chest. They work very effectively by stopping water from entering the waders and trapping a pocket of air around the angler's legs. The buoyancy this creates enables the angler to roll over onto their back and float downstream feet first, so that it is their feet and not their head, which hits any rocks. Furthermore the angler can use their arms in a sculling motion to propel themselves towards the edge. (*Target Taupo*, issue 43 page 16).

The quick actions of Roy Baker saved Peter's life. "I'm so pleased it turned out happily," says Roy. "I just reacted the way anyone would."

Even though wading rivers and river mouths can be potentially hazardous, knowing and applying the basic skills of wading safely, and wearing a wading belt, will help you keep safe while fishing this summer.

Roy Baker; ranger with the fishery team, who rescued Peter Grange from the Tongariro River earlier this year

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Angler numbers on Taupo rivers

by Glenn Maclean

Every year, particularly while undertaking creel surveys on the Tongariro River, we hear comments that there are more anglers on the river now than in past years. But is this really the case? To some degree yes, but perhaps not as much as many anglers might perceive.

Anglers can be readily counted from a small plane

A major difficulty is that it there is very little data before 1990 on angler numbers. There are certainly numerous anecdotes and comments recorded, and evidence from angling surveys carried out which indicates that at times there were large numbers of anglers on the rivers as far back as the 1930s. How indicative such numbers were of general numbers over the course of a season is completely unknown.

The earliest information of value is a series of aerial counts of anglers fishing the Tongariro on seven days between 4 and 15 July 1977. These flights occurred shortly after dawn as earlier work indicated that this was when peak angler numbers could be expected.

The next estimate on the Tongariro occurred over the 1990/91 season when, as part of the year-long harvest survey, 63 flights were made over 18 days between April and September. Typically, three evenly-spaced flights were made each day and all anglers fishing at the time counted. Effectively each count represents an instantaneous estimate of the number of anglers on the river. This survey was repeated over the 1995/96 season (81 flights on 25 days) and 2000/01 season (66 flights on 22 days). These counts are summarised in table 1. Over the later two seasons the flights were extended to also count anglers on the Whitahanui, Hinemaiaia, Tauranga-Taupo, Waimarino and Waiotaka rivers.

This data indicates that over the last decade angler numbers did not increase and that on average 44 anglers could be expected to be on the Tongariro River at any particular time. If we assume all the anglers were above the Downs Pool and exclude the river below this point, then 44 anglers represents an average density of approximately 3 anglers per kilometre and the peak count of 167 is a density of 11.9 anglers per kilometre.

As an interesting aside at the time, we calculated there were 34 widely recognised pools. This estimate did not include a number of productive lies known to a minority of anglers. Converting each count to an average number of anglers per pool, and taking the average of all these, results in a mean of 1.25 anglers per pool. Only 10.8% of the flights recorded an average of more than two anglers per pool. Given that there are nearly always significant concentrations of anglers in one or two well known pools then clearly there are usually pools somewhere along the river which are empty.

The counts indicate that the Tauranga-Taupo attracts approximately one third of the number of anglers as the Tongariro, and the Waitahanui about a quarter the number.

Year	Tongariro		Waitahanui	Hinemaiaia	Tauranga-Taupo	Waimarino	Waiotaka
	Average	Maximum					
1991	44	121					
1996	42	90	11.6	1.6	18.2	0.8	2.6
2001	46	167	10.4	5.4	14.5	2.5	4.2

Table 1: Mean angler numbers (instantaneous) on Taupo rivers between April and May 1991, 1996 and 2001 (counts were not included for any days where the river was deemed to be too dirty to be fishable)

The year-long harvest surveys are repeated at five-yearly intervals but are too costly and demanding on staff resources to repeat more often. In order to monitor angling use in intervening years a modified schedule of aerial counts is undertaken concentrating on June and July. These counts are designed to estimate angler numbers through the peak fishing period and are undertaken just after dawn when numbers are typically at their highest. The programme was begun in 2002 and repeated again this year.

the Red Hut bridge, whereas during the 1990s a third of all anglers were fishing this stretch. Comparing the counts below the swing bridge suggests no change in the density of anglers between 1977 and 2000/01.

Nevertheless graph 1 and table 1 suggest an increase in angler density over the last couple of winters on the Tongariro. This is mirrored by a decrease on the Tauranga-Taupo, perhaps in response to changes in the river and more difficult access since the

Table 2: Mean angler numbers just after dawn during June and July on the Tongariro and TaurangaTaupo rivers 1977, 1990/91, 1995/96, 2000/01, 2002 and 2003 (the 1995/96 data is only for July 1995 as June 1996 numbers were affected by the eruption of Mount Ruapehu)

Year/Season	1977	1990/91	1995/96	2000/01	2002	2003
Tongariro	48.1	65.6	66.5	71.1	77.8	78.1
Tauranga-Taupo			19	17.9	8.3	9.8

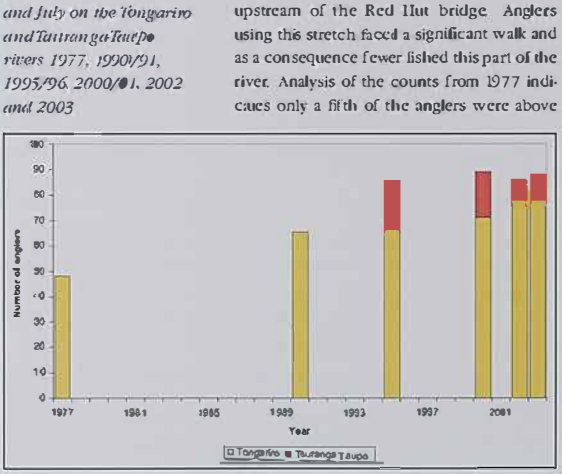
These counts can be compared to those done during the harvest surveys over the same period and time of day and with the earliest counts in 1977. The results are presented in table 2. This data is also presented in graph 1.

At first glance there appears to have been a 60% increase in angler numbers on the Tongariro River during June and July over the last 25 years. However it is important to remember that in 1977 there was no vehicle access for the general public to the river upstream of the Red Hut bridge. Anglers using this stretch faced a significant walk and as a consequence fewer fished this part of the river. Analysis of the counts from 1977 indicates only a fifth of the anglers were above

December 2000 flood. Interestingly, if we combine the annual means for the Tongariro and Tauranga-Taupo rivers (graph 1), then the average number of anglers spread across the two rivers at any time has remained constant since monitoring began in 1995.

This is the first indication we have seen that angler numbers on one river may be influenced by what is occurring on other rivers. Previously our experiences indicated otherwise. For example in the 1980s we attempted to alleviate crowding on the Tongariro by opening up large areas of new water on the Waimarino, Waiotaka, Tauranga-Taupo and Hinemaiaia rivers through willow removal. The new opportunities created attracted many anglers but the number on the Tongariro appeared to remain similar. This suggested the number of anglers on the Tongariro was controlled by the amount of available water and independent of the total number of anglers using the fishery.

Graph 1: Mean angler numbers counted just after dawn during June and July on the Tongariro and Tauranga-Taupo rivers 1977, 1990/91, 1995/96, 2000/01, 2002 and 2003



Counting anglers over the peak fishing months will continue each year as part of our annual monitoring activities. Similar counts are also undertaken on the lake over the Christmas/New Year period. With time this will provide a valuable index of trends in angler numbers and help answer the age old question "are there more anglers on the lake/river this year?"

Boating safely

by Rob Kirkwood

Rob is a fishery Ranger and part of the team that undertakes much of our field work

With the arrival of summer and the holidays now is the time to prepare yourself and your boat. So you, your family and friends stay safe, consider the following recommendations of what to check before heading out on to the lake this summer. Remember that most boating accidents are the result of a series of little things going wrong.
Although not an extensive list the following information will help.

Boat and Motor

- Take your motor for a test run close to home. Better still have a professional service your engine prior to the summer season – a little maintenance may save a lot of grief later on.
- Carry more **fuel** than you expect to use. Use fresh fuel or an additive to maintain the octane rating.
- Check the state of your battery and familiarise yourself with how to manually start your motor if this is an option.
- If your boat has **navigation lights** make sure they work. Ensure the correct lights are on the correct sides of the boat. Although not a common problem it has happened in the past.
- Check the state of the **bungs**. Obtain a spare and try to avoid damaging your reputation by ensuring the bungs are in prior to launching! If your boat has a bilge pump make sure it works effectively. Unwanted water on board is often the catalyst for a serious situation to develop.
- Check your **anchor** is suitable and that all ropes, chains and shackles are fit for the job and are attached to the boat. Bear in mind that parts of the lake are over 100 metres deep, including areas close to the cliffs in the Western Bays.
- Make sure your safety equipment is current and in good operating condition.
- With the popularity of **cell phones** these days it is not uncommon to see boaties and anglers using them when out on the lake. This piece of equipment is invaluable when seeking weather information (Met Phone 0900 999 13) or calling for help (111) but should not be used in place of a VHF radio. Remember that if you call for help on the radio anyone nearby may hear your message and be able to respond.
- Carrying a life jacket on board for each person on the boat is not only sensible but now law. **Life jackets** come in a variety of shapes and styles. Life jackets needn't be big and clumsy, and some of the more modern inflatable ones are comfortable, slimline and a pleasure to wear. When fitting life jackets to children make sure that they are the correct size for the child.

75% of all drownings could have been avoided, simply by wearing a life jacket.

- Having a fire on board your boat has the potential to be devastating. Carry a **fire extinguisher** and check it has a current seal of approval and is full. Every passenger on board should know where the fire extinguisher is kept and how to use it.
- A boat can take on water when you least expect it. Have a **bailer** handy. Suitable objects such as buckets and containers that can double as bailers will mean your passengers can help bail you out as well.
- **Flares** on your boat can heighten the chances of being found quickly.
- Keep a **torch** on board. Small LED head torches are great for getting the rods ready on those early starts, but a robust waterproof torch is more suitable for making contact with another vessel or when beaching at night.
- Have a suitable **first aid kit** on board. Your first aid kit should have enough equipment to deal with minor accidents such as cuts and lacerations.
- Carry a sea anchor to keep bow on in heavy seas should your motor fail.

Trailers

- It is now law to attach a **high visibility cover** to the prop of your motor when towing on the road, if it extends more than 1m behind the trailer.

A fine example of all the necessary safety equipment that should be on board your boat

- If your trailer has a wire winch rope, keep an eye on any **sprags** that may occur. A days boating can be spoiled by a cut to the hand while launching.
- Obtain a current **ramp permit** and have it visible. Like your fishing license it is not acceptable to leave it at home.

Weather

Weather controls so much in our lives and understanding it can mean the difference between going boating and not. A simple change in wind direction can turn a pleasurable day on the lake into a potentially dangerous one.

Take an interest in the weather and obtain up to date forecasts before heading out.

- Get weather information from a reliable source such as www.metco.nz, National radio or the Metphone 0900 999 13. The most convenient way is from Coastguard on VHF channel 61 at 0915, 1615, 1815 and 2015 hours every day.
- When using your **VHF radio** it is important to note that Channel 16, the international VHF calling and distress frequency is not monitored on Lake Taupo.
  You can gain a lot of useful weather and fishing information from monitoring Channel 61 (the call-up repeater channel) Channel 63 (the repeater "chat" channel) and channels 6 and 71 the two main simplex ship to ship channels.
- Finally, make a plan and advise someone you trust of where you intend going and expected time of return from the trip. This will increase the likelihood of being found if the unfortunate happens. Make sure you let them know when you return to avoid an unnecessary search.

Skipper's responsibility

It is the skipper's responsibility to know and abide by the regulations associated with speed of boats and the rules on the water. If you are unsure about any of these then sbend some time with an experienced skipper or consider obtaining a Day Skipper or Boat Masters qualification from the Coastguard Boating Education Service www.cbes.org.nz .

Keep yourself, your family and your friends safe while enjoying your boating this summer.

FREE SUMMER LAKE ANGLING SEMINARS

Are you keen to improve your chances of catching trout?

Then make a note in your diary to come along to our free summer lake angling seminars, being held over the peak Christmas holiday period.

The two seminars, which form part of the Department of Conservation's Summer Programme, have proven very popular in previous years with many visitors or beginner anglers keen to learn more about the Taupo fishery and tips on how to catch trout.

Fishery staff will not only answer anglers' questions about fishing, but will also explain the life cycle of Taupo trout, how seasonal changes affect where and when fish can be found, various angling methods and rigs, how to release trout effectively, basic boat fishing techniques and key angling and boating regulations.

The information gleaned from these seminars is invaluable to the novice angler or holidaymakers that fish the lake infrequently during the year. The seminars last for approximately two hours and will be held outdoors at the following locations this year:

- **TUESDAY, 30 DECEMBER 2003 — 10:00 AM — WHAREROA RESERVE, WESTERN BAYS**
- **WEDNESDAY, 31 DECEMBER 2003 — 10:00 AM — THREE MILE BAY BOAT RAMP, TAUPO**

The seminars are free, and no bookings are required. Just remember your chair, hat, drink and sunscreen and bring an "eager to learn" angling mind!

Women who just love fishing!

by Petrina Francis

New anglers or visitors to Taupo are often initially put off by the tradition and mystique associated with the fishery. They feel their skills may be inadequate or they may be concerned that they may inadvertently offend other anglers. To their pleasant surprise they invariably discover the reality is much more welcoming.

For aspiring women anglers, there is also the uncertainty of how to get involved in what has largely been seen as a male dominated sport. However if the thought of fishing at Taupo appeals to you, don't be put off, and we hope the following article may just encourage you to give it a try!

