Julian's Pond, south-east of Opunake has a range of indigenous species, including nationally threatened plants.

Freshwater biodiversity

Taranaki's rivers, streams and wetlands support a diverse array of plants and animals. Some of New Zealand's most threatened species depend on healthy freshwater habitats for their very survival.

Pollution has a devastating effect on life forms that are dependent on waterways. Harvesting fish species, draining wetlands and building structures within waterways can also impact habitats and freshwater biodiversity. If left uncontrolled, invasive pest fish, aquatic plants and algae can have a considerable impact on the biodiversity and community health of freshwater systems. People often unintentionally spread freshwater weeds by leaving fragments on recreational equipment. Aquatic weeds can displace native freshwater species or generally disrupt the structure and functions of the ecosystem. The often deliberate introduction of pest fish species may also impact on freshwater biodiversity with pest fish preying on, competing with, and displacing indigenous aquatic plants and fish species.

The Council has major operational programmes in place to manage significant wetlands and keep track of the extent and condition of the remaining wetland areas in the region. Initiatives to enhance freshwater quality are also in place, and with better control of point-source pollution and diffuse run-off, freshwater quality is improving. Each year, we measure freshwater biodiversity through a number of programmes, particularly as part of our freshwater quality monitoring. Additionally, we collate data on built structures within waterways and on any modifications to waterways and require fish passage to be installed where there are in-stream barriers to fish. As part of resource consenting processes, we periodically collect data on freshwater fish in streams and rivers.

Wetlands

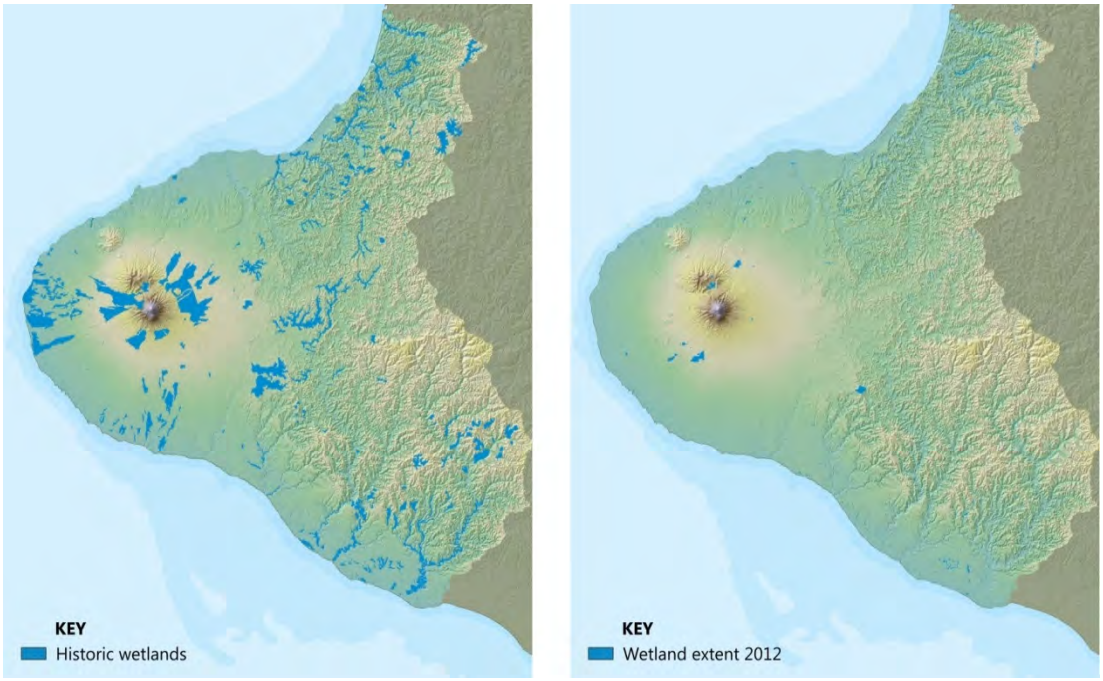
Wetlands, such as swamps, marshes, and bogs are the meeting ground of land and fresh water. They are some of the most diverse ecosystems in the world and support a huge variety of life. An important characteristic of wetlands is that they filter out nutrients and sediment from farm run-off. This is important in controlling water flow and improving water quality.

