



# Marvellous mudfish

## Brown mudfish



*Mudfish are small, native freshwater fish found in swampy lowland habitats, such as wetlands and slow-flowing streams, where they spend their entire lives. This brochure explores what makes brown mudfish unique, and what you can do to help protect them.*

Department of Conservation  
Te Papa Atawhai

### Brown mudfish over the past 150 years

Brown mudfish found on the west coast of the South Island were the first mudfish species to be discovered and formally identified in New Zealand.

In the early days of European settlement on the West Coast, brown mudfish were frequently found in damp mud when clearing roads or digging up paddocks in areas that had previously been swamp forest—hence the name ‘mudfish’. In some paddocks ‘fish and chips’ were literally being dug up, as brown mudfish were found in potato paddocks that had once been wetlands.



### What are the other benefits of protecting wetlands?

Wetlands that do not have brown mudfish are still important ecosystems. They provide habitat for a wide range of native plants and animal species, such as orchid, tī/cabbage tree, matuku/bittern, mātātā/fernbird, moho pererū/banded rail, pūweto/spotless crane, koitareke/marsh crane, giant kōkopu, tuna/eel, and kōura/freshwater crayfish—all of which will benefit from greater protection.

Wetlands are also natural purifiers—when water flows through a wetland system, the plant community takes up nutrients, and sediment is deposited. Wetlands help balance the surrounding water supply, soaking up water during floods and releasing it slowly, as well as recharging water tables during periods of drought.

Australasian bittern.  
Photo: Dick Veitch



Longfin eel.  
Photo: Alton Perrie



Banded rail. Photo: Dick Veitch

### For more information

Contact your local DOC office, or visit [www.doc.govt.nz/mudfish](http://www.doc.govt.nz/mudfish)

Check out the DOC website for information on restoring wetland habitat:

[www.doc.govt.nz/funding](http://www.doc.govt.nz/funding)

[www.doc.govt.nz/wetlands-protection](http://www.doc.govt.nz/wetlands-protection)

Taranaki Regional Council: [www.trc.govt.nz](http://www.trc.govt.nz)

Horizons Regional Council: [www.horizons.govt.nz](http://www.horizons.govt.nz)

Greater Wellington Regional Council: [www.gw.govt.nz](http://www.gw.govt.nz)

Tasman District Council: [www.tasman.govt.nz](http://www.tasman.govt.nz)

West Coast Regional Council: [www.wcrc.govt.nz](http://www.wcrc.govt.nz)

QEII Trust for covenant information: [www.openspace.org.nz](http://www.openspace.org.nz)

LandCare Trust – search for the fish factsheets page: [www.landcare.org.nz](http://www.landcare.org.nz)

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## What are brown mudfish?

*Brown mudfish are one of five species of mudfish found in Aotearoa/New Zealand. They are small, elongated, native freshwater fish. On average, they grow to 10–12 cm in length, but can grow as large as 17.5 cm. Brown mudfish have thick skin with no scales, and vary in colour from mottled light brown to almost black.*



Brown mudfish (*Neochanna apoda*) in a swamp forest habitat.  
Photo: Nga Manu Images

### A very special fish

All species of mudfish in New Zealand have the ability to survive during times when there is no surface water, which allows them to occupy habitats that other fish are unable to survive in. During these 'dry' periods, their metabolism slowly drops and they absorb oxygen through their skin. While mudfish can sometimes survive like this for extended periods of time, they must have damp surroundings and cover, such as mud, logs, and vegetation, to keep them alive. When surface water returns, they are able to become active again immediately.

## Brown mudfish distribution



### How to spot a brown mudfish

Adults are not easily seen, as they are primarily nocturnal and spend most of their time amongst the leaf litter on the bottom of pools. Younger mudfish are active both day and night, and may sometimes be seen swimming in areas of open water. Trapping using special 'Gee minnow' traps is the best way to find mudfish.

Brown mudfish caught in a Gee minnow trap, Rutherglen, West Coast.  
Photo: Henk Stengs



Photo: Shaun Nielsen

## Where do brown mudfish live?

Brown mudfish are the most widespread mudfish species in New Zealand, found in both Te Ika-a-Māui/North Island and Te Waipounamu/South Island. In the North Island populations can be found in lowland areas from Taranaki southwards, and in the South Island they are found along the West Coast from Whanganui Inlet to Okarito (see map).

Because of their widespread distribution, brown mudfish are known by more than one Māori name. The two most commonly used are waikaka and hauhau.

Typical brown mudfish habitats include swamp forests, pākihi terraces and dune swamps. They are also found in slow-flowing drains and boggy paddocks—places that at first glance might seem an unlikely place for a fish!



Swamp forest, Manawatu.  
Photo: Natasha Petrove



Pākihi terrace, West Coast  
Photo: Henk Stengs



Swamp forest pool, Kapiti Coast.  
Photo: Natasha Petrove



Willow wetland, Manawatu.  
Photo: Natasha Petrove

## Creating mudfish habitat in Taranaki

*Ngaere Swamp in Taranaki historically covered an area of about 1416 hectares. Brown mudfish would have once been abundant throughout the swamp, however widespread clearance of vegetation and land drainage has resulted in only a few isolated swamp fragments remaining.*

In **2005**, about 1 ha of boggy paddock on the fringes of Ngaere Swamp was retired from farming. The plan was to develop it into habitat for brown mudfish by creating shallow, semi-ephemeral pools under a low forest canopy, so they would contain lots of leaf litter and debris—wetland habitat similar to what would have been there originally, and is found at nearby sites where mudfish are doing well. Surveying indicated that there were no mudfish present at the site.