Nellie Muir – who at the age of 80 caught her first trout barling on Lake Taupo. You are never too old to learn to fish! Nellie is pictured with a lovely 8.5lb brown trout

Bronwyn Wilson smiling after landing a rainbow on the Waitahanui River

Forrestina Ross was quite a woman for the late 19th and early 20th centuries. A teacher, journalist and writer, she was very keen on the outdoors and in particular mountaineering, becoming the first woman member of the NZ Alpine Club in 1890. It was in pursuit of mountains to climb that Forrestina, in 1898, along with her husband and Mr A R Lowe from the Wellington Acclimatisation Society, travelled from Wellington to the Tongariro National Park. Mr Lowe had in his possession 5,000 rainbow trout fry from the society's Masterton hatchery, and on the morning of 24 February 1898, the party journeyed close to the summit of the Desert Road coming across the first of several streams which flow into the Tongariro River. At the ford on the upper Waikato stream, Forrestina Ross, by virtue of being the only woman in the party, released the first pannikin-full of rainbow trout into Taupo waters. This date marked in history the first involvement of a woman with the Taupo fishery, and of course the introduction of rainbow trout to Lake Taupo!

Today, in the Taupo District, there is an enthusiastic group of women anglers who love the sport of trout fishing and the outdoors. In fact 14% of the anglers we surveyed on the lake last summer were women.

One such angler is Cherry Hewitt, who can quite happily spend a full day from 7am to 7pm out on the rivers fly-fishing. Cherry was first introduced to fishing by her grandfather who took her out on Lake Taupo in his boat when she was quite young. Cherry's mother took up the sport of spin fishing, but it was a visit by Cherry in 1990 to a Woman's Recreation Day in Taupo – a day to promote all different recreational sports that woman might be interested in – that turned her attention to fly-fishing. On this day she attended a demonstration on how to cast a fly line, and from then on she was booked, beginning what is now a wonderful 13-year relationship with fly fishing.

Cherry admits that what she enjoys most about the sport is catching a really good fish. "Even just seeing a fish in the water is exciting," Cherry says. "I find water extremely relaxing and restful. Sometimes I enjoy the solitude of fly-fishing, but I have found it is also a good way to meet friends." In fact Cherry met two of her best friends at a river mouth one night, these friendships having grown from that initial meeting.

Bronwyn Wilson is another enthusiastic woman angler who has been involved with fly fishing and fly tying for over 30 years. At the age of 11, Bronwyn used to spend her holidays at the lake boat fishing, and later received fly casting lessons so she could learn to cast properly. A while later, Bronwyn broke her collarbone and then had to change her casting technique to accommodate the injury. However this didn't deter her and she tied flies in the school holidays in order to save enough money to buy her first pair of waders and graphite flyrod. Her fly tying art has developed over the years and she is now well respected as one of New Zealands leading fly tiers. Indeed some of her flies are much too good to be actually used to fish with!

Bronwyn, like Cherry, loves the outdoors and it is this love that draws her to fly fishing and fishing on the lake. As a young girl, Bronwyn would fish the Waitahanui River all day and when not fishing she would sit on the beach and tie flies for the locals. She once tied a White Rabbit for local identity Barney Northcroft, who then caught 32 fish on that one fly.

Perhaps you have thought about learning to fish. Or you have looked at people boat fishing the lake or fly-fishing a river, and thought to yourself, "I would like to give that a go!" If you are new to the area, or you don't know much about angling, as a woman, how do you go about getting involved?

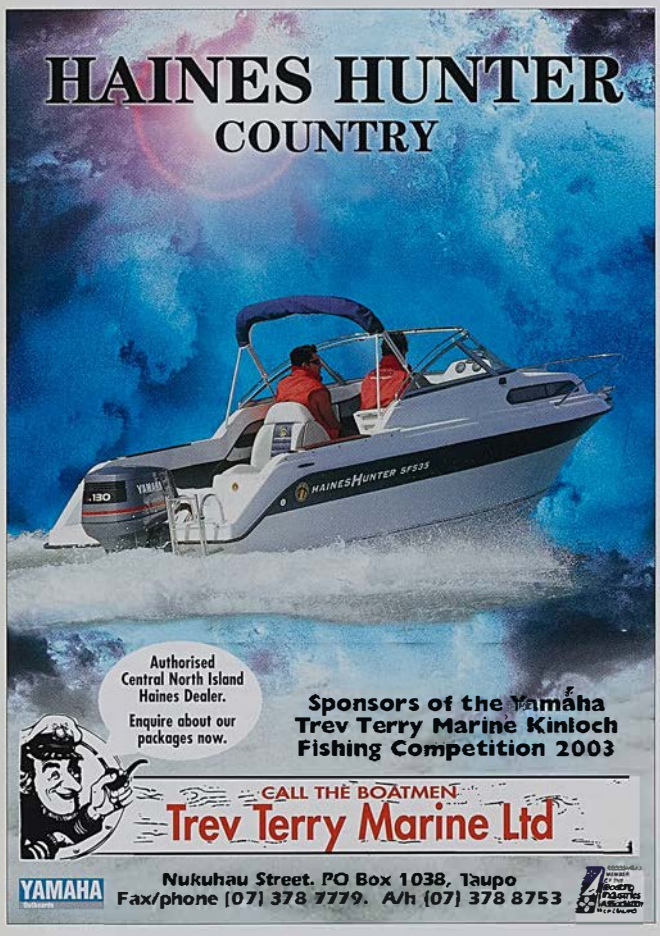
Bronwyn Wilson with a nice 11.5lb brown taken from the Waitahanui rip on a Golden Reaper that she had tied

Cherry Hewitt with a nice rainbow at Hatepe

Cherry and Bronwyn both have good advice for any woman interested in learning to fish at Taupo. They recommend contacting a local fishing club and enquiring at local tackle shops about other women in the area who are interested in fishing. Local club members are often a huge source of information. "Find out who at the club is interested in the type of angling you want to do, and talk to them. For those with children or the working woman who is trying to fit a lot into her week, some clubs hold evening meetings which are convenient," says Cherry. If you are hesitant because you are unsure of what equipment you should use, Bronwyn has the following advice: "Have a good look at the area that you are going to fish and work out the type of water that you want to fish. This will determine to a large extent what gear you require. Most tackle shops have the facility for trying out rods – never buy a rod until you've tried it and make sure you get the line to match the rod. Lighter rods and lines are easier for women to handle. A day out with a guide will help you to gain confidence, and can give you some good tips on casting techniques."

Cherry recommends just getting out, giving it a go and talking to other anglers on the rivers. And reading is another suggestion. "The book 'Fly Fishing for Beginners' by Keith Draper is a fantastic solid introduction to fly fishing," says Cherry. "I still refer to it sometimes."

One of Cherry's most memorable experiences



Carol Harwood with a fine rainbow from Lake Otamangakau

Petrina Francis with a prime maiden rainbow caught downrigging on Lake Taupo

was winning Runner Up for Best Fish of the Tournament in the Lake Taupo International Competition with a prime 8.5lb rainbow. And of course, catching the 12lb brown that is proudly displayed on her lounge wall. "There is something really exciting about seeing a fish, casting a fly to it, watching it take the artificial fly, and then bringing in the fish."

Bronwyn also suggests sitting and observing others fish. "And don't be afraid to ask other anglers about what flies and techniques they use, usually they are more than happy to explain". Bronwyn recommends for those new to fly-fishing to fish where they can 'see' the fish. "This helps you not to be discouraged if you don't catch one straight away."

Carol Harwood, a Turangi resident, was the first woman to become a member of the NZ Professional Fishing Guides' Association, and really enjoys helping other women take up the sport of flyfishing.

Carol believes that what a lot of women need to encourage them to fish is greater confidence in their own ability. Once a woman new to fishing learns how to cast a line, wade water and tie her own flies, she then feels more confident trying to fish on her own.

Carol has noticed that women tend to have safety foremost on their minds. Some women are put off fly-fishing as they don't like to wade in deep water. Generally lighter in weight then men, women are more concerned about slipping over in the water. This combined with the misconception that you need to wade deeply in order to fish the best spots, can put a woman off fly-fishing the major rivers. Carol makes a point of teaching her clients how to wade correctly and cross rivers safely, the importance of looking at the water first before going in, and how to identify places to get out should you slip over. She points out that you do not need to wade up to your armpits to be successful. "Learning to spot fish and where they are, understanding what insects are around and therefore what fly to use, all help in gathering confidence in your ability to catch a fish. Once a woman has learnt to fly cast properly and control the line, she will gain a lot of confidence and the rest comes naturally," says Carol. She also recommends learning in "small doses" to keep the experience enjoyable. "And always wear a hat and glasses when fishing," says Carol. "There is nothing worse than trying to untangle a fly that is caught in your hair!"

Of course, if fly-fishing doesn't appeal to you, then there are lots of other options for catching trout at Taupo. The beauty of the region is that it offers lots of different opportunities for angling, from fly-fishing rivers and streams, to harling or trolling for trout from a boat. We are keen to encourage more women to get involved and plan to hold a women's angling seminar at the Tongariro National Trout Centre. Dates for this seminar will be published in the March issue of *Target Taupo*. In the meantime, we encourage you to come along to our summer boat fishing seminars which are being held on December 30th 2003 (10:00 am) at the Whareroa boat ramp on the Western Bays of Taupo and December 31st 2003 (10:00 am) at the Three Mile Bay boat ramp, Taupo. Page 25 of this issue has more information on these seminars.

We also encourage you to talk to family and friends about the sport, and what they enjoy about it. Look on the internet, a search on a major search engine using the words "fly fishing women" returns lots of interesting links. Check out www.iwiththewomenflyfishers.org – a site put together to profile women around the world interested in fly fishing. Hire a guide and spend a day out on the lake or on one of the rivers with a professional. Most angling clubs have websites with handy hints on the basics, and getting started.

We look forward to seeing you out there and giving it a go at Taupo this summer!

Cherry Hewitt and her big fish - the 12lb (5.45kg) brown

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by Rapala

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Compliance and law enforcement

by Dave Hart

Dave is our Fishery Area Ranger based in Taupo

The winter of 2003 has been a relatively quiet one for our staff on the compliance and law enforcement front with fewer incidences of serious poaching detected or reported, than in previous years. This is a very pleasing outcome ensuring that the vast majority of trout have been able to complete their breeding undisturbed in the many spawning streams around the lake.

Overall the level of compliance with regulations, as measured through our contact with anglers during the routine river creel surveys, is very high and despite literally hundreds of surveys conducted only a few offences were encountered. Mostly these incidents involved anglers fishing without a license, but also included offences of continuing to fish after keeping three trout, using illegal tackle in fly-only waters and using roe as bait.

Dedicated law enforcement operations conducted over the past few months have focused mainly on vulnerable spawning sites, closed-season waters, and after-hours fishing but also included monitoring angler activity at certain locations following information received from the public. As a result of these operations we made several apprehensions on the rivers for offences such as the use of spinning gear with sinkers and baits, spin-fishing with treble hooked lures, fishing in closed waters, and even one non-fishery incident where an offender was caught chain-sawing mature Kanuka in the Hinemaiaia Scenic Reserve. These offenders are now facing District Court prosecution or diversion coupled with the loss of seized equipment.

Should you wish to report suspected illegal activity, please contact our fishery area duty officer direct on (025) 290 7758. Your call will be dealt with immediately by the fishery area team. We also encourage you to enter this number into your cell-phone memory for convenience.

While a few anglers may consider the idea of carrying a cell-phone while fishing abhorrent, we strongly recommend doing so as it provides an immediate means of communication for reporting observed illegal activity or summoning assistance in any emergency situation. We also recommend the use of a waterproof case or bag for the phone.

ALF'S BIG BROWN

by Rob McLay

Rob is our Programme Manager for Field Operations and also a very keen angler

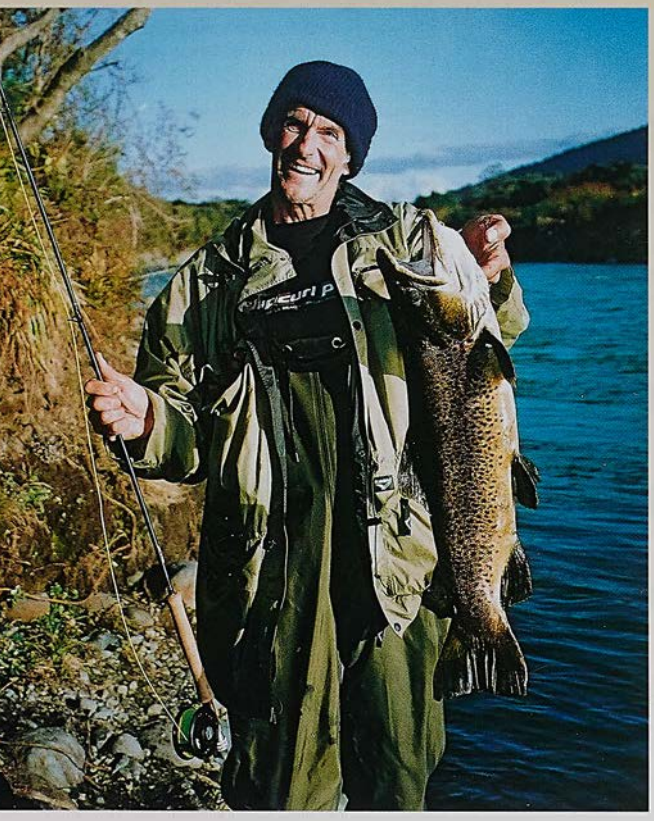
Visiting Australian angler Alf Blakey got the surprise of his life when he landed a magnificent trophy brown trout on a mid-July day on the Tongariro River this year. Alf, who commenced trout fishing just last year was on only his second ever flyfishing trip. During this visit and over the week prior to that memorable day, Alf had been enjoying the fly-fishing learning curve with moderate success on the rainbows under the watchful eye of good friend and fishing coach Dave "Honeypot" Scott.