The wetlands of Taranaki are home to a variety of native species, including rare and threatened species. As with land species, a reduction in habitat also affects wetland species, often leading to a reduction in biodiversity.

Wetland extent

Since the time of human settlement of New Zealand, much of the region's original wetland area has disappeared. Estimates are that as of 2007, only about 10.1% of New Zealand's original wetland remains—less than 5% throughout the North Island. In Taranaki, about 8.1% or 3,291 hectares of wetland habitat remains.

The Council manages wetlands in the region in a range of programmes. To monitor the extent of remaining wetlands in Taranaki, we periodically map changes to the extent of wetlands using aerial photography.



Wetland areas in the region prior to human settlement (left) compared to those mapped in 2012 (right).

What's the story?

Results of the latest wetland mapping show a significant reduction in the rate of loss to the areal extent of wetlands in Taranaki. This reduction can be attributed, in part, to the Council's wetland programme and effective application of the rules contained in the *Regional Fresh Water Plan for Taranaki (2001)*.

Between 2001 and 2007, an estimated 121 hectares of wetland in the region was lost. However, between 2007 and 2012, only 42 hectares or 1.3% of our total wetland areas was lost—a 60% reduction in the annual rate of loss to wetland area.

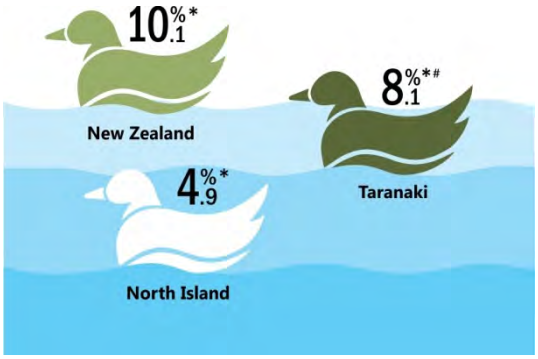
The greatest loss occurred in areas of palustrine wetland, covered with rushes and sedges, which are the most common wetland in the region.

'A 60% reduction in the annual rate of loss to wetland area.'

Condition of wetlands

Every two years, the Council conducts a basic ecological assessment of the condition of regionally significant wetlands. A more comprehensive biodiversity assessment for sites that are also KNEs occurs every five years.

Council officers also record the presence of threatened or regionally distinctive species whenever they are sighted. Some wetland bird species are informally monitored using call surveys. We also work with landowners to improve habitat and predator control where these species are found.



*The percentage of original wetlands that remain in Taranaki and in New Zealand overall. Note: Data from*Ausseil et al., 2008 and #Newsome and Sutherland, 2014. Figures exclude Lake Rotorangi.*

What's the story

In 2007, only 39 regionally significant wetlands had additional formal protection (in full or part) outside of *Regional Fresh Water Plan* rules, either by DOC (if the wetland lies wholly or partly on DOC land) or under a covenant or caveat on the title. As of June 2014, that number had risen to 58 or 76% of all regionally significant wetlands. The Council continues to work on securing additional formal protection for the remaining 18 regionally significant wetlands.

To assess the basic ecological state of wetlands, we examine the indigenous vegetation and the presence and abundance of indigenous fauna. We also look at protection measures, such as fencing, weed and predator control, and any evidence of drainage. The area is given a basic 'condition score', from 'Poor' to 'Excellent' which is used to rate the overall state of the wetland.

A snapshot of 40 wetlands assessed between 2010 and 2012, showed 76% of wetlands assessed were in 'Excellent', 'Very good' or 'Good' condition. Only 5% were found to be in 'Poor' condition.

Reassessment of these sites has been underway since 2013 and to date, 27 sites have been reassessed. Of those 27, preliminary results show an improvement in 72% of wetlands that are managed with a Council-developed biodiversity plan, compared with only 31% of wetlands not managed by a plan.

The main improvements in sites with plans are in the dominance and condition of native vegetation in and around the wetland—the result of improved fencing and weed/pest control.

Out of the 40 wetlands assessed between 2010 and 2012, 76% were in 'Good' condition or better. Of those 20% were considered to be in 'Excellent' or 'Very good' condition.

Find out more

☎ *An inventory of regionally significant wetlands of Taranaki (TRC, 2005)*
Newsome, P.F. and Heke, H.A. 2010: Mapping wetlands of the Taranaki Region 2001–2007. Landcare Research report prepared for Taranaki Regional Council.
Newsome, P.F. and Sutherland, A. 2014: updates to Taranaki Wetlands layer to 2012.

