

## **Biology and Distribution of Trout in New Zealand**

*(Revised 2010)*

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*Rainbow and brown trout are not only highly adaptable but they appear to choose alternative life-styles based on habitat preference. This article focuses on the behavioural and biological diversity underpinning the diverse trout fishing opportunities in New Zealand.*

### *Brown trout distribution and biology*

Brown trout (*Salmo trutta*) were first introduced to New Zealand from Europe (via Tasmania), back in 1867. Wild trout populations now occur throughout all significant river systems south of the Coromandel Peninsula. Interestingly, many of these systems were not intentionally stocked by the Acclimatisation Society, but were colonized by sea going subpopulations of nearby rivers.

Adult browns in New Zealand river systems can be broadly divided into four population types: lake-resident, river-resident, estuarine-resident or sea-dwelling. Owing to a combination of habitat and behavioural peculiarities, each population type offers unique fly fishing experiences.

### Sea trout

Silvery sea trout enter the lower reaches of many rivers in spring, pursuing recruiting whitebait, and again in late summer, when trout migrate upstream to their spawning beds. Recent research on the chemical composition of trout otoliths (ear bones) and eggs, found that trout sub-populations return to spawn in the same tributaries each

year, and that river-resident fish choose tributaries further upstream than those that live in the salt.

Sea-run brown trout are mostly targeted early in the season in the lower reaches and estuaries - i.e. when the whitebait are running – using baitfish imitations. Fishing the estuaries and lower reaches at night with a small wet fly, such as a butcher, attached to the bend of a dark streamer (e.g. black woolly bugger or rabbit fly) is also effective. The fish are often attracted to the large fly but take the trailer.

Sea run fish are also occasionally taken on nymphs, while fishing the middle and upper reaches of river systems for river-resident fish. They are silvery in appearance, often with a purple sheen, and their scales are easily dislodged, appearing on your hands and in your landing net as small silver sequins.



*This silvery sea run brown trout was caught on a nymph in the middle reaches of a small North Island stream.*

### Estuarine-resident brown trout

Some brown trout spend most of their lives in larger estuaries; moving upstream only to spawn. They lack the silvery colouration of their sea going cousins and, on account of their poor fighting ability, are often referred to as “slobs”. Fishing for estuarine browns involves casting baitfish imitations to feeding fish. Despite the derogatory name given to the quarry, the hunting and sight fishing elements of this facet of New Zealand flyfishing make for a lot of fun.

### River-resident brown trout

Most river-resident brown trout are found in the lowland portions of the river system where gradients are lower and flow rates more manageable for smaller fish. The flood-prone headwater and backcountry sections are generally inhabited by large fish, ranging between four and seven pounds. River-resident backcountry trout are able to attain these proportions, even though they feed predominantly on diminutive insect larvae, because their population densities are so low (often <20 fish per km) there is no real competition for food. However, trout can only grow so big feeding on insects.

Double figure trophy fish caught in the backcountry in late summer are often well conditioned sea-run trout returning to their spawning tributaries, after spending most of the year stuffing themselves on protein-rich marine forage-fish like mullet, anchovies and smelt.

Some backcountry brown trout, especially those found in beech forested headwaters, attain trophy proportions feeding on mice. Every three to five years New Zealand's three species of beech tree produce bumper seed crops; a phenomenon known as "masting". Mouse populations in these forests explode in response to the increase in food; which includes both the seeds and insects (such as caterpillars) feeding on flower litter. Mice are not afraid of water and during such population explosions many attempt to cross rivers and lakes at night; which is when they are most active.

Individuals within local trout populations soon learn to target these abundant, high-energy packages, and gain condition incredibly fast. Most resident back country brown trout are male fish in average condition. A 7lb fish in average to poor condition can become a 9 or 10lb fish in excellent condition during a mouse year, within just a few months. Several autopsies on mouse feeders have yielded more than 20 mice per stomach.

Most mouse eaters are caught during the day using nymphs or dry flies; but for those anglers prepared to make the effort, swinging mouse imitations across pools or river mouths flowing into lakes at night can produce outstanding action.



*A typical backcountry brown trout.*

“Backcountry” is the term often used in flyfishing literature to refer to isolated or wilderness areas. Broadly speaking there are two types of backcountry stream/rivers in New Zealand: those that flow through tussock on high country plains or open valleys and those that flow through steep sided valleys of natural bush, deep within mountain ranges. The standard approach to fishing sparsely populated backcountry and headwater and streams is to cast only to sighted fish. Check out my article “Making sense of the backcountry” for more on fishing these special/wonderful places.

