

Trout and Conservation in New Zealand

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The magic of fishing for trout has for hundreds of years captured the hearts and minds of men. Over the last two centuries trout have consequently spread far and wide to countries well beyond their natural boundaries. With a worldwide focus on the ecosystem effects of human activity and introduction of exotic species, trout have recently come under the spotlight as noxious aliens. This article takes a look at conservation issues surrounding New Zealand's brown and rainbow trout and the ecosystems they inhabit. Trout may just be doing more good than harm.

Food for thought

The late summer sun illumined the large brown trout swaying rhythmically alongside a boulder in the shallow tail of the pool. Concealed within the shade of a Totara tree, I clearly see the white of his mouth flash each time he inhales a nymph. Twice the fish rises: first to a mayfly dun and then to something I do not see. He seems so perfectly at one within his habitat, it is difficult to imagine that as little as 130 years ago New Zealand rivers held no trout. On one hand a sad and hollow thought, but on the other, at what ecological cost may we have gained these magnificent creatures and the tourist dollars they earn us as a trout fishing Mecca?

Trout as noxious aliens

Ever since man he has traversed the oceans he has, either inadvertently or intentionally, introduced exotic species to places he has both visited and colonised. While some exotic species have had little impact on their host countries, populations

of others have quite literally exploded, threatening the existence of unique native species by out-competing or preying directly on them. New Zealand has had more than its fair share of disastrous introductions with predators such as rats, possums, stoats, weasels and feral cats causing the extinction of several species of bird and plantlife and threatening many others.

With the recent international focus on biodiversity and broader ecosystem effects of all anthropogenic activities, the spotlight has been focussed on trout as an invasive or noxious alien. Since trout prey on native insects and fish, and compete with other predators for this food, such attention is not unreasonable.

New Zealand has no large native freshwater fish, apart from longfin and shortfin eels. Fishes recognised as most at risk from trout are the 16 *Galaxias* species, particularly those with larvae that do not spend time at sea. The latter are more vulnerable because populations are not seeded by juveniles from other river systems.



Curious eels in a North Island river

Scientific evidence collected over the last 20 or so years demonstrates that densities of galaxiids and aquatic insects are lower where trout are present. As trout prey upon insects and small fish, and juvenile brown trout compete with galaxiids for food, this result is not unexpected. Yet after more than 100 years of co-existence, most prey species remain present in good numbers, suggesting trout have generally not had a major impact. Trout populations in most New Zealand river systems are controlled by environmental factors, like the effect of highly variable water flow rates on spawning success – washing away eggs and fry. The number of trout in most river systems is consequently low by international standards - but as always there are exceptions.

The Taieri river system is unusual in New Zealand in that flow rates are stable and the number of trout is so high that fish do not grow to large sizes. Recent research in tributaries of the Taieri river system (Otago University) revealed that brown trout and river-resident *galaxias* species do not co-exist. This led researchers to conclude that trout were probably responsible for local extinctions. Further research also found that the number of aquatic insects in this river system was reduced where trout were present and the algal growth was higher than at the trout free sites, as many aquatic insects feed on algae. While there are a few other stable systems on the Canterbury Plains, the results of this study cannot be fairly compared to the majority of New Zealand River systems.

Trout appear to have had an impact on the fish in ecosystems of some natural lakes. Koaro, a little galaxiid, was once so abundant in Lake Taupo that it supported an important traditional Maori fishery. However, twenty five years after the introduction

of trout in 1887, the koaro population was so depleted that the condition of trout and their numbers had dropped dramatically. The Lake Taupo trout fishery had to be revived by the introduction of smelt, *Retropinna retropinna*, from coastal rivers. Landlocked smelt populations were also established in several other large lakes throughout New Zealand. As in Lake Taupo, smelt now comprise the staple diet for rainbow and juvenile brown trout. Koaro are still found in Lake Taupo but at levels much lower than 100 years ago. Large Koaro are regularly captured on flies by anglers jigging in deep water for trout, as smelt compete with the koaro for pelagic zooplankton, which both fish feed on as their primary source of food.



Smelt living in lakes grow to only half the size of these 11cm estuarine fish

Trout and conservation

There are much bigger and more serious threats to aquatic life inhabiting New Zealand's rivers and streams than trout. Primary threats include: reduced water levels and flow rates resulting from damming for hydroelectric schemes; excessive water

abstraction for an intensifying agriculture industry; siltation through poor riparian farming practices; deforestation and mining; and pollution from agricultural run-off and live stock, especially from the growing dairy industry.

In a survey conducted by NIWA in 2005, 70% of New Zealand lowland rivers were found to be unsafe for swimming; largely due to excessive bacterial counts from agricultural pollution.



Livestock are a serious source of agricultural pollution in rivers. Removal of riparian vegetation also allows agricultural pollutants, such as fertilizer and faeces, to run off directly into rivers.

Aquatic insects are highly sensitive to agricultural pollutants, with the result that the presence/absence of certain stonefly and mayfly species provides an accurate index of water quality. Many of the species that are abundant in clean water comprise important components of trout diet.



Large stonefly and swimming mayfly nymphs are extremely sensitive to agricultural pollutants and are important trout food in clean streams

New Zealand's trout and game bird populations are managed and conserved by Fish & Game Councils (12 Regional Councils and a New Zealand Council). These Crown entities are independent of central government and responsible directly to the Minister of Conservation. It is perhaps ironic that the Fish & Game Councils frequently provide the biggest legal and financial opposition to forces threatening the health of the country's rivers. Some 25% of the revenue generated from the approximately 75 000 full season fishing licenses sold each year is spent on habitat protection and enhancement.

Fish and Game has recently successfully applied for Water Conservation Orders protecting the Buller (2001), Motueka (2004) and Rangitata (2006) Rivers, and the various councils are currently opposing hydro-electric developments on the Waitaki, Wairau, Arnold, Gowan, Nevis, Oreti and Hurunui rivers. Fish and Game also plays a leading role in the development and advocacy of codes of practices and accords designed to restore habit and water quality by managing existing threats. The Dairying & Clean Streams Accord, for example, aims to achieve healthy water quality

in Dairying areas, through planting and fencing of stream margins, the construction of bridges or culverts at regular crossings and the appropriate treatment of shed effluent. Although District and Regional Councils and the Department of Conservation are responsible for implementing such initiatives, Fish and Game plays both a monitoring and an important watchdog role.

Back to the future

I watched the fish for a good half an hour before, having had his fill, he returned to the protection of rocks and deeper water. Remaining within the Totara's shade, I pondered the issues of trout in New Zealand. I am of the opinion that New Zealand trout do more good than harm to the waterways and ecosystems in which they live. I am no doubt biased by my passion for trout, but at this stage the weight of evidence appears to be on my side. The idea of brown trout causing the extinction of localized populations of non-migratory *Galaxias* on a few stable Canterbury rivers, does niggle, but knowing that these indigenous fish can be protected by physically preventing *Salmo trutta* from entering significant tributaries, gives me some comfort.

I cast a cicada fly upstream, over the mysterious dark depths of the seemingly fishless pool. The fly hadn't drifted more than three feet when a large snout emerged through the surface and the fly disappeared with a sucking sound I could hear above the rushing water. I was giddy from adrenalin, but didn't strike. I watched the leader draw away, go slack and my cicada imitation emerge back onto the surface ...