COASTAL RESTORATION TRUST OF NEW ZEALAND
Tāhuna Ora

KOI FOR CONSERVATION

Turning a pest fish into an environmental gain!

We are exploring a range of potential uses for digested carp in restoration of our degraded coastal dunes as well as other ecosystems.

This is a paradigm shift in restoration of our indigenous biodiversity involving systematic capture and use of this pest fish for benefits to fresh water and coastal ecosystems as well as across wetlands, riparian areas and forests nationwide.

Koi carp have exploded in number in the lower Waikato River basin.

Koi carp

- Koi carp *(Cyprinus carpio)* populations have exploded in fresh water systems of the lower Waikato since introduction, contributing to poor water quality.
- The species is now officially classified as a 'noxious fish'.
- They are opportunistic omnivores eating a wide range of food including insects, fish eggs, juvenile fish, and a diverse range of plants.
- They feed like vacuum cleaners at the bottom of ponds, lakes and rivers, muddying the water and reducing light levels resulting in habitat loss for plants, native fish, invertebrates and waterfowl.

Waikato Regional Council's Carp-N Neutral project

- The Carp-N Neutral project traps large numbers of koi carp and "digests" them into a dry, nutrient-rich, powdery substance that has potential uses in environmental restoration.
- The fish trap screens carp and other pest fish such as catfish while allowing smaller native species such as eel and smelt to pass through unharmed.
- Digested carp produces several components including a dry powder that can be pelletized, a nutrient-rich liquid (fish juice), and a lower-nutrient condensate, all with a range of possible uses in environmental restoration programmes.
- Long term aim is a self-funding, cost-neutral, invasive fish removal programme with outputs supporting other environmental initiatives.

Turning carp to good environmental use

The Waikato Regional Council and Coastal Restoration Trust have teamed up to evaluate the potential uses of processed koi carp in sand dune restoration. They include:

- **Slow release fertiliser –** replacing artificial fertiliser which is essential for boosting performance of hundreds of thousands of natives planted annually.
- **Animal repellent –** applied to foliage of palatable planted natives to deter browsing by rabbits (single largest killer of natives on dunes!) and other feral animals, inadvertent grazing by stock.
- **Rodent bait –** rodents are attracted to digested carp so excellent scope to manufacture moulded bait and chew cards as lures for control operations targeting rodents and mustelids, and reduce predation of roosting and nesting birds, native skinks and invertebrates, and loss of seed crops of threatened natives.
- **Nursery propagation –** early trials indicate digested koi carp is an excellent additive to potting mix in the propagation of natives; also potential liquid fertiliser.
- **Fungal and insect control –** various potential uses of condensate and fish juice in foliar protection of planted natives.
- **Carbon/organic matter –** preliminary investigation indicates bio-char from corn cobs can be mixed with digested koi carp to reduce the smell and boost carbon storage to mitigate expected impacts of climate change.

Recycling nutrients – a win win!!!

One tonne of fish produces 300 kg of dried powder containing nitrogen and phosphorous which has been taken from the waterways through feeding. It is estimated that trapping koi carp from just one northern Waikato peat lake, Lake Waikare, will snare at least 5 tonnes of pest fish per year.

As quoted by Dr Bruno David (Waikato Regional Council)…

"In effect, the carp are helping us recycle the excess nutrients diffused into the environment. The energy that was stored in their flesh is now transferred and stored in plants…. Plants grown in the carp mix can be used in riparian planting, which helps water quality through shade and filtering of surface runoff."

Additionally, anthropogenic pressures have also reduced the number of nesting seabirds in dunes which once provided valuable marine-derived nutrients to fuel dune plants. Use of invasive fish as a replacement fertiliser to fulfil this function is a conceptually important part of this project.

Sustainable cost-effective supply

This project promotes the concept of sustainability and traceability of "energy'' flow within and between ecosystems – e.g. harvesting nutrients in pest fish and using as an organic fertiliser to replace artificial petro-based fertilisers boosting planted natives on sand dunes.

An aim is to determine whether a secure supply of pest fish for processing can meet ongoing demand from community groups for carp-derived products which are practical and cost effective.

Koi carp from the cage trap are being directed down a chute where they are euthanised prior to digestion.

Contacts and further information:

Coastal Restoration Trust of NZ
Email: info@coastalrestorationtrust.org.nz
Website: www.coastalrestorationtrust.org.nz/

Dr Bruno David
Waikato Regional Council
Email: Bruno.David@waikatoregion.govt.nz

Moniqua Nelson-Tunley
Waikato Regional Council
Email: Moniqua.Nelson-Tunley@waikatoregion.govt.nz

Dr David Bergin
Environmental Restoration Ltd
Email: davidbergin.erl@gmail.com

The project is funded by the Ministry for the Environment's Community Environment Fund, the Waikato Regional Council and the Coastal Restoration Trust in collaboration with coast care groups, iwi, other councils and the Department of Conservation.

Waikato Regional Council – Te Kaunihera ā Rohe o Waikato

Ministry for the Environment – Manatū Mō Te Taiao – Community Environment Fund