“Lowland” is a term used to refer to the lower gradient portion of a river between the mountains and the estuary. New Zealand lowland rivers typically flow through agricultural/pastoral lands, have well-developed reach-scale morphology – i.e. riffles, runs and pools - and are often bordered by willows. Lowland fish usually make their

homes in pools, which provide protection and shelter, but feed in the adjacent riffles where aquatic insects, such as mayflies and caddisflies, are most abundant.

Trout densities in lowland rivers tend to be high enough (typically 200 to 300 fish per km) for blind fishing techniques to be effective. The standard approach is to prospect the riffles with tandem nymph rigs, and to target rising fish with emerger patterns if a hatch develops. Most of the dry fly action takes place in the pools, as emergent insects usually drop downstream on their way to the surface.



*Success blind fishing a riffle on the Mataura River below Gore*

Lowland streams also experience seasonal “hatches” of terrestrial insects. Beetle, blowfly, hopper and willow grub imitations all work well when the naturals are about. Bully imitations, such as woolly buggers and rabbit flies, are effective at night, or during the day when the river is rising or a little discoloured.

Many lowland rivers have blind arms, known as backwaters, with little or no flow at current river levels. Backwaters are often inhabited by large trout cruising regular beats in search of food. Apart from providing good sight fishing opportunities for large fish, backwaters often remain clear and fishable when the main river is flooding.



*A good brown trout cruises a lowland backwater.*

### Lake-resident Brown Trout

The life-styles of lake-resident brown trout depend largely on the depth of the lake. Deep, clear New Zealand lakes have substantial offshore zooplankton populations living in the pelagic zone (i.e. the area of the water column between the lake bed and water surface). Zooplankton feed on microscopic diatoms and in turn support landlocked Koaro (*Galaxias brevipinnis*) larvae (whitebait), larvae of the common bully, and in the North Island, introduced populations of smelt (*Retropinna retropinna*).



*Lake dwelling smelt grow to only half the size of these 12 cm estuarine specimens*

Young brown trout begin a pelagic lifestyle after entering deep lakes, remaining offshore and feeding on smelt and the larvae of bullies and koaro. After attaining two or three pounds they move to the lake margins, where they feed on adult bullies, snails, and the nymphs of aquatic insects, such as damsel and dragonflies. Many deep lakes provide good sight fishing opportunities for large brown trout along the margins during summer. Both nymphs and dry flies are effective on sighted fish.



*Sight fishing the margins of Lake Waikeramoana*

Fishing stream mouths of large lakes at night often produces large fish. Depending on the depth of the fish and water, use a dark buoyant fly such as a booby on a high-density line, or fish a large dark streamer on a slow sinking line.



*Hooked up at a stream mouth on crystal clear Lake Wakatipu using a whitebait imitation*

In shallow lakes brown trout of all sizes feed within the weed beds, the main source of primary production. Prospecting these areas with nymphs and streamers is generally most effective. Dry flies can be highly productive around the margins of both shallow and deep lakes when terrestrial insects such as green beetles and cicadas are around.

Brown trout generally live to 8-10 years and begin spawning at three or four years old. They spawn in autumn/winter while rainbows spawn in winter/spring. The oldest brown trout aged in New Zealand was a backcountry specimen of 15 years.

### ***Rainbow trout distribution and biology***

Rainbow trout (*Oncorhynchus mykiss*) were introduced from the United States in 1886, and although populations are scattered throughout both Islands and even dominating trout biomass in a few systems, they are not as widely distributed in New

Zealand as *Salmo trutta*. Rainbows have generally done best in river systems that flow into lakes. There are some famous exceptions though, which include the Mohaka, Rangitikei, Ngaruroro and Ruakituri.

It is not clear whether the patchy distribution of rainbow trout is simply due to many rivers being unsuitable for this species, or whether certain systems are just better suited to browns, which consequently out-competed them. It seems that even though rainbows live and feed in faster flowing water, they do not handle extreme and frequent flooding as well as brown trout.

Most New Zealand rainbows begin life, like most brown trout, in the gravel of a small tributary stream. If they are spawned within a river system that has a lake downstream they may either become river-resident or lake-resident as adults.

