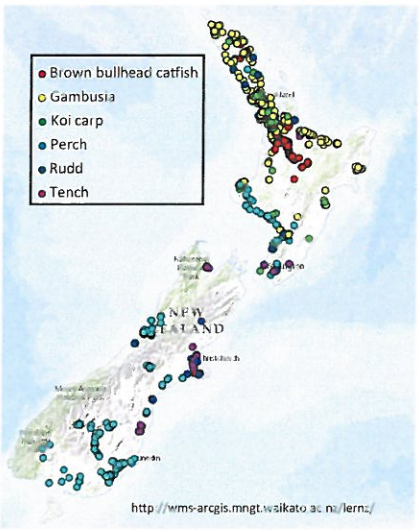
Pest Fish Control – Fact Sheet

Linking lake restoration with end users for positive environmental outcomes

LERNZ
Lake Ecosystem Restoration New Zealand

New Zealand Pest Fish Species

Due to their negative impacts on water quality and native biodiversity in New Zealand, regional councils have included a number of introduced freshwater fish species such as koi carp, rudd, brown bullhead catfish, goldfish, tench, gambusia (mosquitofish) and European perch (Figure 1) in their pest management plans. The Department of Conservation and regional councils undertake control and eradication programmes around New Zealand every year in order to contain their spread and reduce their impacts. Nearly all regions of mainland New Zealand have at least one of these species but they are most prevalent in the Auckland and Waikato regions. LERNZ has been researching the population ecology and capture methods of pest fish populations in order to develop efficient methods for their control.




Rudd


Koi carp


Tench


European perch


Brown bullhead catfish


Gambusia

Figure 1. Distribution of the six most common invasive fish species to New Zealand. These species are recognised as having significant negative impacts on New Zealand's freshwater ecosystems.

Can Pest Fish Populations be Managed?

Removing pest fish from lakes, wetlands and rivers is necessary to improve water quality and preserve native biodiversity. Although it is possible to eradicate isolated populations with piscicides such as rotenone, large breeding populations of pest fish are extremely difficult to eliminate as it only requires few fish to maintain the population. For example, a typical female koi carp can produce over 300,000 eggs and may spawn more than once a year, given favourable conditions.

Small, restricted populations of gambusia and koi carp have been eradicated from areas in the North Island and the Nelson region of the South Island by the Department of Conservation using the piscicide rotenone and water draw-downs. Control of pest fish numbers has only been attempted on a limited basis. The most notable of these being annual netting of rudd in the Rotopiko lakes by the Department of Conservation and the Waikato Regional Council; annual netting of European perch, tench, rudd and catfish by Auckland Council in Lake Wainamu and semi-annual boat electrofishing and netting of European perch in the Karori Reservoir by the University of Waikato. Of these programmes only the netting of rudd in the Rotopiko Lakes appears to have resulted in a significant decline in population abundance.

Pest Fish Control – Fact Sheet Continued

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Pod Traps

Pod traps are pyramid-shaped nets (Figure 2A) equipped with an automated wildlife feeder that frequently adds fresh bait to the trap to attract fish. Baits lose most of their attraction properties after an hour in the water, so adding fresh bait, greatly improving trapping rates. Once inside the pod trap one-way doors keep fish within the trap until emptied. Pod traps are particularly effective at trapping koi carp, and have been shown to improve catch rates compared with other capture methods (Figure 2B). Baited traps such as the pod trap lose their effectiveness after the bulk of the population has been removed because food becomes plentiful, making bait less attractive

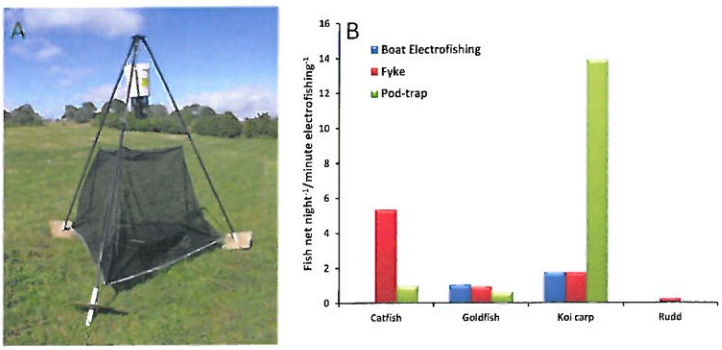

Figure 2. (A) Pod-traps developed by LERNZ researchers have proven to be highly effective and cost efficient for removing koi carp compared to other conventional capture methods. (B) comparison of catch per unit effort for boat electrofishing, fyke netting and pod traps from Lake Ohinewai in the Waikato region.

Use of Toxic Baits

Palatability of toxic baits has been a barrier to their development. LERNZ researchers have investigated the effectiveness of floating baits laced with 'bold' flavours, such as vanilla or strawberry essence. These flavours were readily consumed indicating they could be used as a masking agent for toxins. LERNZ researchers have also investigated the use of cube root powder and sodium nitrite as toxins for koi carp. The dose required to kill half the test animals (LD_{50}) was 136 mg/kg for cube root powder and 122 mg/kg for sodium nitrite, indicating they were viable for inclusion in piscicide baits for koi carp.

Boat Electrofishing

Benthic-pelagic fish species such as goldfish, perch and koi carp are highly susceptible to boat electrofishing in shallow (<2 m) waters (Figure 3A). Although expensive in comparison to netting, capture rates of 50 kg h^{-1} have been regularly achieved. Boat electrofishing (Figure 3B) was an integral part of pest fish removals in Lake Ohinewai, Lake Mangahia, Lake Kuwakatai and the Karori reservoir.

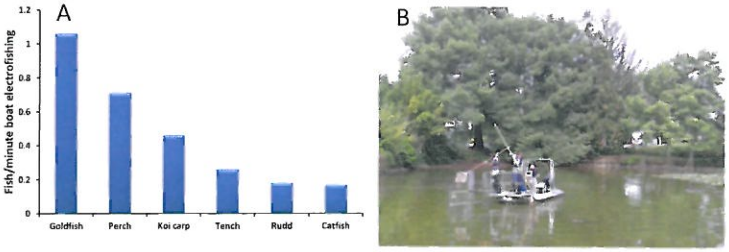

Figure 3. (A) Catch rates of introduced fish species by boat electrofishing. (B) Boat electrofishing on a Waikato University lake.

Targeting Behaviours

LERNZ researchers have shown that koi carp undertake migratory movements between lakes and rivers during periods of changing habitat availability. Initial measures targeting intersection points between lakes and rivers have been highly effective in reducing koi carp numbers (Figure 4). These include one-way barriers allowing passage out of an area but preventing re-entry by adults, and an automated trap developed and installed at the Lake Waikare fish pass by the Waikato Regional Council.

Figure 4. (A) Automated fish trap installed at the Lake Waikare fish pass and (B) a one-way barrier installed on the Lake Ohinewai outlet.