Stage one of the project began in April **2008**, with small, shallow pools created within the swampy area. Locally sourced native shrubs and trees were then planted around the edges of these new pools.

In September 2008, 30 adult mudfish and one fry (young fish) from a captive population were released into the pools in a joint effort between DOC and the landowner. The captive fish initially came from a natural population near the created mudfish habitat.



Stage two of the project focused on expanding the habitat further. Observations over summer 2008/09 found that the pools did not dry up and became colonised by frogs, creating competition. As a result, the new pools were made shallower so that seasonal fluctuations in water levels would make them less suitable for competing species.

In **2009**, fences were upgraded to better prevent stock from entering the wetland, and by June 2010, more than 20 small, interconnected pools had been created. The original plantings around the pools established well, and further plantings were made around the newer pools. As the vegetation continues to grow and create cover around the pools, the habitat is increasingly improving for mudfish. The landowner is working with QEII to secure long-term legal protection for the site.



In July 2009, traps were set where the mudfish had been released in 2008, and four large adult fish were captured—all in good condition and ready to spawn. Further trapping efforts captured one adult and three juvenile fish—exciting evidence of successful breeding!

The most recent survey in July **2013** captured four healthy adult mudfish, all of different sizes, meaning they were different ages. This indicates that the population has continued to breed.



## Threats

Brown mudfish are vulnerable to a number of major threats:

**Wetland drainage and land clearance**, and modification of streams and drains, decreases available habitat.

**Drain clearance**, especially machine clearance where spoil and weeds are dumped on the margins, destroys the habitat for mudfish living in these drains. Fish can also be killed as they get caught up amongst the spoil and weeds and stranded on the banks.

**Gold mining** of pākihi terraces on the West Coast destroys brown mudfish habitat—these landforms are strongholds for mudfish in this region.

**Drought** can threaten the survival of brown mudfish by completely drying up their habitat.

**Grazing pressure** on wetland plants and stock trampling wetland edges can damage habitat, making wetlands more vulnerable to drought and weed invasion.

**Nutrient input** (for example, through run-off and leaching of nitrogen and phosphorus from the surrounding catchment) can degrade the water quality.

**Weeds** compete with native vegetation, can alter the ecology of the wetland, and may degrade the habitat.

**Invasive fish species** such as koi carp and gambusia can alter the ecology of the wetland, prey on mudfish eggs and fry, and compete with adult mudfish for food and habitat.

**Competition** with other native freshwater fish species can also be a threat to brown mudfish, and therefore they are rarely found in high numbers in habitats where other fish are present.

## Why do brown mudfish need our help?

*Brown mudfish are primarily found in low-lying wetlands such as swamp forest, pākihi terraces and dune swamps. These habitats were once extensive in many parts of lowland New Zealand, but widespread clearance and drainage of wetlands has greatly reduced suitable brown mudfish habitat making remaining mudfish populations more vulnerable to threats. The long-term survival of brown mudfish is precarious if wetlands continue to be modified.*

## How you can help

Protecting and restoring wetlands and drains where brown mudfish are found will help increase the mudfish population. If you think that a wetland on your property could be suitable for brown mudfish, contact your local DOC office for advice.

Below are some examples of how brown mudfish habitat can be protected. Remember to always check council rules to see if the actions are permitted or if a resource consent is required.

**Fence off the wetland** to keep stock out and prevent wetland plants from being grazed and habitat trampled. It's important that stock are kept out all year round.

**Increase the size of the wetland** when establishing fence lines by including boggy areas and wetland edges,



Mudfish habitat. Photo: Natasha Petrove

as these can become good wetland habitat once grazing pressure is removed. Remember that brown mudfish are not good at competing with other fish species, so avoid creating new connections between the wetland and other waterways.

**Plant a native vegetation buffer** around the wetland to help protect the habitat and water quality from the impacts of surrounding land use.

**Minimise nutrient inputs**, such as nitrogen and phosphorus, that are transported into a wetland from the wider catchment by runoff and seepage. Careful management of fertilisers throughout the catchment can prevent excess nutrients from entering a wetland.

**Control weeds** to reduce competition with native plants. Weeds can also impact on the water table and ecology of the wetland, as well as alter the nutrient balance, leading to changes in water quality.

**Maintain drains using mudfish friendly methods.**

Create shade by planting native plants on the margins to suppress growth of freshwater weeds. If physical removal of weeds is essential, then clear only short sections, or one side of the drain at a time, to retain habitat.

**Allow natural water level fluctuations**, as brown mudfish tend to occur in wetlands that have naturally variable water levels. Avoid using drains and weirs to manipulate water levels.

**Prevent invasive fish establishing** by finding out which invasive fish species are present in the catchment around the wetland and being careful not to accidentally move them between waterways.

**Allow for long-term conservation of the wetland** by formalising wetland protection with a conservation covenant. In some places, councils may also support landowners who are protecting and/or restoring land for conservation purposes.