David and Marie Russell tinyurl.com/TRC6n

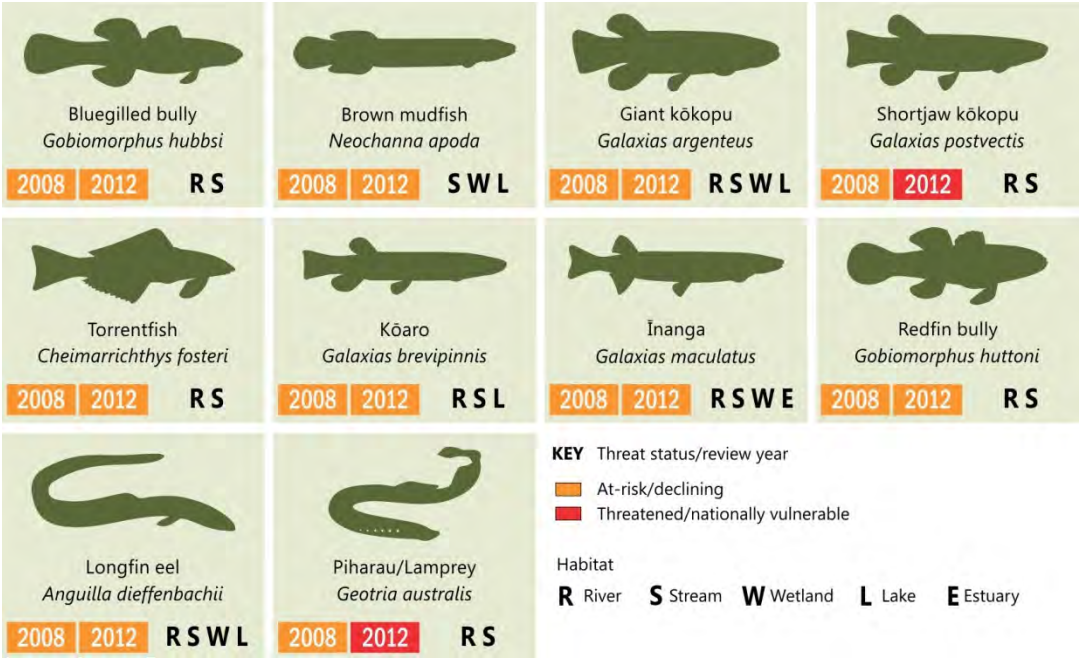
Freshwater fish

Taranaki has 20 recorded species of indigenous freshwater fish. When processing resource consent applications to construct dams, weirs and culverts on the region's fresh waters, the Council considers the provisions for fish passage as part of the assessment and implements subsequent monitoring. We also consider freshwater fish and other species when assessing consents for water abstraction. DOC monitors the number and abundance of species of freshwater fish in the region.

What's the story?

Of the species of freshwater fish in the region, more than half are nationally at risk or under threat. The young of five species found in Taranaki make up the typical whitebait catch in North Island West Coast rivers, including one threatened and three at-risk/declining species. Piharau (or lamprey) and the shortjaw kōkopu have been declining nationally and are classified as threatened/nationally vulnerable.

Also at-risk/declining on a national scale is the longfin eel, which breed only once in their lifetime and live for a long time—some are recorded at more than 100 years old. Nationally at risk from overfishing, loss of habitat and the construction of barriers such as large dams, these native eels also appear to be declining in Taranaki. Two catchments surveyed in 2012 showed very few juveniles and a lack of large adult females.



About 50% of Taranaki's 20 recorded species of native freshwater fish are considered threatened or at-risk nationally.

