



Improving conservation of kōwaro (Canterbury mudfish)

An investigation of the effects of drought on this critically-endangered fish



What are kōwaro?

Kōwaro or Canterbury mudfish are non-migratory endemic fish found on the plains of the east coast of South Island, New Zealand. These fish are generally restricted to waterways that dry temporarily or are isolated from main river systems, as seen in photos above and below.

These kōwaro-inhabited waterways are now surrounded by agricultural land and introduced tree species, so notably differ from the native forests that probably once covered the Canterbury plains.

Why is this investigation important?

Kōwaro are a highly threatened member of the Galaxiidae family of fishes; a group that contains a very high proportion of threatened species. Changes to drought regimes are expected with the predicted impact of climate warming. Consequentially, understanding how kōwaro respond to different drying intensities in a substantially altered landscape will help improve their conservation.

Aim and design

The impact of increased drying intensity (i.e., droughts) on kōwaro of different sizes (i.e., adults and fry) was investigated in two ways:

1. Kōwaro population surveys were completed within the Waianiwi Valley during the summer months under three different rainfall conditions: very high rainfall (2006-2007); approximately average rainfall (2009-2010); or very low rainfall (i.e., drought, and 2015-2016).
2. Kōwaro population surveys along the Waianiwi and Hororata Rivers, with sampled locations arranged along gradients of drying intensity and canopy cover, in summer 2016-2017.



Important findings

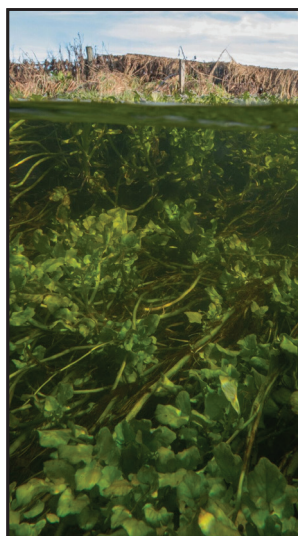


Drought

Under drought conditions, kōwaro populations had limited numbers of breeding adults or no adults at all.

Extended periods of time with no surface water were an important driver of this change.

Long dry periods endanger kōwaro due to the loss of large adults and the chance for recolonisation is hampered by population isolation.



Aquatic plants

Increased plant cover, both within and alongside the stream, corresponded with increased fry abundance.

These plants provide both egg-laying sites and shelter for newly-hatched fish.

Thus, the importance of aquatic plants for kōwaro should be considered when managing weedy plants.



Prey species

Smaller kōwaro feed entirely on aquatic prey, such as fly larve (pictured) and plankton.

Kōwaro with larger body sizes had a more varied diet, with increased consumption of land-based prey, such as flying insects.

Therefore, healthy kōwaro populations, with both adults and fry, require both aquatic and land-based prey.



Adult-fry interactions

Adult kōwaro are the top predators in most waterways they inhabit. Their diets likely include smaller fish, such as kōwaro fry (pictured).

Increased drying intensity was linked with signs of increased cannibalism. Whilst a natural process due to shifts in aquatic prey, increasing the abundance of land-based prey could offset this change.



Willows

Increased canopy cover meant more land-based prey fell into the water; an important food source for adult kōwaro.

However, because willows have high water demands, higher willow cover was also linked with increased drying.

Native plants are likely better than willows when planted alongside kōwaro waterways.



Livestock intrusion

Livestock access into streams was associated with bank slumping (pictured) and a decrease in aquatic and stream-side plant cover.

Excluding livestock from streams will be beneficial for ongoing kōwaro survival by decreasing these impacts.

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More information available:

Read the thesis 'Improving conservation of kōwaro'.

Visit www.ferg.org.nz

For potential funding to support waterway restoration, check out ECAN's Immediate Steps, the Selwyn Natural Environment Fund, and Te Ara Kākāriki Greenway Trust.



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