On the day in question, the river was only marginal for fishing following a flood the previous day and there were very few anglers on the river. Undeterred, Alf ventured forth to the Hydro Pool full of the enthusiasm and expectation that all new anglers have when they first start catching a few fish. So it was that Alf found himself plugging away in the murky water with a standard Tongariro nymphing rig, not considering for a moment that a trout angler's dream was about to become a reality for him.

Alf Blakey with his magnificent trophy brown trout from the Tongariro River

Photo: Rob Hood

In his own words, Alf describes what happened next. "I made a short cast which went close to the bank I was standing on. I thought it was too close really but I let it drift anyway and then the indicator stopped so I struck. I hooked up on something solid and thought straight away that I was snagged. I was just starting to back up to break the rig off when "the snag" started moving. I yelled out to Dave that I had a fish on and it certainly felt different to anything I had hooked before."



What followed was a dogged but unspectacular fight, typical of large Tongariro browns, and eventually Alf had the fish in at the edge of the river but was unable to land it because of its size and the steepness of the bank. All was not lost because at that point, "Honeypot" entered the fray and with complete disregard for his own safety, crash tackled the mighty fish and manhandled it up the bank and into submission. Alf's trophy was secure.

The fish was a male in peak pre-spawning condition and weighed in just a shade under the magical "double figures". It is currently being mounted and is destined to occupy pride of place in Alf's home in Australia. One of the alluring attributes of the Tongariro River is that it can produce a fish like this at any time and often when an angler least expects it. Certainly, the river is now a special place for Alf Blakey. His joy was plain to see as he departed the river that day heading for a well earned cup of tea. As he crossed the Major Jones swing bridge, he was observed grinning from ear to ear, saying something like "you beuwdy" to nobody in particular and clutching his fish to his chest like a long lost child. Alf is now well hooked, he will be back.

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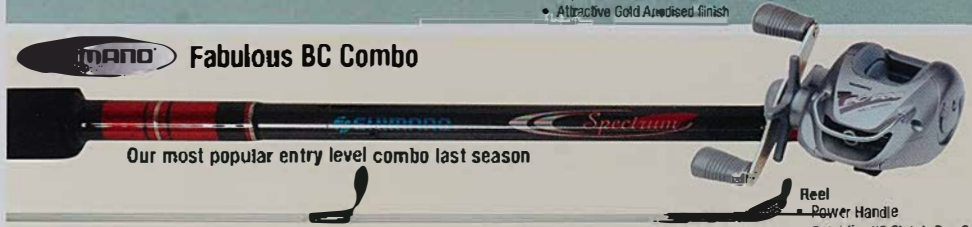

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BLUE-GREEN ALGAE

by Dr Michel Deduat

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

Figure 1: Picture of a cyanobacteria (Anabaena). Each cell is called a heterocyst. The picture, taken by Dr Bill Bullema at the University of Chicago, shows some Anabaena filaments which have been genetically engineered so that the heterocysts are expressing a fluorescent protein

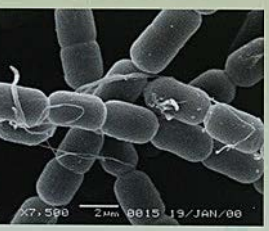


Figure 2: Picture of a cyanobacteria (Anabaena) similar to those found in the bloom present in Lake Taupo in March 2003 taken with a scanning electron microscope

Photo: Mount Allison University, Sackville, New Brunswick, Canada

It is well established that the water quality of lake Taupo is deteriorating. The decline in water clarity has been extensively publicised in local and national newspapers as well as in previous issues of *Target Taupo*, but since last March we have been hearing about a related environmental issue referred to as "blue-green algal blooms".

Blue-green algae blooms are an increasing pollution problem worldwide, and researchers and public health officials are looking into their effect on water quality, both for drinking and recreational uses. Because of increasing eutrophication (nutrient enrichment) and other negative impacts on aquatic ecology, this problem will undoubtedly become worse. But what are blue-green algae?

Algae are simple aquatic plants which occur naturally in rivers, lakes, damp soil, hot springs and even snow. But blue-green algae are actually a type of bacteria called cyanobacteria (figure 1). They are similar in appearance to typical algae and like algae are capable of photosynthesis. Cyanobacteria are very important organisms for the health and growth of many plants since they are one of very few groups of organisms that can convert inert atmospheric nitrogen into an organic form, such as nitrate or ammonia. Cyanobacteria have played an even more important role in the development of life on earth. When they appeared on earth at least three billion years ago, they increased the concentration of atmospheric oxygen from 1% to 21% thus allowing a protective ozone layer to form.

Cyanobacteria are found in almost every imaginable habitat, from oceans to fresh water to bare rock to soil. The greenish slime on the side of your damp flower pot, the wall of your house or the trunk of trees is probably cyanobacteria. It should be noted that not all cyanobacteria are blue-green in colour but can range from green to red to brown. The Red Sea gets its name from occasional blooms of a reddish species of cyanobacteria. Cyanobacteria have even been found on the fur of polar bears to which they pass on a greenish tinge. There are more than 2000 species of cyanobacteria with some still to be discovered. But what causes algal blooms?

While eutrophication of surface water from agricultural and industrial activities has been cited as causing favourable conditions for algal blooms, the causes are more complex. Nutrient loading in the water is not the sole reason that blooms occur. Although much is still to be learned about the ecology of cyanobacteria and their interaction with the aquatic environment, known factors in excessive algal blooms include:

- Run-off into waterways of nutrients (nitrogen and phosphorus) from agricultural fertilizers and effluents, sewage and industrial effluent.
- Poor water flow (blooms generally do not occur in steadily moving water).
- Alteration of lake and river ecosystems through land clearing, agriculture and settlement, and water management systems.
- Climatic conditions.

What's bad about blue-green algae?

Blue-green algae in small numbers are a natural part of the water system and do not cause any detrimental impact. However, in large numbers, the algae spoil the water evidenced by a foul smell and a repulsive thick scum or bloom on the water. Blooms are not always caused by only one species of algae, and may consist of several dominant species.

Blue-green algal blooms may have several effects. A dense bloom floating on the surface may potentially affect the benthic (bottom-dwelling) community underneath by shading it from the sun and altering the community's ecological system. Similarly, as the algae begin to decay, this process consumes oxygen in the water, so fish may die as a result of oxygen deprivation. It can also create skin/sinus irritations.

However, by far the major problem with cyanobacteria, is that they can produce various types of powerful toxins. From the known species of algae it appears that a third of them produce toxins. The various toxins

IN LAKE TAUPO
– is it safe to eat trout?

have different effects on different organisms. Common genera of cyanobacteria associated with toxic metabolites include Microcystis, Anabaena (figure 1 & 2), Aphanizomenon, and Oscillatoria; while others to consider are Cylindrospermopsis and Lyngbya. The known toxins fall within the general categories of hepatotoxins, neurotoxins and non-specific toxins. Hepatotoxins can cause liver failure and neurotoxins disrupt transmissions vital to nerve and brain function.

It is important to note that cyanobacteria do not actively excrete the toxic compounds but that the toxins are released into the aquatic environment when the cyanobacteria dies. This has a particular consequence for management of a bloom in that trying to kill the blue-green algae may actually worsen water quality.

There are some indications to suggest that neurotoxins degrade rapidly in the environment, but some hepatotoxins may persist for a longer time. Another complication is that blooms of a particular species are not always toxic.

The best established method for toxicity is to inject algal components into mice and observe the effects. The LD50 (lethal dose, enough to kill 50% of the observed group) is determined by this method. Obviously, this method is not suitable for field testing, which makes toxin detection difficult.

How does all this affect us?

In March 2003, a bloom of blue-green algae was observed in Lake Taupo. Monitoring by Environment Waikato showed that an Anabaena species that can produce toxins was generally the dominant algal type during this period. The intensity of the bloom level in some areas was sufficient to exceed recreational guidelines. As a consequence on 21 March, and again on 1 April, health warnings were issued for Whakaipo Bay and Omori respectively.

The table below shows the cell counts made by Environment Waikato for blue-green algae in samples collected from selected sites around Lake Taupo in summer 2003. Results are in cells/ml. The guideline value for contact recreation adopted by Environment Waikato is 15,000 cells/ml. Results higher than the guideline are shown in bold.

Date	Taupo	Motutere	Omori	TeHapua	Whanganui	Kawakawa	Whakaipo
19 March	2,600	no data	no data	4,700	1,900	7,200	69,000
25 March	<500	<100	18,900	10,500	4,200	12,300	15,600
3 April	<1,000	<1,000	<1,000	<1,000	<1,000	1,600	1,400
14 April	<500	<500	<1,000	no data	no data	no data	<500

The table above indicates that fortunately the dense algal bloom was confined in certain areas and was short lived. As a result, on 17 April 2003 the health warnings for Lake Taupo were lifted.

Whether toxic algal species dominate a bloom or alternatively, occur at lower levels within a phytoplankton community, their presence often affects other trophic levels, resulting in ecosystem dysfunction, public health risk, and economic losses.

Figure 3: Picture of zooplankton (Bosmina longirostris)

Photo: Per-Gustav Wikstrom

The toxins will first affect the zooplankton (figure 3). Studies have shown that blooms are avoided by zooplankton including rotifers and copepods but the underlying mechanism is unknown.

Smelt eating the zooplankton will be the next affected by cyanobacteria toxins. Smelt consume a large part of the zooplankton produced in lake Taupo especially in the pelagic (open water) zone of the lake and it is possible for smelt to be affected by toxins produced by blue-green algae. We do not have any data that demonstrates that toxins accumulate in smelt or that they die from being in contact with the toxins. However, if smelt avoided grazing on zooplankton where the blooms were present, it could have had some implication for the anglers targeting trout in these areas.

We have seen that dense blooms occurred in Whakaipo and Omori bays last March. If smelt were actively avoiding these areas then it should have been reflected in the number of trout chasing smelt, and as a consequence on anglers' success. We do not have evidential data of this, but we welcome observations from anglers. Especially those who frequently fish in these areas and may have noticed a difference in their angling success during March 2003.

This raises the question: is it safe to make a lunch of these fish?

First of all, a draft document from the New Zealand Ministry of Health on the blue-green algae says that the toxins, known to be produced on occasion by the cyanobacteria which dominated the bloom in Lake Taupo (Anabaena circinali and Ros-aquae), have not been detected in water in New Zealand yet. However, this doesn't mean that they haven't been present.

It also appears that the toxins of freshwater cyanobacteria can bioaccumulate (build up in tissues with prolonged exposure) in fish and other edible freshwater aquatic life, as they do in marine organisms. Nevertheless further studies need to be done on the build-up of toxins in fish to ascertain if it is safe to eat trout that have been caught in areas affected by a blue-green algae bloom. This will be a lengthy exercise.

We advise anglers to adopt a common sense approach. The liver and gut of fish are likely to be the most toxic body part and should be avoided. Other parts of the fish may be eaten but they must be well cleaned and may taste "earthy". The toxins are resistant to heat and cooking fish is no guarantee that it will make your fish any safer.

What happens if I eat a fish contaminated with cyanobacteria toxins?

Health effects in humans are seldom seen from blue-green algae. Medical literature concerning direct contact with algae is sparse. In countries around the world deaths have been reported in animals (particularly pets and cattle) that drank water containing high levels of cyanobacteria, especially in drought conditions when stagnant, contaminated water was the only water source.

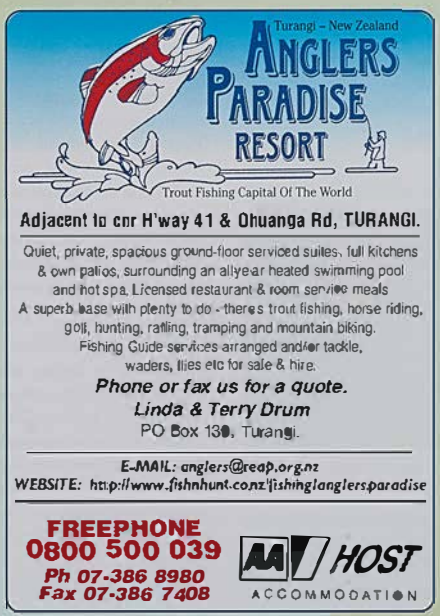
Several standard methods of treating drinking water are thought to break down these toxins, but the health effects created by the by-products of this breakdown are unknown.

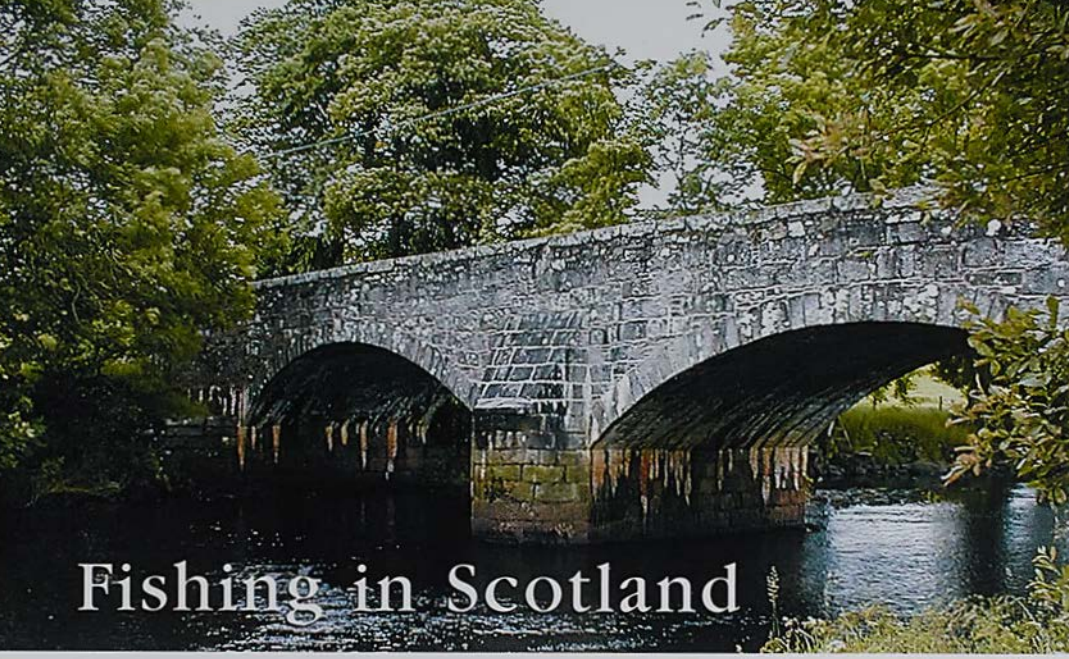
Cyanobacteria are thought to cause a wide range of symptoms in humans. Probably the most common symptom and sign is abdominal pain with nausea, vomiting and diarrhoea. Skin problems, eye irritations, hayfever and asthma strikes can also occur, but it is unknown if the cause is a mechanical irritation or an allergic reaction to toxins or algal components.