Find out more

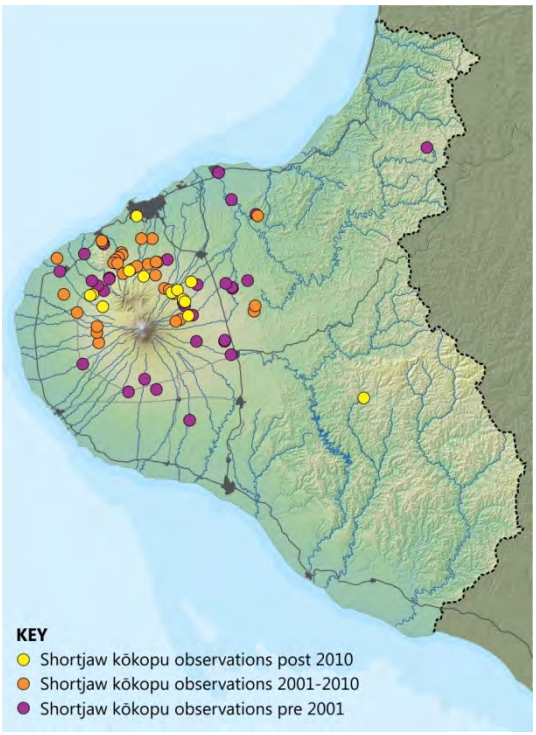
Status and management of the longfin eel tinyurl.com/TRC6p

Summary of changes to the conservation status of taxa in 2008–11 New Zealand Threat Classification System listing cycle (DOC, 2013) tinyurl.com/TRC6r

DOC surveys of 24 sites undertaken in 2011 and 2012 highlighted eight streams as important sites for large galaxiids, either because there was a high abundance of a large galaxiid species or there was good species diversity.

No large galaxiids were found in six catchments, despite at least one of the four large galaxiid species having been found in those catchments in prior surveys. In six other catchments a new large galaxiid species was found that had not been seen there before.

Shortjaw kōkopu.



Known locations of shortjaw kōkopu in the Taranaki region.

Taranaki's unique mudfish

The native brown mudfish is a remarkable creature in that it is able to survive the summer months when its wetland habitat completely dries out. The mudfish becomes active again when the water returns, getting on with the business of breeding.

The resilient brown mudfish (*Neochanna apoda*) can be found in Taranaki's wetlands. Three sites have been monitored for its presence since 1994, with a further two sites added in 2002.

Juvenile mudfish are observed frequently at four of the monitored sites, showing that breeding is occurring and that the current populations of fish are healthy. Three new populations of brown mudfish have been found in the region in the past five years. We are currently working with the landowners in an effort to protect these newly discovered populations.

Taranaki wetlands are an important habitat for the native brown mudfish.

Lamprey.

CASE STUDY

Calling on all its strength

If the legendary strength of the piharau, or lamprey, is not quite enough to meet the challenges which today classify it as a 'nationally vulnerable' species, then it has some determined friends on its side.

Adult lamprey (*Geotria australis*) spend most of their life at sea but migrate up freshwater rivers to spawn in autumn and winter. Reputations are often made in epic migrations and the lamprey is no exception, starring in its own whakataukī (proverb/saying): "He manawa piharau", which means "one with sustained strength". This is based on stories, factual and otherwise, of the species climbing waterfalls and other seemingly impassable barriers in its quest to reach its spawning grounds.

Juvenile lamprey don't display any hint of their future prowess. When very young they are muddy brown in colour and look a bit like small eels, except they have seven gill openings and no eyes. As they approach the time to migrate out to sea, they develop eyes and change to a bright silvery-blue colour, just like the adults. However, they are only about 10 cm long at this stage—they will grow to 40 cm as ocean-going adults.

Adult piharau have long been a great delicacy and a taonga species for Māori, who developed special harvest methods such as the "pa or utu piharau" and the "whakaparu" during their migration upstream. Historically, a number of Taranaki rivers were known as harvesting hot spots and even today are protectively guarded by individual whanau who maintain the fishing rights.

In times past, vast numbers were harvested. According to a 1922 report (Phillips and Hodgkinson), "several tons of this species were captured at a spot near New Plymouth" while at the Waitara River, in "a single night's netting during a fresh in June, three large sacks were filled". But anecdotal evidence indicates that fish stocks have declined markedly, and continue to do so. It's now a good haul to get a dozen where hundreds were reported a decade ago.

The piharau was the subject of a recent hui at Kairau Marae in Waitara, attended by whanau representatives from around the country along with scientists and other interested groups. They lent their weight to a research project by NIWA looking at lamprey spawning, range and navigation. They also decided to support research into a condition called lamprey reddening syndrome which is killing the species in Murihiku (Southland). The hui also decided to record the Mātauranga Māori (knowledge) attached to the piharau, and to hold similar gatherings in future.

'The Council has been undertaking monitoring to increase understanding of the lamprey ...'

Meanwhile, the Taranaki Regional Council has been undertaking monitoring to increase understanding of the lamprey and which catchments it inhabits.