Good rainbow populations are found in a few rivers flowing directly into the sea, e.g. Rangitikei, Ruamahanga and Pelorus-Rai drainages. Given that rainbow trout in these rivers are of Californian steelhead stock, one cannot help wondering why there are no sea-run rainbow trout populations, especially since these systems have sizeable populations of sea-run browns. Distance travelled from the coast may provide some clues to this paradox.

While several salmonids were introduced to New Zealand, only the brown trout and king salmon, *Oncorhynchus tshawytscha*, have successfully formed anadromous populations. It is perhaps no coincidence that both of these species remain close to the coast while they are in the salt. Steelhead, on the other hand, are almost never

caught by coastal fisherman within their native distribution, and are believed to move much further offshore. It is therefore possible that offshore waters around New Zealand do not provide suitable habitat for steelhead. Perhaps there is not enough appropriate food, there are too many predators, or the island current patterns are too complex for adventurous fish to find their way back to natal rivers.

River-resident rainbows are targeted with similar techniques to those described above for river-resident browns in lowland and backcountry streams. Rainbows do tend to inhabit faster water than brown trout and will often move a lot further to intercept a nymph. Although fish in deep pools are easy to spot, prospecting white water is often productive on rivers inhabited by rainbows. Rainbows are generally easier to catch than brown trout, but once 'educated' are equally frustrating.



*A nice backcountry rainbow*

Rainbow trout in large deep lakes - e.g. Lakes Taupo, Rotorua, Waikaremoana, Wakatipu, Wanaka and Hawea - spend much of their time offshore within the pelagic zone. These fish are mostly targeted by trolling or jigging from boats or flyfishing the river mouths with streamers (especially at night).

In October to December many Lake Taupo rainbows follow spawning smelt into the shallow bays and stream mouths. Targeting smelting trout along the shoreline at this time of year, as they charge into shoals of baitfish, is both different and exciting. The inshore movement of whitebait (koaro larvae) produces similar excitement at the stream mouths of many South Island lakes from March through to May.

Given the ancestry of New Zealand rainbows, fish in deep lakes, particularly Lake Taupo, are not unlike the steelhead of the Great Lakes of North America. Both use the lakes as true steelhead would the sea (i.e. to feed on baitfish), returning to natal (their nursery) rivers to spawn. They also have the chrome silver flanks and dark blue backs from whence the name 'steelhead' was derived; not to mention a partiality for Globugs. Although steelhead are bright silver on their feeding grounds, once they enter a river to spawn they soon display their olive and crimson spawning regalia.



*Silvery fresh run and spawning steelhead from the Tongariro River*

Steelhead running up Lake Taupo tributaries, such as the famous Tongariro River, support an important and unique fishery. Large numbers of anglers thrashing strong water with heavy nymphs and luridly bright indicators, splashy casting, multiple hook-ups and powerful fish, is certainly not for the faint hearted. But feel the power of that first fresh run fish and let the adrenalin hit you, and you could find yourself easily hooked.

Rainbow trout in shallow lakes without smelt populations, e.g. Lakes Aniwhenua and Otamangakau, feed within the littoral zone (i.e. any area shallow enough to support the growth of aquatic vegetation). In lakes with productive littoral zones that contain both trout species, the shallow littoral zone (1-5 m) is dominated by large brown trout during the day. Rainbows move from the deep littoral to the shallow littoral zone under cover of darkness, when the browns are less aggressive. Fishing methods for shallow lakes are similar for both brown and rainbow trout.

Rainbow trout generally attain maturity at 2-3 years and live to 4-5 years of age. Many individuals therefore die before spawning a second time. There are, however, some noteworthy exceptions, and the reason some New Zealand rivers produce trophy specimens is attributed to greater longevity. Rainbows of up to 11 years old have been recorded from the Rangitikei River. In a survey conducted by Fish & Game and the Cawthron Institute, the average age in this river system was found to be 6 years.

### *Conclusion*

Brown and Rainbow trout have adapted well to environmental conditions in New Zealand, providing diverse and unique flyfishing opportunities. Many first time visitors from overseas have been disappointed by 'elusive' New Zealand trout, largely because they expect these fish to behave like the ones back home. Understanding the behavioural complexity of both local trout species, and how they have responded to different habitats, is essential to creating realistic expectations and greater fishing success.