The most dramatic documented event concerning human health occurred in a hospital in Brazil in February 1996. Water contaminated with an unspecified type of cyanobacteria was used for dialysis during a water shortage. The toxin was microcystin, a hepatotoxin. This resulted in each patient's bloodstream being directly exposed to approximately 125l of contaminated water. Sixty patients died with kidney failure and 66 others were rendered ill. The predominant algae were never identified, and interestingly, there were no reports of similar human illness or animal effects from other exposures to the same water source.

Some cyanobacteria (Spirulina) have long been valued as a food source. It is high in protein, and can be cultivated in ponds quite easily. In tropical countries, it may be a very important part of the diet, and was regularly eaten by the Aztecs. It is also served in several Oriental dishes. In western countries Spirulina is sold as a dietary supplement in markets, advertised as a diet aid. African flamingos get their colour from eating Spirulina. While Spirulina has not been implicated as a toxin-producing blue-green alga, the full understanding of if, how and when cyanobacteria are able to produce toxic compounds is far from complete.

Time will tell if this bloom was a one-off occurrence perhaps exacerbated by the unusually settled weather, or a reflection of the deterioration in water quality of the lake. Let's hope it is the former.





Fishing in Scotland

by Mark Venman

Mark joined our team in March 2003. In this article he describes the fishing he left behind in Scotland and compares the fishery there to the Taupo fishery

Nancy Venman and Bertie Moore with a hatchery-reared 3lb rainbow trout caught at Blahhuy Loch, Scotland

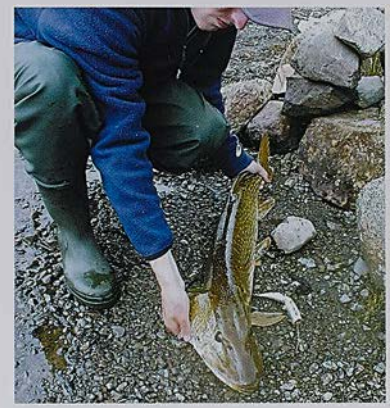
Photo: Joan Rodger

Fishing in Scotland doesn't need much of an introduction. For hundreds of years, Scots have hunted Atlantic salmon (*Salmo salar*), the Scottish equivalent of a freshly run wild rainbow trout (*Oncorhynchus mykiss*) in New Zealand. However, rainbow trout can also be caught in Scotland and are farmed throughout the country. Brown trout (*Salmo trutta*) are also found in many of the rivers and lochs and although wild, never quite reach the impressive size of their kiwi counterparts. In this article I compare the Taupo Fishery with the fishery I am familiar with in the south-west corner of Scotland. In particular a comparison of the species present, the problems faced by each fishery, the different angling and monitoring techniques being used, and a summary of the present state of the Scottish freshwater fishery.

Dumfries & Galloway is a beautiful rural part of southern Scotland which provides anglers with plenty of fishing opportunities from river and lake angling to some of the country's best sea angling. The rivers are most famous for producing excellent whisky and of course for their wild salmon populations. In this part of Scotland, salmon can be caught between February and October and a closed season exists over the winter months to allow spawning fish to travel unhindered upstream. Brown trout are also present in many of the rivers and streams along with their anadromous cousins the sea trout, (*Salmo trutta*), who tend to dominate the lower reaches of river systems.

Several lochs are also stocked with locally farmed rainbow trout to provide further angling opportunities. Some fish can reach 10lbs (4.54kg) before being released. However, the overall condition of these farmed rainbows is relatively poor in comparison to the wild rainbow trout at Taupo. For example, these fish are farmed in relatively high densities and fin nipping occurs. This results in damaged fins and does little for their appearance. Due to the fish meal that they are fed on until they are released these fish tend not to taste as good as wild Taupo rainbows and their flesh isn't as pink. However, some of these rainbows are actually farmed for human consumption and the remainder are used for re-stocking purposes. This is necessary because the conditions in the rivers are not suitable for rearing young rainbow trout naturally. No salmon are farmed in this area on a commercial basis which helps to reduce the risk of disease being spread and the dilution of the gene pool amongst the wild salmon population.

There is a demand for increased angling in the area and many farmers are creating ponds on their land. Access to angling is also



Mark Venman with a 15lb pike from Loch Moberry, Scotland

Photo: Joan Rodger

being increased by ensuring that existing angling opportunities are brought to the attention of the general public.

Apart from trout and salmon, there are several other fish species present in Scottish rivers. For example, European eels (*Anguilla anguilla*), minnows (*Phoxinus phoxinus*) and sticklebacks (*Gasterosteus aculeatus*) can be found in the rivers and streams. These don't contribute much to the diet of salmonids as salmon in particular tend not to feed in freshwater when returning as adults. Pike (*Esox lucius*) are also present in some rivers and lakes and are considered a threat to salmonid populations by anglers and some fishery managers. Management techniques include removing small pike (<2.5kg) as the only predator of a small pike is a larger one! Studies have shown that if all large pike are removed from a specific habitat then there is an explosion of small pike due to the lack of predation. Returning the larger fish should also create an excellent pike fishery in the future while hopefully reducing the overall pike population.

At least three species of lamprey are present in the lochs. Perch are also present in one of the rivers which is home to both salmon and trout. These fish would have serious consequences on the Taupo fishery were they to be introduced.

Finally, one of the most interesting comparisons is the presence of smelt in both fisheries. In Scotland, the European smelt (*Osmerus eperlanus*) is much larger than its kiwi cousin with a maximum length of 45cm. These smelt have a long slim body with a pointed head and snout and like their New Zealand counterparts smell like cucumber. They feed on shrimps and crustaceans and spawn on sandy or gravely bottoms. These fish once supported a huge commercial fishery on the Solway Firth but their commercial value has significantly declined as the population has decreased. It is believed that over fishing, pollution and barriers to migration have resulted in their decline. These smelt provide salmonids with a valuable food source when small in size but they do not appear to be as important as the New Zealand smelt is to Taupo rainbows.

> *"one of the most interesting comparisons is the presence of smelt in both fisheries"*

The species of smelt present in lake Taupo is *Retropinna retropinna* and belongs to a different family to the Scottish smelt. They are extremely important to both feeding juveniles and adult trout returning to the lake after spawning. Juvenile trout can grow 3cm per month by feeding exclusively on smelt. With 90% or more of a trout's diet consisting of smelt, it is vital that the population of smelt is monitored and protected to prevent their numbers from declining and seriously affecting the Taupo trout fishery.

Fishery problems

After just a few weeks in the job, I became aware that although Scotland and New Zealand are some 20,000km apart, the prob-

lems faced by each fishery are for a large part very similar. For example, maintaining fish passage to spawning sites, reduced numbers of spawning sites, nutrient enrichment and trampling of bank sides through farming practices, are common problems in both countries. Scotland also suffers from acidification problems due in part to the large amounts of coniferous plantations which surround many of the river catchments. These acidic conditions in the headwater streams especially, result in a recruitment failure amongst salmon and particularly affects salmon at the egg/ alevin stages. The enzyme required for egg development is unable to function at low pH levels. Fin and tail deformities have also been observed in some populations where the water pH is low.

"I became aware that although Scotland and New Zealand are some 20,000km apart, the problems faced by each fishery are for a large part very similar"

Culverts are widely used throughout this part of Scotland by both farmers and forestry companies. In most cases, culvert pipes are badly positioned or designed which can lead to blockages which may go unseen for considerable lengths of time due to their remoteness. Sometimes, culverts are set too high above the bed to allow migrating fish to pass in an upstream direction and this can be made even more difficult by low flows. These culverts are also widely used on smaller spawning streams and it is here that they can cause the most trouble. Wooden baffles and slotted weirs are used in New Zealand to constrict and deepen the flow to help lift spawning fish up into culverts and allow fish access to suitable spawning areas further upstream.

I also became aware that New Zealand has its fair share of farming-associated problems such as trampling and sedimentation. At present, this is a problem being addressed in Scotland with many important spawning streams and rivers being fenced off from livestock. Livestock also have the habit of defecating in waterways which further reduces water quality and increases the level of sediments, nutrients and bacteria, in the water. Fisheries trusts are also involved in planting up these bank sides once they have been fenced off with deciduous trees to help minimise further bank side erosion and increase buffer strips. These broad leaved trees also help provide canopy cover and a suitable habitat for terrestrial invertebrates (insects), an important food source for salmonids. It is important to ensure that the fencing is far enough back from the water to allow natural shading riparian vegetation to develop if no immediate planting is to occur. Fences erected too close to waterways also tend to trap flood debris and get damaged when the water level is higher.

Another major fishery problem in Scotland is associated with forestry. During the last forty years, forestry workers planted conifers right up to the edges of many of the important spawning tributaries and it is only now that we are seeing the consequences. For example, these conifers were planted so close together that all light was excluded from the bank sides

Trampling, erosion and secondary collapse of bank sides caused by livestock intrusion

Photo: Mark Venman

below. This stopped any vegetation from growing which would normally help stabilise the bank sides especially during floods. The decaying pine needles further prevented any vegetation from growing by acidifying the soil. These bank sides are now completely bare and erosion and secondary collapse are common. It is common to see the trees lying right across these waterways. Trees often completely block the stream as their branches are dense and tend to trap further debris and prevent migrating fish from passing. Thankfully, new forestry guidelines brought out in the early 1990s now mean that all new coniferous plantations must be planted a sufficient distance back from the stream or river, based on the width of the waterway. However, care needs to be taken in the removal of these trees to ensure they are not left lying in the streams. Similarly logging trucks are often permitted to drive straight through the waterway. These issues occurred in the past in New Zealand but fortunately the careful planting and management of Lake Taupo Forest has largely avoided these problems locally. Here the extensive native riparian margins act to protect the streams and water quality.

Livestock wading through an important spawning tributary

Photo: Mark Venman

In New Zealand, the main natural predators of trout apart from anglers are shags and herons. However, in Scotland there are many predators which prey upon salmon including eels, perch, pike, trout, kingfishers, dippers, herons, gulls, terns, cormorants, (shags), ospreys, saw-bill ducks, grebes, seals, otters and even mink. Management problems arise when both the predator and the prey are protected species! Most native predators of fish in Scotland receive some form of statutory protection as a consequence of past persecution, pollution damage or habitat loss which have collectively contributed to historically low levels of many predator populations. However, fish predators often still need to be managed in order to protect biodiversity or prevent damage to the economy. Licensed shooting can be used if necessary to resolve the 'conservation conflict'.

A final problem in south-west Scotland is the presence of an introduced species, the American signal crayfish (*Pacifastacus leniusculus*) which was first reported in 1996. This species of crayfish is an omnivore (eats both plant and animal material) and was initially thought to be a danger to native salmon and trout as it could feed on fish eggs. These crayfish also cause physical effects by burrowing into bank sides which can further reduce bank stability.

Monitoring Techniques

Fishery trusts in Scotland use electro-fishing as an important technique for sampling the wild trout and salmon populations present. Minnow traps to catch juvenile trout are not used and fish traps to catch adult fish in Scotland are much smaller than those used here in New Zealand. These are only used for a couple of weeks each winter to capture spawning adults which are stripped for their eggs and milt. Some anglers fishing toward the end of the season also donate rod caught salmon which are kept alive in keep nets for

the restocking program. Restocking is particularly important where there is limited natural spawning or where poor spawning habitat exists. Eggs are stripped from both salmon and sea trout.

As discussed earlier, there are many predators of juvenile salmonids. However, suitable habitat also plays an important role in their survival. Many small spawning tributaries in Scotland are affected by farming practices and a considerable amount of suitable juvenile habitat has been lost. For example, cattle crossing streams significantly widen the channel, reduce water depth, alter the flow and remove bank side cover. Silting of the substrate also occurs in these areas and this affects salmon fry in particular which require clean gravel. Attempts have been made to vary flows by inserting weirs and boulders which act to deepen areas and provide additional cover for salmon parr. Further attempts are being made to restore these habitats so that conditions are more suitable for juvenile salmonids, as poor survival between the fry and parr stages is proving to be a real bottleneck in the population. With improved freshwater habitats it is hoped that salmon numbers will recover in the future as the marine conditions slowly improve. Watercourses identified for stocking require good instream and bank side cover and water quality with suitable flows.

"Radio tagging programmes are also run in Scotland and have been successfully used to follow migrating salmon upstream"

Radio tagging programmes are also run in Scotland and have been successfully used to follow migrating salmon upstream to see which streams are being used for spawning. The radio tags used on salmon were inserted down through the mouths of these fish instead of being surgically implanted from the outside as with the recent trout tagged at Taupo.