Since 2005, lamprey have been recorded at seven sites, including one (Tāngāhoe River) where it had not been recorded before. Very small numbers were recorded at most sites except at the Kurapete Stream near Inglewood, and the Matau Stream near Matau, where good numbers of juvenile lamprey were found. These streams will be considered for inclusion in a more extensive monitoring programme.

Lamprey mouth.

Fish passage

A number of indigenous species rely on Taranaki's more than 20,000 kilometres of rivers. Rivers and streams are also a significant spawning habitat for whitebait species such as īnanga.

Historically, land development such as stream realignment has contributed to a loss of freshwater habitats and reduced biodiversity. A huge effort to fence and plant riparian margins of rivers and streams in the region has been made over the past two decades, largely on the intensively farmed ring plain and coastal terraces. These efforts have greatly benefited freshwater quality and habitats.

Structures such as dams, and poorly-constructed culverts and weirs can also impact biodiversity. Fifteen of the 20 known freshwater fish species in Taranaki are diadromous, meaning that as part of their lifecycle they migrate to and from the sea. Barriers such as dams and culverts can restrict or completely prevent the upstream migration of some of these species, interrupting the breeding cycle.

Incorporating a clear passage for fish when constructing the Kapuni water intake channel earned the South Taranaki District Council a TRC Environmental Award in 2014.

The Council collates data on stream and river bed modifications in the region to determine the state and trends in freshwater habitats for indigenous biodiversity and the need for intervention. In 2001, the Council compiled an inventory of known or potential barriers to fish passage. Over time, we have worked with stakeholders to investigate and/or resolve the barriers registered in the inventory, which are often 'orphaned' (remnants of an historical activity for which no-one has responsibility).

What's the story?

Since 2001, when the Council began investigating barriers to fish passage in rivers, the number of known structures with the potential to present barriers, including culverts, fords, dams and weirs has steadily decreased. In 2001 there were 61 structures requiring further action and or monitoring. In 2014 the number had reduced to 44. This includes 'orphaned' structures.

The number of consented structures registered in the inventory as requiring no action (where adequate fish passage is provided) has increased from 37 in 2001 to 53 in 2014.

As part of resource consent compliance, the Council has recently implemented a monitoring programme for culverts and access structures (such as fords) that includes monitoring the consideration of fish passage. This is expected to further improve fish passage in Taranaki with increased awareness also likely to lead to better reporting from the public regarding barriers that are not currently known to the Council. As part of *Regional Fresh Water Plan* regulations, resource consent for any structure or activity taking place on a river bed now requires consideration of fish passage.

In terms of modifications to streams, between 2008 and 2014 the Council granted 83 consents to pipe streams, totalling 23.2 kilometres of stream in the region.

In the same period, just less than seven kilometres of stream was realigned, under 44 consents. Although more consents to realign streams were granted between 2008 and 2014 than between 2003 and 2008—44 compared with 28 consents, fewer kilometres of stream were actually realigned—6.8 kilometres between 2003 and 2008 compared with 6.7 kilometres between 2008 and 2014.

Macroinvertebrates

The small freshwater insects, crustaceans, worms and snails that live in fresh water are collectively known as freshwater macroinvertebrates. The Council monitors the diversity of freshwater macroinvertebrates as part of water quality monitoring programmes because the composition of these communities gives the best indication of water quality and habitat health.

What's the story?

The diversity of macroinvertebrate species tends to be higher in ring plain streams that drain Egmont National Park than in lowland coastal streams or hillcountry streams, particularly in the number of different types of caddisflies, crustaceans, stoneflies and mayflies.

In general terms, the stonefly, caddisfly and mayfly prefer harder substrates (such as rock) and good water quality at higher altitudes where the temperature is cooler. Trueflies, dipterans, and worms tend to be more tolerant of nutrient enriched water, warmer temperatures and other factors that affect water quality, so are more abundant further downstream from the mountain.

The most diverse macroinvertebrate class in the region's fresh waters is trueflies, with 30 different varieties. Second is caddisflies with 27.

For more information on how these species help us determine the ecological quality of water, and trends in the ecological health of the region's streams, including biodiversity, see Chapter 3—Fresh water.

Stoneyfly nymphs generally prefer good-quality water.