Habitat surveys have become popular over the last couple of years in Scotland and new protocols have been developed to allow comparisons to be made and data to be used in the production of Geographical Information Systems (GIS) maps. These surveys in particular highlight areas where erosion is bad and can identify areas that would benefit from both habitat restoration and restocking of wild fish. However, these surveys involve a considerable amount of walking, as all sites and obstacles to fish migration need to be individually grid-referenced. Interestingly, many of the habitat surveys at Taupo are carried out by fishery staff from the air. This allows a much larger area to be covered in a considerably shorter time. If any problems are identified, fishery staff can return with vehicles or on foot and examine the problem on the ground.

Assessing stocks of salmonids is extremely difficult and fishery managers in Scotland are now considering using snorkel surveys to physically count numbers of adult fish. This will be possible in many of the smaller spawning streams during the winter months. By comparison, drift dive counts have been successfully used for several decades to count the numbers of spawning trout present in the rivers over the winter months here in Taupo.

Native deciduous trees, dense bankside cover and boulders provide excellent conditions for juvenile salmonids

Photo: Mark Venman

A typical Scottish spawning stream utilised by both salmon and trout

Photo: Mark Venman

Fishing methods and regulations

The Association of Salmon Fishery Boards was established in 1932 to protect, preserve and develop salmon fisheries throughout Scotland. Charitable research trusts and similar organisations have also emerged in recent years. Core funding for the operation of these research trusts is provided by the fishery boards even although these organisations are independent. The model of a fishery board with its statutory powers to manage salmon fisheries combined with a research trust responsible for education and research into fisheries issues, is thought to be a suitable model for managing Scotland's salmonid populations.

In terms of fishing methods, one of the most interesting comparisons between Taupo and Dumfries & Galloway is the fact that legal netting for salmon still occurs in the lower sections of some rivers although it has been practised much less in recent years. In the past couple of seasons anglers have paid for some nets not to be fished to increase angling opportunities. Netting is permitted between March and September, although in some years, netting proprietors have delayed the start of fishing by 2-3 months to allow free passage of early running spring fish.

"One of the most interesting comparisons ..... is the fact that legal netting for salmon still occurs in the lower sections of some rivers..."

In stark contrast, netting is absolutely prohibited in the Taupo Fishery. Another interesting regulation which doesn't apply on the rivers in south-west Scotland, is the ban on the use of treble hooks as in the Taupo Fishery. You only have to walk into a Scottish tackle shop to be greeted by an array of beautifully coloured mepps, devon-minnows, lures and plugs, all fitted with treble hooks and used to catch both salmon and trout. Many salmon and sea trout flies are also tied on double or treble hooks, while it is also possible to bait fish for salmon and trout in some areas. However, the use of prawns and shrimps is highly illegal when river fishing for salmon, as is the use of trout roe in the Taupo fishery.

As mentioned earlier, there is a closed season for both salmon and trout in Scotland and no fishing is permitted over the winter months in order to allow these fish time to move upstream and spawn. River fishing is also forbidden on every Sunday during the open season, and this has been the case for some considerable time. Limits also don't seem to be an issue on many of the southern rivers although they do apply when fishing for stocked rainbows and browns on the lochs. On the rivers, a kill limit of two wild salmon or trout is considered acceptable per day, although no actual limit is set.

The fishing laws in Scotland are ancient with the earliest known law being in place during the 15th Century. Unlike many other countries such as England, Scotland has no state licensing system in place for fishing. Until a salmon is caught, it is considered to be a wild animal. However, once caught, the salmon belongs by common law to the person who caught the fish. Nevertheless, various statutes forbidding the taking of salmon without right or written permission, and forfeitures imposed by statute, have made the possession of salmon legal only when they have been captured by legal means. Fishing rights are private and it is not the salmon that are owned but the right to fish for them.

Spinning on the River Bladnoch, Scotland
Photo: Joan Rodger

Therefore, no one may fish for salmon in rivers, estuaries or even in the sea within territorial limits without permission of the Crown. In many cases, the rights have been granted by private individuals and local authorities. Salmon fishing rights are heritable rights that can be held separately from the ownership of the land or given along with land ownership. In the former, the proprietor of the right has an implied right of access when exercising his right to fish for salmon.

The opportunity to go salmon fishing is only available to the salmon fishery owner or to others with the express, written permission of the owner. Specific conditions may be applied to the permission such as location, method and times permitted to fish.

In general, it is not considered to be a criminal offence to fish for or take trout in Scotland. However, this does not mean that anglers have the right to fish everywhere. The rights of land owners are protected by principles of civil law, and permission should be sought before fishing.

A major difficulty in enforcing the law arises from the piecemeal nature of the large number of acts and regulations. It is a criminal offence to fish for salmon without the legal right or without appropriate written permission from the owner of the fishing right. In terms of trout fishing, the general rule is that fishing without permission is a civil rather than a criminal offence although there are exceptions under Protection Orders.

Poaching used to be a much bigger problem during the 1920s and 1930s when salmon were much larger and numbers considerably higher. I remember my grandfather telling me tales about people netting and using dynamite to catch salmon and these catches used to be so plentiful that almost everyone in the village would end up with a fish, as it was difficult to keep the fish fresh without fridges or freezers. Hanging fish on the back of the coal-shed door proved a good alternative!

Salmon fishing prices throughout Scotland vary widely and are influenced by many different factors including the time of year, the location of the beat (stretch of water) and the likelihood of actually catching a fish. Prices range from £3 ($10) to £300+ ($1050+) per rod, per day for salmon fishing and it is often necessary to book well in advance to ensure the best beats and months. No other licences are required in Scotland. Fishing for trout is normally much cheaper at approximately £2+ ($7+) per day and this applies to both river and loch fishing. Location and likelihood of catching again influence the cost. Thus, in comparison to fishing in the Lake Taupo region, salmon fishing in Scotland is considerably more expensive with some daily permits costing almost 16 times the cost of a Taupo Adult Season licence.

Current state of the Scottish fishery

Catch and release is being promoted by fishery staff in Scotland to ensure that salmon, in particular, are not being overharvested. Approximately 20% of all salmon caught by anglers are released. One incentive used is to offer anglers who catch and return spring salmon a side of smoked salmon, but only if they have taken scale samples from the fish. This recent enticement appears to be working well and salmon anglers are quite happy to return their catch. It is also worth noting that it is not illegal to sell or buy trout or salmon in Scotland unlike New Zealand.

Since 1991, an education programme known as "salmon in the classroom" has been run by the Galloway Fisheries Trust in south-west Scotland. This programme has been used successfully to educate children on the life cycle of Atlantic salmon and the various environmental problems they face. It is mainly classroom based but two field trips are also arranged for the children as a "hands-on" approach. The programme basically allows the children to look after fertilised salmon eggs until they hatch and become fry. At this stage fishery staff and the children involved take the fry back to their stream or river of origin and release them.

As discussed earlier, forestry has played a destructive role in Scottish freshwater fisheries over the last 40 years. This is now changing with new planting and thinning guidelines and the use of forestry materials being incorporated into fishery management. For example, spare wood is being used to create weirs, while logs and Christmas trees are used for stabilising and protecting bank sides. Likewise, root structures are being incorpo-

rated into bank sides to help strengthen them. These structures also create excellent cover for juveniles. Acidification is also being minimised by promoting buffer strips along the sides of streams and rivers combined with an increase in open spaces, especially around higher altitudes where pollutant loading on trees is greatest. Acidification, excessive shading and siltation resulting from poor past forestry practices have severely limited the aquatic biodiversity of large sections of these headwaters.

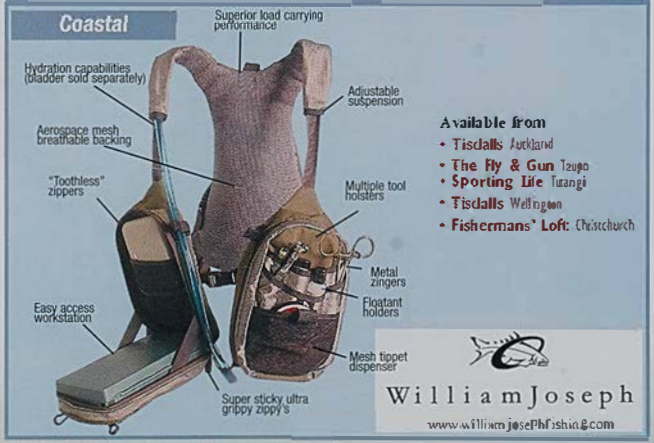
In conclusion, it is interesting that both of these fisheries have similar issues in terms of their management, the species present and problems encountered. What is rewarding, is that both countries are taking sufficient action to counteract these problems. As mentioned earlier, wild Taupo rainbow trout can only be compared to wild Scottish salmon, as all of the rainbow trout present in south-west Scotland are farmed and their overall condition is generally poor in comparison to wild Taupo trout. I remember vividly the first Taupo trout that I caught of any size at the Tongariro Delta and it was as silvery and beautiful as a prime Scottish salmon. The wild brown trout here in New Zealand are also much larger than their Scottish cousins, although they are still partial to some traditional Scottish fly patterns!

NEWTON STEWART ANGLING ASSOCIATION RULES

- All fry, parr, kelts, smolts, gravid backend and unclean fish to be returned immediately.
- A two fish per day (300mm) kill limit applies to all Association controlled lochs.
- No illegal method of fishing by net, rake, drag hook, otter or any illegal instrument to be practised. Any member or permit holder found committing any of the above offences will be liable to expulsion from the association and permit withdrawn for life.
- Permits, fish and tackle in holders possession should be exhibited to any association member on their request. Permits must be carried at all times when fishing and shown on request.
- Maggots, prawns and shrimps are totally prohibited on all Association waters.

Bringing accessories out of the "Dark Ages"

Yes, we know fly fishing is a sport built around tradition, however, with new technologies some traditions no longer seem relevant. You know, like tying your horse up to the hitch with two knots. Or making sure your typewriter has a new ribbon, so all your correspondence looks fresh. You get the idea. With time comes change and improvement. And in the William Joseph tradition of improvement, we offer these cutting-edge technologies:

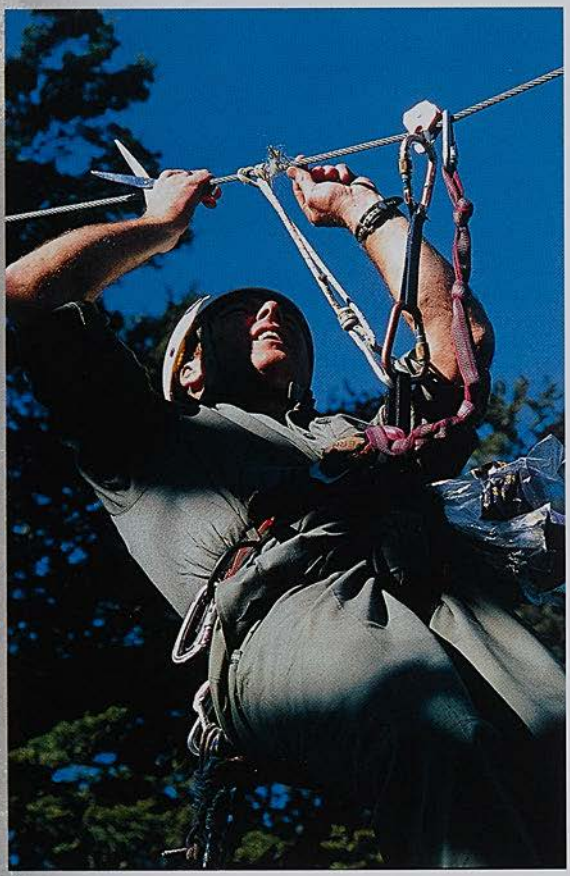


ALL IN A DAY'S WORK

One of the sights that has irritated many of us are the tangled masses of nylon and flies looped at intervals along on the sway wires of the Major Jones footbridge, over the Tongariro River. Over the years trout visible from the bridge have proved just too much temptation for anglers. Despite the close proximity of the bridge they have tried their luck only to frequently loop their backcast around the wire ropes overhead.

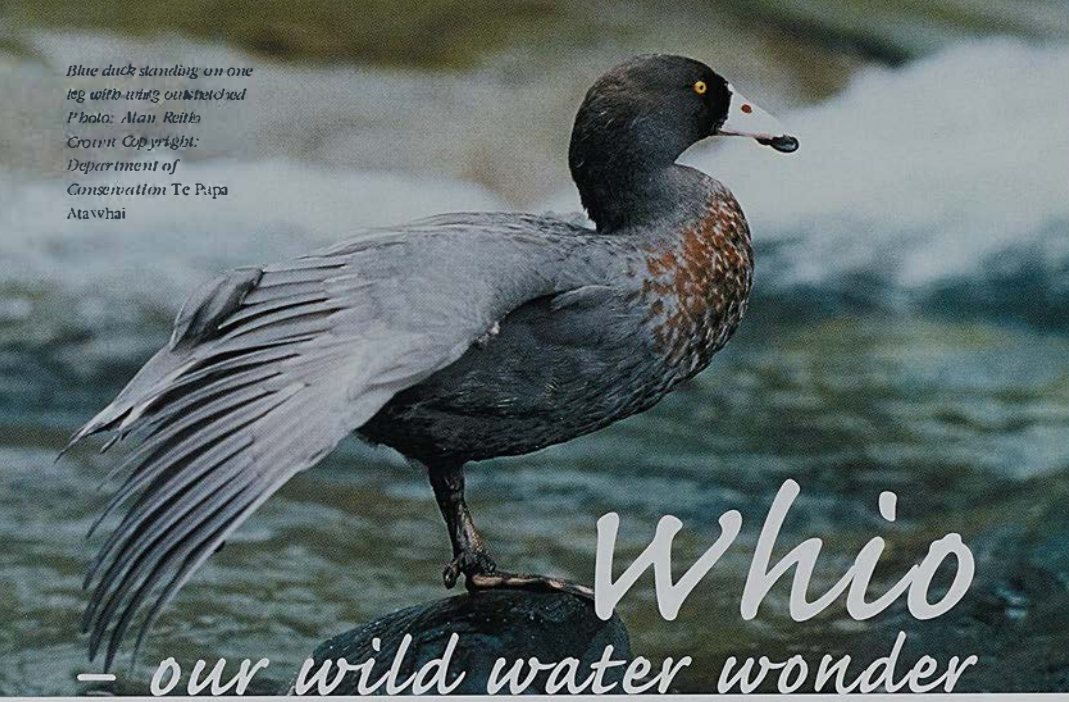
With the arrival of Rob Kirkwood to join the fishery team a solution to this eyesore was at hand. Previously a professional mountain guide and expert in abseiling and rope work, Rob volunteered to traverse along the wires and remove the accumulated litter.