	Large east hill country	Lowland coastal stream	Ring plain rising in National Park	Ring plain rising outside National Park	Small (lowland) hill country	TOTAL
Worms	4	3	3	2	2	4
Beetles	7	6	7	7	7	7
Crustaceans	15	10	16	11	11	17
Trueflies	22	25	29	27	26	30
Mayflies	13	7	15	13	10	15
Bugs	3	4	4	4	4	4
Molluscs	7	9	9	9	11	11
Dragonflies	2	6	5	5	7	7
Flatworms	3	3	4	4	4	4
Stoneflies	6	3	10	7	7	10
Caddisflies	22	16	26	24	21	27
Neuroptera	0	0	1	1	0	1

Streams arising from Egmont National Park generally have the greatest variety of caddisflies, stoneflies and mayflies.

'Our aim is that all riparian planting and fencing will be completed by the end of the decade ...'

The Umutekai Wetland on the outskirts of New Plymouth.

Our responses

Regional Fresh Water Plan

The *Regional Fresh Water Plan for Taranaki*, made operative in 2001, contains objectives, policies and rules for managing freshwater biodiversity. These include the protection of regionally significant wetlands (as listed in Appendix II and III of the plan), the requirement of resource consent to drain any wetlands greater than five hectares in size and provision for fish passage past man-made structures.

The Council first reviewed the effectiveness and efficiency of the *Regional Fresh Water Plan for Taranaki* in 2008. In response to concerns raised by DOC and Fish and Game New Zealand, a technical discussion document *Maintaining indigenous freshwater biodiversity in the Taranaki region* was prepared in March 2013, and the Council is working with key stakeholders on options that will better protect our remaining wetlands and other indigenous biodiversity values. This is part of the review of the *Regional Fresh Water Plan for Taranaki* currently underway.

Future directions

In addition to a review of the *Regional Fresh Water Plan for Taranaki*, the Council's *2008 Biodiversity Strategy* is currently under review. The future strategy will further develop the Council's current biodiversity programmes and initiatives. It will also include implementation of a comprehensive State of the Environment monitoring programme for palustrine wetlands—freshwater wetlands fed by rain, ground water or surface water but not directly connected to estuaries, lakes or rivers. Palustrine wetlands are the most common wetland in the region and under the greatest pressure.

Wetland protection

Council spending in protecting wetlands has doubled from $287,550 in 2008/2009 to $555,622 in 2013/2014. The Council has a range of programmes that protect wetlands across the region, including the *Regionally Significant Wetland Programme,* the *Key Native Ecosystem Programme* and the *Riparian Management Programme*. Combined, these programmes cover 2,194 hectares of the 3,249 hectares of wetland area in the region, or 67.5%.

Regionally Significant Wetland Programme

The *Regionally Significant Wetland Programme* targets the 76 wetlands or groups of wetlands identified in the Inventory of Regionally Significant Wetlands of Taranaki (2005). These areas are considered regionally significant wetlands (RSW) because they are greater than five hectares in area and/or because there are threatened, at-risk or regionally uncommon indigenous species present. All RSWs are protected by regional rules contained in the *Regional Fresh Water Plan for Taranaki*.

The Council advocates for the protection of these wetlands with a particular focus on fencing, weed control, and supplementary planting. Grants are provided to landowners and occupiers to help with the costs of enhancement and protection. Over the past few years, the Council has worked hard to ensure regionally significant wetlands also have additional legislative protection (such as a QEII covenant).