Rob made the task look easy but we noticed that no one else was in a hurry to join him. In less than an hour the job was done and Rob even had a few flies to add to his fly box.



Rob Kirkwood at work on the Major Jones Bridge.

Photo: Glenn Maclean



Blue duck standing on one leg with wing outstretched Photo: Alan Reith Crown Copyright: Department of Conservation Te Papa Atawhai

Whio – our wild water wonder

by Nic Etheridge

Nic is Technical Support Officer: Biodiversity, for the Tongariro/Taupo Conservancy, and is passionate about the plight of blue duck

Few who hunt, fish or tramp the upper river valleys of the central North Island, the western flank of the Southern Alps or Fiordland can fail to have heard it – whio! whio! whio! A shrill whistle, carried above the noise of cascading white water. On a rock not far away, its body stretched forward as it utters its most obvious note, a male blue duck signals its presence. His mate, identical in appearance with her steely blue body, chestnut-speckled breast, whitish bill and a piercing yellow eye, will probably add her reply in the form of a couple of low growls.

Blue duck prefer turbulent, bouldery rivers and streams flowing out of heavily forested catchment areas, which allow for high water quality, low sediment loadings and abundant and diverse invertebrate (insect) communities. Stable river banks with a good cover of native vegetation are also important features for blue duck.

Blue duck are unique to New Zealand for a number of reasons. On a world scale they are one of only three species which occupy fast flowing, high country rivers. They are the only one of their kind in New Zealand. They have a fleshy flange on either side of their bill, either to assist food collection or to protect their bills from abrasion, and large feet which assist in swimming against the often strong and turbulent flow and enable them to ascend almost vertical sides of boulders.

Their food consists predominantly of stream invertebrates and in this regard they have a similar diet to trout. They glean aquatic insects from the sides of rocks or pick them from the water as they drift past.

Blue ducks are an indicator of river quality and natural character. As higher order predators of aquatic invertebrates, the higher the number of breeding pairs of blue duck on a given stretch of river, the greater the invertebrate production and therefore life supporting capacity of that river.

Blue duck live in pairs on exclusive territories of up to a kilometre long. Strong pair bonding results in individual pairs occupying the same

Blue duck feeding with head under water Photo: Alan Reith Crown Copyright: Department of Conservation Te Papa Atawhai

Blue duck adult and three ducklings
Photo: Alan Reith
Crown Copyright: Department of Conservation Te Papa Atawhai

stretch of river year after year, which they aggressively defend against other blue duck, as well as grey duck, paradise duck and even shags or gulls. The males tend to live up to 12 years while females are generally much shorter lived. Typically, nesting and egg incubation of 4 to 7 eggs is undertaken by the female while the male stands guard. Nesting begins in August and continues through to November, with juveniles ready to fledge in February/March. Nests are as shallow, twig, grass and down-lined scrapes in caves, under riverside vegetation or in log-jams. They are therefore very prone to spring flooding. For this and other reasons, their breeding success is extremely variable from one year to the next.

For those of you who spend many a day travelling up and down our backcountry rivers, there is no doubt you will have come across this masterful white water specialist. Occasionally anglers even see single birds on the upper Tongariro River around the Blue Pool. Sadly however they are becoming less abundant. While fishing up the Travers Valley in Nelson Lakes National Park, I would be constantly reminded of the demise this species was facing. One lone male would religiously call but each season left him without luck. Whilst fishing I would imagine what the river must have been like full of blue duck. How long ago was that?

The species is now limited to the less modified catchments of the Urewera, East Cape and central areas of the North Island and along the west coast of the South Island from Nelson to Fiordland. The remaining populations are becoming increasingly fragmented and isolated as their range decreases. It is estimated that about 640 pairs remain in the North Island while just under 700 pairs remain in the South Island giving a total population of between 2,000 and 3,000 individuals. With fragmented, declining populations which have sex ratios heavily biased towards males, and combined with low breeding success, the Department of Conservation has given this species a classification of "Nationally Endangered", the second highest level of threat. Blue duck are recorded by the International Union of Conservation for Nature (IUCN) as "vulnerable".

So why are blue duck declining? One of the major causes is habitat loss and degradation. Forest clearance for agriculture and poor riparian (riverside) management has resulted in reduced water quality through sedimentation and nutrient run-off changing in-stream invertebrate habitat in many catchments. In many other rivers, flows are now manipulated for hydro-electric power generation or irrigation, changing the characteristics of the rivers.

STOATS AND BLUE DUCKS

Direct evidence of who kills what is often very hard to come by. Modern video technotogy has played an important role in bringing the real culprits to the fore. Te Anau DOC officer Murray Willans has made use of video to monitor nests to follow the breeding attempts of blue ducks alongside the Milford Track. For the past three years he has run a line of traps alongside the Milford Track in the Clinton River Valley. It has been enough to reduce stoats to a level where they are undetectable in tracking tunnels set up to monitor rat and stoat presence. But it has not been enough to eradicate stoats, nor eliminate their deadly effect. At the beginning of this study Murray banded 18 male blue ducks and five females. Three years later only one female remains and only one brood of ducklings has been sighted there in the past four years. After so many years of no production, a catastrophic decline in Fiordland blue ducks is obviously looming even with predator control.

At the other end of the country, in Bay of Plenty, DOC officer Andy Glaser has monitored blue ducks on the Takaputahi River, a tributary of the Motu. He has watched the number of adult birds decline by two thirds over 10 years where no predator control exists. In addition he has been following the fate of dispersing juveniles. It appears they are not becoming a part of the population because they do not survive their first year.

However, even where high quality river habitat remains, predation by introduced predators is playing a significant role in the decline of the species. The observation referred to on the Travers River is typical. The lone male is a symptom of what appears to be the root cause of the decline – the high loss of breeding females. Stoats are perhaps the greatest danger here, as the photo below shows. They attack females on the nest, steal the eggs, and perhaps even take young ducklings from the rivers edge. This appears especially significant in the beech forest of the South Island. Feral cats, domestic dogs and ferrets are also known predators of blue duck, while rats and possums have been recorded at nests and are likely to take eggs.

A stoat attacks a female blue duck
Photo: Murray Willans
Crown Copyright: Department of Conservation Te Papa Atawhai

As New Zealand and overseas tourists increasingly utilise wilderness rivers for recreational activities like white water rafting and kayaking advemuces there is some, as yet unquantified evidence that disturbance of family groups during the breeding season is also having an adverse effect on populations. The use of rivers by anglers, especially if they have companion dogs, may also be an issue seasonally when ducks are either breeding or moulting (a period in summer when the ducks lose their feathers to grow a new set and during which time they cannot fly).

The larvae of aquatic insects – mayfly, caddis, dobsonfly, stonefly – are high on the blue duck's list of choice foods, just as they are of trout. Massey University student Dale Towers conducted research into the competition between blue duck and trout. He concluded that, although blue duck and trout each eat the same prey, they partition it out according to prey size. Therefore, direct competition is unlikely to be a major cause of the blue ducks decline.

With all these odds stacked against it, how is it possible to reverse the decline of this unique taonga? Conservation of blue duck is guided by the Blue Duck Recovery Group (BDRG), consisting primarily of specialist

staff from DOC, together with a co-ordinator of private holders of captive ducks. Strategic direction for blue duck conservation was initiated with a blue duck conservation strategy produced in 1988. Since then a Blue Duck Recovery Plan has been developed with the key aim of maintaining sufficient numbers of blue duck in the wild to see its IUCN and DOC threat categories reduced from their current high levels.

Since publication of the recovery plan, the focus of recovery planning has shifted from "how many ducks are there and where are they?" to halting and reversing the ongoing decline. In particular, there is increasing emphasis on the role of predation in population declines. This led to the BDRG developing a research by management strategy which provides a strategic approach to investigating the predation issue on key rivers.

However this programme will not protect enough blue duck over a large enough area to ensure the future of the species. In response, the BDRG has identified eight regions where blue duck must be conserved to ensure a future for the species. Within these regions a minimum of 30 inter-relating pairs will be protected. The central North Island is one of the eight regions identified.

In the central North Island the Tongariro/Taupo and Wanganui conservancies have joined forces in the western central North Island. Staff, in consultation with the new Central North Island Blue Duck Conservation Charitable Trust, have developed a strategy which aims to secure key populations, re-establish a Mt Taranaki population, monitor the outcomes of management and to work closely with community groups and iwi.

The North Island remains a national stronghold for blue duck with a number of rivers holding important populations. The most important blue duck populations in the central North Island include the Whakapapa, upper Whanganui, Mangatepopo and Manganui-a-te-ao rivers. Other rivers in the region, including the Retreuke, Oamaru and streams in the Kaimanawas, potentially hold important populations but their size and viability is unknown. The Tongariro River previously held a key population but that has declined, likely as a result of water extraction and the impacts of nearby volcanic eruptions.

The central North Island has been a major centre of blue duck research and management for over two decades now. The establishment of the Central North Island Blue Duck Conservation Charitable Trust provides an important opportunity to increase that knowledge further. The need for, and the importance of public and community help to protect remaining small blue duck populations has never been greater. All of which makes the arrival of a new source of funds for blue duck conservation a much needed and timely boost. It will benefit the species not only in the catchments running off the mountains of Tongariro National Park, but throughout the country (see page 51 in this article on the Central North Island Blue Duck Conservation Charitable Trust). Anglers sharing our special whitewater with whio, can assist them in their battle for survival. Below are tips on conduct around whio, should you have the special experience of encountering them while out on a river fishing.

VOLUNTARY CODE OF CONDUCT FOR ANGLERS AROUND WHIO -

- Anticipate seeing whio on upland central North Island rivers
- leave your dog at home, but at the very least, keep it under tight control
- If you need to move past an active group of whio, do so quietly and make slow, deliberate movements
- Keep as far away as conditions and safety will allow
- If birds are taken by surprise and they are alarmed, move away and give them time to settle
- If whio are moving towards you as you fish, take up a motionless position until they pass.

As well as following these guidelines anglers can help whio by reporting sightings to any DOC office or at www.blueduck.org.nz . Reports need to cover how many whio were seen, whereabouts and when.

For more information on blue duck contact your local DOC office.

CENTRAL NORTH ISLAND BLUE DUCK CONSERVATION CHARITABLE TRUST

Approximately ten years ago, ECNZ (the predecessor to Genesis Power Ltd) began the process to renew resource consents to continue to operate the Tongariro Power Development (TPD) scheme. ECNZ started consultation with many interested and affected parties including anglers, the Department of Conservation (DOC) and the Royal Forest and Bird Protection Society (Forest and Bird).

Central to the concerns for DOC and Forest and Bird were blue ducks and trout, two of the more conspicuous inhabitants of these rivers. After much discussion, DOC, Forest and Bird and Genesis Power ltd agreed a package for blue duck consisting of the release of specific flows below the Mangatepopo and Whanganui intakes on the Western Diversion of the TPD and the establishment of a blue duck trust. The trust would provide for ongoing initiatives to enhance, protect and promote blue duck populations, habitat and natural character.

A formal agreement was entered into on 2 November 2000 and the Central North Island Blue Duck Conservation Charitable Trust (CNIBDCT) was launched in Tokaanu on 16 August 2002. The trust is chaired by former Forest and Bird president Keith Chappell. The new trust seeks to assist the establishment of new blue duck populations, especially locally, the protection of existing ones and the promotion of blue duck river conservation awareness from a fund of $1.5 million provided by Genesis Power.

THE PRIMARY OBJECTIVE OF THE TRUST IS TO:

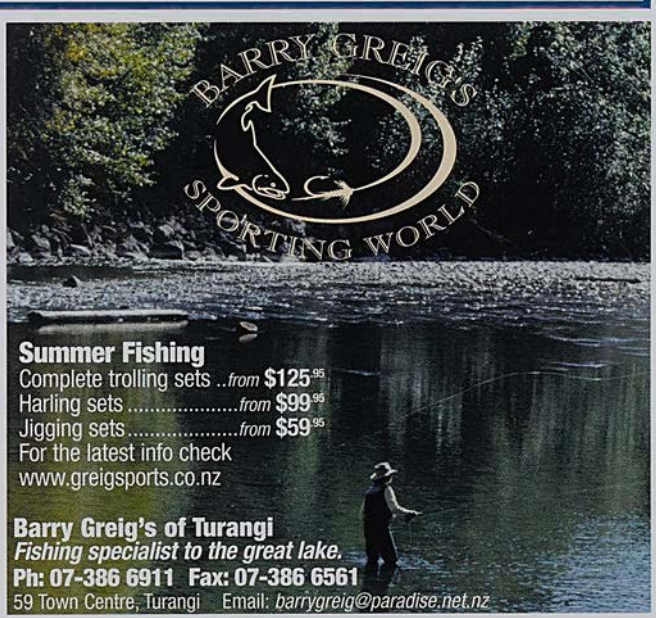
- **Create new self-sustaining populations of blue duck in appropriate locations (not limited to the TPD region)**

THE ANCILIARY OBJECTIVES ARE TO:

- **Enhance existing populations of blue duck within catchments affected by the TPD as a first priority but not limited to these catchments**
- **Enhance priority aquatic indigenous ecosystems within the catchments affected by the TPD**
- **Enhance priority threatened species conservation work within the catchments affected by the TPD**

The trust has recently approved two projects following the Blue Duck Recovery Group's recommendations. The first is to undertake a predator control pilot study on the Manganui-a-te-ao River in the central North Island and the second is to establish a new blue duck population on Mount Taranaki in the Egmont National Park.