Key Native Ecosystem Programme

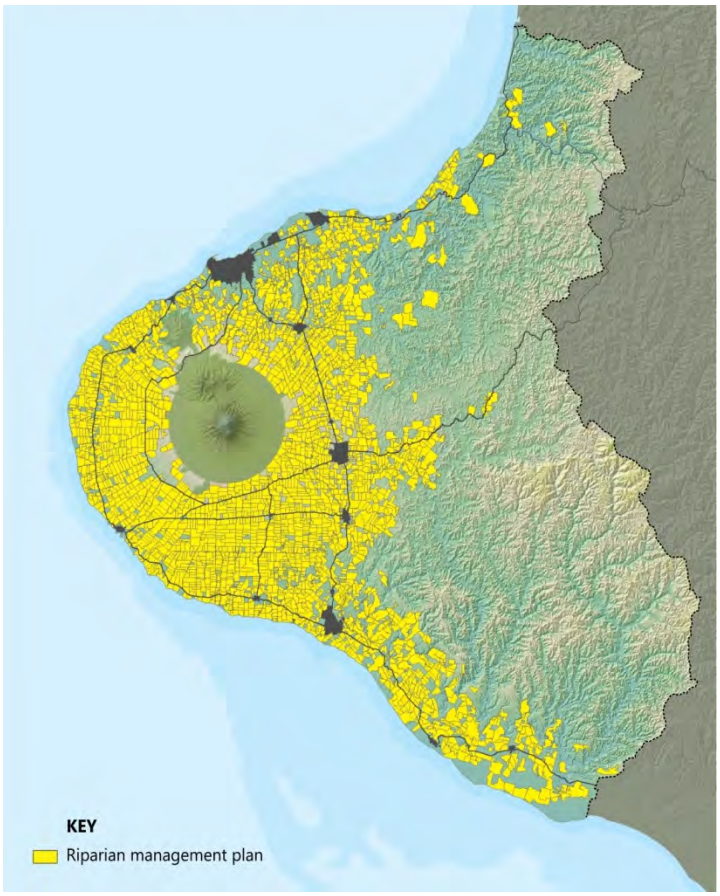
The Council actively manages a selection of wetlands via the *Key Native Ecosystem (KNE) Programme* and will continue to focus on adding wetland areas on private land to the KNE programme. We will also continue to focus on implementing biodiversity plans for wetlands that meet KNE programme criteria.

This will lead to continued improvements in the condition of wetland areas in the region, as shown in the majority of wetlands with a biodiversity plan that have been assessed since 2013.

Riparian Management Programme

To date, we have made significant strides in riparian management in the region, with 2,483 Council-prepared riparian plans covering the fencing and planting of 13,836 kilometres of stream bank (see Chapter 3—Fresh water for more detail).

Long promoted as an effective measure to protect and enhance the quality of waterways, riparian management also has positive biodiversity spin-offs. The Council's own research has shown riparian fencing and planting to be a biodiversity success in Taranaki. Among other things, the research has found the diversity of native and introduced bird species to be higher in planted sites than in non-planted sites, and in older plantings than in younger plantings. Overall research indicates that planting of riparian margins is creating new habitats for native plant and bird species where none existed previously, leading to an improvement in the biodiversity of the region.



Riparian management plans covering almost all of the ring plain and coastal terraces create potential wildlife corridors in the region.

Currently 665.7 hectares of wetlands (individually larger than 0.5 hectares) that are mapped on our database are covered by riparian plans. Many smaller wetlands will be identified and captured by riparian plans over time. The Council expects that all riparian planting and fencing of wetlands and stream banks will be complete by the end of the decade, and that implementation of plans will become mandatory.

Pest management

The Council's pest management strategies identify a number of fish and aquatic plants as pests in Taranaki and we work with DOC, the Ministry for Primary Industries (MPI), and the National Institute of Water and Atmospheric Research (NIWA) to prevent these pests from establishing or spreading in the region.

Small populations of koi carp, rudd and gambusia are present in the region. The pest fish, gambusia, has currently been found at only five sites in Taranaki. In conjunction with DOC, the Council has recently worked to eradicate gambusia from one site in Kaimata. Routine monitoring of Lake Rotorangi, conducted by both the Council and NIWA, shows fluctuations of invasive oxygen weeds from year to year. Egeria (*Egeria densa*) is usually the most dominant oxygen weed species.

In 2012, the invasive hornwort was detected for the first time in Lake Rotorangi, most likely spread by recreational boats. Subsequent surveys of Lake Rātāpiko, Lake Rotomanu, Lake Opunake and Lake Rotokare did not detect any further infestations.

The Council works with MPI to raise awareness of the invasive algae didymo, conducting an annual awareness campaign in the region. Eight years of monitoring have found no evidence of didymo in Taranaki.

Pest fish in Taranaki from top: gambusia, rudd and koi carp. Council staff work with DOC to eradicate gambusia at Kaimata (bottom).

Find out more

Biodiversity in Taranaki (TRC website)
www.trc.govt.nz/Biodiversity

Proposed National Policy Statement on Indigenous Biodiversity (MfE, 2011)
tinyurl.com/TRC6j

Regional Fresh Water Plan for Taranaki
tinyurl.com/TRC6u

Regional Policy Statement for Taranaki
tinyurl.com/TRC6g