If you would like to find out more about the Trust contact Bonny Hooker C/- Tokaanu Power Station, Private Bag 36, Turangi. Ph 07 3861112 or e-mail bonny.hooker@genesispower.co.nz.



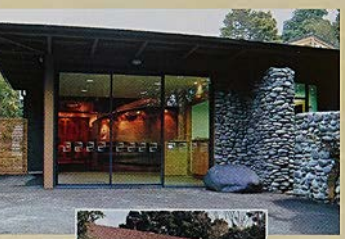
Exciting developments at the Tongariro

by Petrina Francis

This is what it is all about! Budding anglers of the future learning all about the life cycle of trout

Photo: Bill Crawford

In issue 30 of *Target Taupo* a master plan for the development of the Tongariro National Trout Centre was outlined, which included major projects to improve the complex and add value to the visitor's experience. Since that article was written (March 1999) a great deal has been achieved including the upgrading of the underwater viewing chamber, and building a kiosk to service the children's fishing pond. And this year saw the biggest development of all, a new interpretive building opened at the centre – "The River Walk".

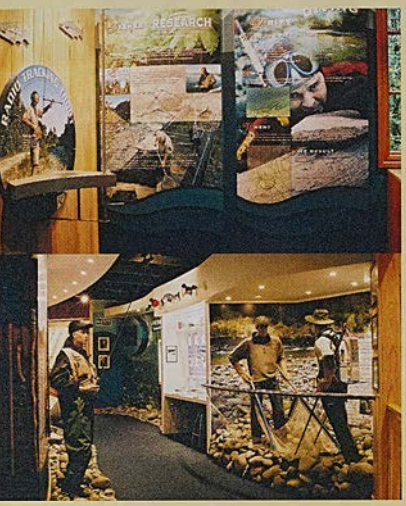


The entrance to The River Walk building today
Photo: Blake McDavitt
Inset: The way it was – the original DOC workshop building which has now been developed into "The River Walk" visitor centre
Photo: Glenn Maclean

Over $500,000 was raised by the Tongariro National Trout Centre Society to develop this impressive building. This huge achievement was only possible through the dedication, effort, and enthusiasm of the society, who want to encourage the public to learn about the history of fishing in the area and the wonderful opportunities this sport provides. Many generous sponsors and benefactors contributed funds to the development, along with major sponsor Genesis Power Ltd. These individuals, families and corporate sponsors, without whom the project would never have become a reality, are acknowledged at the entrance of the new centre. The time taken to develop the displays inside has certainly been well worthwhile, and can be seen in the content and the quality of craftsmanship. As you enter the building your eye is drawn to the beautiful collection of antique fishing gear on display, including rods and reels that date back to the 1800's,- an enthusiast's dream! Other displays are designed to help the public understand more about different angling opportunities available in the district, the life cycle of trout, freshwater ecology, pest fish threats, and how DOC manages the fishery. A replica fly-tier's hut has been created with incredible attention to detail. The science laboratory draws children straightaway, with amazing photographs of aquatic insects, a diagram of the lifecycle of a mayfly and magnifying glasses through which these insects can be examined. The interactive nature of some of the displays encourages both young and old to listen, read and learn. Since the building was opened to the public by the Prime Minister, the Rt. Hon Helen Clark, on the 28th of August 2003, we have had very positive and enthusiastic feedback from visitors.

As an educational tool, the Tongariro National Trout Centre provides plenty of scope for development. We already have almost 100 school groups visiting the centre each year, and so there is certainly plenty of potential to grow and develop the centre as an educational facility. With the new build-

National Trout Centre



Far left: Displays that show the work the fishery area team does in managing the fishery

Photo: Bill Crawford

Above: The stunning craftsmanship of the angling displays

Photo: Bill Crawford

Left: The Prime Minister, Helen Clark stands outside the fly-tier's hut with John Milner, President of the Tongariro National Trout Centre Society

Photo: Dave Wakelin

ing now open, school groups visiting can take advantage of learning from the displays and viewing an educational video in the auditorium. A plan is underway to employ a teacher for the facility, who would be responsible for the development of programmes delivered at the centre, based around the NZ school curriculum. Through these programmes, children would be given a quality learning experience outside of their normal class environment. The centre as a whole lends itself well to both classroom learning and "hands on" interactive sessions based around science, social science, geography, conservation, mathematics, physics, trout, stream ecology, and the use of technology for scientific study.

Issue 41 of *Target Taupo* outlined the conceptual plan for the new building and visitor centre. It is exciting now to see the plan has taken shape and how impressive the new centre is in reality. The building is a credit to the society and the vision of designer Peter Langford, who as a keen angler himself saw the potential for the displays. The interior design of The River Walk building imitates the flow path of a river as it winds and curves past stones and boulders, and as the visitor rounds each corner there is a new display to see.

If you have not visited the Tongariro National Trout Centre recently, we encourage you to turn off State Highway One and visit for a while. The centre is open from 10 am until 3pm daily and we are sure you will be impressed with the developments. There are a keen group of volunteers at The River Walk building daily, who are more than happy to talk to visitors about the displays, as well as our on duty Ranger who can answer any questions you may have about the centre. Our hope is that a visit to The River Walk, along with a stroll through the grounds of the Tongariro National Trout Centre, will open your eyes to the wonderful world of fishing in the district, and the importance of the work done by our fishery area team in managing this superb resource.

Analysing insects at the science display

Photo: Bill Crawford

SONOMA CREEK

By Dr Michel Deduat

Rainbow trout were first introduced to New Zealand from a shipment of eggs from Sonoma Creek in central California. Sonoma Creek flows directly into the northern part of San Francisco Bay and still has a run of steelhead trout. In June of this year, Michel Deduat, our fishery area scientist, visited this river which is so significant to New Zealand anglers.

Sonoma Valley is in the heart of the California vineyard area

Photo: Michel Deduat

After a long trip in a cramped plane I eventually landed in Los Angeles and after a delay of three hours embarked for San Francisco. Courtesy of "Nine Eleven" I didn't have to wonder what to do with these three hours; the immigration, customs, check points, scanning point, baggage X-ray point and re-check point made sure that I remained in a queue for almost all this time. Welcome to America!

I arrived at last at San Francisco where John, a friend based in Davies was waiting for me. During the trip from San Francisco we made a plan for the next day to visit the Sonoma Creek catchment to investigate the origin of rainbow trout in New Zealand.

The next morning we drove to Sonoma City, a booming tourist destination of about 20,000 people in the heart of the Californian vineyard area. Sonoma City is known for its downtown plaza, historic buildings and fine wines. In 1846 the plaza was the site of the declaration of California's independence from Mexico. Being in a tourist wine producing area bosed some dangers but it has also kept the heavy industry and its nasty "byproducts" at bay.

In Sonoma we went to the Tourism Information Centre where we explained the purpose of our visit. I had expected all Californians to be aware of the establishment of rainbow trout in New Zealand, and anticipated being inundated with information as soon as this was mentioned. The person in charge was immediately interested but to my dismay he couldn't put us on the right track! After some searching in the shop library we came across a picture dated 1984 showing the Governor of California receiving a painting from a New Zealand artist showing a fly fisherman, as recognition of the role that trout from Sonoma Creek had played in the introduction of trout to New Zealand. However, we couldn't get much information about the orig-

Right: The small tributary called Calabazas Creek that meets Sonoma Creek

Photo: Michel Deduat

Below: Lower section of Sonoma Creek

Photo: Michel Deduat

where it all began for New Zealand rainbow trout

inal location of the hatchery where the trout eggs were collected. The only thing that the man knew was that the hatchery didn't exist any more.

Detective work finally established that the hatchery on Sonoma Creek that produced the first shipment of rainbow trout eggs, was situated at Glen Ellen in the headwater of Sonoma Creek. It was built by a man called A. V. La Motte around 1878. The hatchery has now been demolished and unfortunately we couldn't locate the original site. We drove to Glen Ellen and after a few enquiries with local residents we were advised to contact a lady called Tish Ward who was a local ranch manager.

When we were introduced to Tish she immediately swamped us with hospitality. She also mentioned that she had some relatives in the Coromandel and that not so long ago she was in New Zealand and fly fished in the South Island! What a small world! However, she didn't know that New Zealand rainbow trout had come from Sonoma Creek and was very interested.

Sonoma creek joins the sea
Photo: Michel Dedual

Tish is involved with the California Department of Fish and Game (CDFG) and puts a lot of effort into restoring the parts of the Sonoma Creek catchment that have been affected by detrimental farm practices.

Even though Tish could not recall where the hatchery had been situated, she was adamant that the steelhead came from a small tributary that meets Sonoma Creek at Glen Ellen, called Calabazas Creek. Calabazas Creek is about the size of the Waipehi Stream and has a clean stony bottom and a slight tea colour tinge. According to Tish, Calabazas Creek has been classified by the CDFG, using invertebrate species distribution, as the healthiest creek of the San Francisco Bay area. This partly explains why steelhead are still running in the stream.

We followed the water from the headwaters to the mouth of the stream. Downstream of Sonoma City the creek gets bigger (about the size of the Waimarino Stream) but remains confined into a narrow channel with a heavy riparian zone making the approach difficult. Further downstream Sonoma Creek in its lower part is very difficult to access being almost entirely on private land. The best vantage point we found was from a winery close by. We walked past the numerous wine tasters motivated by the desire of taking the ultimate picture of the creek.

Sonoma Creek flows through one of the largest natural marsh zones left in the San Francisco Bay. The stream has a very confused course and it's incredible how the fish migrating upstream can still find the right way to go. On the road back to Davies we passed a bridge over the tidal zone of the creek, where I took a last picture before Sonoma Creek joins the sea.

We had made almost the same trip as the steelhead have been making for the last 100 million years or so and we can only hope they will continue to make this trip for the next 100 million years.

Fish pain and angling ethics

By Dr Michel Dedual

Do fish feel pain? This simple question has opened a can of worms among anglers, scientists, and animal welfare activists. Reasonable arguments have been made both to support and refute the claim that fish are capable of sensing and experiencing pain. Last year, two scientists, one alleging that fish don't feel pain, and the other that they do, reignited the debate.

What is pain?

A good definition is: pain is exactly what you say it is and it hurts when you say it hurts. However, animals cannot tell us when and how much it hurts. This leaves us having to make some sort of measurement using experimental protocol and then making a judgment based on the results.

The pain felt by humans includes two aspects: the actual physical sensation and the emotional response (the way it makes you feel). The emotional part of pain is specific to each individual. The level of pain a person feels depends on a variety of factors, including their mood and what the pain means to them. This is why different people experience different levels of pain, even if they have the same physical condition.

The physiology of pain in humans is extremely complex, and scientists have determined many types of brain cells are involved one way or another in the perception and/or transport of the information. However, even if names have been given to some of these cells their function will probably never be fully known. This is the first point to make in the debate over whether fish feel pain: there is no absolute definition of pain.

Who to believe?

Fish don't feel pain

Dr James Rose of the University of Wyoming has presented a strong argument for the inability of fish to experience pain that relies on comparing the structure of the human brain with that of a fish brain. Neuroanatomy says that the highly developed neocortex of the human brain is responsible for our ability to experience emotions and sensations such as pain. This so-called emotional centre of the brain is missing in fish.

Rose distinguishes between reaction to injury and the psychological experience of pain and emphasizes that the presence of the former does not prove the existence of the latter. Indeed, human experiments have proven that the sensation of and reaction to noxious, or potentially harmful, stimuli can occur without the experience of pain. The concept of nociception makes this possible.

Last year, two scientists, one alleging that fish don't feel pain, and the other that they do, reignited the debate.

The term nociception refers to the detection of harmful stimuli by the nervous system. The nociceptors sense stimuli and report to the central nervous system where motor responses are initiated and the sensation of pain is perceived. Some fish species have nociceptors similar to those found in humans. However, it is important to emphasize that detecting and responding to noxious stimuli is not necessarily the same as feeling pain. Rose believes that a fish's reaction to being hooked is a simple "escape reaction."

While a fish may not feel human-like pain or suffering, they do however secrete stress hormones when they're hooked and/or handled by an angler. These stress hormones can have undesirable health effects on the fish if large enough amounts are allowed to build up. That is why it is important when an angler wants to release a fish, to land it before it's exhausted, keep it in the water and release it as quickly as possible.

Fish do feel pain

Dr Lynne Sneddon from Liverpool University set out to find pain receptors in fish like those in higher mammals and humans. "If we, as humans, touch a hot iron, we have a reflex to pull away immediately. This is down to nociceptors. For the first time we discovered that fish have them too."

The next step was to prove that these nerves reacted in the same way as in other animals when subjected to pain and are not a simple reflex. She injected the lips of rainbow trout with bee venom (a standard substance used to test pain) and also with acetic acid. Other fish were subjected to other unpleasant experiences, such as extremes of temperature.

Dr Sneddon observed odd behaviours in the experimental fish. The fish injected with venom and acid took almost three times longer to resume feeding than the fish that were not injected with the venom. She also says that the "fish demonstrated a 'rocking' motion, strikingly similar to the kind of motion seen in stressed higher vertebrates like mammals. The trout injected with the acid were also observed to rub their lips onto the gravel in their tank and on the tank walls. These do not appear to be reflex responses." She said that only bony fish such as cod, trout and salmon would show these responses. Previous research on boneless fish, such as stingray, dogfish and shark, which have cartilage, had not shown they had nerves or felt pain in the same way as mammals.

When asked about the psychological side of pain she says, "You can't prove emotional experience because they don't speak to you and tell you how they're feeling ... All we can do is make indirect measurements and then make a judgment based on that evidence."

So what is the right answer?

The arguments on both sides of the debate about fish pain are not as far apart as they first appear. Both agree that fish definitely react to negative stimuli, detected by sensory receptors called nociceptors. However neither side can agree on a definition of exactly what pain is, which complicates things considerably. On one hand some believe that fish cannot feel the "psychological" aspect of pain as humans do because they don't have a similar brain structure as we do and therefore they cannot feel pain. Others believe that since some similar receptors as those known to respond to painful stimuli have been found in fish then they assume that fish must feel pain. It may be a problem of semantics as much as one of science.

Psychological states are intimate experiences. This fact alone requires us to make assumptions about subjective experiences of animals in one of two ways: by analogy between the behaviours and physiological state of humans and of animals, or by making the case that pain is necessary for the existence of a species.

In the current debate both arguments are made by analogy. The difficulty is that the argument becomes even more questionable the further that you digress from the human being, toward primitive organisms. Scientists often devise experiments to ask animals what counts for them, what matters for them, and those experiments do show that animals respond as if pain does matter to them.

Using analogy is employed routinely by animal welfare scientists when assessing experiments on mammals and birds, and has even been used to argue for the capacity of invertebrates to suffer. Similarly, Dr Rose makes a case by analogy to cast doubt upon pain sensation in fish by showing that fish neuroanatomy is sufficiently different from that of humans.

Pain evolved because, by being unpleasant, it keeps us away from the disaster of death (an evolutionary necessity). Clearly any animal could not be successful unless it featured both a mechanism for detecting potentially harmful stimuli and a kind of negative or unpleasant psychological or subjective state or experience with which it could associate such stimuli. Pain is part of a mechanism for helping us to avoid immediate sources of injury, and also to refrain from repeating actions that have resulted in damage.

Fish can remember negative experiences. For example, paradise fish avoid places where they have experienced an attack by a predator and continue to do so for many months. Studies carried out in New Zealand have shown that when trout are caught and released they will for a certain period be more difficult to catch a second time. Carp appear to have a very good memory and can avoid bait for up to three years after they have been hooked just once. This indicates that fish can learn from "unpleasant" experiences and become "hook" shy.

The problem with evolutionary necessity is that, providing you have nociceptors, you don't need a brain to make the right decision as to what to do in the case of stressful stimuli. For example, bacteria can react to light or elec-

A SUSTAINABLE FUTURE FOR THE TAUPO CATCHMENT

This article has been contributed by Jennifer Pearson, Communications Adviser for the 2020 Taupo-nui-a-Tia project

Photo: Destination Lake Taupo

Sustainable development is all about looking at the big picture. It's about thinking ahead and making sure the things we do within our communities are achieving benefits for the environment, people and the economy all at the same time.

That's exactly what the 2020 Taupo-nui-a-Tia project is aiming for in the Taupo catchment. It is a three-year project being driven by Environment Waikato and Tuwharetoa Maori Trust Board, funded by Ministry for the Environment, working together with a number of other local agencies and stakeholders.

Threats to the Lake

The 2020 project has looked at what could be threatening the health of lake Taupo and its catchment. We've asked the community what they think the threats are and we've also asked scientists. Bringing this information together, we're developing a priority list of the main threats to the lake that we need to plan for. So far, these include:

- Nutrient enrichment of the lake
- Animal and plant pests threatening native plants and desirable fish species
- Diseases from organisms in roof tank water, deposited by birds and possums
- Restricted access to the lake and its tributaries
- Confusion about the roles and responsibilities of agencies who manage natural resources
- Destruction and changes to waahi tapu sites.

Planning Ahead

So what are we doing to make sure these threats don't become a reality?

In mid-November, Environment Waikato and Taupo District Council will release their strategy to reduce nitrogen reaching the lake from catchment land uses. This is a major undertaking and will require everyone around the lake to do things a little differently in the future. Find out more about the strategy and opportunities to have your say later in this article.

Other threats will be addressed by various agencies in association with the 2020 Taupo-nui-a-Tia project. These agencies include Taupo District, Tuwharetoa Maori Trust Board, Department of Conservation and Environment Waikato.

The 2020 team will complete a community action plan by June 2004, highlighting what different agencies will do to address the priority threats to the lake and its catchment. You can keep up to date with progress on the plan by visiting the 2020 website at www.taupoinfo.org.nz

Progress with plans to reduce nitrogen in Lake Taupo

This article has been contributed by Angelina Legg who provides communications and consultation advice for Environment Waikato

Photo: Destination Lake Taupo

After more than two years of hard work and discussions with agencies and landowners, Environment Waikato and Taupo District Council will release a strategy to protect Lake Taupo later this month. The strategy is supported in principle by central government who are currently considering their role in protecting Lake Taupo, a national icon.

Scientists agree that the lake is under threat from increasing nitrogen leaching from land uses in the catchment. To simply maintain the lake's current water quality, we need to reduce the amount of nitrogen coming from farmland and urban sources by 20 percent.

To develop a solution that meets the needs of the community as well as protecting the lake, Environment Waikato and Taupo District Council have been working together with:

- Central Government
- Tuwharetoa Maori Trust Board and their economic authorities
- 2020 Taupo-nui-a-Tia project
- Taupo Lake Care farmer group
- Forestry representatives
- Department of Conservation
- Lakes and Waterways Action Group

Strategy proposes mix of rules and support

The forthcoming strategy suggests a way forward to protect the lake and ensure a viable local economy and community. It proposes using rules in the Waikato Regional Plan to prevent nitrogen outputs from land in the catchment from increasing and to reduce nitrogen coming from sewage and septic tanks.

Alongside this, the strategy will suggest support for land use change to reduce the overall nitrogen load to the lake, together with research and advisory services to improve economic opportunities for landowners. Any restrictions on nitrogen outputs from land in the catchment will require a significant contribution from landowners in the form of missed opportunities and loss of capital value. Landowners have already made extensive contributions to protecting the lake by planting plantation forests, retiring riparian areas and setting aside lakeshore reserves.

The challenge for agencies and stakeholders will be to achieve the best possible compromise solution, recognising that the agencies involved want to ensure that the district's economy continues to prosper. Central government has agreed to work separately with Tuwharetoa to address any Treaty issues arising out of land use restrictions in the catchment.

Tell us what you think

Community input and buy-in to any solutions is critical to the success of plans to protect the lake. We want to hear what you think!

Environment Waikato and Taupo District Council will formally release the strategy to protect the lake later this month. We'll be holding stakeholder meetings throughout the Taupo District in late November and early December. If you live in the Taupo District, watch out for notices in the Taupo Times, Tunangi Chronicle and on the radio about when and where these meetings will be held.

If you'd like someone from Environment Waikato to talk with your group about plans to protect the lake, phone us on the Environment freephone 0800 800 401.

For a copy of the full strategy document, check out our website at www.ew.govt.nz later this month or call the Environment freephone 0800 800 401.

Where to next?

Your input will help guide further development of the strategy. Your ideas and preferences will determine the actions and funding commitments that are included in Environment Waikato and Taupo District Council's Long Term Council Community Plans (LTCCPs). These documents set out the councils' overall priorities for the year ahead and outline how they will be funded.

We still have a long way to go before we reach a final solution to protecting Lake Taupo. We know we need to act now and look forward to hearing your opinions about our proposed plan of action.

TEAM PROFILE

Pia Te Rangiita

Pia joined the Taupo fishery area team in August as our Ranger – Service, responsible for the administration of the Taupo District fishing licences. Pia previously worked in Auckland in the telecommunications industry, and leapt at the opportunity at a career change. The job provided an opportunity for Pia to return with his partner Deborah, and their two sons Benjamin and Cole, to the area where he was raised.

Keen on the great outdoors, Pia is excited about having resources such as the local lakes, rivers and mountains on his doorstep once more. Like most boys raised in the area he is keen on skiing, mountain biking and angling (although he admits that his angling abilities are severely outweighed by his enthusiasm). He is looking forward to hitting the snow and taking on the elusive rainbow trout, armed with a pocket full of band aids and his young family in tow.

Pia is enjoying his role with the Taupo Fishery Area team and cites job diversity as being the key. "It was the best move I've ever made. Not only is it a pleasure to be a part of such a friendly team as this, but I'm learning so much about the fishery. I can't think of any other office-based role that allows you to get out on the lake and rivers as part of your job!"

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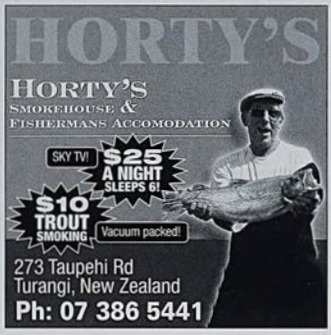

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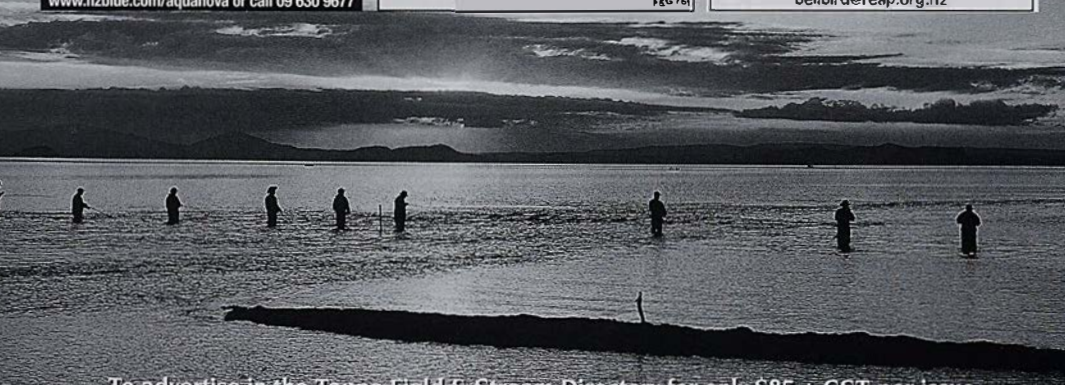

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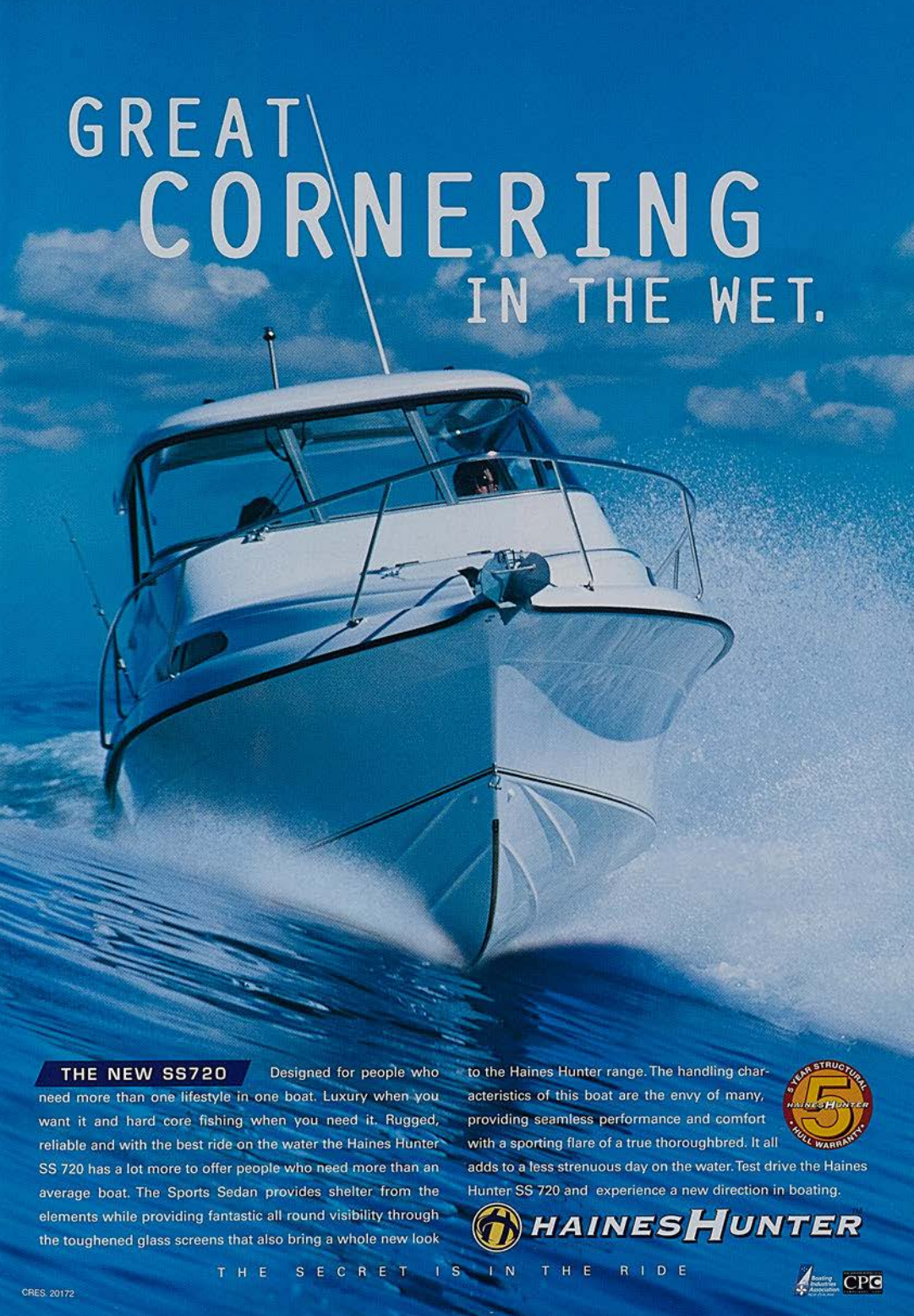

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